

# Pipestone County All Hazard Mitigation Plan

August  
2019

*This multi-jurisdictional hazard mitigation plan includes Pipestone County and the Cities of Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, and Woodstock. This project was supported by Grant Award awarded by the Federal Emergency Management Agency (FEMA).*

Prepared by  
Southwest  
Regional  
Development  
Commission  
and Pipestone  
County  
Emergency  
Management

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# PIPESTONE COUNTY

## ALL HAZARD MITIGATION PLAN

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August 2019

### Executive Summary

The purpose of the Pipestone County All Hazard Mitigation Plan (AHMP) is to determine how to reduce property damage and loss of life resulting from natural and other hazards. The Pipestone County AHMP includes resources and information to assist county residents, public and private sector organizations, and others interested in participating in planning for both natural and other hazards. This mitigation plan identifies hazards that pose a threat to Pipestone County, as well as what is currently being done to mitigate their impacts. The plan also provides a list of actions and programs that may enable Pipestone County to further reduce negative impacts caused by disasters. The implementation strategies address both natural and other hazards that include but are not limited to flooding, drought, severe summer and winter storms, fires, and tornadoes.

“The overall benefit-cost ratio for FEMA mitigation grants is about 4:1, though the ratio varies from 1.5 for earthquake mitigation to 5.1 for flood mitigation.”<sup>1</sup>

The Pipestone County AHMP Planning Team identified the following natural and other hazard as the highest ranked hazards for Pipestone County:

- Tornado, Winter Storm, and Windstorm

This planning process has been conducted by the Southwest Regional Development Commission (SRDC) and Pipestone County Emergency Management in accordance with current guidance provided by the State of Minnesota Department of Homeland Security and Emergency Management (HSEM) and the US Federal Emergency Management Agency (FEMA). This hazard mitigation plan documents the multi-jurisdictional, multi-hazard mitigation planning process in [COUNTY] County, Minnesota, which is intended to meet the requirements of the Federal Emergency Management Agency (FEMA) Regulation 44 CFR 201.6 Local Mitigation Plans.

All participating jurisdictions in Pipestone County have agreed to a joint administration and operation of the AHMP to help mitigate the effects of natural and other hazards. The project was undertaken so that all local units of government in Pipestone County, that wished to participate, could participate and remain eligible for FEMA funding.

The previous Pipestone County AHMP was adopted in 2010. The current update reviewed and updated the original plan. The update utilized a great deal of data from many different sources and also relied on

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<sup>1</sup> FEMA. Benefits-Cost Analysis of FEMA Hazard Mitigation Grants. Accessed: 3/4/16. Available: <http://earthmind.org/files/risk/Nat-Haz-Review-2007-CBA-of-FEMA-Grants.pdf>

input and expertise from the Pipestone County AHMP Planning Team. The plan resides with the Office of Emergency Management in Pipestone County, who is responsible for maintenance and updates.

*Pipestone County's All Hazard Mitigation Mission:*

"The Mission of the Pipestone County Hazard Mitigation Plan is to minimize impacts of disasters and provide safety, order, and structure before, during, and after disasters."

*Participation in Plan Development*

The Pipestone County All Hazard Mitigation Plan is a multiparty effort among Pipestone County, Pipestone County Emergency Management, Pipestone County citizens, local public agencies, people in the private sector, and many people in regional and state organizations. Public participation plays a key role in the planning process. We also rely on the experience of elected and appointed volunteers. The Pipestone County AHMP Planning Team (here after referred to as planning team) members comprised a broad representation of the county and their feedback was immensely useful in the development of the plan update.

*Pipestone County AHMP Planning Team:*

- Steve Ewing – Pipestone County Administrator (Emergency Management Director for beginning of planning process)
- Casey Sievert – Pipestone County Emergency Management Director
- Chris Hollingsworth – Pipestone County Commissioner
- Mike Appel – Grange Township
- Bill Folger – Pipestone County IT
- Lauren Mellenthin – Southwest Health and Human Services
- Doug Fortune – City of Pipestone
- Kyle Krier – Pipestone County Zoning
- Les Nath – Pipestone County Commissioner
- Luke Johnson – Pipestone County Commissioner
- Bruce Kooiman – Pipestone County Commissioner
- Nick Bergmann – Pipestone County Highway Engineer

*Southwest Regional Development Commission:*

- Maxwell Kaufman, AHMP Planner
- Jay Trusty, Executive Director
- Kathy Schreiber, Administrative Assistant



- For more information regarding hazard mitigation, contact:



Pipestone County Emergency Management

Phone: 507-825-1170

Fax: 507-825-6774

[http://www.pipestone-county.com/board/departments\\_offices/emergency\\_management.php](http://www.pipestone-county.com/board/departments_offices/emergency_management.php)



Southwest Regional Development Commission

2401 Broadway Ave, Suite 1

Slayton, MN 56172

Phone: 507.836.8547

Fax: 507.836.8866

[www.swrdc.org](http://www.swrdc.org)



Minnesota Division of Homeland Security and Emergency Management



**FEMA**

Federal Emergency Management Agency

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# Section 1 – Introduction

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## 1.1 Mitigation Planning

Natural and other hazards present risks throughout Minnesota. Pipestone County has to be ready at all times to respond to a number of natural and other disasters. Local units of government, first responders, and emergency managers have worked together to create the Pipestone County All Hazard Mitigation Plan (AHMP). This plan helps Pipestone County protect its population and infrastructure by planning for natural and other hazards before the disaster strikes.

What is Hazard Mitigation Planning? According to the U.S. Federal Emergency Management Agency (FEMA) State and Local Mitigation Planning Fact Sheet:

*Hazard mitigation planning is the process State, local, and tribal governments use to identify risks and vulnerabilities associated with natural disasters, and develop long-term strategies for protecting people, resources, and property in future hazard events. This planning process involves Tribal members and other affected stakeholders, and results in a mitigation plan with a strategy for breaking the cycle of disaster damage, reconstruction, and repeated damage. The mitigation plan also identifies mitigation actions and projects to implement the mitigation strategy. Under the Disaster Mitigation Act of 2000 (Public Law 106-390), State, local and tribal governments are required to develop a hazard mitigation plan as a condition for receiving certain types of non-emergency disaster assistance and FEMA grants to implement mitigation projects.*

A simpler description comes from James Schwab:

“Hazard mitigation essentially is the art and science of reducing risks of future losses.”<sup>2</sup>

## 1.2 Purpose

- *Save lives, reduce injuries, sustain public health*

Identify properties that are in obvious need of protection and establish policies and practical actions that fortify these properties from the effects of natural and human caused hazards.

Reduce both economic and physical losses from repetitive damages caused from constant hazard events. Encourage county communities to participate in the National Flood Insurance Program (NFIP).

Improve hazard assessment information to make recommendations for discouraging new development and encouraging preventative measures for existing development in areas vulnerable to natural hazards.

- *Minimize social dislocation and stress*

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<sup>2</sup>Planning Magazine. James Schwab. Accessed: 5/29/13. Available: <http://allhazards.wordpress.com/2010/03/02/mitigation-planning/>

Where appropriate, develop and implement education and outreach programs to increase public awareness of the risks associated with natural hazards and the potential danger for human caused hazards.

Provide assistance in locating tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.

- *Minimize agricultural losses*

Balance land use planning and natural resource management with hazard mitigation in order to protect life, property, and natural environment.

Preserve, rehabilitate, and enhance the county's natural infrastructure systems to serve hazard mitigation functions.

- *Protect critical infrastructure from damage*

Establish policy through the planning process to ensure mitigation projects for critical facilities and services.

Strengthen emergency operations by increasing collaboration and coordination among public agencies, non-profit organizations, businesses, and industries.

Coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

### **1.3 Justification & Legal Authority**

The rising costs of natural and human-caused disasters at the end of the 20<sup>th</sup> century led many leaders to consider how to better protect people and their communities. Congress passed the Disaster Mitigation Act of 2000 (DMA2K) (PL 106-390) to establish a unified national hazard mitigation program. DMA2K amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Stafford Act), which in turn had amended the Disaster Relief Act of 1974. DMA2K placed new emphasis on hazard mitigation planning in state and local units of government, requiring adoption of mitigation plans as a prerequisite for certain assistance programs.

A multi-hazard or "All-Hazards" approaches to mitigation planning encompasses both natural and other hazards. Following the 2001 attacks on New York City and Washington, DC, and the subsequent reorganization of FEMA and the nation's homeland security structure, many mitigation planning efforts explicitly incorporated technological hazards arising from human activities in the hazard mitigation plans. While local hazard mitigation plans are only required to address natural hazards, the All-Hazards approach considers a comprehensive array of both risks and potential mitigation actions.

FEMA has implemented hazard mitigation planning requirements through federal regulations (44 CFR 201.6). In Minnesota, the Homeland Security and Emergency Management (HSEM) division of the Department of Public Safety (DPS) works with FEMA to implement disaster mitigation efforts. The Minnesota Department of Natural Resources (DNR) is also involved with mitigation as the agency



responsible for implementation of FEMA's National Flood Insurance Program (NFIP) and floodplain management in the state.

Minnesota Governor's Executive Order 07 – 14 assigns responsibility for the creation and maintenance of the Minnesota Emergency Operation Plan, the State All Hazard Mitigation Plan and such other duties as may be requested by the HSEM.<sup>3</sup> The order also directs other state agencies to assist with the planning process.

Under 44 CFR 201.6, local governments must have a FEMA-approved Local All Hazard Mitigation Plan to be eligible for and receive project grants under the following hazard mitigation assistance programs: Hazard Mitigation Grant program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), and Severe Repetitive Loss (SRL).

## 1.4 Mitigation Funding Programs

FEMA administers several different programs that provide hazard mitigation funding. Typically grants allow a cost-share of 75 to 90 percent federal funding for eligible projects. FEMA offers four hazard mitigation assistance programs which are described in detail at [www.fema.gov/hazard-mitigation-assistance](http://www.fema.gov/hazard-mitigation-assistance). Any projects funded by these programs must demonstrate a positive benefit-cost ratio. The four hazard mitigation assistance programs include: the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), Flood Mitigation Assistance (FMA), and Repetitive Flood Claims (RFC).

### 1.4.1 Hazard Mitigation Grant Program (HMGP)

HMGP provides funds in accordance with priorities identified in hazard mitigation plans to implement mitigation measures during disaster recovery. State and local governments, certain private non-profit organizations, and tribes are eligible sub-applicants through HSEM. Examples of eligible projects include:

- Acquiring and relocating structures from hazard-prone areas
- Retrofitting structures to protect them from floods, high winds, earthquakes, or other natural hazards
- Constructing certain types of minor and localized flood control projects
- Constructing safe rooms inside schools or other buildings in tornado-prone areas
- Hazard mitigation planning

### 1.4.2 Pre-Disaster Mitigation (PDM)

PDM provides funds for hazard mitigation planning and implementation prior to a disaster event. State-level agencies, tribes, local government, and public colleges are eligible sub-applicants through HSEM. Examples of eligible projects include:

- Voluntary acquisition of real property for open space
- Elevation of existing public or private structures
- Retrofitting existing structures to meet building codes
- Construction of safe rooms for public or private structures that meet certain FEMA requirements

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<sup>3</sup> State of Minnesota Executive Order 07-14. Accessed 5/29/13. Available: <http://www.leg.mn/archive/execorders/07-14.pdf>

- Hydrologic and hydraulic studies/analyses, engineering and drainage studies for project design and feasibility
- Vegetation management
- Protective measures for utilities, water, sewer, roads and bridges
- Storm water management to reduce/eliminate long-term flood risk

#### 1.4.3 Flood Mitigation Assistance (FMA)

FMA implements cost-effective measures to reduce or eliminate long-term risk of flood damage to NFIP structures. State-level agencies, tribes, and local government are eligible sub-applicants through HSEM. Eligible projects include:

- Acquisition, structure demolition, or structure relocation with the property deed restricted for open space uses in perpetuity
- Elevation of structures
- Dry flood proofing of non-residential structures
- Minor structural flood control activities

#### 1.4.4 Other Federal Disaster-related Funding Programs

FEMA is probably more well-known for providing response and recovery assistance. Other programs such as FEMA's Public Assistance (PA) Grant Program provide assistance to State, Tribal and local governments, and certain Private-Nonprofit organizations, so that communities can quickly respond to and recover from major disasters or emergencies. Through the PA Program, FEMA provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain Private Non-Profit (PNP) organizations. The PA Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process.

### 1.5 FEMA Guidance

FEMA has created the *Local Multi-Hazard Mitigation Planning Guidance* (the "Blue Book") to provide guidance to local governments to meet the requirements of 44 CFR §201.6 *Local Mitigation Plans*. There are three main objectives of the Blue Book. First, the Blue Book is intended to help local jurisdictions develop new mitigation plans or update existing plans in accordance with the requirements of the regulations. Second, the Blue Book is designed to help Federal and State Reviewers evaluate mitigation plans from local jurisdictions in a fair and consistent manner. Third, the Blue Book is designed to help jurisdictions conduct comprehensive reviews and prepare updates to their plans to meet the requirements of 44 CFR Part 201.6.

The Pipestone County All Hazard Mitigation Plan is going to follow the planning process outlined in the Blue Book. The Pipestone County plan will also use the Local Mitigation Plan Review Tool in the Local Mitigation Planning Handbook (March 2013) to specify where in the plan and how the specific regulation requirements were met.

FEMA requires that ALL participating jurisdictions meet the requirements for mitigation planning in 44CFR§201.6. The Blue Book specifically requires that each participating jurisdiction address:

- Risks, where they differ from the county
- Mitigation actions (actions must be identified for each jurisdiction)
- Participation in the planning process (attending meetings, contributing research, data, or other information, commenting on drafts of the plan); and
- Adoption (each jurisdiction must formally adopt the plan).

## **1.6 County Capabilities**

The Capabilities Worksheet identifies planning capabilities, policies and ordinances, programs, studies and reports, staff, and community partners that are relevant to hazard mitigation. The Worksheet is attached as Addendum I. Several documents were referenced extensively in the planning process, including the county comprehensive (land use) plan and development ordinance, transportation plans, and water management plans. Other policies and ordinances were referenced more generally in the planning process. Specific items, such as wellhead protection plans, watershed plans, and other local resources, helped the planning team develop mitigation goals, objectives, and strategies. County and city staff and representatives were consulted by the planning team throughout the planning process.

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# Section 2 – Public Planning Process

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## 2.1 Description of the Planning Process

### 2.1.1 Preplanning

Since the previous Pipestone County AHMP was approved and adopted in 2010, the Pipestone County Emergency Manager and the Southwest Regional Development Commission (SRDC) have collected information on hazards that occurred in Pipestone County. This information gathering helped in updating the risk assessment section of the plan. It also helped to initiate conversations during the planning process regarding strategies to mitigate the effects caused from hazards over the five year update cycle.

In the summer of 2017, the planning process began for the update of the Pipestone County AHMP. Every five years the Pipestone County AHMP has a planned update. “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.”<sup>4</sup> The Pipestone County Emergency Manager initiated the planning process by applying for a planning grant from FEMA and contacting the Southwest Regional Development Commission (SRDC) to assist with the grant and update to the plan.

The Pipestone County AHMP Planning Team was reformed to assist with the update. The planning team consisted of a number of elected officials, county staff, city staff, and emergency personnel (refer to the planning team list in the executive summary).

The SRDC contacted all of the cities within Pipestone County that the update to the Pipestone County AHMP was taking place. This original outreach also asked the cities to participate in the planning process to update the plan. Outreach was also done to the townships in Pipestone County and multiple planning team members also represent townships in Pipestone County.

### 2.1.2 Planning Meeting

The first All Hazard Mitigation Plan Update Meeting was held on October 11, 2017. This meeting was an introduction for the Pipestone County AHMP Planning Team. The SRDC presented on the AHMP planning process, the purpose of the plan and its update, the benefits of having a plan, and participation in the development of the plan. Team members also filled out CPRI worksheets to rank the risk each hazard posed to their jurisdiction and began the process of updating strategies from the 2010 plan. Team members who did not attend the meeting were sent CPRI and mitigation strategies update sheets via email and mail. The agenda for the meeting immediately follows this section, and copies of all of the meeting sign-in sheets are located after the copies of the resolutions of participation.

The planning process started with a review of the timeline and the information that needed to be gathered as part of the update and included in the plan. There were a total of two planning meetings, including the

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<sup>4</sup> FEMA. 44 CFR 201.6 - Local Mitigation Plans. Accessed: 9/25/15. Available: <http://www.law.cornell.edu/cfr/text/44/201.6>

first meeting, to gather information, analyze the natural and other hazards that pose a risk in Pipestone County, and outline mitigation strategies to mitigate the risk of the hazards that were identified.

In lieu of subcommittee meetings (and due to the length of the plan), the entire planning team was invited to review the plan in detail online. This was done to further refine the plan and gather additional information, analyze potential hazards, and identify mitigation measures.

The CPRI was also discussed during the presentation regarding the planning process. The CPRI worksheet was distributed to the planning team via email so they could complete it prior to meeting in order to expedite the process and gain input from others in their jurisdiction. The CPRI is an important part of the planning process and helps the planning team rank and quantify the natural and other hazards in Pipestone County. Vulnerability is the critical component to the planning meetings. The planning team and city involvement is needed to help identify hazards and provide feedback in regard to potential frequency, spatial extent, potential severity, warning time, risk level, and hazard rank.

The CPRI outlined the natural and other hazards that were included in the original Pipestone County AHMP. SRDC staff presented other hazards that are typical to Minnesota and were included in the Minnesota AHMP and other county AHMPs. After thoroughly discussing each statewide hazard, the planning team updated the list of hazards that will be included in the plan. The planning team identified the following hazards (not in a specific order):

Natural Hazards affecting the jurisdiction include:

- Drought
- Earthquake
- Erosion
- Extreme Temperatures
- Flood
- Lightning
- Severe Wind
- Severe Winter Weather
- Tornado
- Wildfire
- Severe Summer Storms (including Hail)

Other hazards affecting the jurisdiction include:

- Agricultural Disease
- Civil Disturbance
- Dam, Impoundment, Culvert Failure
- Hazardous Materials
- Public Health Emergencies
- Transportation Infrastructure

- Structure Fire
- Water Supply Contamination
- Utility Failure

Certain statewide hazards were eliminated from the discussion since the planning team thought the risk of the hazard was minimal or non-existent in Pipestone County. These hazards included:

- Erosion & Landslide — Pipestone County's lakes and lakeshore are typically stable.
- Sinkholes and Land Subsidence—Maps of Karst topography show this is not an issue in Pipestone County. This is an issue in counties in eastern Minnesota.
- Sea Level Rise, Storm Surge, Tsunami – As these hazards affect coastal areas, which Pipestone County is not, the planning team did not consider these hazards applicable.

Public participation is a critical component in the development of the Pipestone County AHMP. The planning team is critical in helping to engage the public and to garner feedback in regards to the plan. The planning team recognizes the importance of public involvement during the planning process. Participation in the development of the Pipestone County AHMP came from county staff, township and city representatives, and the general public. Efforts were made to actively include these groups in the update of the Pipestone County AHMP, including posting notices as well as draft copies of the plan on the Pipestone County Emergency Management website.

#### *Planning Meeting #2*

The second All Hazard Mitigation Plan Meeting was held on August 20, 2018. The second meeting was centered on identifying the gaps and deficiencies in current mitigation and discussing new strategies to include in the plan.

Planning Team members were given the opportunity to revisit the list of identified hazards to make sure no hazards were overlooked. This meeting aimed to allow planning team members to draw on personal expertise and experience to contribute to the mitigation strategies.

The risk assessment meeting helped to educate the planning team, local government representatives, and other meeting attendees. Profiling the hazards also helped to facilitate conversation regarding the hazards. The conversations helped to fill in gaps in the research related to the hazards. There was also a chance for meeting attendees to discuss gaps that they identified.

#### *Mitigation Strategies & STAPLEE Process – Online Review*

The team finalized and prioritized the goals, objectives, and strategies through the STAPLEE Process. STAPLEE stands for Social, Technical, Administrative, Political, Legal, Economic, and Environmental. The STAPLEE Process takes all seven criteria into consideration when finalizing and prioritizing the mitigation goals, objectives, and strategies.

A qualitative approach was used by the team in prioritizing the mitigation goals. The qualitative approach judged and prioritized the mitigation goals, objectives, and strategies based on perceived costs and benefits.

### *Plan Review Meeting*

The finished plan was sent to the Pipestone County Emergency Management Director for review at the beginning of March 2019.

The Draft Plan was disseminated to all of the Team Members for review in late April 2019. The Pipestone County AHMP Planning Team reviewed the entirety of the Pipestone County AHMP. Modifications were made via email and phone to the SRDC.

The Public Review Meeting was held on [DATE]. The event was intended as an opportunity for local residents as well as neighboring communities, agencies, businesses, academia, nonprofits, and other interested parties to be involved in the planning process. Entities had the opportunity to ask questions and discuss specific goals with Planning Team members and SRDC staff. The Pipestone County AHMP was available online on Pipestone County's website for three weeks prior to the Public Review Meeting.

Interested entities could prepare feedback and recommendations before the public review meeting. Attendees were also able to come and go at their convenience, review the material sections of the plan, provide feedback, and make recommendations. A press release for the Public Review Meeting was advertised in the official Pipestone County newspaper. A flyer was also provided to local units of government and a press release was distributed to other local media in the region. The open comment period provided a great opportunity for gathering feedback in regards to the Pipestone County AHMP.

## **2.2 Public Involvement**

Intergovernmental coordination was essential in the development of the Pipestone County AHMP. The SRDC and Pipestone County Emergency Manager provided information to all local units of government in the county regarding the Pipestone County AHMP planning process and opportunities for participation. Meeting participation was solicited, but smaller local units of government opted for participating via phone, email, and mail. Public Notice of all planning team meetings was posted at various government offices in Pipestone County. Email notices were also sent to local units of government, local organizations, and other entities involved in hazard mitigation. Subcommittee Meetings were not publicized.

All local units of government in Pipestone County were invited to review and comment on mitigation goals, objectives and strategies. Public and private entities were sent the mitigation strategies that their representing entity was listed in. Feedback and recommendations were requested regarding the mitigation goals, objectives, and strategies. Refer to Figure #1 for more information regarding participating jurisdictions (including emergency response departments, schools, and organizations) that reviewed and approved the goals section of the Pipestone County AHMP.

## **2.3 Other Opportunity for Involvement**

Hazard mitigation has been a regional effort in Southwest Minnesota, with many opportunities for involvement provided for neighboring communities, agencies involved in hazard mitigation, and



businesses, academia, and other relevant private and non-profit interests. SRDC has worked with the following Minnesota counties on their hazard mitigation plans:

- Cottonwood County (2011; update 2019)
- Jackson County (2008; update 2016)
- Lincoln County (2010; update 2019)
- Lyon County (2010; update 2017)
- Murray County (2005; update 2012; update 2019)
- Nobles County (2005; update 2011; update 2018)
- Pipestone County (2010; update 2019)
- Redwood County (2005; update 2012; update 2019)
- Rock County (2007; update 2014)

## **2.4 Existing Plans, Studies, Reports, and Technical Information**

Many sources of local, state, federal, and private information were used during the AHMP update. Various plans, programs, and policies were reviewed by SRDC staff. The literature review was a critical step in updating the Pipestone County AHMP. The coordinated use and consideration of these diverse data sources provided a sound basis for this plan and implementation activities. The following references were consulted during the planning process.

- Pipestone County Emergency Operations Plan
- Pipestone County Comprehensive Plan
- The Pipestone County Water Management Plan
- Pipestone County Land Use Maps
- Pipestone County Zoning Ordinances
- Local Water Plans
- Minnesota Department of Health (MDH) regulations regarding water systems and routine inspection of public water systems
- The Minnesota Pollution Control Agency (MPCA) regulations regarding wastewater systems
- Clean Water, Land and Legacy Amendment of 2008
- Minnesota Well Code
- NOAA Weather Radio All Hazards (NWR) weather broadcasts system
- The National Flood Insurance Program
- FIRM maps identifying flood hazard areas
- Fire District and Ambulance District Maps
- Mutual Aid Agreements between police forces, fire districts and ambulance districts
- Response Plans: HAZMAT
- MNDOT's Towards Zero Deaths (TZD) Program
- Traffic safety publications: the National Cooperative Highway Research Program (NCHRP), MnDOT Road Design Manual, ADA Tool Kit, MnDOT Bikeways Facility Design Manual, Minnesota Manual on Uniform Traffic Control Devices, and multiple Safe Routes to School Resources.
- The Minnesota DNR dam safety program

- The Minnesota DNR drafts Emergency Action Plan
- FEMA Planning Aids and Tools
- County All Hazard Mitigation Plans

The above documents are incorporated into this planning document by reference. The maps selected and included in this plan have been created by Pipestone County and the SRDC utilizing data from Pipestone County GIS and the State of Minnesota's **Land Management Information Center (LMIC)**.

The University of Minnesota Duluth **Geospatial Analysis Center (GAC)** performed a hazard risk assessment for 100-year floods using the HAZUS-MH GIS tool. In recognition of the importance of planning in mitigation activities, FEMA created **Hazards USA Multi-Hazard (HAZUS-MH)**, a powerful geographic information system (GIS)-based disaster risk assessment tool. This tool enables communities of all sizes to predict estimated losses from floods, hurricanes, earthquakes, and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses. The Minnesota **Homeland Security and Emergency Management (HSEM)** office has determined that HAZUS-MH should play a critical role in Minnesota's risk assessments, and therefore the 100-year flood event hazard analysis is introduced in this plan.

The list of final mitigation actions was divided into jurisdiction-specific mitigation action charts so that each could see and address those actions that applied specifically to their cities (see *Appendix G: Mitigation Actions by Jurisdiction*).

Public input was sought through meetings and direct conversations (see *Appendix E: Public Hearing Notices and Meeting Notes/Comments*).

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# SECTION 3: PREREQUISITES

This Chapter covers prerequisites for eligibility to adopt this multi-hazard mitigation plan in multiple jurisdictions. Section II describes the plan adoption process. Section III describes participation provisions post-approval of the all hazard mitigation plan by HSEM and FEMA.

## 3.1 Jurisdictions Represented in this Plan

For the purpose of hazard mitigation, FEMA considers a Local Government having jurisdiction as “any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments..., regional or interstate government entity, or agency or instrumentality of a local government.” (44CFR§201.2) Special considerations are given by FEMA for school districts, private nonprofit organizations, and multi-jurisdictional private nonprofit utilities (such as rural electric cooperatives).

Pipestone County has the land use authority over the townships, so Pipestone County will represent the townships in the All Hazard Mitigation Plan (AHMP). The Pipestone County AHMP will cover all the townships in the county. Land use authority within city limits is controlled by the local jurisdiction. Representatives from the townships were asked to participate in the planning process. Pipestone County and all of its cities previously passed resolutions of intent to participate in the hazard mitigation process and to be covered by the Pipestone County All Hazard Mitigation plan.

Pipestone County is a rural county. A number of resources and responsibilities are shared throughout the county. The Pipestone County Sheriff’s Office provides law enforcement throughout the county. Additional resources and responsibilities are shared regionally. Pipestone County is part of the Southwest Health and Human Services (SWHHS) service area, which includes the following counties: Lincoln, Lyon, Murray, Pipestone, Redwood, and Rock. A representative from SWHHS was a member of the planning team. This ensured a regional prospective was taken when analyzing natural and other hazards.

Invitations were sent via email to representatives of all of the local jurisdictions to participate in the development of the plan either through filling out the worksheets, attendance at the meetings or participating in the plan review process. As in most rural areas, many of the participants wore multiple hats during the development process. For example, Steve Ewing first participated as the Pipestone County Emergency Management Director and then transitioned to the Pipestone County Administrator.

Resolutions of Participation from each participating jurisdiction can be found in Appendix C. The Resolutions of Adoption will be added after FEMA approval.

**Figure #1**

### **Participating Jurisdictions**

| <b>Local Units of Government</b> |
|----------------------------------|
| Pipestone County                 |
| City of Edgerton                 |
| City of Hatfield                 |
| City of Holland                  |

|                                                 |
|-------------------------------------------------|
| City of Ihlen                                   |
| City of Jasper                                  |
| City of Pipestone                               |
| City of Ruthton                                 |
| City of Trosky                                  |
| City of Woodstock                               |
| (All Townships covered under Pipestone County.) |
| <b>Other Participating Organizations</b>        |
| Southwest Health and Human Services             |
| Pipestone County IT                             |
| Pipestone County Conservation & Zoning          |

### 3.2 Adoption Procedure

Each jurisdiction participating in the plan must formally adopt the plan after FEMA provisionally approves the document (Section 1.B.1). This plan must be adopted within one year of provisional FEMA approval, or else be updated and re-submitted to FEMA again. Minnesota Statutes §375.51 Subd.1 requires that a “public hearing shall be held before the enactment of any ordinance adopting or amending a comprehensive plan or official control...”

Once the planning team finalized the draft All Hazard Mitigation Plan (AHMP), copies were made available to the public, local governments, and county departments for comment. The feedback period for the plan was 31 days. The planning team reviewed comments, modifications were made, and the draft was sent to Pipestone County Board of Commission for their review.

As part of the planning team’s review, a public hearing was held to obtain any additional comments that the public or others wished to make. **This final public review was conducted on [DATE]. [##] members of the public attended.** When satisfied with the plan, the planning team recommended the Pipestone County Board of Commissioners forward the plan the State of Minnesota Division of Homeland Security & Emergency Management (HSEM) for review. Federal rules require that this plan be submitted to HSEM for initial review and coordination, with the State then forwarding the plan to FEMA’s Regional Office in Chicago for formal review and approval. Upon approval by FEMA, the Pipestone County Board of Commissioners will consider a Resolution of Adoption. After County approval, staff will work with each participating local unit of government to facilitate the local adoption of the plan.

Local jurisdictions with Comprehensive Plans and Land Use Plans are encouraged to incorporate applicable strategies, goals, and policies from the Pipestone County AHMP into their local plans upon next adoption. Local jurisdictions should utilize applicable zoning, subdivision control, and other ordinances to enforce the policies described in this plan. The Pipestone County Emergency Management Department will work with local jurisdiction to help incorporate the applicable strategies, goals, and policies from the Pipestone County AHMP into their local plans. The SRDC sent all entities the goals, objectives, and strategies that their entity was named in. These entities had the opportunity to provide feedback and

acknowledged the goals, objectives, and strategies that they were named in. Documentation of responses from those that responded can be found at the end of this plan.

### 3.3 Participation Provisions Post-Approval

FEMA guidance explains a process that jurisdictions can follow to become part of the planning process, or “join” the mitigation plan, after FEMA approval. Any jurisdiction wishing to join the plan at a later date should contact Pipestone County Emergency Management.

### 3.4 Planning Committee Worksheets

All planning meeting agendas, notes, and attendance (sign in sheets, emails) can be found in Appendix E for the meetings stated in Table #2 below.

**Figure #2**  
**Planning Team and Public Meetings**

| Meeting Type                          | Date             | Location             |
|---------------------------------------|------------------|----------------------|
| 1 <sup>st</sup> Planning Team Meeting | October 11, 2017 | Pipestone, Minnesota |
| 2 <sup>nd</sup> Planning Team Meeting | August 20, 2018  | Pipestone, Minnesota |
| Online Plan Review                    | April-May 2019   | <i>Online</i>        |
| Public Hearing                        |                  |                      |

## Section 4 – Pipestone County Profile

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This section offers a general overview of Pipestone County to provide a basic understanding of the characteristics of the community, such as the physical environment, population, and the location and distribution of services.

### 4.1 Location and Area

Pipestone County is located in southwest Minnesota and has a total area of 466 square miles, 0.9 square miles of which is water. The county is bordered on the north by Lincoln County, on the south by Rock County, on the east by Murray County, and on the west by Moody County, South Dakota. Cities within Pipestone County include Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky and Woodstock.

The City of Pipestone is the largest city in Pipestone County and serves as the Pipestone County seat. The city is along U.S. Highway 75 and Minnesota State Highways 23 and 30. These highways provide thoroughfares into and out of the county from the north and south, northeast and southwest, and east and west respectively. US Highway 75 – part of the King of Trails scenic byway – runs north-south through the county, connecting south to I-90 in Luverne and north to I-94 in Moorhead. MN Highway 30 enters Pipestone County near Woodstock and runs west to South Dakota. MN Highway 23 enters Pipestone County from the northeast near Ruthton and passes through Holland, Pipestone, Ihlen, and finally Jasper where it exits at near the southwest corner of the county. The BNSF railroad runs parallel to Highway 23 through the entire county. All three major highways (US Highway 75 and MN Highways 23 and 30) intersect in the City of Pipestone.

**Figure #3**  
**Minor Civil Divisions – Pipestone County<sup>5</sup>**

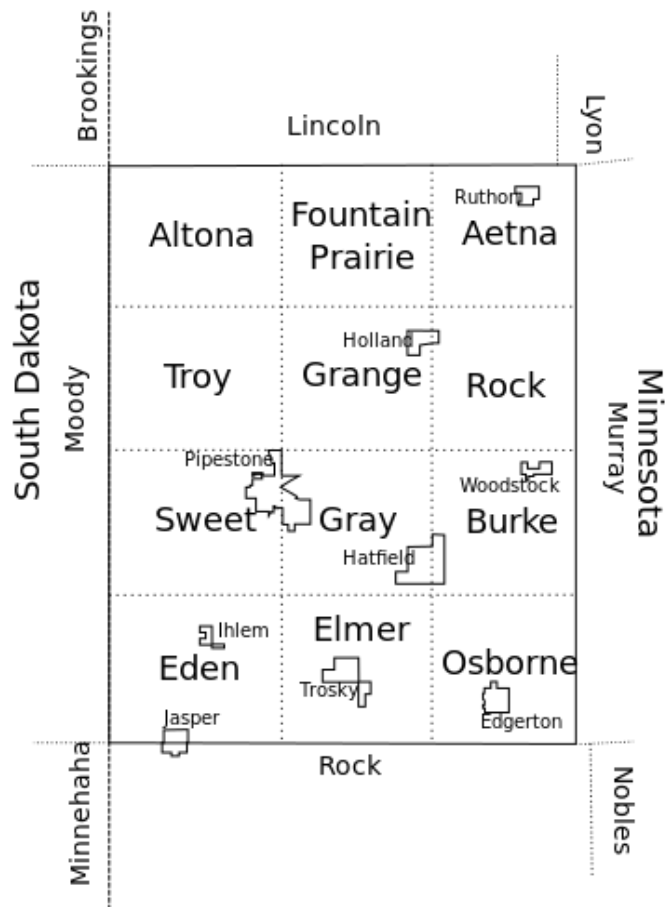
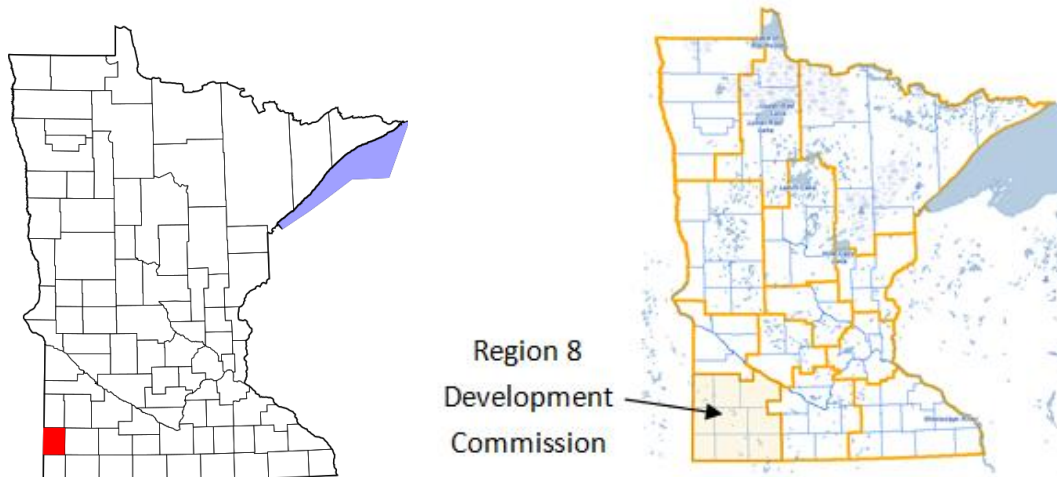


**Figure #4**  
**Location of Pipestone County & Region 8 Development Commission**



<sup>5</sup> By Jankidudu - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=25471300>



## 4.2 History

For generations, the Sisseton and Wahpeton bands of Dakota inhabited Southwest Minnesota. Under the Treaty of Traverse De Sioux (1851), the US Government acquired what is now Pipestone County. Pipestone County was created in 1857 from Brown County, and was officially organized in 1879.

Like many cities in Southwest Minnesota, the settlement of Pipestone County was aided by railroad commerce. The population in 1880 was 2,092 and just ten years later in 1890 it more than doubled to 5,132. In 1900 the population reached 9,264 and 9,553 in 1910. The population of Pipestone County reached its peak at 14,003 in 1950. The population has continued to decline since then. By 2017, the Minnesota Demographic Center estimated the population of Pipestone County at 9,127.<sup>6</sup>

## 4.3 Physical Features

Buffalo Ridge, part of the Coteau des Prairies landform, crosses Pipestone County from northwest to southeast, creating a steep escarpment (elevation 1995 feet) that is home to some of the largest wind farms in the United States. The southern portion of the Coteau Moraines is characterized as a transition from shallow deposits of windblown silt (loess) over glacial till. The Inner Coteau covers southwestern Pipestone County with highly dissected moraines of pre-Wisconsin drift. Bedrock is covered by up to 800 feet of glacial till; however, there are exposures of red Upper Precambrian quartzite in the area.<sup>7</sup>

University of Minnesota Remote Sensing and Geospatial Analysis Laboratory analysis indicates that 74% of land in Pipestone County was in agricultural use in the year 2000. This accounts for over 220,000 of the almost 300,000 acres in the county. Almost 19% (close to 56,000 acres) of land is in grass/shrub/wetland, while 6.5% (19,000 acres) is classified “urban”. The same analysis found that only 2% (6,200 acres) of the county is considered “impervious” or developed such that water will run off rather than soak into the ground.

### 4.3.1 Open Water Sources

There are approximately 0.9 square miles of open water in Pipestone County. Open water is characterized in three categories: lakes, marshes, and rivers and streams.

#### *Lakes*

Pipestone County is one of four counties in Minnesota with no natural lakes.<sup>8</sup> There are, however, a few reservoirs and small manmade water bodies. Split Rock Reservoir at Split Rock Creek State Park near the City of Ihlen was created by a dam as well as the Minnett-Kranz Reservoir south of the City of Ruthton. There are also small sloughs east of the City of Holland and north of the City of Woodstock in the Woodstock Wildlife Management Area. A small portion of Pipestone Creek widens to form what is called

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<sup>6</sup> Minnesota State Demographic Center. Accessed: 4/23/2019. Available: <https://mn.gov/admin/demography/data-by-topic/population-data/our-estimates/>

<sup>7</sup> Pipestone County All-Hazard Mitigation Plan 2010

<sup>8</sup> MN DNR “Lakes, Rivers & Wetlands Facts.” Accessed: 7/18/2017. Available: <http://www.dnr.state.mn.us/faq/mnfacts/water.html>

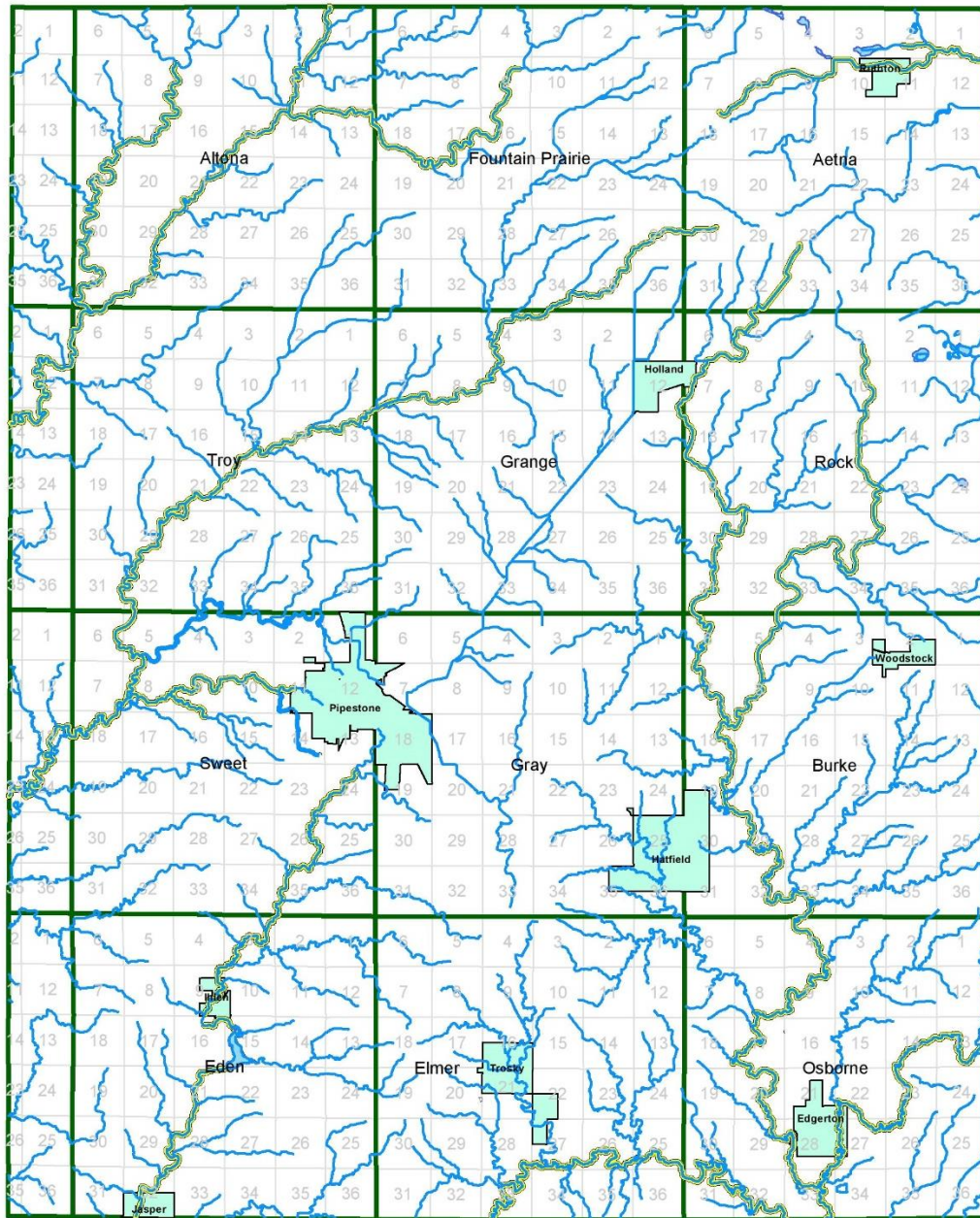
“Indian Lake” within the Pipestone Indian State Wildlife Management Area at the north end of the City of Pipestone.

#### *Rivers*

The only major river of Pipestone County is the Rock River. The river originates in Pipestone County about three miles northeast of the City of Holland. The Rock River flows south and exits Pipestone County toward Rock County just south of the City of Edgerton. This river is part of the Missouri River Basin.

Figure #5  
Shoreland, Lakes, & Streams – Pipestone County

# Pipestone County Lakes and Streams



Streams Lakes Special Protection Shoreland Zone Cities Townships



0 1.5 3 6 9 Miles



Created: 3-12-19, Kyle Krier, Pipestone County

### *Watersheds*

There are four watersheds in Pipestone County that help drain surface water. The two largest cover the majority of the county and they are the Lower Big Sioux Watershed and the Rock River Watershed. The additional two watersheds that cover a much smaller portion of Pipestone County are the Redwood River Watershed and the Des Moines River Headwaters Watershed. The Rock and Lower Big Sioux watersheds drain into the Missouri River whereas the Redwood and Des Moines River Headwaters drain to the Mississippi. There are also a number of small streams that flow into these waterways.

### *Wetlands*

Pipestone County is one of 4 counties in Minnesota that has no natural lakes. There are however, some man-made water bodies such as the dammed lake at Split Rock Creek State Park. Pipestone County is also home to many streams and rivers.

There is ongoing concern in the county for protecting water and the natural environment. The Pipestone County Comprehensive Plan (developed in 2004 and updated in 2009) functions as the county's local water management plan. Objectives include reducing priority pollutants, and protecting surface water and ground water resources. The plan also includes goals to raise public awareness of fiscal and environmental issues key to the county's quality of life.

There are also many wetlands scattered across the region. According to MN DNR, "a wetland has mostly wet soil, is saturated with water either above or just below the surface and is covered with plants that have adapted to wet conditions" Wetlands provide many benefits to humans including the reduction of flooding by means of storage during high flows, filtration of pollutants and sediment, groundwater and aquifer recharge, wildlife habitat and aesthetic appeal.

Wetlands store runoff and allow for a natural filtration of the water before it enters the ground water. The benefits of a healthy wetland vary from improved water quality to economic development generated from increased hunting, fishing, and recreation spending. Overall, wetlands provide many benefits to humans including the reduction of flooding by means of storage during high flows, filtration of pollutants and sediment, groundwater and aquifer recharge, wildlife habitat and aesthetic appeal.

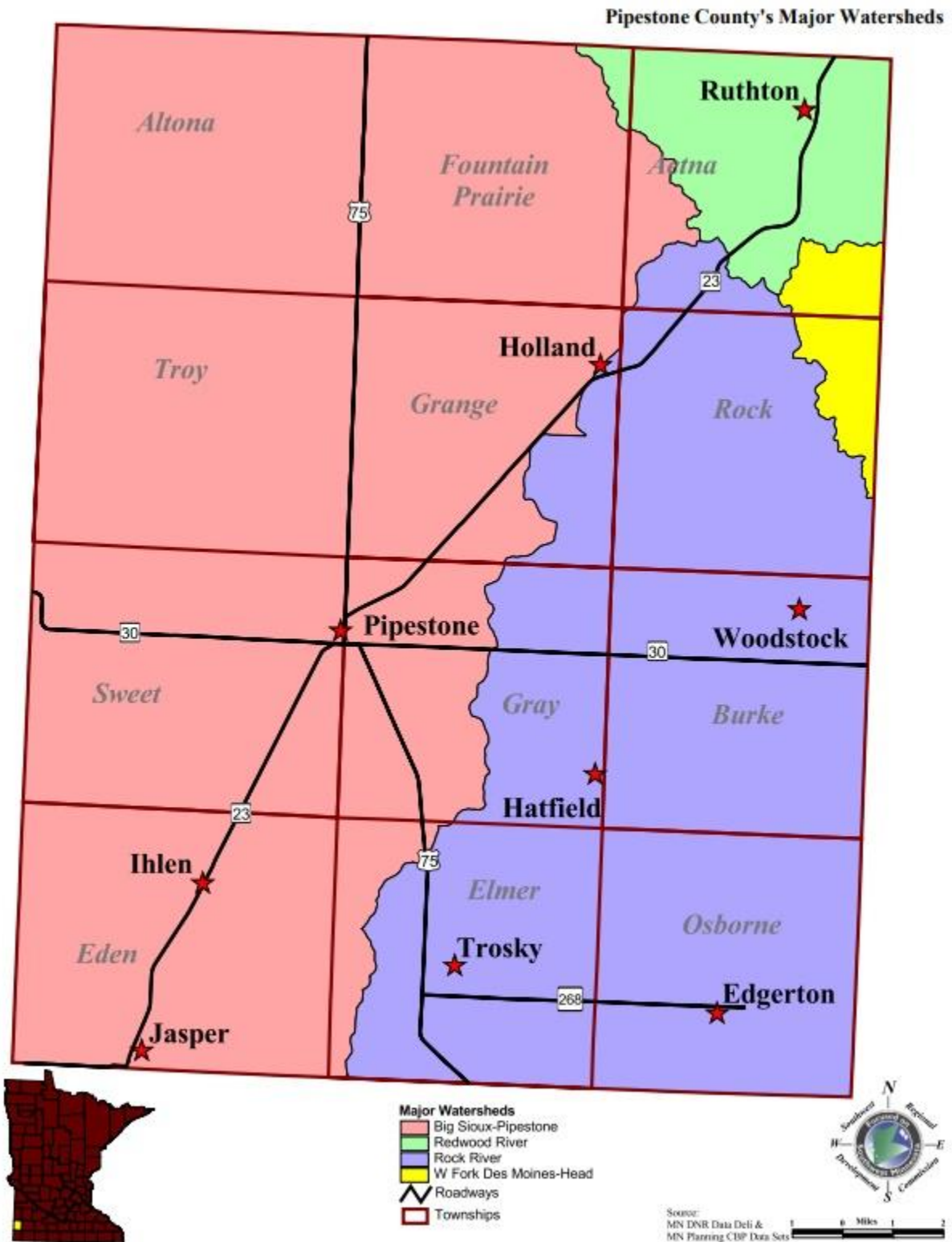
In addition, the wetlands in Lincoln County provide the following benefits:

- Floodwater Storage and Detention
- Nutrient Assimilation
- Sediment Entrapment
- Groundwater Recharge and Discharge
- Low-Flow Augmentation
- Aesthetics and Recreation
- Shore land Anchoring and Erosion Control
- Wildlife Habitat
- Fisheries Habitat

Per the 2018 impaired waters list from the Minnesota Pollution Control Agency, the following waters of Pipestone County are impaired:

- Chanarambie Creek
- Flandreau Creek
- Main Ditch (City of Pipestone)
- Pipestone Creek
- Pipestone Creek, North Branch
- Poplar Creek
- Redwood River
- Rock River
- Rock River, East Branch
- Split Rock Creek
- Willow Creek
- 5 other unnamed creeks
- 1 other unnamed wetland

Figure #6  
Watersheds Map – Pipestone County





### 4.3.2 Surficial Geology

Buffalo Ridge, part of the Coteau des Prairies landform, crosses Pipestone County from northwest to southeast, creating a steep escarpment (elevation 1995 feet) that is home to some of the largest wind farms in the United States. The southern portion of the Coteau Moraines is characterized as a transition from shallow deposits of windblown silt (loess) over glacial till. The Inner Coteau covers southwestern Pipestone County with highly dissected moraines of pre-Wisconsin drift. Bedrock is covered by up to 800 feet of glacial till; however, there are exposures of red Upper Precambrian quartzite in the area.

### 4.3.3 Bedrock Geology

The majority of the bedrock of Pipestone County is Sioux quartzite, covering most of the central, south, and western areas of the county. A small portion of eastern Pipestone County is also Sioux quartzite. Migmatitic gneiss/amphibolite/granite lies below a strip of Pipestone county stretching from the north-central border to the southeast portion of the county. Undivided cretaceous rocks form the bedrock of portions of northern and far southeastern Pipestone County.<sup>9</sup>

### 4.3.4 Soils

There are seven soil associations within Pipestone County according to the Soil Survey of Pipestone County.<sup>10</sup> Three of those soils make up 81 percent of the county. The first, Kranzburg-Vienna Association, is gently sloping and makes up 41 percent of the county. The second, Estelline-Lamoure Association, is nearly level and makes up 27 percent of the county. The third, Brookings-Hidewood Association, is nearly level and constitutes 13 percent of the county. The remaining four associations are Barnes-Buse Association (gently undulating to steep, 5 percent of the county), Barnes-Flom Association (gently undulating and nearly level, 4 percent of the county), Ihlen-Rock Outcrop Association (nearly level and gently sloping, 1 percent of the county), and Moody-Trent-Whitewood Association (nearly level and gently sloping, 9 percent of the county).

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<sup>9</sup> Geologic Map of Minnesota: Bedrock Geology (2000). Accessed 10/17/2017. Available: [http://www.d.umn.edu/~mille066/Teaching/3000/Photos\\_Images/S20%202000.pdf](http://www.d.umn.edu/~mille066/Teaching/3000/Photos_Images/S20%202000.pdf)

<sup>10</sup> Soil Survey of Pipestone County, Minnesota. Accessed 7/19/17. Available: [https://www.nrcs.usda.gov/Internet/FSE\\_MANUSCRIPTS/minnesota/MN117/0/Pipestone\\_MN.pdf](https://www.nrcs.usda.gov/Internet/FSE_MANUSCRIPTS/minnesota/MN117/0/Pipestone_MN.pdf)

Figure #7  
General Soils Map – Pipestone County

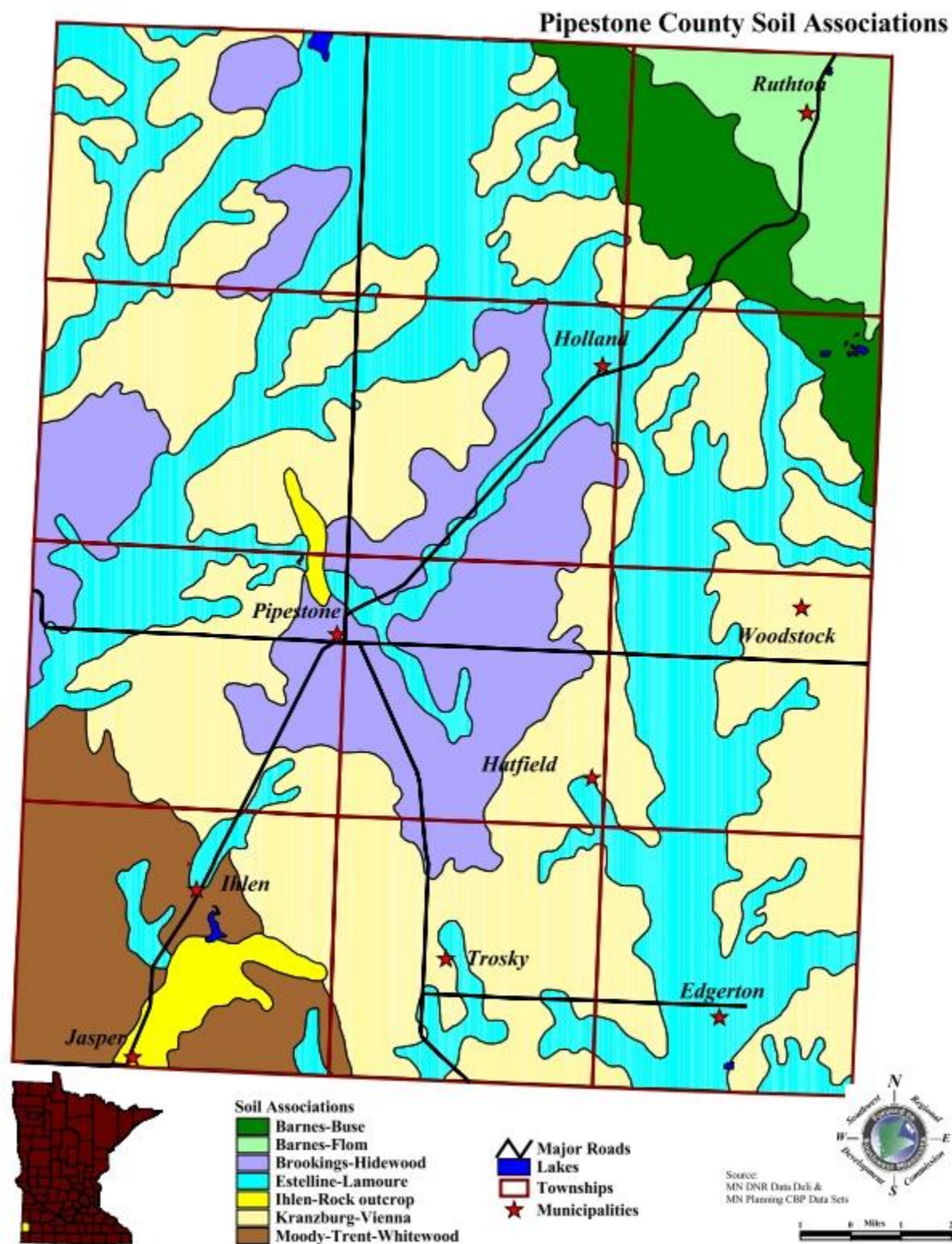
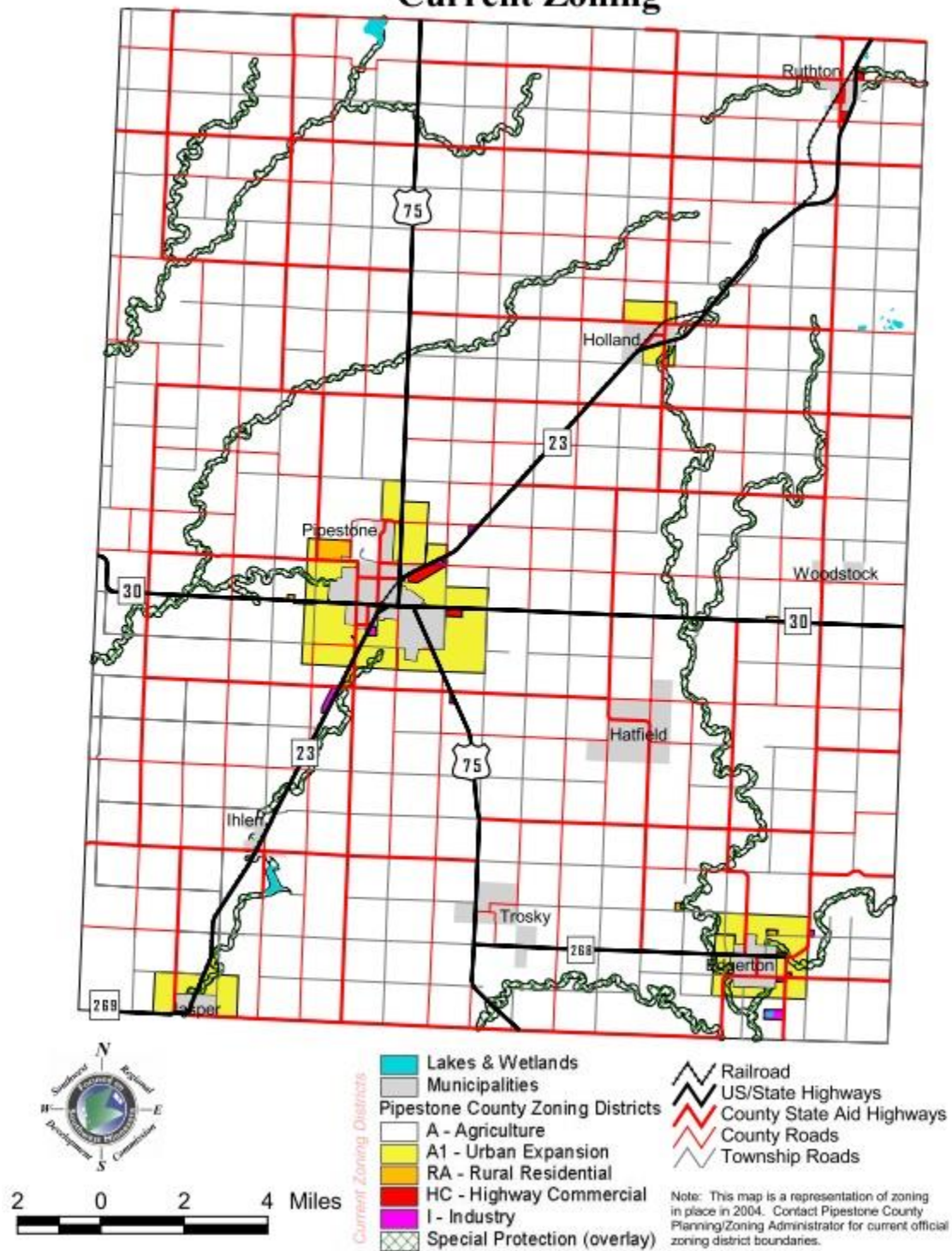




Figure #8  
Zoning Map – Pipestone County

## Pipestone County Current Zoning



## 4.4 Climate

Southwest Minnesota has a humid, mid-continental climate. Winters are characterized by cold, dry continental polar air. Summers are characterized by hot, dry tropical air masses from the Southwest meeting warm, moist maritime air masses from the Gulf of Mexico in the summer.

The weather is extremely variable during the year. During the winter months, precipitation is in the form of snowstorms, some which may be severe. During the summer months, precipitation is in the form of showers (occasionally heavy) when warm moist air leaves the Gulf region and meets cooler air over Pipestone County. Weather patterns circulate counter-clockwise and generally enter Pipestone County from the west to southwest and sometimes from the south.

### 4.4.1 Precipitation

Average precipitation in Pipestone County from 1981 to 2010 was 27.6 inches. Average precipitation ranged from 17.8 inches to 39 inches from 1981 to 2010. From 1981 to 2010, the average seasonal snow fall was unavailable.

**Figure #9**  
**Precipitation: 1981 – 2010 Average**

| Month                 | Precipitation in Inches – Pipestone |
|-----------------------|-------------------------------------|
| January               | 0.59                                |
| February              | 0.57                                |
| March                 | 1.75                                |
| April                 | 2.90                                |
| May                   | 3.29                                |
| June                  | 4.21                                |
| July                  | 3.34                                |
| August                | 3.14                                |
| September             | 3.24                                |
| October               | 2.33                                |
| November              | 1.45                                |
| December              | 0.79                                |
| <b>Annual Average</b> | <b>27.6</b>                         |

Source: NOAA (<https://www.ncdc.noaa.gov/cdo-web/datatools/normals>)

#### 4.4.2 Temperature

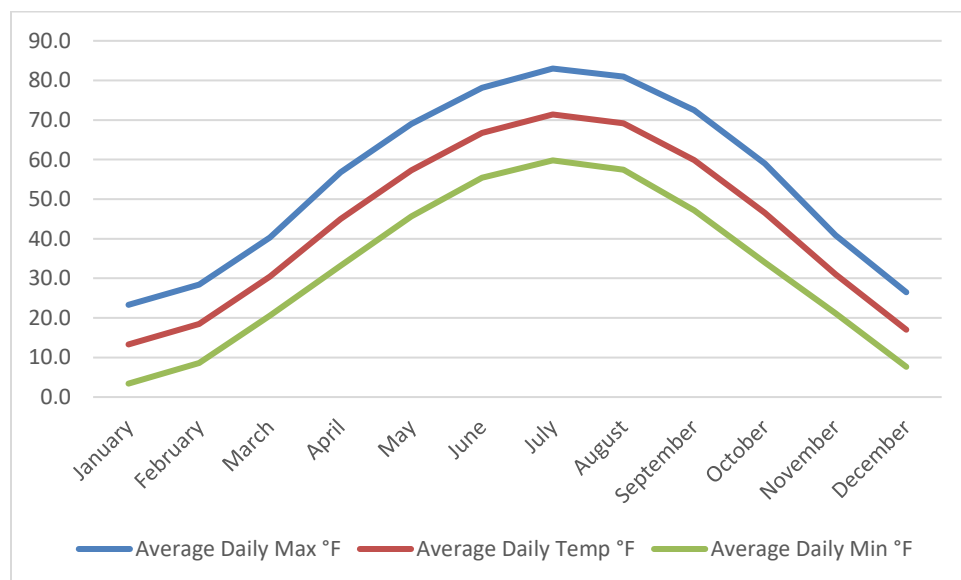
Average temperature in Pipestone County from 1981 to 2010 was 43.9 degrees Fahrenheit. The hottest month on average in Pipestone County is July with an annual average temperature of 71.4°F. The coolest month on average is January with an annual average temperature of 13.3°F. Temperatures were taken in the City of Pipestone.

**Figure #10**  
**Average Temperature: 1981 – 2010 – Pipestone**

| Month          | Average Daily Max °F | Average Daily Temp °F | Average Daily Min °F |
|----------------|----------------------|-----------------------|----------------------|
| January        | 23.3                 | 13.3                  | 3.4                  |
| February       | 28.4                 | 18.5                  | 8.6                  |
| March          | 40.3                 | 30.4                  | 20.6                 |
| April          | 56.8                 | 45.0                  | 33.2                 |
| May            | 69.0                 | 57.3                  | 45.6                 |
| June           | 78.1                 | 66.7                  | 55.4                 |
| July           | 83.0                 | 71.4                  | 59.8                 |
| August         | 81.0                 | 69.2                  | 57.4                 |
| September      | 72.5                 | 59.9                  | 47.2                 |
| October        | 59.0                 | 46.5                  | 34.0                 |
| November       | 40.9                 | 31.0                  | 21.1                 |
| December       | 26.5                 | 17.0                  | 7.6                  |
| Annual Average | 54.9                 | 43.9                  | 32.8                 |

Source: National Climatic Data Center (<http://ggweather.com/normals/>)

**Figure #11**  
**Average Temperature: 1981 – 2010 – Pipestone**



## 4.5 Population

Pipestone County is the 73<sup>rd</sup> most populous county in the State of Minnesota (out of 87).<sup>11</sup> Population growth trends have an effect on the needs and demands of services such as transportation, law enforcement, and emergency response personnel. It is important to analyze past population trends to attempt to make valid projections. However, it should be recognized that population projections are dependent upon a number of factors, a number of which are beyond county control.

### 4.5.1 Population Trends

The 2010 Census showed that Pipestone County had a population of 9,596. The most recent MN Demographic Center estimate in 2016 places the population at 9,211. The two largest communities are Pipestone with a population of 4,317 in 2010 and Edgerton with a population of 1,189 in 2010. From 2000 to 2010, Pipestone's population increased by 0.9 percent and Edgerton's population increased by 15.1 percent. As a whole, Pipestone County experienced a decrease in population of 3.0 percent from 2000 to 2010. Pipestone County shares many of the demographic opportunities and challenges common in rural Minnesota and the Midwest overall.

**Figure #12**  
**Population Trends – Region 8**

| County          | 1970           | 1980           | 1990           | 2000           | 2010           |
|-----------------|----------------|----------------|----------------|----------------|----------------|
| Cottonwood      | 14,887         | 14,854         | 12,694         | 12,167         | 11,687         |
| Jackson         | 14,352         | 13,690         | 11,677         | 11,268         | 10,266         |
| Lincoln         | 8,143          | 8,207          | 6,890          | 6,429          | 5,896          |
| Lyon            | 24,273         | 25,207         | 24,789         | 25,425         | 25,857         |
| Murray          | 12,508         | 11,507         | 9,660          | 9,165          | 8,725          |
| Nobles          | 23,208         | 21,840         | 20,098         | 20,832         | 21,378         |
| Pipestone       | 12,791         | 11,690         | 10,491         | 9,895          | 9,596          |
| Redwood         | 20,024         | 19,341         | 17,254         | 16,815         | 16,059         |
| Rock            | 11,346         | 10,703         | 9,806          | 9,721          | 9,687          |
| <b>Region 8</b> | <b>141,532</b> | <b>137,039</b> | <b>123,359</b> | <b>121,717</b> | <b>119,151</b> |

Source: U.S. Census 1970, 1980, 1990, 2000, 2010

**Figure #13**  
**Distribution of Population – Pipestone County**

|                  | 1970   | 1980   | 1990   | 2000  | 2010  |
|------------------|--------|--------|--------|-------|-------|
| Cities           | 8,423* | 7,812* | 7,249* | 6,840 | 6,834 |
| Townships        | 4,368* | 3,878* | 3,242* | 3,055 | 2,762 |
| Pipestone County | 12,791 | 11,690 | 10,491 | 9,895 | 9,596 |

Source: U.S. Census 1970-2010

<sup>11</sup> MN State Demographic Center. Accessed: 7/19/2017. Available: <https://mn.gov/admin/demography/data-by-topic/population-data/our-estimates/>

\* Due to Jasper's location partly in Pipestone County and partly in Rock County, these numbers are not exact. A very small number of Jasper residents who live in Rock County were included in calculating this number.

While 34.1 percent of the county's population lived in rural areas in 1970, only 28.2 percent lived in those rural townships in 2010. The loss in population numbers from the rural areas and increasing proportion urban population (though also decreasing in number) is not unique to Pipestone County, which is seen in the decline of the number of farmers. Populations in rural farming communities, like Pipestone County, are interconnected to the agricultural economy.

The agricultural economy is a competitive industry and is often used in economics as an example of a perfectly competitive market. Competition in the agriculture industry has lead agricultural businesses to specialize and exploit economies of scale to stay competitive in the market place. Innovation, specialization, and economies of scale have resulted in an agriculture industry that has been able to supply agriculture demand with fewer workers. In addition, the migration of young people from the rural areas to more urban areas, and the elderly persons moving to warming states have contributed to the decline of the rural population and the growth of urban centers.

#### *Population by County Subdivision*

The overwhelming majority of county subdivisions saw a decline in population from 2000 to 2010. The three county subdivisions that did not see a population decline from 2000 to 2010 were the City of Edgerton (15.1 percent increase), the City of Hatfield (14.9 percent increase), and the City of Jasper (9.8 percent increase). The two largest population declines were in the City of Ihlen with a 41.1 percent decrease and the City of Trosky with a 25.9 percent decrease.

**Figure #14**  
**Distribution of Population by County Subdivision – Pipestone County**

| County Subdivision        | 2000         | 2010         | Percent Change<br>2000 - 2010 |
|---------------------------|--------------|--------------|-------------------------------|
| Aetna township            | 201          | 194          | -3.5%                         |
| Altona township           | 192          | 153          | -20.3%                        |
| Burke township            | 246          | 209          | -15.0%                        |
| Eden township             | 294          | 278          | -5.4%                         |
| Edgerton city             | 1,033        | 1,189        | 15.1%                         |
| Elmer township            | 275          | 231          | -16.0%                        |
| Fountain Prairie township | 199          | 188          | -5.5%                         |
| Grange township           | 244          | 203          | -16.8%                        |
| Gray township             | 234          | 225          | -3.8%                         |
| Hatfield city             | 47           | 54           | 14.9%                         |
| Holland city              | 215          | 187          | -13.0%                        |
| Ihlen city                | 107          | 63           | -41.1%                        |
| Jasper city (part)        | 522          | 573          | 9.8%                          |
| Osborne township          | 324          | 286          | -11.7%                        |
| Pipestone city            | 4,384        | 4,317        | -1.5%                         |
| Rock township             | 184          | 182          | -1.1%                         |
| Ruthton city              | 284          | 241          | -15.1%                        |
| Sweet township            | 344          | 324          | -5.8%                         |
| Trosky city               | 116          | 86           | -25.9%                        |
| Troy township             | 318          | 289          | -9.1%                         |
| Woodstock city            | 132          | 124          | -6.1%                         |
| <b>Total</b>              | <b>9,895</b> | <b>9,596</b> | <b>-3.0%</b>                  |

Source: U.S. Census 2000, 2010

#### *Population by Age Cohort*

Population by age cohort can help planners identify trends and make predictions based on these trends. Changes in age cohorts can also help government plan for changes in demand for services. If the childbearing cohorts decline, government can make predictions that student enrollments may decline in the near future. The largest gain in population by age cohort was the age group 55 to 64 with 28.6 percent. The largest loss in population by age cohort was 35 to 44 with a decrease of 27.0 percent.

**Figure #15**  
**Population by Age Cohort – Pipestone County**

| Age Group | 2000  | Percent of Total | 2010  | Percent of Total | Percent Change 2000 - 2010 |
|-----------|-------|------------------|-------|------------------|----------------------------|
| 0-9       | 1,241 | 12.5%            | 1,323 | 13.8%            | 6.6%                       |
| 10-19     | 1,574 | 15.9%            | 1,279 | 13.3%            | -18.7%                     |
| 20-24     | 408   | 4.1%             | 438   | 4.6%             | 7.4%                       |

|       |       |        |       |         |        |
|-------|-------|--------|-------|---------|--------|
| 25-34 | 989   | 10.0%  | 994   | 10.4%   | 0.5%   |
| 35-44 | 1,450 | 14.7%  | 1,058 | 11.0%   | -27.0% |
| 45-54 | 1,220 | 12.3%  | 1,444 | 15.0%   | 18.4%  |
| 55-64 | 901   | 9.1%   | 1,159 | 12.1%   | 28.6%  |
| 65-74 | 921   | 9.3%   | 781   | 8.1%    | -15.2% |
| 75-84 | 789   | 8.0%   | 703   | 7.3%    | -10.9% |
| 85+   | 402   | 4.1%   | 417   | 4.3%    | 3.7%   |
| Total | 9,895 | 100.0% | 9,596 | 100.00% | -3.0%  |

Source: U.S. Census 2000, 2010

### Median Age

Cities in Pipestone County had small to significant changes in median age from 2000 to 2010. The largest three increases in the median age were in the City of Ihlen with 31.1 percent, and in the Cities of Ruthton and Woodstock, both with 13.1 percent. The largest decrease in the median age was in the City of Hatfield with a decrease of 11.1 percent. The City of Pipestone had the smallest change in median age, which was a 3.6 percent increase.

**Figure #16**  
**Median Age by City – Pipestone County**

| City      | 2000 | 2010 | Percent Change 2000-2010 |
|-----------|------|------|--------------------------|
| Edgerton  | 49.7 | 46.0 | -7.4%                    |
| Hatfield  | 34.3 | 30.5 | -11.1%                   |
| Holland   | 34.5 | 37.5 | 8.7%                     |
| Ihlen     | 41.8 | 54.8 | 31.1%                    |
| Jasper    | 44.2 | 40.5 | -8.4%                    |
| Pipestone | 39.4 | 40.8 | 3.6%                     |
| Ruthton   | 38.3 | 43.3 | 13.1%                    |
| Trosky    | 41.5 | 46.5 | 12.0%                    |
| Woodstock | 39.8 | 45.0 | 13.1%                    |

Source: U.S. Census 2000, 2010

All Pipestone County townships but one saw an increase in their median age from 2000 to 2010. The largest increase in the median age was in Altona Township, and the increase was 36.7 percent. The only decrease in the median age was in Sweet Township, with a 10.6 percent decrease.

**Figure #17**  
**Median Age by Township – Pipestone County**

| Township | 2000 | 2010 | Percent Change 2000-2010 |
|----------|------|------|--------------------------|
|----------|------|------|--------------------------|

|                  |      |      |        |
|------------------|------|------|--------|
| Aetna            | 35.9 | 39.3 | 9.5%   |
| Altona           | 33.0 | 45.1 | 36.7%  |
| Burke            | 38.0 | 44.5 | 17.1%  |
| Eden             | 35.3 | 40.3 | 14.2%  |
| Elmer            | 34.7 | 41.7 | 20.2%  |
| Fountain Prairie | 33.8 | 37.0 | 9.5%   |
| Grange           | 37.0 | 44.5 | 20.3%  |
| Gray             | 40.3 | 46.6 | 15.6%  |
| Osborne          | 39.2 | 45.3 | 15.6%  |
| Rock             | 40.8 | 41.2 | 1.0%   |
| Sweet            | 47.0 | 42.0 | -10.6% |
| Troy             | 37.7 | 41.1 | 9.0%   |

Source: U.S. Census 2000, 2010

In Pipestone County the median age had a small increase from 40.2 to 42.3 from 2000 to 2010. The median age in Pipestone County is 1.8 years higher than Region 8 and is 4.9 years higher than the State of Minnesota, while Region 8 has a median age that is 3.1 years higher than the State of Minnesota.

**Figure #18**  
**Median Age by County/Region/State**

| Jurisdiction     | 2000 | 2010 | Percent Change<br>2000-2010 |
|------------------|------|------|-----------------------------|
| Pipestone County | 40.2 | 42.3 | 5.2%                        |
| Region 8         | 38.7 | 40.5 | 4.6%                        |
| Minnesota        | 35.4 | 37.4 | 5.6%                        |

Source: U.S. Census 2000, 2010

### *Population by Race*

From 2000 to 2010, the Caucasian population of Pipestone County declined while each minority group increased by significant percentages. From 2000 to 2010, the White population had a 3.4 decrease in percentage while a 6.2 percent decrease in their overall number (a decrease of 591 individuals). The American Indian/Alaska Native population saw the highest percent decrease in Pipestone County at -18.0. The number of population for all other races in 2010 increased significantly. The highest of which was a 730.8 percent increase in the number of respondents choosing "Some Other Race." The US Census Bureau classifies ethnicity separately from race. The ethnicity "Hispanic or Latino of any race" accounted for 0.7 percent of the population in 2000 and increased to 3.7 percent of the population in 2010.

**Figure #19**  
**Population by One Race – Pipestone County**

| Race | 2000 | Percent | 2010 | Percent | Percent Change<br>2000-2010 |
|------|------|---------|------|---------|-----------------------------|
|------|------|---------|------|---------|-----------------------------|



|                                            |              |       |              |       |        |
|--------------------------------------------|--------------|-------|--------------|-------|--------|
| White                                      | 9,566        | 96.9% | 8,975        | 93.5% | -6.2%  |
| Black or African-American                  | 17           | 0.2%  | 56           | 0.6%  | 229.4% |
| American Indian and Alaska Native          | 122          | 1.2%  | 100          | 1.0%  | -18.0% |
| Asian                                      | 46           | 0.5%  | 69           | 0.7%  | 50.0%  |
| Native Hawaiian and other Pacific Islander | 2            | 0.0%  | 0            | 0.0%  | 0.0%   |
| Some Other Race                            | 26           | 0.3%  | 216          | 2.3%  | 730.8% |
| Two or More Races                          | 92           | 0.9%  | 180          | 1.9%  | 95.7%  |
| <b>Total Race Responses</b>                | <b>9,871</b> |       | <b>9,596</b> |       |        |

Source: U.S. Census 2000, 2010

Roughly 94 percent of residents in Pipestone County speak only English at home. There are a number of other languages that are spoken in Pipestone County, that include: Spanish or Spanish Creole, French, Portuguese, German, other West Germanic Languages, Laotian, Native American languages, Arabic, and African languages.

**Figure #20**  
**Language Spoken At Home – Pipestone County**

| Subject                             | Percent | Margin of Error |
|-------------------------------------|---------|-----------------|
| Speak only English                  | 94.1%   | +/-0.9          |
| Speak a language other than English | 5.9%    | +/-0.9          |
| Spanish                             | 3.6%    | +/-0.7          |
| Other Indo-European                 | 1.2%    | +/-0.5          |
| Asian and Pacific Island Languages  | 0.3%    | +/-0.3          |
| Other Languages                     | 0.8%    | +/-0.5          |

Source: 2010-2014 American Community Survey 5-Year Estimates

#### 4.5.2 Population Projections

Population projections from the MN Department of Administration show that the population in Pipestone County is projected to decrease by 18.6 percent from 2015 to 2050. The projections show a small increase (no more than 7.0 percent) in the age cohorts 20-24, 40-44, and 80-84 from 2015 to 2050. All other age groups are expected to decrease, the largest of which are expected to be in age cohorts 5-14 and 50-74 (up to 57.6 percent). Pipestone County communities will undoubtedly be impacted by the changing age structure of their communities. The county must ensure that services and needs are met as the population gradually becomes older and the demands for public services change. In the next three decades of years, local governments throughout the State will find themselves dealing with an aging population and attempting to improve the safety and welfare of an older and a more diverse community.

**Figure #21**  
**Population Projections – Pipestone County**

|                  | 2015 |        | 2020 |        | 2025 |        | 2030 |        |
|------------------|------|--------|------|--------|------|--------|------|--------|
| Age Group        | Male | Female | Male | Female | Male | Female | Male | Female |
| 00 to 04         | 268  | 300    | 216  | 243    | 219  | 246    | 244  | 273    |
| 05 to 09         | 329  | 309    | 278  | 262    | 224  | 210    | 228  | 214    |
| 10 to 14         | 327  | 325    | 305  | 303    | 257  | 256    | 206  | 205    |
| 15 to 19         | 304  | 275    | 348  | 315    | 323  | 294    | 274  | 249    |
| 20 to 24         | 256  | 256    | 311  | 311    | 348  | 348    | 324  | 324    |
| 25 to 29         | 216  | 227    | 193  | 203    | 246  | 258    | 281  | 295    |
| 30 to 34         | 260  | 228    | 223  | 195    | 198  | 174    | 252  | 221    |
| 35 to 39         | 234  | 223    | 245  | 234    | 211  | 200    | 187  | 179    |
| 40 to 44         | 247  | 248    | 213  | 213    | 223  | 224    | 190  | 191    |
| 45 to 49         | 263  | 256    | 239  | 232    | 205  | 199    | 214  | 208    |
| 50 to 54         | 325  | 326    | 234  | 235    | 211  | 211    | 179  | 180    |
| 55 to 59         | 348  | 344    | 311  | 306    | 223  | 219    | 200  | 198    |
| 60 to 64         | 299  | 287    | 334  | 322    | 297  | 285    | 212  | 204    |
| 65 to 69         | 223  | 268    | 251  | 303    | 280  | 337    | 247  | 299    |
| 70 to 74         | 168  | 193    | 214  | 246    | 240  | 276    | 268  | 307    |
| 75 to 79         | 147  | 197    | 144  | 192    | 182  | 244    | 204  | 273    |
| 80 to 84         | 104  | 183    | 103  | 182    | 100  | 177    | 127  | 223    |
| 85+              | 131  | 272    | 99   | 206    | 87   | 181    | 80   | 169    |
| Gender Totals    | 4449 | 4717   | 4261 | 4503   | 4074 | 4339   | 3917 | 4212   |
| Total Population | 9166 |        | 8764 |        | 8413 |        | 8129 |        |

| 2035 |        | 2040 |        | 2045 |        | 2050 |        | Percent Change 2015-2045 |        |
|------|--------|------|--------|------|--------|------|--------|--------------------------|--------|
| Male | Female | Male | Female | Male | Female | Male | Female | Male                     | Female |
| 257  | 289    | 248  | 278    | 227  | 254    | 213  | 238    | -20.5%                   | -20.7% |
| 253  | 238    | 270  | 254    | 266  | 250    | 245  | 230    | -25.5%                   | -25.6% |
| 211  | 210    | 238  | 236    | 258  | 256    | 255  | 254    | -22.0%                   | -21.8% |
| 224  | 203    | 231  | 209    | 261  | 237    | 284  | 257    | -6.6%                    | -6.5%  |
| 279  | 279    | 235  | 235    | 244  | 244    | 274  | 274    | 7.0%                     | 7.0%   |
| 262  | 275    | 226  | 237    | 189  | 198    | 200  | 209    | -7.4%                    | -7.9%  |
| 290  | 255    | 274  | 240    | 240  | 210    | 201  | 177    | -22.7%                   | -22.4% |
| 237  | 225    | 275  | 262    | 264  | 251    | 234  | 222    | 0.0%                     | -0.4%  |
| 170  | 170    | 219  | 220    | 258  | 260    | 251  | 251    | 1.6%                     | 1.2%   |
| 183  | 179    | 166  | 161    | 217  | 212    | 259  | 252    | -1.5%                    | -1.6%  |
| 189  | 190    | 163  | 164    | 150  | 150    | 201  | 201    | -38.2%                   | -38.3% |
| 171  | 169    | 183  | 181    | 161  | 158    | 148  | 146    | -57.5%                   | -57.6% |
| 191  | 184    | 166  | 160    | 180  | 174    | 160  | 153    | -46.5%                   | -46.7% |

|      |      |      |      |      |      |      |      |        |        |
|------|------|------|------|------|------|------|------|--------|--------|
| 178  | 214  | 163  | 196  | 143  | 173  | 157  | 189  | -29.6% | -29.5% |
| 239  | 273  | 174  | 199  | 161  | 185  | 144  | 164  | -14.3% | -15.0% |
| 228  | 305  | 206  | 275  | 152  | 204  | 142  | 191  | -3.4%  | -3.0%  |
| 143  | 252  | 162  | 285  | 148  | 261  | 111  | 194  | 6.7%   | 6.0%   |
| 93   | 194  | 107  | 222  | 123  | 256  | 123  | 256  | -6.1%  | -5.9%  |
| 3798 | 4104 | 3706 | 4014 | 3642 | 3933 | 3602 | 3858 | -19.0% | -18.2% |
| 7902 |      | 7720 |      | 7575 |      | 7460 |      | -18.6% |        |

Source: Minnesota Department of Administration

## 4.6 Housing

Household characteristics have a direct impact on land use, demand for housing, government services, and public education. Changes in demographics are part of the driving forces that contribute to changes in housing characteristics and demand for housing. Planning and consideration needs to take place at the local levels to ensure the supply of housing is adequate to meet the demand.

The population in Southwest Minnesota is aging. This aging population change requires different housing needs than younger cohorts. Assisted living facilities and nursing homes are two types of facilities that will help to accommodate this population change. The 60 plus age cohorts also have to be considered in emergency planning, since a number of persons in this cohort may have trouble evacuating a building and performing other safety protocol. This cohort and youth cohorts have to have special considerations when it comes to emergency planning.

There are a number of other considerations that have to be made when it comes to emergency planning. The age of a structure is one variable that impacts how well a structure will withstand a disaster. The age of a structure is also one variable that impacts the ability to repair a structure after a disaster. The building materials used to construct the structure and the maintenance of the structure are two other variables in whether a structure can withstand a disaster. There are a number of other variables that impact the ability of a structure to withstand the stresses of a disaster.

### 4.6.1 Housing Units

In Pipestone County 35.6 percent of housing units were built in 1939 or earlier. 57.4 percent of the housing units in Pipestone County were built in before 1960, while only 22.9 percent of the housing was built after 1980. Pipestone County still has an older housing stock which impacts the county's ability to withstand a disaster.

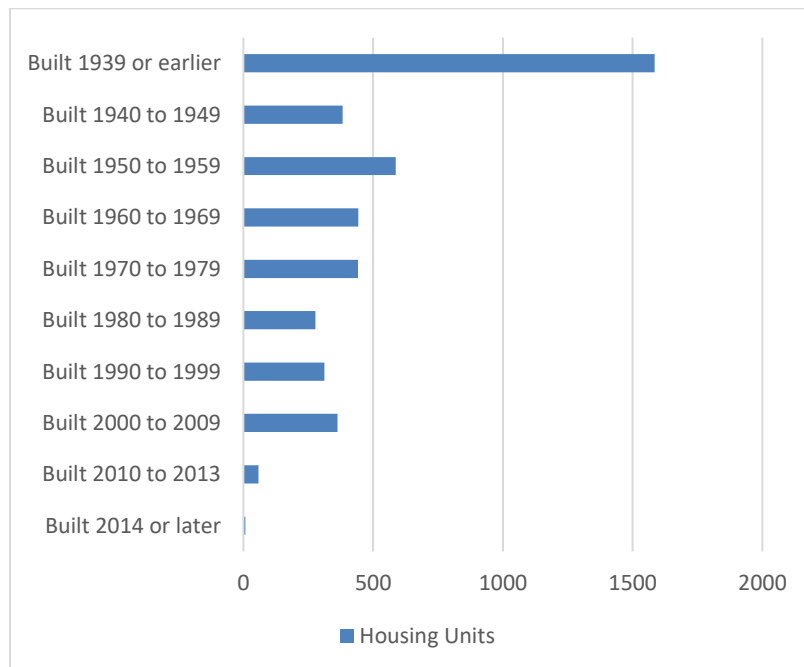
**Figure #22**  
**Build Year of Housing Units – Pipestone County**

| Year Built                 | Housing Units | Percent |
|----------------------------|---------------|---------|
| <i>Built 2014 or later</i> | 8             | 0.2%    |
| <i>Built 2010 to 2013</i>  | 58            | 1.3%    |

|                              |              |                |
|------------------------------|--------------|----------------|
| <i>Built 2000 to 2009</i>    | 363          | 8.1%           |
| <i>Built 1990 to 1999</i>    | 312          | 7.0%           |
| <i>Built 1980 to 1989</i>    | 277          | 6.2%           |
| <i>Built 1970 to 1979</i>    | 442          | 9.9%           |
| <i>Built 1960 to 1969</i>    | 443          | 9.9%           |
| <i>Built 1950 to 1959</i>    | 587          | 13.2%          |
| <i>Built 1940 to 1949</i>    | 383          | 8.6%           |
| <i>Built 1939 or earlier</i> | 1,585        | 35.6%          |
| <b>Total Housing Units</b>   | <b>4,458</b> | <b>100.00%</b> |

Source: U.S. Census Bureau, 2015 ACS

**Figure #23**  
**Building Year of Housing Units – Pipestone County**



There were a total of 46,762 housing units in Region 8 in 1970. Region 8 experienced a 12.98 percent increase in housing units from 1970 to 1980. From 1970 to 2000, there was a 12.13 percent increase in housing units for Region 8. From 2000 to 2010, there was a 1.73 percent increasing in housing units for Region 8. In total, there was a 14.9 percent increase in housing units from 1970 through 2010.

For Pipestone County, the total number of housing units between 1970-1980, with a 8.1 percent (350 actual units) increase, a 5.4 percent (249 actual units) decrease from 1980 to 1990, a 1.1 percent (47 actual units) increase from 1990 to 2000, and a 1.1 percent (49 actual units) increase from 2000 to 2010. This is a 4.6 percent increase over the span of 40 years. Lyon County saw the greatest dramatic housing units' growth among Region 8 counties, with a 47.5 percent (3,572 actual units) increase from 1970 to 2010.

**Figure #24**  
**Housing Unit Trends – Region 8**

| County          | 1970          | 1980          | 1990          | 2000          | 2010          | Percent Change<br>1970 - 2010 |
|-----------------|---------------|---------------|---------------|---------------|---------------|-------------------------------|
| Cottonwood      | 5,130         | 5,804         | 5,495         | 5,376         | 5,419         | 5.6%                          |
| Jackson         | 4,918         | 5,525         | 5,121         | 5,092         | 4,990         | 1.5%                          |
| Lincoln         | 2,882         | 3,298         | 3,050         | 3,043         | 3,108         | 7.8%                          |
| Lyon            | 7,526         | 9,196         | 9,675         | 10,298        | 11,098        | 47.5%                         |
| Murray          | 4,236         | 4,679         | 4,611         | 4,357         | 4,556         | 7.6%                          |
| Nobles          | 7,386         | 8,212         | 8,094         | 8,465         | 8,535         | 15.6%                         |
| Pipestone       | 4,286         | 4,636         | 4,387         | 4,434         | 4,483         | 4.6%                          |
| Redwood         | 6,718         | 7,388         | 7,144         | 7,230         | 7,272         | 8.2%                          |
| Rock            | 3,680         | 4,095         | 3,963         | 4,137         | 4,262         | 15.8%                         |
| <b>Region 8</b> | <b>46,762</b> | <b>52,833</b> | <b>51,540</b> | <b>52,432</b> | <b>53,723</b> | <b>14.9%</b>                  |

Source: U.S. Census 1970, 1980, 1990, 2000, 2010

#### *Population by Household*

Pipestone County's population in households decreased slightly by 2.8 percent from 1990 to 2010. The U.S. Census defines households as the total number of occupied housing units, and household units as the total number of livable dwellings that are available. The downward trend in the number of households was less, with a decrease of 0.3 percent from 1990 to 2010.

As the result of the decreasing population, but relatively stable number of households, the persons per household decreased from 2.38 in 1990 to 2.32 in 2010. The change over that time period was a decrease of 2.5 percent. This might be partially due to the number of elderly living alone, which poses a number of concerns in regards to emergency preparedness.

The Housing Summary Table shows the number of householders living alone and the number of householders 65 years and over living alone. There are 1,306 householders living alone and 630 householders 65 years and over living alone.

**Figure #25**  
**Population by Household – Pipestone County**

|                                 | 2000  | 2010  | Percent Change<br>1990 - 2010 |
|---------------------------------|-------|-------|-------------------------------|
| <i>Population in Households</i> | 9,664 | 9,391 | -2.8%                         |
| <i>Households</i>               | 4,069 | 4,054 | -0.3%                         |
| <i>Persons Per Household</i>    | 2.38  | 2.32  | -2.5%                         |

Source: U.S. Census 2000, 2010

In Pipestone County 74.9 percent of occupied housing units are owner-occupied. Pipestone County has seen fluctuations in the number of owner-occupied housing units over the past four decades. From 1970

to 2010, Pipestone County has seen a 1.0 percent decrease in owner-occupied housing units. During that same time period, Region 8 as a whole saw a 4.6 percent decrease in owner-occupied housing units.

**Figure #26**  
**Housing Occupancy – Region 8**

|                 | Total Occupied | Owner -Occupied |
|-----------------|----------------|-----------------|
| County          | 2010           | 2010 (%)        |
| Cottonwood      | 4,912          | 79.6%           |
| Jackson         | 4,429          | 78.3%           |
| Lincoln         | 2,574          | 80.2%           |
| Lyon            | 10,227         | 66.5%           |
| Murray          | 3,717          | 82.6%           |
| Nobles          | 7,946          | 72.8%           |
| Pipestone       | 4,054          | 74.9%           |
| Redwood         | 6,580          | 78.0%           |
| Rock            | 3,918          | 77.4%           |
| <b>Region 8</b> | <b>48,357</b>  | <b>74.9%</b>    |

Source: U.S. Census 2010

**Figure #27**  
**Owner- Occupied Housing Occupancy – Region 8**

| County          | 1970          | 1980          | 1990          | 2000          | 2010          | Percent Change<br>1970 – 2010 |
|-----------------|---------------|---------------|---------------|---------------|---------------|-------------------------------|
| Cottonwood      | 3,760         | 4,243         | 3,925         | 3,955         | 3,757         | -0.1%                         |
| Jackson         | 3,356         | 3,781         | 3,477         | 3,601         | 3,466         | 3.3%                          |
| Lincoln         | 2,131         | 2,323         | 2,161         | 2,130         | 2,063         | -3.2%                         |
| Lyon            | 5,107         | 6,203         | 6,207         | 6,643         | 6,799         | 33.1%                         |
| Murray          | 2,821         | 3,181         | 2,982         | 3,135         | 3,070         | 8.8%                          |
| Nobles          | 5,161         | 5,928         | 5,791         | 5,955         | 5,783         | 12.1%                         |
| Pipestone       | 3,066         | 3,358         | 3,129         | 3,173         | 3,035         | -1.0%                         |
| Redwood         | 4,587         | 5,252         | 5,055         | 5,328         | 5,135         | 11.9%                         |
| Rock            | 2,519         | 2,868         | 2,826         | 2,994         | 3,031         | 20.3%                         |
| <b>Region 8</b> | <b>32,508</b> | <b>37,137</b> | <b>35,553</b> | <b>36,914</b> | <b>31,009</b> | <b>-4.6%</b>                  |

Source: U.S. Census 1970, 1980, 1990, 2000, 2010

The trend of renter-occupied units in Pipestone County was similar with the owner-occupied units in that they have both been relatively stable. From 1970 to 2010, the percentage change in renter-occupied housing units increased by 2.3 percent (23 actual units). The demand for renter-occupied housing units may increase as the population ages and moves from owner-occupied housing units to assisted living facilities and other rental facilities.

**Figure #28**  
**Renter – Occupied Housing Occupancy – Region 8**

| County          | 1970          | 1980          | 1990          | 2000          | 2010          | Percent Change<br>1970 - 2010 |
|-----------------|---------------|---------------|---------------|---------------|---------------|-------------------------------|
| Cottonwood      | 1,053         | 1,233         | 1,134         | 962           | 1,003         | -4.7%                         |
| Jackson         | 1,193         | 1,207         | 1,083         | 955           | 963           | -19.3%                        |
| Lincoln         | 448           | 605           | 543           | 523           | 511           | 14.1%                         |
| Lyon            | 1,930         | 2,476         | 2,866         | 3,072         | 3,428         | 77.6%                         |
| Murray          | 897           | 855           | 776           | 587           | 647           | -27.9%                        |
| Nobles          | 1,864         | 1,886         | 1,892         | 1,984         | 2,163         | 16.0%                         |
| Pipestone       | 996           | 999           | 949           | 896           | 1,019         | 2.3%                          |
| Redwood         | 1,579         | 1,600         | 1,499         | 1,346         | 1,445         | -8.5%                         |
| Rock            | 975           | 987           | 928           | 849           | 887           | -9.0%                         |
| <b>Region 8</b> | <b>10,935</b> | <b>11,848</b> | <b>11,670</b> | <b>11,174</b> | <b>10,622</b> | <b>-2.9%</b>                  |

Source: U.S. Census 1970, 1980, 1990, 2000, 2010

#### 4.6.2 Vacant Housing Units

The 1970 U.S. Census reported that Pipestone County had 224 vacant housing units. This number increased by 54, to 278 units from 1970 to 1980. The number of vacant housing units increased again from 1980 to 1990 by 31 units to 309. The number of vacant housing units continued to rise in 2000 and 2010, at 365 and 429 vacant units, respectively.

In 1990, the Census Bureau began to separate owner and renter vacant housing units. The combined percentages of the new data are higher than the actual vacant units year round. The numbers include unoccupied units for sale and housing used for seasonal, recreational, or occasional use. The rise of vacant housing units from 1970 to 1990 is mainly contributed to the decrease in rural population in Pipestone County and other rural counties.

**Figure #29**  
**Vacant Housing – Region 8**

| County          | 1970         | 1980         | 1990         | 2000         | 2010         | Percent Change<br>1970 - 2010 |
|-----------------|--------------|--------------|--------------|--------------|--------------|-------------------------------|
| Cottonwood      | 317          | 318          | 435          | 459          | 507          | 59.9%                         |
| Jackson         | 322          | 379          | 561          | 536          | 561          | 74.2%                         |
| Lincoln         | 280          | 324          | 346          | 390          | 534          | 90.7%                         |
| Lyon            | 484          | 512          | 602          | 583          | 871          | 80.0%                         |
| Murray          | 463          | 445          | 853          | 635          | 839          | 81.2%                         |
| Nobles          | 350          | 383          | 411          | 526          | 589          | 68.3%                         |
| Pipestone       | 224          | 278          | 309          | 365          | 429          | 91.5%                         |
| Redwood         | 520          | 523          | 590          | 556          | 692          | 33.1%                         |
| Rock            | 182          | 239          | 209          | 294          | 344          | 89.0%                         |
| <b>Region 8</b> | <b>3,142</b> | <b>3,401</b> | <b>4,316</b> | <b>4,344</b> | <b>5,366</b> | <b>70.8%</b>                  |

Source: U.S. Census 1970, 1980, 1990, 2000, 2010

In 2010, 9.6 percent of the housing units in Pipestone County were vacant, which was about average in Region 8. The percentage of a county's housing units being vacant adversely affects preparing for and cleaning up after a disaster.

**Figure #30**  
**Percent Vacant – Region 8**

| County          | 1970        | 1980        | 1990        | 2000        | 2010        |
|-----------------|-------------|-------------|-------------|-------------|-------------|
| Cottonwood      | 6.6%        | 5.8%        | 8.6%        | 8.5%        | 9.4%        |
| Jackson         | 7.1%        | 7.6%        | 12.3%       | 10.5%       | 11.2%       |
| Lincoln         | 10.9%       | 11.1%       | 12.8%       | 12.8%       | 17.2%       |
| Lyon            | 6.9%        | 5.9%        | 6.6%        | 5.7%        | 7.8%        |
| Murray          | 12.5%       | 11.0%       | 22.7%       | 14.6%       | 18.4%       |
| Nobles          | 5.0%        | 4.9%        | 5.3%        | 6.2%        | 6.9%        |
| Pipestone       | 5.5%        | 6.4%        | 7.6%        | 8.2%        | 9.6%        |
| Redwood         | 8.4%        | 7.6%        | 9.0%        | 7.7%        | 9.5%        |
| Rock            | 5.2%        | 6.2%        | 5.6%        | 7.1%        | 8.1%        |
| <b>Region 8</b> | <b>7.1%</b> | <b>6.8%</b> | <b>8.9%</b> | <b>8.1%</b> | <b>9.7%</b> |

Source: U.S. Census 1970, 1980, 1990, 2000, 2010

#### *Housing Unit Value*

Pipestone County has a median housing unit value of \$85,100 – the third lowest in Region 8. The cost of a disaster is potentially less in Pipestone County when compared to Region 8 averages.

**Figure #31**  
**Median Housing Unit Value – Region 8**

| County          | Median Housing Unit Value | Median Rent  |
|-----------------|---------------------------|--------------|
| Cottonwood      | \$81,800                  | \$454        |
| Jackson         | \$100,300                 | \$543        |
| Lincoln         | \$76,300                  | \$477        |
| Lyon            | \$136,300                 | \$543        |
| Murray          | \$90,000                  | \$521        |
| Nobles          | \$97,200                  | \$554        |
| Pipestone       | \$85,100                  | \$576        |
| Redwood         | \$88,300                  | \$557        |
| Rock            | \$99,200                  | \$567        |
| <b>Region 8</b> | <b>\$100,904</b>          | <b>\$538</b> |

Source: U.S. Census 2010



**Figure #32**  
**Housing Summary: 2010 – Pipestone County**

| <b>Subject</b>                            | <b>Number</b> | <b>Percent</b> |
|-------------------------------------------|---------------|----------------|
| <b>Total Population</b>                   |               |                |
| In Households                             | 9,391         | 97.9%          |
| In Group Quarters                         | 205           | 2.1%           |
|                                           |               |                |
| <b>Total Households</b>                   |               |                |
| Family Households                         | 2,573         | 63.5%          |
| Non Family Households                     | 1,481         | 36.5%          |
| Householder Living Alone                  | 1,306         | 32.2%          |
| Households 65 years and over living Alone | 630           | 15.5%          |
| Households with Individuals under 18      | 1,173         | 28.9%          |
| Households with Individuals 65 and over   | 1,264         | 31.2%          |
| Average Household Size                    | 2.32          | (X)            |
|                                           |               |                |
| <b>Units in Structure</b>                 |               |                |
| 1 unit, detached                          | 3,615         | 81.1%          |
| 1 unit, attached                          | 135           | 3.0%           |
| 2 units                                   | 119           | 2.7%           |
| 3 or 4 units                              | 108           | 2.4%           |
| 5 to 9 units                              | 78            | 1.7%           |
| 10 to 19 units                            | 83            | 1.9%           |
| 20 or more units                          | 215           | 4.8%           |
| Mobile Home                               | 95            | 2.1%           |
|                                           |               |                |
| <b>Vehicles Available</b>                 |               |                |
| None                                      | 236           | 5.9%           |
| 1 Vehicle                                 | 1,303         | 32.7%          |
| 2 Vehicles                                | 1,431         | 36.0%          |
| 3 or more                                 | 1,010         | 25.4%          |
|                                           |               |                |
| <b>House Heating Fuel</b>                 |               |                |
| Utility Gas                               | 1,802         | 45.3%          |
| Bottled, tank, or LP gas                  | 1,093         | 27.5%          |
| Electricity                               | 659           | 16.6%          |
| Fuel oil, kerosene, etc.                  | 246           | 6.2%           |
| Coal or coke                              | 11            | 0.3%           |
| Wood                                      | 69            | 1.7%           |
| Solar Energy                              | 1             | 0.0%           |
| Other fuel                                | 58            | 1.5%           |
| No fuel used                              | 41            | 1.0%           |
|                                           |               |                |
| <b>Selected Characteristics</b>           |               |                |

|                                      |    |      |
|--------------------------------------|----|------|
| Lacking complete plumbing facilities | 21 | 0.5% |
| Lacking complete kitchen facilities  | 77 | 1.9% |
| No telephone service                 | 60 | 1.5% |

Source: U.S. Census 2010 and 2006-2010 ACS

## 4.7 Employment

Pipestone County had an estimated employment of 4,446 persons in 2016, including 3,536 employments by private ownership and 909 employments by government ownership. The two largest employers by industry were the Education and Health Services Industry and Trade, Transportation and Utilities Industry, followed by the Manufacturing Industry. The industry cohort Natural Resources and Mining including Agricultural, Forestry, Fishing, Hunting and Mining, is estimated to be higher, but self-employed farms workers are not reported in Department of Employment and Economic Development figures.<sup>12</sup>

**Figure #33**  
**Employment by Industry – Pipestone County**

| Industry                            | 2000         | 2010         | 2016         |
|-------------------------------------|--------------|--------------|--------------|
| Natural Resources and Mining        | 148          | 294          | 409          |
| Construction                        | 166          | 144          | 312          |
| Manufacturing                       | 825          | 470          | 439          |
| Trade, Transportation and Utilities | 978          | 971          | 974          |
| Information                         | 78           | 67           | 62           |
| Financial Activities                | 205          | 117          | 129          |
| Professional and Business Services  | 88           | 221          | 248          |
| Education and Health Services       | 1,012        | 1,265        | 1,185        |
| Leisure and Hospitality             | 420          | 380          | 303          |
| Other Services                      | 65           | 123          | 115          |
| Public Administration               | 216          | 236          | 268          |
| <b>All Industries</b>               | <b>4,203</b> | <b>4,287</b> | <b>4,446</b> |

Source: Department of Employment and Economic Development

Agriculture is a significant driving force in Pipestone County. The USDA 2012 Census of Agriculture showed that there were 637 farms in Pipestone County in 2012, 6 percent less than in 2002. In 2012, the average farm size was 380 acres, and the average farm reported sales of \$483,356. There were 241,970 acres of farm land in production in Pipestone County.<sup>13</sup> In 2012, the market value of agricultural products sold in Pipestone County was \$307,898,000. Between 2007 and 2012, the market value of

<sup>12</sup> MN Department of Employment and Economic Development. Accessed 7/20/17. Available: <https://apps.deed.state.mn.us/lmi/qcew/AreaSel.aspx>

<sup>13</sup> USDA Census 2012, Pipestone County Profile. Accessed: 7/21/17. Available: [https://www.agcensus.usda.gov/Publications/2012/Online\\_Resources/County\\_Profiles/Minnesota/cp27117.pdf](https://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Minnesota/cp27117.pdf)

agricultural products sold in Pipestone County increased by 74 percent and the average per farm increased by 85 percent.

#### 4.7.1 Unemployment Trends

The unemployment rate in Pipestone County was 3.9 percent in 2012, while the State of Minnesota had an unemployment rate of 3.9 percent. From 2000 through 2016, the average unemployment rate was 4.3 percent for Pipestone County, 4.2 percent for Region 8, 4.9 percent for Minnesota, and 6.2 percent for the United States. The average unemployment rate for Pipestone County was slightly higher than Region 8, but lower than the state and national rates.

During the economic recession of 2008-2012, the average unemployment rate was 5.8 percent for Pipestone County, 5.3 percent for Region 8, 6.5 percent for the State of Minnesota, and 8.3 percent for the United States. Pipestone County fared significantly better during the recession than the State of Minnesota, and the United States.

One explanation for Pipestone County seeing significantly lower unemployment rates was the agriculture industry. Pipestone County is part of a strong agricultural region in Southwest Minnesota. About 2/3 of farmers list farming as their primary occupation. Pipestone County has a significant amount of livestock, including hogs and pigs, cattle, and sheep. The largest employers in Pipestone County are Pipestone Vet Clinic in the City of Pipestone and Fey Industries in Edgerton. There are other large employers including Pipestone County Medical Center, Good Samaritan Village, and J&B Group, among others. .

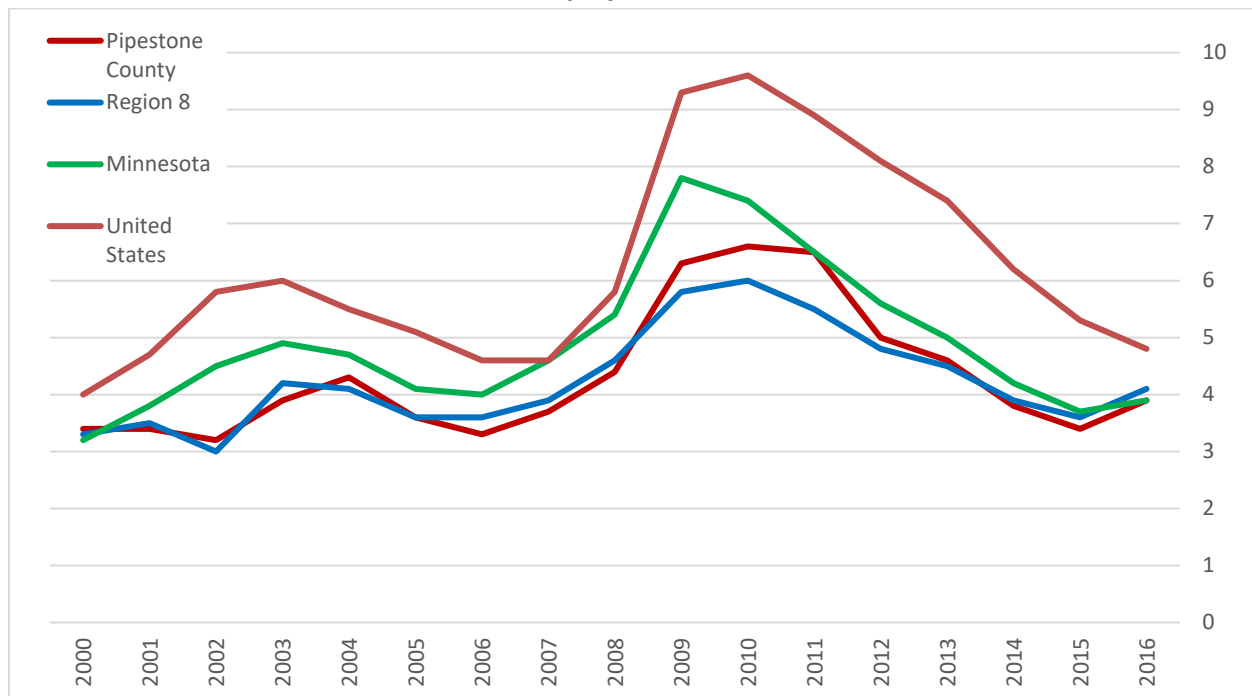
**Figure #34**  
**Unemployment Trends**

| Year | Pipestone County | Region 8 | Minnesota | United States |
|------|------------------|----------|-----------|---------------|
| 2016 | 3.9              | 4.1      | 3.9       | 4.8           |
| 2015 | 3.4              | 3.6      | 3.7       | 5.3           |
| 2014 | 3.8              | 3.9      | 4.2       | 6.2           |
| 2013 | 4.6              | 4.5      | 5.0       | 7.4           |
| 2012 | 5.0              | 4.8      | 5.6       | 8.1           |
| 2011 | 6.5              | 5.5      | 6.5       | 8.9           |
| 2010 | 6.6              | 6.0      | 7.4       | 9.6           |
| 2009 | 6.3              | 5.8      | 7.8       | 9.3           |
| 2008 | 4.4              | 4.6      | 5.4       | 5.8           |
| 2007 | 3.7              | 3.9      | 4.6       | 4.6           |
| 2006 | 3.3              | 3.6      | 4.0       | 4.6           |
| 2005 | 3.6              | 3.6      | 4.1       | 5.1           |
| 2004 | 4.3              | 4.1      | 4.7       | 5.5           |
| 2003 | 3.9              | 4.2      | 4.9       | 6.0           |

|         |     |     |     |     |
|---------|-----|-----|-----|-----|
| 2002    | 3.2 | 3.0 | 4.5 | 5.8 |
| 2001    | 3.4 | 3.5 | 3.8 | 4.7 |
| 2000    | 3.4 | 3.3 | 3.2 | 4.0 |
| Average | 4.3 | 4.2 | 4.9 | 6.2 |

Department of Employment and Economic Development & Bureau of Labor Statistics

**Figure #35**  
**Unemployment Trends**



#### 4.7.2 Household Income Levels

Changes in income are an indicator of the county's economic condition. Per Capita income is the mean income computed for every person in a specified geographic area. For household income, the median is based on the distribution of the total number of housing units, including those occupants with no income. According to the 2010 Census information, the median household income for Pipestone County was \$40,589, while the Region 8 average was \$44,360. Per capita income in Pipestone County was \$22,289, while Region 8 was \$23,192. The median family income was \$55,609, while Region 8 was \$57,072. In all three income examples, Pipestone County ranked lower than the Region 8 average.

**Figure #36**  
**Comparative County Income Levels – Region 8**

| County     | 2000<br>Median<br>Household<br>Income | 2010<br>Median<br>Household<br>Income | 2000<br>Per<br>Capita<br>Income | 2010<br>Per<br>Capita<br>Income | 2000<br>Median<br>Family<br>Income | 2010<br>Median<br>Family<br>Income |
|------------|---------------------------------------|---------------------------------------|---------------------------------|---------------------------------|------------------------------------|------------------------------------|
| Cottonwood | 31,943                                | 40,292                                | 16,647                          | 23,162                          | 40,237                             | 51,705                             |

|                 |                 |                 |                 |                 |                 |                 |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Jackson         | 36,746          | 46,869          | 17,499          | 25,144          | 43,426          | 59,238          |
| Lincoln         | 31,607          | 44,672          | 16,009          | 24,922          | 38,605          | 58,953          |
| Lyon            | 38,996          | 46,872          | 18,013          | 23,755          | 48,512          | 63,793          |
| Murray          | 34,966          | 45,657          | 17,936          | 24,045          | 40,893          | 54,647          |
| Nobles          | 35,684          | 43,040          | 16,987          | 20,953          | 43,076          | 52,356          |
| Pipestone       | 31,909          | 40,589          | 16,450          | 22,289          | 40,133          | 55,609          |
| Redwood         | 37,352          | 44,181          | 18,903          | 23,548          | 46,250          | 55,829          |
| Rock            | 38,102          | 45,411          | 17,411          | 23,079          | 44,296          | 58,147          |
| <b>Region 8</b> | <b>\$35,998</b> | <b>\$44,360</b> | <b>\$17,493</b> | <b>\$23,192</b> | <b>\$42,923</b> | <b>\$57,072</b> |

Source: U.S. Census 2000, 2010

## 4.8 EMERGENCY RESPONSE PROFILE

### 4.8.1 Introduction

A county's ability to respond to an emergency situation is based on service areas, facilities, equipment, and staff. An understanding of response times and abilities is critical for providing protection to Pipestone County residents. The existing facilities, equipment, and staff in Pipestone County are here to respond to local hazard events and provide regional support. These investments are critical in mitigating the effects of natural and other hazards and protecting lives, property, and other assets. The following summary and description serves as an inventory of the response facilities for Pipestone County. This Chapter profiles the emergency response capabilities of Pipestone County. Facilities included in the profile include:

- Law Enforcement
- Regional Assets
- Public Health
- Medical Facilities
- Ambulance Service
- Fire Departments
- Red Cross Shelters
- Sirens and other Emergency Notification Devices

### 4.8.2 Pipestone County Emergency Management

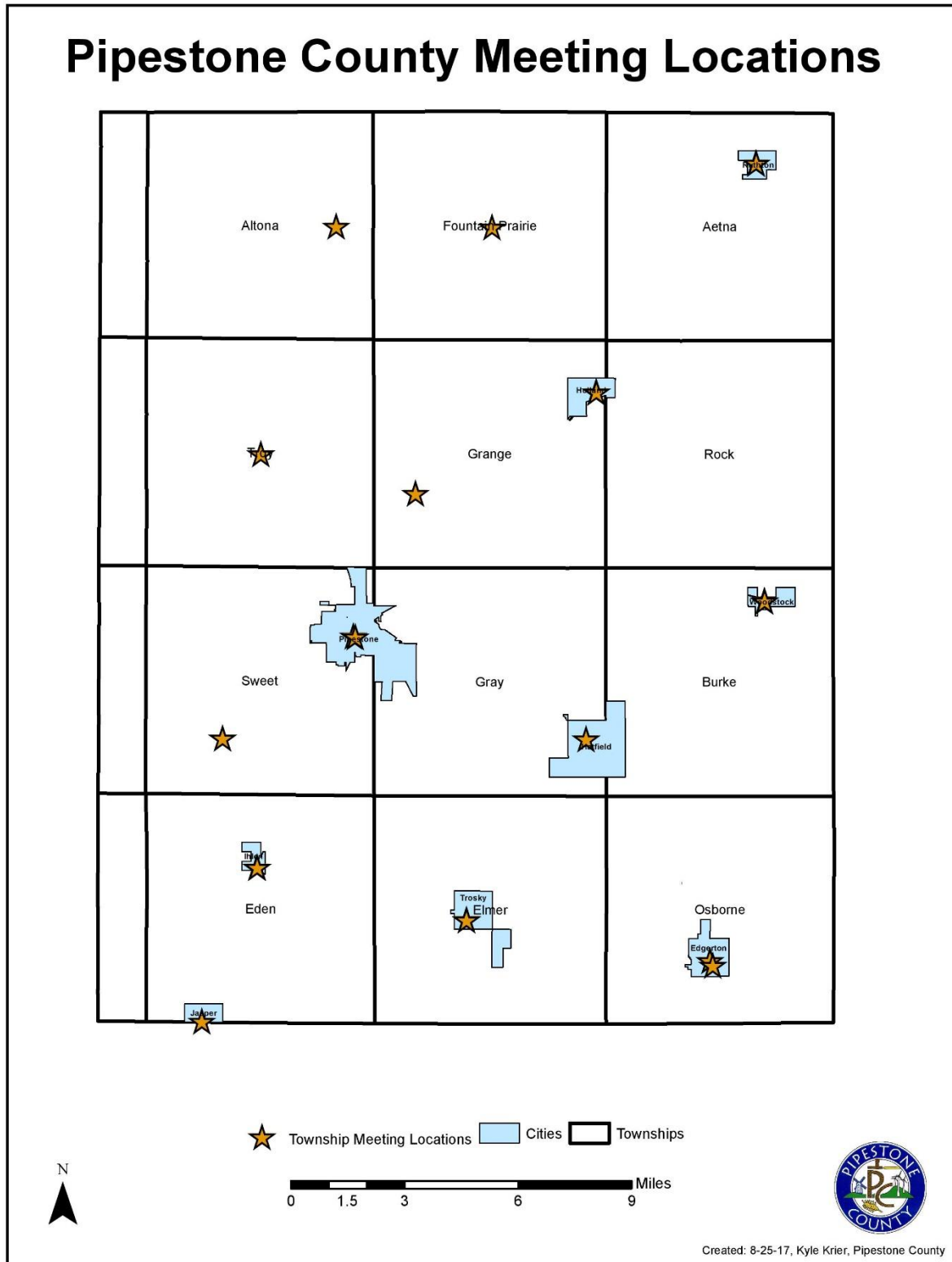
The Pipestone County Emergency Management Director administers the county-wide emergency management program in Pipestone County. The Director coordinates the emergency management functions of county and city governmental units assigned to various emergency management responsibilities. The Department and Director's duties also include the following:<sup>14</sup>

- Coordinating the emergency preparedness and homeland security efforts of the county
- Disaster planning and education
- Providing assistance to local jurisdictions and county agencies before, during and after disasters
- Mitigate disasters' effects, inform the public, and reduce the chances that such events can happen again where possible.
- Training, conducting drills, testing equipment, and coordinating activities with the community are other important functions.
  - Working with law enforcement and with neighboring jurisdictions to enhance homeland security and better prepare for and respond to incidents ranging from tornadoes to terrorism.
  - Work with many agencies and jurisdictions to coordinate information, training and equipment needed for protecting the county and the nation from acts of terrorism.

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<sup>14</sup> Pipestone County Emergency Management Department. Accessed 10/18/2017. Available: [http://www.pipestone-county.com/board/departments\\_offices/emergency\\_management.php](http://www.pipestone-county.com/board/departments_offices/emergency_management.php)

**Figure #37**  
**Township Halls – Pipestone County**



## 4.9 Profiling Emergency Response Capabilities

### *Emergency Operations Center*

The Pipestone County Emergency Management Office is located in the Emergency Services Building in Pipestone, which also houses the Pipestone County Ambulance Service.

#### 4.9.1 Law Enforcement

In Pipestone County the entire county is served by the Pipestone County Sheriff's Office. The mission of the Pipestone County Sheriff's Office is to "serve all people with respect, fairness, and sensitivity," "to protect the lives, property, and rights of all people," "to enforce the law impartially by providing quality service in partnership with the community," and "to attain the highest degree of ethical behavior and professional integrity at all times." The Sheriff's deputies patrol approximately 466 square miles, and contracts police services to all 9 incorporated cities of Pipestone County. Pipestone County Sheriff Deputies are affiliated with the Buffalo Ridge Drug Task Force (BRDTF), the National Association of School Resource Officers (NASRO), and the Southwest Minnesota/Northwest Iowa High Risk Entry and Arrest Team (Emergency Response Unit H.E.A.T.).

The Pipestone County Sheriff's Office houses the Pipestone County Jail. The Pipestone County Sheriff's Office currently has 1 sheriff, 1 chief deputy, 13 deputy sheriffs, 1 jail administrator, 12 dispatchers/jailers, and 1 administrative assistant. The patrol deputies provide law enforcement and other sheriff's services to the citizens of Pipestone County.

The Pipestone County Sheriff's Office also operates a county jail system. The Pipestone County jail is located in the City of Pipestone, and is connected to the Pipestone County Courthouse. The jail houses 19 beds. The Pipestone County 911 Emergency Dispatch and Communications Center is comprised of dedicated dispatchers who work 7 days a week, 24 hours a day, on a variety of shifts and are responsible for the dispatching of Law Enforcement, Fire, and EMS countywide. The Pipestone County jail provides for the safe, secure, and humane detention of offenders in Pipestone County. The Pipestone County Sheriff's Office responded to 10,730 calls for service during the year of 2016. For the year of 2017 they are on track to respond to approximately 11,304 calls for service. Those calls range from homicide, death investigations, fatal car crashes, domestic assaults, personal and non-personal injury vehicle crashes, neighbor disputes, civil disputes, animal nuisances, both human and animal well-being checks, alarm calls and a various amount of other calls for service.

Law enforcement agencies in Pipestone County are also supported by state and federal law enforcement agencies. Law enforcement can contact the MN Bureau of Criminal Apprehension (BCA) for felony crimes that have occurred in the county or for internal investigations. There are a number of other specialized law enforcement agencies that can provide assistance to Pipestone County.

#### 4.9.2 Regional Assets

There are a number of regional assets that are shared throughout southwest Minnesota in Emergency Management Region Five. These assets include: light towers, generators, cameras, livestock trailers, APX radios, computers, go kits, video tele-conferencing systems, cots, blankets, privacy screens, identification equipment, pet shelter equipment, and presentation equipment.



- Radio communications trucks – There are five radio communications trucks available.<sup>15</sup>
- Portable ARMER Tower

#### 4.9.3 Public Health

Pipestone County is part of the Southwest Health and Human Services (SWHHS) group. SWHHS provides services across six counties, serving Lincoln, Lyon, Murray, Pipestone, Redwood, and Rock Counties. Southwest Health and Human Services is a multi-county agency that is committed to strengthening individuals, families and communities by providing quality services in a respectful, caring and cost effective manner. SWHHS provides a number of services in regards to public health and welfare that include: social services, child support, financial assistance, and public health services.

- Social Services include: special needs adoption, adult and children’s mental health, adult and child protection, chemical health, developmental disabilities, foster care, child care assistance, individuals with disabilities/chronic illness, licensing of foster and child care providers, family services, and senior services.
- Child support assisting in establishing parentage, establishing court orders for child support, enforcing those orders, providing medical, dental and child care support, collecting and processing payments.
- Financial assistance services that determine eligibility for services ranging from cash assistance, food support, health care and emergency assistance.
- Public Health Services that assure a strong public health system, promote healthy families and communities, prevent the spread of infectious disease, make environments safe and healthy, prepare for disasters and emergencies, and help all people get quality health services.

#### 4.9.4 Medical Facilities

Medical facilities inventoried in Pipestone County consist of one hospital, four medical clinics, two nursing homes, five assisted living facilities, and three chiropractic clinics.

##### *Hospitals*

The hospitals in Pipestone County are the Pipestone County Medical Center Avera in Pipestone – a Level IV trauma center.

Patients in Pipestone County are also transferred to hospitals in the region. Other hospitals in the region include: Sanford Worthington Medical Center, Avera Marshall Regional Medical Center, Sanford USD Medical Center (Sioux Falls), and Avera McKennan Hospital (Sioux Falls).

##### *Clinics*

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<sup>15</sup> Minnesota Southwest ARES District. Accessed: 1/1/16. Available:  
<http://www.minnesotaares.org/ares/index.php/mn-ares-districts/2014-02-15-22-14-39>

There are four health clinics within Pipestone County that specialize in a variety of areas. The health clinics in Pipestone County include: Edgerton Family Clinic Avera, Jasper Family Clinic Avera, New Life Treatment Center in Woodstock, and Western Mental Health Center in Pipestone.

#### *Nursing Homes*

There are two nursing homes in Pipestone County. The nursing homes in Pipestone County include: Edgebrook Care Center (Edgerton) and Good Samaritan Society (Pipestone).

#### *Assisted Living Facilities*

There are five assisted living facilities in Pipestone County. The assisted living facilities in Pipestone County include: Jasper Sunrise Village, Hiawatha Manor (Pipestone) and Edgebrook Estates (Edgerton), Falls Landing Assisted Living (Pipestone), and Ridgeview Estates (Pipestone).

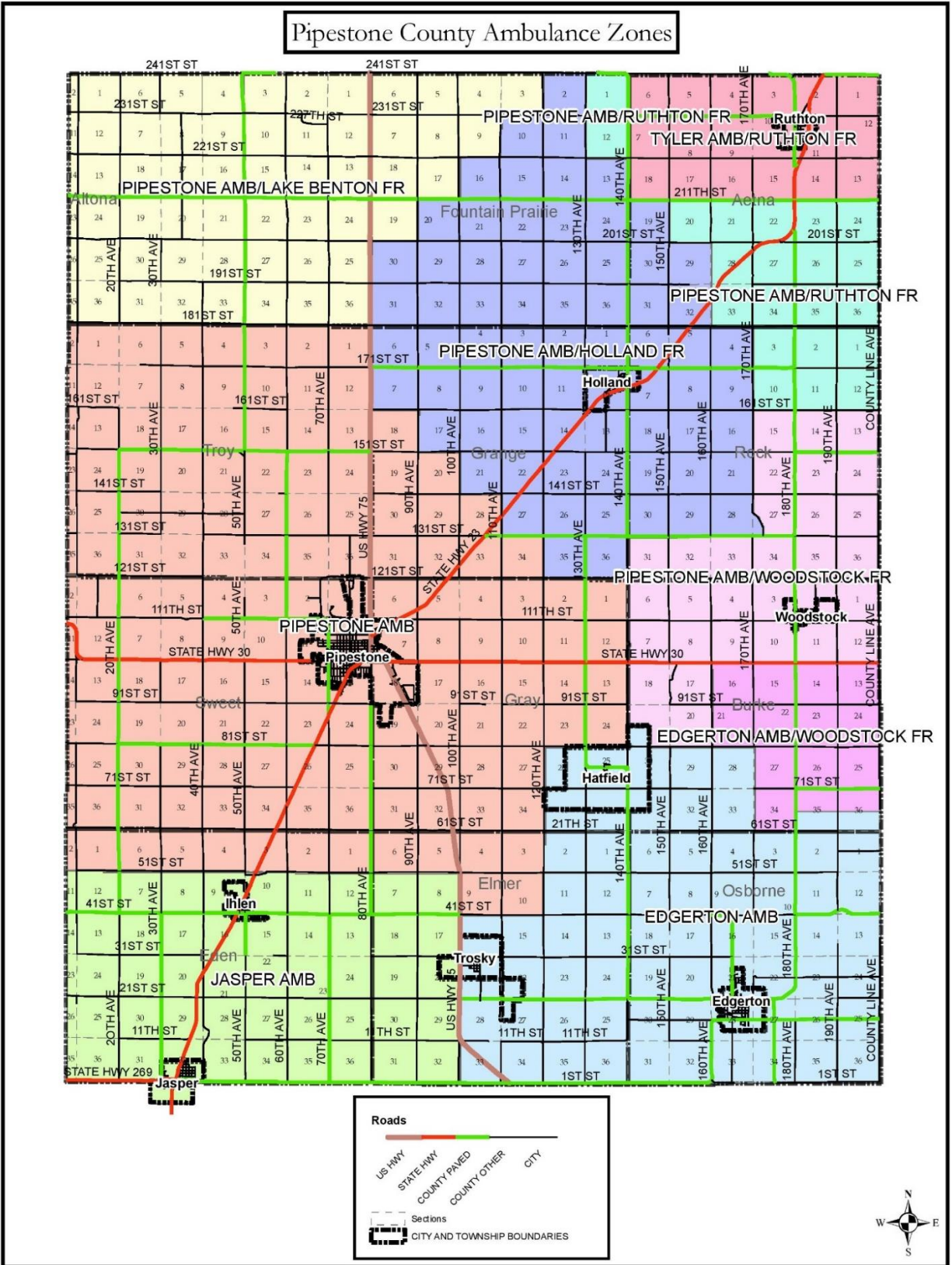
#### *Chiropractic Clinics*

There are four chiropractic clinics in Pipestone County. The chiropractic clinics in Pipestone County include: Edgerton Family Chiropractic, Pipestone Family Chiropractic, Keuhl Chiropractice, and Dynamic Health Ltd. (Pipestone).

#### **4.9.5 Ambulance Service**

There are six Ambulance Districts and First Responders headquartered in Pipestone County with two additional first responder and ambulance districts serving Pipestone County. Those headquartered in Pipestone County are Edgerton Ambulance, Holland First Responders, Pipestone Ambulance, Jasper Ambulance, Ruthton First Responders, and Woodstock First Responders. The two additional districts serving Pipestone County, but headquartered in Lincoln County are Lake Benton First Responders and Tyler Ambulance.

Figure #38  
Ambulance and First Responder Districts – Pipestone County



### *Edgerton Ambulance Service*

The Edgerton Ambulance Service covers the Cities of Edgerton, Hatfield, and Trosky, all of Osborne Township, and portions of Burke, Elmer, and Gray Townships (as well as the City of Chandler and Leota CDP and surrounding areas outside of Pipestone County). The Edgerton Ambulance Service is comprised of 22 EMTs. The Edgerton Ambulance Service went on 171 calls in 2015 and 137 calls in 2016. The majority of calls were medical followed by trauma.

For assistance, the Edgerton Ambulance Service relies on mutual aid. The Edgerton Ambulance Service has mutual aid agreements with Pipestone Ambulance, Jasper Ambulance, Murray County Ambulance, and Rock County Ambulance Services.

### *Holland First Responders*

The Holland First Responders Service covers the City of Holland and also portions of Fountain Prairie, Aetna, Rock, and Grange Townships. The Holland First Responders Service is comprised of 1 EMT and 9 First Responders. The Holland First Responders Service went on 7 calls in 2017 and 8 calls in 2018.

The Holland First Responders Service has a mutual aid agreement with the Ruthton First Responders.

### *Jasper Ambulance Service*

The Jasper Ambulance Service covers the Cities of Ihlen and Jasper and also portions of Eden and Elmer Townships (as well as portions of rural Rock County). The Jasper Ambulance Service is comprised of 10 EMTs and 1 First Responder. The Jasper Ambulance Service went on 85 calls in 2015 and 116 calls in 2016. The majority of calls were medical followed by trauma and interfacility transfers.

For assistance, the Jasper Ambulance Service relies on mutual aid. The Jasper Ambulance Service has mutual aid agreements with Pipestone Ambulance, Edgerton Ambulance, Rock County Ambulance, Dell Rapids (South Dakota) Ambulance, and Garretson (South Dakota) Ambulance Services.

### *Lake Benton First Responders*

The Lake Benton First Responders Service covers the City of Lake Benton, all of Altona Township in Pipestone County and portions of Fountain Prairie Township.

### *Pipestone Ambulance*

The Pipestone Ambulance Service covers the Cities of Holland, Pipestone, and Woodstock; all of Troy and Sweet Townships; and portions of Grange, Gray, Eden, and Elmer Townships. The Pipestone Ambulance Service is comprised of 22 EMTs and 5 Paramedics. The Pipestone Ambulance Service went on 925 calls in 2015 and 884 calls in 2016. The majority of calls were medical follow by trauma and interfacility transfers.

For assistance, the Pipestone Ambulance Service relies on mutual aid. The Pipestone Ambulance Service has mutual aid agreements with Edgerton Ambulance, Jasper Ambulance, Tyler Ambulance, Murray County Ambulance, and Rock County Ambulance Services.

### *Ruthton First Responders*

The Ruthton First Responders Service covers the City of Ruthton and portions of Aetna, Fountain Prairie, and Rock Townships. The Ruthton First Responders Service is comprised of 5 EMTs and 5 First Responders. The Ruthton First Responders Service went on 21 calls in 2017 and 17 calls in 2018.

The Ruthton First Responders Service has a mutual aid agreement with the Holland First Responders.

#### *Tyler Ambulance Service (Tyler EMS)*

The Tyler Ambulance Service covers the Cities of Tyler, Lake Benton, Verdi, Florence and Ruthton, as well as portions of Aetna Township in Pipestone County.

#### *Woodstock First Responders*

The Woodstock First Responders Service covers the City of Woodstock and also portions of Rock and Burke Townships. The Woodstock Ambulance Service is comprised of 12 First Responders. The Woodstock First Responders Service went on 29 calls in 2017 and 21 calls in 2018.

The Woodstock First Responders Service has a mutual aid agreement with the both Pipestone and Edgerton Ambulance Services.

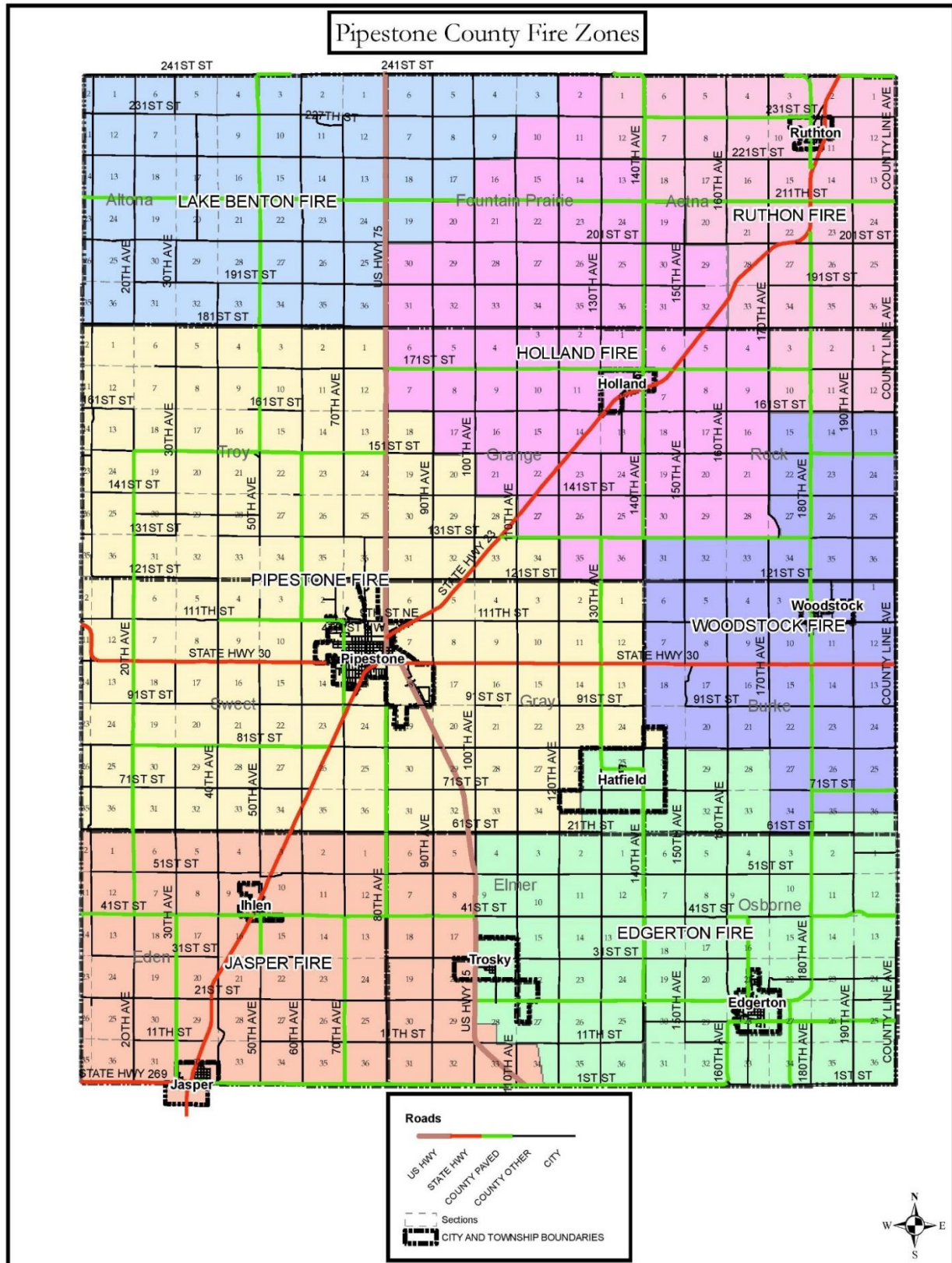
### **4.9.6 Fire/ Emergency Services**

There are 7 fire districts serving Pipestone County – 6 of which are headquartered within the county.

The primary fire districts include: Edgerton Fire District, Holland Fire District, Jasper Fire District, Pipestone Fire District, Ruthton Fire District, and Woodstock Fire District. Secondary fire districts include Lake Benton Fire District.



**Figure #39**  
**Fire District Map – Pipestone County**



There are no full time fire departments within Pipestone County. All fire departments are volunteer based with responsibilities being divided between the fire districts. The ten districts allow for response times to be reduced, but since Pipestone County is a rural county some areas are better served than other.

#### 4.9.7 Primary Fire Districts

##### *Edgerton Fire Department (Edgerton Fire District)*

The Edgerton Fire Department covers the Cities of Edgerton, Hatfield, and Trosky; all of Osborne Township; and portions of surrounding townships including: Burke, Gray, and Elmer. The Edgerton Fire Department consists of 23 volunteer fire fighters. The Edgerton Fire Department went on 22 calls in 2017 and 20 calls in 2018. The Edgerton Fire Department does have mutual aid agreements with surrounding fire departments, though none are formal.

##### *Holland Fire Department (Holland Fire District)*

The Holland Fire Department covers the City of Holland and portions of surrounding townships including: Fountain Prairie, Aetna, Grange, and Rock. The Holland Fire Department consists of 20 volunteer fire fighters. The Holland Fire Department went on 5 calls in 2017 and 9 calls in 2018. The Holland Fire Department does have mutual aid agreements with all fire departments in the SWRFDA, including all Pipestone County departments.

##### *Jasper Fire Department (Jasper Fire District)*

The Jasper Fire Department covers the Cities of Ihlen and Jasper, all of Eden Township, and portions of Elmer Township.

##### *Pipestone Fire Department (Pipestone Fire District)*

The Pipestone Fire Department covers the City of Pipestone, all of Troy and Sweet Townships, and portions of Gray and Grange Townships. The Pipestone Fire Department consists of 32 volunteer fire fighters. The Pipestone Fire Department went on 69 calls in 2015 and 56 in 2016. The Pipestone Fire Department does have mutual aid agreements with Jasper, Holland, Woodstock, and Edgerton Fire Departments in Pipestone County and Flandreau Fire Department in South Dakota.

##### *Ruthton Fire Department (Ruthton Fire District)*

The Ruthton Fire Department covers the City of Ruthton and portions of Fountain Prairie, Aetna, and Rock Townships. The Ruthton Fire Department consists of 18 volunteer fire fighters. The Ruthton Fire Department went on 11 calls in both 2017 and 2018. The Ruthton Fire Department does have aid agreements with every Pipestone County fire department and the Balaton Fire Department.

Needs: The Ruthton Fire Department is in need a of new pumper truck.

##### *Woodstock Fire Department (Woodstock Fire District)*

The Woodstock Fire Department covers the City of Woodstock and portions of Burke and Rock Townships.

#### 4.9.8 Secondary Fire Districts

##### *Lake Benton Fire Department (Lake Benton Fire District)*

The Lake Benton Fire Department covers the City of Lake Benton, all of Altona Township, and portions of Fountain Prairie Township.

#### 4.9.10 Red Cross Shelters

American Red Cross Southwest Minnesota Chapter serves communities across Yellow Medicine, Lincoln, Lyon, Redwood, Renville, McLeod, Sibley, Nicollet, Blue Earth, Watonwan, Brown, Cottonwood, Murray, Pipestone, Rock, Nobles, Lyon, Martin and Faribault counties, covering the nine counties in Southwest Minnesota. There are three shelter trailers; one is in Marshall, one is in Worthington and one is in Pipestone. The American Red Cross Southwest Minnesota Chapter is an Emergency Support Function (ESF) #6 and #15.

ESF #6 is responsible for Mass Care, Emergency Assistance, Housing, and Human Services. ESF #6 coordinates the delivery of federal mass care, emergency assistance, housing, and human services when local, tribal, and state response and recovery needs exceed their capabilities.<sup>16</sup>

- *Mass Care* - Includes sheltering, feeding operations, emergency first aid, bulk distribution of emergency items, and collecting and providing information on victims to family members.
- *Emergency Assistance*: Assistance required by individuals, families, and their communities to ensure that immediate needs beyond the scope of the traditional “mass care” services provided at the local level are addressed. These services include: support to evacuations (including registration and tracking of evacuees); reunification of families; provision of aid and services to special needs populations; evacuation, sheltering, and other emergency services for household pets and service animals; support to specialized shelters; support to medical shelters; nonconventional shelter management; coordination of donated goods and services; and coordination of voluntary agency assistance.
- *Housing* - Includes housing options such as rental assistance, repair, loan assistance, replacement, factory-built housing, semi-permanent and permanent construction, referrals, identification and provision of accessible housing, and access to other sources of housing assistance. This assistance is guided by the National Disaster Housing Strategy.
- *Human Services* - Includes the implementation of disaster assistance programs to help disaster victims recover their non-housing losses, including programs to replace destroyed personal property, and help to obtain disaster loans, food stamps, crisis counseling, disaster unemployment, disaster legal services, support and services for special needs populations, and other Federal and State benefits.

Emergency Support Function (ESF) #15 ensures that sufficient federal assets are deployed to the field during incidents requiring a coordinated federal response to provide accurate, coordinated, timely, and accessible information to affected audiences, including governments, media, the private sector, and the local populace, including the special needs population. ESF #15 provides the resource support and

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<sup>16</sup> FEMA. Accessed: 4/16/14. Available: <http://www.fema.gov/pdf/emergency/nrf/nrf-esf-06.pdf>



mechanisms to implement the National Response Framework (NRF) Incident Communications Emergency Policy and Procedures (ICEPP) described in the Public Affairs Support Annex.<sup>17</sup>

#### 4.9.11 Sirens and other Emergency Notification Devices

Outdoor warning sirens provide coverage in cities and other more densely populated areas within Pipestone County. The emergency sirens are radio-controlled by Pipestone County Dispatchers (with the exception of Ruthton's manually-operated siren) to warn residents in the event of severe weather. Pipestone County is a rural county, so large portions of the county are outside the range of severe weather warning sirens. Refer to Figure #83 for outdoor warning siren coverage and needs in Pipestone County.

Since Pipestone County is a rural county, additional measures are in place to expand the notification system. Emergency warnings over the radio are still an effective medium to reach wide audiences. NOAA Weather Radio is used for broadcasting severe weather warnings. NOAA Weather Transmitters are located in Fulda (WNG702), Jeffers (KX131), Russell (KX150), and Sioux Falls (WXM28).

Pipestone County selected CodeRed Community Notification System as their emergency response system. CodeRED is an emergency notification service that allows emergency officials to notify residents and businesses by telephone, cell phone, text message, email and social media regarding time-sensitive general and emergency notifications.

Pipestone Area Public School District and Edgerton Public Schools use Honeywell Instant Alerts for their emergency alert systems.

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<sup>17</sup> FEMA. Accessed: 4/16/14. Available: <https://www.hSDL.org/?view&did=483049>

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# Section 5 – Risk Assessment

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The goal of mitigation is to reduce the future impacts of a hazard including loss of life, property damage, disruption to local and regional economies, and the expenditure of public and private funds for recovery. Sound mitigation practices must be based on sound risk assessment. A risk assessment involves quantifying the potential loss resulting from a disaster by assessing the vulnerability of buildings, infrastructure, and people.

Basing risk assessments on the best information available is important in developing effective mitigation actions that benefit communities. Geographic Information System (GIS) tools are not only helpful in producing maps, but they also show structures at risk and may determine damage estimates for potential hazard scenarios. MN Homeland Security and Emergency Management (HSEM) mitigation staff encourages the use of GIS tools in risk assessments because they produce good information to be used in the risk assessment process. In recognition of the importance of planning in mitigation activities, FEMA created **Hazards USA Multi-Hazard (Hazardus-MH)**, a powerful GIS-based disaster risk assessment tool. This tool enables communities to predict estimated losses from floods, hurricanes and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses. Hazardus-MH was used by University of Minnesota Duluth Geospatial Analysis Center staff in the flood hazard risk assessment.

This assessment identifies the characteristics and potential consequences of a disaster, how much of the community could be affected by a disaster, and the impact on community assets. A risk assessment consists of 3 components — hazard identification, risk profile, and vulnerability profile. The last step is the risk ranking for each jurisdiction.

## 5.1 Hazard Identification/Profile

### 5.1.1 Hazard Identification

The cornerstone of the risk assessment is identification of the hazards that affect jurisdictions. To facilitate the planning process, several sources were employed to ensure that the natural hazards are identified prior to assessment.

The County maintenance of the plan includes continual updates of the hazards identified in the initial plan. The mitigation planning team decided to compare the hazards in the initial plan to the current publications to determine if new hazards should be considered or if some should be deleted.

Natural hazards are identified in the FEMA publication “Multi-Hazard Identification and Risk Assessment – A Cornerstone of the National Mitigation Strategy” also known as MHIRA. FEMA Region V developed a list based on state mitigation plans in the region. The list was divided into natural (Figure #40) and other hazards (Figure #41) as was done in the 2014 Minnesota State Hazard Mitigation Plan.

**Figure #40**  
**FEMA MHIRA Natural Hazards in the 2014 Minnesota State Hazard Mitigation Plan**

|                   |                                     |              |
|-------------------|-------------------------------------|--------------|
| Flooding          | Hail                                | Drought      |
| Dam/Levee Failure | Lightning                           | Extreme Heat |
| Wildfire*         | Winter Storms                       | Extreme Cold |
| Windstorms        | Erosion                             | Earthquakes  |
| Tornadoes         | Land Subsidence (Sinkholes & Karst) |              |

*\*Addressed in the State Mitigation Plan because Minnesota is a heavily forested state compared to other states in Region V.*

For the purpose of this plan, FEMA defines other hazards or “man-made hazards” as technological hazards and terrorism. These are distinct from natural hazards primarily in that they originate from human activity. In contrast, while the risks presented by natural hazards may be increased or decreased as a result of human activity, they are not inherently human-induced. The term “technological hazards” refers to the origins of incidents that can arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials. For the sake of simplicity, this guide assumes that technological emergencies are accidental and that their consequences are unintended. The term “terrorism” refers to intentional, criminal, and malicious acts. There is no single, universally accepted definition of terrorism, and it can be interpreted in many ways. For the purposes of this plan, FEMA refers to “terrorism” as the use of Weapons of Mass Destruction (WMD), including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous materials releases; and “cyber terrorism.”

**Figure #41**  
**FEMA MHIRA Other Hazards in the 2014 Minnesota State Hazard Mitigation Plan**

|                                 |                                    |                                                |
|---------------------------------|------------------------------------|------------------------------------------------|
| Terrorism                       | Nuclear Generating Plant Incidents | Ground and Surface Water Supply Contamination* |
| Infectious Disease Outbreak     | Hazardous Materials Incidents      |                                                |
| Fires (Structures and Vehicles) | Transportation Incidents           |                                                |

*\*Addressed in the State Hazard Mitigation Plan because Minnesota has made a high investment in its prized resource, water.*

### 5.1.2 Vulnerability Assessment by Jurisdiction

The planning team met multiple times to review and update the hazards faced by residents of Pipestone County, update the existing mitigation actions published in the 2010 All Hazard Mitigation Plan, and propose new mitigation actions.

To engage in this process the planning team drew on a number of data sources. First, the planning team examined the hazards identified in the 2010 Pipestone County Hazard Mitigation Plan (Figure #42). The existing mitigation actions were discussed and adjusted to reflect the definitions of natural hazards used in the State of Minnesota 2014 Multi-Hazard Identification and Risk Assessment list of natural hazards. This was done in order to assure that the risks faced by Pipestone County were categorized the same way as the priority hazards established by the State of Minnesota.

**Figure #42**  
**Hazards Included in the 2010 Pipestone County All Hazard Mitigation Plan**

| Natural Hazards                     |                                   |                                       |
|-------------------------------------|-----------------------------------|---------------------------------------|
| Ag Disease                          | Blizzards and Winter Storms       | Drought                               |
| Fire (wildfire and structures)      | Flooding/Dam Failure              | Severe Summer Storms, Lightning, Hail |
| Tornado & Straight-line Winds       |                                   |                                       |
| Technological/Man-made Hazards      |                                   |                                       |
| Domestic Preparedness and Terrorism | Hazardous Materials and Meth Labs | Public Health Emergencies             |
| Transportation Infrastructure       |                                   |                                       |

While the AHMP mainly deals with natural hazards, this planning took place with the understanding that many non-natural hazards could occur as a result of natural disasters (i.e. disruption in electrical service due to freezing rain causing problems for both utility corporations and vulnerable populations dependent on electricity for heat).

This plan draws on a variety of data sources including the State of Minnesota and Homeland Security Emergency Management Critical Infrastructure Strategy for the State of Minnesota (2010), FEMA’s Local Mitigation Planning How-to Guide Integrating Manmade Hazards into Mitigation Planning (2003), and the State of Minnesota Multi Hazards Identification Risk Assessment.

Based on the planning team’s comparison of these two sets of hazards, the planning team developed a list of hazards faced by Pipestone County to address in the 2019 plan update (**Error! Reference source not found. #43**).

**Figure #43**  
**Hazards Included in the 2019 Murray County All Hazard Mitigation Plan Update**

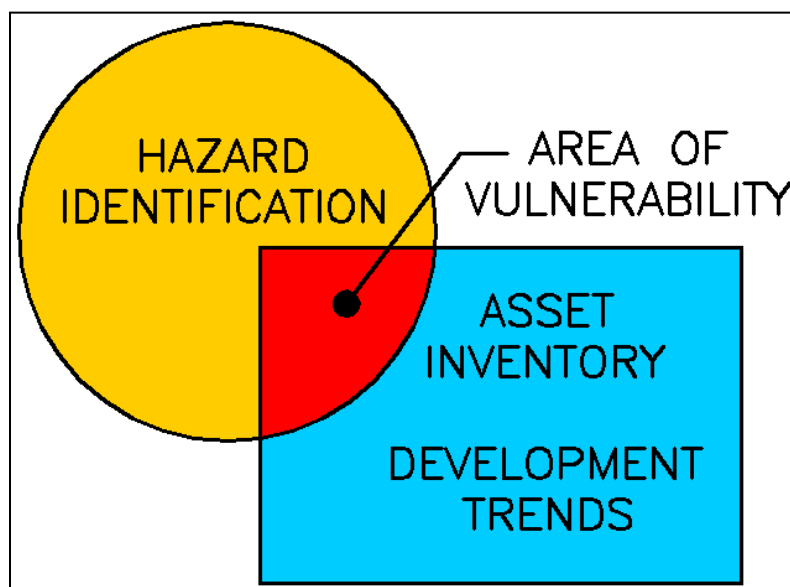
| Natural Hazards                                |                                       |                                    |
|------------------------------------------------|---------------------------------------|------------------------------------|
| Earthquake                                     | Severe Winter Storms                  | Drought                            |
| Extreme Temperatures                           | Wildfire                              | Flooding                           |
| Tornado & Severe Winds                         | Severe Summer Storms, Lightning, Hail | Erosion                            |
| Man-made Hazards                               |                                       |                                    |
| Civil Disturbance                              | Dam, Impoundment, Culvert Failure     | Hazardous Materials                |
| Public Health & Infectious Disease Emergencies | Structure Fires                       | Agricultural Disease (animal/crop) |
| Transportation Infrastructure                  | Utility Failure                       |                                    |

The committee drew on the 2018 Pipestone County Calculated Priority Risk Index (CPRI) rankings to prioritize each hazard for inclusion in the plan. The methodology of the CPRI is outlined below.

### 5.1.3 Calculated Priority Risk Index

The vulnerability assessment builds upon the previously developed hazard information by identifying the community assets and development trends and intersecting them with the hazard profiles to assess the potential amount of damage that could be caused by each hazard event. This concept is generally illustrated in Figure #44. A summary of Calculated Priority Risk Index (CPRI) Categories and Risk Levels is shown in Figure #45.

**Figure #44**  
**Conceptual Depiction of a Vulnerability Analysis**



#### *Definitions of CPRI Categories in Figure #45*

**Probability** – a guide to predict how often a random event will occur. Annual probabilities are expressed between 0.001 or less (low) up to 1 (high). An annual probability of 1 predicts that a natural hazard will occur at least once per year.

**Magnitude/Severity** – indicates the impact to a community through potential fatalities, injuries, property losses, and/or losses of services. The vulnerability assessment gives information that is helpful in making this determination for each community.

**Warning Time** – plays a factor in the ability to prepare for a potential disaster and to warn the public. The assumption is that more warning time allows for more emergency preparations and public information.

**Duration** – relates to the span of time local, state, and/or federal assistance will be necessary to prepare, respond, and recover from a potential disaster event.

**Figure #45**  
**Summary of Calculated Priority Risk Index (CPRI) Categories and Risk Levels**

| CPRI Category      | DEGREE OF RISK     |                                                                                                                                                                                                                                                                                                                        |             | Assigned Weighting Factor |
|--------------------|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------------------|
|                    | Level ID           | Description                                                                                                                                                                                                                                                                                                            | Index Value |                           |
| Probability        | Unlikely           | Extremely rare with no documented history of occurrences or events. Annual probability of less than 0.001                                                                                                                                                                                                              | 1           | 45%                       |
|                    | Possible           | Rare occurrences with at least one documented or anecdotal historic event. Annual probability that is between 0.01 and 0.001.                                                                                                                                                                                          | 2           |                           |
|                    | Likely             | Occasional occurrences with at least two or more documented historic events. Annual probability that is between 0.1 and 0.01.                                                                                                                                                                                          | 3           |                           |
|                    | Highly Likely      | Frequent events with a well-documented history of occurrence. Annual probability that is greater than 0.1.                                                                                                                                                                                                             | 4           |                           |
| Magnitude/Severity | Negligible         | Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure). Injuries or illnesses are treatable with first aid and there are no deaths. Negligible quality of life lost. Shutdown of critical facilities for less than 24 hours.                                            | 1           | 30%                       |
|                    | Limited            | Slight property damages (greater than 5% and less than 25% of critical and non-critical facilities and infrastructure). Injuries or illnesses do not result in permanent disability and there are no deaths. Moderate quality of life lost. Shut down of critical facilities for more than 1 day and less than 1 week. | 2           |                           |
|                    | Critical           | Moderate property damages (greater than 25% and less than 50% of critical and non-critical facilities and infrastructure). Injuries or illnesses result in permanent disability and at least one death. Shut down of critical facilities for more than 1 week and less than 1 month.                                   | 3           |                           |
|                    | Catastrophic       | Severe property damages (greater than 50% of critical and non-critical facilities and infrastructure). Injuries or illnesses result in permanent disability and multiple deaths. Shut down of critical facilities for more than 1 month.                                                                               | 4           |                           |
| Warning Time       | Less than 6 hours  | Self-explanatory.                                                                                                                                                                                                                                                                                                      | 4           | 15%                       |
|                    | 6 to 12 hours      | Self-explanatory.                                                                                                                                                                                                                                                                                                      | 3           |                           |
|                    | 12 to 24 hours     | Self-explanatory.                                                                                                                                                                                                                                                                                                      | 2           |                           |
|                    | More than 24 hours | Self-explanatory.                                                                                                                                                                                                                                                                                                      | 1           |                           |
| Duration           | Less than 6 hours  | Self-explanatory.                                                                                                                                                                                                                                                                                                      | 1           | 10%                       |
|                    | Less than 24 hours | Self-explanatory.                                                                                                                                                                                                                                                                                                      | 2           |                           |
|                    | Less than one week | Self-explanatory.                                                                                                                                                                                                                                                                                                      | 3           |                           |
|                    | More than one week | Self-explanatory                                                                                                                                                                                                                                                                                                       | 4           |                           |

The prioritized list of hazards is presented in Figure 46 and is based on the ranking of hazards in the 2018 Pipestone County CPRI.

**Figure #46**  
**Pipestone County CPRI Hazard Ranking and Risk Levels (Ranked by CPRI)**

| Hazard             | Probability | Magnitude/<br>Severity | Warning<br>Time | Duration | Risk Index | Risk<br>Severity |
|--------------------|-------------|------------------------|-----------------|----------|------------|------------------|
| Tornado            | 2.29        | 2.82                   | 3.82            | 2.65     | 2.72       | Medium           |
| Winter Storm       | 3.24        | 1.71                   | 1.53            | 2.35     | 2.43       | Medium           |
| Windstorm          | 2.53        | 1.94                   | 2.79            | 2.18     | 2.36       | Medium           |
| Lightning          | 2.59        | 1.29                   | 3.24            | 1.94     | 2.23       | Medium           |
| Flash Flood        | 2.29        | 1.94                   | 2.71            | 2.06     | 2.23       | Medium           |
| Hail               | 2.59        | 1.41                   | 3.12            | 1.47     | 2.20       | Medium           |
| Dam Failure        | 1.55        | 2.27                   | 2.82            | 2.73     | 2.07       | Medium           |
| Extreme Cold       | 2.47        | 1.53                   | 1.29            | 3.06     | 2.07       | Medium           |
| Extreme Heat       | 2.24        | 1.47                   | 1.24            | 3.29     | 1.96       | Low              |
| Wildfire           | 1.41        | 1.82                   | 3.35            | 2.59     | 1.94       | Low              |
| Drought            | 1.94        | 1.71                   | 1.18            | 3.76     | 1.94       | Low              |
| Flood (Riverine)   | 1.88        | 1.59                   | 1.71            | 1.76     | 1.76       | Low              |
| Earthquake         | 1.00        | 1.81                   | 3.00            | 2.50     | 1.69       | Low              |
| Erosion            | 1.67        | 1.00                   | 1.93            | 1.40     | 1.48       | Low              |
| Landslide/Mudslide | 1.10        | 1.00                   | 2.30            | 1.80     | 1.32       | Low              |
| Subsidence         | 1.00        | 1.00                   | 2.00            | 0.80     | 1.13       | Low              |

#### *Hazard Profiling Concept of Planning*

The risk assessments identify the characteristics and potential consequences of a disaster, how much of the community could be affected by a disaster, and the impact on community assets. A risk assessment consists of 3 components—hazard identification, risk profile, and vulnerability profile. The last step is the risk ranking for each jurisdiction.

#### **5.1.4 GIS and Hazus-MH**

The risk analysis step in this assessment quantifies the risk to the population, infrastructure, and economy of the community. Hazards that can be geographically identified (wildland fires, windstorms, tornadoes, hail, floods) were mapped.

Hazus-MH was used to estimate the damages incurred for a 100-year flood event and for general asset assessment. Hazus-MH also generates a combination of site-specific and aggregated loss estimates for the entire county due to a 100-year flood event. Aggregate inventory loss estimates, which include building stock analyses, are based upon the assumption that building stock is evenly distributed across each census block. Therefore, it is possible that overestimates of damage will occur in some parts of



areas while underestimates will occur in other areas. With this in mind, total loss estimates tend to be more reliable over larger geographic areas (groups of many blocks) than for individual census blocks. It is important to note that Hazus-MH is not intended to be a substitute for detailed engineering studies. Rather, it is intended to serve as a planning aid for communities interested in assessing their risk to flood-, earthquake-, and hurricane-related hazards. This documentation does not provide full details on the processes and procedures completed in the development of this project. It is only intended to highlight the major steps that were followed during the project.

Site-specific analysis is based upon loss estimations for individual structures. For flooding, analysis of site-specific structures takes into account the depth of water in relation to the structure. Hazus-MH also takes into account the actual dollar exposure to the structure for the costs of building reconstruction, content, and inventory. However, damages are based upon the assumption that each structure will fall into a structural class, and structures in each class will respond in a similar fashion to a specific depth of flooding. Site-specific analysis is also based upon a point location rather than a polygon, therefore the model does not account for the percentage of a building that is inundated. These assumptions suggest that the loss estimates for site-specific structures as well as for aggregate structural losses need to be viewed as approximations of losses that are subject to considerable variability rather than as exact engineering estimates of losses to individual structures.

#### 5.1.5 National Centers for Environmental Information (NCEI) Records

Historical storm event data was compiled from the National Centers for Environmental Information (NCEI). NCEI records are estimates of damage reported to the National Weather Service (NWS) from various local, state, and federal sources. However, these estimates are often preliminary in nature and may not match the final assessment of economic and property losses related to given weather events.

The NCEI data included 309 reported events in Pipestone County between 1950 and October 2017. No records before 1950 were available. A summary table of events related to each hazard type is included in the hazard profile sections that follow. A full table listing all events, including additional details, is included in Appendix C. NCDC hazard categories used in this plan are listed in Figure #47.

**Figure #47**  
**National Climatic Data Center Historical Hazards**

| Hazard                  |                   |
|-------------------------|-------------------|
| Tornado                 | Hail Storm        |
| Thunderstorm Wind       | Flood/Flash Flood |
| Severe Snow Events      | Ice Storms        |
| Extreme Cold/Wind Chill | Excessive Heat    |
| Wildfire                | Drought           |

### 5.1.6 FEMA Declared Disasters

Another historical perspective is derived from FEMA-declared disasters. Nine federal disaster declarations in Pipestone County have been made between 1965 and 2016 (Error! Reference source not found.).

**Figure #48**  
**FEMA-Declared Disasters in Minnesota (1953-2016)**

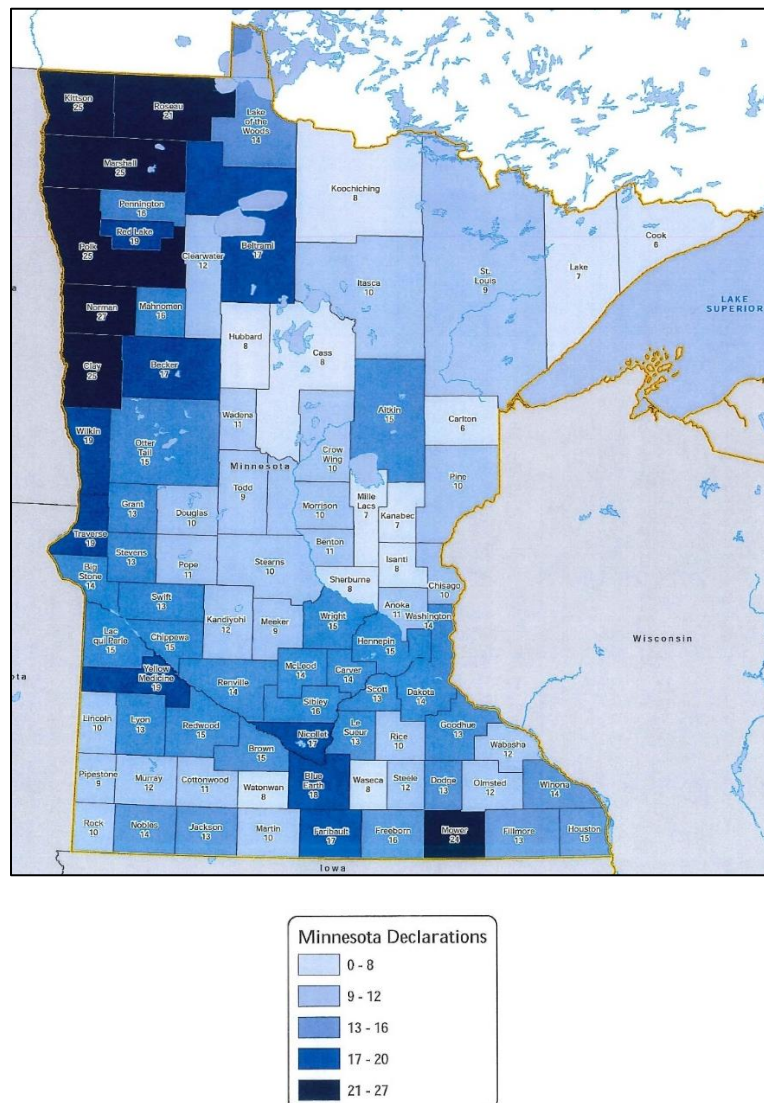


Figure #49 and Figure #50 show the details of the disasters including payments for Public Assistance (PA) and Individual Assistance (IA), listed under the flooding and severe storms profiles. No declarations were made for the other storms listed in the NCDC database. Reviewing the federal payments for damages from the declared disasters is a way of correlating the impact from the NCDC report.

**Figure #49**  
**FEMA-Declared Major Disasters in Pipestone County (1953-2016)**

| Incident                                                                | Declaration Date and Disaster Number | Incident Period           | Total PA Obligated by FEMA for Disaster in Minnesota | Total PA Obligated by FEMA for Disaster in Pipestone County | Individual Assistance in Minnesota | Individual Assistance in Pipestone County |
|-------------------------------------------------------------------------|--------------------------------------|---------------------------|------------------------------------------------------|-------------------------------------------------------------|------------------------------------|-------------------------------------------|
| Flooding                                                                | DR-255<br>4/18/1969                  | 4/18/1969-<br>4/18/1969   | Yes – Unknown Amount                                 | Unknown                                                     | Yes – Unknown Amount               | Unknown                                   |
| Severe Storms, Tornadoes, & Flooding                                    | DR-993<br>6/11/1993                  | 5/6/1993-<br>8/25/1993    | Yes – Unknown Amount                                 | Unknown                                                     | Yes – Unknown Amount               | Unknown                                   |
| Severe Ice Storm                                                        | DR-1151<br>1/7/1997                  | 11/14/1996-<br>11/30/1996 | Yes – Unknown Amount                                 | Unknown                                                     | \$0                                | \$0                                       |
| Severe Winter Storms                                                    | DR-1158<br>1/16/1997                 | 1/3/1997-<br>2/3/1997     | Yes – Unknown Amount                                 | Unknown                                                     | \$0                                | \$0                                       |
| Severe Storms and Flooding                                              | DR-1941<br>10/13/2010                | 9/22/2010-<br>10/14/2010  | \$25,963,422.37                                      | \$383,595.44                                                | \$0                                | \$0                                       |
| Severe Storms, Flooding and Tornadoes                                   | DR-4009<br>7/28/2011                 | 7/1/2011-<br>7/11/2011    | \$11,519,032.40                                      | \$87,876.99                                                 | \$0                                | \$0                                       |
| Severe Storms, Straight-Line Winds, Flooding, Landslides, and Mudslides | DR-4182<br>7/21/2014                 | 6/11/2014-<br>7/11/2014   | \$41,013,709.98                                      | \$487,192.01                                                | \$0                                | \$0                                       |

\* Data provided by FEMA Region V on December 2, 2014, MN HSEM on December 10, 2014, and <https://www.fema.gov/media-library/assets/documents/28331> accessed on December 10, 2014. Values are estimates collected at the time of the disaster.

**Figure #50**  
**FEMA-Declared Emergencies in Pipestone County (1953-2016)**

| Incident                     | Declaration Date and Disaster Number | Incident Period            | Individual Assistance in Minnesota | Public Assistance (all affected areas) |
|------------------------------|--------------------------------------|----------------------------|------------------------------------|----------------------------------------|
| Drought                      | EM-3013<br>6/17/1976                 | 6/17/1976-<br>6/17/1976    | \$0                                | Yes – Unknown Amount                   |
| Hurricane Katrina Evacuation | EM-3242<br>09/13/2005                | 08/29/2005 to<br>10/1/2005 | \$0                                | \$2,470,003                            |

\*Note the Public Assistance totals are for ALL counties affected in the disaster. Data accessed Dec. 29, 2014 at [https://www.fema.gov/disasters/grid/state-tribal-government/57?field\\_disaster\\_type\\_term\\_tid\\_1=All](https://www.fema.gov/disasters/grid/state-tribal-government/57?field_disaster_type_term_tid_1=All)

Figure #51 depicts the historical projects in Pipestone County resulting from hazard mitigation funding.

**Figure #51**  
**Historical Hazard Mitigation Funding in Pipestone County**

| Year | Project Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Sub-Grantee                               | Federal Share |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------|
| 1997 | Planting of indigenous vegetation for living snowfence.                                                                                                                                                                                                                                                                                                                                                                                                                                                           | MN Department of Transportation           | \$107,608     |
| 1997 | Installation of living snow fences (2 rows of shrubs and 50 feet of grasses) along roads and highways in Pipestone County                                                                                                                                                                                                                                                                                                                                                                                         | Pipestone County                          | \$76,390      |
| 2004 | Southwest Regional Development Commission will be assisting Pipestone County in preparing and developing an All Hazard Mitigation Plan. SRDC will create a Community Profile and use demographic data along with developing a hazard identification section.-CRAMSEY-08/26/2005 22:25 GMT                                                                                                                                                                                                                         | Southwest Regional Development Commission | \$20,000      |
| 2006 | <p>To complete an all-hazard mitigation plan.-KSAILER-08/29/2006 18:28 GMT</p> <p>To complete an all-hazard mitigation plan for Pipestone County-KSAILER-08/29/2006 19:08 GMT</p> <p>Southwest Regional Development Commission will complete an All-Hazard Mitigation Plan for Lyon County and Pipestone County (Two (2) plans).-KSAILER-11/27/2006 16:10 GMT</p> <p>Project closeout per State's request in letter dated 3/11/11, no deobligation of funds, all funds expended-EHARDIMO-03/18/2011 18:49 GMT</p> | Southwest Regional Development Commission | \$43,500      |



## 5.2 Vulnerability Assessment

### 5.2.1 Asset Inventory

The HAZUS-MH defaults, critical facilities, and essential facilities have been updated based on the most recent available data sources. The essential facility updates (schools, medical care facilities, fire stations, and police stations) were integrated into the HAZUS-MH input database. Other critical facilities identified by the county were geocoded and overlaid with the HAZUS-MH flood model output. Critical facilities are defined by the Department of Homeland Security in the Automated Critical Asset Management System (ACAMS).

FEMA's Hazus 4.2 in ArcGIS 10.5.1 was used to estimate the potential losses incurred for a 100-year flood event in Pipestone County using a Digital Flood Insurance Rate Map (DFIRM). A 10-meter DEM (digital elevation model) to create a flood depth grid. The resulting HAZUS-MH 100-yr floodplain output is shown in Figure #67.

Pipestone County specific building data was sourced from the parcel tax and spatial databases to include building valuations, occupancy class, square footage, year built, and number of stories. A shapefile named *ParcelsPipestone.shp* (Occupancy class and building value) was obtained from the county to locate buildings within the county. Additionally, an attribute file named *Pipestone County Flood Building Data.xlsx* (residential stories, square footage, and year built), was used and supplemented with regional averages where values were missing. The resulting spatial dataset included 8,016 unique parcel numbers, 4,963 of these records were identified as having building values and were used in the analyses.

In cases where building value, year built, or number of stories were missing, values were assigned based on best practices from values in the other variables and from the region. Square footage was not available for non-residential building records, so building polygons derived from LiDAR (from the Minnesota GeoCommons) were intersected with the parcel outlines to total building square footage and used average values/square foot by occupancy class from a neighboring county to estimate square footage. The data were then assigned to one parcel centroid or building location, which served as a surrogate for the each parcel's buildings to aggregate to the associated census block for use in the Hazus model.

### 5.2.2 Facility Replacement Costs

According to the Pipestone County general building stock (derived from the county's parcel data and imported to the Hazus model), the Hazus model estimates there are 4,963 parcels with buildings in the region with a total replacement value (excluding contents) of \$600 million (2010 dollars). Approximately 66% of the buildings (and 38% of the building value) are associated with residential housing. The Hazus model estimated 34 parcels' buildings will be at least moderately damaged (>10% damage). Zero buildings are estimated to be completely destroyed.

The total economic loss estimated for the flood is \$50.48 million dollars, which represents 44.6% of the total replacement value of the buildings exposed, because the census block in which they reside is in the 100-year floodplain. Building losses are broken into 2 categories: direct building losses and business

interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood. The total building-related losses were \$10.27 million dollars. 80% of the estimated losses were related to the business interruption of the region. Residential occupancies made up 12% of the total loss.

The reported building counts should be interpreted as degrees of loss rather than an exact number of buildings exposed to flooding. These numbers were derived from aggregate building inventories which are assumed to be dispersed evenly across census blocks. Hazus requires that a predetermined amount of square footage of a typical building sustain damage in order to produce a damaged building count. If only a minimal amount of damage to buildings is predicted, it is possible to see zero damaged building counts while also seeing economic losses.

The total estimated number of damaged buildings (parcels as a surrogate), total building losses, and estimated total economic losses for the countywide 100-year flood along with the distribution of economic losses are shown in Figure #52.

**Figure #52**  
**Total Economic Loss from 100-Year Flood**

| General Occupancy     | Estimated Total Buildings | Total Damaged Buildings | Total Building Exposure | Total Economic Loss | Building Loss      |
|-----------------------|---------------------------|-------------------------|-------------------------|---------------------|--------------------|
| Agricultural          | 1,051                     | 0                       | \$160,340,000           | \$17,436,000        | \$575,000          |
| Commercial            | 376                       | 5                       | \$49,776,000            | \$5,999,000         | \$143,000          |
| Education             | 21                        | 0                       | \$55,006,000            | \$0                 | \$0                |
| Government            | 100                       | 0                       | \$37,347,000            | \$17,623,000        | \$227,000          |
| Industrial            | 52                        | 0                       | \$26,202,000            | \$939,000           | \$116,000          |
| Religious /Non-Profit | 78                        | 0                       | \$41,286,000            | \$2,399,000         | \$61,000           |
| Residential           | 3,285                     | 45                      | \$229,679,000           | \$6,084,000         | \$1,575,000        |
| <b>Total</b>          | <b>4,963</b>              | <b>50</b>               | <b>\$599,636,000</b>    | <b>\$50,480,000</b> | <b>\$2,697,000</b> |

Census blocks of concern should be reviewed in more detail to determine the actual location and proximity of facilities with respect to the flood hazard areas. The aggregate losses reported in this study may be overstated due to the fact that values are distributed evenly across a census block. The 3 census blocks with the greatest estimated loss values (calculated by adding the total value of the buildings + the value of the buildings' contents located within a census block), which contain parcels with buildings located within the floodplain, are shown in Figure #53. These potentially high loss census blocks, used for the loss estimation, and the Hazus-MH output floodplain can be found in the Hazus Analysis in Appendix A. In some cases, the assets of value may not fall in the floodplain in the same proportion that

the floodplain covers the entire census block. For this reason, some potential losses may be overstated.

**Figure #53**  
**Pipestone County Census Blocks with the Greatest Estimated Losses in the 100-Year Floodplain**

| Census Block Number | Description | Total Estimated Loss | Location  |
|---------------------|-------------|----------------------|-----------|
| 271174602002001     | Residential | \$655,000            | Pipestone |
| 271174605002009     | Residential | \$464,000            | Edgerton  |
| 271174602002010     | Residential | \$443,000            | Pipestone |

An additional analysis was performed to identify the 10 parcels with the highest values (building + contents) that contain buildings which intersect the 100-year floodplain. Some of the parcels are located in one of the 3 census blocks with the greatest estimated loss; these parcels are labeled accordingly. The results of this analysis (and total building values) are shown in Figure #54.

**Figure #54**  
**Pipestone County Properties with Highest Building/Contents Value Intersecting 100-Year Floodplain**

| Parcel ID    | Parcel Building + Contents Total Value | Class Description | Building Area (ft <sup>2</sup> ) |
|--------------|----------------------------------------|-------------------|----------------------------------|
| 11.001.0250  | \$ 2,460,000                           | GOV1              | 17,361                           |
| 18.112.0311  | \$ 1,509,200                           | REL1              | 15,326                           |
| 18.395.0400  | \$ 1,033,000                           | IND2              | 665                              |
| 18.112.4000  | \$ 817,200                             | COM1              | 4,507                            |
| 11.007.0200  | \$ 720,600                             | AGR1              | 36,704                           |
| 18.007.1410  | \$ 702,000                             | IND2              | 2,165                            |
| 18.112.3300  | \$ 572,200                             | COM1              | 14,636                           |
| 09.020.0400  | \$ 446,400                             | AGR1              | 15,544                           |
| 09.033.0100  | \$ 402,150                             | RES1              | 4,185                            |
| 04.029.0300  | \$ 389,700                             | RES1              | 7,031                            |
| <b>Total</b> | <b>\$ 9,052,450</b>                    |                   |                                  |

#### *HAZUS-MH Essential Facility Loss Analysis*

Essential facilities encounter the same impacts as other buildings within the flood boundary: structural failure, extensive water damage to the facility, and loss of facility functionality (i.e. a damaged police station will no longer be able to serve the community). One of Pipestone County's essential facilities (care facilities, fire stations, police stations, and schools) included in the Hazus-MH analysis fall within the flood boundary.

**Figure #55**  
**Pipestone County Essential Facilities within Estimated 100-Year Flood Boundary**

| Type           | Name                                           | Site Address       | City      |
|----------------|------------------------------------------------|--------------------|-----------|
| Police Station | National Park<br>Service – Pipestone<br>Nation | 36 Reservation Av. | Pipestone |

#### *HAZUS-MH Shelter Requirement Analysis*

Hazus-MH estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus-MH also estimates those displaced people that may require accommodations in temporary public shelters. The countywide 100-year flood model estimates 106 households may be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, the model estimates 6 people (out of 9,596) may seek temporary shelter in public shelters.

#### *HAZUS-MH Debris Generation Analysis*

Hazus estimates the amount of debris that may be generated by the flood. The countywide 100-year flood model breaks debris into 3 general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,790 tons of debris may be generated. Of the total amount, Finishes comprises 72% of the total, Structure comprises 16% of the total, and Foundation comprises 12%. If the debris tonnage is converted into an estimated number of truckloads, it will require 72 truckloads (@25 tons/truck) to remove the debris generated by the flood.

### 5.3 Future Development

Because Pipestone County is vulnerable to a variety of natural and technological hazards, the county government—in partnership with state government—must make a commitment to prepare for the management of these types of events. Pipestone County is committed to ensuring that county elected and appointed officials become informed leaders regarding community hazards so that they are better prepared to set and direct policies for emergency management and county response.

The Pipestone County Emergency Management Director will work to keep the jurisdictions covered by the AHMP engaged and informed during the plan’s 5-year planning cycle. By keeping jurisdictional leaders actively involved in the monitoring, evaluation and update of the AHMP, they will keep their local governments aware of the hazards that face their communities and how to mitigate those hazards through planning and project implementation. Each jurisdiction has identified mitigation strategies that they will seek to implement in their communities (see *Appendix G: Mitigation Actions by Jurisdiction*). Jurisdictions will include considerations for hazard mitigation in relation to future development when updating local comprehensive plans or other plans that may influence such development.

## 5.4 Hazard Profiles

The following hazards were identified for inclusion in the All-Hazard Mitigation Plan by the planning team. Each hazard is included in the risk assessment; however, not all hazards have associated mitigation strategies.

**Figure 56: Ranking of Hazards in Pipestone County 2019 AHMP Update**

| Natural Hazards    |               |
|--------------------|---------------|
| Type               | Risk Severity |
| Tornado            | Medium        |
| Winter Storm       | Medium        |
| Windstorm          | Medium        |
| Lightning          | Medium        |
| Flash Flood        | Medium        |
| Hail               | Medium        |
| Dam Failure        | Medium        |
| Extreme Cold       | Medium        |
| Extreme Heat       | Low           |
| Wildfire           | Low           |
| Drought            | Low           |
| Flood (Riverine)   | Low           |
| Earthquake         | Low           |
| Erosion            | Low           |
| Landslide/Mudslide | Low           |
| Subsidence         | Low           |

### Natural Hazards

Blizzards/Winter Storm  
 Erosion  
 Extreme Cold  
 Extreme Heat  
 Drought  
 Earthquake  
 Fire  
 Flooding  
 Severe Summer Storms/Lighting/Hail  
 Tornado/Straight Line Winds

### Other Hazards

Civil Disturbance/Terrorism  
 Dam/Culvert Failure  
 Hazardous Materials  
 Public Health Emergencies  
 Transportation Infrastructure  
 Utility Failure  
 Water Supply Contamination

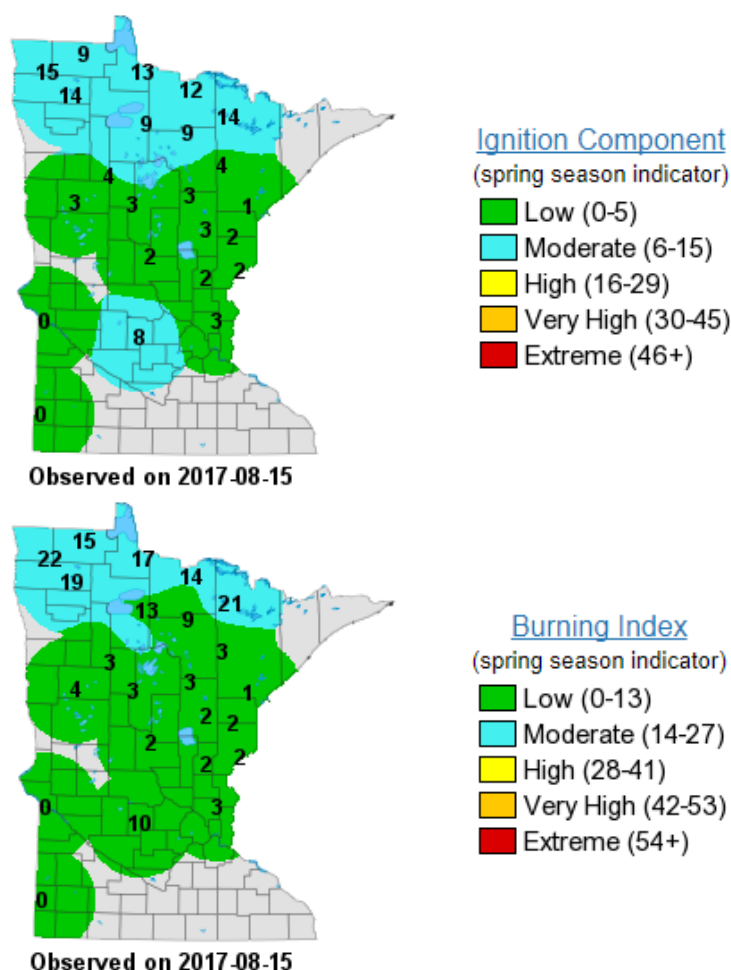
### 5.4.1 Fire (Wildfires and Structure Fires)

According to FEMA, each year in the United States more than 2,500 people die and 12,600 are injured in home fires, many of which could have been prevented.<sup>18</sup> A home fire is reported every 85 seconds in the United States.<sup>19</sup> Fires can occur in any community and pose a year-round threat.

#### *Locations Affected by the Hazard*

All locations in Pipestone County are at risk to be exposed to this hazard. Incidents of wildfire tend to be localized in southwest Minnesota due to the low burning index in this area. "Burning Index relates the potential amount of effort needed to contain a single fire in a particular fuel type."<sup>20</sup> Wildfires can start in grasslands or in crops if the conditions are dry.

**Figure #57**  
**Ignition Component & Burning Index Map – Minnesota**



<sup>18</sup> FEMA. Accessed: 6/2/14. Available: <http://www.ready.gov/fires>

<sup>19</sup> Karter Michael Jr. Fire Loss in the United States During 2011. Accessed: 6/20/14. Available: <http://www.nfpa.org/assets/files/pdf/os.fireloss.pdf>

<sup>20</sup> MN Department of Natural Resources. Accessed: 5/20/13. Available: [http://www.dnr.state.mn.us/forestry/fire/maps/fdi\\_grass.html](http://www.dnr.state.mn.us/forestry/fire/maps/fdi_grass.html)



Incidents of structure fires tend to be contained to one or two buildings, rather than spreading widely. Isolated rural structures can be at risk due to long response times and limited water supplies. However, there are many risks in town, such as one structure fire spreading to adjacent properties.

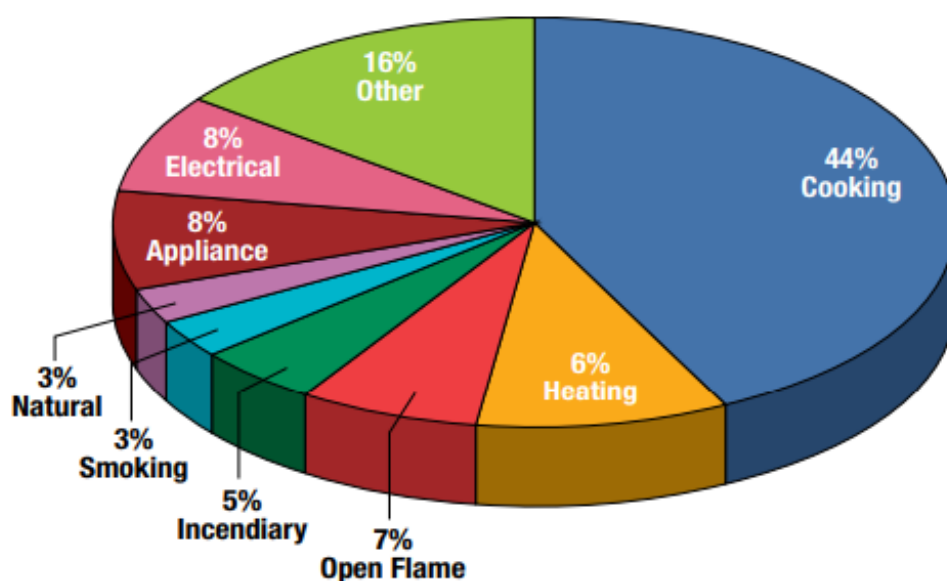
#### *Extent of the Hazard*

Structure fires are classified into three categories:

- Residential Structures
- Public and Mercantile Structures
- Industrial Structures

In Minnesota, there was over 119 million dollars in losses due to residential structure fires in 2014. Almost half of structure fires are caused by cooking accidents (mostly from unattended cooking equipment), 14 percent by other causes, and 10 percent by heating sources.<sup>21</sup> Refer to Figure #58 for a complete breakdown of structure fire causes.

**Figure #58**  
**Structure Fire Causes – Minnesota (2015)**



“While careless smoking accounts for only two percent of structure fires, it caused 35 percent of known fire fatalities and 27 percent of residential fire deaths.”<sup>22</sup> The most deadly time for a fire is during the

<sup>21</sup> Minnesota Fire Marshall. Fire in Minnesota Report. Accessed: 1/8/16. Available: <https://dps.mn.gov/divisions/sfm/Documents/2014-Fire-Minnesota-Report.pdf>

<sup>22</sup> Minnesota Fire Marshall. Fire in Minnesota Report. Accessed: 1/8/16. Available: <https://dps.mn.gov/divisions/sfm/Documents/2014-Fire-Minnesota-Report.pdf>

night when people are sleeping. There have been 5 civilian deaths related to fires in Pipestone County, since 1990.<sup>23</sup>

The State Fire Marshal reports that there was \$781,250 in fire related losses reported in Pipestone County in 2015.

Wildfire occurs when an uncontrolled fire spreads through vegetation, posing danger and destruction of property. Wildfires often begin unnoticed, spread quickly, and can be highly unpredictable. Prairie fires are less common than forest fires in the rugged Northern or Western forested area, but prairie fires can pose a serious threat. The State hazard plan categorizes wildfires into three types:

- Wild land fires in grasslands, brush and forests;
- Interface fires where natural landscapes meet urbanized areas
- Prescribed burns, intentionally set or natural fires that are allowed to burn for beneficial purposes

Factors such as topography, fuel and weather affect wildfire behavior. Fire intensity tends to increase during daytime heating. Large parcels of land left fallow in conservation and natural areas may be susceptible to grass fire even when properly managed. Gusty winds and low relative humidity create conditions for wildfire to spread rapidly in dry grasses and crops. Farm fields with row crops, ditches, and rights-of-way along railroad tracks are also vulnerable, in particular to the errant spark or carelessly discarded cigarette. Prolonged periods of high temperatures and/or high winds increase the risk of wildfires.

#### *Relationship to Other Hazards—Cascading Effects*

- Flooding and erosion. Major wildfires can completely destroy ground cover, which causes heavy erosion and vegetation loss. If heavy rains follow a major fire, flash floods, landslides, and mudflows might occur since vegetation is essential in deterring flooding during heavy rainfalls or spring runoff.
- Hazardous Material. The potential for hazardous materials to catch on fire is an added risk to wildfires. Any leaking or explosion of hazardous materials adds to the potential destruction caused by a wildfire.
- Service disruptions. Major fires can completely destroy structures, utility infrastructure, and essential public facilities that provide basic services to the community.
- Health risks. Destruction or damage to essential infrastructure like water or wastewater facilities might cause public health risk.
- Hazardous materials. If certain buildings or storage areas are ruptured or caused to explode because of fire, dangerous hazardous materials could be unleashed into surrounding areas. For example, many farms have anhydrous ammonia and other agricultural chemicals, which can cause serious difficulties for emergency response.
- Public Health - Air quality is adversely affected by wildfires

#### *Previous Occurrences of the Hazard*

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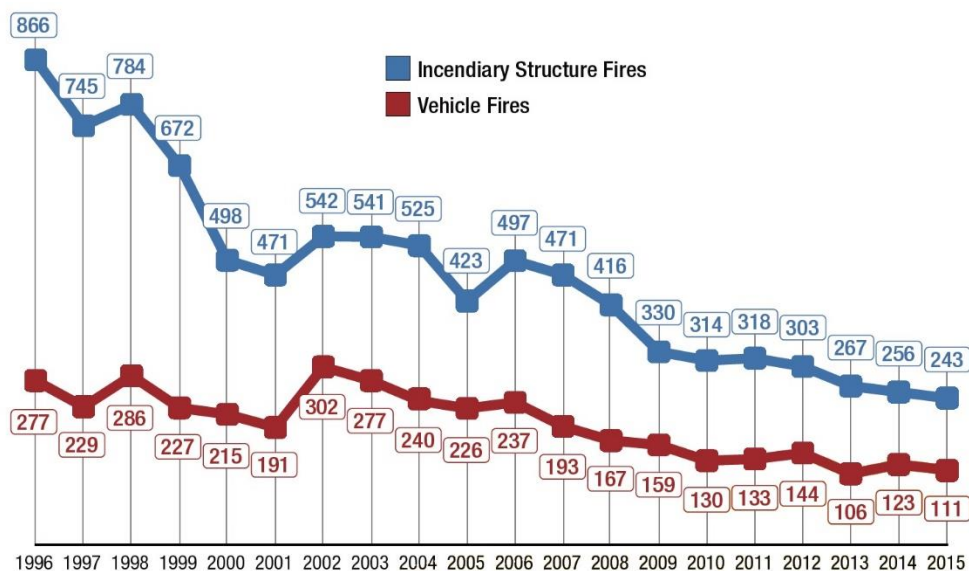
<sup>23</sup> Minnesota Fire Marshall. Fire in Minnesota Report. Accessed: 1/8/16. Available: <https://dps.mn.gov/divisions/sfm/Documents/2014-Fire-Minnesota-Report.pdf>

Structure Fires occur periodically throughout Pipestone County. In 2016 there were at least 6 reported structure fires and in 2017 there were at least 10.<sup>24</sup> From 1990 through 2016, there were 5 civilian deaths related to fires in Pipestone County.<sup>25</sup>

According to data from the National Centers for Environmental Information, Minnesota experienced 14 wildfires between 2003 and 2017. Wildfires occur throughout the spring, summer and autumn. During the spring and autumn periods, much of the existing vegetation has been killed due to winter temperatures and is dead, brown and combustible. Also, there is little green vegetation to serve as a barrier for a moving wildfire.

Wildfires in western Minnesota most often occur in grasslands. Grasslands typically include lands in conservation programs such as Reinvest In Minnesota (RIM), Conservation Reserve Program (CRP), Wetland Reserve Program (WRP) and Conservation Reserve Enhancement Program (CREP); “rough ground” that has been hayed, pastured or left wild; and public lands (such as wildlife management areas (WMAs), state parks, waterfowl production areas (WPAs), etc.). Fire danger grows when cedar trees encroach into grasslands. These trees can add a considerable amount of fuel load.

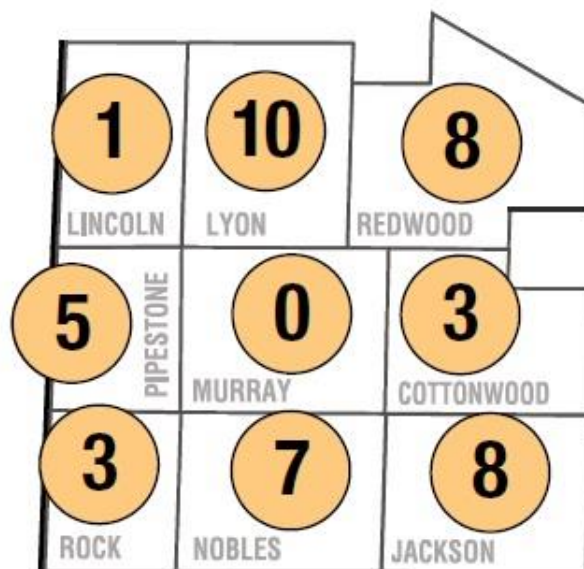
**Figure #59**  
**Structure & Vehicle Incendiary Fires – Minnesota**



<sup>24</sup> Pipestone County Data Request. Received 1/3/2019.

<sup>25</sup> Minnesota Fire Marshall. 2016 Fire in Minnesota Report. Accessed: 01/19/2018. Available: <https://dps.mn.gov/divisions/sfm/mfirs/Documents/Fire%20in%20Minnesota/Fire-in-Minnesota-2016.pdf>

**Figure #60**  
**Civilian Fire Deaths by County: 1990 – 2015**



Minnesota Department of Public Safety<sup>26</sup>

**Figure #61**  
**Runs & Dollar Losses by County – 2016**

| County     | Fire Runs | Other Runs | Total County Dollar Loss | Fire Rate | Avg. Dollar Loss/Fire |
|------------|-----------|------------|--------------------------|-----------|-----------------------|
| Cottonwood | 26        | 70         | \$1,671,500              | 498       | \$69,646              |
| Jackson    | 21        | 91         | \$167,450                | 661       | \$9,850               |
| Lincoln    | 20        | 20         | \$1,078,100              | 363       | \$63,418              |
| Lyon       | 92        | 281        | \$764,250                | 348       | \$10,764              |
| Murray     | 31        | 40         | \$684,531                | 428       | \$32,597              |
| Nobles     | 54        | 281        | \$1,066,375              | 499       | \$24,236              |
| Pipestone  | 28        | 83         | \$94,600                 | 416       | \$4,113               |
| Redwood    | 68        | 80         | \$1,046,878              | 295       | \$19,034              |
| Rock       | 33        | 125        | \$496,000                | 63        | \$17,103              |

Minnesota Department of Public Safety<sup>27</sup>

There were zero wildfires in Pipestone County from January 2000 through April 2017.<sup>28</sup> The National Weather Service issues Grassland Fire Danger statements from April 1<sup>st</sup> to November 15<sup>th</sup> each year. The

<sup>26</sup> Minnesota Fire Marshal. Fire in Minnesota Report. Accessed: 1/8/16. Available: <https://dps.mn.gov/divisions/sfm/Documents/2014-Fire-Minnesota-Report.pdf>

<sup>27</sup> Minnesota Fire Marshall. Fire in Minnesota Report. Accessed: 1/8/16. Available: <https://dps.mn.gov/divisions/sfm/Documents/2014-Fire-Minnesota-Report.pdf>

<sup>28</sup> NOAA. Storm Events Database. Accessed 8/9/17. Available: <http://www.ncdc.noaa.gov/stormevents/>

DNR is the lead state agency for wildfire response and prevention across the state, and offers training and other resources for local fire departments. DNR conducts controlled burns annually to help manage grasslands.

### *Wildfire and Climate Change*

Temperatures are predicted to rise in the state, which could lead to more extreme heat events and associated wildfire risks. As Minnesota's climate changes, weather fluctuations between drought and extreme rain events and increasing temperatures will result in changes to forest composition and/or distribution. These fluctuations can lead to dry conditions that may cause increased fire risk in both grassland and forest environments.

### *Vulnerability*

There are structure fires every year. Wildfires in Pipestone County are rare, but they can occur under the right conditions.

Fire is a serious risk that is not always understood. Fires can spread very quickly. It only takes 30 seconds for a small flame to get completely out of control.<sup>29</sup> There is often only enough time to get out of the house safely, before the entire house is engulfed with smoke and flames.

### *Plans and Programs*

- Local fire departments – Local fire departments within the districts extinguish structure fires. Each department is responsible for fires within their boundaries. However, they often work together on larger fires through mutual aid agreements.
- State training – Local firefighters participate in mandatory firefighting training classes offered by the state. Firefighters are also offered the opportunity to participate in wildfire training classes offered by the Minnesota Department of Natural Resources-Forestry Department.
- Zoning – The Pipestone County Development Code controls development of new construction, including the enforcement of safety restrictions like setbacks, coverage, depth, and structure height requirements. The county Environmental Office issues permits for all new construction in the county outside incorporated municipalities.
- Burning Bans – Currently, in times of extreme heat and drought, the county will enact burning bans. Residents are alerted through the media when a burning ban is enacted.
- Burn Permits – Lyon County Sheriff's Office issues burn permits free of charge. Burning permits are good for two years and law enforcement will be checking and calling if they see smoke. Emergency responders respond to reported fires, so you should alert the authorities when you are going to burn.
- Burn barrels – "In Minnesota, open burning of household garbage is banned, with the exception of farms where regularly scheduled pick up of waste is not "reasonably available to the resident" (Minn. Stat. §§ 17.135 and 88.171). In Minnesota, 32 counties have formally banned garbage burning at the local level, passing a county board resolution stating garbage service is reasonably available to all

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<sup>29</sup> FEMA. Learn About Fire: The Nature of Fire. Accessed: 1/6/16. Available: [http://www.usfa.fema.gov/citizens/about\\_fire.shtm](http://www.usfa.fema.gov/citizens/about_fire.shtm)

residents and making onsite disposal illegal for county residents. Pipestone County has not adopted a burning ban.

- Property management – Many properties that are owned by Pipestone County are used for recreation or conservation. Management plans providing maintenance of these properties (including cutting tall grass, thinning trees, prescribed burning, and removal of low-hanging branches around structures) are in place.
- Wind tower fires – Plans are in place for fires involving wind towers. Firefighters are instructed to contain the fire from a distance and let the turbine burn.
- Electrical fires – The state electrical inspectors inspect commercial structures for potential fire hazards.
- Prescribed burns – The DNR conducts prescribed (or controlled) burns annually in Pipestone County. Controlled burns help to reduce fuel load, while also benefiting native prairie restoration. Controlled burns have to be conducted in the right locations and in the right weather conditions. Coordination between the DNR and local fire departments is done to ensure the controlled burns are contained.
- Burning permits – Local residents are required to acquire burning permits to conduct burns.
- Ditch maintenance – Road ditches are maintained to help decrease the chance of a wildfire spreading. MN Stat. 160.232 states: “To provide enhanced roadside habitat for nesting birds and other small wildlife, road authorities may not mow or till the right-of-way of a highway... Exception is from July 31 to August 31, where the entire right of way may be mowed. Statute also states “When feasible, road authorities are encouraged to utilize low maintenance, native vegetation that reduces the need to mow, provides wildlife habitat, and maintains public safety.”
- Water source capacity – Water storage is also analyzed by fire departments in Pipestone County to understand water source capacity to fight fires.
- Road closures – Fire departments in Pipestone County keep up to date on road closures so efficient routes can be used to reduce response times.
- Development Policy – New developments in Pipestone County are required to have streets and alleys wide enough to sufficiently handle the size of a modern fire truck.
- Mutual Aid Agreements – Mutual Aid Agreements are in place between police forces, fire districts and ambulance districts to ensure adequate emergency services in Pipestone County. Mutual Aid Agreements create agreement among emergency responders to lend assistance across jurisdictional boundaries. Mutual Aid Agreements are updated every five years in Pipestone County, and they are currently in the process of updating them.
- Right-of-way maintenance – Road Authorities maintain the right-of-way of roadways in Pipestone County. This helps to limit tree growth and farm fields from approaching onto public right-of-way of roadways.
- Ordinances – Snow removal ordinances are in place to keep fire hydrants accessible.
- Building codes – Public buildings are constructed to include fire/smoke alarms and sprinkler systems.

#### *Gaps and Deficiencies*

- Wildfire risk assessment – Pipestone County does not undertake a systematic assessment of wildfire risk and associated prevention measures.
- Countywide fire department – With a number of smaller fire departments, Pipestone County could benefit from creating a countywide fire department. A countywide department could help with

coordination, fire inspections, education, and regulations regarding compliance. A countywide department would also help with sharing of resources and decreasing operating costs.

- Fire department/EMS equipment – Regulations, compliance, and training issues are costing rural fire departments more and more. This is causing deficiencies in equipment availability. Not having proper equipment is a safety concern. Older equipment is better than no equipment.
- Specialized trainings – Homes with chimneys pose a larger threat for fires. Specialized training classes, like chimney cleaning, safe cooking in the kitchen, and holiday hazards could be offered to residents.
- Evacuation plans – All cities in Pipestone County should have evacuation plans detailing the routes residents should take in the event of a large fire.
- Street capacity – Currently, some local streets and alleys are not adequate to handle fire trucks. Those roads should be identified and widened in the future to provide adequate protection.
- Property maintenance – An increasing number of properties are used for recreation or conservation. These properties may not be monitored frequently, which can result in overgrowth and an increased fire risk. Managing properties effectively can reduce the risk of structure and wildfires. Effective property maintenance can include cutting tall grass, thinning trees, prescribed burning, and removal of low-hanging branches around structures as needed.
- Zoning – Currently, Pipestone County zoning lacks regulations regarding vegetation on property. One of the problems with past fires is the undergrowth and overhanging trees near residential structures. Although aesthetically appealing, vegetation around homes can add fuel to the fire.
- Emergency response staffing levels – Keeping local fire departments staffed is becoming an issue. Local fire departments are getting older, and there are less young residents volunteering for the departments. Availability is also a concern for the local fire departments. A number of Pipestone County residents work outside the county, so availability is an issue.
- Burn barrel compliance – Compliance with burn barrel regulation is an issue. An educational campaign may be necessary to increase compliance.
- Water availability – Pipestone County is a rural county, so water availability during a rural fire can be an issue. Barn fires require between 5 and 15 tankers of water, each 2,000 gallons. This requires firefighters to pull water from multiple locations depending on the location of the fire. Pulling water from multiple sources affects response times and the ability to contain the fire.
- Dry hydrants – Pipestone County currently has not dry hydrants.
- Transformer and meter fires – corn dryers and other heavy equipment can overload and overheat a transformer or meter. This is a concern in the fall during harvest.
- Household electrical fires – Electrical improvements in homes in greater Minnesota are often not inspected. The homeowner has an incentive to ensure the work is done properly, but some people may not be able to ensure proper electrical work.
- Rural fire hydrants – There are no fire hydrants located by water storage towers in rural Pipestone County.

#### 5.4.2 Severe Winter Storms – Blizzards, Ice Storms

Minnesota experiences winter weather from mid-autumn through the winter season into spring. Heavy snowfall can immobilize large regions at the same time. All types of winter storms can also be accompanied by extreme cold—both absolute temperatures and wind chill. Blizzards and winter storms were assigned a hazard rank of high by the planning team.

Between the years of 1975 and 1991, there were 49 deaths associated with blizzards statewide, or an average of 3 deaths per year. Deaths attributable to blizzards have dropped in recent years (seven since 1992), primarily due to increased weather awareness and warning capabilities across the state. The economic costs of winter storms since 1992 has resulted in property damage of over \$26,000,000.

Ice storms are described as occasions when damaging accumulations of ice occur due to freezing rain. The terms freezing rain and freezing drizzle warn the public that a coating of ice is expected on the ground and on other exposed surfaces. Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers.

##### *Locations Affected by the Hazard*

All locations in Pipestone County are equally likely to be exposed to this hazard. Rural areas are more likely to be severely impacted by the hazard. Rural homes and farms face the threat of isolation and utility failure during winter storms. Roads throughout the county are at risk from ice or blowing and drifting snow. Roads closed due to hazardous winter weather also make it difficult for emergency responders to access individuals located in remote rural areas.

Given the rural nature of Pipestone County, residents of smaller communities may face similar isolation issues as rural residents. City residents are also at risk. Attempting to travel between communities would expose city dwellers to higher levels of risk corresponding with their rural counterparts.

##### *Extent of the Hazard*

There are several types of winter storm events that are typical for this area including: heavy snow events, ice storms, and blizzards.

Heavy snow events in Minnesota are considered to be 6 or more inches of snow in a 12-hour period, or 8 or more inches in a 24-hour period. Snow is considered heavy when visibilities drop below one-quarter mile regardless of wind speed. Heavy snows can lead to building collapse as well as creating a hazard to residents and travelers.

Ice storms include freezing rain, freezing drizzle and sleet (see Section 5.4.4 Severe Summer Storms below for information on hail storms, which more typically occur in the spring and summer seasons). Freezing rain, probably the most serious of the ice storms, occurs during a precipitation event when warm air aloft exceeds 32 degrees Fahrenheit while the surface remains below the freezing point. When precipitation originating as rain or drizzle contacts physical structures on the surface, ice forms on all surfaces creating problems for traffic, utility lines, and tree limbs.

Sleet forms when precipitation originating as rain falls through a rather large layer of the atmosphere with below freezing temperatures allowing the raindrops to freeze before reaching the ground. Sleet is also



referred to as ice pellets. Freezing rain freezes when it hits the ground, creating a coating of ice on roads, trees and power lines. Sleet storms are usually of shorter duration than freezing rain and generally create fewer problems.

Ice storms combined with high winds often threaten the electrical power grid. Typical power outages are due to localized storm events and utility crews can respond and restore power within hours. A complete power outage, however, has the potential to be a catastrophic event, due to the extensive systems that rely on remote power generation. Water and sewer service rely on electrical pumping stations. Individual home furnaces may be able to run on natural gas or propane, but usually need electricity to circulate warm air or hot water throughout a building.

Blizzards are the most violent type of winter storm. A blizzard occurs with sustained or frequent gusts to 35 miles per hour or greater and considerable amounts of falling and/or blowing snow (reducing visibility to less than a quarter mile) for three hours or longer. While blizzards in Lyon County can occur from October through April, they are most likely from November through the end of March. Temperature is not taken into consideration when the National Weather Service issues a Blizzard Warning; however, the nature of these storms typically leads to extreme cold.

#### *Relationship to Other Hazards—Cascading Effects*

- **Flooding.** Heavy snows and rapid snow melt are primary contributors to seasonal spring flooding. Areas along rivers and stream in Pipestone County can be impacted by spring flooding.
- **Transportation Crashes.** Winter storms often lead to hazardous conditions for transportation infrastructure. Icy roads can make travel difficult and poorly designed roads can result in large drifts that make travel impossible. Poor driving conditions and poorly designed transportation infrastructure can contribute to motor vehicle crashes.
- **Utility Failure.** Winter storms can impact the power grid. Utility interruption could be severe in Pipestone County due to the rural nature of the county. A winter storm can isolate rural residents and can leave them without power for extended periods of time. These residents are at risk of hypothermia or even death.
- **Wildland or Structural Fire -** Heavy storms that result in large amounts of downed timber can result in an increase of dead or dying trees left standing, thus providing an increased fuel load for a wildfire. There is an additional risk of increased frequency of structural fires during heavy snow events, primarily due to utility disruptions and the use of alternative heating methods by residents.
- **Public Safety -** Drivers stranded in snowstorms may make uninformed decisions that can put them at risk; residents who are unprepared or vulnerable may not be able to obtain goods or reach their destinations. EMS providers may be slowed by road conditions while responding to emergencies. Ice storms may result in power outages due to downed power lines, putting people at risk for cold temperature exposure and reducing the ability to spread emergency messages to the public via television, radio or computer.

#### *Previous Occurrences of the Hazard*

From January 2000 through April 2017, there have been 27 documented winter storms in Pipestone County. These winter storms are often not confined to Pipestone County but affect all of southwest

Minnesota. In the figure below are winter storm occurrences that occurred from January 2015 through April 2017.

**Figure #62**  
**Winter Storms – Pipestone County**

| Date       | Location                                                            | Event Narrative                                                                                                                                                                                                                                                                                                                                               |
|------------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01/05/2015 | Pipestone, Rock, Lincoln, Lyon, Nobles, Cottonwood, Jackson, Murray | Snow accumulated 3 to 6 inches. The snow was accompanied by southeast winds gusting to over 30 mph, reducing visibility to a quarter mile or less in a few areas. The storm forced some schools to close early for the day.                                                                                                                                   |
| 11/30/2015 | Lyon, Lincoln, Jackson, Pipestone, Nobles, Murray, Rock, Cottonwood | Freezing drizzle was quickly followed by snow. The snow accumulated 5 to 9 inches over a 24 to 30 hour period, including 9.0 inches near Pipestone. The storm resulted in cancellations or cutbacks of school classes.                                                                                                                                        |
| 12/01/2015 | Lyon, Lincoln, Jackson, Pipestone, Nobles, Murray, Rock, Cottonwood | Freezing drizzle was quickly followed by snow. The snow accumulated 5 to 9 inches over a 24 to 30 hour period that began on November 30th, including 9.0 inches near Pipestone. The storm resulted in cancellations or cutbacks of school classes.                                                                                                            |
| 12/25/2015 | Murray, Pipestone, Lyon, Lincoln, Rock, Cottonwood, Jackson, Nobles | Snow accumulated 5 to 8 inches, including 7.0 inches near Pipestone. North to northwest winds gusted to around 30 mph on December 26th, causing areas of blowing snow with visibilities below a half mile in places. The storm affected mainly Christmas weekend travel.                                                                                      |
| 03/23/2016 | Lincoln, Lyon, Rock, Nobles, Pipestone, Murray, Cottonwood, Jackson | Snowfall ranging from 4 to 9 inches, including 9.2 inches near Woodstock, was accompanied by north to northeast winds gusting to over 40 mph. Despite the wet nature of the snow, the winds caused blowing and drifting snow while the snow was falling. The snow made travel difficult at times.                                                             |
| 12/16/2016 | Lyon, Nobles, Rock, Lincoln, Murray, Pipestone, Jackson, Cottonwood | Snow accumulated 5 to 7 inches, including 6.0 inches at Pipestone. Northerly winds increased to around 20 mph sustained with gusts around 30 mph, causing drifting snow and areas of blowing snow. The winds and falling temperatures caused wind chills to drop to 20 to 25 below zero during the storm. Some schools were dismissed early on December 16th. |

National Climatic Data Center (NCDC) Storm Events database

From January 2000 through April 2017, there have been 15 documented Blizzards in Pipestone County. In the figure below are blizzard occurrences that occurred from January 2013 through April 2017.

**Figure #63**  
**Blizzards – Pipestone County**

| Date       | Location                                                            | Event Narrative                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|------------|---------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2/10/2013  | Pipestone, Rock, Lyon, Nobles, Lincoln, Cottonwood, Jackson, Murray | Snowfall of 2 to 4 inches was accompanied by northwest winds gusting to 45 mph, producing blizzard conditions with widespread visibilities below a quarter mile. The low visibilities and drifting snow closed several roads, some businesses, and forced school closings on Monday February 11th.                                                                                                                                                                          |
| 01/08/2015 | Lyon, Lincoln, Murray, Pipestone, Nobles, Jackson, Cottonwood       | Northwest winds gusting up to 50 mph combined with existing snow cover to cause blowing snow, reducing visibilities to a quarter mile or less over much of the area. Some schools ended classes early.                                                                                                                                                                                                                                                                      |
| 02/02/2016 | Nobles, Jackson, Rock, Pipestone, Lincoln, Murray, Cottonwood, Lyon | Heavy snow combined with north to northwest winds 20 to 35 mph, with gusts over 40 mph, to produce near zero visibilities in falling and blowing snow. Accumulations ranged from 6 to 10 inches with 7 inches reported at Pipestone. Travel was brought to a halt and numerous vehicles slid off roads due to the combination of snowy roads and low visibility. Schools and numerous businesses were closed.                                                               |
| 02/07/2016 | Lyon, Pipestone, Murray, Lincoln, Cottonwood, Nobles, Jackson       | Northerly winds gusting to over 50 mph combined with existing snow cover and around one inch of new snowfall to produce widespread blizzard conditions, with visibilities lowering to below a quarter mile in blowing snow. Some vehicles became stuck or drove off roads in zero visibilities. Some schools and businesses closed on Monday February 8th.                                                                                                                  |
| 11/18/2016 | Lyon, Lincoln, Murray, Pipestone                                    | Wet snow accumulated 4 to 7 inches, including 6 inches at Pipestone. The snow was accompanied by northwest winds gusting to 55 mph, which caused widespread visibilities of less than a quarter mile while the snow was falling. Travel was difficult because of the low visibility and snow covered surfaces. Wind chills were driven down into the teens after an immediately preceding period of much above normal temperatures. Classes were cancelled at many schools. |
| 02/23/2017 | Rock, Pipestone, Cottonwood, Nobles, Jackson, Murray                | Snowfall of 2 to 4 inches combined with strong winds of 30 to 40 mph created localized blizzard conditions with widespread visibilities below a half mile. Highway crews were reporting localized white-out conditions.                                                                                                                                                                                                                                                     |

National Climatic Data Center (NCDC) Storm Events database

#### *Severe Winter Storms and Climate Change*

Historically, winter storms have had a large impact on public safety in Minnesota. This will continue, with a possible increase in snowstorm frequency and annual total snowfall. Winter weather is often a cause of power outages. Pressures on energy use, reduced reliability of services, potential outages and potential rise in household costs for energy are major climate change risks to public health.

The number of heavy snowfall years for the Midwest has fluctuated throughout the 1900-2006 time period. The periods of 1900-1920 and 1960-1985 had numerous years with snowfall totals over the 90<sup>th</sup> percentile. In the recent 3 decades, the number of heavy seasonal snowfall totals has been much lower. Despite these generally lower seasonal snowfall totals, some areas of the Midwest have still experienced significant snow totals in the most recent decade. The 100-year linear trends based on decadal values show that the upper Midwest had statistically significant (1% level) upward linear trends in snowstorm frequency from 1901 to 2000 (Kunkel, et al., Regional Climate Trends and Scenarios for the U.S. National Climate Assessment., 2013).

### *Vulnerability*

Winter storms are highly likely in the area, and they occur annually.

Winter storms have major impacts on local communities. The risk level assigned to blizzards and winter storms events by the planning team is high. The effects of a winter storm can include: closures, need to clear snow and ice from public streets, recover from utility failure, possibly provide emergency shelters for travelers and dislocated residents, and potential injuries and death. Winter storms can also cause lost productivity and disruptions in the local workforce, with public and private employees unable to work regular hours.

A number of facilities in Pipestone County have emergency generators that help keep emergency services available during a winter storm.

The accumulated effects of winter storms and blizzard conditions also pose a risk to structures from snow load on roofs. Vulnerable structures can easily collapse under the weight of heavy snow and/or high winds. The Minnesota building code has requirements for snow loads.

Analysis of specific infrastructure and structure dollar-cost vulnerability is not possible since winter storms can (and do) impact large portions of the study area. Based on current available data, modeling future losses would only be possible for total losses with excessive margins of error. Future storm events could be tracked specifically as they occur and could be used to model local vulnerability to winter storms in future updates.

### *Plans and Programs*

- Real-time weather monitoring – The City of Pipestone has a real-time weather monitoring station at the Southwest Minnesota Regional Airport-Marshall that provides current temperatures, dew point, wind speed, wind direction, and barometric pressure.
- Travel Assistance – “511 is a public service of the Minnesota Department of Transportation (MnDOT) to help traveler’s access information about road conditions, traffic incidents, commercial vehicle restrictions, and weather information via the phone or the Web, 24 hours a day, seven days a week.”
- Regional Forecasts – Pipestone County is in the Sioux Falls broadcasting region. Weather forecasts in the Sioux Falls region tend to be a good predictor of weather in Pipestone County. Pipestone County uses this information in regards to school closures and other weather related announcements.
- School closings – Pipestone County’s school districts have a policy of closing schools when wind chills exceed certain thresholds, low visibilities create unsafe driving conditions, or when heavy snow has

fallen making travel difficult. Local radio stations partner with the school districts to make sure the announcements are out by 6:00 am or earlier if possible.

- Snow Fences – Pipestone County has in the past promoted natural and manmade snow fences to protect highways against drifting snow.
- Road closures – Pipestone County Highway Department and local cities are working closely with MnDOT to improve transportation safety in all weather conditions. Road closures are enacted when conditions become too hazardous. MnDOT uses the 511MN.org, or 511 for mobile phones. This system does not send out alerts, but posts weather related road information online for public access.
- Emergency generators – Emergency generators help keep emergency services available during winter storms.
- City Policies – Cities have snow removal and winter parking policies in place to ensure access throughout the city.
- Rental Ordinance – The City of Pipestone has a rental ordinance to help identify and correct deficient rental housing units within the city.
- Minnesota Building Code – The Cities of Pipestone, Edgerton and Jasper have have adopted the Minnesota Building Code. The Minnesota Building Code helps to ensure buildings are built with minimum snow load requirements and other requirements to ensure the building is safe and will be safe for years to come. Cities that have not adopted a building code include: Holland, Ihlen, Woodstock, Trosky and Ruthton. Pipestone County has not adopted the Minnesota Building Code.
- Backup generators – Some critical public facilities have emergency electrical generation on-site. A number of private residents also have backup generators.
- Hardening of the electrical grid – Much work has already been completed to harden electric utilities against winter storms. Redundancies in utility systems can further reduce outages resulting from storms.
- Hardening of the electrical grid – [UPDATE FOR SIOUX VALLEY SW ELECTRIC?] suffers from storm damage and interruptions mainly from ice, wind, and severe weather on its overhead lines. In order to lower the effects from extreme weather on overhead lines, LLEC builds and maintains its distribution system to specifications that try to limit damage during extreme weather conditions. Some of the techniques that are used include: use of heavier conductor; spans for all conductors between overhead poles shall be 250 feet; conductor tensions are calculated to NESC heavy conditions; using larger class of poles; the relocation of overhead lines to underground; and tree maintenance, which helps to increase the reliability of the utility grid. LLEC works with its engineering company to determine areas where overhead facilities should be replaced with underground facilities, to locate tie lines and to loop feeds to pick up member electrical load if one substation fails. If/when available, LLEC would use FEMA mitigation dollars for site specific projects to harden its distribution system and would pursue additional non-site specific projects if additional FEMA dollars become available.

#### *Gaps and Deficiencies*

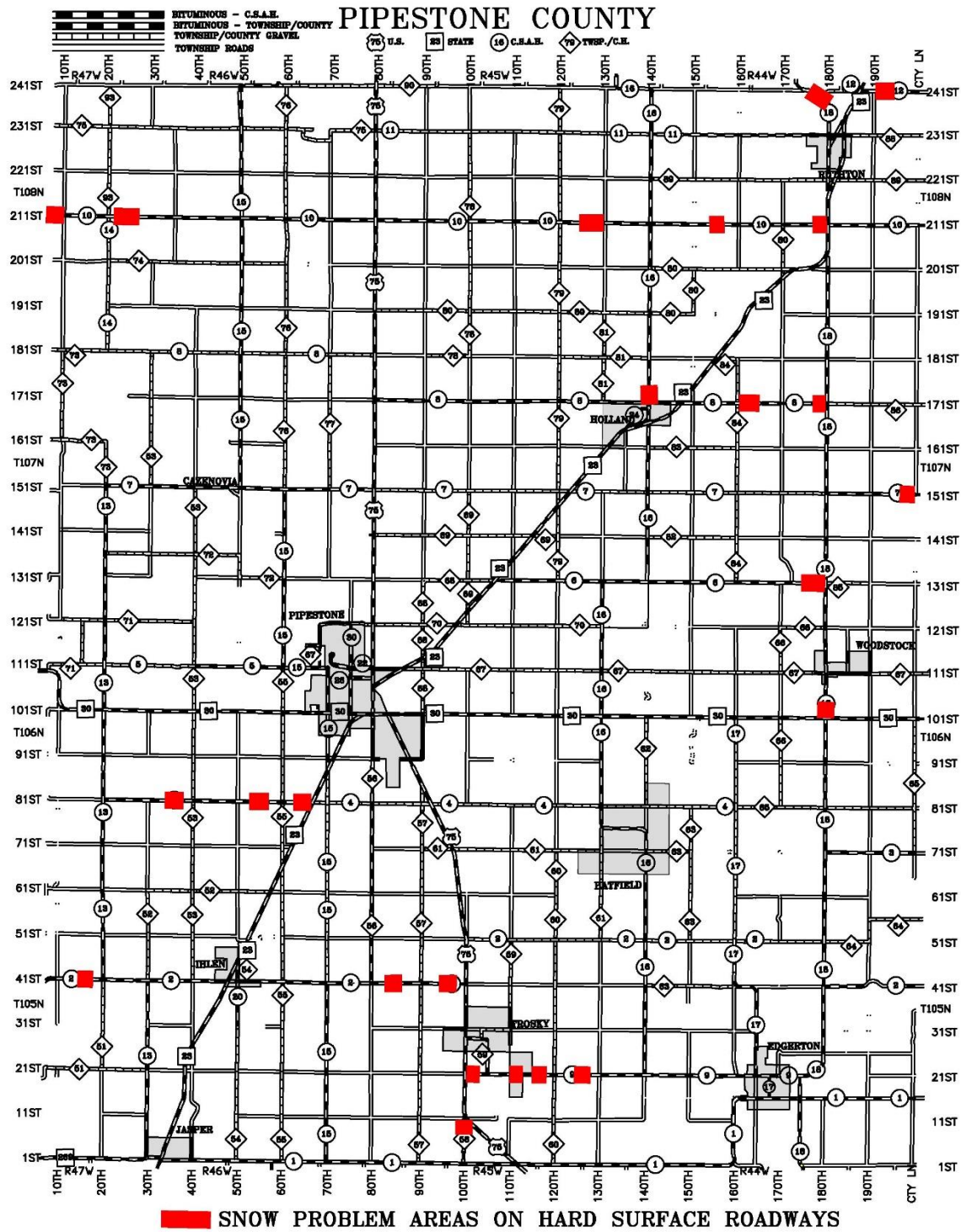
- Automated weather stations at schools – Automated weather stations at schools throughout Pipestone County would provide more current information and quicker response to dangerous and changing weather conditions.

- 511 System – The 511 system does not incorporate local knowledge as well as it could. County staff has little involvement in providing updates to the 511 system. Including snowplow drivers and other county staff could help to improve the accuracy of the system. County staff has local knowledge regarding the road network and can provide accurate information into the system.
- Road Closures Coordination – MnDOT closes state highways and does not talk to local emergency managers. There needs to be a direct line of communications between MnDOT and local emergency managers. This is an issue for emergency response and mass sheltering.
- Snow removal ordinance – Snow removal along sidewalks and at intersections can be an issue in Pipestone County. Most cities in Pipestone County have an ordinance regarding snow removal. Snow should be removed from sidewalks within 24 hours of a snow event, but this policy is often not enforced. City ordinances and enforcement should be used to prohibit snow piles from interfering with pedestrian traffic and visibility, especially around schools.
- Warning systems – The effective range of warning systems is limited. Travelers may be unaware of an upcoming storm. Local radio stations issue severe weather warnings, but satellite radio is becoming more widely used. Severe weather warnings issued on the radio may not be as effective as in the past. Weather radios should be promoted and more widely used, so residents and travelers can plan accordingly.
- Snow loads and building codes – Some residents are resistant to building codes that could help assure higher standards for new construction. The accumulated effects of winter storms and blizzard conditions also pose a risk to structures from snow load on roofs. Vulnerable structures can easily collapse under the weight of heavy snow and/or high winds. The Cities of Pipestone and Jasper have adopted the Minnesota State Building Codes, which includes snow load requirements. The Cities of Edgerton, Hatfield, Holland, Ihlen, Trosky, Ruthton, Woodstock do not have any building code requirements in regards to snow loads.
- Building Codes – Certified inspectors increase the cost of building. This increase in costs could result in less development. Cities in Pipestone County have thought it is the responsibility of the property owner to ensure the building meets standards outlined in the Minnesota Building Code. The City of Pipestone does have a building and zoning department that inspects property and requires building permits.
- Commuting time – Commuting times have increased. In Pipestone County a number of residents commute long distances to work, which increases their exposure to winter weather hazards.
- Backup generators – It is expensive to install back-up generators. Due to limited funding sources, redundant electrical supply back-up may not be available in all essential locations in Pipestone County.
- Lack of rental ordinances – The City of Pipestone has a rental ordinance to help identify and correct deficient rental housing units within the city. Other cities in Pipestone County do not have a similar ordinance.
- Lack of snow fences – As prices for farm land and crops have went up, a number of trees and wind breaks have been taken out.
- Coordination with rural electric cooperatives – When power outages occur, it can be difficult for rural electric trucks to get into areas with drifting snow. Increased coordination is needed with county and township staff to open routes to the source of a power outage.

- Language barriers – Language barriers can be an issue regarding severe weather warnings. There are a number of nationalities and languages spoken in Pipestone County. This makes it difficult to send out emergency broadcast. Having to translate emergency broadcasts into multiple languages takes time and money.
- Generator connectivity – The Pipestone County Government Center is not equipped with a quick connect system for a transportable generator, however it does have its own standby power system. All critical government infrastructure should be built with a quick connect generator system.



**Figure #64**  
**Snow Removal Problem Areas – Pipestone County**





Below are a few non-site specific projects that could be pursued if mitigation funding from FEMA was available:

- Looping/tying substation feeds together so if one substation fails, the load can be picked up by other substations.
- Putting ties between substations underground.
- Replacing overhead lines with underground lines for key member loads. These loads would include rural water pumping stations and other emergency loads that rely on electricity to maintain service.
- Tree Maintenance – Cities help to increase the reliability of the utility grid by cutting down and maintaining trees that are close to power lines and in the public right-of-way.
- Road design – Transportation engineers use road design to substantially reduce hazards from blowing and drifting snow. Living snow fences have been used to mitigate the effects of blowing and drifting snow, which affect road conditions. Living snow fences are designed plantings of trees and/or shrubs and native grasses located along roads or around buildings, which create a vegetative trap to control blowing and drifting snow.

### 5.4.3 Flooding

Flooding is one of the most common hazards across the United States. Flooding can occur anytime, anywhere. Seemingly benign streams can overflow their banks from a sudden rainstorm, quick snowmelt, or blockage of a channel. Lakes or reservoirs can retain water and quietly creep up the shorelines. City sewers can back up and pour into private basements and onto public streets. Dams can break causing flooding down river.

The National Flood Insurance Program (NFIP) was created by Congress to help property owners to protect themselves financially. NFIP offers flood insurance in communities that agree to adopt and enforce ordinances to reduce the risk of flooding. In Minnesota, the DNR administers floodplain management programs.<sup>30</sup>

There are 20 flood insurance policies in Pipestone County.<sup>31</sup> Each policy covers a single building, but all single family home policies include detached garages. The figure below outlines that number of policies in each city.

**Figure #65**  
**Flood Insurance Policies – Pipestone County**

| Area                              | Number of NFIP | Insurance In-force |
|-----------------------------------|----------------|--------------------|
| City of Jasper                    | 1              | \$280,000          |
| City of Pipestone                 | 1              | \$180,000          |
| Pipestone County (Unincorporated) | 18             | \$1,900,500        |

FEMA Data, 04/30/2017

The Federal Emergency Management Agency (FEMA) has mapped the probability of flood waters inundating floodplains. FEMA works with local communities to map the Special Flood Hazard Area (SFHA), commonly known as the 100-year floodplain (one percent floodplain), where they calculate a one percent chance of a flood event any given year. Within the SFHA lie the floodway, in which water can be expected at any time, and the flood fringe which is vulnerable to flood events.

FEMA has developed Flood Insurance Rate Maps (FIRMs) for many communities across the United States. FEMA now posts these online, along with “FIRMettes” —a “a full-scale portion of a FEMA Flood Insurance Rate Map (FIRM) that you create yourself online by selecting the desired area from an image of a Flood Insurance Rate Map.”

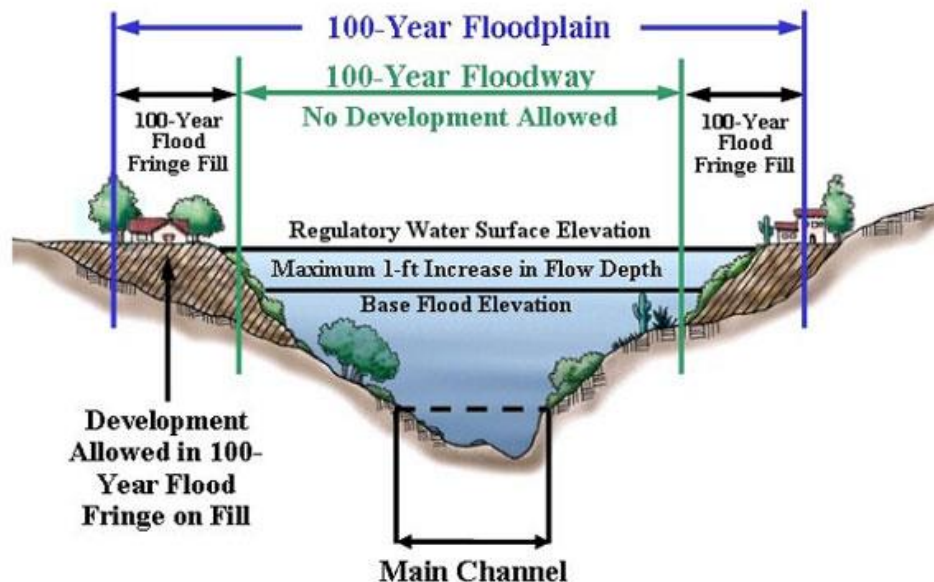
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<sup>30</sup> Flood Smart. Accessed 5/21/13. Available:

[http://www.floodsmart.gov/floodsmart/pages/about/nfip\\_overview.jsp](http://www.floodsmart.gov/floodsmart/pages/about/nfip_overview.jsp)

<sup>31</sup> FEMA Data. Accessed 8/8/2017. Available: <https://bsa.nfipstat.fema.gov/reports/1011.htm>

**Figure #66**  
**100-Year Floodplain (1 percent Floodplain)**



#### *Locations Affected by the Hazard*

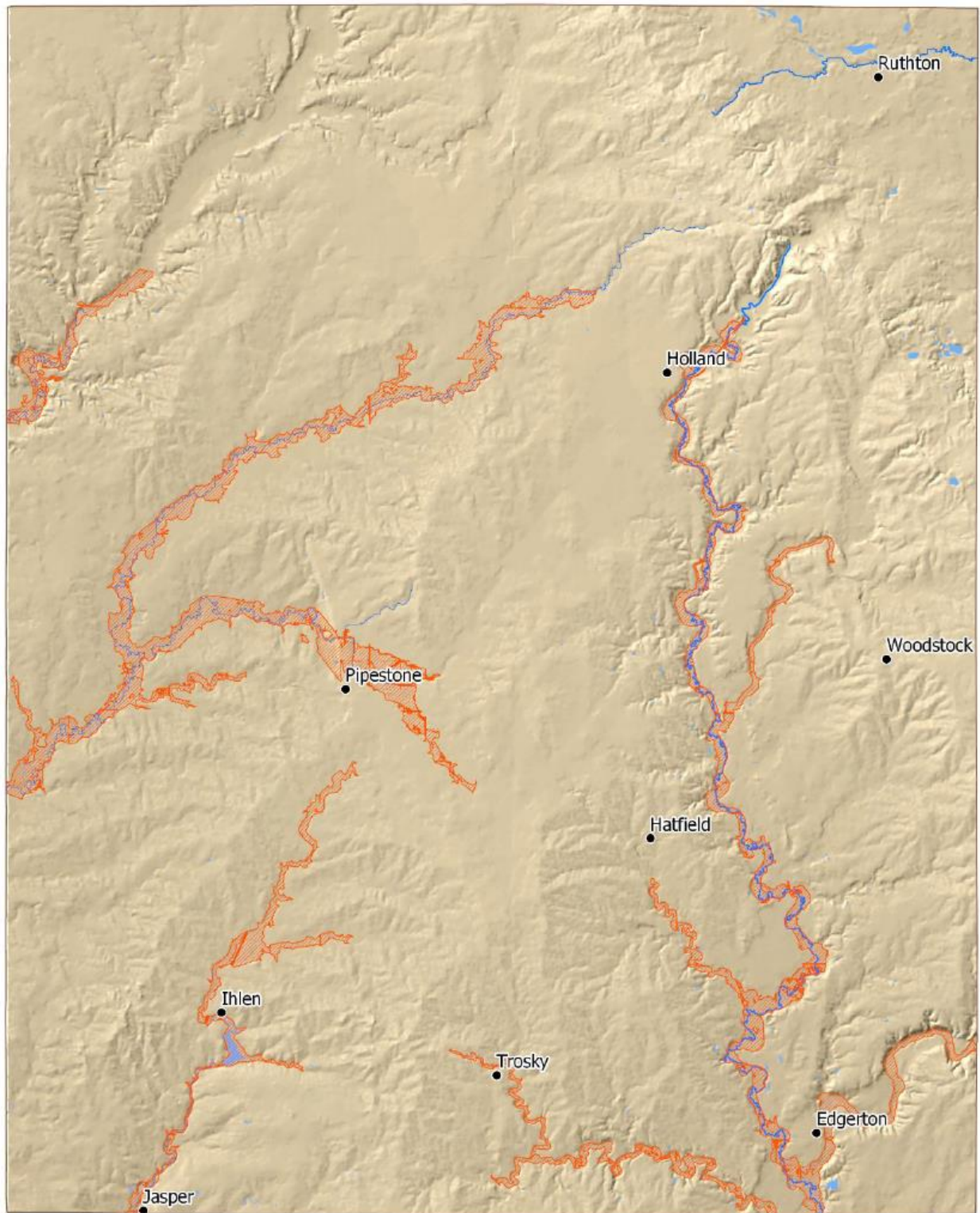
Flooding can occur anytime, anywhere. The majority of Pipestone County is classified as Zone C, which is defined as an area of minimal flooding. The areas of minimal flooding include most of the intermittent streams throughout the county. These streams contain surface water runoff at various times throughout the year and high water levels may extend beyond the established drainage channel and onto adjacent lands.

Flash flooding events tend to be localized, not countywide, but the risk is countywide. Flash flooding can occur rapidly and cause substantial damage. Flash flooding can cause a rapid rise in the water level of a stream or creek above a predetermined flood level.

One percent floodplain areas do exist in Pipestone County, particularly along the rivers, streams, and creeks in the county. Particularly Pipestone Creek, Split Rock Creek, Poplar Creek, Chanarambie Creek, and the Rock River. Additionally, the floodplain extends into parcels that are within or directly adjacent to the Cities of Edgerton, Holland, Ihlen, Jasper, Pipestone, and Trosky. See Figure #67 for a map of Pipestone County's 100-year floodplain.

Flood Insurance Rate Maps (FIRMs) are available for the cities of Ihlen, Jasper, Pipestone, Ruthton, and Trosky as well as all townships in Pipestone County. The Flood Insurance Rate Maps (FIRM) for these public entities can be found by contacting the Pipestone County Emergency Manager.

**Figure #67**  
**Flood Plain Map – Pipestone County**



 100 Year Floodplain

Data Sources: FEMA DFIRM Flood Data, and Hazus-MH

#### *City of Edgerton*

Edgerton participates in the NFIP, though is unmapped according to FEMA. The HAZUS analysis shows substantial estimated economic losses in Edgerton – particularly in northern, eastern, and southern portions of the city. See Figure #68 for a map of 100-year flood estimated losses in Edgerton.

#### *City of Hatfield*

The City of Hatfield is not listed in the NFIP Community Status Book and FEMA has not completed a study to determine flood hazard for the city, so no flood map has been published. The HAZUS analysis does not show a 100-year floodplain close to Hatfield.

#### *City of Holland*

The City of Holland is not listed in the NFIP Community Status Book and FEMA has not completed a study to determine flood hazard for the city, so no flood map has been published. The HAZUS analysis shows a small portion of the 100-year floodplain close to Hatfield causing minimal losses.

#### *City of Ihlen*

The City of Ihlen does not participate in the NFIP. There is a FIRM for Ihlen from 1974 which shows Ihlen outside the special flood hazard area (Zone A).

#### *City of Jasper*

Jasper participates in the NFIP. A FIRM from 1974 exists for Jasper, showing the entire incorporated city outside the special flood hazard area. The HAZUS analysis shows moderate losses in the outlying areas surrounding the city limits of Jasper, including some of the properties on its edges. See Figure #69 for a map of the 100-year flood estimated losses in the Pipestone County portion of Jasper.

#### *City of Pipestone*

The City of Pipestone participates in the NFIP. The FIRM for Pipestone shows significant portions of northern and southeastern Pipestone within Zones A and AE (special flood hazard areas inundated by a 100-year flood) and X (other flood areas). The HAZUS analysis estimates high potential economic losses for those areas and can be seen in Figure #70.

#### *City of Ruthton*

The City of Ruthton does not participate in the NFIP. Ruthton has a FIRM from 1974 that shows the entire city limits outside the special flood area. The HAZUS analysis shows no 100-year floodplain near Ruthton.

#### *City of Trosky*

Trosky does not participate in the NFIP. A firm from 1974 exists for Trosky that shows the entire city limits outside the special flood area. The HAZUS flood analysis shows moderate estimated losses in Trosky in the event of a 100-year flood.

#### *City of Woodstock*

Woodstock is not listed in the NFIP community status book, nor does it have a FIRM. The HAZUS analysis shows no 100-year floodplain near Woodstock.



**Figure #68**  
**100-Year Flood, Estimated Building-Related Losses in Edgerton**

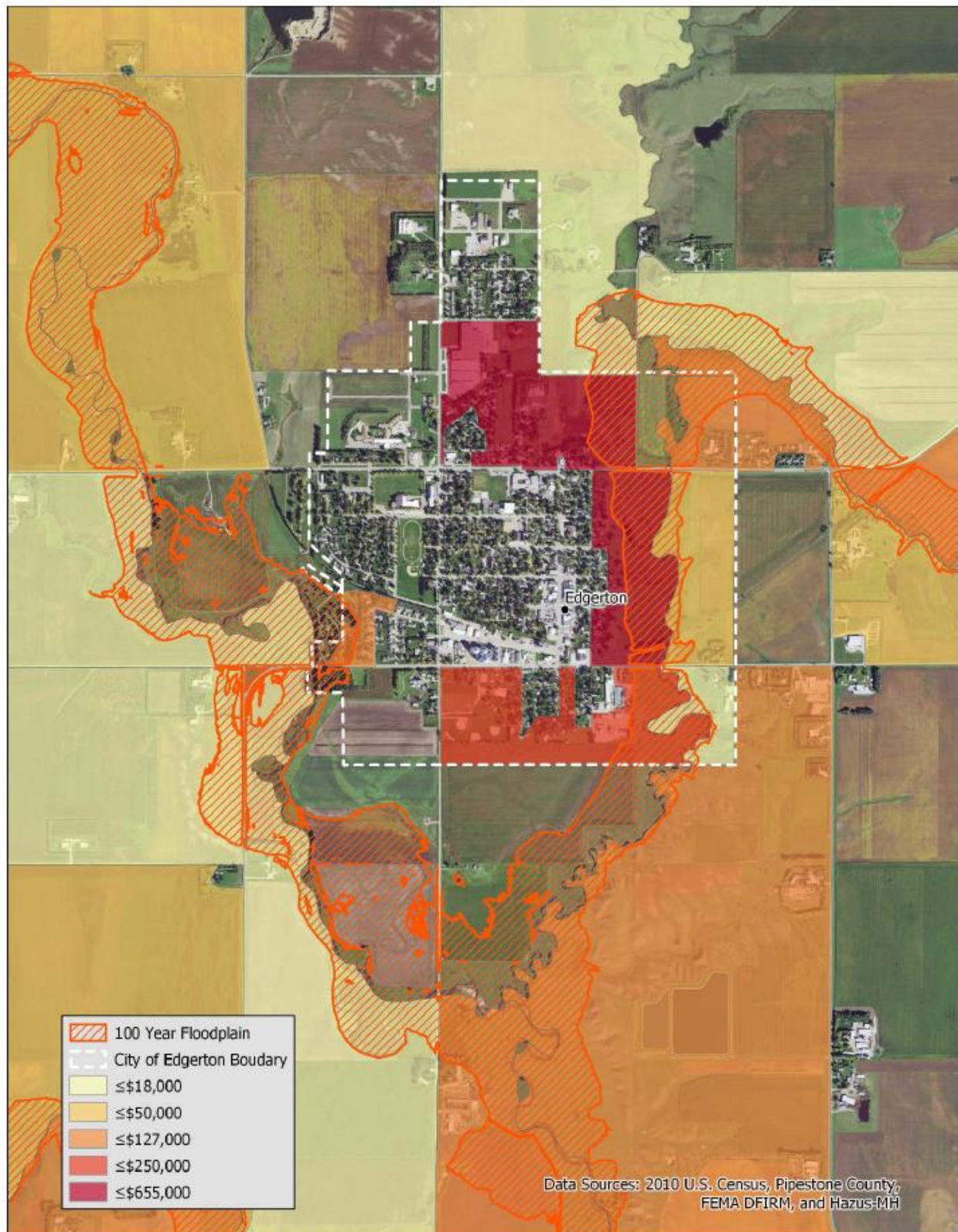


*Figure 4. 100-Year Building-Related Flood Loss Estimates in Edgerton*

**Figure #69**  
**100-Year Flood, Estimated Building-Related Losses in Jasper**

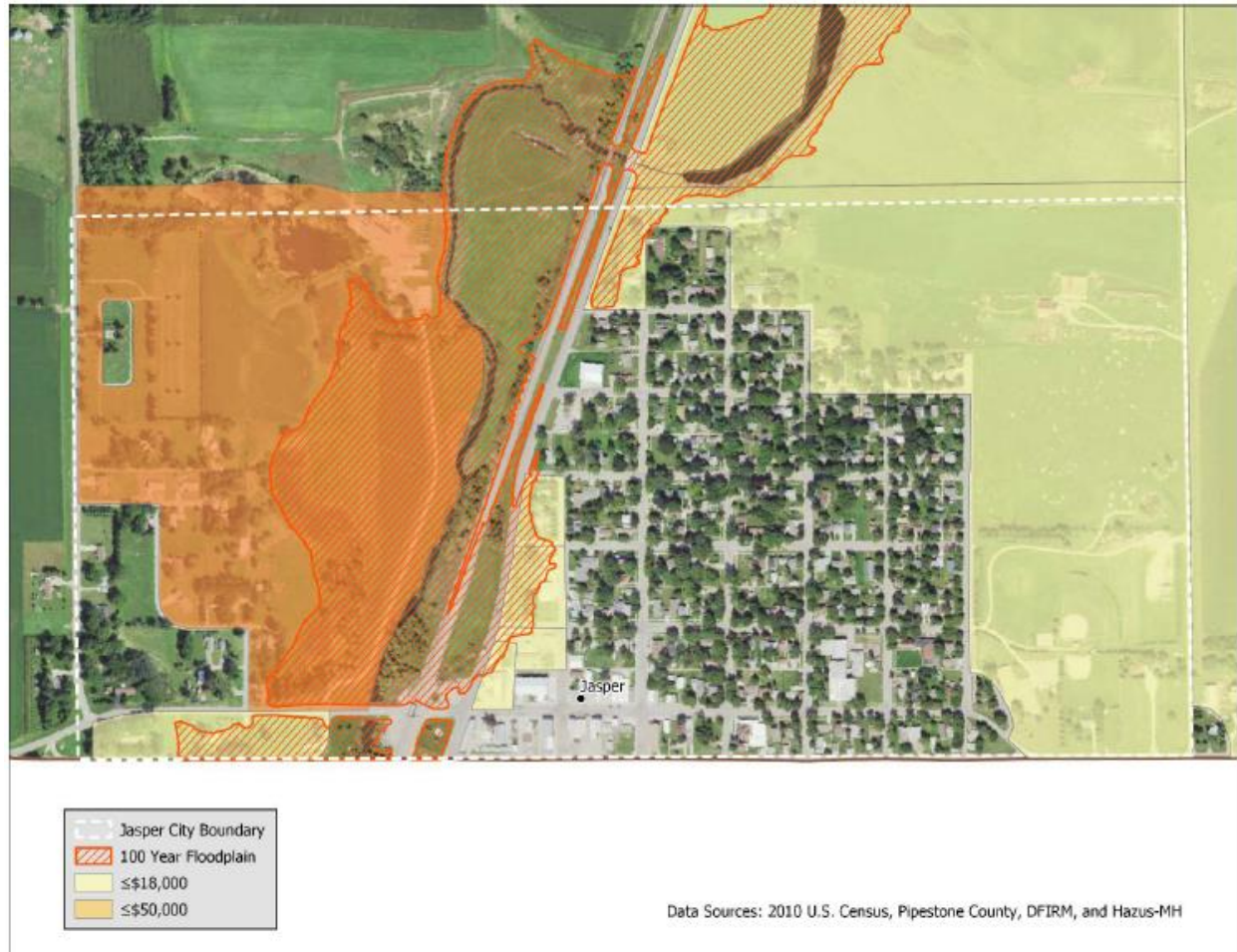




**Figure #70**  
**100-Year Flood, Estimated Building-Related Losses in Pipestone**

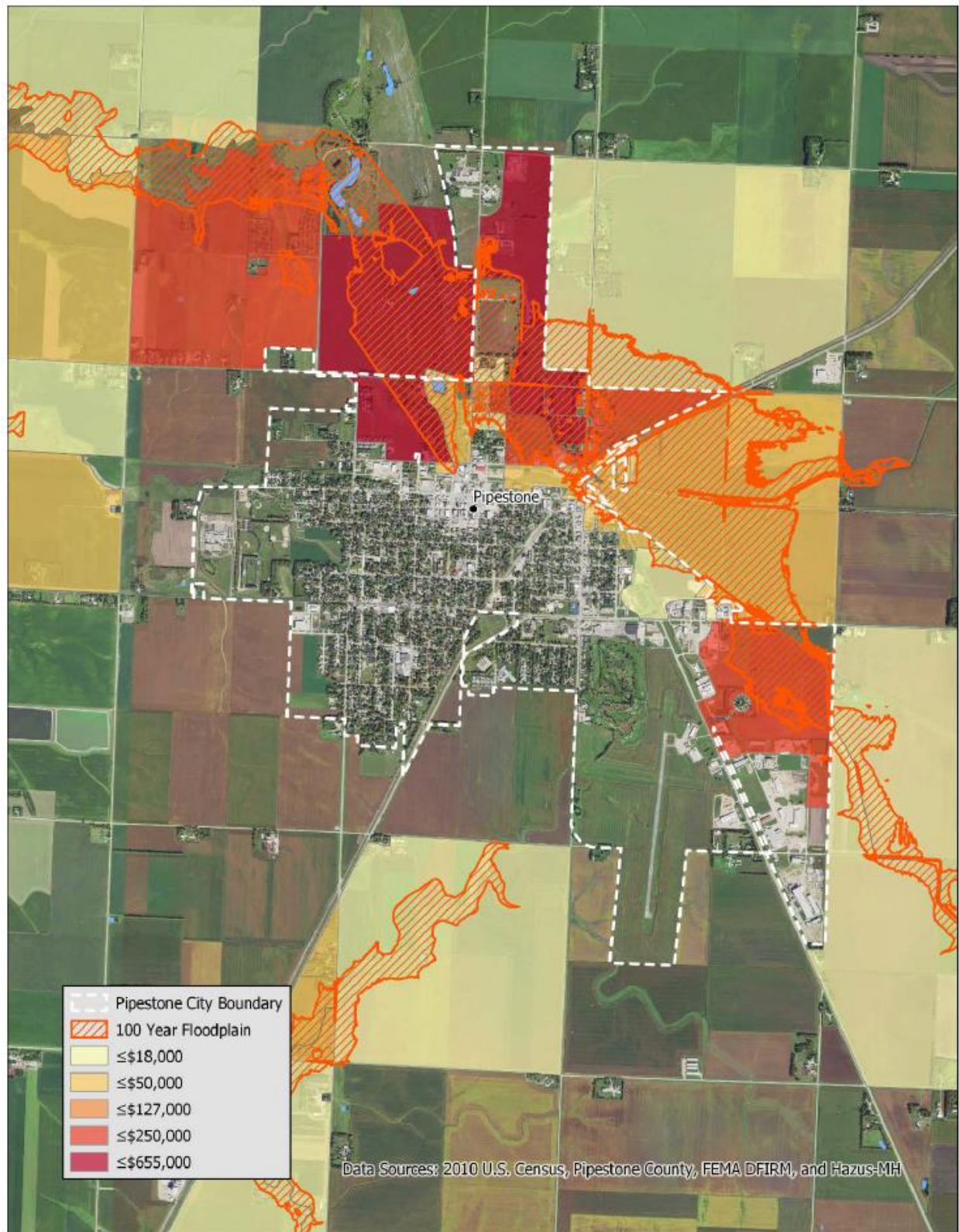
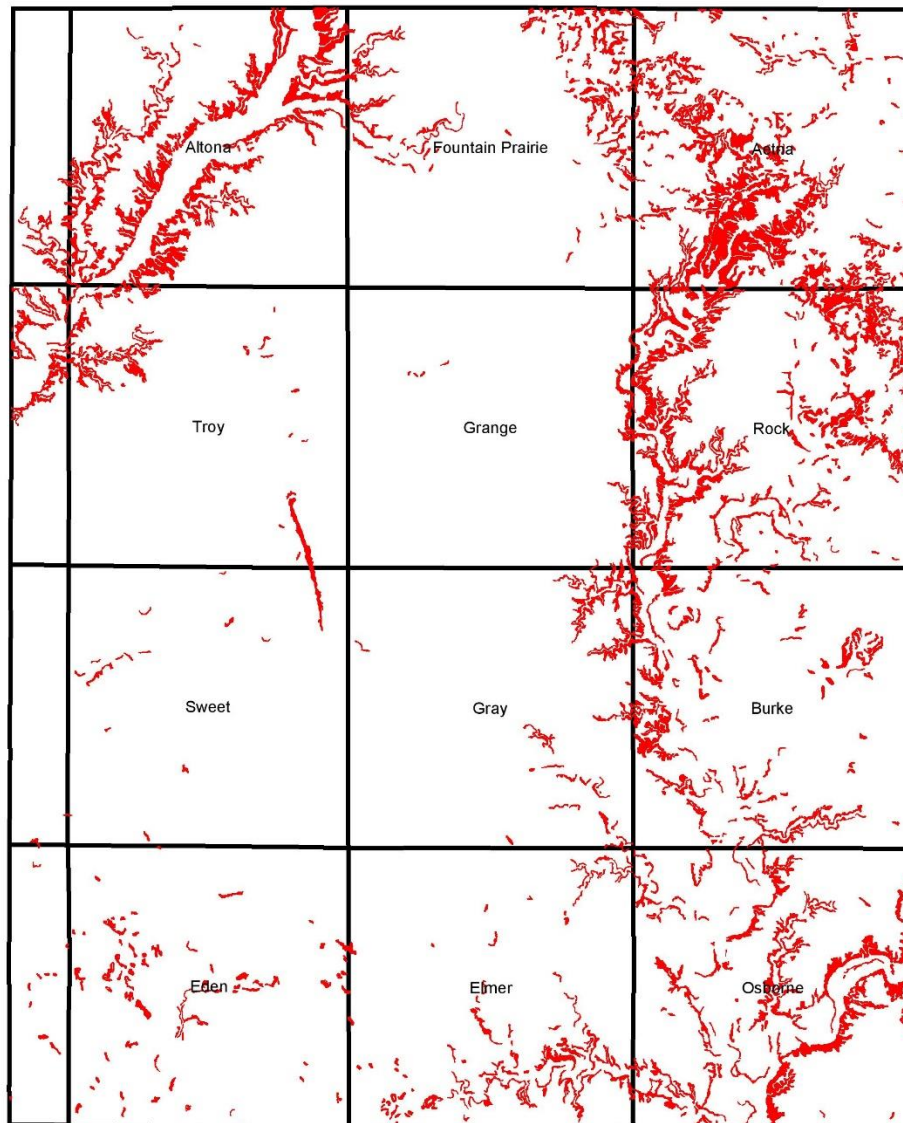


*Figure 3. 100-Year Flood Building-Related Loss Estimates in Pipestone*



Figure #71  
Highly Erodible Soils – Pipestone County

## Pipestone County Highly Erodible Soils



Highly Erodible Soils Townships

0 1.5 3 6 9 Miles



Created: 8-25-17, Kyle Krier, Pipestone County

“A highly erodible soil, or soil map unit, has a maximum potential for erosion that equals, or exceeds, eight times the tolerable erosion rate. The maximum erosion potential is calculated without consideration to crop management or conservation practices, which can markedly lower the actual erosion rate on a given field. The maximum potential erosion rate is determined using the formula:  $RKLS/R$  (where  $R$  = the rainfall factor,  $K$  = erodibility value of the soil, and  $LS$  = the slope factor). If  $RKLS/T$  is  $> 8$  then the soil meets the criteria for a highly erodible soil.”<sup>32</sup>

Highly erodible soils can result in landslides and sinkholes. Both of these phenomenon can occur in Lyon County.

#### *Extent of the Hazard*

“Floods are among the most frequent and costly natural disasters.”<sup>33</sup>

#### *Critical Facilities*

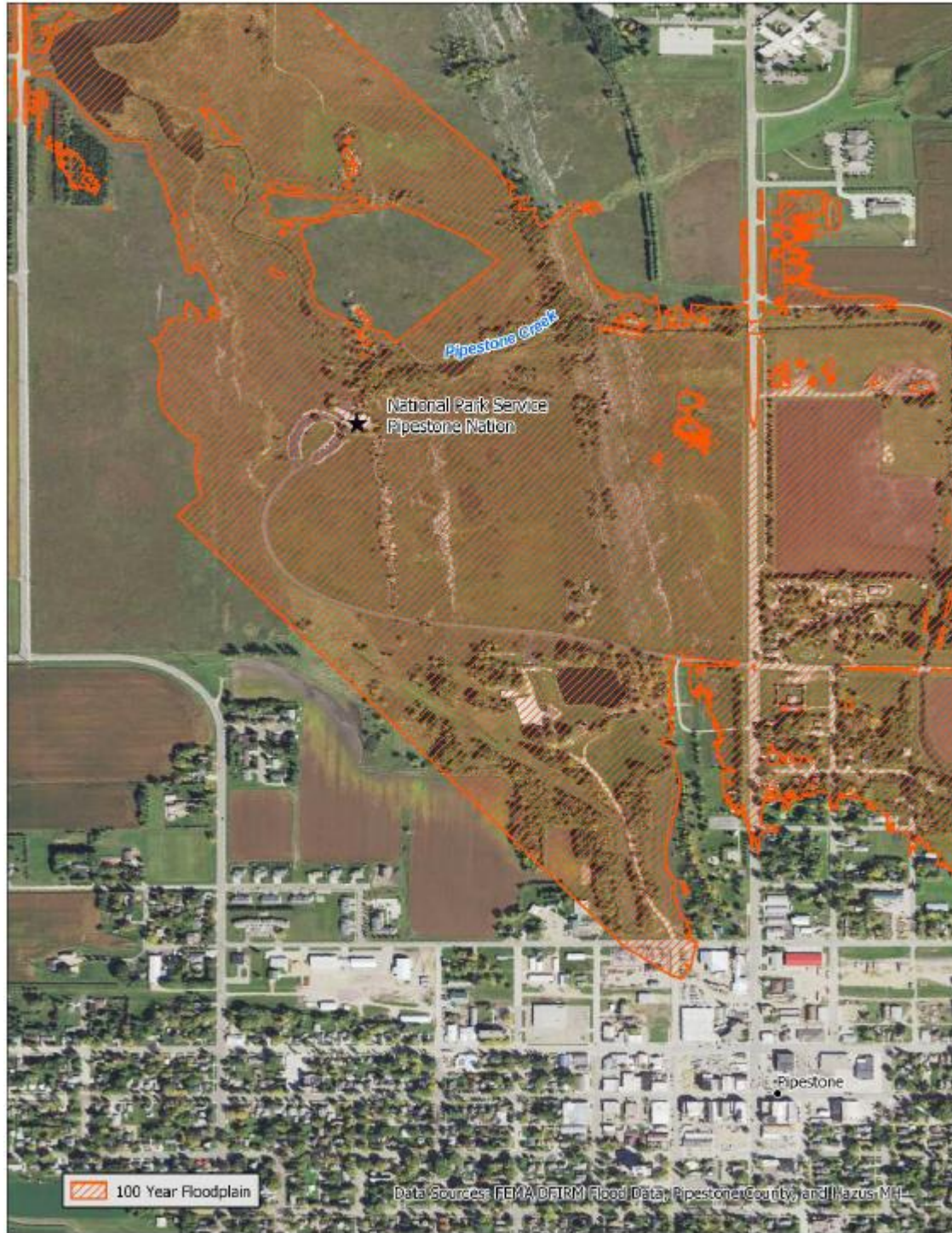
The only essential facility within Pipestone County’s 100-year floodplain boundary is the National Park Service’s Pipestone National Monument. See Figure ## for the HAZUS analysis map of Pipestone National Monument in the floodplain.

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<sup>32</sup> National Resources Conservation Service. Accessed: 11/24/14. Available: [http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ri/soils/?cid=nrcs144p2\\_016637](http://www.nrcs.usda.gov/wps/portal/nrcs/detail/ri/soils/?cid=nrcs144p2_016637)

<sup>33</sup> American Red Cross. Accessed: 10/30/13. Available: <http://www.redcross.org/prepare/disaster/flood>

**Figure #72**  
**Pipestone National Monument in the 100-Year Floodplain**



#### *Effect on Housing*

The majority of Pipestone County's population lives safe from flooding, and Pipestone County has a shoreland ordinance which limits building within the floodplain. County staff has identified residential and commercial structures within the floodplain using GIS, FIRM Maps, and other resources.



The median housing unit value in Pipestone County was \$92,400 in 2016.<sup>34</sup> The HAZUS model estimates there are 4,963 parcels with buildings in the region with a total replacement value (excluding contents) of \$600 million (2010 dollars). Approximately 66% of the buildings (and 38% of the building value) are associated with residential housing. The HAZUS model estimated 34 parcels' buildings will be at least moderately damaged (>10% damage). Zero buildings are estimated to be completely destroyed. With that said, the potential effect of a 100-year flood on housing is very high.

### *Commercial Structures*

There are some commercial structures currently located within the one percent floodplain in Pipestone County, but past damages that have occurred were minimal. Commercial buildings are not a permitted use in shoreland districts of Pipestone County's zoning ordinance.

### *Public Infrastructure*

Within Pipestone County there are likely roads that are prone to flooding or washing out during a hazard event. Low-lying areas and areas along rivers are the most vulnerable to intermittent flooding from spring thaws or large rain falls.

There are 298 bridges on county, municipal, and township roadways within Pipestone County.<sup>35</sup> To date, none of the bridges within Pipestone County have been destroyed as a result of flooding.

The majority of roadway damages from flooding occur on township roads and county roads. Many other locations can experience damage from flooding depending on the location, amount, and duration of the rainfall event. A one percent flood event could result in a number of roadways sustaining damage and wider spread road closures.

Roads, bridges, and culverts are susceptible to damage from flooding. This may be the result of an undersized culvert, poor drainage, inadequate holding basin, or other issues. For more information regarding specific locations identified in the figure below, please contact the Pipestone County Public Works Office.

There are no communities in Pipestone County that have wastewater treatment plants close to the one percent floodplain. To date, extensive damage to wastewater treatment ponds within the county due to flooding has not occurred.

### *Relationship to Other Hazards—Cascading Effects*

- Numerous. Flooding can have a number of secondary effects that can create additional hazards related to fire, public health, utility failure, insect and pest infestation, and infrastructure damage. Flooding can interfere with emergency response to fires, as seen in Grand Forks, North Dakota, during the Red River Flood of 1997. The after effects of a flood can be a contaminated water supply and mold which affect public health. It can take up to a week or two to get the power back on after a flood. Not having reliable power makes day to day life more difficult. Insect and pest infestation can take place after the

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<sup>34</sup> Census 2010. Accessed: 01/25/2018. Available: <http://factfinder.census.gov>

<sup>35</sup> MnDOT. Accessed: 8/14/2017. Available: <http://www.dot.state.mn.us/bridge/pdf/minnesota-bridges-2016-report.pdf>

flood has receded. Damage to infrastructure can take weeks to repair. This can cause increased emergency response times and put residents at risk.

#### *Previous Occurrences of the Hazard*

From January 2000 through April 2017, there have been 16 documented floods and 6 documented flash floods in Pipestone County. Those between 2012 and 2017 are listed below. NOAA defines a flood as “an overflow of water onto normally dry land. The inundation of a normally dry area caused by rising water in an existing waterway, such as a river, stream, or drainage ditch. Ponding of water at or near the point where the rain fell. Flooding is a longer term event than flash flooding: it may last days or weeks.”<sup>36</sup>

NOAA defines a flash flood as “a flood caused by heavy or excessive rainfall in a short period of time, generally less than 6 hours. Flash floods are usually characterized by raging torrents after heavy rains that rip through river beds, urban streets, or mountain canyons sweeping everything before them. They can occur within minutes or a few hours of excessive rainfall. They can also occur even if no rain has fallen, for instance after a levee or dam has failed, or after a sudden release of water by a debris or ice jam.”<sup>37</sup>

**Figure #73**  
**Floods – Pipestone County**

| Date       | Location                        | Event Narrative                                                                                                                                                                                                                                                  |
|------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 05/06/2012 | 5NW Pipestone to 5WNW Pipestone | Heavy rain caused brief but record flooding of Pipestone Creek. Fields, parkland, and roads were flooded, including the Pipestone County fairgrounds. One street in the city of Pipestone caved in. The creek crested at 5.71 feet above flood stage on May 6th. |
| 05/06/2012 | 2SSW Ihlen to 5SSW Ihlen        | Heavy rain caused moderate flooding of Split Rock Creek, flooding nearby lowlands including some farmland. The creek crested at 4.35 feet above flood stage near Jasper on May 7th.                                                                              |
| 05/26/2012 | 5NW Pipestone to 5WNW Pipestone | Heavy rain caused moderate flooding of Pipestone Creek, with flooding of parkland and a few roads. The creek crested at 2.78 feet above flood stage on May 26th.                                                                                                 |
| 06/23/2013 | 5NW Pipestone to 5WNW Pipestone | Heavy rain caused Pipestone Creek to briefly flood on June 23rd, with lowlands including a few rural roads affected. The creek crested at 0.9 foot above flood stage at Pipestone on June 23rd.                                                                  |
| 06/24/2013 | 2SSW Ihlen to 5SSW Ihlen        | Heavy rain caused Split Rock Creek to briefly flood, with lowlands including a few rural roads affected. The creek crested at 0.9 foot above flood stage near Jasper on June 24th.                                                                               |
| 06/14/2014 | 2SSW Ihlen to 5SSW Ihlen        | Repeated heavy rains caused record flooding of Split Rock Creek, with considerable agricultural flooding. The creek crested at a record 7.47 feet above flood stage at Jasper on June 16th.                                                                      |

<sup>36</sup> NOAA. Accessed: 11/24/14. Available: <http://www.srh.noaa.gov/mrx/hydro/flooddef.php>

<sup>37</sup> NOAA. Accessed: 11/24/14. Available: <http://www.srh.noaa.gov/mrx/hydro/flooddef.php>

|            |                                          |                                                                                                                                                                                                                                                                             |
|------------|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 06/15/2014 | 3ENE<br>Ruthton to<br>6SW Ihlen          | Persistent moderate to heavy rain caused flooding of some fields and other lowlands, including several roads. This flooding lasted well into the daytime hours after the rain subsided.                                                                                     |
| 06/15/2014 | 5NW<br>Pipestone to<br>5WNW<br>Pipestone | Repeated heavy rains caused brief moderate flooding of Pipestone Creek, with farmland and some roads flooded. The river crested at 2.15 feet above flood stage at Pipestone on June 15th.                                                                                   |
| 06/16/2014 | 10NNW<br>Cazenovia to<br>6SW Ihlen       | Persistent moderate to heavy rain caused flooding of fields and other lowlands, including several roads, homes, and businesses. This flooding lasted for two days, and was aggravated locally by additional storms during that time. Some roads were damaged or washed out. |

National Climatic Data Center (NCDC) Storm Events database

**Figure #74**  
**Flash Floods – Pipestone County**

| Date       | Location                        | Event Narrative                                                                                                                                                                                                                                                                                                                                                                                |
|------------|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 06/02/2002 | 2S Pipestone                    | Heavy rain caused flooding of county roads and lowlands in the Pipestone area.                                                                                                                                                                                                                                                                                                                 |
| 05/29/2004 | Pipestone                       | Rainfall of around 3 inches caused flooding of several roads and basements in Pipestone.                                                                                                                                                                                                                                                                                                       |
| 06/20/2005 | Trosky                          | Heavy rain caused flooding of numerous county roads, a few of which were washed out. The amount of damage was not known.                                                                                                                                                                                                                                                                       |
| 09/22/2010 | 2 SW Trosky to<br>2SE Edgerton  | Heavy rain caused flash flooding of numerous roads in much of central and southern Pipestone County, including Minnesota Highway 30 at several locations. The town of Edgerton was temporarily isolated by the flooding. Several motorists were stranded, and some water rescues were needed. there was widespread flooding of fields, parks and other lowlands, as well as basement flooding. |
| 06/14/2011 | 5SW Holland to<br>2SW Cazenovia | Heavy rain on saturated ground caused flash flooding of Pipestone Creek and of several roads. The worst road flooding was at an underpass on Minnesota Highway 30 in Pipestone, and along a stretch of Highway 23 about 5 miles south southwest of Pipestone.                                                                                                                                  |
| 06/16/2014 | 3E Ihlen to 3W<br>Edgerton      | Heavy rain caused flash flooding of numerous roads, including U.S. Highway 75. Many secondary roads were reported to be under water, and major roads suffered damage.                                                                                                                                                                                                                          |

National Climatic Data Center (NCDC) Storm Events database

### *Vulnerability*

Flooding is highly likely to occur each year and forecasting technology and models can help predict yearly spring flooding. Even with weather forecasting technology floods can occur rapidly and poses a risk throughout the county.

Flooding can occur anytime anywhere, so the potential damage of a flood could be higher than the total value of residential structures within the floodplain. The value of residential structures does not take into



consideration outbuildings, machine sheds, and agricultural production. The potential damage of a flood could be relatively high. Flash flooding could result in sewer systems being overloaded and flooding to occur in basements. Basement flooding could be isolated to low lying areas, or could be citywide in an event of an extreme rain event.

Improvements have been made along the flood plain. Pumps have been purchased by cities to assist with bypassing the sewer system during an extreme rain event.

### *Plans and Programs*

- Zoning – The floodplain section of the Pipestone County Development Code addresses the placement of structures within the floodplain. Pipestone County’s zoning regulations prohibits any further development within the floodplains. Existing structures may continue to exist as “grandfathered” structures, but the county anticipates the number of these structures will be reduced over time.
- The Redwood-Cottonwood Rivers Control Area, a non-regulatory, joint-powers organization that includes eight counties in the Redwood and Cottonwood river basins, focuses mostly on water quality but also works to keep water on the landscape longer, reducing potential flood impacts.
- Area II River Basin – The Area II River Basin works to alleviate recurrent flood problems in southwest Minnesota. Member counties include: Brown, Cottonwood, Lac qui Parle, Lincoln, Lyon, Murray, Pipestone, Redwood, and Yellow Medicine.
- County flood area maps – Pipestone County has FIRM maps identifying the 100-year. The county zoning ordinance controls permitted land uses in these areas, what can be built, and how.
- City flood area maps – Cities in Pipestone County have official FIRM maps identifying the 100-year flooding plain. All cities addressed flood risks in their planning and zoning documents.
- Pipestone County Emergency Operations Plan – A response plan to a flood emergency has been developed and local resources and personnel have been committed to it:
- Response Plan – A response plan to a flood emergency has been developed and local resources and personnel have been committed to it. Part of the response plan is an evacuation plan that is in the EOP.
- National Flood Insurance Program (NFIP) – Pipestone County and the following cities participate in the NFIP: Pipestone, Edgerton. The NFIP has three basic aspects that include: floodplain identification and mapping, floodplain management, and flood insurance. Zoning restrictions – The City of Pipestone and Pipestone County have zoning restrictions that limit new structures and land uses within the Floodway, Flood Fringe, and General Flood Plain District.
- Water level monitoring – Water levels in Pipestone Creek are monitored, so the water levels downstream are predictable. The closest gage is by Hwy 23/75 in Pipestone.
- Local Water Management Plan – The water plan identifies priorities regarding drainage, which includes flooding.
- Emergency response planning – Road closures are taken into account in planning and training. Local fire departments, emergency medical services, and other emergency responders plan for having to use alternative routes in case of flooding.
- Ditch system / drainage – Pipestone County continues to make improvements to the ditch system. With increased tiling, it is important to reevaluate the ditch system and drainage.

- Sediment ponds – The Pipestone County Highway Department works with the DNR and other organizations to increase the number of sedimentation ponds along roadways in Pipestone County. Sedimentation ponds hold back water, which helps to control flooding. Pipestone County Zoning references erosion control and drainage in our subdivision ordinance, but the county does not distinctly call out requirements for sedimentation ponds or their required size. Pipestone County follows state recommendations on storm water management for bare land development and other applicable projects.
- Road mitigation projects – Road retention projects were pursued to reduce the impact of flooding along roadways. These projects included: analyzing runoff and the capacity of county ditches, the installation of smaller culverts, and adding water retention ponds. Downsizing culverts is a reversal in the trend of replacing culverts with larger sized culverts, which only transfer additional water downstream.
- Diversion channel – Water retention systems and water quality projects have been constructed along diversion channels.

#### *Gaps and Deficiencies*

- Wastewater treatment vulnerability to flooding – Wastewater treatment plants are vulnerable to flooding. Pumps may not be capable to keep up with flood events. This would result in sewer water being combined with clean water and entering the various watersheds. Pond systems are the most vulnerable.
- Grandfathered in structures in the floodplain – At-risk uses and structures remain in identified 100-year floodplains, because they are “grandfathered” in.
- Severe flooding and local resources – Local resources are not adequate for a severe and prolonged flood. State and federal resources are required when responding to severe flooding. There may be a time delay to receive assistance.
- Development in the floodplain – Some residents are resistant to leaving their property, even if it is located in a designated floodplain. The area may be seen as scenic, so the resident may want to continue living in the floodplain.
- Local assistance – Local match for mitigation projects (such as acquisition of property) is often difficult to acquire, due to limited local budgets.
- Limitations of models – Models are increasingly being used by engineers and scientists in flood management. Models are only as accurate as the data that is used in the analysis. Outdated maps and not including all the impacting variables can cause forecasting errors to occur. Ground saturation is one variable that is not included in the models for estimating yearly flood levels. Ground saturation affects the amount of moisture that can be soaked in during a precipitation event. Forecasters are working on ways to include ground saturation into their flood models.
- Critical facilities in the flood plain – Pipestone National Monument
- Pumps – There are always a number of requests for pumps and generators when there are flood events. The MN Warn System helps to coordinate the supply of pumps, generators, and other equipment to affected communities. Through the MN Warn System communities can share local and regional assets.

- Aging drainage systems – Public drainage systems are aging and maintenance costs are increasing. Culverts are rusting out and replacement costs are substantial. Townships and local units of government need outside funding to help update public drainage systems. Not updating the system will lead to culvert failures, roads washing out, and erosion.

#### 5.4.4 Severe Summer Storms (Severe Thunderstorms, Lightning, and Hail)

During the spring, summer and autumn, severe thunderstorms, lightning, and hail can occur. (Windstorm and tornado events are addressed in the next section.)

##### *Locations Affected by the Hazard*

All locations in Pipestone County are at risk to be affected by this hazard. Severe summer storm events will be more widespread. These weather events can generate lightning and hail that tend to be more isolated.

##### *Extent of the Hazard*

Thunderstorms, which occur most frequently from mid-May through mid-July, are the most common type of severe summer storm. Thunderstorms are usually localized, produced by cumulonimbus clouds, accompanied by lightning, and have strong wind gusts, heavy rains, and sometimes hail or tornadoes. Thunderstorms are produced by air masses that become unstable and that overturn violently. Unstable air masses are usually the result of warm humid air at lower elevations and colder air at higher elevations.

Lightning is often associated with thunderstorms and can be deadly. Lightning occurs to balance the difference between positive and negative discharges within a cloud, between two clouds, and between the cloud and ground. For example, a negative charge at the base of the cloud is attracted to a positive charge on the ground. A lightning bolt happens when the difference between the charges is great enough. The charge is usually strongest on tall buildings, trees, and other objects protruding from the surface. Consequently, these objects are more likely to be struck than lower objects.

While cloud-to-ground lightning poses the greatest threat to people and objects on the ground, it accounts for only 20 percent of all lightning strikes. The remaining lightning occurs within the cloud, from cloud to cloud, or from the ground to the cloud. The most common type of lightning is lightning occurring within a cloud. The planning team suggested that it is difficult to mitigate for lightning beyond surge protectors and insurance policies.

Hail is an ice product produced in severe thunderstorms. It is formed when strong updrafts within the cumulonimbus cloud carry water droplets above the freezing level or when ice pellets in the cloud collide with water droplets. The water droplets freeze or attach themselves to the ice pellets and begin to freeze as strong updraft winds toss the pellets and droplets back up into colder regions of the cloud. Both gravity and downdrafts in the cloud pull the pellets down, where they encounter more droplets that attach and freeze and are tossed once again to higher levels in the cloud. This process continues until the hail becomes too heavy to be supported by the updrafts and falls to the ground.

**Figure #75**  
**Estimating Hail Size**

| Description | Diameter (inches) |
|-------------|-------------------|
| Pea         | 0.25              |
| Plain M&M   | 0.5               |
| Penny       | 0.75              |

|                          |          |
|--------------------------|----------|
| Nickel                   | 0.88     |
| Quarter                  | 1        |
| Half Dollar              | 1.25     |
| Walnut or Ping Pong Ball | 1.5      |
| Golf ball                | 1.75     |
| Hen's Egg or Lime        | 2        |
| Tennis Ball              | 2.5      |
| Baseball                 | 2.75     |
| Tea Cup                  | 3        |
| Grapefruit               | 4        |
| Softball                 | 4.5      |
| CD-DVD                   | 4.75 – 5 |

National Weather Service (NWS)

In Minnesota, most hail ranges in size from pea-size (1/4 inch) to golf-ball size (1-3/4 inch). Larger hailstones have been reported, but occur less frequently. Strong updrafts are necessary within the cloud to form hail, and are usually associated with severe thunderstorms. Coverage areas for individual hailstorms are highly variable and spotty due to the changing nature of the cumulonimbus cloud.

Given the rural agricultural nature of the county, the likelihood is greatest that crops would experience the most damage from a hail event; however, hail can also do a great amount of damage to vehicles and roofs of individual structures. The chance of significant building damage is likely to be higher within the cities as there are simply more buildings clustered in a small area to be potentially damaged.

#### *Relationship to Other Hazards—Cascading Effects*

- Utility Failure. Extreme heat can lead to the power grid being overloaded and can in turn cause blackouts.
- Transportation Infrastructure. Heavy rain can cause flash flood events, and may threaten transportation infrastructure.
- Fire. Lightning can cause both structure fires and wildfires.
- Agricultural Disease. Extreme Heat can have a major effect on the county's crops and livestock. During prolonged heat events, crops grow weak and are more susceptible to plant pests and diseases. In times of extreme heat, it is important that confinement buildings are properly ventilated and outside livestock are provided with places to get into the shade. Heat stroke can pose a serious threat to livestock.

#### *Previous Occurrences of the Hazard*

Thunderstorms are not documented by the NOAA as a separate event. There were two documented lightning events in Pipestone County from January 2000 through April 2017.<sup>38</sup> In addition to those reported events, there was also an instance of lightning striking the Pipestone County Courthouse, resulting in multiple chillers being lost and \$40,000 in damage. There were most likely a number of other

<sup>38</sup> NOAA. Accessed: 11/24/15. Available: <http://www.ncdc.noaa.gov/stormevents/>

lightning events, but they went unreported. “Tall objects such as trees and skyscrapers are commonly struck by lightning... Lightning can strike the ground in an open field even if the tree line is close by.”<sup>39</sup>

**Figure #76**  
**Lightning Events – Pipestone County**

| Date       | Location        | Event Narrative                                                                                                                                                                                                                                                                                               |
|------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 09/24/2005 | Ruthton         | Lightning struck a large tree at an elementary school, damaging the tree and forcing its removal.                                                                                                                                                                                                             |
| 06/14/2011 | 1E<br>Pipestone | Lightning struck an apartment building, starting a fire in the attic which heavily damaged an upstairs apartment. Another upstairs apartment suffered water damage, while two basement apartments were undamaged. Six residents home in the apartments at the time of the lightning strike escaped uninjured. |

National Climatic Data Center (NCDC) Storm Events database

The lightning activity level (LAL) is a common parameter that is part of fire weather forecasts nationwide. LAL is a measure of the amount of lightning activity using values 1 to 6 where:

**Figure #77**  
**Lightning Activity Level**

| LAL | Cloud & Storm Development                                                                                                                                                                                                                                     | Lightning Strikes / 15 min |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| 1   | No thunderstorms.                                                                                                                                                                                                                                             | -                          |
| 2   | Cumulus clouds are common but only a few reach the towering cumulus stage. A single thunderstorm must be confirmed in the observation area. The clouds produce mainly virga, but light rain will occasionally reach the ground. Lightning is very infrequent. | 1-8                        |
| 3   | Towering cumulus covers less than two-tenths of the sky. Thunderstorms are few, but two to three must occur within the observation area. Light to moderate rain will reach the ground, and lightning is infrequent.                                           | 9-15                       |
| 4   | Towering cumulus covers two to three-tenths of the sky. Thunderstorms are scattered and more than three must occur within the observation area. Moderate rain is common and lightning is frequent.                                                            | 16-25                      |
| 5   | Towering cumulus and thunderstorms are numerous. They cover more than three-tenths and occasionally obscure the sky. Rain is moderate to heavy and lightning is frequent and intense.                                                                         | >25                        |
| 6   | Similar to LAL 3 except thunderstorms are dry.                                                                                                                                                                                                                |                            |

<sup>39</sup> NOAA. Accessed: 11/24/15. Available: <http://www.nssl.noaa.gov/education/svrwx101/lightning/>



There are currently no lightning detectors in Pipestone County.

Hail events are separate events recorded by NOAA. Hail is often part of a thunderstorm and is not always reported due to the varying size and the rural nature of Pipestone County. From January 2000 through April 2017, there have been 35 documented hail events in Pipestone County. Some of these hail events are only minutes apart, but a hail event is a separate event if the storm stops hailing and starts hailing a few minutes later. The events between 2012 and 2017 are listed in Figure #78.

**Figure #78**  
**Hail Events, Pipestone County**

| Date       | Location          | Event Narrative                                                                                                                                                                                                                                                                |
|------------|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 06/19/2013 | 1NE Trosky        | Hail was accompanied by heavy rain.                                                                                                                                                                                                                                            |
| 05/08/2014 | 3WSW Ihlen        | Hail was mostly pea to dime size, but a few stones were as large as golf balls.                                                                                                                                                                                                |
| 05/08/2014 | 2E Pipestone Arpt | Hail was mostly quarter size with a few stones as large as golf balls. The hail was accompanied by damaging winds.                                                                                                                                                             |
| 05/08/2014 | 1S Ihlen          | The largest hailstones were measured at golf ball size.                                                                                                                                                                                                                        |
| 05/08/2014 | 1S Edgerton       | Thunderstorms produced marginally large hail at a few places in southwest Minnesota on the afternoon of May 8th.                                                                                                                                                               |
| 06/16/2014 | 1S Edgerton       | Thunderstorms produced numerous events of large hail, damaging winds, flash flooding, and areal flooding across most of southwest Minnesota during the afternoon and evening of June 16th. The areal flooding was a longer term event and persisted through much of June 18th. |
| 06/16/2014 | 3ESE Edgerton     | Thunderstorms produced numerous events of large hail, damaging winds, flash flooding, and areal flooding across most of southwest Minnesota during the afternoon and evening of June 16th. The areal flooding was a longer term event and persisted through much of June 18th. |
| 07/24/2014 | 1E Pipestone      | Thunderstorms produced up to half dollar size hail in the southwest corner of Minnesota during the early afternoon of July 24th.                                                                                                                                               |
| 07/24/2014 | 1NE Trosky        | Thunderstorms produced up to half dollar size hail in the southwest corner of Minnesota during the early afternoon of July 24th.                                                                                                                                               |

|            |               |                                                                                                                                                         |
|------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07/24/2014 | 1SSW Edgerton | Thunderstorms produced up to half dollar size hail in the southwest corner of Minnesota during the early afternoon of July 24th.                        |
| 06/09/2015 | 2NNE Airlie   | Thunderstorms produced large hail and damaging winds at a few locations in southwest Minnesota during the late afternoon and early evening of June 9th. |
| 06/09/2015 | 2NNE Airlie   | Thunderstorms produced large hail and damaging winds at a few locations in southwest Minnesota during the late afternoon and early evening of June 9th. |

National Climatic Data Center (NCDC) Storm Events database

### *Hail and Climate Change*

According to the Federal Advisory Committee Draft National Climate Assessment (NCA), winter storms have increased slightly in frequency and intensity, and their tracks have shifted northward over the U.S. Other trends in severe storms, including the numbers of hurricanes and the intensity and frequency of tornadoes, hail, and damaging thunderstorm winds are uncertain. Since the impact of more frequent or intense storms can be larger than the impact of average temperature, climate scientists are actively researching the connections between climate change and severe storms (National Climate Assessment Development Advisory Committee, 2013).

The occurrence of very heavy precipitation has increased in Minnesota in recent decades and future projections also indicate this will continue (International Climate Adaptation Team, 2013). While it is unknown if this precipitation will occur during severe storms that produce hail, the possibility has not been ruled out.

### *Vulnerability*

People do not always recognize their limitations. Summer storms can pose a serious risk to all populations, especially the young and elderly population. Informing the public about summer storms is important in preventing accidents.

### *Plans and Programs*

- Emergency alert system – Pipestone County has the CodeRED emergency notification system. CodeRED allows emergency officials to notify residents and businesses by telephone, cell phone, text message, email and social media regarding time-sensitive general and emergency notifications.
- Lightning detectors – “Lightning hazards can be mitigated by advanced planning. One part of this safety program should include an early detection and warning alarm package. Lightning detectors can give notice to shut down dangerous operations before the arrival of lightning. (Note: there is no defense from a “first strike” situation.) Detectors also may signal ‘all clear’ conditions after the lightning threat has passed.”<sup>40</sup> Lightning detectors would improve safety at outdoor sporting events.
- Storm Ready Community – StormReady is a community preparedness program that encourages government entities and commercial gathering sites to prepare for severe storms. Storm Ready

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<sup>40</sup> National Lightning Safety Institute. Overview of Lightning Detection Equipment. Accessed: 2/24/16. Available: [http://lightningsafety.com/nlsi\\_lhm/detectors.html](http://lightningsafety.com/nlsi_lhm/detectors.html)

Communities are about building resilient communities in the face of increasing vulnerabilities to extreme weather events. To date Pipestone County is not enrolled in the Storm Ready Program.

- Weather Ready Nation Ambassador – Pipestone County is a Weather Ready Nation Ambassador. “The Weather-Ready Nation Ambassador™ initiative is the National Oceanic and Atmospheric Administration’s (NOAA) effort to formally recognize NOAA partners who are improving the nation’s readiness, responsiveness, and overall resilience against extreme weather, water, and climate events. As a WRN Ambassador, partners commit to working with NOAA and other Ambassadors to strengthen national resilience against extreme weather.”<sup>41</sup>
- Severe Weather Awareness – Each spring, Pipestone County Emergency Management personnel will educate local schools, nursing homes, hospitals, etc. on the importance of doing a “Severe Weather Awareness Week” workshop for their staff. This workshop identifies evacuation routes and emergency shelters, along with other important information. Entities that participate include: Pipestone Public Schools, Edgerton Public Schools, Russell-Tyler-Ruthton Public Schools, Avera Pipestone Medical Center, and Pipestone County Government Center. There are also a number of businesses, assisted living and long term care facilities, and day cares that participate.
- Local media – Severe weather warnings are broadcasted via local media. Public service announcements are one of the ways to warn the public of severe weather.
- Severe weather spotter training – an annual training is provided through a Pipestone County/Lincoln County partnership. The last two trainings were 2016 in Pipestone and 2017 at Hole in the Mountain Park (Lake Benton). The National Weather Service conducts the training.
- Phone Apps: Phone apps exist to notify people of lightning strikes within a one mile radius. There is not currently a push to have residents download those apps.

#### *Gaps and Deficiencies*

- Public education – The public may not be aware of the real risks associated with heat exhaustion, extreme heat events, and other severe summer storms.
- Lightning detectors – Lightning detectors detect lightning produced by thunderstorms. Lightning detectors would improve safety at outdoor sporting events by providing better information when delaying or cancelling a sporting event. Not all outdoor sporting events have a lightning detector. Currently, the National Federation of State High School Associations (NFHS) “30-30 Rule” is used. The 30-30 Rule states that when you see lightning, count the time until you hear thunder. If this time is 30 seconds or less, go immediately to a safer place. Some smart phones are able to download a lightning detector app.

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<sup>41</sup> NOAA. Weather Ready Nation Ambassadors. Accessed: 3/24/16. Available: <http://www.nws.noaa.gov/com/weatherreadynation/ambassadors.html>

#### 5.4.5 Tornado & Straight-line Wind Events

Tornadoes are the most violent of all storm types experienced in Minnesota.<sup>42</sup> A tornado is a rapidly rotating column of air that is spawned from a cumulonimbus cloud. When it drops to the ground, it can create significant property damage and loss of life.

Straight-line winds are also damaging but not to the extent of more powerful tornadoes. Straight-line winds can and do produce substantial damage over wider areas at one time. NOAA documents straight-line wind events as thunderstorm wind events and defines them as winds equal to or greater than 40 mph (35 knots).

##### *Locations Affected by the Hazard*

All of Pipestone County is at risk of a tornado. FEMA places Southern Minnesota in Wind Zone IV, subject to winds of up to 250 mph.<sup>43</sup>

##### *Extent of the Hazard*

Minnesota lies along the north edge of the region of maximum tornado occurrence in the United States, known as tornado alley. Tornado Alley encompasses part of the central United States that extends across parts of Texas, Oklahoma, Kansas, Missouri, East Nebraska, and West Iowa. Tornadoes have been reported in Minnesota in every month from March through November.<sup>44</sup>

The severity of tornado damage is measured by the Fujita Tornado Scale, with a sliding scale from F0 to F5 depending on wind speed. A tornado's path typically ranges from 250 feet to a quarter of a mile in width. The speed a tornado travels varies but commonly is between 20 mph and 30 mph. Most tornadoes stay on the ground for less than five minutes. Tornadoes frequently move from southwest to northeast but this also varies and cannot be counted on in all instances.<sup>45</sup>

Tornado damage can vary from limited damage to trees and building to complete destruction of a community. Along with monetary damages, loss of life is a real concern. However, due to the rural nature of Pipestone County, many funnel clouds have only caused damages to crops and unpopulated area.

**Figure #79**  
**Derived Enhanced F-Scale for Tornado Damage**

| Scale | Wind Estimate | Typical Damage                                                                                                           |
|-------|---------------|--------------------------------------------------------------------------------------------------------------------------|
| EFO   | 65-85 mph     | Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged. |

<sup>42</sup> MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: [https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011\\_MinnesotaAllHazardMitigationPlanDraft.pdf](https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf)

<sup>43</sup> FEMA. Accessed: 5/29/13. Available: <http://www.fema.gov/safe-rooms/wind-zones-united-states>

<sup>44</sup> MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: [https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011\\_MinnesotaAllHazardMitigationPlanDraft.pdf](https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf)

<sup>45</sup> MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: [https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011\\_MinnesotaAllHazardMitigationPlanDraft.pdf](https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf)

|     |             |                                                                                                                                                                                                                    |
|-----|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EF1 | 86-109 mph  | Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.                                                                                         |
| EF2 | 110-137 mph | Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.                           |
| EF3 | 138-167 mph | Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.                                               |
| EF4 | 168-199 mph | Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.                                                          |
| EF5 | 200-234 mph | Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur. |

National Climatic Data Center (NCDC) Storm Events database

**Figure #80**  
**Straight-line Wind Damage Estimates**

| Wind Speed   | Effects                                                                                  |
|--------------|------------------------------------------------------------------------------------------|
| 25 – 31 mph  | Large branches in motion, whistling in telephone wires                                   |
| 32 – 38 mph  | Whole trees in motion                                                                    |
| 39 – 54 mph  | Twigs break off of trees, wind impedes walking                                           |
| 55 – 72 mph  | Damage to chimneys and TV antennas, pushes over shallow rooted trees                     |
| 73 – 112 mph | Peels surface off roofs, windows broken, trailer houses overturned                       |
| 113+ mph     | Roofs torn off houses, weak buildings and trailer houses destroyed, large trees uprooted |

The National Weather Service

The most severe windstorms usually occur (and do the most damage) during severe thunderstorms in the spring and summer months. These include tornadoes, downbursts, or straight line winds. Straight-line winds have similar effects to tornadoes without the rotational damage pattern.

Downbursts are created by a column of sinking air, capable of producing straight-line winds in excess of 150 mph. Winds of greater than 60 mph are also associated with intense spring and fall low-pressure systems. These winds can inflict damage to buildings and overturn high profile vehicles.

The Minnesota AHMP calculated an annual probability of 0.84 of a windstorm event causing \$54,167 worth of damages per event.<sup>46</sup> This average damage per event is based on wind damages from 1950 through 2007. During that timeframe there were 48 reported incidences of damages from windstorms.

<sup>46</sup> MN All Hazard Mitigation Plan. Accessed 9/11/13. Available: [http://www.rrbdin.org/wp-content/uploads/2011/08/MN\\_state\\_mitigation\\_plan.pdf](http://www.rrbdin.org/wp-content/uploads/2011/08/MN_state_mitigation_plan.pdf)

#### Relationship to Other Hazards—Cascading Effects

- Numerous. A tornado or straight-line wind storm, can lead to total destruction of buildings and wide-scale casualties. There can be fires, disruptions to transportation infrastructure and other infrastructure, and potential public health emergencies. Catastrophic events such as these may also create the potential for civil unrest.
- Emergency Response. Emergency response times can also be affected by infrastructure being damaged. Cell phone towers and telephone lines can be downed delaying calls for help.

#### *Previous Occurrences of the Hazard*

There were 4 documented tornadoes in Pipestone County from January 2000 through April 2017. There were 23 thunderstorm wind events documented during this same time period. Straight-line winds are classified by NOAA as thunderstorm wind events. The tornadoes that took place between 2000 and 2017 are listed below. The wind events with speeds over 60 kts are listed in Figure #82.

**Figure #81**  
**Tornadoes – Pipestone County**

| Date       | Mag. | Location                                        | Event Narrative                                                                                                                                                                                                                         |
|------------|------|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 06/20/2005 | F0   | 5SW Ihlen                                       | A tornado caused no reported damage after moving from Rock County.                                                                                                                                                                      |
| 07/01/2011 | EF1  | 1SE<br>Ruthton<br>to 1E<br>Ruthton              | A tornado destroyed a shelter belt, damaged a Morton building, and damaged several garages, one of which was moved off its foundation. The tornado also caused widespread tree damage, including several trees snapped off at the base. |
| 06/03/2016 | EF0  | 4ENE<br>Cazenovia                               | A brief tornado, a landspout, caused no reported damage.                                                                                                                                                                                |
| 06/14/2016 | EF0  | 1W<br>Pipestone<br>ARPT to<br>3NNW<br>Pipestone | A tornado caused an unknown amount of crop damage.                                                                                                                                                                                      |

National Climatic Data Center (NCDC) Storm Events database

**Figure #82**  
**Thunderstorm Wind Event – Pipestone County**

| Date       | Mag.    | Location | Event Narrative                                                                 |
|------------|---------|----------|---------------------------------------------------------------------------------|
| 08/07/2000 | 65 kts. | Edgerton | Thunderstorm winds caused tree damage. The amount of damage was not determined. |



|            |         |                  |                                                                                                                                                   |
|------------|---------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 06/20/2005 | 61 kts. | 4SW<br>Ihlen     | Thunderstorm winds caused tree damage, including several trees blown over. The winds also blew down power lines, resulting in power outages.      |
| 06/20/2005 | 61 kts. | Edgerton         | Thunderstorm winds caused tree and power line damage, causing a power outage. The winds blew down 3 to 4 inch diameter branches.                  |
| 07/23/2010 | 61 kts. | 1E<br>Pipestone  | Thunderstorm winds caused tree damage, including several large trees blown down.                                                                  |
| 08/12/2010 | 61 kts. | 1S<br>Edgerton   | Thunderstorm winds blew the roof off a bowling alley, and caused tree damage.                                                                     |
| 09/22/2010 | 60 kts. | 2ESE<br>Edgerton | Thunderstorm winds caused tree damage, including moderate size branches blown down.                                                               |
| 07/01/2011 | 70 kts. | 1E<br>Ruthton    | Non tornadic thunderstorm winds blew down trees, power poles, and power lines, destroyed a highway shop, and blew the roof off a pallet business. |
| 06/03/2016 | 61 kts. | 3SE<br>Ruthton   | Thunderstorm winds caused tree damage.                                                                                                            |

National Climatic Data Center (NCDC) Storm Events database

Often the right conditions exist to produce a tornado, but a tornado will not be produced. Also, an unknown number of tornadoes are not reported because they do not touch down or cause any damages.

Straight-line winds can also cause property damage, but there is less risk of loss of life associated with straight-line winds. Tornadoes and straight-line winds can be most devastating to those living in mobile homes, boats, or RVs. The 2015 American Community Survey identified 95 mobile home units in Pipestone County.<sup>47</sup>

#### *Windstorms and Climate Change*

Lack of high-quality long-term data sets make assessment of changes in wind speeds very difficult (Kunkel, et al., Regional Climate Trends and Scenarios for the U.S. National Climate Assessment, 2013). One analysis generally found no evidence of significant changes in wind speed distribution. Other trends in severe storms, including the numbers of hurricanes and the intensity and frequency of tornadoes, hail, and damaging thunderstorm winds are uncertain. Since the impact of more frequent or intense storms can be larger than the impact of average temperature, climate scientists are actively researching the connections between climate change and severe storms (National Climate Assessment Development Advisory Committee, 2013).

#### *Tornadoes and Climate Change*

Tornadoes and other severe thunderstorm phenomena frequently cause as much annual property damage in the U.S. as do hurricanes, and often cause more deaths. Although recent research has yielded insights into the connections between global warming and the factors that cause tornadoes and severe

<sup>47</sup> FactFinder. Accessed 8/9/17. Available: <http://factfinder.census.gov>

thunderstorms, such as atmospheric instability and increases in wind speed with altitude (Del Genio, Yao, & Jonas, 2007), these relationships remain mostly unexplored, largely because of the challenges in observing thunderstorms and tornadoes and simulating them with computer models (National Climate Assessment Development Advisory Committee, 2013).

According to Harold Brooks of NOAA's National Severe Weather Laboratory, there is increasing variability in the "start" of tornado season. The number of days with more than 30 EF1 or greater tornadoes is increasing, while the number of days with at least 1 EF1 or greater tornadoes is decreasing. Thus, tornadoes are occurring on fewer days, but *more* are occurring on outbreak days.

Tornadoes have not been recorded in Minnesota in the winter months of December, January and February (MN DNR, 2014). However, the state of Wisconsin has recorded 3 tornadoes in January and 6 in December during the period of 1844-2013 (National Weather Service Weather Forecast Office, 2014) including a recent January tornado in 2008.

### *Vulnerability*

Tornado and Straight-line Wind events are likely to take place in any year. Tornadoes are less common than straight-line wind events, but communities need to be prepared since loss of life is a risk associated with these two hazards.

Severe wind events can cause minor damage to structural failure and full-scale devastation. Residents and travelers must be warned of impending danger immediately before and during a tornado or severe straight-line wind event.

### *Plans and Programs*

- Severe Weather Spotter Network – The severe storm spotter network, sponsored by the National Weather Services (NWS), enlists the help of trained volunteers to spot severe storm conditions and report this information to the NWS. No tornado warnings are given unless the storm has been spotted by someone or is confirmed by NWS radar reports. Pipestone County annually trains severe weather spotters who report directly to the NWS when severe weather is observed.
- NOAA Weather Radio – NWR broadcasts official warnings, watches, forecasts, and other hazard information 24 hours a day, seven days a week. The nationwide network of radio stations broadcast continuous weather information from the nearest National Weather Service office. The NWR is your primary source of comprehensive weather and emergency information regarding all hazards.
- Outdoor warning sirens – Outdoor warning sirens offer last minute warnings to take shelter. The primary purpose of the outdoor warning siren is to alert people who are outside to severe weather, chemical hazard, or other emergency. If you hear an outdoor warning siren you should seek shelter immediately. Most of the cities in Pipestone County have good coverage by emergency sirens that can be activated to warn residents in the event of a severe weather event or other emergency. All of the sirens in Pipestone County have been converted to narrow band frequency.
- County Emergency Management Plan – The county Emergency Management Plan designates where to go in case of an emergency, who the main contacts are, and who is in charge of response and clean up.

- Minnesota State Parks and Trails Severe Weather Policy –Minnesota State Parks have a severe weather policy to help inform visitors on how to respond during severe weather events. Split Rock Creek State Park does not have an emergency siren, so visitors rely on direct state park and state recreation area managers to provide information and communication methods to visitors. State parks, state recreation areas and state forest recreation areas have posted general procedures on how visitors should respond to severe weather events. Division of Parks and Trails staff will make reasonable efforts to advise visitors of impending severe weather information when staff is present. The state park and state recreation area manager is responsible for the implementation of this policy. State park, state recreation area and forest recreation area visitors are ultimately responsible for their own safety during severe weather.
- Text Alert – Pipestone Public Schools has a text alert system for emergencies and school closings.
- Warning sirens – No warning sirens in Pipestone County have voice capabilities.
- Tornado drills – Pipestone Public Schools, Edgerton Public Schools, Edgerton Christian Schools, and Russell-Tyler-Ruthton Public Schools participate in severe weather awareness week. The schools have a plan in place for tornadoes and other severe weather events.
- Emergency shelters – Local units of government in Pipestone County provide emergency shelters.

**Figure #83**  
**Outdoor Warning Sirens – Pipestone County**

| Cities       | Number | Sirens Adequate | Have backup battery | Feedback                                                                                                                                                                                                    |
|--------------|--------|-----------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Edgerton     | 4      | Yes             | No                  | Located at city park, City Hall, Edgebrook Campus, machine shop corner. Dispatchers can activate.                                                                                                           |
| Hatfield     | 0      |                 |                     |                                                                                                                                                                                                             |
| Holland      |        |                 |                     |                                                                                                                                                                                                             |
| Ihlen        | 1      | Yes             | Yes                 | At 104 Homan Street. Received USDA small cities grant in 2016 for their siren. County dispatchers can activate.                                                                                             |
| Jasper       |        |                 |                     |                                                                                                                                                                                                             |
| Pipestone    |        |                 |                     |                                                                                                                                                                                                             |
| Ruthton      | 1      | Yes             | No                  | At the water tower. Manual control siren (not radio controlled by dispatch like all the others in Pipestone County). Fire chief/assistant, Mayor, City Maintenance, City Clerk, dispatch, can all activate. |
| Trosky       | 1      | No              | No                  | Behind city hall. City council members manually trigger.                                                                                                                                                    |
| Woodstock    | 1      | Yes             | Unsure              | On Main Street. Dispatchers can trigger.                                                                                                                                                                    |
| County Parks |        |                 |                     |                                                                                                                                                                                                             |

#### *Gaps and Deficiencies*

- Emergency shelters in nursing homes and assisted living facilities – A number of nursing homes and assisted living facilities in Pipestone County do not have basement shelters or other suitable shelters for the residents. A survey conducted by the Southwest Area Agency on Aging analyzed how many nursing homes within the county do have basement shelters or other suitable shelters for the residents. Over 90 percent of the respondents indicated that their facility does NOT have a basement that can be used for a shelter. While some of the facilities do have basements, in the event of a violent storm residents are moved into an interior hallway away from windows. This policy is in place because the majority of the residents are elderly and don't move well, so it would be difficult to move all the residents to the basement.
- Emergency shelters in mobile home parks – Mobile homes typically do not provide adequate emergency shelter for residents. The city of Pipestone has a mobile home park and is identified as needing emergency shelters.
- Warning siren range – The effective range of warning sirens is limited. Rural areas are outside the range of the severe weather warning system areas.
- Local radio and television warnings – Local radio and television stations do provide warnings, but they are effective only if tuned to the local channel. Satellite and internet based mediums are widely used, so local emergency broadcasts are limited. Language barriers can also be an issue regarding severe weather warnings.
- Tornado preparedness training – Training should be given to educate residents as to where to go in their own homes during a tornado.
- Countywide basement study – A small number of homes in the county lack basements that would provide shelter in the event of a tornado or damaging winds from a severe thunderstorm. The county needs to better assess how many actual homes do not have basements, and then develop a plan to provide shelter to those residents.
- Emergency shelter and safe rooms – Not all parks in Pipestone County have emergency shelters. There are no safe rooms in Pipestone County. Funding is an obstacle for the construction of safe rooms.
- Warning siren backup batteries – Not all sirens are equipped with a backup battery. If the power goes off as a result of the storm, the siren is useless if it does not have a backup generator. See Figure #83 for warning sirens in Pipestone County that do and do not have backup batteries (backup power generation).
- Diversity and language barriers – There are a number of nationalities and languages spoken in Pipestone County. This makes it difficult to send out emergency broadcast. Having to translate emergency broadcasts into multiple languages takes time and money.

**Figure #84**  
**Emergency Shelters & Safe Rooms – Pipestone County**

| Cities   | Emergency Shelter | Safe Room | Need |
|----------|-------------------|-----------|------|
| Edgerton | N/A               | N/A       |      |
| Hatfield | N/A               | N/A       |      |
| Holland  | N/A               | N/A       |      |

|              |     |     |                                                                                                               |
|--------------|-----|-----|---------------------------------------------------------------------------------------------------------------|
| Ihlen        | N/A | N/A |                                                                                                               |
| Jasper       | N/A | N/A |                                                                                                               |
| Pipestone    | N/A | N/A | The planning team identified the need for safe rooms at the private campground and trailer park in Pipestone. |
| Ruthton      | N/A | N/A |                                                                                                               |
| Trosky       | N/A | N/A |                                                                                                               |
| Woodstock    | N/A | N/A |                                                                                                               |
| County Parks | N/A | N/A |                                                                                                               |

#### 5.4.6 Extreme Cold

Minnesota experiences winter weather from mid-autumn through the winter season into spring. Extreme cold can immobilize large regions at the same time. All types of winter storms can be accompanied by extreme cold—both absolute temperatures and wind chill.

##### *Locations Affected by the Hazard*

All locations in Pipestone County are equally likely to be exposed to this hazard. Rural areas are more likely to be severely impacted by the hazard. Rural homes and farms face the threat of isolation and utility failure during winter storms.

Given the rural nature of Lincoln County, residents of smaller communities may face similar isolation issues as rural residents. City residents are also at risk. Attempting to travel between communities would expose city dwellers to higher levels of risk corresponding with their rural counterparts.

##### *Extent of the Hazard*

Extreme cold events are when temperatures lead to direct dangers to people and animals. Infants and the elderly are most susceptible to prolonged exposure to the cold. Wind and cold weather can combine to cause wind chill temperatures as low as 70 degrees below zero.<sup>48</sup> Prolonged exposure can cause frostbite or hypothermia and can be life-threatening.

Below freezing temperatures can also damage vegetation and cause pipes to freeze and burst inside homes. More deaths are attributed to winter storms than to extreme cold weather events, but some populations are at more risk than others. The best advice is to stay inside. Over half of winter-weather deaths occurred in a vehicle, and 30 percent occurred outdoors.

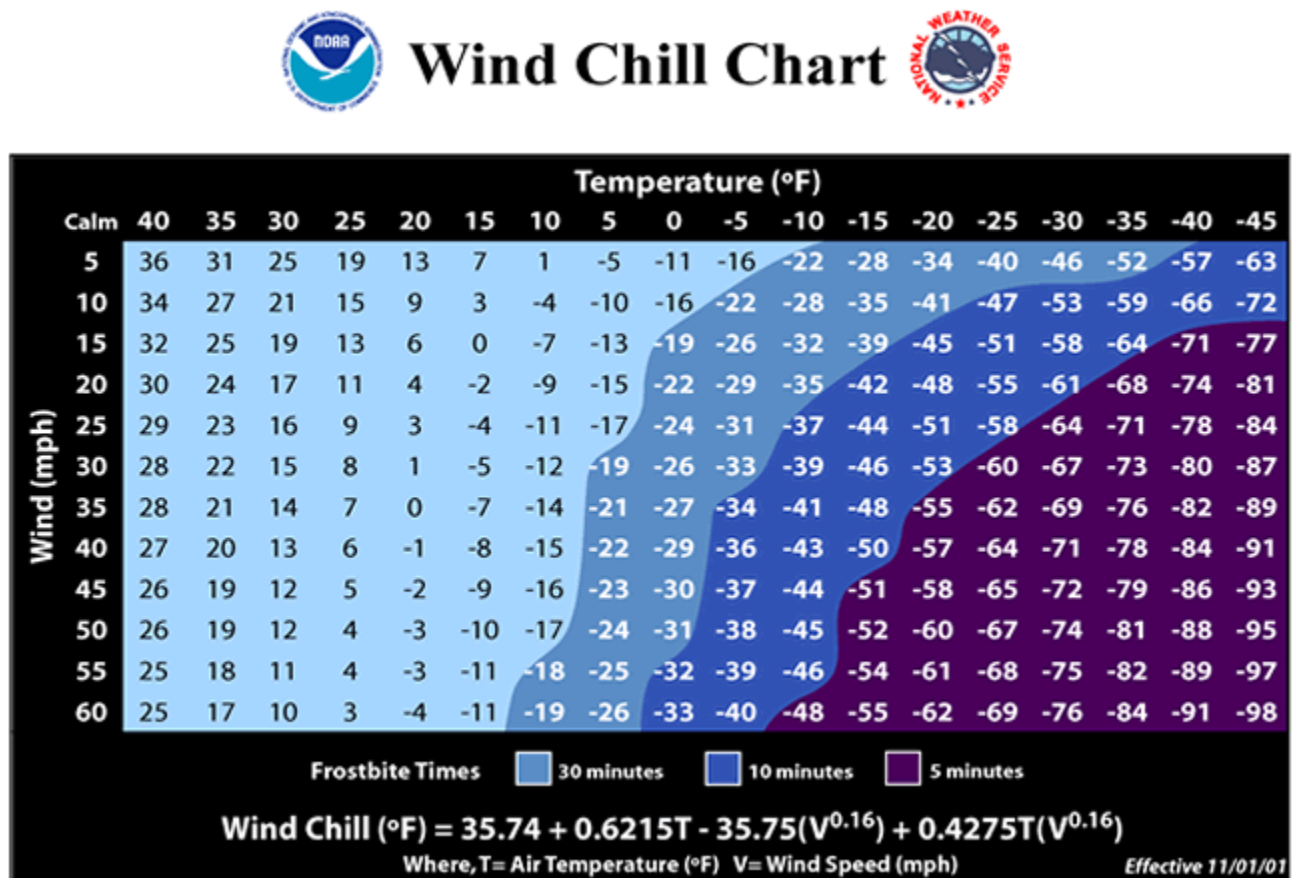
The planning team expects this hazard would affect individuals more so than public infrastructure and planning measures should be considered as such. This may mean focusing more on public awareness rather than high-cost measures.

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<sup>48</sup> National Oceanic and Atmospheric Administration. Accessed 8/9/17. Available: [http://www.nws.noaa.gov/om/cold/wind\\_chill.shtml](http://www.nws.noaa.gov/om/cold/wind_chill.shtml)



Figure #85  
Wind Chill Table



#### Relationship to Other Hazards—Cascading Effects

- Transportation Crashes. Winter storms often lead to hazardous conditions for transportation infrastructure. Icy roads can make travel difficult. Poor driving conditions and poorly designed transportation infrastructure can contribute to motor vehicle crashes.
- Wildfire. Extreme cold directly impacts firefighting, making fire suppression more difficult and increasing the likelihood of equipment damage.
- Public Health. Frozen septic systems can lead to the release of increased levels of untreated wastewater into the environment.
- Public Safety. Anyone exposed to extremely cold temperatures can develop frostbite and hypothermia. The elderly, children and those who engage in outdoor work or recreation may be most susceptible to the danger of extremely cold temperatures.

#### Previous Occurrences of the Hazard

From January 2000 through April 2017, there have been eight documented extreme cold events in Pipestone County. In the figure below are extreme cold events that occurred from January 2000 through April 2017.

**Figure #86**  
**Extreme Cold Events – Pipestone County**

| Date       | Location(s)                                                         | Event Narrative                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 01/14/2009 | Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon, Cottonwood | Moderate to strong northwest winds and very cold air combined to lower wind chills to 35 to 45 below zero at times. The coldest winds chills were during the morning of January 14th with strong winds, and the night of January 14th to daybreak of January 15th when temperatures were falling and winds were slowly decreasing. The actual temperature dropped to 26 below zero at Pipestone on the morning of January 15th after the wind had subsided.      |
| 01/07/2010 | Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon, Cottonwood | Persistent north to northwest winds combined with very cold air to produce wind chill values the frequently dropped to 35 below zero or a little colder. These extremely dangerous wind chills added to the hazards produced by the preceding winter storm. As winds slowly subsided during the night of January 7th, temperatures continued to drop to well below zero, keeping the wind chills at the very dangerous level through the morning of January 8th. |
| 02/01/2011 | Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon, Cottonwood | North to northwest winds averaging 15 to 30 mph combined with temperatures dropping below zero to produce wind chills of 20 to 35 below zero on February 1st. On the night of February 1st and the early morning of February 2nd, wind chills reached the 35 to 40 below zero range at times despite slowly decreasing winds, as temperatures fell further below zero.                                                                                           |
| 12/23/2013 | Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon, Cottonwood | Temperatures of 15 to 28 below zero and winds reaching 10 to 15 mph at times combined to produce wind chills of 35 to 45 below zero.                                                                                                                                                                                                                                                                                                                             |
| 01/23/2014 | Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon, Cottonwood | Temperatures of 10 to 16 below zero and winds reaching 10 to 15 mph at times combined to produce wind chills of 35 to 40 below zero.                                                                                                                                                                                                                                                                                                                             |
| 03/02/2014 | Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon, Cottonwood | Temperatures dropping to around 15 below zero, combined with northwest winds of 5 to 15 mph, produced wind chill readings around 35 below zero for several hours ending a little after sunrise on March 2nd.                                                                                                                                                                                                                                                     |
| 01/16/2016 | Lyon, Pipestone, Lincoln, Murray, Nobles, Jackson, Cottonwood, Rock | Wind chills dropped to the 35 to 45 below zero range for much of the night and morning hours on January 16-17. Northwest winds gusted to around 20 mph early in the event, but generally averaged 10 to 15 mph when the coldest wind chills were reached, during which time actual temperatures were 15 to 20 degrees below zero.                                                                                                                                |
| 12/17/2016 | Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon, Cottonwood | Strong northwest winds on December 17th, decreasing to around 10 mph during the night of the 17th, combined with falling temperatures to lower wind chill readings to 40 to 55 below zero. Actual temperatures dropped to colder than 20 below zero.                                                                                                                                                                                                             |

- National Climatic Data Center (NCDC) Storm Events database

### *Extreme Cold and Climate Change*

There is not yet any observable trend related to extreme cold events and climate change in Minnesota. Cold temperatures have always been a part of Minnesota's climate and extreme cold events will continue. However, an increase in extreme precipitation or storm events such as ice storms as the climate changes could lead to a higher risk of residents being exposed to cold temperatures during power outages or other storm-related hazards during extreme cold.

### *Vulnerability*

Extreme cold temperatures affect the county nearly every year. The amount of snow and ice, number of blizzard conditions, and days of sub-zero temperatures each year are unpredictable.

Within Pipestone County the risk of extreme cold does not vary widely geographically. Citizens living in climates such as these must always be prepared for situations that put their lives or property at risk. It is not always the depth of the cold, but an unprepared individual with a vehicle breakdown or unmaintained garage that are at risk. Rural citizens not connected to city gas lines are more vulnerable to issues with extreme cold. The vulnerability of each jurisdiction to extreme cold has not changed due to any development in the last five years.

### *Plans and Programs*

- Real-time weather monitoring – The City of Pipestone has a real-time weather monitoring station at the Pipestone Airport that provides current temperatures, dew point, wind speed, wind direction, and barometric pressure.
- Travel Assistance – “511 is a public service of the Minnesota Department of Transportation (MnDOT) to help traveler's access information about road conditions, traffic incidents, commercial vehicle restrictions, and weather information via the phone or the Web, 24 hours a day, seven days a week.”
- Regional Forecasts – Pipestone County is in the Sioux Falls broadcasting region. Weather forecasts in the Sioux Falls region tend to be a good predictor of weather in Pipestone County. Pipestone County uses this information in regards to school closures and other weather related announcements.
- School closings – Pipestone County's school districts have a policy of closing schools when wind chills exceed certain thresholds, low visibilities create unsafe driving conditions, or when heavy snow has fallen making travel difficult. Local radio stations partner with the school districts to make sure the announcements are out by 6:00 am or earlier if possible.
- Wind chill warnings – The local radio and television media partner with the National Weather Service to issue a wind chill warning when temperatures are -30 degrees Fahrenheit or lower. Severe wind chill warnings are provided when conditions warrant and when safety is a factor. Wind chills of -40 degrees Fahrenheit or lower frequently prompt the closing of schools to protect children, particularly in rural areas.
- Emergency generators – Emergency generators help keep emergency services available during winter storms.
- SMOC Home Winterization is one service already available to Pipestone County residents.

### *Gaps and Deficiencies*

- Automated weather stations at schools – Automated weather stations at schools throughout Pipestone County would provide more current information and quicker response to dangerous and changing weather conditions.
- 511 System – The 511 system does not incorporate local knowledge as well as it could. County staff has little involvement in providing updates to the 511 system. Including snowplow drivers and other county staff could help to improve the accuracy of the system. County staff has local knowledge regarding the road network and can provide accurate information into the system.
- Road Closures Coordination – MnDOT closes state highways and does not talk to local emergency managers. There needs to be a direct line of communications between MnDOT and local emergency managers. This is an issue for emergency response and mass sheltering.
- Language barriers – Language barriers can be an issue regarding severe weather warnings. There are a number of languages spoken in Pipestone County. This makes it difficult to send out emergency broadcast. Having to translate emergency broadcasts into multiple languages takes time and money.

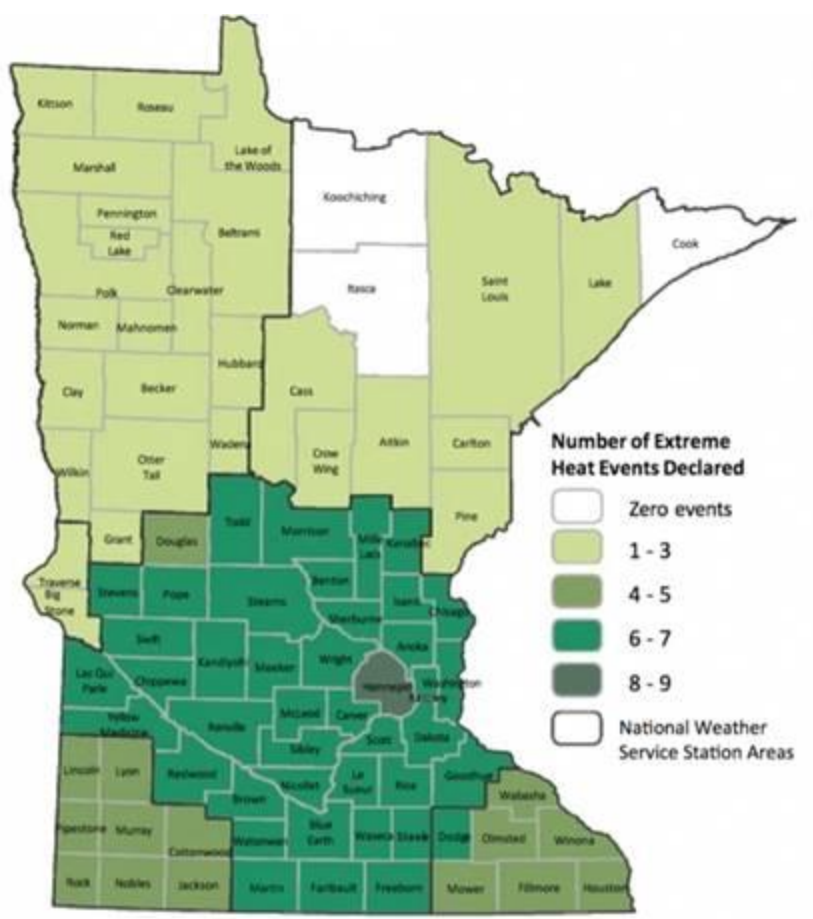
Existing Mitigation Measures

### 5.4.7 Extreme Heat

During the spring, summer and autumn excessive heat can occur. Extreme heat events were assigned a hazard rank of moderate by the planning team. Excessive heat temperatures and temperature change is one of the variables that impact summer storms.

Extreme heat helps to contribute to the magnitude of a thunderstorm and often accompanies severe summer storms. The combination of high temperatures and exceptionally humid conditions can lead to overheating, heat stress, and a severe strain on the system. Heat stress can lead to heat cramps, heat exhaustion, heatstroke, and even death. According to the Centers for Disease Control and Prevention (CDC), more than 300 Americans die annually from excessive heat exposure from 1979-2003. Extreme heat events, or heat waves, are a leading cause of extreme weather-related deaths in the United States. The number of heat-related deaths is rising.<sup>49</sup>

**RA Figure #87:  
Number of Extreme Heat Events by County 1995-2012**



<sup>49</sup> Centers for Disease Control and Prevention (CDC). Accessed 8/10/17. Available: <https://ephracking.cdc.gov/showClimateChangeExtremeHeat.action>

### *Locations Affected by the Hazard*

All locations in Pipestone County are at risk to be affected by this hazard. Severe summer storms and extreme heat events will be more widespread and the planning team expects this will require increased attention as time goes on. These weather events can generate lightning and hail that tend to be more isolated.

### *Previous Occurrences of the Hazard*

Extreme heat events are documented as a separate event by NOAA. There were 6 documented extreme heat events in Pipestone County from January 2000 through April 2017. Excessive heat occurs from a combination of high temperatures and high humidity index. From 1979 to 2003, more people in the U.S. died from extreme heat than from hurricanes, lightning, tornadoes, floods, and earthquakes combined.<sup>50</sup>

### **NOAA Definitions**

#### **Excessive Heat Outlook**

A combination of temperature and humidity over a certain number of days are designed to provide an indication of areas of the country where people and animals may need to take precautions against the heat during the months of May through November.

#### **Excessive Heat Warning**

Issued within 12 hours of the onset of the following criteria: heat index of at least 105°F for more than 3 hours per day for 2 consecutive days, or heat index more than 115°F for any period of time.

#### **Excessive Heat Watch**

Issued by the National Weather Service when heat indices are in excess of 105°F (41°C) during the day combined with nighttime low temperatures of 80°F (27°C) or higher are forecast to occur for two consecutive days.

**Figure #88**  
**Excessive Heat – Pipestone County**

| Date      | Location                                                            | Event Narrative                                                                                                                                                                                                                                                                                                                                                                                                                              |
|-----------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7/15/2011 | Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon Cottonwood  | An extended period of excessive heat produced daytime temperatures reaching the 90s and dew points in the 70s to lower 80s, with heat indices often reaching or exceeding 115 degrees. Nighttime temperatures often in the mid 70s to lower 80s with continued high humidity provided little if any relief. The heat and humidity caused prolonged stress on people and livestock. At least 15 livestock deaths were reported in the county. |
| 6/27/2012 | Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon, Cottonwood | Temperatures reaching the 90s and high humidity with dew points in the 70s caused excessive heat, with the heat index peaking between 100 and 105 degrees.                                                                                                                                                                                                                                                                                   |

<sup>50</sup> Minnesota Department of Health. Assessed: 11/24/15. Available: [http://www.health.state.mn.us/divs/climatechange/docs/toolkit\\_chapter1.pdf](http://www.health.state.mn.us/divs/climatechange/docs/toolkit_chapter1.pdf)



|           |                                                                     |                                                                                                                                                                                                                                                                                                                                 |
|-----------|---------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7/2/2012  | Rock, Pipestone, Nobles, Cottonwood, Lyon, Lincoln, Jackson, Murray | Temperatures reaching the 90s to just above 100, and high humidity with dew points in the 70s, caused an extended period of excessive heat. The heat index peaked at 100 to 110 degrees each day, and did not fall enough at night to provide much relief to indoor locations that were not otherwise cooled.                   |
| 7/16/2012 | Rock, Pipestone, Nobles, Cottonwood, Lyon, Lincoln, Jackson, Murray | Temperatures reaching the 90s, and high humidity with dew points in the 70s, caused excessive heat. The heat index peaked at 100 to 105 degrees.                                                                                                                                                                                |
| 6/10/2016 | Rock, Nobles, Jackson, Cottonwood, Murray, Lincoln, Lyon, Pipestone | Temperatures reaching daytime highs in the mid to upper 90s after a period of cool weather were accompanied by humid conditions, with the heat index rising to 100 degrees or a little hotter. An unknown number of people suffered from heat stress, heat exhaustion, or dehydration, as reported by hospital emergency rooms. |
| 7/20/2016 | Jackson, Nobles, Rock, Lincoln, Murray, Pipestone, Lyon, Cottonwood | Temperatures reaching daytime highs in the 90s were accompanied by very humid conditions, with the heat index rising to 100 to 110 degrees. An unknown number of people suffered from heat stress, heat exhaustion, or dehydration, as reported by hospital emergency rooms.                                                    |

National Climatic Data Center (NCDC) Storm Events database

#### *Relationship to other Hazards*

- *Drought and Wildfire* - Dry, hot conditions can reduce the protective moisture of woodlands and increase the risk of wildfire.
- *Public Safety* - Anyone exposed to extreme heat can develop heat exhaustion and heat stroke. The elderly, children and those who engage in outdoor work or recreation may be most susceptible to the danger of extreme heat.

#### *Extreme Heat and Climate Change*

Minnesota's average temperature has increased more than 1.5°F since recordkeeping began in 1895, with increased warming happening in recent decades (International Climate Adaptation Team, 2013). Annual temperatures in the Midwest have generally been well above the 1901-1960 average since the late 1990s, with the decade of the 2000s being the warmest on record (Kunkel, et al., Regional Climate Trends and Scenarios for the U.S. National Climate Assessment, 2013). 7 of Minnesota's 10 warmest years occurred in the last 15 years. Projected increases are 2°F to 6°F more by 2050 and 5°F to 10°F by 2100 (MN Environmental Quality Board, 2014). The Midwest has experienced major heat waves and their frequency has increased over the last 6 decades (Perera, et al., 2012). For the U.S., mortality increases 4% during heat waves compared with non-heat wave days (Anderson & Bell, 2011). During July 2011, 132 million people across the U.S. were under a heat alert – and on July 20 the majority of the Midwest experienced temperatures in excess of 100°F. Heat stress is projected to increase as a result of climbing summer temperatures and humidity (Schoof, 2012). On July 19, 2011, Moorhead Minnesota set a new state record for the hottest heat index ever, at 134°F. That same day, Moorhead also recorded a

new state record for the highest dew point at 88. It was the hottest, most humid spot on the planet that day (Douglas, 2011).

Increasing temperatures impacts Minnesota's agricultural industry. Agriculture is highly dependent on specific climate conditions. As a result of increasing temperature, crop production areas may shift to new regions of the state where the temperature range for growth and yield of those crops is optimal. According to the National Climate Assessment, the Midwest growing season has lengthened by almost 2 weeks since 1950 due in large part to earlier timing of the last spring freeze. This trend is expected to continue. While a longer growing season may increase total crop production, other climate changes, such as increased crop losses and soil erosion from more frequent and intense storms, and increases in pests and invasive species, could outweigh this benefit. There may also be higher livestock losses during periods of extreme heat and humidity. Losses of livestock from extreme heat lead to a challenge in disposal of animal carcasses. Currently there are only 2 rendering facilities in Minnesota available for livestock disposal. If a rendering facility is not available, lost livestock must be composted on an impervious surface. If losses are high, finding an impervious surface large enough is a challenge. In an attempt to adapt to increased temperatures, livestock areas in Minnesota may shift farther north. As a result of new livestock areas and the resulting manure production, farmers may transition to manure-based fertilizer applications in areas where traditionally only commercial fertilizers have been used, with accompanying environmental advantages and disadvantages (Adapting to Climate Change in Minnesota: 2013 Report of the Interagency Climate Adaptation Team, 2013).

### *Vulnerability*

Severe summer storms are highly likely to take place every year, including excessive heat, lightning, and hail.

People do not always recognize their limitations. Summer heat can pose a serious risk to all populations, especially the young and elderly population. Informing the public about extreme heat events and other summer storms is important in preventing accidents.

### *Plans and Programs*

- Heat advisories – The local radio and television media are in contact with the National Weather Service to issue a heat advisory when the combination of temperature and humidity create risks for people and animals. A heat index of 105 to 114 warrants a heat advisory. This occurs when air temperature reaches 95 degrees and the relative humidity is 50 percent. An excessive heat warning is issued when the heat index reaches 115. This occurs with an air temperature of 95 degrees and relative humidity of 60 percent. A heat index of 115 or higher puts both humans and animals at risk.
- Emergency alert system – Pipestone County has the CodeRED emergency notification system. CodeRED allows emergency officials to notify residents and businesses by telephone, cell phone, text message, email and social media regarding time-sensitive general and emergency notifications.
- Local media – Severe weather warnings are broadcasted via local media. Public service announcements are one of the ways to warn the public of severe weather.
- Severe weather spotter training – an annual training is provided in either Lincoln or Pipestone County. The National Weather Service conducts the training.

### *Gaps and Deficiencies*

- Public education – The public may not be aware of the real risks associated with heat exhaustion, extreme heat events, and other severe summer storms.

#### 5.4.8 Drought

Drought is defined as a prolonged period of dry weather with very little or no precipitation. There are four types of drought: meteorological drought (departure from average), hydrological drought (shortfall of stream flows or groundwater), agricultural drought (soil moisture deficiencies), and socioeconomic or water management drought. Droughts can have lasting effects and can cause a serious depletion of surface and ground waters.

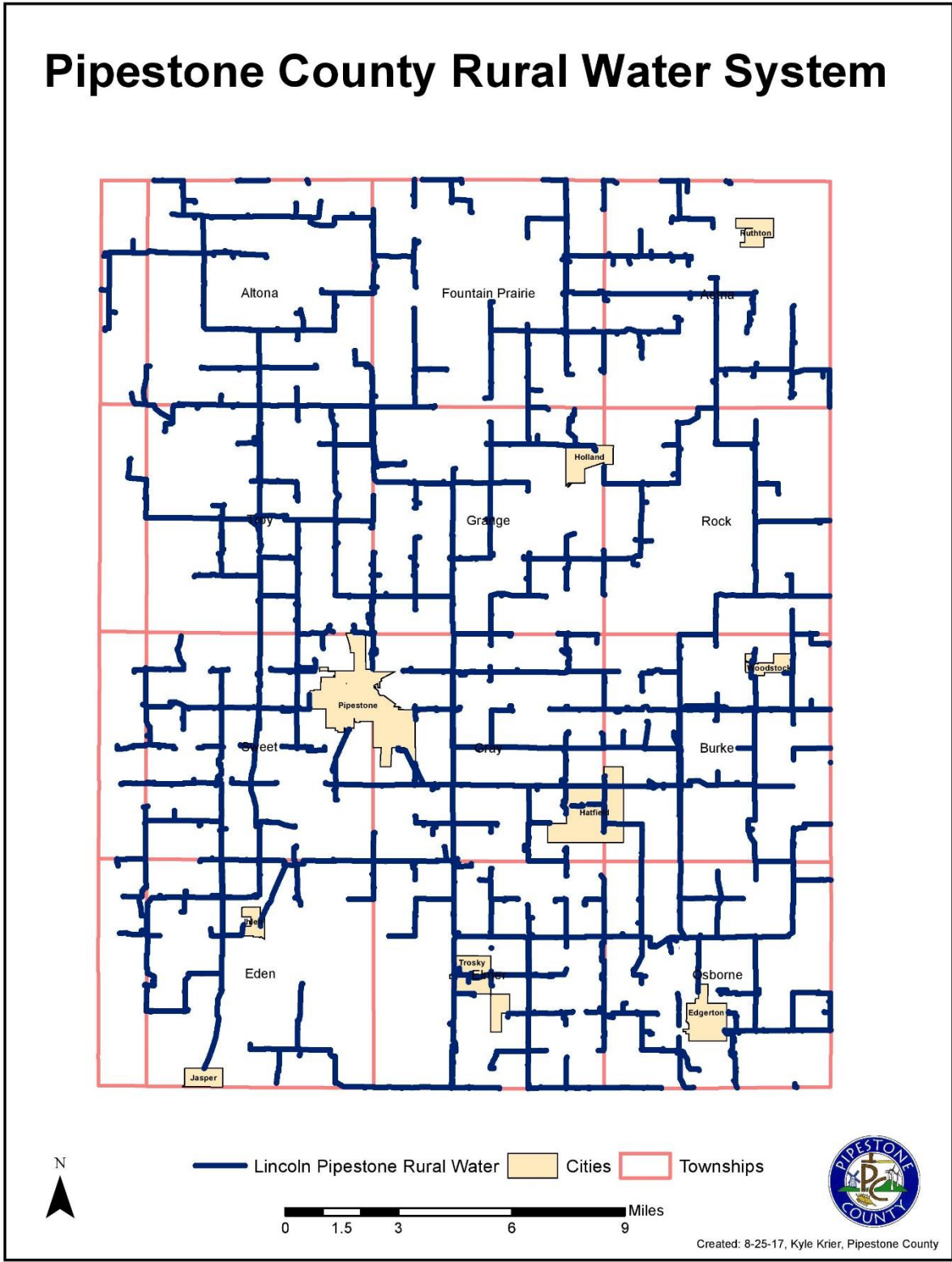
##### *Locations Affected by the Hazard*

The entire county is equally at risk for drought; however, areas within the county may react differently to drought conditions. Areas with well-drained soils may be more likely to experience adverse impacts to crops. Areas that rely on individual wells for drinking water supplies are more likely to experience shortages than areas with access to municipal and rural water suppliers.

Different areas in Pipestone County may be impacted differently by a drought, but the small size of the county and interdependence of the residents will result in any drought event having a significant impact on the entire county.

The Cities of Pipestone and Edgerton have their own water system that consists of multiple wells. Lincoln-Pipestone Rural Water System (LPRW) provides potable water service to rural Pipestone County and the Cities of Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, and Woodstock. LPRW currently does not provide any emergency backup to cities in Pipestone County that have their own water system.

Figure #89  
Rural Water Distribution Map – Pipestone County



### *Extent of the Hazard*

Pipestone County's economy is base heavily on agriculture. A severe drought could cause economic hardship within the county.

Corn and soybeans yields can be dramatically decreased by drought conditions. Livestock operations are affected by loss of feedstock, pasture and general forage, as well as drinking water. Reduced yields due to a drought event will not only have an economic impact on individual farmers, but on secondary suppliers who buy and sell crops and livestock, agricultural retailers, and local governments that rely on sales taxes. Drought insurance for crops does help compensate for losses, but there can still be economic hardship as the result of a drought.

A drought will not only produce a hardship for the farmers growing the crops, but overall supply can decrease causing food prices to rise. The U.S. Department of Agriculture estimates that the drought during the summer of 2012 will push retail food prices up by between 3% and 4% in 2013.<sup>51</sup>

### *Relationship to Other Hazards—Cascading Effects*

Drought can increase the risk of a number of natural and other hazards.

- **Wildfires.** Drought stressing woods, brush land, and non-cultivated fields significantly increases the risk of wildfires and lightning strikes onto dry fields have the potential to cause wildfires as well. In addition, moving equipment within Pipestone County like trains or combines during fall harvest have the potential to cause wildfires.
- **Insect Infestation.** An increase in the amount of insects and other pests are often caused or impacted by severe drought conditions.
- **Tree Loss.** Due to the lack of moisture, tree loss or decline can be experienced resulting in several problems including: loss of shade for homes requires increased power consumption, and loss of windbreaks provided by trees allows for an increase in soil erosion.
- **Wells/Aquifers.** The absence of rain for a long period of time is insufficient to recharge aquifers and eventually, the loss of water in underground wells results.
- **Business interruption.** A drought can result in watering bans. Businesses that are heavier water users will be impacted. Golf courses, processing facilities, car washes, and a number other businesses will be impacted.
- **Utility/Infrastructure.** Pipestone County's groundwater resources can be easily negatively impacted by drought.
- **Dust Storms.** As surface soils dry out and the winds blow, an increased amount of soil erosion occurs.
- **Civil Disturbance.** A long lasting drought can cripple the economic opportunity in greater Minnesota and other areas that have an agricultural based economy. This loss in economic opportunity can cause social unrest.

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<sup>51</sup> Time. The Cost and Consequences of the U.S. Drought. Oct. 26 2012. Access: 6/20/14. Available: <http://business.time.com/2012/10/26/the-cost-and-consequences-of-the-u-s-drought/#ixzz2Tqswe7kB>



### *Previous Occurrences of the Hazard*

From January 2000 through April 2017, there were 14 documented droughts in Pipestone County. In the figure below are documented droughts that occurred from January 2010 through April 2017.

**Figure #90**  
**Droughts – Pipestone County**

| Date       | Location                                                            | Event Narrative                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 07/01/2012 | Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock | Much below normal rainfall aggravated existing long term dry soil conditions, and also resulted in a lack of even short term relief. This produced stress on crops with the stress becoming increasingly visible. Damage in the form of reduced yields became certain, but the amount of yield reduction was still highly unknown because of the long time remaining before harvest, and the unknown future weather during that time. At the end of the month, corn crops were judged to be the most susceptible to the reduced yields, due to the lack of moisture during the tasseling period, while soybeans had more recovery potential if significant rain were to fall in the near future. |
| 08/01/2012 | Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock | Below normal rainfall continued to aggravate existing long term dry soil conditions, and stress on crops continued despite less hot weather than in July. Crop damage including certain reduced crop yields was very apparent, although the amount of yield reduction and other damage was still highly uncertain before harvest. Corn continued to be the crop suspected of enduring the most damage, with some recovery potential for soybeans in the less hot weather. The drought was also leading to local water use restrictions.                                                                                                                                                          |
| 09/01/2012 | Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock | Well below normal rainfall continued to aggravate existing long term dry soil conditions. Stress on crops which was observed during most of the summer became more evident with the beginning of harvest, although the amount of yield reduction and other damage was still uncertain. Corn, soybeans, and other crops were known to be severely affected, although corn continued to be the crop suspected of suffering the most damage. The drought continued to result in local water use restrictions.                                                                                                                                                                                       |
| 10/01/2012 | Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock | Below normal rainfall continued to aggravate existing long term dry soil conditions. The fall harvest was generally completed with definitely reduced yields, but no estimation on how much the reduction in yields was. The dryness hampered the germination of winter wheat which was planted. The effect of local water use restrictions eased with the dropping off of water usage.                                                                                                                                                                                                                                                                                                          |
| 11/01/2012 | Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock | Well below normal rainfall continued to aggravate existing long term dry soil conditions. The effect of the dryness on winter wheat germination was more strongly confirmed, and the future effect of the lack of soil moisture on next spring and summer's farming was feared if the dryness were to continue. Otherwise, few new effects of the drought were noted during the month due to the seasonal decrease in water usage and need.                                                                                                                                                                                                                                                      |

|            |                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------|---------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12/01/2012 | Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock | Long term dry soil conditions continued, despite normal to above normal precipitation, as the excess over the low winter normals was not enough to relieve the dry conditions. Aside from the effects on winter wheat and available winter livestock feed, hunting was hampered due to reduced pheasant population and disease in the deer population. The future effect of the lack of soil moisture on next spring and summer's farming was feared if the dryness were to continue. Otherwise, few new effects of the drought were noted during the month due to the seasonally low water usage and need.                                                                                                                                                                                                                                                                                                                                |
| 1/1/2013   | Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock | Drought conditions continued over all of southwest Minnesota in January. Precipitation was below to well below normal, although with the low midwinter normals, even greater precipitation would have been unlikely to change the dry soil conditions. There was little noted in the way of new effects of the drought, with the dry conditions giving a poor outlook for the Spring and Summer, including poor germination of the winter wheat crop during the dry fall. Water restrictions continued to be few during the winter because of the low water usage, but the area was becoming more vulnerable to even marginally weather if it developed in the spring and summer. Drought was generally listed as continued severe to extreme for the area.                                                                                                                                                                                |
| 2/1/2013   | Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock | Drought conditions continued over all of southwest Minnesota in February, despite precipitation which was a little above normal. The excess of a few tenths of an inch in the driest month of the year did little to relieve the long term dry soil conditions. There was little noted in the way of new effects of the drought, with the dry conditions giving a poor outlook for the Spring and Summer, including the poor germination of the winter wheat crop during the dry fall. Water restrictions continued to be few during the winter because of the low water usage, but the area was deemed vulnerable to even marginally dry weather if it developed in the spring and summer. Drought was generally listed as continued severe to exceptional for the area, with the northern edge of the area, from Ivanhoe to Marshall, making a slight improvement to severe because of greater snowfall and snow cover during the month. |
| 3/1/2013   | Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock | Drought conditions continued over all of southwest Minnesota in March. Precipitation was normal to half of normal, with drought rated severe to extreme over all of the area. There continued to be a lack of soil moisture as winter approached its end, since even normal winter precipitation is low compared to the warmer seasons. Also, the frozen ground forced runoff of what precipitation and snowmelt there was. There was little noted in the way of new effects of the drought, with the dry conditions giving a poor outlook for the Spring and Summer, including the winter wheat crop, which was also affected by poor germination conditions in the dry fall. Water restrictions continued to be few because of the low water usage, but the area was deemed vulnerable to even marginally dry weather if it developed in the spring and summer. Some effect was noted on livestock, although the                         |

|          |                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------|---------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|          |                                                                     | majority of the livestock was in good condition despite persistent feed shortages.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 4/1/2013 | Lyon, Lincoln, Jackson, Cottonwood, Pipestone, Nobles, Murray, Rock | Extreme to exceptional drought abated slowly to the moderate to severe category over southwest Minnesota during April. Near to a little above normal precipitation was not enough to end the long standing drought entirely, given the long term dry soil conditions that carried over into the month. Accordingly, the area was still deemed very sensitive to the potential of below normal rainfall during the planting and growing seasons. However, the severity of the drought generally decreased. No new effects of the drought were noted during the month. |

National Climatic Data Center (NCDC) Storm Events database

**Figure #91:**  
**US Drought Monitor – August 2017**

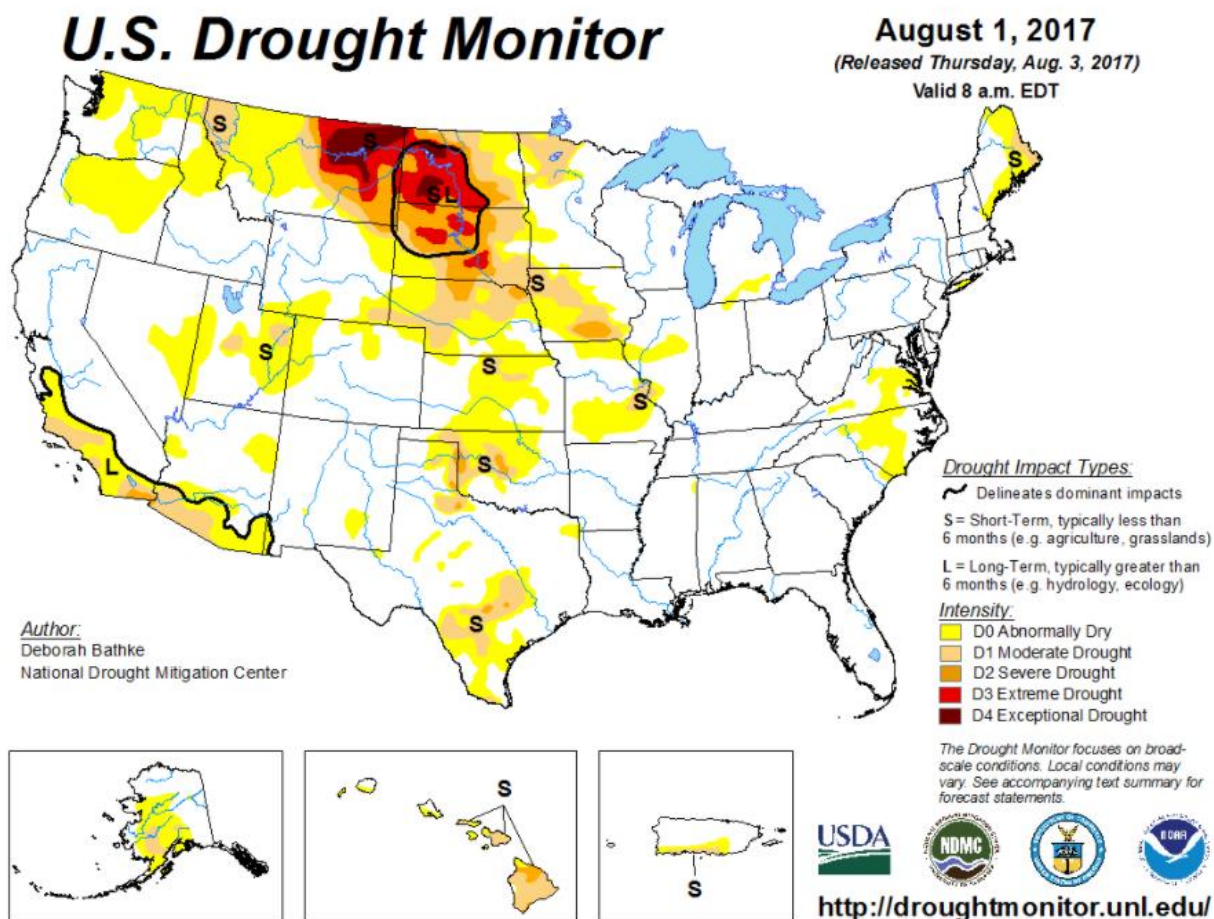
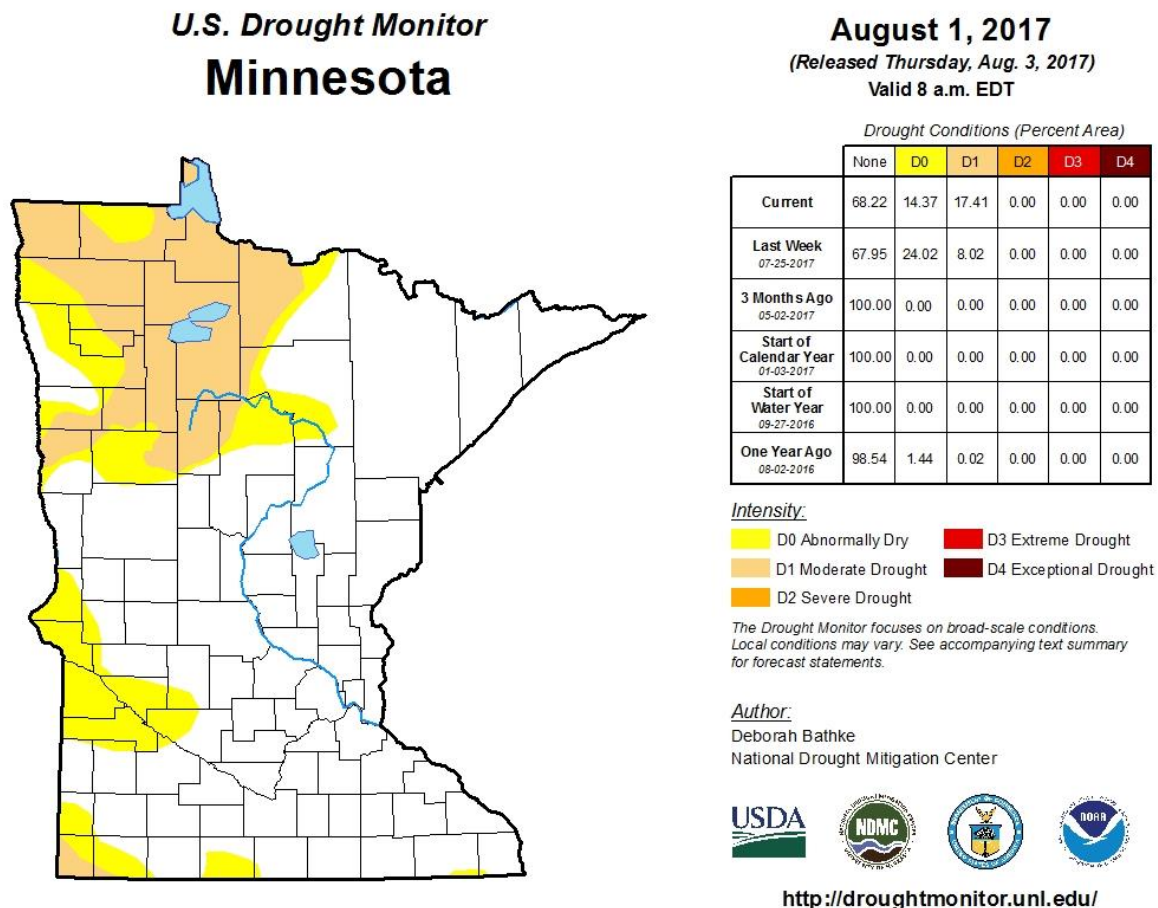


**Figure # 92:**  
**US Drought Monitor, Minnesota – August 2017**



### *Drought and Climate Change*

Droughts have been happening throughout Minnesota's history and it is not yet clear how climate change may impact this (International Climate Adaptation Team, 2013). While there was no apparent change in drought duration in the Midwest over the past century (Dai, 2011), the average number of days without precipitation is projected to increase in the future (National Climate Assessment Development Advisory Committee, 2013).

Even in areas where precipitation does not decrease, projected higher air temperatures will cause increased surface evaporation and plant water loss, leading to drier soils. As soil dries out, a larger proportion of the incoming heat from the sun goes into heating the soil and adjacent air rather than evaporating its moisture, resulting in hotter summers under drier climatic conditions.<sup>52</sup> Temperature has risen in Minnesota about 2°F since the early 20th century. Under a higher emissions pathway, historically unprecedented warming is projected by the end of the 21<sup>st</sup> Century. While warmer temperatures will reduce the heating energy demand and lengthen the growing season, it will also increase the intensity of

<sup>52</sup> Mueller and Seneviratne. PNAS, July 31, 2012, vol. 109, no. 31

naturally occurring droughts.<sup>53</sup> In 2007, 24 Minnesota counties received drought designation, while 7 counties were declared flood disasters. In 2012, 55 Minnesota counties received federal drought designation at the same time 11 counties declared flood emergencies (MN Environmental Quality Board, 2014).

### *Vulnerability*

Droughts do occur in Southwest Minnesota.

### *Plans and Programs*

- Watering Ban Ordinance – The City of Pipestone has developed ordinances on water usage within their communities and can place restrictions on this usage in times of drought. The watering bans decrease the demand for water. This is done to curve demand for nonessential watering. Residents are alerted through the media when a watering ban is enacted. Cities in Pipestone County have not issued a watering ban in recent memory.
- Burning ban – Pipestone County can issue a burning ban during a drought event.
- Pipestone County Water Management Plan – The Pipestone County Comprehensive Water Management Plan serves as the five year ‘Work Plan’ for the Pipestone County Soil and Water Conservation District (SWCD). Yearly Plans are developed to achieve the goals and objectives of the Water Plan. The Water Plan identifies and maps the major and minor aquifers serving the county. The Pipestone County Comprehensive Water Management Plan can be found on the Pipestone County SWCD website. The next update is planned for 2018.
- Recharge rates – The Pipestone County Water Management Plan documents the number of gallons of water used per year by municipalities and large water users within the county. Regionally, recharge rates are tracked regional by Minnesota Board of Soil and Water Conservation.
- Aquifer inventories – Recharge rates and capacities of the county’s aquifers are recorded and inventoried by United States Geological Survey (USGS). These studies help to determine the capacities and recharge rates of the county’s aquifers in order to better assess use restrictions and provisions during times of drought.
- Usage rates – The Department of Natural Resources (DNR) regulates withdrawal and usage rates. There has to be a draw down study before irrigation permits can be issued.
- Public outreach – Educational campaigns regarding water conservation by the Pipestone County Soil and Water Conservation District and rural water systems. This helps to ensure Pipestone County’s ground water supplies are sufficient to meet demands.

### *Gaps and Deficiencies*

- Water conservation outreach – Water conservation programs need to be established to educate residents on the need and ways to conserve water usage.
- Lack of watering ban ordinance – Pipestone County and the City of Pipestone, has developed ordinances on water usage within their community can place restrictions on this usage in time of drought. Cities with populations over 1,000 have a Water Supply Plan with the DNR, which has triggers for water reduction measures.

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<sup>53</sup> NCICS State Summaries. Accessed: 8/10/17. Available: <https://statesummaries.ncics.org/mn>

- Water supply – A number of communities are dependent on or rely on rural water as a backup. Water supply could be an issue in Pipestone County.
- Lack of Fire Breaks – The County needs a program that places fire breaks in between the continuous CRP tracts of land or other state wildlife areas during times of severe drought.
- Lincoln-Pipestone Rural Water – The water sources that serve residents in Pipestone County are located within and outside of the County,
- Large water users – Food processors are large water users. The City of Pipestone is a large water user, since one of the city's main industries is food processing. An adequate water supply is critical to the food processing industry in Pipestone and Pipestone County.



### 5.4.9 Earthquakes

“An earthquake is a sudden motion or trembling caused by an abrupt release of accumulated strain in the tectonic plates that comprise the earth’s crust.”<sup>54</sup>

#### *Locations Affected by the Hazard*

All of Lyon County is at equal risk of an earthquake according to the United States Geological Survey (USGS) seismic map of Minnesota. It is important to acknowledge that earthquakes are a possibility in Pipestone County and plan accordingly.

#### *Extent of the Hazard*

The average magnitude for an earthquake in Minnesota is 3.2. The effects of an earthquake with a magnitude of 3.0 – 3.9 range from a few persons feeling the vibration, especially on upper floors of a building to many people noticing the vibration. Standing motor cars may rock slightly. The Uniform Building Code of the International Conference of Building Officials assigns every location in the United States to a five-grade Seismic Risk Zone (0 = least risk; 4 = greatest risk); Minnesota rates in Seismic Risk Zone 0.

**Figure #93**  
**Richter Scale**

| Magnitude | Description | Average earthquake effects                                                                                                                                                                                                                                              | Average global frequency of occurrence (estimated) |
|-----------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| 1.0–1.9   | Micro       | Microearthquakes, not felt, or felt rarely. Recorded by seismographs.                                                                                                                                                                                                   | Continual/several million per year                 |
| 2.0–2.9   | Minor       | Felt slightly by some people. No damage to buildings.                                                                                                                                                                                                                   | Over one million per year                          |
| 3.0–3.9   |             | Often felt by people, but very rarely causes damage. Shaking of indoor objects can be noticeable.                                                                                                                                                                       | Over 100,000 per year                              |
| 4.0–4.9   | Light       | Noticeable shaking of indoor objects and rattling noises. Felt by most people in the affected area. Slightly felt outside. Generally causes none to minimal damage. Moderate to significant damage very unlikely. Some objects may fall off shelves or be knocked over. | 10,000 to 15,000 per year                          |
| 5.0–5.9   | Moderate    | Can cause damage of varying severity to poorly constructed buildings. At most, none to slight damage to all other buildings. Felt by everyone.                                                                                                                          | 1,000 to 1,500 per year                            |

<sup>54</sup> MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: [https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011\\_MinnesotaAllHazardMitigationPlanDraft.pdf](https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf)

|                 |        |                                                                                                                                                                                                                                                                                                                                          |                        |
|-----------------|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| 6.0–6.9         | Strong | Damage to a moderate number of well-built structures in populated areas. Earthquake-resistant structures survive with slight to moderate damage. Poorly designed structures receive moderate to severe damage. Felt in wider areas; up to hundreds of miles/kilometers from the epicenter. Strong to violent shaking in epicentral area. | 100 to 150 per year    |
| 7.0–7.9         | Major  | Causes damage to most buildings, some to partially or completely collapse or receive severe damage. Well-designed structures are likely to receive damage. Felt across great distances with major damage mostly limited to 250 km from epicenter.                                                                                        | 10 to 20 per year      |
| 8.0–8.9         | Great  | Major damage to buildings, structures likely to be destroyed. Will cause moderate to heavy damage to sturdy or earthquake-resistant buildings. Damaging in large areas. Felt in extremely large regions.                                                                                                                                 | One per year           |
| 9.0 and greater |        | At or near total destruction – severe damage or collapse to all buildings. Heavy damage and shaking extends to distant locations. Permanent changes in ground topography.                                                                                                                                                                | One per 10 to 50 years |

### *Relationship to Other Hazards—Cascading Effects*

An earthquake can be the catalyst to a number of other natural and other hazards.

- **Flooding.** An earthquake could result in dam failure and flooding downstream.
- **Transportation Infrastructure.** An earthquake could damage transportation infrastructure and make emergency response difficult.
- **Civil Disturbance.** An earthquake could cause countywide distress. Emergency responders may not be able to handle everything, so as people grow desperate, distress can take over and cause civil unrest.

### *Previous Occurrences of the Hazard*

On September 28, 1964, an earthquake occurred about 4 miles west of the City of Pipestone. With a magnitude of 3.4, the original reference for the event was lost. No felt reports exist for the event.<sup>55</sup> “Minnesota has one of the lowest occurrence levels of earthquakes in the United States, but a total of 21 small to moderate earthquakes have been documented since 1860.”<sup>56</sup>

<sup>55</sup> Earthquake History of Minnesota (1979), Minnesota Geological Survey. Accessed 8/15/2017. Available: <https://conservancy.umn.edu/bitstream/handle/11299/60458/mgs-243.pdf?sequence=1>

<sup>56</sup> MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: [https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011\\_MinnesotaAllHazardMitigationPlanDraft.pdf](https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf)

**Figure #94**  
**Earthquakes, Minnesota**

| Epicenter<br>(nearest Town) | Date                      | Magnitude |
|-----------------------------|---------------------------|-----------|
| Rosholt                     | 10/20/1995                | 3.7       |
| Granite Falls               | 2/9/1994                  | 3.1       |
| Dumont                      | 6/4/1993                  | 4.1       |
| Walker                      | 9/27/1982                 | 2.0       |
| Cottage Grove               | 4/24/1981                 | 3.6       |
| Nisswa                      | 7/26/1979                 | 1.0       |
| Rush City                   | 5/14/1979                 | 0.1       |
| Evergreen                   | 4/16/1979                 | 3.1       |
| Milaca                      | 3/5/1979                  | 1.0       |
| Pipestone                   | 9/28/1964                 | 3.4       |
| Alexandria                  | 2/15/1950                 | 3.6       |
| Detroit Lakes               | 1/28/1939                 | 3.9       |
| Bowstring                   | 12/23/1928                | 3.8       |
| Staples                     | 9/3/1917                  | 4.3       |
| Red Lake                    | 2/6/1917                  | 3.8       |
| New Ulm                     | 02/12/1881                | 3.0-4.0   |
| St Vincent                  | 12/28/1880                | 3.6       |
| New Prague                  | 12/16/1860                | 4.7       |
| Long Prairie                | Date unknown<br>(1860-61) | 5.0       |

National Climatic Data Center (NCDC) Storm Events database

### *Earthquakes and Climate Change*

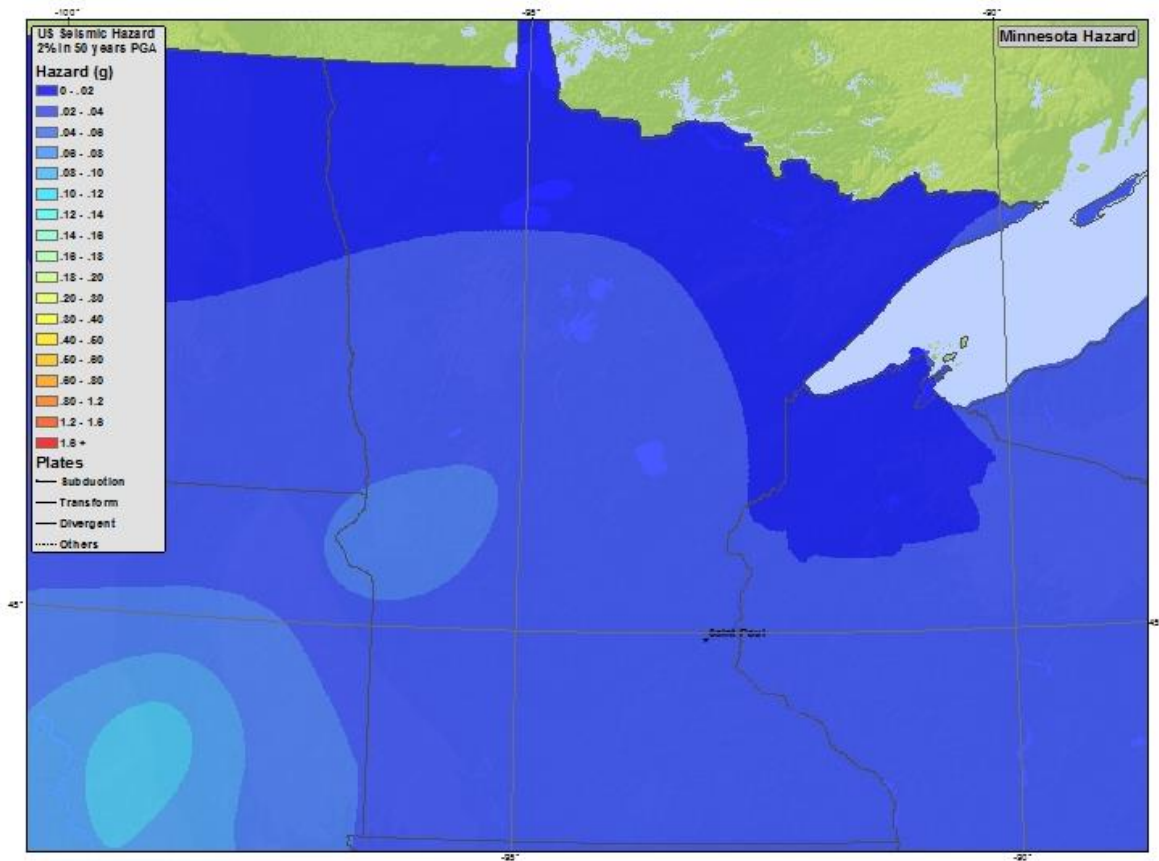
There is no evidence that climate change will increase the risk of earthquakes in Minnesota.

### *Probability*

The USGS Seismic Map shows the seismic activity in the United States, the potential for an earthquake of any significant magnitude happening in Pipestone County is very minimal.

Since it is unlikely for an earthquake to occur in Pipestone County again, little to no preparation has occurred. There have been multiple earthquakes in Minnesota with a magnitude of 4.0 – 5.0. An earthquake registering a 5.0 on the Richter Scale could occur and cause major damage to poorly constructed buildings.

**Figure #95**  
**Seismic Hazard Map – Minnesota**



Source: USGS Minnesota Seismic Hazard Map

### *Plans and Programs*

- Pipestone County does recognize that there is some risk associated with earthquakes, but there are not extensive plans and programs to address the risk.
- Well defined response – Emergency responders have a well-defined response protocol outlined in the Emergency Operations Plan. The response protocol is in regards to all hazards. An earthquake would result in a large hazard event with a number of smaller events that include the risk of fire, transportation infrastructure damage, utility damage, civil disturbance, and water supply contamination. The response protocols would generally be applied to an earthquake and the resulting hazard events.
- Past mitigation measures consist of recognizing that an earthquake is possible in Pipestone County.

### *Gaps and Deficiencies*

- The risk associated with an Earthquake in Pipestone County is perceived as very minimal, so extensive planning does not take place. This lack of preparation could result in an earthquake causing large damages and disorganization in the aftermath of the hazard.

#### 5.4.10 Erosion

Erosion is the wearing away of land, such as the loss of a riverbank, beach, shoreline, or dune material. It is measured as the rate of change in the position or displacement of a riverbank or shoreline over a period of time. Short-term erosion typically results from periodic natural events, such as flooding, hurricanes, storm surges, and windstorms, but may be intensified by human activities. Long-term erosion is a result of multi-year impacts such as repetitive flooding, wave action, sea level rise, sediment loss, subsidence, and climate change. Death and injury are not typically associated with erosion; however, it can destroy buildings and infrastructure (FEMA, 2013).

##### *Relationship to Other Hazards—Cascading Effects*

Erosion is related to flooding, which has become more common in across Southwest Minnesota. Flood-relation erosion is the collapse or subsidence of land along the shore of a lake or other body of water as a result of undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as a flash flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding.<sup>57</sup>

##### *Soil Erosion History in Pipestone County*

Some areas of Pipestone County have had issues with soil erosion, though they were not major. There is increasing concern about the hazard in the county, particularly with the trends of higher levels of rain.

##### *Soil Erosion/Landslides and Climate Change*

The increased magnitude and frequency of flooding events and storm activity that may result from climate change may in turn increase the risk of soil erosion. According to University of Washington geologist Dave Montgomery, “If the climate changes in a way that we get a lot more rainfall you would expect to see a lot more landslides” (Phillips, 2014).

In Minnesota, the wettest days are getting wetter. This can contribute to increased erosion in many locations due to flooding and saturation of soils. Reduced ice cover on lakes and shorelines (due to warmer temperatures) could potentially expose shorelines to increased erosion or damage during weather events when they previously may have been covered with ice (National Climate Assessment Development Advisory Committee, 2013).

According to the 2014 National Climate Assessment, “Increased precipitation intensity also increases erosion, damaging ecosystems and increasing delivery of sediment and subsequent loss of reservoir storage capacity” (Pryor, et al., 2014).

##### *Vulnerability*

The vulnerability of each jurisdiction to soil erosion and landslides has not changed due to any development in the last 5 years.

##### *Plans & Programs*

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<sup>57</sup> FEMA: Flood-Related Erosion. Accessed: 2/8/2019. Available: <https://www.fema.gov/flood-related-erosion>

- The planning team identified no current plans and programs in place to address erosion.

#### *Gaps & Deficiencies*

- The planning team did not identify any currently existing gaps for erosion.



## 5.5 Other Hazards

### 5.4.1 Agricultural Disease (animal or crop)

Agriculture is a major economic driver in Pipestone County and Southwest Minnesota. Animal and crop related diseases have the potential to inflict both large economic losses and logistical hazards on the community.

#### *Locations Affected by the Hazard*

Agricultural disease is often difficult to contain. The majority of incidents related to agricultural disease are likely to occur countywide rather than in localized areas, given the small size and the difficulty to contain a disease.

One of the most current threats is emerald ash borer, which is an exotic beetle from Asia that is devastating ash trees in a number of states. Emerald ash bore is a small green beetle that kills ash trees. It has been difficult to contain this threat, and there are a number of other similar examples of how it is difficult to contain an agricultural disease. The decision to relate agricultural disease to a countywide area instead of a localized area is also based on the planning teams experience within the county, the prevalence of crop agriculture, and the relative ease with which plant diseases spread. It is likely that any outbreak will likely affect all trees, crops, and animal agriculture within the county.

#### *Extent of the Hazard*

The majority of the land in Pipestone County is used for agriculture. An agricultural disease causing crop failure could cause millions of dollars in lost production. Pipestone County is ranked 33 in total agricultural production and 19 in livestock production among counties in Minnesota with a total of \$270,328,000 in 2011.<sup>58</sup> Animal transmitted diseases pose the greatest threat to animal confinement buildings, feeding lots, and pastures. Insects and pests pose the largest risk to both agriculture crops and tree-cover.

#### *Animal Transmitted Diseases*

Avian Influenza (HPAI) is a disease caused by infection with avian influenza and Type A viruses. These viruses occur naturally among wild aquatic birds worldwide and can infect domestic poultry and other bird and animal species. Avian Influenza viruses do not normally infect humans. However, sporadic human infections with Avian Influenza viruses have occurred.<sup>59</sup>

“Influenza in poultry falls into two groups: low pathogenic avian influenza (LPAI), or highly pathogenic avian influenza (HPAI). Similar to influenza symptoms in people, birds infected with LPAI usually experience only mild signs if any, including respiratory signs such as conjunctivitis and nasal discharge, ruffled feathers or a drop in egg production. Unlike LPAI, the first indication of HPAI in poultry is sudden

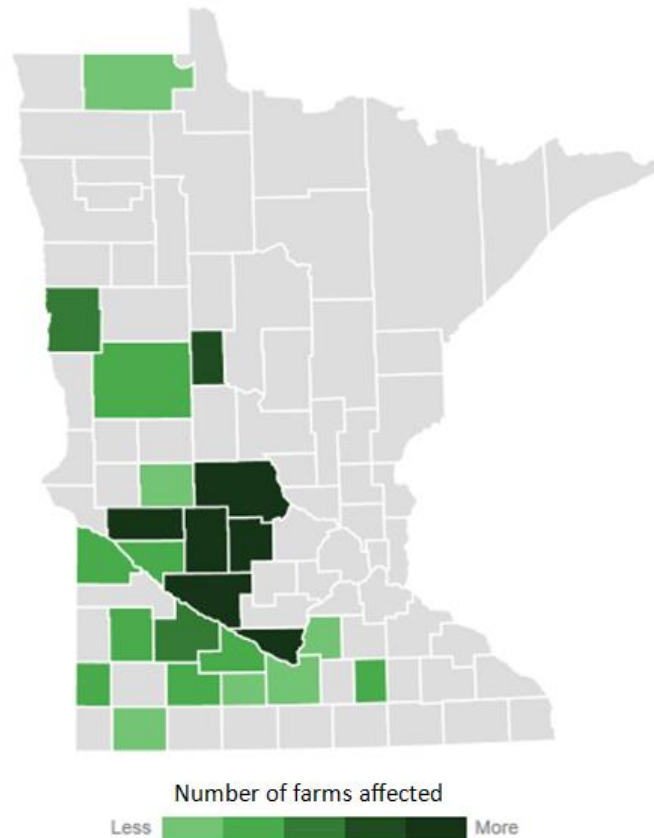
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<sup>58</sup> Lyon County Agricultural Profile. Accessed 11-24-2015. Available: <http://www.mda.state.mn.us/food/business/agmktg-research/~media/Files/food/business/countyprofiles/econrpt-pipestone.ashx>

<sup>59</sup> CDC. Information on Avian Influenza. Access: 11/24/15. Available: <http://www.cdc.gov/flu/avianflu/>

death, often without signs of illness. In the last 40 years, there have been introductions of LPAI in Minnesota poultry all of which have been successfully eliminated.”<sup>60</sup>

**Figure #96**  
**Avian Influenza Outbreak Map – Minnesota June 2015**



The threat of bovine tuberculosis (TB) has impacted agriculture in Minnesota recently. In April, 2008, USDA downgraded Minnesota’s status, requiring Minnesota cattle producers to do additional testing when shipping animals out of state. According to the Board of Animal Health website, bovine TB can be difficult to diagnose, infected animals can be infected for a long period of time before showing any outward signs of TB.<sup>61</sup>

The United States has been free of Hoof and Mouth Disease Bovine Spongiform Encephalopathy (BSE-Mad Cow Disease) since 1929.<sup>62</sup> This was possible through effective collaborative prevention programs between private producers, veterinarians, researchers, and government organizations. Education and

<sup>60</sup> Minnesota Board of Animal Health. Avian Influenza. Accessed: 11/24/15. Available: <https://www.bah.state.mn.us/avian-influenza>

<sup>61</sup> Minnesota Board of Animal Health. Accessed 5-17-13. Available: <http://mn.gov/bah/diseases/bovine-tb/tb-testing.html>

<sup>62</sup> University of California Cooperative Extension. Accessed: 9/10/13. Available: [http://cesanbernardino.ucanr.edu/Dairy511/FACT\\_SHEET\\_No-1\\_Foot\\_and\\_Mouth\\_Disease/](http://cesanbernardino.ucanr.edu/Dairy511/FACT_SHEET_No-1_Foot_and_Mouth_Disease/)

early symptom identification were critical in the success. When an infection of foot and mouth disease or BSE is confirmed, the only effective way to control the disease is isolation and culling of an entire herd.

Early detection can be difficult since symptoms can be the same for multiple diseases. Later detection can result in a large percentage of a herd having the disease. Having to dispose of a large percentage of a herd would result in substantial financial loss to the producer.

Animals are also susceptible to the flu and common colds. “Respiratory diseases are common and costly to livestock producers.”<sup>63</sup> The common cold along with other animal diseases like avian Influenza (bird flu), Chronic Wasting Disease, and Lyme Disease, just to name a few, pose risks to producers and cost thousands of dollars to producers to treat annually.

### *Plant Pests and Diseases*

Plant diseases can cause a loss of yield or damage to the infected plants. Certain tree diseases may weaken their structure and create a hazardous situation where property damage or serious bodily injury may result from falling limbs or the entire tree toppling. Root decay and the loss of trees may also lead to erosion.

In many cases, fungi are involved in tree diseases that result in a tree becoming a hazard. A tree with slowed growth, branch dieback, smaller than normal leaves or needles, excessive cone or seed set, premature autumn leaf coloration, or severe winter twig kill may be exhibiting early symptoms of a disease. Nothing can be done for a tree once it is infected nor is it likely that fungus can be completely eliminated from the soil or general area around the tree once the tree is removed.

A tree with fungal fruiting structures on several limbs, trunk, butt, or roots should be removed promptly if it is in a location where property damage might occur or where falling limbs or tree could strike people or animals. If most of the tree appears healthy, any single branch with fungal fruiting structures should be removed promptly, regardless of the identity of the fungus present.

Some of the more notable pests infest corn fields. Corn rootworm and European corn borer are two major pests that pose serious potential loss of income to farmers. Goss’s Bacterial Wilt and Leaf Blight are two other damaging diseases that have caused problems over the past few growing seasons in Minnesota. In 2010, Wilt and Leaf Blight developed in many fields across southern Minnesota. Wilt and Leaf Blight can be a significant disease problem, with yield losses reported as high as 70 to 80 bushels per acre in Minnesota.<sup>64</sup>

In the past few decades technological progress has been made, and seed companies have been able to genetically enhance corn varieties to provide a higher level of protection against pests and diseases. Advances in Soybean seed modifications have also been able to overcome a number of plant pests and diseases that include soybean cyst nematode and soybean aphids. These hybrids have resistance to

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<sup>63</sup> The Cattle Site. Accessed: 9/11/13. Available:  
<http://www.thecattlesite.com/diseaseinfo/#sthash.KWvGHoRq.dpuf>

<sup>64</sup> University of Minnesota Extension. Accessed 5-17-13. Available:  
<http://blog.lib.umn.edu/efans/cropnews/2011/08/watch-for-gosss-leaf-blight-an.html>

certain types of cyst nematode, but not all. Soybean aphids can be addressed with commercial spray, but Mother Nature is often one step ahead. Other plant diseases include: Asian Soybean Rust, European Corn Borer, elongate hemlock scale, and a number of insects.

#### Relationship to Other Hazards—Cascading Effects

- **Public Health.** Agricultural disease can have a major impact on public health. A shortage of food can cause poor development among youth that will have lifelong consequences.
- **Civil Disturbance.** A shortage of food could also result in civil disturbance. When the supply of a necessity becomes drastically low, distress can take over and cause civil unrest.

#### *Previous Occurrences of the Hazard*

There have been limited large scale occurrences of agricultural disease in Pipestone County. There were reported turkey farms in Pipestone County that were affected by H5N2 avian influenza (HPAI).<sup>65</sup>

Having limited large scale occurrences of agricultural disease is largely due to the economic incentives farmers have to stay ahead of new diseases and taking precautionary actions. Large operations have specialized staff to monitor livestock and enforce sterilization of equipment and employees before entering facilities. Ag businesses also work with Minnesota Department of Agriculture (MDA) and University of Minnesota Extension Service to stay ahead of and combat agricultural disease.

Minnesota Department of Agriculture (MDA) and University of Minnesota Extension Service provide information on a variety of insects and pests that help prevent occurrences of agricultural disease. Seed producers and other agricultural businesses use this information to modify crops to be resistant to more pests and diseases. The agricultural sector studies past seed modifications and make adjustments to combat the next year's hazards. It is important to study past plant pests and diseases, so we can prepare for future hazards. Understanding the past is an important variable in mitigating future hazard events.

During the spring and summer of 2015, Highly Pathogenic Avian Influenza hit turkey and chicken farmers in Minnesota and neighboring states. As of June 5, 2015, 9 million birds were affected and humanely put down in Minnesota.<sup>66</sup> Losses in poultry production and related businesses due to avian influenza were estimated at \$309.9 million in Greater Minnesota, according to University of Minnesota Extension. "Using economic modeling, analysts determined that for every million dollars in direct losses, the estimated ripple effect leads to \$1.8 million in overall economic losses, including \$450,000 in wages. Ripple effect losses stem from factors including reduced wage-earner and business-to-business spending."<sup>67</sup>

#### *Vulnerability*

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<sup>65</sup> Minnesota Board of Animal Health. Accessed: 2/3/16. Available: <https://www.bah.state.mn.us/avian-influenza#collaborative-effort>

<sup>66</sup> CDC. Information on Avian Influenza. Access: 7/23/15. Available: <http://www.cdc.gov/flu/avianflu/>

<sup>67</sup> University of Minnesota. Extension analysis: Economic impact of avian flu at nearly \$310 million as of May 11. Accessed: 7/23/15. Available: <http://discover.umn.edu/news/food-agriculture/extension-analysis-economic-impact-avian-flu-nearly-310-million-may-11>

Large scale animal outbreaks are rare. The Minnesota Board of Animal Health works with producers to educate, monitor, report, and respond to outbreaks. This coordinated effort has worked to reduce the frequency and scale of occurrences.

Some occurrence of crop pests and diseases happens each year. Researchers try to stay ahead of the hazards by giving livestock vaccinations and supplements and by genetically modifying crops.

Emerald Ash Borer (EAB) is one pest that has the potential for a large amount of damage in Pipestone County. There are statewide efforts being made to slow the spread, but the outcome is unknown at this time. According to a story in *Planning Magazine* ("Diversifying the Urban Forest, February 2010), Minnesota could lose all of its ash trees within 10 years.

Ash trees became a preferred quick-growing street tree and shade tree across the USA after elm trees succumbed to Dutch Elm Disease. According to the MDA, the EBA is an insect that attacks and kills ash trees. The adults are small, iridescent green beetles that live outside of trees during the summer months. The larvae are grub or worm-like and live underneath the bark of ash trees. Trees are killed by the tunneling of the larvae under the tree's bark.

"On May 14, 2009, emerald ash borer was confirmed as present in the South Saint Anthony Park neighborhood in St. Paul. EAB is a serious invasive tree pest. Quarantine has been placed on Ramsey, Hennepin, Houston, and Winona counties to help slow the spread of Emerald Ash Borer to other areas."<sup>68</sup>

Agricultural disease is difficult to contain and can spread quickly. The risk level assigned to agricultural disease by the planning team is average. Emerald Ash Bore is an example of how a plant disease can spread and how it is difficult to contain. The City of Minneapolis has removed 879 unhealthy ash trees in 2012.<sup>69</sup> It is recommended by the Minneapolis Tree Advisory Commission to remove and replace another 5,000 ash trees in 2013 to help prevent the widespread infestation of the bug.

**Figure #97**  
**Farm Summary – Pipestone County**

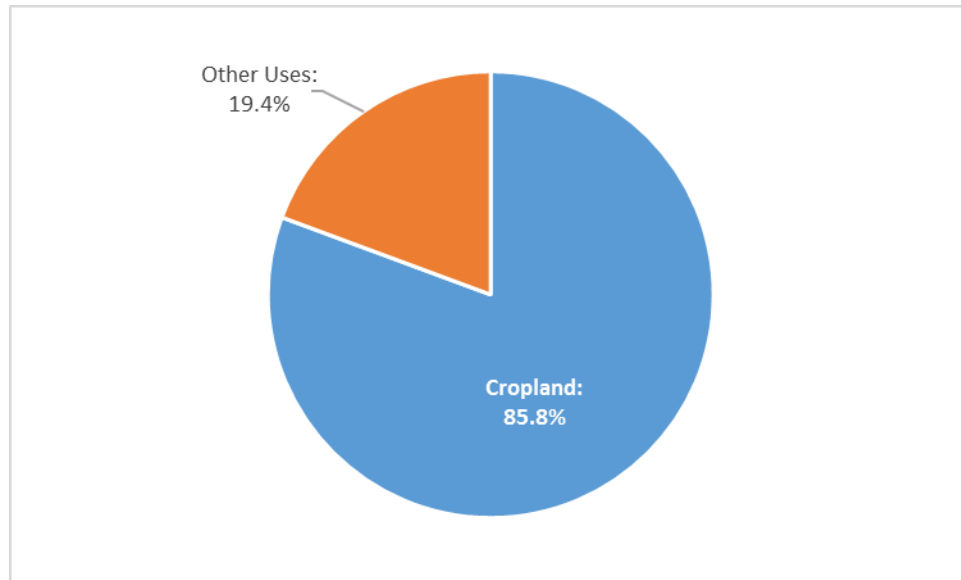
|                            | 1987    | 1992    | 1997    | 2002    | 2007    | 2012    | Change<br>2007-2012 |
|----------------------------|---------|---------|---------|---------|---------|---------|---------------------|
| Land in Farm<br>(acres)    | 246,804 | 252,658 | 243,525 | 249,432 | 244,670 | 241,970 | -1.10%              |
| Number of Farms            | 785     | 778     | 690     | 703     | 676     | 637     | -5.80%              |
| Average Size (acres)       | 314     | 325     | 353     | 355     | 362     | 380     | 4.70%               |
| Harvested Crops<br>(acres) | 164,210 | 186,470 | 190,792 | 185,056 | 185,955 | 195,106 | 4.92%               |
| Corn (acres)               | 68,352  | 85,421  | 85,114  | 83,332  | 89,556  | 92,667  | 3.47%               |
| Soybean (acres)            | 60,994  | 75,713  | 86,073  | 79,491  | 73,066  | 77,426  | 5.97%               |

<sup>68</sup> Minnesota Department of Agriculture. Accessed 5-17-13. Available:  
<http://www.mda.state.mn.us/plants/pestmanagement/eab.aspx>

<sup>69</sup> City of Minneapolis. Accessed: 9/17/13. Available:  
<http://www.minneapolismn.gov/sustainability/indicators/WCMS1P-081056>

Source: Census of Agriculture 1987, 1992, 1997, 2002, 2007, 2012  
(<http://agcensus.mannlib.cornell.edu/AgCensus/homepage.do?jsessionid=2AFCEF7241026635E4A4466B27A437AD>)

**Figure #98**  
**Land in Farms – Pipestone County 2012**



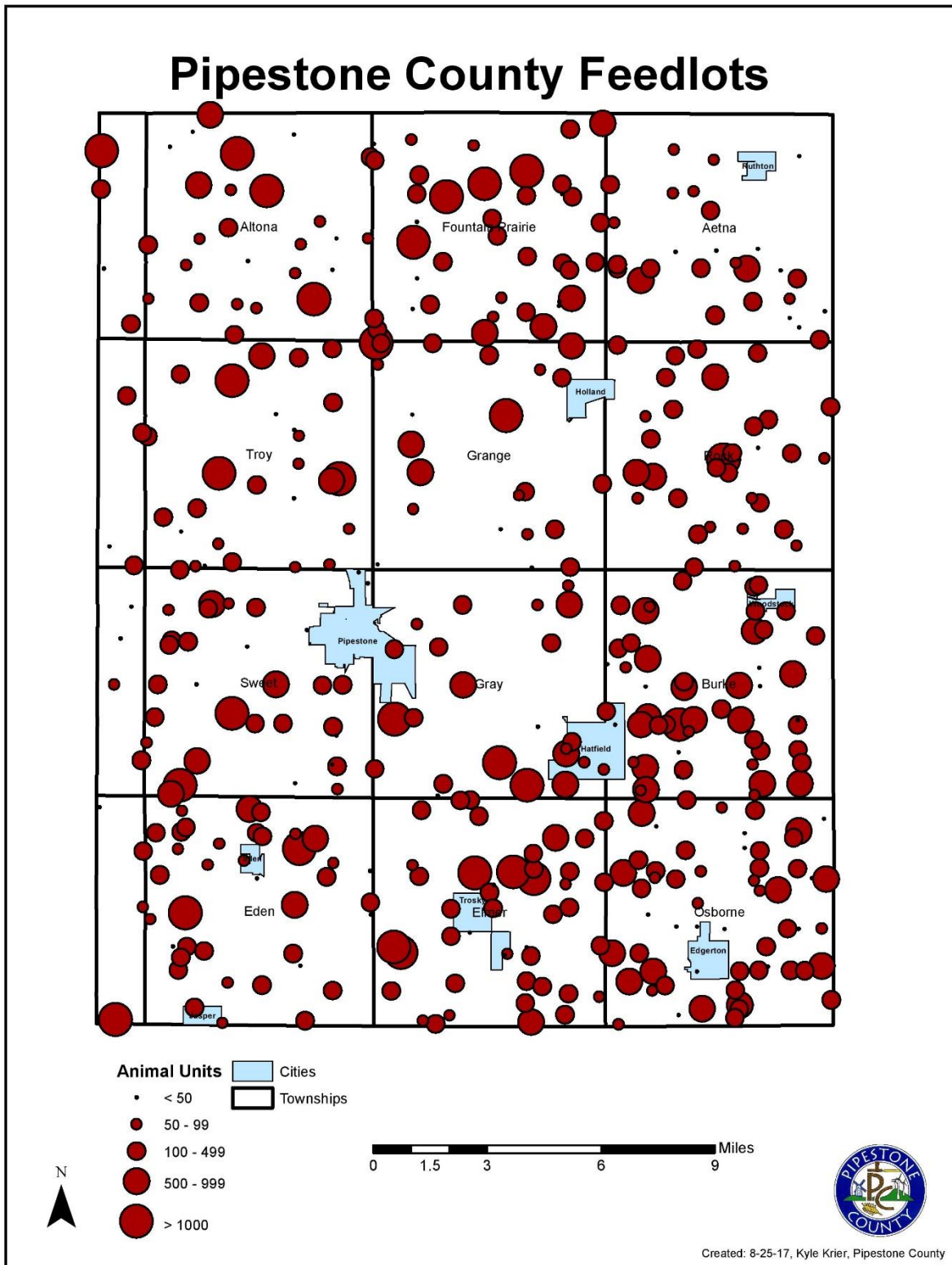
#### *Feedlots*

The Minnesota Pollution Control Agency (MPCA) regulates collection, transportation, storage, processing and disposal of animal manure. As of July 2016, there were 524 registered feedlots within Pipestone County.<sup>70</sup> Management of feedlots and manure is a priority for Soil and Water Conservation Districts in southwest Minnesota. Pipestone County participates in the MPCA County Feedlot Program.

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<sup>70</sup> Lyon County Planning and Zoning Department Information request. Received: 3/24/16.

Figure #99  
Feedlots – Pipestone County





### *Plans and Programs*

- Combined mitigation approach – Department of Agriculture, Minnesota Board of Animal Health, Minnesota Department of Health, University of Minnesota Extension Service, and Homeland Security and Emergency Management (HSEM) are working with local agencies and farmers to effectively mitigate any and all effects of hazards on animal agriculture and plant agriculture.
- The Minnesota Board of Animal Health continues to work together with agricultural industries and other state and federal agencies to prepare for and respond to introductions of animal disease outbreaks. The state's voluntary cooperative control plan includes education, monitoring, reporting, and response. For the Avian Influenza outbreak, testing for influenza in poultry is conducted at the Minnesota Poultry Testing Laboratory in Willmar. Commercial and non-commercial poultry flocks are routinely monitored for influenza. Livestock and other agricultural operations are also monitored for animal disease outbreaks.
- Catastrophic animal loss – In the event of a catastrophic animal loss the Minnesota State Duty Officer, the Board of Animal Health (BAH), the Department of Agriculture, and your local feedlot officer should be contacted.<sup>71</sup> The primary responsibility for regulating carcass disposal in Minnesota lies with the BAH. The 7020 feedlot rule addresses site selection for composting animal carcasses.<sup>72</sup> MPCA is in charge of carcass disposal in Minnesota.
- Catastrophic animal loss preparation – the Board of Animal Health conducted a catastrophic animal loss training exercise that helped dramatically with the response to Avian Influenza. Foaming and composting was part of the training, which was used during the response to Avian Influenza.
- The private sector has done a good job of policing itself in regards to animal disease outbreaks and the spread of plant diseases. Private agricultural businesses have an economic interest in maintaining a healthy field and healthy animal stock. Research and development plays a big role in trying to stay ahead of the animal and plants diseases and pests.

### *Gaps and Deficiencies*

- Livestock / Poultry Disposal – Disposal of dead livestock and poultry was an issue identified in many rural counties since the 2015 Avian Influenza Outbreak. This is in regards to catastrophic animal loss. The catastrophic animal loss issue pertains to on the farm animal loss and while the livestock or poultry is being transported. Refer to the section of Transportation accidents for more information related to catastrophic animal loss while livestock and poultry are being transported.
- Identifying backyard flocks – During the Avian Influenza outbreak there were identification of smaller flock issues.
- Animal Disease Containment – Isolation and containment was and is a concern regarding Avian Influenza. It is difficult to quickly identify infected flocks. Once an infected flock is identified containment protocols can be established.
- Avian Influenza Cause – Unsure why Avian Influenza occurred and other questions related to how it was transmitted.

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<sup>71</sup> Minnesota Pollution Control. Accessed: 7/19/13. Available: <http://www.pca.state.mn.us/index.php/view-document.html?gid=3579>

<sup>72</sup> Minnesota Pollution Control. Accessed: 7/19/13. Available: <http://www.pca.state.mn.us/index.php/view-document.html?gid=3579>

- Local Coordination – The relationship between Emergency Management, Southwest Health and Human Services (SWHHS), and local veterinarians needs to be strengthened in order to respond to the potential of actual animal disease that would pose a public health threat.
- Lag in Response – The response for Foreign Disease Outbreak is controlled at the State level. There may be a lag in response, since organizations have to be informed about the outbreak before a response is coordinated. Time is critical in responding to an outbreak, so additional local assets may be needed. Additional training between local assets and state level staff could also help to decrease response times.
- Aquatic Invasive Species – It is a good thing to slow and prevent the spread of aquatic invasive species, but the Minnesota Department of Natural Resources (DNR) needs to take a more visible approach. The “DNR recommends that boaters either: spray boat with high-pressure water; rinse boat with hot water (120 degrees for two minutes, or 140 degrees for 10 seconds); or dry boat and equipment for at least five days.”<sup>73</sup> There needs to be more decontamination units at boat launches, or part of aquatic invasive species regulations are simply a tool to fundraise. You can take your plugs out and let your boat sit all winter and there is still a little bit of water in the bottom. A very small number of boaters can comply with aquatic invasive species regulations.
- Disposal of contaminated materials – During the Avian Influenza there was a lack of coordination regarding the transportation and disposal of contaminated supplies and equipment. Wash in and wash out was used for larger equipment, but disposal of contaminated supplies and equipment needed additional coordination.
- Availability of PPE suits (Personal Protection Equipment – Contamination Suits) – Contamination suits were not always available for workers when entering a contaminated site during the Avian Influenza outbreak.

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<sup>73</sup> Minnesota Department of Natural Resources. Accessed: 5/18/15. Available: <http://www.dnr.state.mn.us/invasives/aquatic/index.html>

### 5.5.2 Dam, Impoundment, and Culvert Failure

Dams and impoundments maintain lake levels and help control flooding and the destructive power of water. Dams and impoundments are a critical part in minimizing erosion. “There are more than 1,250 dams in Minnesota; 800 are public dams, and the state owns over 430 of the public dams. Most of the public dams are more than 50 years old and require ongoing emergency repairs and reconstruction to maintain their structural integrity.”<sup>74</sup>

Dam failure is defined as a collapse or failure of an impoundment resulting in downstream flooding. Failure may occur for one or a combination of the following reasons:

- Prolonged periods of rainfall and flooding;
- Inadequate spillway capacity, resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage or piping;
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross section of the dam and abutments, or maintain gates, valves, and other operational components;
- Improper design, including the use of improper construction materials and construction practices;
- Improper operation, including the failure to remove or open gates or valves during high flow periods;
- Failure of upstream dams on the same waterway that release water to a downstream dam;
- Earthquakes, which typically cause longitudinal cracks at the tops of the embankments that can weaken entire structures

The Department of Natural Resources (DNR) has a dam safety program that inspects the structural integrity of dams and impoundments. The DNR classifies dam structures in three categories:

- Class 1: High Hazard: any loss of life or serious hazard to public;
- Class 2: Significant Hazard: possible health hazard or probable loss of high-value property;
- Class 3: Low Hazard: property loss restricted to rural outbuildings and local roads.

#### *Locations Affected by the Hazard*

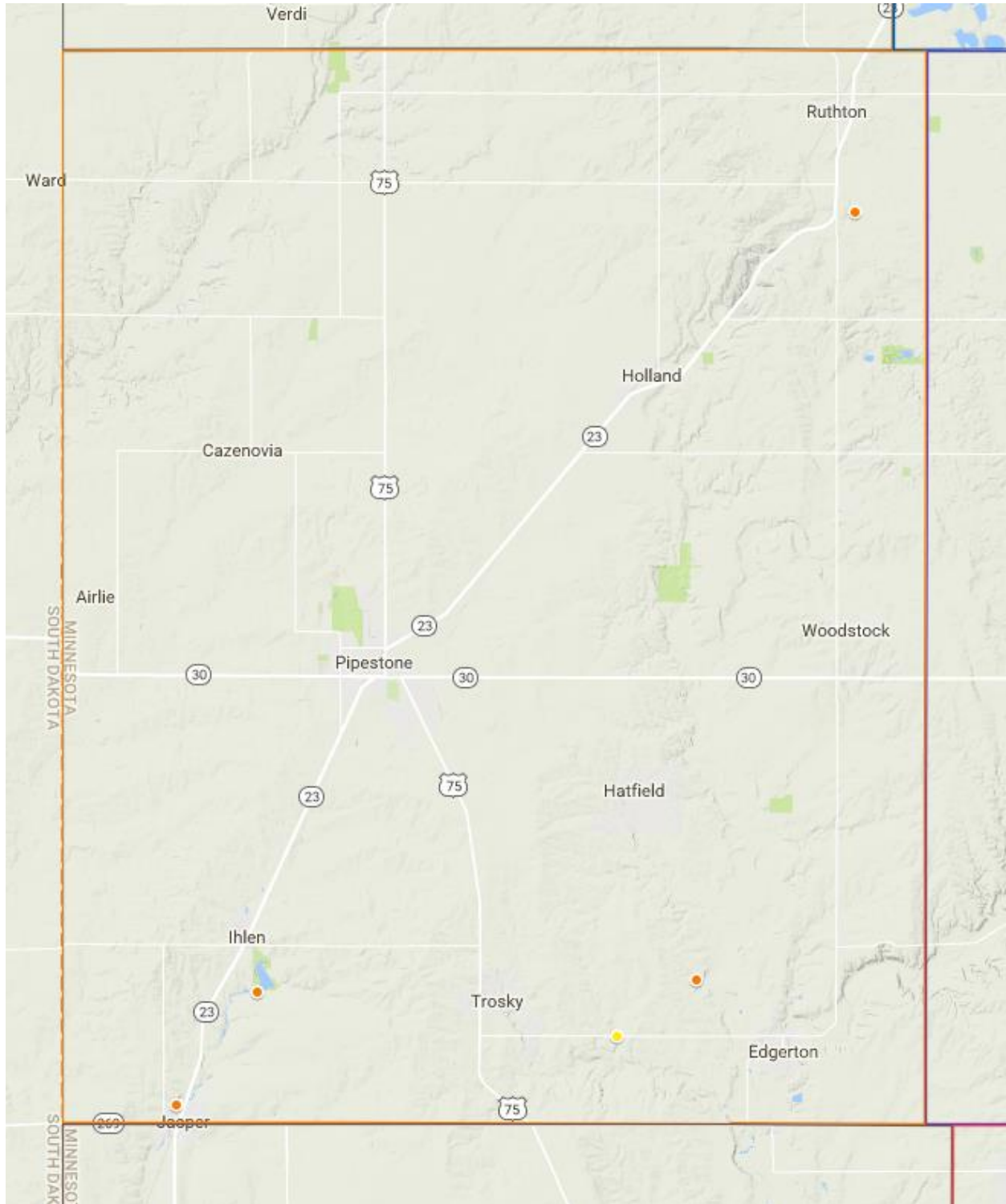
There are 4 dams in Pipestone County. Three of those dams are a Class 3, which is the lowest risk. There are no Class 1 dams. Below is a dam inventory table for Pipestone County.

**Figure #100**  
**Dam Inventory – Pipestone County**

| Dam Name         | ID      | Next Inspection Year | Last Inspection Date | Dam Class |
|------------------|---------|----------------------|----------------------|-----------|
| Splitrock Lake   | MN00100 | 2016                 | 5/6/2014             | 2         |
| Brockberg Pond   | MN00277 | 2016                 | 5/22/2008            | 3         |
| Snyder Farm Pond | MN00851 | 2016                 | 3/29/2012            | 3         |

<sup>74</sup> Minnesota Department of Natural Resources. Accessed: 11/14/13. Available: [http://www.dnr.state.mn.us/waters/surfacewater\\_section/damsafety/index.html](http://www.dnr.state.mn.us/waters/surfacewater_section/damsafety/index.html)

**Figure #101**  
**Dams – Pipestone County**



Select areas along other streams and water ways in Pipestone County where impoundments were constructed to hold back water are also susceptible to flooding from impoundments washing out or dam failure upriver.

#### *Extent of the Hazard*

Dam failure, although the risk is minimal, has the potential to be devastating to the areas within the floodplain and around the streams directly below impoundments and dams. Dam failure may result in flash flooding, extensive property damage, erosion, destruction of infrastructure including road and culvert, and loss of life.

It is more likely to have an impoundment or culvert fail. A failure of an impoundment or culvert has a potential of devastating downstream property damage, erosion, and destruction of infrastructure, including roads and other culverts.

#### *Relationship to Other Hazards—Cascading Effects*

- **Flash Flooding.** Dam failure has the potential to cause damage to the areas directly below the dam. Dam failure would cause immediate flash flooding, destruction of property, erosion of crops, infrastructure damage, and possibility of lives being lost. Damage to public infrastructure could also occur in areas of heavy water movement.

#### *Previous Occurrences of the Hazard*

In 1993, Pipestone County's Split Rock Creek State Park dam failed.

#### *Relationship to other Hazards*

- **Flooding** - In the event of dam failure, flooding of communities and transportation corridors can occur.

#### *Dam Failure and Climate Change*

Dams are designed based on assumptions about a river's annual flow behavior that will determine the volume of water behind the dam and flowing through the dam at any one time. Changes in weather patterns due to climate change may alter the expected flow pattern. It is conceivable that bigger rainfalls at earlier times in the year could threaten a dam's designed margin of safety, causing dam operators to release greater volumes of water earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream.

While climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures. Minnesota had a dam failure due to a large storm event in June 2012. The Forebay canal had operated as designed for nearly 100 years. The intensity of the 2012 rain event caused a failure of the canal wall which caused significant damage.

Climate change is adding a new level of uncertainty that needs to be considered with respect to assumptions made during dam construction.

#### *Vulnerability*

Free flowing water has tremendous power. It can move boulders, carve out rock, and erode an impoundment or dam. It is important to slow the runoff of water, so groundwater supplies can be replenished and the volume of free flowing water in streams and rivers is reduced. Reducing the free flowing water in streams and rivers will help to preserve impoundments and dams, but over time impoundments and dams will require maintenance and replacement.

There are 4 dams in Pipestone County. All of the dams are classified a Class 2 or Class 3, which are the lowest two risk classifications.

#### *Plans and Programs*

- Minnesota Dam Safety Program – The Minnesota Department of Natural Resources (DNR) regulates nearly 900 dams in the State of Minnesota. The DNR and U.S. Army Corps of Engineers regularly inspect dam and reservoir capabilities for flooding and dam failure. The Minnesota DNR dam safety program inspects the structural integrity of dams and impoundments in Pipestone County. The classification of the dam depends on how often the dam is inspected. A dam classified as High Hazard is inspected annually. A dam classified as Significant Hazard is inspected every three to four years. A dam classified as Low Hazard is inspected every eight years.
- Dam Emergency Action Plan – The Minnesota DNR drafts an Emergency Action Plan (EAP) for all High Hazard dams and strongly recommends that Significant Hazard dams be included as well. An EAP is a formal document that identifies potential emergency conditions at a dam and specifies preplanned actions to be followed in order to minimize property damage and loss of life in the event of a dam failure.
- Emergency Operations Plan – Explains the standard operating guidelines for countywide notification in the event of an emergency and the procedures of evacuation during an emergency.
- Impoundment dams and other water control systems.
- U.S. Army Corps of Engineers - The U.S. Army Corps of Engineers has plans in place for terroristic acts against the dams and flood control projects in the county.

#### *Gaps and Deficiencies*

- Registry of dams – Not all dams and impoundments are identified by the DNR. If the dam is not on the registry, the dam does not get inspected by the DNR. Non-identified dams could be at risk of failing, since they are not inspected.
- Frequency of dam inspection – Dams in Pipestone County that are all classified by the Minnesota DNR as Low Hazard dams and therefore only get inspected every eight years. However, due to the poor condition of both Snyder Farm Pond Dam and Splitrock Lake Dam, their frequency of inspection is every two years. The infrequency of inspection may result in maintenance being deferred for a number of years or structural deficiencies not being identified. Inadequate maintenance could result in dam failure.

### 5.5.3 Hazardous Materials

Hazardous materials are found everywhere, from farm to home. A hazardous material is any item which has the potential to cause harm to humans, animals, or the environment, by itself or through interaction with other factors. Spilled material can be costly to clean up and may render the area of the spill unusable for an extended period of time. Water supplies may become contaminated by the introduction of point and non-point source pollutants into public ground water and/or surface water supplies.

#### *Locations Affected by the Hazard*

All locations in Pipestone County could be affected by this hazard. In addition to manufacturers who use and or produce a number of hazardous chemicals, MN 23 and 30 as well as US 75 run through the county and these major transportation corridors have a high volume of semi-truck traffic. The loads coming to the county and through the county varies, but some of these loads could pose a serious chemical hazard if a crash would take place. Oil tankers are one example.

Many chemicals are also used daily in agriculture, putting farms and rural communities at risk. Anhydrous ammonia is one dangerous chemical used in agriculture that if not handled properly can be very dangerous. Methamphetamine (commonly referred to as “meth”) manufacturers have targeted isolated rural homes and abandoned farm sites for illegal drug labs. However, these individuals also have been known to set up labs in their car or basement in town, so populations in town are equally at risk of a meth lab explosion and other hazards.

#### *Extent of the Hazard*

Federal law defines certain hazardous chemicals, and requirements for emergency planning for facilities at which hazardous substances are present. According to the Minnesota AHMP, approximately 6,000 facilities across the state report their storage of hazardous chemicals to the Minnesota Department of Public Safety’s Emergency Planning and Community Right-To-Know Act (EPCRA) Program, US Environmental Protection Agency (EPA), and their local fire department. Within Pipestone County there is one facility that reports hazardous material storage to state and local authorities.<sup>75</sup> These types of facilities are known as 302 facilities after EPCRA Section 302(c) that require state and local authorities to develop chemical emergency preparedness and response capabilities through better coordination and planning with local businesses.

#### *Chemicals*

Land use activities and farming practices can have significant impacts on vulnerable aquifers. Aquifers in the region are often shallow and have a high potential of contamination from nitrate leaching. Deeper aquifers may not be suitable for water supplies due to naturally occurring contaminants, such as sulfur, or because of slow well recharge. Nitrates have been identified as a specific problem in the region. Hocking International Laboratories runs a chemical manufacturing plant in the City of Pipestone.

#### *Pipelines*

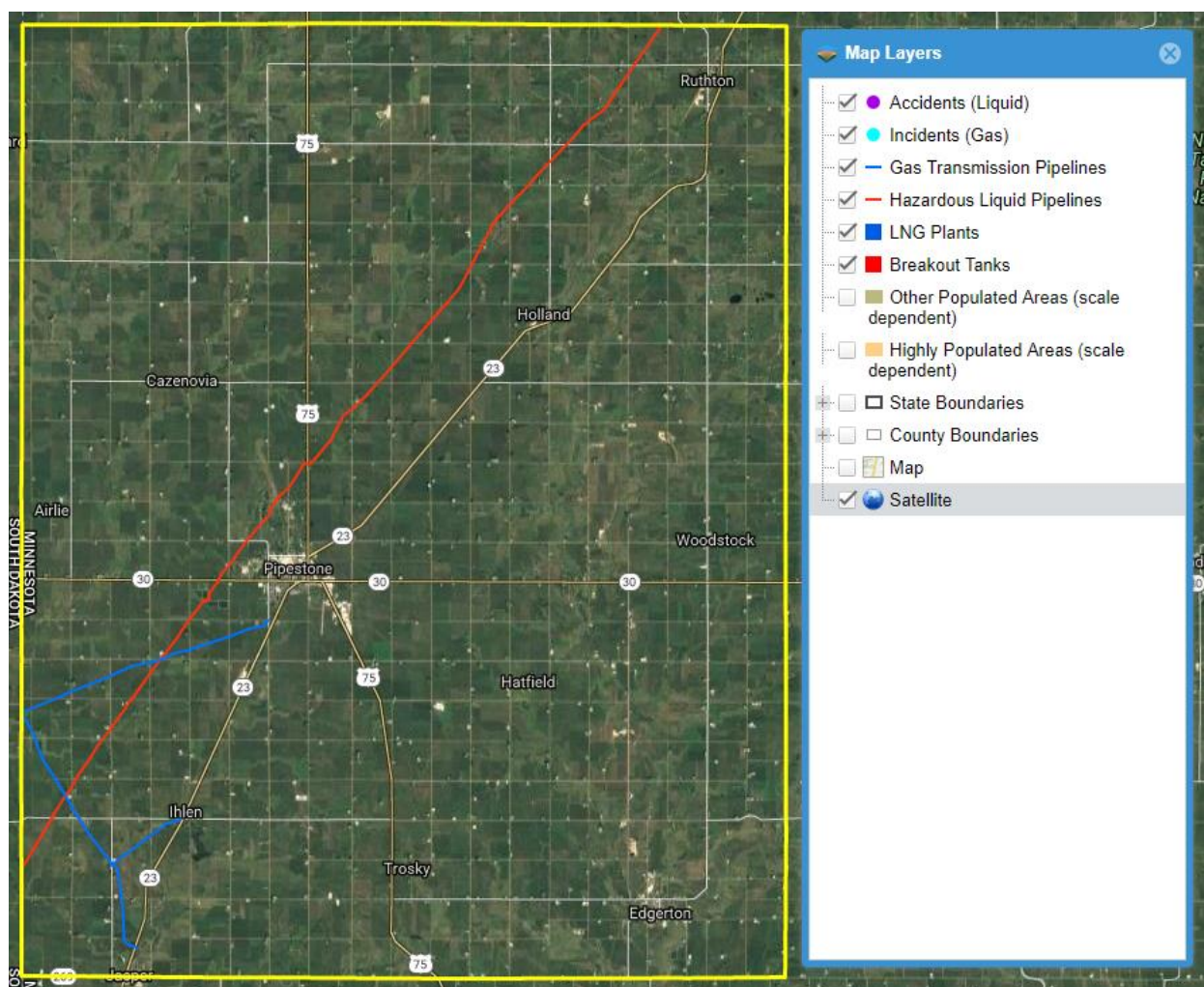
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<sup>75</sup> Toxic Release Inventory Program. 2016 Preliminary Dataset. Accessed 8/14/17. Available: <https://www.epa.gov/toxics-release-inventory-tri-program/2016-preliminary-dataset-basic-data-files>



The State Fire Marshal's Pipeline Safety Team (SFMPST) oversees pipeline operations in Minnesota. The National Pipeline Mapping System identifies one hazardous liquid pipeline traversing Pipestone County. The pipelines are in red on the map below. There are also several Gas Transmission Pipelines in Pipestone County. These pipelines are blue on the map below. Pipelines are pressurized and monitored, so pipelines can be quickly shut off in case of an accident. Pipelines are a safer way to transport hazardous liquids than by trucks or rail. "The evidence is clear: transporting oil and natural gas by pipeline is safe. Furthermore, pipeline transportation is safer than transportation by road, rail, or barge, as measured by incidents, injuries, and fatalities—even though more road and rail incidents go unreported."<sup>76</sup>

**Figure #102**  
**Hazardous Liquid and Gas Transmission Pipelines – Pipestone County**



Source: National Pipeline Mapping System - <https://www.npms.phmsa.dot.gov/PublicViewer/>

*Meth*

<sup>76</sup> Manhattan Institute for Policy Research. Issue Brief – Pipelines are Safer for Transportation of Oil and Gas. Accessed: 7/23/15. Available: [http://www.manhattan-institute.org/html/ib\\_23.htm#.VbFOi6\\_bK70](http://www.manhattan-institute.org/html/ib_23.htm#.VbFOi6_bK70)

Meth is a powerful stimulant drug that is similar to a family of drugs called amphetamines. During the production process there are a number of dangerous chemicals that are mixed that can cause dangerous fires and explosions. According to the Rand Drug Policy Research Center, amphetamines are the most widely used illicit drug worldwide, after marijuana.<sup>77</sup> Information in regional data systems and feedback from law-enforcement agencies and elected officials indicate that meth is still a problem facing the populations they serve.

Meth labs are a concern in the region and an incident at a lab could result in a major hazard material incident. A number of hazardous chemicals are used in the production process. An explosion and fire could result in a number of chemicals being emitted into the air and the ground water. There is also chemical byproduct from cooking meth that is often discarded. This chemical byproduct could infiltrate the ground water and cause ground water contamination. However, the team has stated that methamphetamine production rarely occurs in the area anymore, as it is now more often produced elsewhere and trafficked into the region.

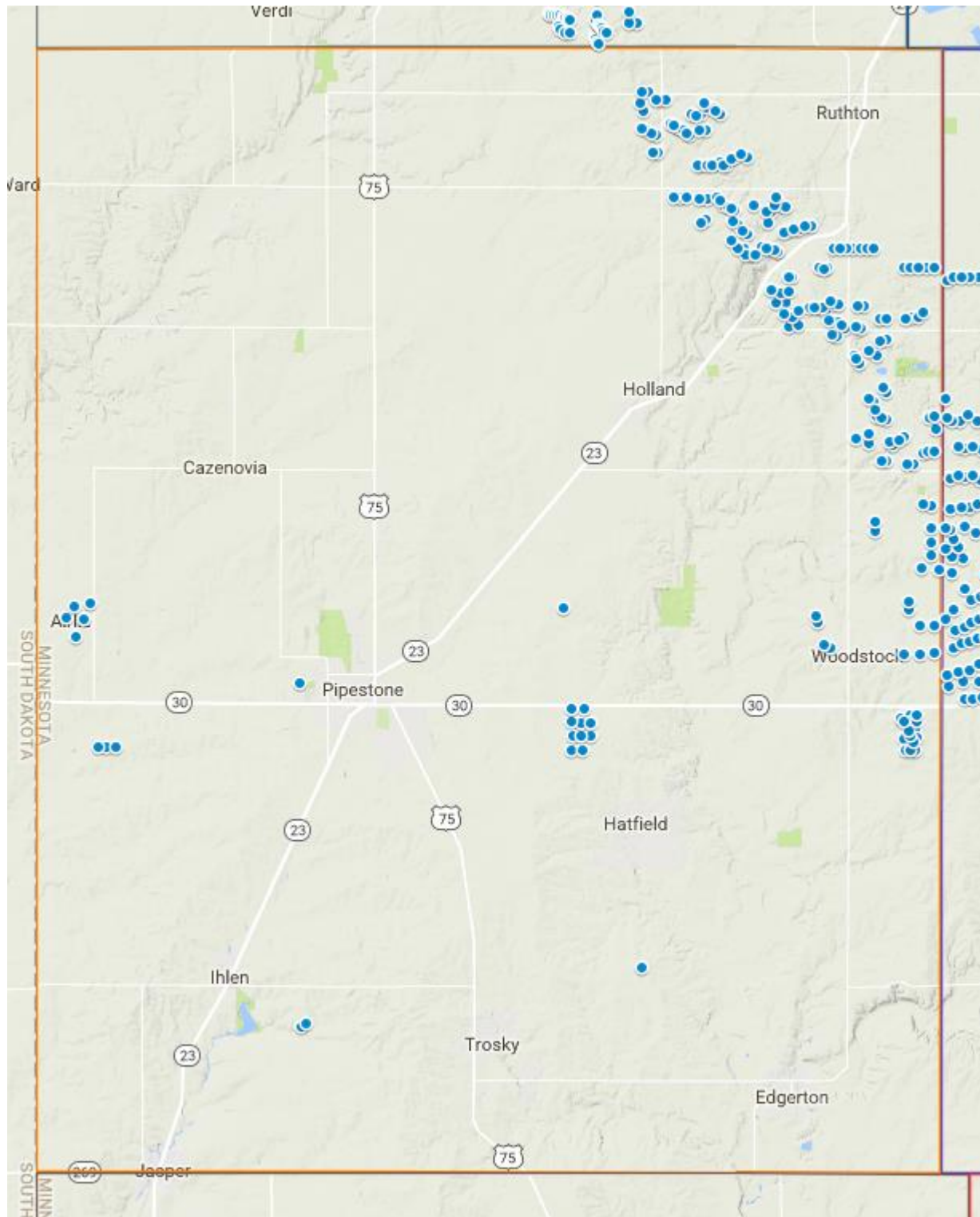
#### *Decommissioning of Wind Towers*

There are a number of wind towers in Pipestone County and more are being built. They are located predominantly along the edge of the Coteau des Prairies – locally known as Buffalo Ridge – in the eastern portion of the county. There is a concern of wind towers being abandoned and property owners left with removal and cleanup. There are removal and cleanup guarantees in the majority of the contracts with the wind farms, but if the wind farm files bankruptcy or closes all together, there may not be funding for removal and cleanup. There would be a substantial cost associated with decommissioning wind towers.

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<sup>77</sup> Rand. Accessed: 5/29/13. Available: [http://www.rand.org/pubs/research\\_briefs/RB9438/index1.html](http://www.rand.org/pubs/research_briefs/RB9438/index1.html)

**Figure #103**  
**Wind Towers in Pipestone County<sup>78</sup>**



<sup>78</sup> Source: USGS. Accessed 8/23/2017. Available: <https://eerscmapp.usgs.gov/windfarm/>

### *Relationship to Other Hazards—Cascading Effects*

- Fire. Hazardous materials incidents may cause or occur in conjunction with a fire. This could result in the fire spreading at a fast rate and can make containing and fighting the fire more difficult. Specialized equipment may be required to combat the fire caused or in conjunction with a hazard material.
- Water Supply Contamination. An incident involving hazardous materials on the roads, rail, or in the air can lead to a water contamination issue. Wellhead Protection Plans discuss the infiltration of chemicals leaking into ground water aquifers. The issue of infiltration could be multiplied by a load of hazardous materials being transported on any of the main highways being in a crash and causing contamination to the ground water.
- Terrorist activity. Most hazardous materials in transit are marked, but there is an unknown volume of government materials being shipped that are not marked due to security reasons. Since MN HWY 23 passes through Lyon County, there is an increased risk of a semi-truck being stolen and used in a terrorist activity.
- Public Health Emergency. Hazardous materials being proceeded in or shipped through Lyon County could be involved in a crash. The exposure of radiological substances by unprotected humans might result in the negative effects caused by such an exposure. It can be life threatening depending upon how much exposure and the length of the exposure time.

### *Previous Occurrences of the Hazard*

Hazardous material incidents can occur in different locations:

- Fixed site facilities
- Highway and rail transportation
- Air transportation
- Pipeline transportation

There have been 10 hazardous materials incidents in Pipestone County since 2000.<sup>79</sup> They are listed in the figure below. It is unknown how many hazardous materials are buried in Pipestone County.

**Figure #104**  
**Hazardous Materials Incidents – Pipestone County**

| Date/Time         | Type            | Cause | Nearest City | Description                                                                                                                                                                                                           |
|-------------------|-----------------|-------|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6/16/2012<br>8:00 | STORAGE<br>TANK | OTHER | HATFIELD     | THE CALLER REPORTING A DISCHARGE OF GASOLINE (APPROXIMATELY 500 GALLONS) ONTO SOIL. THE CALLER STATED THAT A STORAGE TANK AT A LOCAL FACILITY HAD A LEAK APPROXIMATELY A YEAR AGO AND NO REMEDIAL ACTIONS WERE TAKEN. |

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<sup>79</sup> USCG National Response Center – EPA Hazardous Incidents Reports. Accessed 8/14/17. Available: <http://nrc.uscg.mil/>

|                    |                             |                      |           |                                                                                                                                                                                     |
|--------------------|-----------------------------|----------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6/19/2013<br>6:30  | STORAGE<br>TANK             | UNKNOWN              | PIPESTONE | CALLER STATED THERE WAS A RELEASE OF ANHYDROUS AMMONIA FROM A NURSE TANK AT THE FACILITY DUE TO UNKNOWN CAUSES.                                                                     |
| 10/27/2011<br>8:00 | STORAGE<br>TANK             | EQUIPMENT<br>FAILURE | PIPESTONE | CALLER REPORTED THAT A TANK IN A FIELD IS LEAKING ANHYDROUS AMMONIA INTO THE ATMOSPHERE.                                                                                            |
| 10/27/2011<br>8:00 | STORAGE<br>TANK             | EQUIPMENT<br>FAILURE | PIPESTONE | THIS IS AN UPDATE TO REPORT NUMBER 993722. CALLER REPORTED THAT A TANK IN A FIELD IS LEAKING ANHYDROUS AMMONIA INTO THE ATMOSPHERE.                                                 |
| 6/16/2008<br>9:44  | MOBILE                      | OPERATOR<br>ERROR    | PIPESTONE | CALLER IS REPORTING A DIESEL SPILL FROM A TANKER TRUCK AT THE SERVICE STATION TO THE STORM DRAIN. A PICKUP TRUCK BROKE THE HOSE.                                                    |
| 1/29/2004<br>14:50 | RAILROAD<br>NON-<br>RELEASE | OPERATOR<br>ERROR    | PIPESTONE | THE CALLER IS REPORTING A GRADE CROSSING ACCIDENT. A FREIGHT STRUCK A PASSENGER CAR.                                                                                                |
| 8/21/2002<br>6:55  | FIXED                       | OTHER                | PIPESTONE | CALLER STATED THAT LIGHTENING HIT THE CONTROL PANEL FOR THE REFRIGERATION SYSTEM WHICH CAUSED THE SYSTEM TO SHUT DOWN. AS A RESULT A RELIEF VALVE RELEASED AMMONIA FROM THE SYSTEM. |
| 8/3/2001<br>4:00   | STORAGE<br>TANK             | UNKNOWN              | PIPESTONE | THE MATERIAL RELEASED OUT OF A STORAGE TANK BEHIND THE NE SIDE OF THE BUILDING DUE TO UNKNOWN CAUSES.                                                                               |
| 4/26/2000<br>17:45 | PIPELINE                    | OPERATOR<br>ERROR    | RUTHTON   | 8 INCH TRANSFER STEEL PIPELINE / RUPTURED DUE TO UNKNOWN THIRD PARTY EQUIPMENT DIGGING                                                                                              |
| 7/3/2000<br>15:30  | FIXED                       | OTHER                | PIPESTONE | ANHYDROUS APPLICATOR / EQUIPMENT CAME LOOSE FROM A HITCH ON THE BACK OF A TRACTOR AND ROLLED DOWN INTO A DITCH OFF OF THE HIGHWAY                                                   |

*Vulnerability*



With MN Highway 23 & 30, US Highway 75, and one Class I railroad (BNSF) there is a chance that there will be a crash involving hazardous materials. Refer to Figure #107 for the Minnesota Railroad Map in the Transportation Infrastructure subsection.

As traditional drugs, like cocaine, become more scarce and expensive due to the War on Drugs, it is likely demand for synthetic drugs, like meth, will increase. This increase in demand will entice more people to supply the drug. Meth can be produced locally and is relatively inexpensive to manufacture, so as the number of meth labs increase due to the increase in demand, the probability of a hazardous event involving a meth lab increases.

With MN Highway 23 & 30, US Highway 75, and one Class I railroad (BNSF) crossing Pipestone County, hazardous materials may be traveling through the area at any time. This volume of hazard materials traversing Pipestone County poses a serious risk of a hazardous material incident occurring. Precautionary measures are in place to prevent an incident from occurring, but a crash on involving a tanker of hazardous materials could result in a major hazardous material incident. A major incident could have large cascading effects since almost all water for public consumption in Southwest Minnesota is sourced from underground aquifers, rather than surface waters.

#### *Plans and Programs*

- State agency cooperation – Pipestone County works directly with the appropriate state agencies to address needs for responding to and mitigating the impacts of a hazardous materials event.
- Emergency Operations Plan – The EOP discusses Radiological/Hazardous Materials and outlines procedures for dealing with hazardous material accidents, spills, and releases. EOP identifies the 302/312 facilities within Pipestone County that maintain a supply of hazardous chemicals.
- Environmental health regulations – Pipestone County has worked to develop environmental health regulations and a County Safety Procedures and Policy Guide. These documents are cross-departmental plans that deal with hazardous material, infectious disease, and food-borne illnesses. They serve to provide guidelines to protect the citizens of the county.
- Training of emergency personnel – All emergency personnel are trained to at least the minimum Hazardous Materials Awareness level and all first responder groups conduct the required Occupational Health and Safety Administration training on a yearly basis.
- Ordinance – Pipestone County has a meth lab ordinance describing the policies and procedures for cleaning up such a site. The cost of the cleanup is billed to the property owner.
- Pipestone County Solid Waste Plan – In 2014, Pipestone County updated its 10 year Solid Waste Plan. The plan identifies the policies and programs regarding Hazardous Waste Management for the county. The plan also identifies the large waste generators within the county.
- Hazardous chemicals collection – Pipestone County's Emergency Manager works with the Department of Public Safety, Emergency Response Commission to assist in the statewide collection of hazardous chemicals existing at facilities throughout Pipestone County so that local emergency officials can prepare for incidents.
- Household Hazardous Waste Facility – In 2002, Pipestone County opened its greater than 90 day Household Hazardous Waste Facility. The facility takes any hazardous waste that comes from a household such as paint, cleaners, fluorescent lights, etc.

- Regional hazardous waste facility. Pipestone County works with the regional office in Marshall, MN, in providing a way for Very Small Quantity Generators (VSQG) to dispose of their hazardous waste.
- Hazardous Materials Response Team – Pipestone County does not have a HAZMAT Team. Pipestone County coordinates with the HAZMAT Team out of Mankato and Marshall. Sioux Falls could potentially be added as a HAZMAT Team, but state lines can make coordination more difficult.
- Monitoring program – A number of store owners currently report to the sheriff's office when products are sold that are used in making meth.
- Pipestone County Medical Center and has a portable decontamination shower. The facility has access to other decontamination assets, personal protective equipment (PPE), and other resources through the System and Regional partners which can be deployed with a phone call (through SWEPT).
- MnDOT – MnDOT has several departments to address hazardous materials, freight, emergency management and disaster preparedness. The District State Aid Engineer is a good contact for access to those resources.
- County assistance – Although the potential risk of a radiological emergency to the county is small, Pipestone County could potentially house displaced residents from eastern Minnesota around the Prairie Island Nuclear Power Plant.
- Water plan – Pipestone County's water plan recognizes that the county's ground water is impacted by both agricultural and residential fertilizer and pesticide applications.
- Regional and State assistance – Plans are in place specifying hazardous material cleanup and protocol for who should be contacted for regional and state assistance.

#### *Gaps and Deficiencies*

- Specialized equipment – Pipestone County fire departments are in need of specialized equipment to deal with hazardous materials. This equipment is often a single use item and is a high cost item. Maintaining this equipment is expensive, so this equipment is often not purchased, available, or dies on the shelf.
- Public education regarding drug ingredients – Public outreach to business owners needs to occur more frequently regarding substances used in making meth and other controlled substances.
- Hazard material / Meth lab cleanup -The sheriff's office and local fire departments are trained to handle a number of hazardous materials, but for meth labs and other hazard materials a HAZMAT certified cleanup team is required. The Pipestone County sheriff's office does not have a HAZMAT Team. Meth lab clean up can be very costly. If a fire fighter goes into a fire and sees that it is a meth lab, the equipment the fire fighter is wearing is no longer good. The chemicals in the fire contaminate the suit, so there are other costs that can be associated with a meth lab fire and clean up.
- Hazardous material training for first responders – First responders are trained to recognize hazardous materials and establish a perimeter. Hazardous material training only happens every three years for emergency responders. A refresher course would be helpful for emergency responders.
- 302 Facilities portable database – It may be time consuming to look up what hazardous materials a 302 facility is storing. A more usable database could assist with emergency response and increasing the safety of emergency responders.



- Proper hazardous waste disposal – Although the Pipestone County Household Hazardous Waste Facility is open, there is still a need to educate the public and businesses on how to dispose of their waste properly.
- Drug Drop Box outreach and marketing – There is a prescription and over the counter medication disposal drop box in Pipestone. The Pipestone County sheriff's office has a drug drop box located at the Law Enforcement Center. Additional outreach and marketing to the public is needed to increase use of the drug drop box.

### 5.5.4 Public Health Emergencies

As technology developed people started to demand sewer systems, running water, and waste disposal. This helped to prevent the spread of disease and helped to maintain a healthier public. As building technology also developed people started to demand safe and well-built buildings. This made it safer for people to live and work. Local government saw these demands and has tried to create uniformity through regulation. Through this government regulation the public health service evolved.

Public health services today face new challenges to counter ever-evolving disease. The Minnesota Department of Health (MDH) works with Department of Public Safety (DPS) and other agencies to prepare for large-scale emergencies of many types. Infectious diseases can present wide threats to many people, or very narrow threats to highly susceptible populations.

- An “epidemic” is a disease that occurs suddenly in numbers clearly in excess of normally expected rates.
- A “pandemic” is an epidemic that spreads across a large region.

**Figure #105**  
**Cases of Selected Communicable Diseases Reported to the Minnesota Department of Health by District of Residence, 2015**

| Disease                            | District<br>(population per U.S. Census 2014 estimates) |                           |                           |                      |                           |                            |                           |                           | Unknown<br>Residence | Total (5,372,030) |
|------------------------------------|---------------------------------------------------------|---------------------------|---------------------------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------|-------------------|
|                                    | Metropolitan<br>(2,919,177)                             | Northwestern<br>(157,393) | Northeastern<br>(326,026) | Central<br>(732,492) | West Central<br>(235,563) | South Central<br>(290,521) | Southeastern<br>(498,011) | Southwestern<br>(212,847) |                      |                   |
| Anaplasmosis                       | 145                                                     | 104                       | 96                        | 186                  | 49                        | 5                          | 23                        | 5                         | 0                    | 613               |
| Arboviral disease                  |                                                         |                           |                           |                      |                           |                            |                           |                           |                      |                   |
| La Crosse                          | 0                                                       | 0                         | 0                         | 0                    | 0                         | 1                          | 0                         | 0                         | 0                    | 1                 |
| West Nile                          | 5                                                       | 0                         | 0                         | 2                    | 1                         | 0                          | 0                         | 1                         | 0                    | 9                 |
| Babesiosis                         | 9                                                       | 14                        | 3                         | 12                   | 5                         | 1                          | 1                         | 0                         | 0                    | 45                |
| Blastomycosis                      | 16                                                      | 3                         | 5                         | 7                    | 1                         | 0                          | 2                         | 0                         | 0                    | 34                |
| Botulism (Infant)                  | 0                                                       | 0                         | 0                         | 0                    | 0                         | 0                          | 1                         | 0                         | 0                    | 1                 |
| Brucellosis                        | 3                                                       | 0                         | 0                         | 0                    | 0                         | 0                          | 1                         | 0                         | 0                    | 4                 |
| Campylobacteriosis                 | 469                                                     | 15                        | 29                        | 152                  | 42                        | 47                         | 91                        | 79                        | 0                    | 924               |
| Cryptosporidiosis                  | 72                                                      | 7                         | 8                         | 58                   | 44                        | 30                         | 60                        | 37                        | 0                    | 316               |
| Escherichia coli O157<br>infection | 49                                                      | 2                         | 1                         | 22                   | 4                         | 6                          | 11                        | 20                        | 0                    | 115               |
| Hemolytic uremic<br>syndrome       | 2                                                       | 0                         | 0                         | 4                    | 1                         | 1                          | 2                         | 1                         | 0                    | 11                |
| Giardiasis                         | 316                                                     | 15                        | 42                        | 105                  | 23                        | 25                         | 49                        | 45                        | 0                    | 620               |
| Haemophilus<br>influenzae disease  | 37                                                      | 6                         | 8                         | 17                   | 3                         | 9                          | 10                        | 14                        | 0                    | 104               |
| HIV (non-AIDS)                     | 200                                                     | 1                         | 3                         | 7                    | 3                         | 2                          | 6                         | 2                         | 4                    | 228               |

| Disease                                   | District<br>(population per U.S. Census 2014 estimates) |                           |                           |                      |                           |                            |                           |                           | Unknown<br>Residence | Total (5,372,030) |
|-------------------------------------------|---------------------------------------------------------|---------------------------|---------------------------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------|-------------------|
|                                           | Metropolitan<br>(2,919,177)                             | Northwestern<br>(157,393) | Northeastern<br>(326,026) | Central<br>(732,492) | West Central<br>(235,563) | South Central<br>(290,521) | Southeastern<br>(498,011) | Southwestern<br>(212,847) |                      |                   |
| AIDS (diagnosed in 2015)                  | 93                                                      | 3                         | 3                         | 6                    | 4                         | 3                          | 7                         | 2                         | 20                   | 141               |
| Legionellosis                             | 31                                                      | 0                         | 5                         | 6                    | 1                         | 2                          | 6                         | 0                         | 0                    | 51                |
| Listeriosis                               | 1                                                       | 0                         | 0                         | 1                    | 0                         | 0                          | 1                         | 0                         | 0                    | 3                 |
| Lyme disease                              | 555                                                     | 44                        | 120                       | 288                  | 49                        | 18                         | 92                        | 10                        | 0                    | 1176              |
| Measles (rubeola)                         | 2                                                       | 0                         | 0                         | 0                    | 0                         | 0                          | 0                         | 0                         | 0                    | 2                 |
| Meningococcal disease                     | 2                                                       | 0                         | 1                         | 2                    | 0                         | 0                          | 2                         | 0                         | 0                    | 7                 |
| Mumps                                     | 6                                                       | 0                         | 0                         | 0                    | 0                         | 0                          | 0                         | 0                         | 0                    | 6                 |
| Pertussis                                 | 343                                                     | 23                        | 30                        | 88                   | 13                        | 6                          | 75                        | 14                        | 2                    | 594               |
| Q Fever (acute)                           | 0                                                       | 0                         | 1                         | 1                    | 0                         | 0                          | 0                         | 0                         | 0                    | 2                 |
| Salmonellosis                             | 578                                                     | 18                        | 36                        | 135                  | 31                        | 48                         | 70                        | 59                        | 0                    | 975               |
| Sexually transmitted diseases             |                                                         |                           |                           |                      |                           |                            |                           |                           |                      |                   |
| Chlamydia trachomatis -genital infections | 13534                                                   | 461                       | 992                       | 1901                 | 576                       | 823                        | 1470                      | 370                       | 1111                 | 21238             |
| Gonorrhea                                 | 3166                                                    | 50                        | 130                       | 263                  | 87                        | 54                         | 185                       | 23                        | 139                  | 4097              |
| Syphilis, total                           | 569                                                     | 3                         | 13                        | 29                   | 1                         | 10                         | 19                        | 10                        | 0                    | 654               |
| Primary/secondary                         | 220                                                     | 0                         | 2                         | 10                   | 2                         | 4                          | 5                         | 4                         | 0                    | 246               |
| Early latent*                             | 162                                                     | 3                         | 1                         | 10                   | 0                         | 3                          | 4                         | 2                         | 0                    | 185               |
| Late latent**                             | 184                                                     | 0                         | 10                        | 9                    | 1                         | 3                          | 9                         | 4                         | 0                    | 220               |
| Congenital                                | 3                                                       | 0                         | 0                         | 0                    | 0                         | 0                          | 0                         | 0                         | 0                    | 3                 |
| Other***                                  | 0                                                       | 0                         | 0                         | 0                    | 0                         | 0                          | 0                         | 0                         | 0                    | 0                 |
| Shigellosis                               | 244                                                     | 1                         | 6                         | 12                   | 8                         | 8                          | 8                         | 5                         | 0                    | 292               |
| Streptococcal invasive disease - Group A  | 124                                                     | 10                        | 27                        | 32                   | 8                         | 8                          | 20                        | 7                         | 0                    | 236               |
| Streptococcal invasive disease - Group B  | 275                                                     | 13                        | 39                        | 76                   | 15                        | 30                         | 62                        | 17                        | 0                    | 527               |
| Streptococcus pneumoniae disease          | 238                                                     | 16                        | 50                        | 81                   | 32                        | 44                         | 51                        | 22                        | 0                    | 534               |
| Toxic shock syndrome (Staphylococcal)     | 10                                                      | 0                         | 0                         | 1                    | 0                         | 0                          | 0                         | 0                         | 0                    | 11                |
| Tuberculosis                              | 111                                                     | 1                         | 0                         | 9                    | 3                         | 4                          | 18                        | 4                         | 0                    | 150               |
| Varicella                                 | 167                                                     | 4                         | 10                        | 75                   | 9                         | 35                         | 33                        | 28                        | 0                    | 361               |
| Viral hepatitis, type A                   | 15                                                      | 0                         | 2                         | 0                    | 1                         | 2                          | 1                         | 0                         | 0                    | 21                |

| Disease                                                              | District<br>(population per U.S. Census 2014 estimates) |                           |                           |                      |                           |                            |                           |                           | Unknown<br>Residence | Total (5,372,030) |
|----------------------------------------------------------------------|---------------------------------------------------------|---------------------------|---------------------------|----------------------|---------------------------|----------------------------|---------------------------|---------------------------|----------------------|-------------------|
|                                                                      | Metropolitan<br>(2,919,177)                             | Northwestern<br>(157,393) | Northeastern<br>(326,026) | Central<br>(732,492) | West Central<br>(235,563) | South Central<br>(290,521) | Southeastern<br>(498,011) | Southwestern<br>(212,847) |                      |                   |
| Viral hepatitis, type B<br>(acute infections only,<br>not perinatal) | 15                                                      | 0                         | 0                         | 2                    | 0                         | 0                          | 2                         | 0                         | 0                    | 19                |
| Viral hepatitis, type C<br>(acute infections only)                   | 13                                                      | 2                         | 10                        | 4                    | 4                         | 1                          | 2                         | 1                         | 0                    | 37                |

\* Duration ≤1 year

\*\* Duration >1 year

\*\*\* Includes unstaged neurosyphilis, latent syphilis of unknown duration, and latent syphilis with clinical manifestations

#### County Distribution within Districts

Metropolitan - Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, Washington

Northwestern - Beltrami, Clearwater, Hubbard, Kittson, Lake of the Woods, Marshall, Pennington, Polk, Red Lake, Roseau

Northeastern - Aitkin, Carlton, Cook, Itasca, Koochiching, Lake, St. Louis

Central - Benton, Cass, Chisago, Crow Wing, Isanti, Kanabec, Mille Lacs, Morrison, Pine, Sherburne, Stearns, Todd, Wadena, Wright

West Central - Becker, Clay, Douglas, Grant, Mahnommen, Norman, Otter Tail, Pope, Stevens, Traverse, Wilkin

South Central - Blue Earth, Brown, Faribault, LeSueur, McLeod, Martin, Meeker, Nicollet, Sibley, Waseca, Watonwan

Southeastern - Dodge, Fillmore, Freeborn, Goodhue, Houston, Mower, Olmsted, Rice, Steele, Wabasha, Winona

**Southwestern** - Big Stone, Chippewa, Cottonwood, Jackson, Kandiyohi, Lac Qui Parle, Lincoln, Lyon, Murray, Nobles, Pipestone, Redwood, Renville, Rock, Swift, Yellow Medicine

Source: <http://www.health.state.mn.us/divs/idepc/newsletters/dcn/sum15/2015dcn.pdf>

### *Locations Affected by the Hazard*

People throughout Pipestone County are equally affected by this hazard.

### *Extent of the Hazard*

“Infectious diseases have the potential to affect any form of life.”<sup>80</sup> Some infectious diseases that were thought to have been eradicated have re-emerged and new strains present threats to the populations and require monitoring. Different strains of the influenza virus emerge seasonally and require modifications to antibiotics and vaccinations.

<sup>80</sup> MN All Hazard Mitigation Plan. Accessed: 5/29/13. Available: [https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011\\_MinnesotaAllHazardMitigationPlanDraft.pdf](https://dps.mn.gov/divisions/hsem/hazard-mitigation/Documents/2011_MinnesotaAllHazardMitigationPlanDraft.pdf)

Infectious diseases in livestock also pose a significant risk. Food supplies could be affected and the livelihood of the owners of livestock will be impacted. Certain infectious diseases are considered more likely to present a public health emergency hazard in rural Minnesota.

Many infectious diseases are preventable and controllable. Measles, Rubella, Polio, and Pertussis are all vaccine preventable diseases. These diseases are no longer common, but a single case can cause a public health emergency. Doctors are often not looking for these diseases, so they may be overlooked which can cause the disease to spread. Also, more parents are electing not to vaccinate which puts the entire population at greater risk.

Arboviral Encephalitis commonly known as West Nile Virus is a mosquito transmitted disease that can cause encephalitis in people and horses. This virus was usually found in mosquitos and birds in Africa and Europe. However, West Nile encephalitis was reported in New York City in 1999.<sup>81</sup> In 2012, there was one death in Minnesota associated with West Nile Virus, and one case of West Nile Virus in Pipestone County.<sup>82</sup>

In 2009, the Centers for Disease Control and Prevention (CDC) started taking larger steps to combat H1N1 (sometimes called “swine flu”). H1N1 was first detected in people in the United States in April 2009. This virus has the potential to spread fast and can cause severe illness in people. The virus can spread person to person, much in the same way the seasonal influenza is spread.<sup>83</sup>

Smallpox has not been an issue in the United States for more than 50 years. Due to the threat of terrorism, this disease has been thrust to the forefront of public concern and fear. Smallpox is a serious, contagious, and sometimes fatal infectious disease. There is no specific treatment for smallpox. The only prevention for small pox is vaccination.

“Ebola is a rare and deadly disease caused by infection with a strain of Ebola virus. The 2014 Ebola epidemic is the largest in history, affecting multiple countries in West Africa. The risk of an Ebola outbreak affecting multiple people in the U.S. is very low.”<sup>84</sup>

#### *Relationship to Other Hazards—Cascading Effects*

- Emergency Response. A public health emergency will affect the ability to respond and recover from any other natural or other hazard. If an epidemic event were to occur, deaths could be in the many hundreds of thousands across the nation.
- Civil Disturbance. If the health of the general public is perceived to be threatened on a large scale, riots or states of lawlessness are a possibility.

#### *Previous Occurrences of the Hazard*

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<sup>81</sup> Minnesota Department of health. Accessed: 8/19/13. Available:

<http://www.health.state.mn.us/divs/idepc/diseases/westnile/>

<sup>82</sup> Minnesota Department of health. Accessed: 8/19/13. Available:

<http://www.health.state.mn.us/divs/idepc/diseases/westnile/wnvmap12.pdf>

<sup>83</sup> Center for Disease Control and Prevention. Accessed: 5/29/13. Available: <http://www.cdc.gov/h1n1flu/qa.htm>

<sup>84</sup> Center for Disease Control and Prevention. Accessed 11/5/14. Available:

<http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/index.html>

Standard procedures involve collection of accurate assessment data, outbreak detection and investigation, and development of appropriate control strategies based on specific epidemiological data. These activities require close collaboration between health care providers, clinical laboratories, state and local health departments, and federal agencies.

There have been no major outbreaks of any disease in Pipestone County in recent years.<sup>85</sup>

Influenza is a common seasonal occurrence in Pipestone County, but no major outbreak has occurred. Seasonal influenza is planned for every year. The annual seasonal influenza usually peaks in February.

There are strains of influenza that can be more devastating. Influenza Type A virus has caused three pandemics in the past century worldwide with significant loss of life. Pandemics are caused by the unstable nature of Influenza Type A, and new subtypes that appear through genetic drifts or shifting.

### *Vulnerability*

People contract seasonal influenza every year. Other diseases occur regularly.

If an outbreak occurs that is contagious it is critical to quarantine the population affected by the disease. This is often difficult since the outbreak may go unnoticed for a period of time. Certain mutations of a disease are also becoming more resistant to antibiotics. This is particularly true regarding Influenza Type A. Younger and older population cohorts are at a higher risk for acquiring a disease.

### *Plans and Programs*

- Emergency Operations Plan – County Emergency Management is working closely with Public Health and local healthcare facilities to mitigate and effectively respond to potential Public Health Emergencies. The Pipestone County Emergency Operations Plan outlines procedures for county and local governments for contacting appropriate state and federal agencies and provides guidelines and strategies for dealing with infectious diseases. A command structure between local public health and the Emergency Manager is also outlined in the Emergency Operations Plan.
- Southwest Health and Human Services (SWHHS) – SWHHS works with the Minnesota Department of Health (MDH) to address infectious diseases that are listed in MN Rule #4605.7040 (such as Encephalitis, Hepatitis, Influenza, Lyme's Disease, Tuberculosis, and Syphilis). If any of these or other listed diseases should appear in Pipestone County, SWHHS works with MDH and local medical providers to limit the spread of the disease. SWHHS routinely receives information from MDH via Health Alert Network (HAN) for outbreaks occurring in Minnesota or outbreaks that could impact the state and issues appropriate information based on the most current alerts. SWHHS provides information to public and private employers, schools and hospitals about potential infectious disease threats and prevention measures.
- Area Strategic Stockpile Plan – SWHHS has a Strategic National Stockpile (SNS) plan in place. SWHHS is working with the Minnesota Department of Health and other regional and local partners for the mass distribution of needed medicines and supplies for a Public Health Emergency. SWHHS will

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<sup>85</sup> Southwest Health and Human Services Data Request. Received: 01/26/2018

continue to coordinate with regional partners for mass distribution of needed medical supplies for a public health emergency.

- Response capabilities (facilities) – SWHHS have designated buildings for the Strategic National Stockpile and Medical Countermeasure Dispensing Sites.
- Medical Countermeasure Dispensing Plan – SWHHS has a Medical Countermeasure Dispensing Plan in place. The plan covers mass dispensing of medicines and supplies/Medical Countermeasure Dispensing (MDS). In the event of a naturally occurring outbreak, bioterrorism incident or mass vaccination, dispensing of medication may be needed within a short period of time to prevent morbidity and mortality due to the incident. SWHHS has four designated medical countermeasure dispensing sites (MDS) which are utilized as an emergency, temporary, public health clinic to provide immunizations or medications to a large number of residents. SWHHS follows guidance from the Minnesota Department of Health (MDH) and works with other local, state, federal, and non-governmental agencies, as necessary.
- Isolation/Quarantine (I/Q) Plan – SWHHS has developed an Isolation & Quarantine plan to prevent the spread of diseases. The I/Q will be event specific. The plan will address measures to protect the public and prevent spread of disease. Isolation measures are directed towards people already ill, who are usually within a health care facility or off site care. Quarantine is a tool used to hold & limit contact between persons who have been exposed to a disease in their own home. Both measures are effective tools in preventing spread of disease. SWHHS does not monitor individuals once they are placed in I/Q. This monitoring will come down from MDH.
- Media outreach – Pipestone County Emergency Management works with SWHHS and other local media throughout the county in the event of an infectious disease outbreak.
- Vaccination program – SWHHS conducts outreach programs to educate residents on the benefits of routine vaccinations. Part of this outreach is to assure that children and adults have access to recommended vaccines. Targeted groups include children, people with high deductibles, or people with no insurance. People in these groups can receive immunizations through the agency. Flu immunizations are also targeted to some adults within the county. Immunizations are designed to assist families of need in protecting their children and themselves from infectious diseases. SWHHS also participates in the South Central/Southwest Minnesota Immunization Information Connection (MIIC), which is a confidential, computerized network of shared immunizations records. It provides clinics, schools, and parents/adults with accurate, complete, and up-to-date immunization records. This system can assist in alerting participating families if there is any disease outbreak that may put them at risk in their area.
- Environmental health regulations and policies – SWHHS in cooperation with MDH has worked to develop environmental health regulations, a policy guide, and procedures to address infectious disease and food borne illness. Pipestone County relies on the State for inspections.
- Outbreaks – Pipestone County Medical Center has written plans for Investigation of Suspected Outbreaks, Significant Epidemiologic Occurrence or Sentinel Events, Pandemic Influenza, Flu Center, and Reporting of Communicable Diseases.
- Southwest Healthcare Preparedness Coalition Team – The coalition represents 23 hospitals, 43 primary care clinics, 50 Nursing Homes, 103 EMS groups and two tribal governments in our 16-county region in southwest Minnesota. Additional coalition members include: State and local representatives from



Public Health, Homeland Security and Emergency Management, the Minnesota Department of Health, and the Emergency Medical Services Regulatory Board. The coalition is working together toward enhancing our response to local, regional, statewide, and national emergencies.

- MDH FluSafe Program – Pipestone County Medical Center has performed staff vaccination and tracked percentage vaccinated each year participating in the MDH FluSafe Program with vaccination efforts of greater than 90% for several years.
- Public education – Southwest Health and Human Services, the agency responsible for the delivery of public health and social services in Pipestone County, has various campaigns to educate the public on the importance of active living and healthy eating, vaccinations, tobacco, and other public health issues.
- Senior LinkAge Line® – The Senior LinkAge Line® is the Minnesota Board on Aging's free statewide information and assistance service. This service helps to connect Minnesotans to local services.

#### *Gaps and Deficiencies*

- Strategic National Stockpile vulnerable to power outages – Southwest Health and Human Services (SWHHS) and the Minnesota Department of Health maintain a Strategic National Stockpile (SNS) of needed medicines and supplies for Public Health Emergencies. The medication/vaccinations are vulnerable to power outages. A power outage could result in medicines and supplies not being kept cold and spoiling.
- Response capabilities (facilities) – SWHHS needs to work with Emergency Management, various units of government, and health care facilities to clarify and determine the use of buildings needed to respond to a public health emergency or respond to a hazard.
- Aging population – An aging population puts the county at greater risk of Public Health Emergencies. The population cohort 85 plus has increased by 22.4 percent from 2000 to 2010. As more of the population is dependent on the younger population cohorts to help them, it puts a greater need on the rest of the population to stay healthy. The older population is dependent and requires services the rest of the population provides. If healthcare staff becomes sick that will put a strain on the care capacity of assisted living facilities, other elderly care facilities, and general care facilities.
- Cultural diversity & vaccination disparities – Due to the diversity of Pipestone County, it is difficult to conduct public outreach in regards to immunizations. People from other countries do not have the same immunization plans as is custom in the United States. The overwhelming majority of school age children are vaccinated, but adults from other counties may not be vaccinated.
- Lack of Alzheimer's treatment – There is a lack of treatment facilities for Alzheimer's in southwest Minnesota.
- Lack of mental health treatment – There is a lack of treatment facilities for mental health issues in southwest Minnesota. Mental health issues go undiagnosed and too many people are not getting treatment. Jail space is being used to house people with mental health issues.

### 5.5.5 Transportation Infrastructure

Infrastructure is a critical need for the operation and competitiveness of a city, county, or region. Infrastructure is the skeleton and nervous system of a community. Infrastructure includes roads and bridges, rail, air and transit.

Minnesotans move goods and people on a variety of transportation networks. In the wake of the Interstate 35W bridge collapse, the 2008 update of the Minnesota AHMP focused attention on the status of bridges across Minnesota.

#### *Locations Affected by the Hazard*

Roads, bridges, rails, landing strips, and other transportation infrastructure wear out. Transportation infrastructure is characterized by long-term, capital-intensive investments that are interdependent and vulnerable to both natural and other hazards. Transportation infrastructure continually needs to be inspected and upgraded. Numerous locations in Pipestone County have the potential to be affected by transportation infrastructure hazards.

Pipestone County's transportation network is comprised of highways, railways, airports and trails. The system is designed to serve local residents, agriculture and industry, as well as travelers and regional commerce. The Minnesota Department of Transportation (MnDOT) works with the county engineer and municipal authorities to construct, maintain, and regulate a comprehensive system of roads, rail and airports for public and private use.

#### *Roads*

There are hundreds of miles of roadway to be monitored and maintained in Pipestone County. There are county state aid highways, county roads, township roads, and city streets traversing Pipestone County that all require different monitoring and upkeep. It is critical to keep the system in a good state of repair, so people and goods can travel safely.

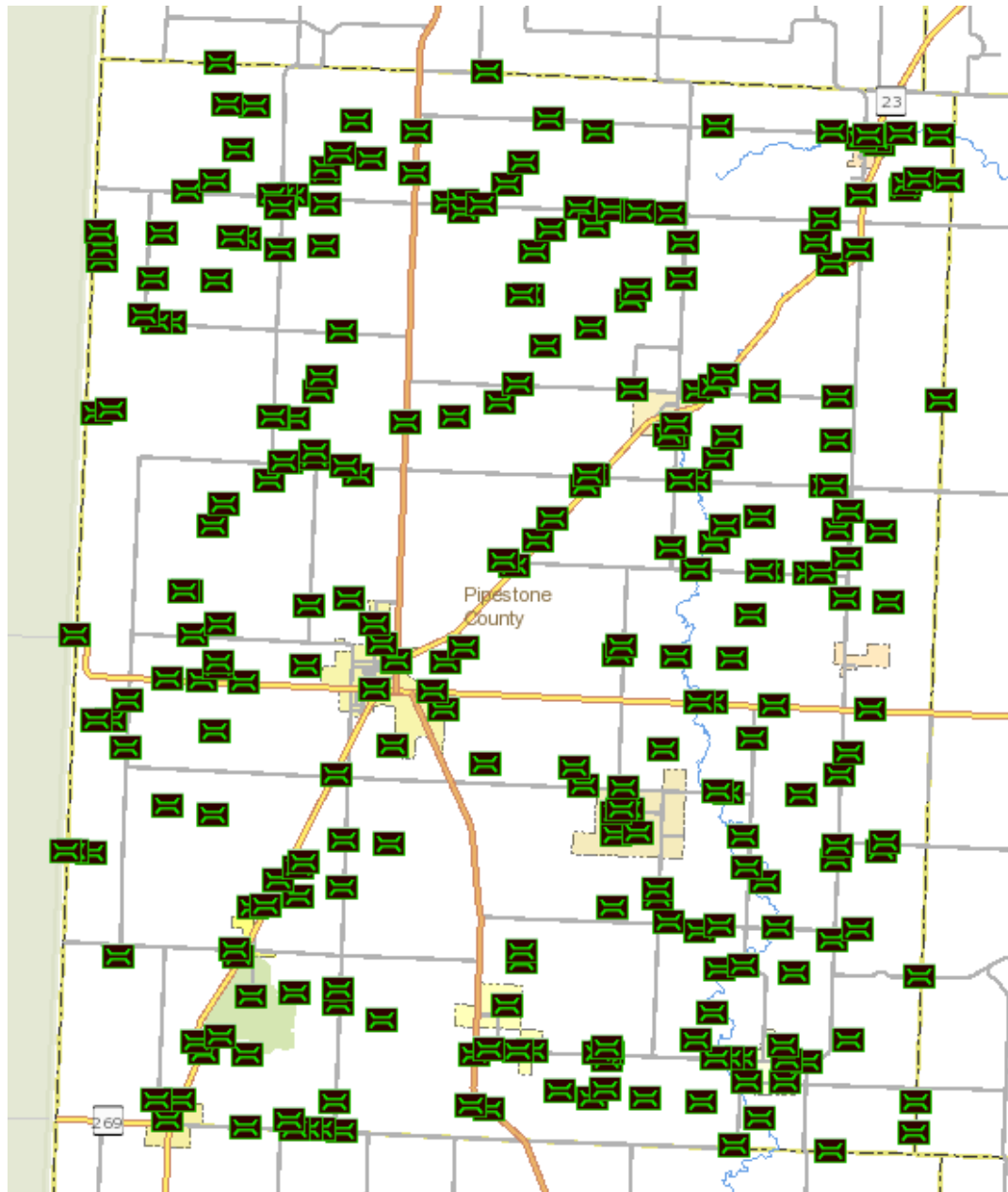
Pipestone County has roads and bridges in state, county, and local jurisdictions with each entity having primary responsibility for construction and maintenance over their segments. The road network is designated by jurisdiction:

- **Trunk Highway System.** Statewide routes originally established under a 1920 constitutional amendment. The routes are the responsibility of MnDOT. Pipestone County is located in MnDOT's District 8, which has its primary office in Willmar. U.S. Highways 14 and 75, and State Highways 19 and 23 are Trunk Highways (TH routes).
- **County State Aid Highways (CSAH).** Roads or streets established and designated under county jurisdiction in accordance with Minnesota Statutes Chapter 162. The State provides funding assistance to maintain the CSAH system.
- **County Roads (CR).** Roads established and maintained by the county under the sole authority of the county board.
- **Township Roads.** Roads established and maintained by township boards or reverted back to township jurisdiction by the county board.
- **City Streets.** Any street/road in a municipality not otherwise designated.

## Bridges

There are approximately 298 bridges on county, municipal, and township roadways within Pipestone County.<sup>86</sup> MnDOT lists 176 bridges in Pipestone County on their inventory of bridges over 20 feet.

**Figure #106**  
**Bridge Map – Pipestone County<sup>87</sup>**



<sup>86</sup> MnDOT. Minnesota Bridges, December 2017. Accessed: 11/6/18. Available: <http://www.dot.state.mn.us/bridge/pdf/minnesota-bridges-2017-report.pdf>

<sup>87</sup> BridgeInfo3 by State Aid and Bridge of MnDOT. Accessed: 8/15/2017. Available: <http://dotapp9.dot.state.mn.us/bridgeinfo3/>

### *Railroads*

There is one railroad serving Pipestone County: the Burlington Northern Santa Fe (BNSF) Railway. The BNSF is a Class I railroad. Class I railroads have operating revenues of 433.2 million or more while class II railroads are regional with operating revenues under 433.2 million. These railroads are a critical element in Pipestone County's transportation system.

The BNSF crosses Pipestone County from the northeast to the southwest and has 1,584 miles of track in Minnesota. Agricultural products account for the majority of rail commodities shipped in the region, including grain, farm and chemical products. BNSF also hauls significant amounts of coal into the state and increasing amounts of crude oil. The Marshall Subdivision, running from Willmar to the Iowa Border paralleling TH 23, sees about 14 trains a day, according to a technical memorandum for the MnDOT Statewide Rail Plan. There are numerous rail crossings close to TH 23, often at skewed angles which make clear views difficult.

### *Air Transportation*

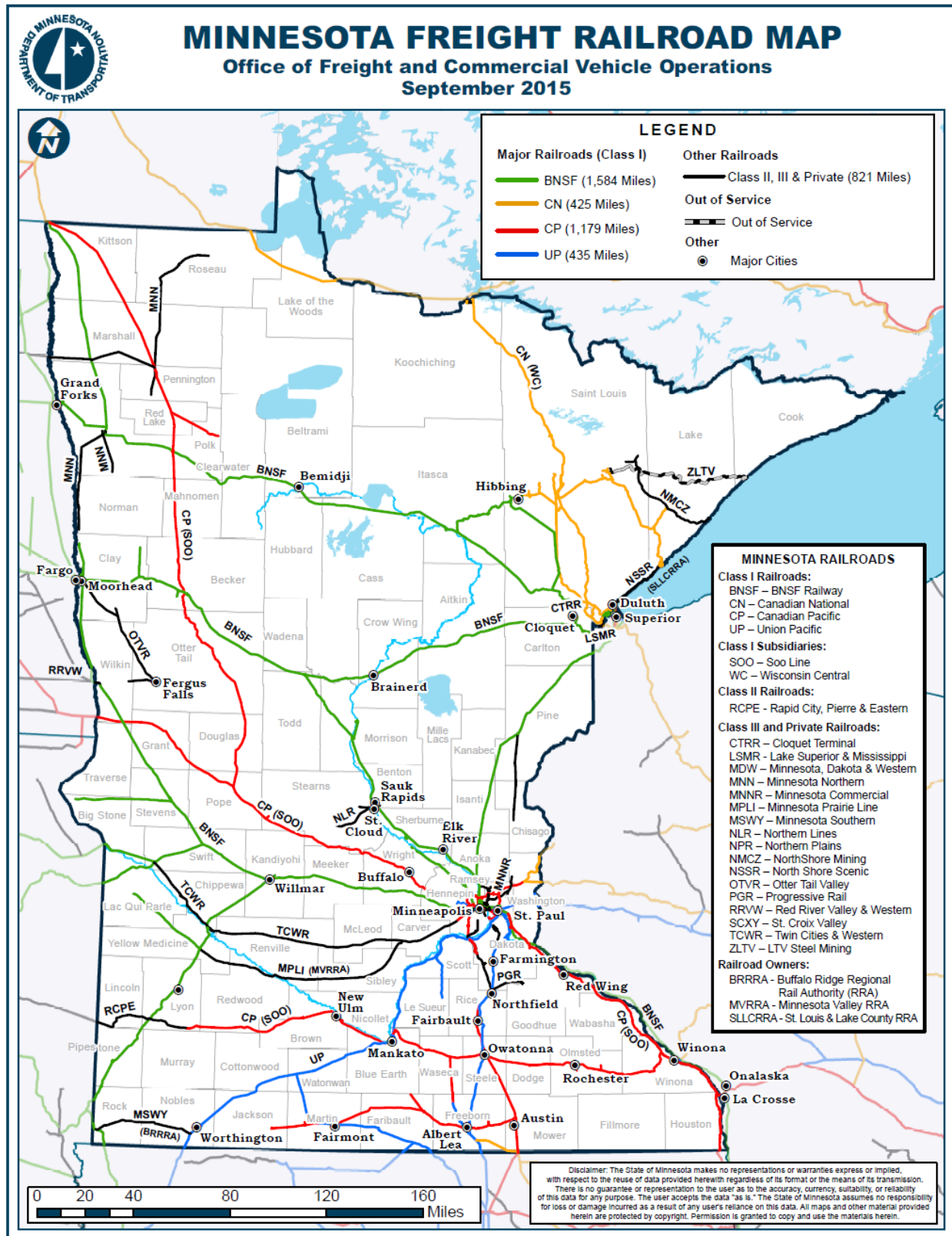
There is one municipal airport in Pipestone County, the Pipestone Municipal Airport. The Pipestone Municipal Airport features a 4,206' primary asphalt runway. The airport also has a 2,522' turf runway. The airport averages 22 aircraft operations per day.<sup>88</sup> The Pipestone Municipal Airport is located at the southeast edge of the City of Pipestone along US Highway 75.

The city of Pipestone has adopted Airport Zoning regulations to protect adjacent land use from conflicts with airport traffic. MnDOT also reviews applications within a certain distance of an airport to reduce the chance of future use conflicts.

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<sup>88</sup> AirNav. Accessed 8/15/2017. Available: <http://www.airnav.com/airport/KPQN>

Figure #107  
Railroads – Minnesota



### *Extent of the Hazard*

Rails, landing strips, and other transportation infrastructure are monitored, inspected, and maintained to ensure people and goods are transported safely. There are a number of variables that impact safety that vary from current weather condition and design to age and upkeep. Driving and planning for the conditions are important to ensure safety.

One issue that affects road conditions is winter weather. Ice and snow can build up on the road and can cause hazardous driving conditions. Due to the prevailing wind patterns in the area, east-west roads are more susceptible to ice and snow affecting the road surface. Road crews are responsible for maintaining the roadway, clearing snow, and salting for ice. It is also the responsibility of the driver to take the road conditions into consideration and drive appropriately. Winter weather is just one variable that impacts road conditions. There are a number of other variables that impact road conditions.

Traffic crashes are the primary hazard to people and property related to transportation infrastructure. The Minnesota Department of Transportation (MnDOT) and Minnesota Department of Public Safety (DPS) developed the Strategic Highway Safety Plan covering years 2014-2019. The plan was intended to examine the underlying causes of traffic deaths and serious injuries, determine strategies to mitigate those causes, and implement the most promising strategies in the “Toward Zero Deaths” program. The Toward Zero Death program continues today.

The Minnesota Strategic Highway Safety Plan (SHSP) study for the entire state of Minnesota found the most frequent crash types and contributing factors included:<sup>89</sup>

- Lane Departure
- Intersection
- Unbelted Occupants
- Impaired Roadway Users
- Younger Drivers
- Inattentive Drivers
- Speed
- Motorcyclists

These variables along with transportation infrastructure conditions and design can impact the severity of crash or incident. The condition can be a variable that is assumed to be safe, as in the 35W bridge collapse. Bridges are classified as “structurally deficient” if they have a general (poor) condition rating for the deck, superstructure, substructure, or culvert or if the road approaches regularly overtop due to flooding. The fact that a bridge is structurally deficient does not imply that it is unsafe. If a bridge has been identified as unsafe during a physical inspection, the structure will be closed.

There are approximately 298 bridges on county, municipal, and township roadways within Pipestone County.<sup>90</sup> MnDOT lists 176 bridges in Pipestone County on their inventory of bridges over 20 feet. These bridges are inspected and a grade of the bridge is given. This helps to ensure the safety of crossing using

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<sup>89</sup> MnDOT. Accessed: 5/29/17. Available: <http://www.dot.state.mn.us/trafficeng/safety/shsp/>

<sup>90</sup> MnDOT. Minnesota Bridges, December 2017. Accessed: 11/6/18. Available: <http://www.dot.state.mn.us/bridge/pdf/minnesota-bridges-2017-report.pdf>

a bridge. There are 41 bridges in Pipestone County that have been identified as structurally deficient, as of 2017.<sup>91</sup> In Minnesota, 9.1 percent of bridges are structurally deficient in 2012.<sup>92</sup>

Railroad crossing pose a serious risk for motor vehicles passing over the tracks. Railroad crossings are marked and a number have crossing arms, but according to MnDOT, the chance of death or serious injury from a vehicle and train crash is 11 times greater than other traffic collisions.<sup>93</sup> Since there is an increased risk of crossing, additional measures should be taken to ensure the safety of the crossing.

#### *Relationship to Other Hazards—Cascading Effects*

- **Hazardous Materials.** Dangerous roadways can lead to an accident and hazardous materials being spilt. This spill can result in ground water contamination, dangerous chemicals going into the air, and dangerous fire scenarios. If a fuel tanker is involved in the crash, the fire would be extremely hot and the fire would burn until the right equipment can be brought in to control the fire.
- **Emergency Response.** Dangerous roadways can make emergency response difficult.

#### *Previous Aviation Accidents*

Since 2010, there have been 3 recorded aviation incidents in Pipestone County.<sup>94</sup> The figure below details them.

**Figure #108**  
**Aviation Incidents – Pipestone County**

| Date      | Location    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Severity  |
|-----------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|
| 8/19/2016 | Ruthton, MN | Single passenger agricultural spray plane crash. After the plane struck a guy-line structured radio tower, the plane incurred severe damage and crashed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Fatal (1) |
| 7/27/2015 | Holland, MN | The private pilot departed with two passengers for a personal, local flight in a Wheeler Express amateur-built airplane. Air traffic control data indicate that, after departing the airport, the airplane climbed and performed several maneuvers. A review of onboard flight data revealed that the airplane then maneuvered into a nose-high attitude while in a steep, right turn. As the airspeed decelerated below stall speed and the turn steepened, the airplane pitched nose down and entered a prolonged, right-turning spin until ground impact. Examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. | Fatal (3) |

<sup>91</sup> MnDOT. Minnesota Bridges, December 2017. Accessed: 11/6/18. Available: <http://www.dot.state.mn.us/bridge/pdf/minnesota-bridges-2017-report.pdf>

<sup>92</sup> Governing. Local Bridges in Bad Shape. Accessed: 2/18/16. Available: <http://www.governing.com/topics/transportation-infrastructure/gov-local-state-government-owned-bridge-condition-disparity.html>

<sup>93</sup> MNDOT. Accessed: 2/18/16. Available: <http://www.dot.state.mn.us/ofrw/railroad/safety.html>

<sup>94</sup> National Transportation Safety Board. Accessed: 8/15/2017. Available: [https://www.nts.gov/\\_layouts/nts.gov/Results.aspx?queryId=be5f147f-735a-41e7-a6d8-97e31800d845](https://www.nts.gov/_layouts/nts.gov/Results.aspx?queryId=be5f147f-735a-41e7-a6d8-97e31800d845)



|                 |              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |          |
|-----------------|--------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|                 |              | <p>Previous flight testing of a Wheeler Express kit airplane similar to the accident airplane revealed that it had poor yaw stability at low airspeed due to the aerodynamic design of the tail section. The testing also revealed that, during poststall and high-yaw maneuvering, the horizontal tail and elevators appeared to have an inadequate effect. Following bankruptcy of the original kit manufacturer, a variant of the Wheeler Express kit airplane was developed using the same wing and fuselage as the accident model but with a larger tail that had 40 percent more wetted area to provide additional yaw stability at low airspeed.</p> <p>The National Transportation Safety Board determines the probable cause(s) of this accident as follows:<br/>The pilot's failure to maintain adequate airspeed during a high-pitch, steep right turn, which resulted in the exceedance of the airplane's critical angle-of-attack and a subsequent aerodynamic stall, loss of control, and impact with terrain. Contributing to the accident was the airplane's design, which resulted in poor yaw stability at low airspeed.</p> |          |
| <b>9/4/2013</b> | Edgerton, MN | <p>The pilot reported he was not going to be able to stop the airplane before the end of the runway while landing on his private runway. He added engine power to abort the landing; however, the nose gear contacted the soybean crop located off the end of the runway and the airplane nosed over resulting in substantial damage to the fuselage. The landing was being made to the north on the 1,050 foot long grass airstrip. The wind condition recorded at an airport 11 miles from the accident site was from 220 degrees at 4 knots. The pilot reported the local wind was calm and that there was no mechanical malfunction/failure of the airplane.</p> <p>The National Transportation Safety Board determines the probable cause(s) of this accident as follows:<br/>The pilot's delay in aborting the landing which resulted in the airplane contacting the terrain off the departure end of the runway.</p>                                                                                                                                                                                                                    | Nonfatal |

#### *Previous Bridge Incidents*

There have been no recent bridge related incidents in Pipestone County.

#### *Previous Railroad Incidents*

Between January 2000 and May 2017 there have been 4 rail incidents in Pipestone County. There were zero injuries and fatalities in these incidents, but they created \$172,143 in reportable damage.<sup>95</sup>

<sup>95</sup> Federal Railroad Administration Office of Safety Analysis. Accessed: 8/15/2017. Available: <http://safetydata.fra.dot.gov/OfficeofSafety/publicsite/Query/inctmap.aspx>

Other transport trails also pose a serious risk, if a derailment occurs.

### *Vulnerability*

Transportation infrastructure is a basic component of government. Funding for transportation infrastructure should be maintained in every budget cycle, but funding previously allocated for transportation infrastructure has been used for other programs, like subsidizing ethanol and other programs in the general fund. This has resulted in less funding to maintain our transportation infrastructure. This decrease in funding makes maintaining and improving our transportation infrastructure more difficult.

### *Plans and Programs*

- Emergency Operations Plan – The Pipestone County Emergency Operations Plan explains the procedures of evacuation during an emergency evacuation.
- Road authorities – The Pipestone County Highway Department works closely with MnDOT to improve local transportation infrastructure. MnDOT encourages discussions to identify and improve locations where higher risk areas of conflict may exist and is interested in suggestions to improve safety. Public Roadways and other transportation infrastructure are inspected, monitored, and maintained to ensure safety.
- Safe Routes to School (SRTS) – Transportation projects around schools may be eligible for SRTS funding. These projects can be related to education, encouragement, enforcement, evaluation, and engineering. During the 2016-2017 academic year, the Pipestone Area School District completed the SRTS planning process. Southwest Regional Development Commission staff and MnDOT can discuss potential SRTS projects on request.
- Towards Zero Deaths (TZD) – Strategies for promoting safe driving are important facets to MnDOT's TZD program. Many counties are forming local TZD coalitions involving schools, law enforcement, and other agencies. Representatives from Pipestone County are encouraged to form a TZD coalition with MnDOT.
- Safe and Sober – A Minnesota campaign under the umbrella of the Minnesota Department of Public Safety and the Office of Traffic Safety. The program is dedicated to reducing traffic related deaths and injuries.
- Traffic safety resources – Several publications, such as the National Cooperative Highway Research Program (NCHRP), are available to MnDOT to suggest options for improved safety for all users. Other technical guides exist to improve pedestrian safety and include: MnDOT Road Design Manual, ADA Tool Kit, MnDOT Bikeways Facility Design Manual, Minnesota Manual on Uniform Traffic Control Devices, and multiple Safe Routes to School Resources.
- Snow management – According to MnDOT, "Drift-free roads are achievable through two mitigation strategies, proper road design and/or the use of snow fences. A suitably designed roadway will promote snow deposition in ditches rather than on the roadway and blowing snow that does reach the road will move across without drifting. Snow fences can also help maintain clear roadways by capturing blowing snow upwind of a problem area and storing that snow over the winter season."

- Living snow fences – Pipestone County in partnership with the Extension Service and the Board of Soil and Water Conservation continues to explore the use of and reimbursement of natural snow fences to protect highways against drifting snow
- National Bridge Inventory System – Bridges or culverts that carry vehicular traffic and are longer than 20 feet are part of the National Bridge Inventory System. In Minnesota, bridges 10 feet or longer are inspected and inventoried. The general condition rating ranges from 0 (failed condition) to 9 (excellent) based on the physical condition of the deck (riding surface), the superstructure (load carrying members such as beams or trusses that support the driving surface), and substructures (abutments and piers).
- Pipestone County Transportation Safety Plan – the Pipestone County Highway Department develops a transportation safety plan to identify higher risk intersections and other transportation related safety concerns. Higher risk intersections are identified by the number of crashes and local knowledge by the Pipestone County Highway Department and local law enforcement.
- Comprehensive Plan – the City of Pipestone has a Comprehensive Plan, which contains a chapter on transportation. Transportation goals are outlined in the plan to mitigate transportation related issues.
- There are a number of regional assets that are shared throughout southwest Minnesota in Emergency Management Region Five. Primary among these shared assets is the Minnesota Emergency Response and Industrial Training (MERIT) Center located in Marshall. The MERIT Center provides training opportunities for local and regional emergency responders for a wide variety of situations, including hazardous materials spills, tanker spills and renewable energy related disasters.

#### *Gaps and Deficiencies*

- Transportation Funding – As funding has declined the condition of the transportation infrastructure has also declined
- High commuting numbers – Many people in Pipestone County commute to work, which increases exposure to transportation hazards.
- Road width limitations – A narrow road can cause difficulties when trying to improve safety. If a road is too narrow there is not room to add rumble strips and a safe place to pull over in case of an emergency. Rumble strips alert drivers that they are leaving the travel lane.
- Train derailment – Train derailments have occurred in Pipestone County. As the number of trains increase the likelihood of a derailment causing injury, death, and property damage goes up.
- Hazard materials transport – Hazard materials are being shipped on BNSF trains routinely through Pipestone County. This includes hazard materials as well as Bakken Shale Oil and ethanol.

### 5.5.6 Utility Failure

Utility failure consists of power outages, water treatment system failure, and waste water treatment system failure. Citizens have come to expect these services on a 24/7 basis. When these services fail there can be a social, economic, and public health impact. The planning team also noted this can include the failure of communications equipment – specifically emergency services communications.

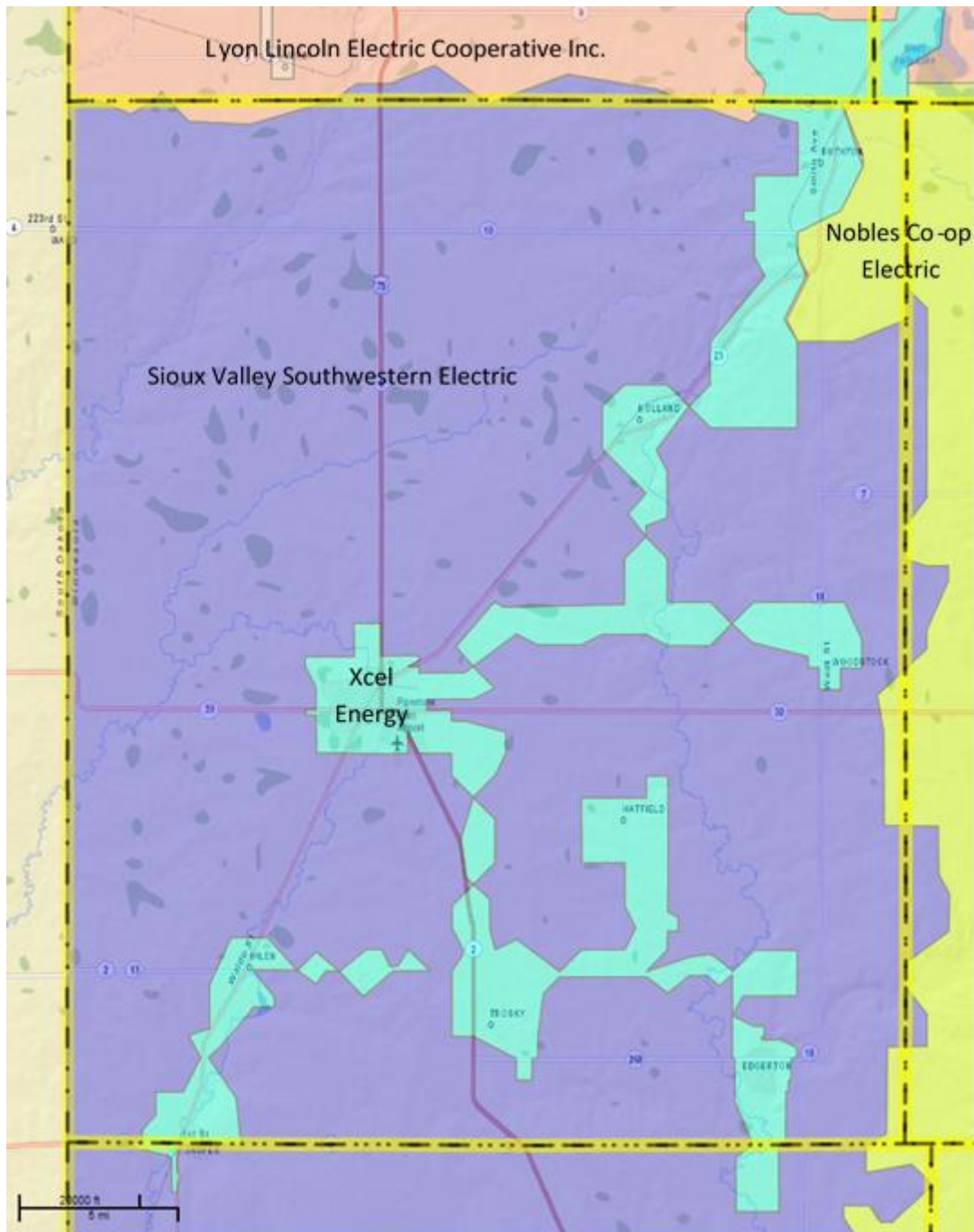
#### *Locations Affected by the Hazard*

The majority of Pipestone County residents are connected to and rely on one or more of these systems: power grid, water treatment system, and waste water treatment system. A small percentage of residents have personal backup generator, personal wells, and septic tanks. In the event of a major utility failure, the majority of Pipestone County residents will be affected by the event.

There are four electric utilities serving Pipestone County. The main electric utilities include: Sioux Valley Southwestern Electric, Xcel Energy, Nobles Cooperative Electric, and Lyon Lincoln Electric Cooperative Inc. Refer to RA Figure #24 for electric utility service area map.

Xcel Energy (formerly Northern States Power Co.) provides electrical service to all incorporated cities in Pipestone County – Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, and Woodstock – and their surrounding rural areas. Sioux Valley Southwestern Electric provides electrical service to the majority of the rural townships. A small portion of Nobles Cooperative Electric serves the eastern edge of Pipestone County and a small part of the Lyon Lincoln Electric Cooperative crosses into the northern part of Pipestone County just along the border with Lincoln County.

**Figure #109**  
**Electric Utilities – Pipestone County<sup>96</sup>**



#### *Extent of the Hazard*

Utility failure can cause hardship and economic loss. The loss of power can have a cascading effect. A loss of power can result in water supply pumps not being able to replenish the water supply for a city or rural water system and water treatment facilities not being able to process waste water. Power

<sup>96</sup> <http://www.mngeo.state.mn.us/eusa/index.html>

interruption can also result in food spoiling, adequate drinking water supplies being diminished, and extreme cold and warm temperatures causing hardship and can be potentially life threatening for both people and livestock. The majority of all feedlots operating within the county rely on electricity for their livestock's water. In terms of animal production, a loss of power could result in large livestock losses. Routine daily activities can also become difficult and overwhelming at times.

#### *Relationship to Other Hazards—Cascading Effects*

- **Civil Disturbance.** Food and water are basic necessities and if power is out for multiple days, supplies could be diminished to critical levels. When the supply of a necessity becomes drastic low distress can take over and cause civil unrest. Scarce resources could cause the public to loot and cause civil disorder.
- **Public Health Emergency.** The failure of septic treatment facilities and systems can have immediate adverse impacts on human health due to communicable diseases and epidemics. A water treatment failure could also result in contamination of the water supply.
- **Fire.** Utility failures caused by downed power lines can cause wildfires and structure fires. Fighting a fire would be more challenging since electric pumps are not able to replenish the water supply and refueling may have to take place a number of miles from the fire. These variables will affect the response time, and will make it more difficult to stay ahead of the fire.

#### *Previous Occurrences of the Hazard*

Pipestone County has seldom experienced a countywide power loss. Typically, when the power is down it is confined to certain localities and crews can respond immediately and have power restored within hours. However, a severe daylong blizzard can keep crews from getting to the problem. The initial storm and piled up snow left behind can cause the power outage to last for multiple days. Ice storm can also cause power outages that last for multiple days.

**Figure #110**  
**Downed Powerlines**



Associated Press

### *Vulnerability*

Natural hazards will continue to cause power outages. Hardening of the utility grid will help to prevent large outages, but the costs of redundancy and hardening of the utility grid will limit the extent of the project.

There are miles of power lines in Pipestone County that are above ground on poles. This makes them vulnerable to winter storms, ice buildup, tornadoes and straight line winds, and other natural disasters. The risk level assigned to utility failure by the planning team is average.

### *Plans and Programs*

- Tree maintenance – Electric utility providers identify and clean up areas of Pipestone County that are most likely to experience damage to power lines from falling tree limbs. Pipestone County works with each of its communities to ensure that these activities are conducted regularly.
- Limiting electrical power – In times of extreme heat, the electricity providers may enact rolling power blackouts. Rolling blackouts decrease the demand for electricity and conserves energy during peak demand. A rolling blackout is having certain portions of the community scheduled to lose power. This is done to keep the system from overloading. Residents are alerted through the media when their portion of town will be without power.
- Utility grid upgrades – The utility grid is constantly being upgraded with new poles and technology to make the system more reliable.
- Water storage – There are planning recommendations to help mitigate the impact of utility failure. To help ensure adequate water storage capacity, cities consider two basic recommendations when analyzing water storage needs. First, Minimum storage should be at least 40 gallons/capita. Second, municipal water supply should have a minimum water storage capacity equal to the average daily water usage. During a power outage the water stored in water holding facilities can act as a reserve water supply until power can be regained.
- Emergency primary care facility – The Pipestone Area School is designated as an emergency primary care facility.
- Underground gas lines – Most gas mains within the county have been placed underground. This makes the lines less susceptible to damage to the system.
- Water availability – The City of Pipestone is in process of completing a new water treatment facility and increasing its water supply. It is anticipated that this project will meet the needs of the City for the foreseeable future including planning for any growth.
- Lincoln Pipestone Rural Water supplies rural water to Pipestone County. This expansion will provide a more reliable water supply in this area.
- Mutual Aid Agreement – Sioux Valley Energy Rural Electric Association has mutual aid agreements with neighboring electric utilities to provide support in case of a large scale outage.
- MnWARN – “MnWARN is a formal emergency response program in Minnesota. MnWARN is a mutual aid agreement to provide a program whereby water, wastewater, and storm water utilities sustaining physical damage from natural or man-made disasters in the state of Minnesota can obtain emergency assistance, in the form of personnel, equipment, and materials and other associated services necessary



to protect the health and welfare of the utilities' customers.” The following cities are members of MnWARN: Edgerton, Jasper, Pipestone, Ruthton, and Woodstock.

- Utility grid hardening – Local electrical cooperatives are hardening the electrical grid through various building techniques. Rural electrics suffer from storm damage and interruptions mainly from ice, wind, and severe weather on its overhead lines, so additional mitigation funding could advance utility hardening projects at a faster rate.

#### *Gaps and Deficiencies*

- Above ground power lines – Many power lines in the county are above ground and subject to damage from ice storms, wind, and falling tree limbs.
- Backup generators – Not all communities have backup electrical generators to guarantee the operation of essential services in the event of a county wide utility failure. Water supplies could be diminished quickly, medical supplies that need to be cold may spoil, large amounts of food may spoil, and waste water could become an issue.
- Essential operating systems – Facilities that have backup generators learned, in the spring ice storm of 2012, that all essential operating systems were not hooked up to the generator. There are also key facilities that do not have backup generators.
- Public education – Public awareness should be increased for alerting the public of potential damage to gas mains and lines as these could be disrupted at many locations within the county.
- Natural gas lines and township road maintenance – there is a risk associated with snagging natural gas lines along township roads when work is being done. County roads require getting a permit. A permit should also be required along township roads.
- Hardening of the electrical grid – It is important to increase redundancy between the different electrical utilities in Pipestone County. There is redundancy within individual systems, but there should also be redundancy between systems and suppliers. This would increase the reliability of the grid within Pipestone County.
- Funding for hardening of the electrical grid – Local cooperatives will be able to harden the grid at a faster rate if rural electric funding could be supplemented with mitigation funding from FEMA and other sources.

### 5.5.7 Water Supply Contamination

Water supply contamination is the introduction of point and non-point source pollutants into public ground water and/or surface water supplies.<sup>97</sup> Water supply contamination can be the result of mismanaged landfills and dumps, negative externalities of industrial activity, and agricultural run-off. The availability of water is always a concern, with water sources being consumed at high rates across the United States. Coupled with the risk for drought, water supply availability continues to be a concern for the planning team.

Surficial aquifers yield “young water”, with 10-12 year recharge cycles from precipitation. This makes them more susceptible to drought and contamination from both point and non-point sources. The highest quality water comes from these shallow aquifers. The deeper the aquifers the more iron and manganese there is in the water. The more shallow aquifers are preferred since they have better quality water, but are more susceptible to contamination.

Microbiological and chemical contaminants can enter the ground water through leaking underground storage tanks, feedlots, and waste disposal sites. Human wastes and pesticides can also be carried to lakes and streams during heavy rains or snow melt. Areas in Pipestone County have different risk factors in regards to certain contaminants, but there is equal risk throughout the county for water contamination.

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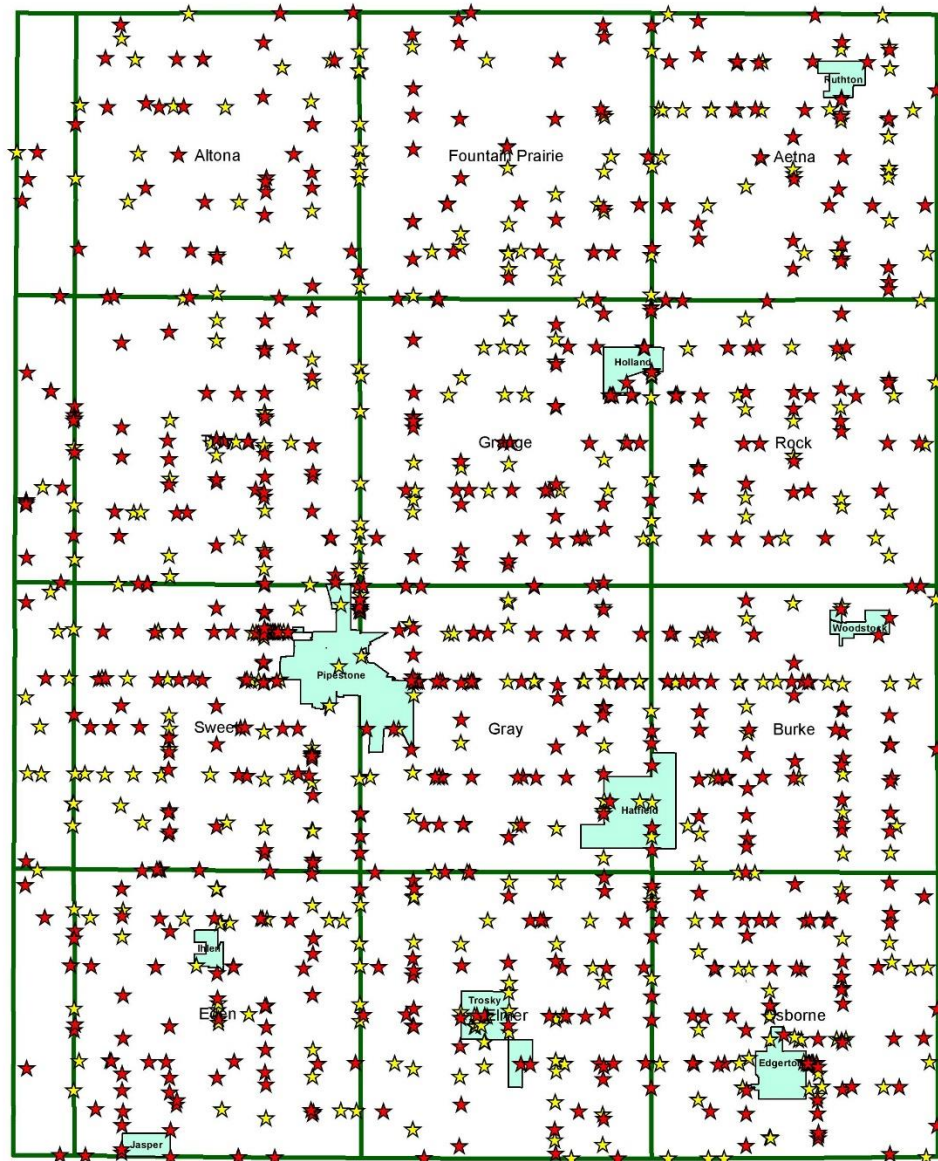
<sup>97</sup> EPA. Accessed 6/3/13. Available: <http://www.epa.gov/agriculture/tsur.html>

**Figure #111**  
**Public Water Supplies – Lyon County**

| Public Water Supply Name | ID      |
|--------------------------|---------|
| Edgerton                 | 1590001 |
| Hatfield                 | 1590011 |
| Heartland Colony         | 1590012 |
| Holland                  | 1590010 |
| Ihlen                    | 1590003 |
| Jasper                   | 1590004 |
| Pipestone                | 1590005 |
| Ruthton                  | 1590007 |
| Trosky                   | 1590008 |
| Woodstock                | 1590009 |

Figure #112  
Septic Systems – Pipestone County

## Pipestone County Septics



★ Unpermitted septsics ★ Permitted septsics □ Cities □ Townships



0 1.5 3 6 9 Miles



Created: 8-28-17, Kyle Krier, Pipestone County

### *Extent of the Hazard*

A major contamination could cause massive disruption to Pipestone County's economy and health and that of surrounding communities. Removing contaminants from a water supply or relocating a well is an expensive process. Treating water for both human and animal consumption may result in people and farming operations relocating to new locations. This would leave areas of Pipestone County unused until contaminants are removed from the water supply.

### *Relationship to Other Hazards—Cascading Effects*

- Public Health Emergency. Shallower well systems can be more susceptible to water supply contamination. Polluted water sources can cause illness and epidemics in both humans and animals.
- Civil Disturbance. A water supply shortage could also lead to public unrest and civil disturbances. When the supply of a necessity becomes drastically low distress can take over and cause civil unrest. Scarce resources could cause the public to loot and cause civil disorder.

### *Previous Occurrences of the Hazard*

Pipestone County has not had a major groundwater contamination problem.

### *Vulnerability*

Water recharge in shallow wells can occur in a matter of hours, so wells that are drilled into the shallow aquifer are more vulnerable to pollutants infiltrating the water supply. A number of regulations and monitoring procedures are in place to help maintain a quality water supply. Refer to the Plans and Programs section under Vulnerability for more measures to keep ground water supplies safe.

### *Plans and Programs*

- Pipestone Comprehensive Plan addresses management of water, effective environmental protection, and efficient resource management. The water management plan is intended to identify existing and potential water issues in the context of watershed units and groundwater systems. The Plan identifies and maps the major and minor aquifers serving the county. The Plan outlines Pipestone County's enforcement of the state code for septic systems and floodplain ordinances. The county also does testing of some private wells through the guidelines set in the county's water plan.
- Wellhead Protection Program – Several municipalities in Pipestone County have set up a wellhead protection programs, as promoted by the Minnesota Department of Health. All incorporated communities in Pipestone County will eventually be developing wellhead protection plans. Since 1974, all water wells constructed in Minnesota must meet the location and construction requirements of the Minnesota Well Code. These requirements pertain to private wells, also. Refer to Appendix A for a handout regarding wellhead protection.
- Abandoned Well Sealing Program – Pipestone County has a cost share program for sealing abandoned wells. This program is part of the Local Water Management Plan.
- Feedlot pollution prevention – Pipestone County actively works to protect water sources from feedlot runoff. County ordinances require that all feedlots within the county participate in the state's feedlot program. Also, county and county extension services promote best management practices to minimize runoff from feedlots into rivers. County zoning ordinances also limit feedlot locations.

- Subsurface Sewage Treatment Systems (SSTS) – SSTS are commonly known as septic systems and are regulated by Minnesota Statutes 115.55 and 115.56. Minnesota Pollution Control Agency (MPCA) enforces the statutes and Pipestone County continually works with MPCA towards updating failing septic systems.
- Septic System Code – Pipestone County enforces the state code for septic systems and floodplain ordinances.
- Household Hazardous Waste Program (HHW) – The Pipestone County’s HHW program, helps residents with the disposal of toxic household products and provides an exchange program for usable leftover products.
- Wastewater water monitoring – The MPCA requires routine inspection of all public wastewater systems. State staff, in the Water-Quality Point-Source Program, issue permits and monitors compliance through data review and inspections, and enforces permit conditions. Employees at municipal wastewater facilities are certified operators under state requirements. These operators are required to take state training to maintain their certified operator status.
- Public water system monitoring – The MDH requires routine inspection of all public water systems. State staff issues permits and monitors compliance through data review and inspections, and enforces permit conditions. Employees at the municipal water facilities are certified operators under state requirements. These operators are required to take state training to maintain their certified operator status.
- Drinking water standards – The U.S. Environmental Protection Agency (EPA), as required by the Safe Drinking Water Act of 1974, sets uniform nationwide minimum standards for drinking water. State public health and environmental agencies have the primary responsibility for ensuring that each public water supplier meets the federal drinking water standards or more stringent ones established by the state. The EPA requires an ongoing water quality monitoring program to ensure public water systems are working properly. Local officials work together with the MDH and EPA to ensure that all public water supplies are safe. Also, the EPA requires all local suppliers to promptly inform the public should the supply become contaminated.
- Shoreline zoning – Pipestone County has adopted the state’s statutory shoreline riparian zoning classifications and minimum standards via ordinance.
- Floodplain Management Program – The Floodplain Management Program outlines how Pipestone County tests general water quality following a heavy rain or flood event. The water quality test is looking for high levels of nitrates or phosphorus. The MDH assists Pipestone County with the program.
- Clean Water, Land and Legacy Amendment – The Clean Water, Land and Legacy Amendment of 2008 increased the sales and use tax rate by three-eighths of one percent on taxable sales, starting July 1, 2009, continuing through 2034. Approximately 33 percent of this revenue is dedicated to the Clean Water Fund to protect, enhance, and restore water quality in lakes, rivers, streams, and groundwater.
- I & I – Cities in Pipestone County work to reduce Infiltration and Inflow in their sanitary sewer systems.
- Sediment ponds – The Pipestone County Highway Department works with the DNR and other organizations to increase the number of sedimentation ponds along roadways in Pipestone County. Sedimentation ponds hold back water, which allows for a more natural filtration process to occur and helps to increase water quality and aquifer recharge rates.

- County zoning – Several steps are being taken to protect ground water sources from feedlot runoff. County ordinances require that all feedlots within Pipestone County participate in the State’s feedlot programs. Also, county extension services promote best management practices to minimize runoff from feedlots into streams and rivers. County zoning ordinances also limit feedlot locations.
- Inflow & Infiltration – All cities in Pipestone County work to reduce inflow and infiltration in their sanitary sewer systems.
- Sedimentation pond –Sedimentation ponds are being integrated into highway projects to help slow the flow of water and allow for a more natural water filtration process.
- 

### *Gaps and Deficiencies*

- Backup drinking water sources – The Pipestone County Emergency Operations Plan should identify alternate sources of drinking water, including locations for acquiring adequate amounts of bottled water, in the event of well contamination.
- Public outreach for wellhead protection – Efforts to educate private well owners on the importance of wellhead protection plans are not well planned and coordinated with state and federal efforts.
- Septic system inspection – Pipestone County does not have an ordinance requiring periodic inspections of individual septic systems. The initial installation has to meet MPCA requirements, and it has to be installed by a licensed contractor.
- Security around public water sources – Wells, water towers, groundwater storage tanks and water treatment plants should have additional security. This may include fencing around sites, alarm systems for break-ins and the addition of surveillance cameras. Rural water supplies may be more vulnerable, since security is less.
- Backup electrical generators – Not all communities have backup electrical generators to guarantee the operation of their water supply and/or wastewater treatment facilities.
- Annual recharge rates – Pipestone County does not have estimated annual recharge rates, but there is a robust mounting of heavy water users and wells.
- Sump pump public education – The general public may be unaware that sump pumps cannot drain into the city wastewater system.
- Wellhead protection plans -All cities do not have Wellhead Protection Plans. The Cities of Pipestone and Edgerton have wellhead protection plans. The Cities of Holland, Hatfield, Jasper, Ruthton, Trosky, Woodstock do not have wellhead protection plans, but are planning to have one developed by the Minnesota Department of Health within the next five years. All of the other cities in Pipestone County are served by rural water. Some of those cities do have backup wells, but MDH does not go through the Wellhead Protection Planning Process for backup wells. Pipestone County currently does not have a wellhead protection program. Existing rural wells can provide a pathway for potential pollutants to reach the county’s aquifers.
- Wellhead protection plan funding – The Minnesota Department of Health lacks resources to work with every community to complete wellhead protection plans quickly.
- Nitrates – Aquifers in the region are often shallow and have a high potential of contamination from nitrate leaching. Deeper aquifers may not be suitable for water supplies due to naturally occurring



contaminants, such as sulfur, or because of slow well recharge. Nitrates have found to be a specific problem in the region.

- Aging infrastructure – The water supply infrastructure in the majority of cities in southwest Minnesota is past its useful life. The water supply infrastructure is old, in need of repair, and is extremely costly to replace. Repairs and replacement is occurring, but this process could be accelerated with state and federal funding. Accelerated funding would help to decrease costs, so cities could make larger updates. There are economies of scale in larger projects and having work done in multiple adjacent cities.

## 5.6 Hazard Identification Worksheet

### 5.6.1 Methodology

The Hazard Identification Worksheet is a tool to help profile the identified hazards. In Section II above the results of Planning Team's Hazard Identification Worksheet were included in the profile of the identified natural and other hazards. The profile and the hazard identification worksheet helped the planning team assign priority to hazard mitigation strategies.

The Hazard Identification Worksheet was developed by the former Minnesota Planning Agency and expanding by the Southwest Regional Development Commission.

The sorting criteria for categories in the Hazard Identification Worksheet are as follows:

**Figure #113**  
**CPRI Sorting Criteria**

|                            |                                                                                                                                                                                                     |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Probability:</b>        | Unlikely if <1% chance in the next 100 years, Occasional = 1% and 10% chance in next year, Likely = between 10% and 100% chance in next year, Highly Likely = greater than 10% chance in next year. |
| <b>Magnitude/Severity:</b> | Limited =<10% area affected destroyed, Minor = 10% to 25% area affected, Major = 25% to 50% area affected, Substantial = >50% area affected.                                                        |
| <b>Warning Time:</b>       | Minimal, 6 – 12 hours, 12– 24 hours, 24+ hours                                                                                                                                                      |
| <b>Duration:</b>           | Prolonged, Extended, Intermediate, or Brief                                                                                                                                                         |
| <b>Risk Level:</b>         | Combined ranking based on previous categories                                                                                                                                                       |
| <b>Hazard Rank:</b>        | Subjective ranking by Planning Team based on previous categories                                                                                                                                    |

**Figure #114**  
**CPRI Worksheet – Planning Team Rankings**

| Hazard       | Probability | Magnitude/Severity | Warning Time | Duration | Risk Index | Risk Severity |
|--------------|-------------|--------------------|--------------|----------|------------|---------------|
| Tornado      | 2.29        | 2.82               | 3.82         | 2.65     | 2.72       | Medium        |
| Winter Storm | 3.24        | 1.71               | 1.53         | 2.35     | 2.43       | Medium        |
| Windstorm    | 2.53        | 1.94               | 2.79         | 2.18     | 2.36       | Medium        |
| Lightning    | 2.59        | 1.29               | 3.24         | 1.94     | 2.23       | Medium        |
| Flash Flood  | 2.29        | 1.94               | 2.71         | 2.06     | 2.23       | Medium        |
| Hail         | 2.59        | 1.41               | 3.12         | 1.47     | 2.20       | Medium        |
| Dam Failure  | 1.55        | 2.27               | 2.82         | 2.73     | 2.07       | Medium        |
| Extreme Cold | 2.47        | 1.53               | 1.29         | 3.06     | 2.07       | Medium        |
| Extreme Heat | 2.24        | 1.47               | 1.24         | 3.29     | 1.96       | Low           |
| Wildfire     | 1.41        | 1.82               | 3.35         | 2.59     | 1.94       | Low           |
| Drought      | 1.94        | 1.71               | 1.18         | 3.76     | 1.94       | Low           |

|                    |      |      |      |      |      |     |
|--------------------|------|------|------|------|------|-----|
| Flood (Riverine)   | 1.88 | 1.59 | 1.71 | 1.76 | 1.76 | Low |
| Earthquake         | 1.00 | 1.81 | 3.00 | 2.50 | 1.69 | Low |
| Erosion            | 1.67 | 1.00 | 1.93 | 1.40 | 1.48 | Low |
| Landslide/Mudslide | 1.10 | 1.00 | 2.30 | 1.80 | 1.32 | Low |
| Subsidence         | 1.00 | 1.00 | 2.00 | 0.80 | 1.13 | Low |

## 5.6.2 Repetitive Flood Claim Properties and Severe Repetitive Loss Properties

Repetitive loss properties are defined by FEMA as having two or more losses of at least \$1,000 each paid under the National Flood Insurance Program (NFIP) within any 10-year period since 1978. A Severe Repetitive Loss (SRL) property is defined by FEMA as a residential property covered under NFIP that has at least four NFIP claim payments over \$5,000 each and the cumulative amount of such claims exceeds \$20,000. An SRL property may also be one for which at least two separate NFIP payments have been made with the cumulative amount of the building portion of these claims exceeding the market value of the building.

### *Repetitive Loss Properties*

FEMA has a nonpublic database of all of the repetitive loss structures within the State. These structures are those which have sustained damages on two separate occasions within a ten-year time span for which the cost of repairs at the time of the flood meets or exceeds 25 percent of the market value of the structure before the damage occurred.

Based on this database, Pipestone County does not have any repetitive loss structures identified. From January 1, 1978, through December 31, 2015, 13 total losses were reported in Pipestone County; 1 was reported in rural Pipestone County and 12 were reported in the City of Pipestone.<sup>98</sup>

**Figure #115**  
**Loss Statistics Flooding – Pipestone County**  
**January 1, 1978 – December 31, 2015**

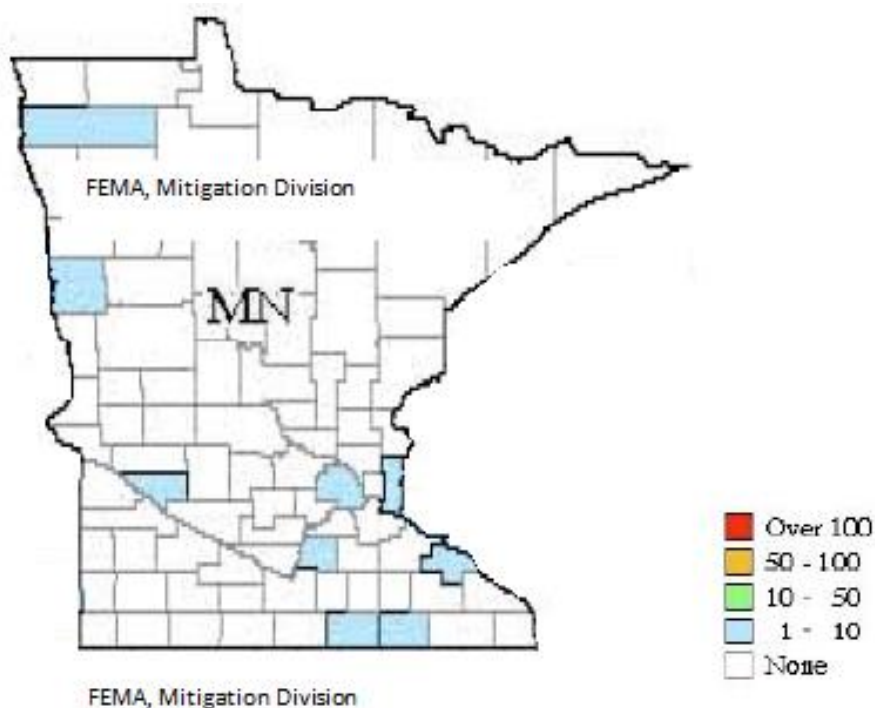
| Community Name     | Total Losses | Closed Losses | Open Losses | CWOP Losses | Total Payments      |
|--------------------|--------------|---------------|-------------|-------------|---------------------|
| Pipestone County   | 1            | 1             | 0           | 0           | \$9,720.27          |
| Pipestone, City of | 12           | 10            | 0           | 2           | \$211,594.36        |
| <b>Totals</b>      | <b>13</b>    | <b>11</b>     | <b>0</b>    | <b>2</b>    | <b>\$221,314.63</b> |

FEMA: Loss Statistics

<sup>98</sup> FEMA. Loss Statistics. Accessed: 01/17/2018. Available: <http://bsa.nfipstat.fema.gov/reports/1040.htm>

RA Figure #28

## Counties with Repetitive Loss Properties



### Severe Repetitive Loss Properties

As of December 2017, there were no Severe Repetitive Loss properties in Pipestone County.<sup>99</sup>

### 5.6.3 Analyzing Development Trends

#### Land Use and Development Trends

Pipestone County is a rural county with limited urban growth. There are 241,970 acres in farm production in Pipestone County.<sup>100</sup>

A large percentage of tillable land in Pipestone County is farmed. There are also lands in conservation programs, parks, and other more natural settings. Not having all of the tillable ground in production helps to maintain ground water quality, wetlands, and plants and wildlife.

Prohibiting development in floodplains also helps to mitigate the negative effects of flooding and runoff. Grasslands, shrubs, and other vegetation help to negate the negative effects that flooding and runoff can have. It is important to incorporate land conservation practices into local and county land use policy and development plans.

<sup>99</sup> FEMA, Date Request. Received 12/07/2017.

<sup>100</sup> USDA Census 2012. Accessed: 01/17/2018. Available:

[http://www.agcensus.usda.gov/Publications/2012/Full\\_Report/Volume\\_1,\\_Chapter\\_2\\_County\\_Level/Minnesota/st27\\_2\\_001\\_001.pdf](http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Minnesota/st27_2_001_001.pdf)

One percent floodplain areas do exist in Pipestone County, specifically along Pipestone Creek, Split Rock Creek, and Rock River. The cities of Edgerton, Holland, Ihlen, Jasper, Pipestone, and Trosky all lie within or directly adjacent to the 100-year floodplain.

In southwest Minnesota there have also been a growing number of wind farms, solar farms, ethanol plants, and other biofuel plants. This development trend poses some unique challenges. In regards to roads and bridges, there is an increase of oversized loads, which can wear out the infrastructure faster and pose safety concerns to other motorists.

Firefighting also may be challenging. Specialized equipment is required to reach the top of the turbines, so firefighters have been instructed to sit back and let the wind turbine burn. Firefighters will monitor the fire to make sure the fire does not spread.

Ethanol plants and other biofuel plants have the potential to generate large and very hot fires. Plans are in place to address these new developments, but there is not extensive experience in mitigating hazards related to these development trends. Refer to Section 5.4.1: Fires for more information related to wind turbines ethanol plants, and biofuel fires.

A combination of conservation and planning has helped Pipestone County maintain safe and efficient development. Pipestone County is a rural county, so emergency response is impacted by distance and time and the availability of equipment and resources. Regional efforts help to mitigate the effects of natural and other hazards in Pipestone County.

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## Section 6 – Mitigation Strategy

The goal of mitigation is to protect lives and reduce the future impacts of hazards including property damage, disruption to local and regional economies, the amount of public and private funds spent to assist with recovery, and to build disaster-resistant communities. Mitigation actions and projects should be based on well-constructed risk assessments, provided in Section 5 of this plan. Mitigation should be an ongoing process adapting over time to accommodate a community's needs.

### 6.1 Community Capability Assessment

The capability assessment identifies current activities used to mitigate hazards. The capability assessment identifies the policies, regulations, procedures, programs, and projects that contribute to the lessening of disaster damages. The assessment also provides an evaluation of these capabilities to determine whether the activities can be improved in order to more effectively reduce the impact of future hazards. The following sections identify existing plans and mitigation capabilities within all of the communities.

#### 6.1.1 National Flood Insurance Program (NFIP)

The NFIP is a federal program created by Congress to mitigate future flood losses nationwide through sound, community-enforced building and zoning ordinances and to provide access to affordable, federally-backed flood insurance protection for property owners. The NFIP is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods. Participation in the NFIP is based on an agreement between local communities and the federal government that states that if a community will adopt and enforce a floodplain management ordinance to reduce future flood risks to new construction in Special Flood Hazard Areas (SFHAs), the federal government will make flood insurance available within the community as a financial protection against flood losses.

There are 20 flood insurance policies in Pipestone County.<sup>101</sup> Each policy covers a single building, but all single family home policies include detached garages. Refer to Figure #65 for an outline of policies in each city.

Figure #116 below shows which jurisdictions in Pipestone County participate in the National Flood Insurance Program (NFIP).

**Figure #116:**  
**NFIP Participation in Pipestone County**

| Jurisdiction Name | NFIP y/n | Mapped High-Risk Areas |
|-------------------|----------|------------------------|
| Pipestone County  | Yes      | Yes                    |
| Edgerton          | Yes      | No                     |
| Hatfield          | No       | No                     |
| Holland           | No       | No                     |

<sup>101</sup> FEMA Data. Accessed 8/8/2017. Available: <https://bsa.nfipstat.fema.gov/reports/1011.htm>



| Jurisdiction Name | NFIP y/n | Mapped High-Risk Areas |
|-------------------|----------|------------------------|
| Ihlen             | No       | Yes                    |
| Jasper            | Yes      | Yes                    |
| Pipestone         | Yes      | Yes                    |
| Ruthton           | No       | Yes                    |
| Trosky            | No       | Yes                    |
| Woodstock         | No       | No                     |

There are no repetitive loss properties in Pipestone County.

### 6.1.2 Plans and Ordinances

Pipestone County and its incorporated communities have a number of plans and ordinances in place to ensure the safety of residents and the effective operation of communities, including a Zoning Ordinance, Floodplain Ordinance, Wellhead Protection Plan, Local Water Plan, Transportation Plan, Economic Development Plan, and Emergency Operations Plan. In Section 5 of this plan (*Hazard Profiles*) a review of the plans and programs in place was included as related to each of the hazards addressed in the plan.

## 6.2 Mitigation Goals

In Section 5.0 of this plan, the risk assessment identified Pipestone County as prone to a number of natural and technological hazards. Planning team members understand that although hazards cannot be eliminated altogether, Pipestone County can work toward building disaster-resistant communities.

Hazard mitigation is intended to protect our communities by reducing or eliminating long-term risk to people and property before a disaster strikes. Emergency management involves a cycle through which communities prepare, respond, and recover from emergencies and disasters. The planning team formulated goals, objectives, and strategies to mitigate the effects of natural and other hazards.

Goals are general guidelines that explain what Lyon County wants to achieve. Objectives narrow the general guidelines and define in more detail what Lyon County wants to achieve. Strategies are the actual steps to be taken to achieve the goals.

A qualitative approach was used by the planning team to judge and prioritize the mitigation strategies based on perceived costs and benefits. The process used to judge and prioritize the mitigation strategies was the STAPLEE Process.

**Figure #117**  
**STAPLEE Planning Factors**

|                           |                                                                                                                                                                                                                                                        |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>S – Social</b>         | Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the community's social and cultural values. |
| <b>T – Technical</b>      | Mitigation actions are technically most effective if they provide a long-term reduction of losses and have minimal secondary adverse impacts.                                                                                                          |
| <b>A – Administrative</b> | Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.                                                                                                                                                 |

|                          |                                                                                                                                                                                                                                                                                 |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>P – Political</b>     | Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support for the action.                                                                                           |
| <b>L – Legal</b>         | It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.                                                                                                                                              |
| <b>E – Economic</b>      | Budget constraints can significantly deter the implementation of mitigation actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost benefit review, and possible to fund.                                                      |
| <b>E – Environmental</b> | Sustainable mitigation actions that do not have an adverse effect on the environment, comply with federal, state, and local environmental regulations, and are consistent with the community's environmental goals, have mitigation benefits while being environmentally sound. |

Refer to the Planning Process Chapter for more information relating to the STAPLEE Process and the planning process.

It should be noted that not every hazard identified within the risk assessment has a goal outlined below. Goals were combined for certain hazards with similar mitigation measures. For example, severe summer storms and tornadoes both require similar awareness, prevention and structural measures. The main benefit of the actions listed is the improved health, safety and welfare of the community and residents. The highest ranking hazards are listed first, followed by moderate rank hazards and finally low rank hazards. An acronym list of entities listed in the strategies below can be found in Section 6.3.

### 6.2.1 Hazard Mitigation Actions

Pipestone County and its included municipalities share a common All Hazard Mitigation plan and worked closely to develop it. These people work together with their city councils and the Pipestone County Emergency Management Director to assure that the hazards and mitigation actions included in this plan are accurate and addressed in their jurisdictions. The jurisdictions responsible for each action are: Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, and Woodstock.

Figure #118 lists all mitigation actions for Pipestone County and its jurisdictions. Appendix G contains separate mitigation action tables for each jurisdiction. Each of these mitigation action charts detail the hazard, the mitigation action to address it, the priority ranking for implementation (1 = High Priority; 2 = Moderate Priority; 3 = Low Priority), its current stage of implementation, the timeframe for implementation going forward, the jurisdictions who have identified they will work to implement the action, the responsible parties to carry through with implementation, and comments on how the plan will be implemented through existing planning mechanisms and funding to make implementation happen.

In addition to ranking the hazard mitigation actions using STAPLE+E, the planning team also reports on the status of the mitigation action. Completed and deleted mitigation actions are denoted in Appendix F.

### Status

Ongoing mitigation actions from the initial review were incorporated into annual reviews by the mitigation team. The status designations for the mitigation action chart are below. The status designations are broken into new and existing.

#### *New Mitigation Strategy*

- New – new action added to the AHMP

#### *Existing Mitigation Strategy*

- Ongoing – actions require continuing application
- In Progress – actions are currently being acted upon
- Complete – the action is complete
- Deferred – no progress has been made

#### *Timeframe*

The timeframe for implementing a mitigation strategy is divided into three categories:

- Short Term – 1 to 5 years
- Long Term – 5 + years
- Continuous

### **6.2.2 Strategy Implementation & Administration**

Prioritization does not mean that all strategies with a priority ranking of five have to be accomplished before strategies with a four and so on can be implemented. The purpose of the prioritization is to show that the planning team talked about possible options and with unlimited resources, this is what they chose to accomplish first. Due to scarce resources, it may be necessary to start with a goal that has less upfront costs and is relatively easier to implement. The goals, objectives, and strategies being outlined in the Pipestone County AHMP are recommendations from the planning team, so during implementation modifications can take place.

Pipestone County Emergency Management is the primary agency responsible for implementation and administration of this plan. The County will implement mitigation strategies within the next five years, and will seek appropriate funding to do so.

Local jurisdictions with comprehensive plans and land use controls will be strongly encouraged to incorporate applicable goals, objectives, and strategies into their local plans upon their next update. Transmittal of the final plan will include a letter from the County Emergency Manager requesting that each participating jurisdiction 1) adopt this Hazard Mitigation Plan as a primary policy document, and 2) review and incorporate all applicable policies of this document into the community's existing plans by inclusion or by reference.

### 6.3 Mitigation Strategies Acronym List

#### *Cities*

|      |                   |
|------|-------------------|
| CiE  | City of Edgerton  |
| CiHa | City of Hatfield  |
| CiHo | City of Holland   |
| CiI  | City of Ihlen     |
| CiJ  | City of Jasper    |
| CiP  | City of Pipestone |
| CiR  | City of Ruthton   |
| CiT  | City of Trosky    |
| CiW  | City of Woodstock |

#### *Townships*

|     |               |
|-----|---------------|
| TwP | All Townships |
|-----|---------------|

#### *Local Organizations*

|       |                                         |
|-------|-----------------------------------------|
| PCA   | Pipestone County Administration         |
| PCPW  | Pipestone County Public Works           |
| PCEM  | Pipestone County Emergency Management   |
| PMO   | Pipestone County Land Management Office |
| HAZ   | HAZMAT Team                             |
| SWHHS | Southwest Health and Human Services     |
| SWCD  | Soil and Water Conservation District    |

#### *Other Entities and Organizations*

|       |                                                  |
|-------|--------------------------------------------------|
| EMS   | Medical Response Personnel (EMS)                 |
| Fire  | Fire Districts                                   |
| Hosp  | Hospitals & Clinics                              |
| LAW   | Law Enforcement                                  |
| Sch   | Local School districts                           |
| PU    | Public Utilities                                 |
| RWS   | Rural Water Systems                              |
| BWSR  | Minnesota Board of Water and Soil Resources      |
| MDAg  | Minnesota Dept. of Agriculture                   |
| MDH   | Minnesota Dept. of Health                        |
| MnDOT | Minnesota Dept. of Transportation                |
| BAH   | Minnesota Board of Animal Health                 |
| EXT   | University of Minnesota Extension                |
| MPCA  | Minnesota Pollution Control Agency               |
| DNR   | Department of Natural Resources                  |
| DPS   | Department of Public Safety                      |
| RC    | American Red Cross                               |
| Rail  | Local Railroads                                  |
| Air   | Local Airports (Pipestone)                       |
| FEMA  | U.S. Federal Emergency Management Administration |
| USDA  | U.S. Department of Agriculture                   |

## 6.4 Mitigation Strategies

Figure #118. All Mitigation Actions for Pipestone County

| Action # | Hazard - Strategy                     | Mitigation Action                                                                                                                                                  | Priority | Status       | Time-frame | Jurisdictions                                                | Responsibility                   | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                                                                                                                                      | Est. Cost/ Source |
|----------|---------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|------------|--------------------------------------------------------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1        | Winter Storms – Prevention            | Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, with Specific Alert Message Encoding (SAME) capability.                      |          | Revised      | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper | PCEM, CiE, CiHa, Cii, Cij        | Holland talked to citizens about radios. Ruthton uses CodeRED & IPAWS. Woodstock has a siren, uses CodeRED, and reminds residents to use weather radios. Pipestone: Cable access CodeRED, website crawl, contact TV & radio. Hatfield: No longer working on this. Trosky: Complete soon. | Low               |
| 2        | Winter Storms – Emerg Svcs            | Work with communities to review and/or complete Continuity of Operations Planning, and encourage private businesses and families to prepare for all-hazard events. |          | Carried Over | 2019-2024  | Pipestone County                                             | PCEM                             |                                                                                                                                                                                                                                                                                          | Medium            |
| 3        | Winter Storms – Awareness             | Develop a comprehensive media plan to provide public information about all-hazard events.                                                                          |          | Carried Over | 2019-2024  | Pipestone County                                             | PCEM, HSEM, FEMA                 |                                                                                                                                                                                                                                                                                          | Low               |
| 4        | Winter Storms – Protections           | Work with critical facilities such as hospitals and rural water suppliers to provide access to back-up power generators.                                           |          | Carried Over | 2019-2029  | Pipestone County                                             | PCEM, SWHHS, Hosp, RWS           |                                                                                                                                                                                                                                                                                          | Medium            |
| 5        | Public Health Emergencies – Awareness | Provide information to public and private employers, schools, and hospitals about potential infectious disease threats and prevention measures.                    |          | Carried Over | 2019-2024  | Pipestone County                                             | SWHHS, MDH, Sch, MnW, Hosp, PCEM |                                                                                                                                                                                                                                                                                          | Low               |

| Action # | Hazard - Strategy                      | Mitigation Action                                                                                                                                                                                                            | Priority | Status       | Time-frame | Jurisdictions                                                           | Responsibility                                       | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                                                                                                                                                      | Est. Cost/ Source |
|----------|----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|------------|-------------------------------------------------------------------------|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 6        | Public Health Emergencies – Emerg Svcs | Encourage Southwest Health and Human Services to continue work with MN Dept. of Health for the mass distribution of needed medicines and supplies for public health emergencies.                                             |          | Carried Over | 2019-2024  | Pipestone County                                                        | SWHHS, MDH, PCSO, EMT, Fire, Hosp, PCEM              |                                                                                                                                                                                                                                                                                                          | Low               |
| 7        | Public Health Emergencies – Emerg Svcs | Implement a quarantine plan in coordination with local doctors and other health professionals in the county.                                                                                                                 |          | Carried Over | 2019-2024  | Pipestone County                                                        | SWHHS, PCSO, EMT, Fire, Hosp, PCEM                   |                                                                                                                                                                                                                                                                                                          | Low               |
| 8        | Public Health Emergencies – Protection | Ensure that citizens dependent on oxygen or respiration assistance in their homes have access to back-up power or alternative life support.                                                                                  |          | Carried Over | 2019-2029  | Pipestone County                                                        | SWHHS, Utilities                                     |                                                                                                                                                                                                                                                                                                          | Medium            |
| 9        | Severe Summer Storms – Awareness       | Each spring, educate local schools, hospitals, nursing homes, and others on the importance of doing a “Severe Weather Awareness Week” workshop for their staff, including identifying evacuation routes and safety shelters. |          | Carried Over | 2019-2024  | Pipestone County                                                        | PCEM, Sch, Hosp, MnW                                 |                                                                                                                                                                                                                                                                                                          | Low               |
| 10       | Severe Summer Storms – Structural      | Conduct a study to determine areas that are deficient in safe rooms and/or not covered by warning systems; construct at least one new safe room (including in public facilities or manufactured home parks).                 |          | Revised      | 2019-2024  | Pipestone County, Edgerton, , Holland, Ihlen, Jasper, Pipestone, Trosky | PCEM, PCSO, PCZA, CiE, CiHo, Cii, Cij, CiP, CiT, Sch | Holland’s siren is 15 years old – they have a safe room in their shop, but no city safe room. Edgerton: Perhaps the fire hall basement? A safe room at Pipestone’s private campground and trailer park is an option. The Cities of Ruthton, Pipestone, Hatfield consider this strategy cost-prohibitive. | High              |

| Action # | Hazard - Strategy                          | Mitigation Action                                                                                                                                                                                                                                                                                      | Priority | Status       | Time-frame | Jurisdictions                              | Responsibility                      | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                                                            | Est. Cost/ Source |
|----------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|------------|--------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 11       | Severe Summer Storms – Prevention          | Work with fire and ambulance volunteers to develop a safe shelter plan for the county including shelters, shelter capacity, and transportation routes.                                                                                                                                                 |          | Carried Over | 2019-2024  | Pipestone County                           | PCEM, PCSO, EMT, Fire               |                                                                                                                                                                                                                | Medium            |
| 12       | Severe Summer Storms – Prevention          | Ensure that each manufactured home park has an updated emergency management plan; work with park managers to improve communication during severe storm events; ensure that residents are familiar with the emergency management plan and that residents recognize evacuation routes and shelter sites. |          | Carried Over | 2019-2024  | Pipestone County                           | PCEM, EMT, Fire                     |                                                                                                                                                                                                                | Medium            |
| 13       | Severe Summer Storms – Prevention          | Evaluate and upgrade siren warning systems (considering study outcomes from Action 10).                                                                                                                                                                                                                |          | Revised      | 2019-2029  | Pipestone County, Ruthton, Trosky          | PCEM, CiR, CiT                      | Trosky looking at siren grants. Ruthton looking into USDA grants. Pipestone, Edgerton, & Jasper consider this complete.                                                                                        | High              |
| 14       | Transportation Infrastructure – Prevention | Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.                                                                                                                                                                                                  |          | Revised      | 2019-2029  | Pipestone County, Jasper, Ihlen, Pipestone | PCHWY, PCZA, CiJ, CiI, CiP, Twp, RR | Holland: Hwy 23 & CSAH 16 lights installed. Ruthton: No issues. Pipestone: Flood of underpass – all new infrastructure. 8 <sup>th</sup> Ave & 2 <sup>nd</sup> St NW infrastructure work to alleviate flooding. | High              |
| 15       | Transportation Infrastructure – Emerg Svcs | Increase training of emergency personnel to respond to a variety of transportation accidents.                                                                                                                                                                                                          |          | Carried Over | 2019-2024  | Pipestone County                           | PCEM, PCHWY, EMT, Fire              |                                                                                                                                                                                                                | Low               |



| Action # | Hazard - Strategy                          | Mitigation Action                                                                                            | Priority | Status       | Time-frame | Jurisdictions                                                                                       | Responsibility                                           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                            | Est. Cost/ Source |
|----------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------|----------|--------------|------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 16       | Transportation Infrastructure – Protection | Use road design and living snow fences to help control snow on roadways.                                     |          | Revised      | 2019-2024  | Pipestone County                                                                                    | PCHWY, PCZA, Twp, MnDOT, SWCD                            | In progress – Added SWCD.                                                                                                                                                      | Medium            |
| 17       | Transportation Infrastructure – Prevention | Encourage township road authorities to work with farmers to prevent cropping in road right-of-way.           |          | In Progress  | 2019-2024  | Pipestone County                                                                                    | PCHWY, PCZA, Twp                                         |                                                                                                                                                                                | Low               |
| 18       | Drought – Awareness                        | Educate the public on the importance of wellhead protection and water conservation in times of low rainfall. |          | Revised      | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | PCZA, RWS, CiE, CiHa, CiHo, CiI, CiJ, CiP, CiR, CiT, CiW | BWSR removed from and cities added to responsible parties.                                                                                                                     | Low               |
| 19       | Drought – Prevention                       | Identify the location of adequate amounts of bottled water in case of prolonged utility outage.              |          | Carried Over | 2019-2024  | Pipestone County, Edgerton                                                                          | PCEM, RWS, CiE                                           | Edgerton: New gen-set at well location.                                                                                                                                        | Low               |
| 20       | Drought – Prevention                       | Work with MDH to complete and implement Wellhead Protection Plans.                                           |          | In Progress  | 2019-2024  | Pipestone County                                                                                    | PCZA, RWS, CiE, CiP                                      | Ruthton has this in place and renewed theirs in 2014. Pipestone is currently in progress. Edgerton: Currently working on their Wellhead Protection Action Plan (WHP complete). | Medium            |
| 21       | Drought – Prevention                       | Seek maximum application loads for commercial application of nutrients in Wellhead Protection Areas.         |          | Carried Over | 2019-2024  | Pipestone County                                                                                    | PCZA, RWS                                                |                                                                                                                                                                                | Low               |
| 22       | Drought – Structural/ Prevention           | Continue sewer infiltration improvements to reduce pressure on treatment capacity.                           |          | Ongoing      | 2019-2029  | Pipestone                                                                                           | CiP                                                      | Every street project with storm & sanitary sewer is helping improve I&I.                                                                                                       | High              |
| 23       | Structure Fires & Wildfires – Awareness    | Continue fire education including the nationally coordinated “Firewise” program.                             |          | Carried Over | 2019-2024  | Pipestone County                                                                                    | Fire                                                     |                                                                                                                                                                                | Low               |

| Action # | Hazard - Strategy                        | Mitigation Action                                                                                                                                                                                      | Priority | Status       | Time-frame | Jurisdictions                                                                                       | Responsibility         | Pipestone County Comments on Planning Mechanisms for Implementation                                                                   | Est. Cost/ Source |
|----------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|------------|-----------------------------------------------------------------------------------------------------|------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 24       | Structure Fires & Wildfires – Prevention | Work with First Responders and Fire Departments on long-range capital improvements planning for facilities and equipment.                                                                              |          | Carried Over | 2019-2029  | Pipestone County                                                                                    | PCEM, EMT, Fire        |                                                                                                                                       | Medium            |
| 25       | Structure Fires & Wildfires – Protection | Encourage township road authorities to cut back road ditches and bale where appropriate to limit potential for wildfires to spread.                                                                    |          | Carried Over | 2019-2024  | Pipestone County                                                                                    | PCEM, PCHWY, Fire, Twp |                                                                                                                                       | Low               |
| 26       | Structure Fires & Wildfires – Awareness  | Train property owners on the proper use of controlled burns and firebreaks.                                                                                                                            |          | Carried Over | 2019-2024  | Pipestone County                                                                                    | PCSO, Fire, Twp, DNR   | Trosky: Restricts open ban to only certain dates and if there are no county fire bans – verbal burn permits required for large burns. | Low               |
| 27       | Structure Fires & Wildfires – Emerg Svcs | Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives. |          | In Progress  | 2019-2029  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | ALL                    | SWHHS & Edgerton: In progress. Holland: Part of SW Region Mutual Aid Agreement with other mutual aid agreements. Ruthton: In place.   | Low               |
| 28       | Structure Fires & Wildfires – Awareness  | Educate residents on open burning hazards and solid waste rules pertaining to burn barrels.                                                                                                            |          | New          | 2019-2024  | Pipestone County                                                                                    | Sheriff, PCZA          |                                                                                                                                       | Low               |
| 29       | Hazardous Materials – Prevention         | Work with state and federal agencies to address hazardous materials that have the potential to impact the county and region.                                                                           |          | Carried Over | 2019-2029  | Pipestone County                                                                                    | PCEM, PCSO, Fire       |                                                                                                                                       | Low               |

| Action # | Hazard - Strategy                           | Mitigation Action                                                                                                                                                                  | Priority | Status       | Time-frame | Jurisdictions                      | Responsibility   | Pipestone County Comments on Planning Mechanisms for Implementation                                                | Est. Cost/ Source |
|----------|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|------------|------------------------------------|------------------|--------------------------------------------------------------------------------------------------------------------|-------------------|
| 30       | Hazardous Materials – Awareness             | Increase education of school officials, health care workers, and the general public about the warning signs of meth.                                                               |          | Carried Over | 2019-2024  | Pipestone County                   | SWHHS, PCSO, Sch |                                                                                                                    | Low               |
| 31       | Agricultural Disease – Awareness            | Provide information on agricultural disease and prevention to producers and residents.                                                                                             |          | Carried Over | 2019-2024  | Pipestone County                   | PCZA, Ext, FSA   |                                                                                                                    | Low               |
| 32       | Agricultural Disease – Emerg Svcs           | Review the Emergency Operations Plan for response and care of animals, including disposal, in an outbreak of disease or a major hazard event.                                      |          | Revised      | 2019-2024  | Pipestone County                   | PCEM, Ext, BAH   | BAH added as responsible party.                                                                                    | Medium            |
| 33       | Civil Disturbance – Prevention              | Local governments complete and maintain thorough community risk and threat assessments.                                                                                            |          | Revised      | 2019-2024  | Pipestone County, Pipestone        | PCEM, PCSO, CiP  | Pipestone needs to update theirs.                                                                                  | Low               |
| 34       | Civil Disturbance / Earthquake – Prevention | Consider zoning and building code provisions to protect facilities from intentional or natural destruction. Implement applicable safety and security measures in public buildings. |          | Revised      | 2019-2029  | Pipestone County, CiP              | PCZA, CiP        | Pipestone: City code & uniform building code cover this – Building & Zoning Dept. will help recommend a safe room. | Medium            |
| 35       | Flooding / Dam Failure – Prevention         | Work with DNR to review and update floodplain protection in zoning ordinance. Add check box on building/zoning permit forms indicating flood hazard areas.                         |          | Carried Over | 2019-2024  | Pipestone County, Edgerton, Jasper | PCZA, CiE, CiJ   | Pipestone: Complete.                                                                                               | Low               |

| Action # | Hazard - Strategy                   | Mitigation Action                                                                                                                                         | Priority | Status       | Time-frame | Jurisdictions                                 | Responsibility           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                         | Est. Cost/ Source |
|----------|-------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|------------|-----------------------------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 36       | Flooding / Dam Failure – Protection | Identify specific structures in floodplains for inclusion in acquisition, relocation, or elevation projects to reduce flooding risk.                      |          | Revised      | 2019-2029  | Pipestone County                              | PCZA                     | Pipestone: Completed and in mid-acquisition of Tianna Trailer Park which is located in the floodplain and will be converted to green space. | High              |
| 37       | Flooding / Dam Failure – Prevention | Work closely with DNR on all development applications in identified flood hazard areas; discourage zoning variances in identified flood hazard areas.     |          | Revised      | 2019-2024  | Pipestone County, Edgerton, Jasper            | PCZA, CiE, CiJ           | Pipestone: Complete – Building & Zoning currently working with DNR and state officials.                                                     | Low               |
| 38       | Flooding / Dam Failure – Awareness  | Encourage all property owners in flood hazard areas to purchase flood insurance.                                                                          |          | Revised      | 2019-2024  | Pipestone County, Edgerton, Jasper            | PCZA, CiE, CiJ           | Pipestone: Complete and ongoing.                                                                                                            | Low               |
| 39       | Flooding / Dam Failure – Prevention | Jurisdictions not currently participating in the National Flood Insurance Program (NFIP) will review their flood hazard areas and consider participation. |          | Revised      | 2019-2024  | Pipestone County                              | DNR                      | Ruthon: Removed as they have no homes in hazard areas.                                                                                      | Medium            |
| 40       | Flooding / Dam Failure – Protection | Promote buffer system along creeks and streams that are prone to flooding (e.g. grass strips, CRP).                                                       |          | Carried Over | 2019-2024  | Pipestone County                              | PCZA, BWSR               |                                                                                                                                             | Medium            |
| 41       | Flooding / Dam Failure – Awareness  | Prepare Public Service Announcements for local media to use during flood hazard events.                                                                   |          | Carried Over | 2019-2024  | Pipestone County, Edgerton, Jasper, Pipestone | DNR, PCZA, CiE, CiJ, CiP | Pipestone: Currently does this. Edgerton: Utilizes local TV channel & social media.                                                         | Low               |

#### 6.4.1 Mitigation Actions by Community

##### *Action items for Participating Jurisdictions*

Lyon County is a rural county with few full-time paid staff in the area of emergency management. Jurisdictions in Lyon County rely on Lyon County Emergency Management for services regarding emergency management and hazard mitigation. Lyon County Emergency Management maintains regular communication with all local units of government in the county to facilitate intergovernmental cooperation.

Combining strategies between jurisdictions is due to the rural nature of the county, and that a number of jurisdictions are similar in regards to the natural or other hazard the strategy is trying to mitigate. A number of strategies in the Lyon County AHMP have “All Cities” listed as who will be working to implement the strategy. Some strategies specifically outline a specific city or multiple specific cities to work together on implementing the strategy. The listed entities under each strategy have had the opportunity to provide input and recommendations in regards to the strategy and will work together to implement the strategy.

##### *Implementation by Local Jurisdictions*

Each local jurisdiction will implement and integrate the strategies identified in the hazard mitigation plan as they update their own comprehensive plans, zoning ordinances, and other plans that the community may from time to time need to update. When “All Cities” are identified within the strategies, it means that all jurisdictions mentioned in a strategy will take the strategy into consideration when updating planning processes and undergoing construction or development projects. For example, planning for new construction at the Lyon County Government Center in recent years took into consideration those strategies such as redundant power supplies when planning and constructing the new addition. In many of the smaller jurisdictions these strategies will be implemented as changes are made, but changes in the smaller jurisdictions do not occur as frequently as in the larger jurisdictions.

Mitigation actions by jurisdiction for the above cities are separated out in Appendix G.

# Section 7 – Plan Maintenance

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## 7.1 Monitoring, Evaluation, and Updating the Plan

The Pipestone County All Hazard Mitigation Plan (AHMP) should be considered a living document. The plan should be reviewed at a minimum of every 5 years. The guidance in this section will function as the primary tool when reviewing progress on the implementation of the Pipestone County AHMP.

### *Plan Monitoring*

It is the intent of the plan to serve as a guide for mitigating current and future hazards. Pipestone County Emergency Management Department maintains regular contact with all jurisdictions in Pipestone County. This will allow the Pipestone County Emergency Management Director and Department to monitor and implement strategies outlined in the AHMP. The Pipestone County Emergency Management Director will evaluate the goals that have been implemented by Pipestone County and jurisdictions within the county. The Pipestone County Emergency Management Director will also evaluate the Pipestone County AHMP on the number of strategies that have been implemented and the number of goals that were reached.

Public participation is critical in implementing strategies outlined in the plan. Local residents and representatives have a thorough understanding of local issues. Local residents and representatives can assist in gathering support and technical information to help ensure the project is successful. Maintaining regular contact with the jurisdictions in Pipestone County will help to ensure that the Pipestone County Emergency Management Director and Department are able to effectively implement the strategies outlined in the plan.

### *Evaluating the Plan*

It is recommended that the County Emergency Management Director review and formally evaluate the plan within eighteen months of adoption, as well as after every disaster event, to adequately prepare for the plan update. When implementing strategies from the existing plan it is important to consider improvements that can be made to the planning process, implementation, and evaluation of the plan. AHMP are evolving documents that need to stay up to date. Information gathering and evaluation should be taking place throughout the five year cycle of updating the plan. This will help to insure existing risk assessments are accurate and that mitigation efforts are effective.

### *Updating the Plan*

FEMA requires that plans be reviewed, updated and re-approved every five years or sooner. The planning process timeline for reviewing, updating, and approving an AHMP at Minnesota Homeland Security and Emergency Management (HSEM) and Federal Emergency Management Agency (FEMA) is around 15 months. Within three years of adoption, the Emergency Management Director will formulate a work plan and seek input from Pipestone County AHMP Planning Team members, local units of government, and local residents to start the process to update the Pipestone County AHMP. The Emergency Management Director will also extend an invitation to non-participating jurisdictions to join the planning process for the update.

## 7.2 Implementation

Pipestone County and its included municipalities share a common All Hazard Mitigation Plan and work together closely to develop, revise, and implement it. This AHMP provides a comprehensive chart of mitigation actions for Pipestone County and its jurisdictions (*see section 6.4: Mitigation Strategies*).

Jurisdictions participated in the AHMP planning process and identified the specific mitigation strategies that they would seek to implement in their communities during the 5-year planning cycle. These mitigation actions are also provided in Appendix G: *Mitigation Actions by Jurisdiction*.

A number of implementation tools are available to address hazards. Many of these tools are below, however, in some cases additional discussion is needed in order to identify what strategies are most appropriate to use. This will be part of an ongoing discussion as Pipestone County looks for opportunities for plan implementation. The following tools should be considered:

**Education:** In many cases education of residents has been identified as one of the most effective mitigation strategies.

**Capital Investments:** Capital investments such as fire and ambulance equipment, sprinkler systems and dry hydrants are tools that can limit risks and impacts of natural and man-made hazards.

**Data Collection and Needs Assessments:** Data collection and needs assessments can aid in gaining a better understanding of threats and allow planning for mitigation strategies accordingly. As resources are limited for this part of the planning process, additional data collection is likely to be an ongoing activity as resources become available.

**Coordination:** Responsibilities for mitigation strategies run across various county departments, local fire and ambulance departments, city and township governments, and a host of state and federal agencies. Ongoing coordination is an important tool to ensure resources are used efficiently. Coordination can also avoid duplication of efforts or prevent gaps that are created because of unclear roles and responsibilities. The mitigation plan review process can function as a tool to have an ongoing discussion of roles, responsibilities, and opportunities for coordination.

**Regional Cooperation:** Counties and public safety services providers throughout the Northeastern Region of Minnesota often share similar challenges and concerns. In some cases a regional approach may be warranted as a mitigation strategy in order to save resources. Mutual aid agreements are a tool already in use for a number of services. Needs assessments for fire and ambulance services and development of assistance for volunteer recruiting, training, and retention could benefit from a regional approach. Cooperation among counties could also help in lobbying for certain funding priorities that address concerns relating to challenges in service delivery in rural areas. Organizations such as FEMA Region V and the MN Department of HSEM through the Regional Program Coordinator can offer tools and resources to assist in these cooperative efforts.



**Regulation:** Regulation is an important mitigation tool for Pipestone County. Regulation plays a particularly important role for land use, access to structures and the protection of water resources and public health.

### 7.3 Continued Public Involvement

Continued public involvement is critical to the successful implementation of the All Hazard Mitigation Plan (AHMP). The County and its participating jurisdictions should continue to engage new public stakeholders in planning discussions and project implementation during the 5-year cycle of this plan.

Pipestone County maintains a website that includes a page for Emergency Management. The SRDC also maintains a website that includes a page for hazard mitigation. Both of these websites will be the main point of access for the public regarding information about the Pipestone County AHMP. A PDF copy of the approved plan will be available on these pages along with other information related to the update and hazard mitigation. The public will have access to the plan and be able to provide input regarding progress on the mitigation strategies.

[https://www.pipestone-county.com/board/departments\\_offices/emergency\\_management.php](https://www.pipestone-county.com/board/departments_offices/emergency_management.php)

<http://www.swrdc.org/planning/hazard-mitigation/>

#### *Other Opportunities for Involvement*

Hazard mitigation has been a regional effort in Southwest Minnesota with services overlapping between counties. All Hazard Mitigation Plan (AHMP) development starts with reviewing the counties existing mitigation plan and comparing the plan with the neighboring counties. There are many opportunities during the development of a plan for involvement provided from neighboring communities, agencies involved in hazard mitigation, businesses, academia, and other relevant private and non-profit interests. SRDC has helped to develop mitigation plans for the following counties in southwest Minnesota:

- Cottonwood County
- Jackson County
- Lincoln County
- Lyon County
- Murray County
- Nobles County
- Pipestone County
- Redwood County
- Rock County

During the 5-year period before the plan is updated, planning team members will be responsible to keep their city councils, city departments, schools, and community members updated and engaged in the implementation of their respective mitigation action charts (see *Appendix G: Mitigation Actions by Jurisdiction*). Each respective jurisdiction will report their progress in this area to the Pipestone County Emergency Management Director. Jurisdictions will use numerous means of public outreach to engage

new public stakeholders in providing input on mitigation efforts or concerns on hazards by sharing information at city council meetings, sharing information at special events, working with local schools and partner organizations, and posting information on relevant local or social media that their communities use to inform and engage the public. As local mitigation projects are implemented, jurisdictions will work to keep the public updated and engaged in those local efforts.

# Conclusion

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Hazards can occur with little or no warning. The relatively unpredictable nature of some hazards makes mitigating the effects of an event more difficult, but history and probability says that natural and other hazards are going to occur. Since hazardous events are going to take place, hazard mitigation is here to minimize the damages to property and loss of life.

When planning mitigation projects and investing in the future, it is critical to consider all the costs, not just the construction costs. There are costs associated with the potential loss of life, public and private property damages, interruption to the economy, decreased connectivity, health outcomes, and loss of community. Decision makers need to consider health and include health related outcomes in the benefits and costs of a project.

Health benefits of a project could be related to increasing livability, connectivity, and creating an environment where people want to live. When people are there, people invest and create demand. Hazard mitigation can be the link between livability, economic vitality, and public safety.

**Figure #119**  
**Disaster Management Cycle**



# APPENDICES

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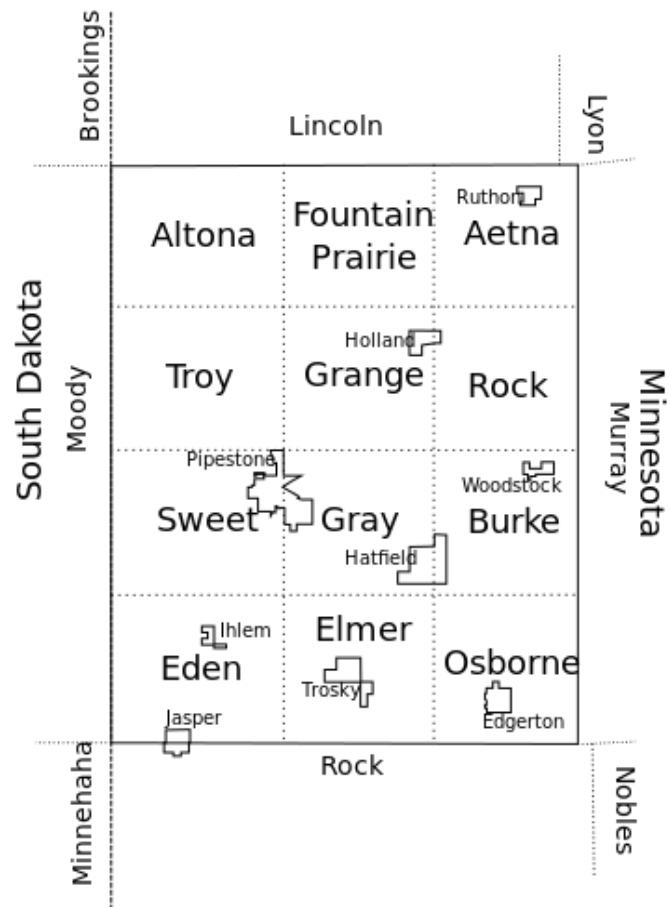
## PIPESTONE COUNTY ALL HAZARD MITIGATION PLAN, 2019

- Appendix A – Pipestone County Maps
- Appendix B – Pipestone County Hazard Events
- Appendix C – Adopting Resolutions
- Appendix D – Planning Team Meetings
- Appendix E – Public Meeting Notices and Meeting Notes
- Appendix F – Completed and Deleted Actions from the 2010 Plan
- Appendix G – Mitigation Actions by Jurisdiction
- Appendix H – Works Cited

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# **Appendix A - Pipestone County Maps & Hazus Analysis**

**Figure #3**  
**Minor Civil Divisions – Pipestone County<sup>102</sup>**

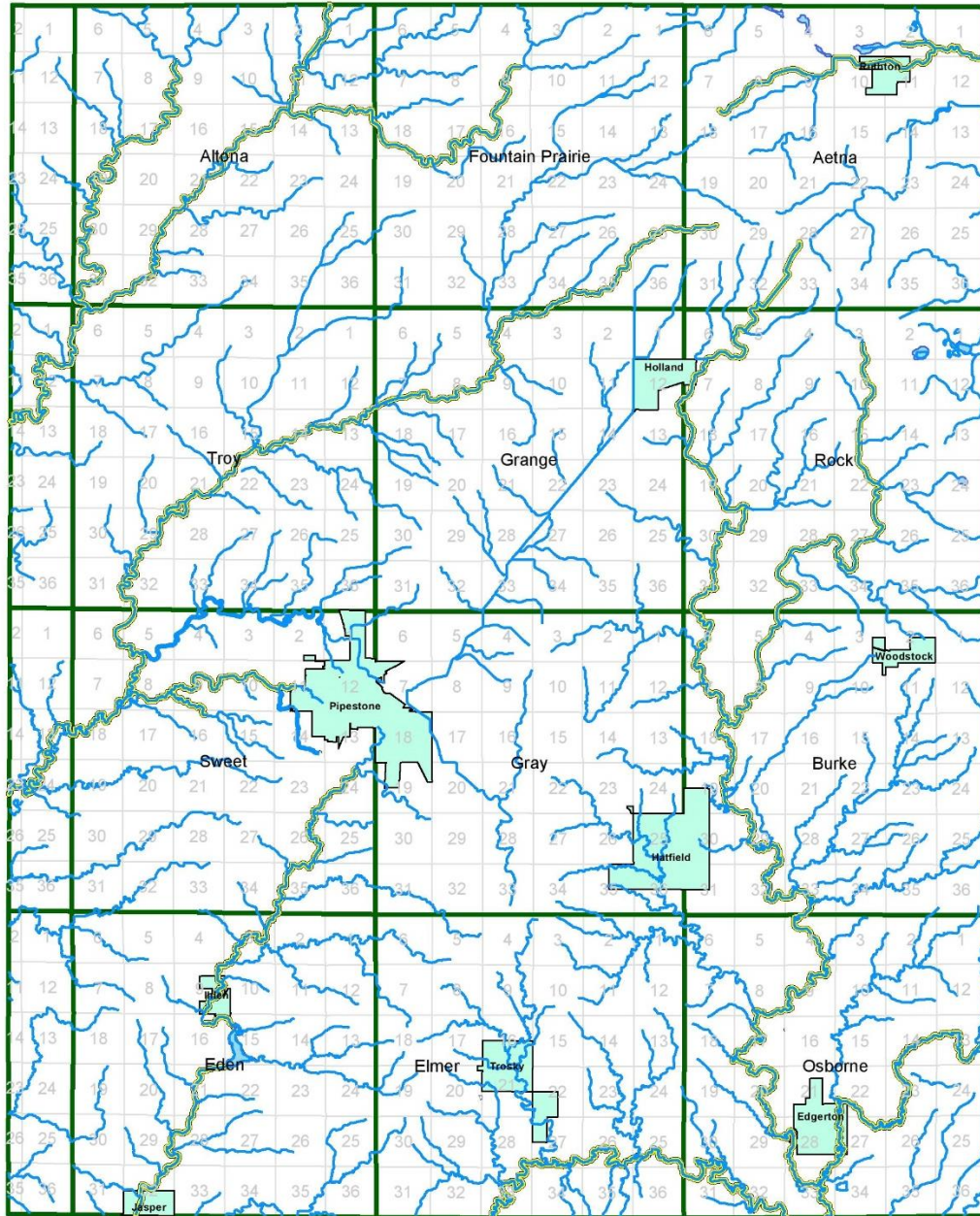


<sup>102</sup> By Jankidudu - Own work, CC BY-SA 3.0, <https://commons.wikimedia.org/w/index.php?curid=25471300>



Figure #5  
Shoreland, Lakes, & Streams – Pipestone County

# Pipestone County Lakes and Streams



Streams Lakes Special Protection Shoreland Zone Cities Townships



0 1.5 3 6 9 Miles



Created: 3-12-19, Kyle Krier, Pipestone County

Figure #6  
Watersheds Map – Pipestone County

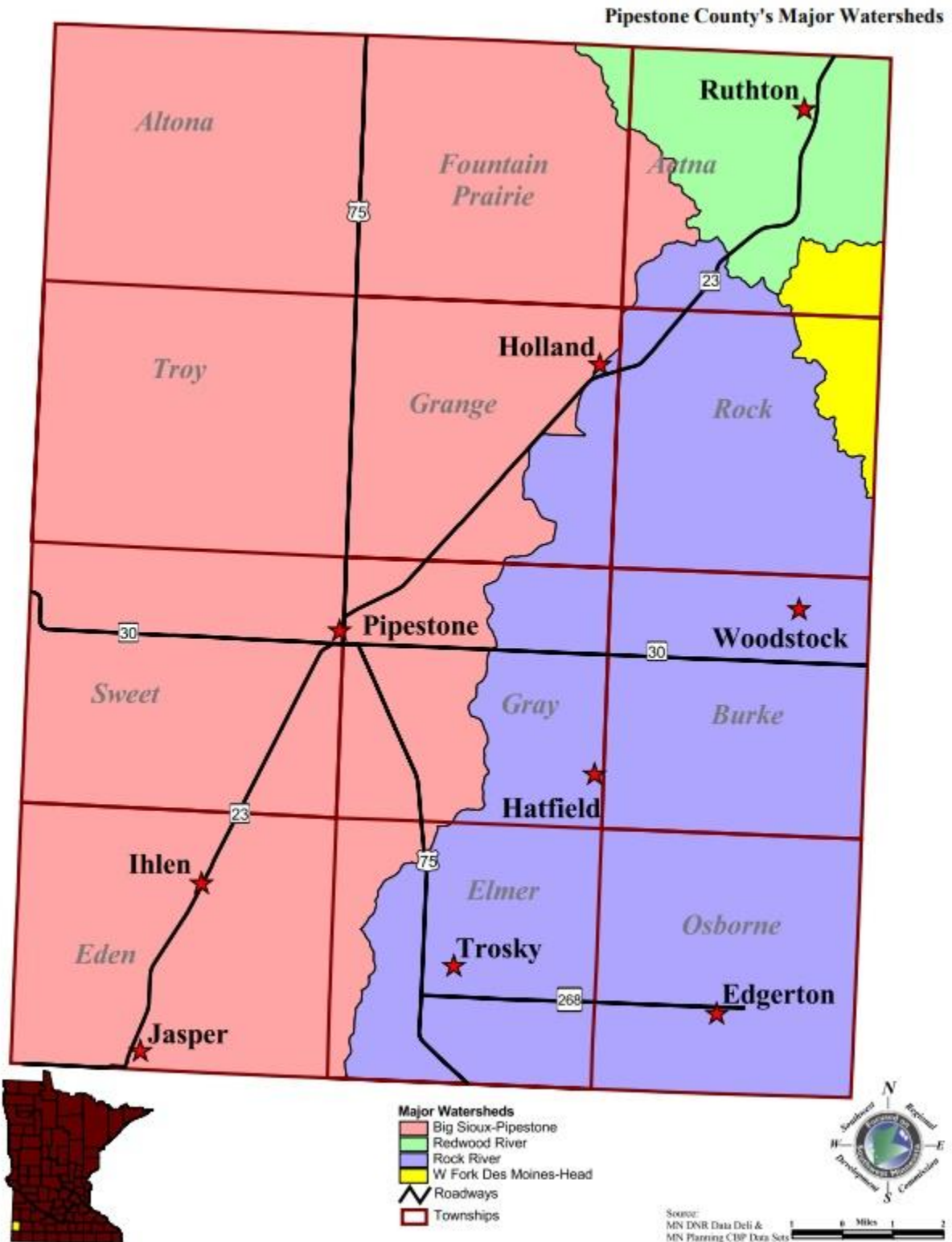




Figure #7  
General Soils Map – Pipestone County

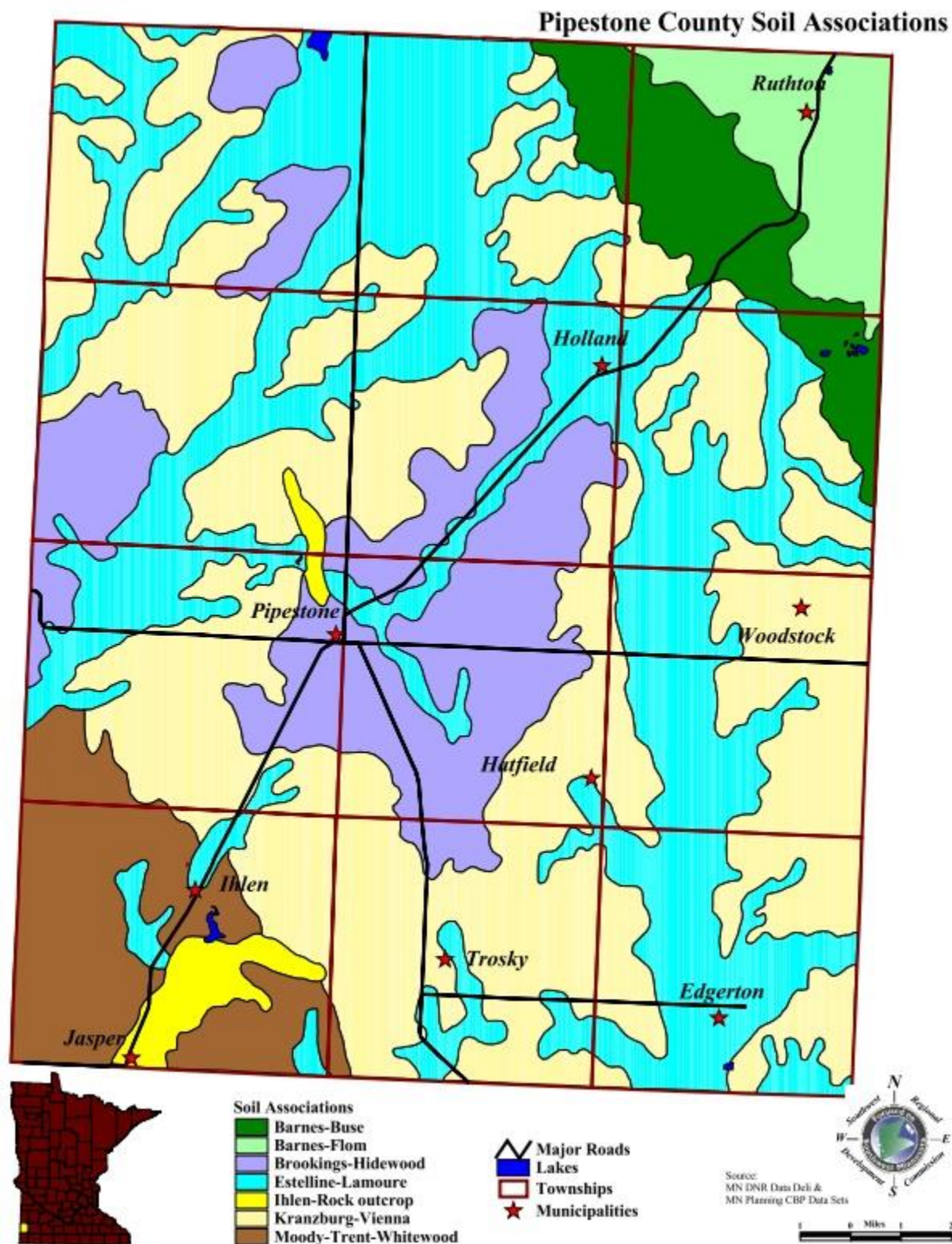


Figure #8  
Zoning Map – Pipestone County

## Pipestone County Current Zoning

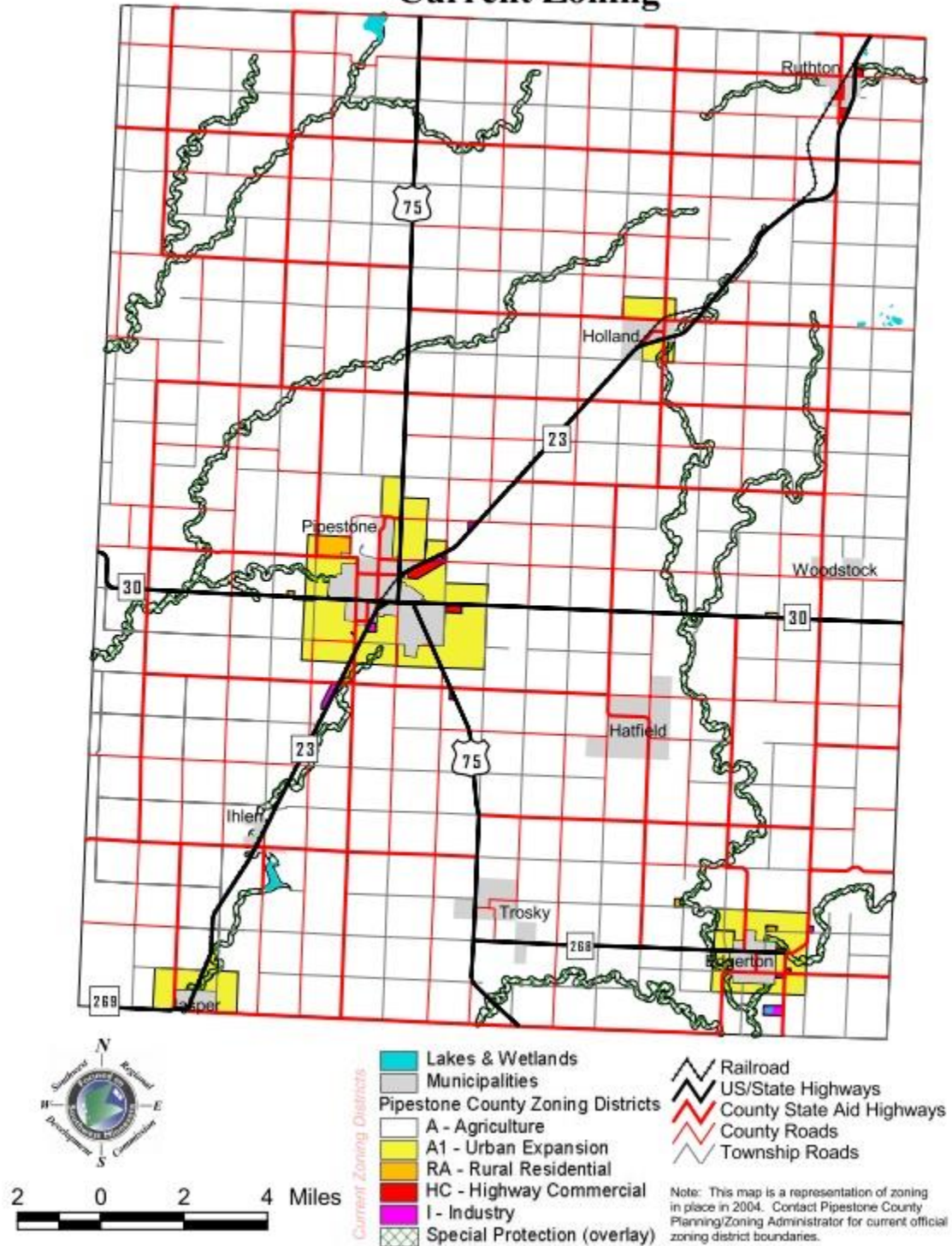
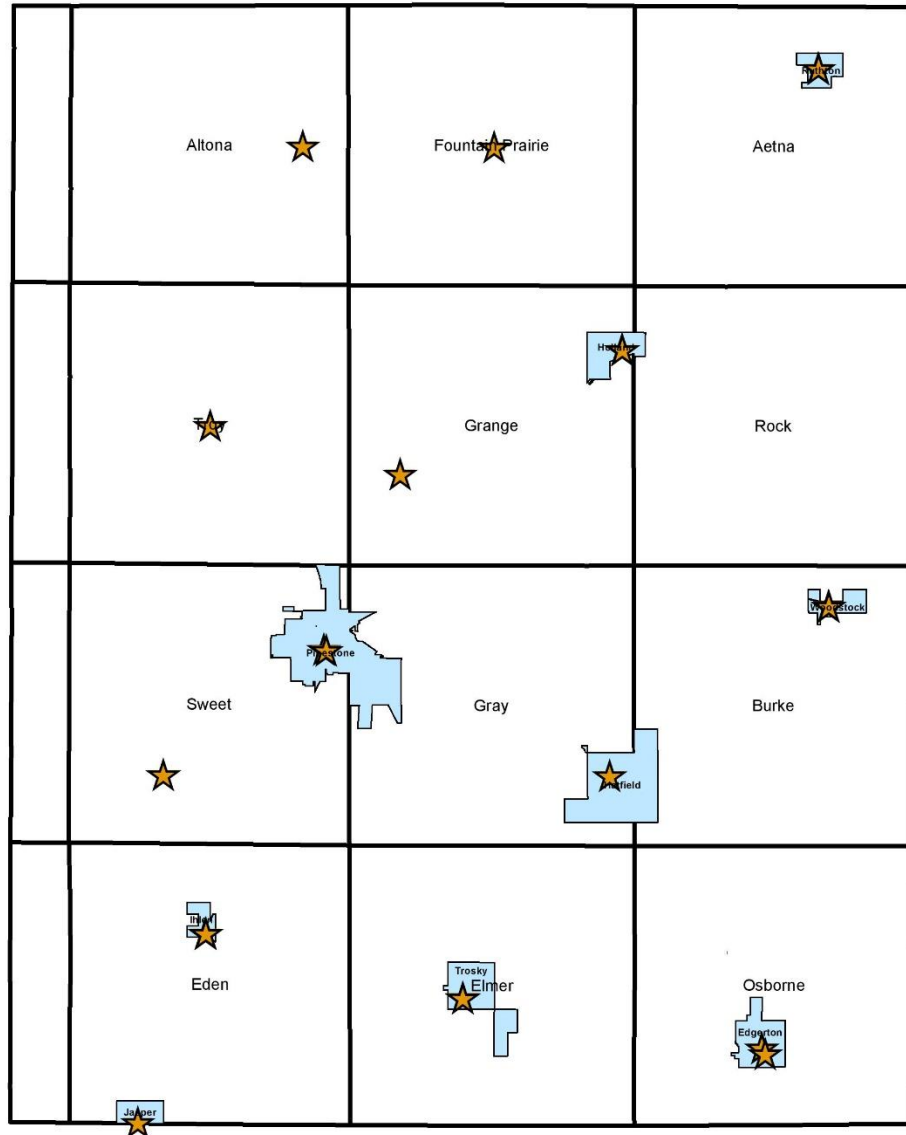


**Figure #37**  
**Township Halls – Pipestone County**

# **Pipestone County Meeting Locations**



★ Township Meeting Locations    Cities    Townships



0 1.5 3 6 9 Miles



Created: 8-25-17, Kyle Krier, Pipestone County



**Figure #38**  
**Ambulance and First Responder Districts – Pipestone County**

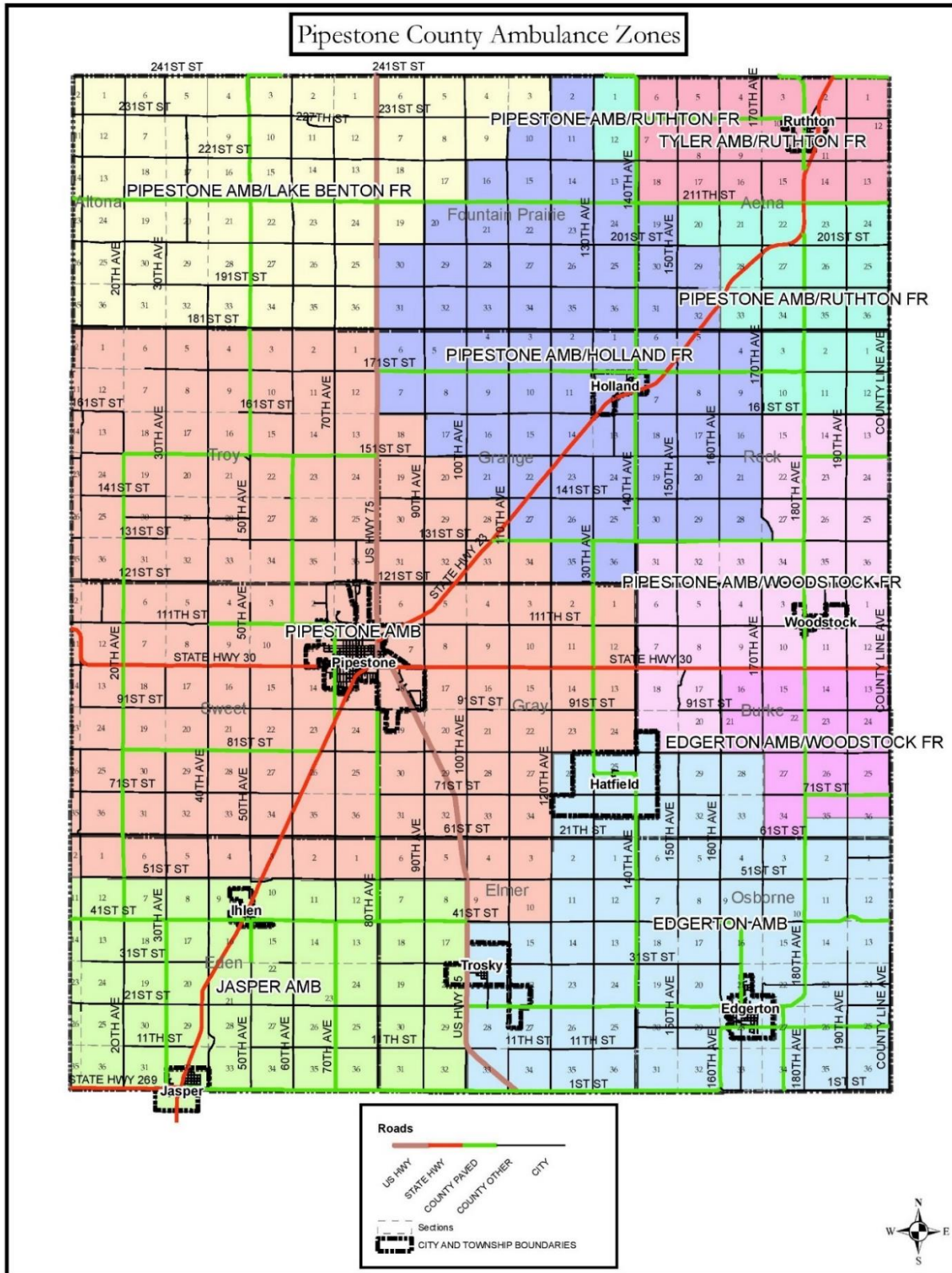
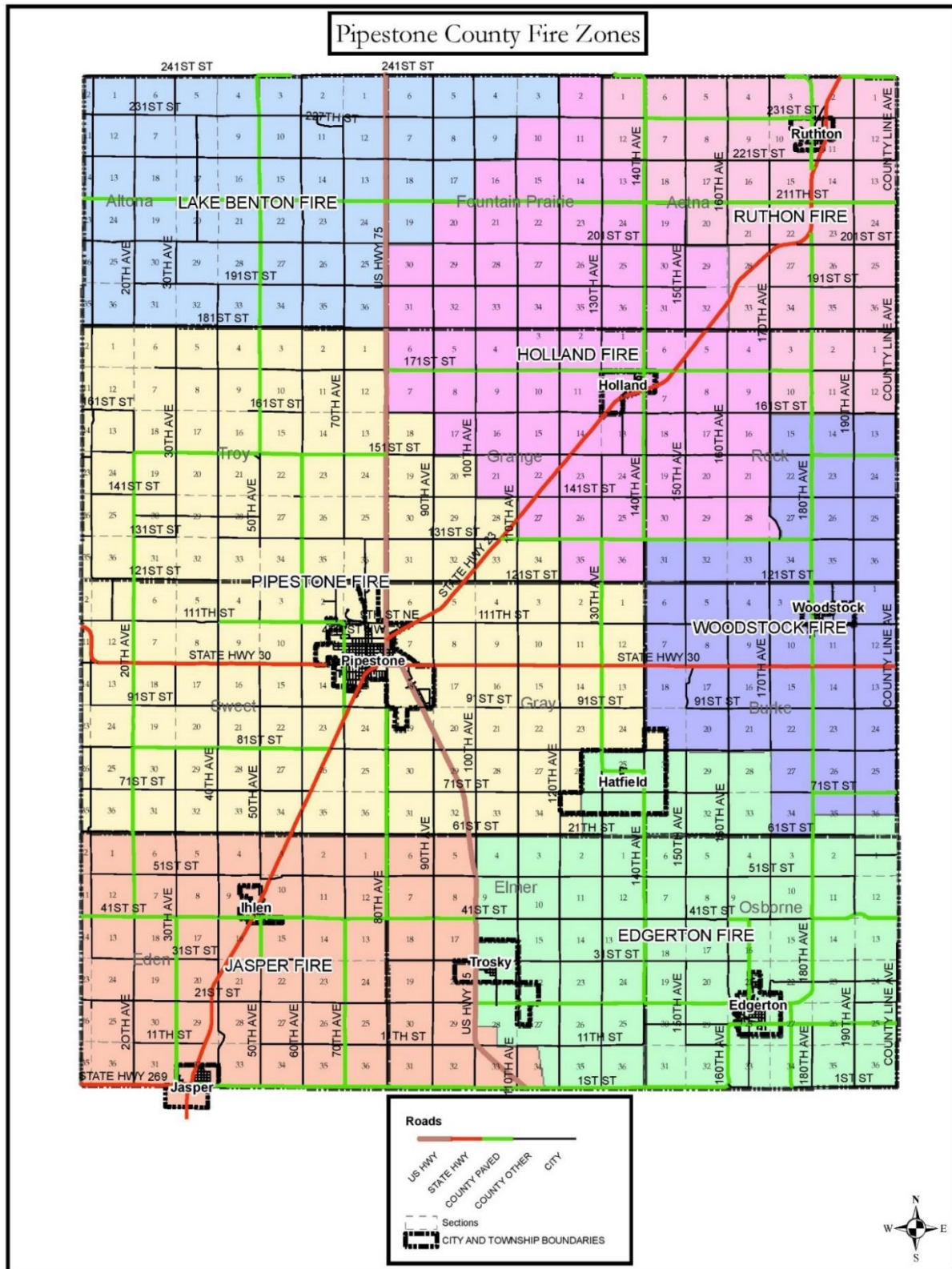


**Figure #39**  
**Fire District Map – Pipestone County**



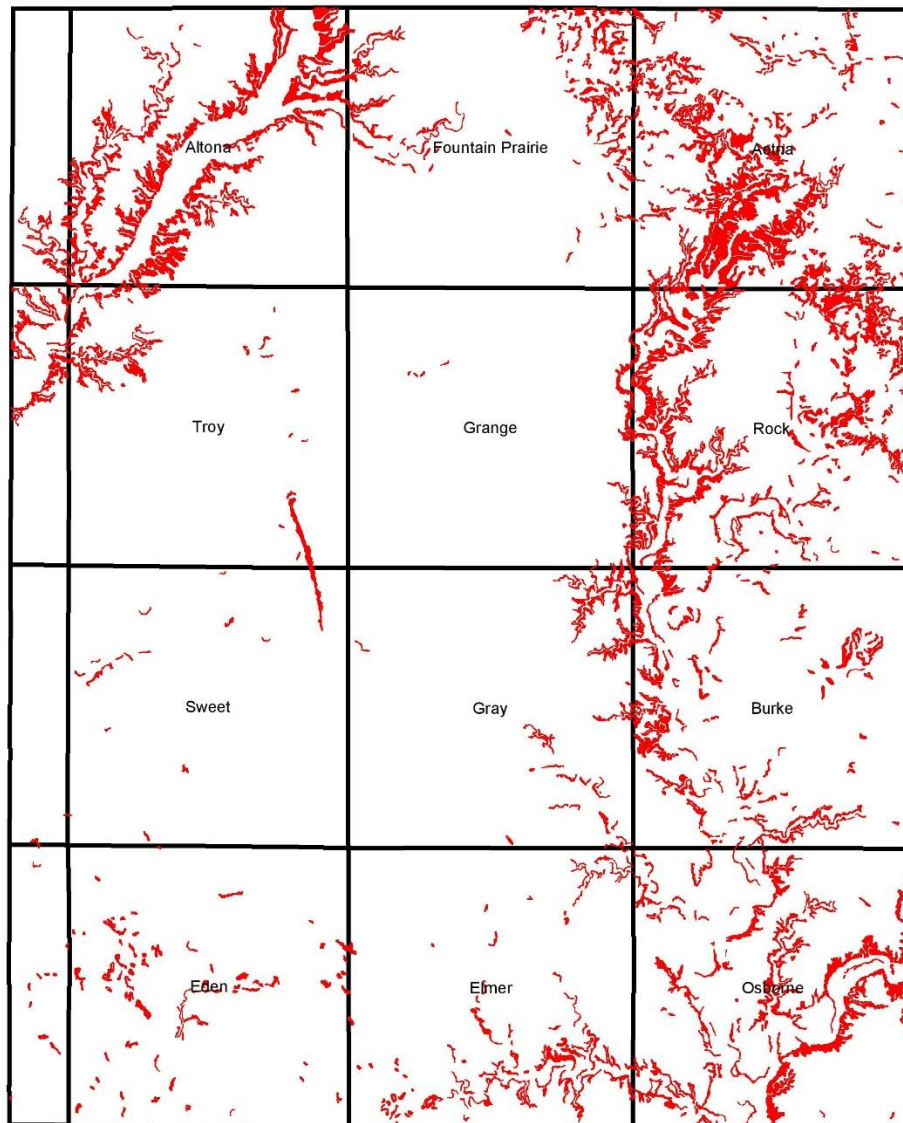


PIPESTONE COUNTY



Figure #71  
Highly Erodible Soils – Pipestone County

## Pipestone County Highly Erodible Soils



Highly Erodible Soils    Townships

0 1.5 3 6 9 Miles



Created: 8-25-17, Kyle Krier, Pipestone County

Figure #89  
Rural Water Distribution Map – Pipestone County

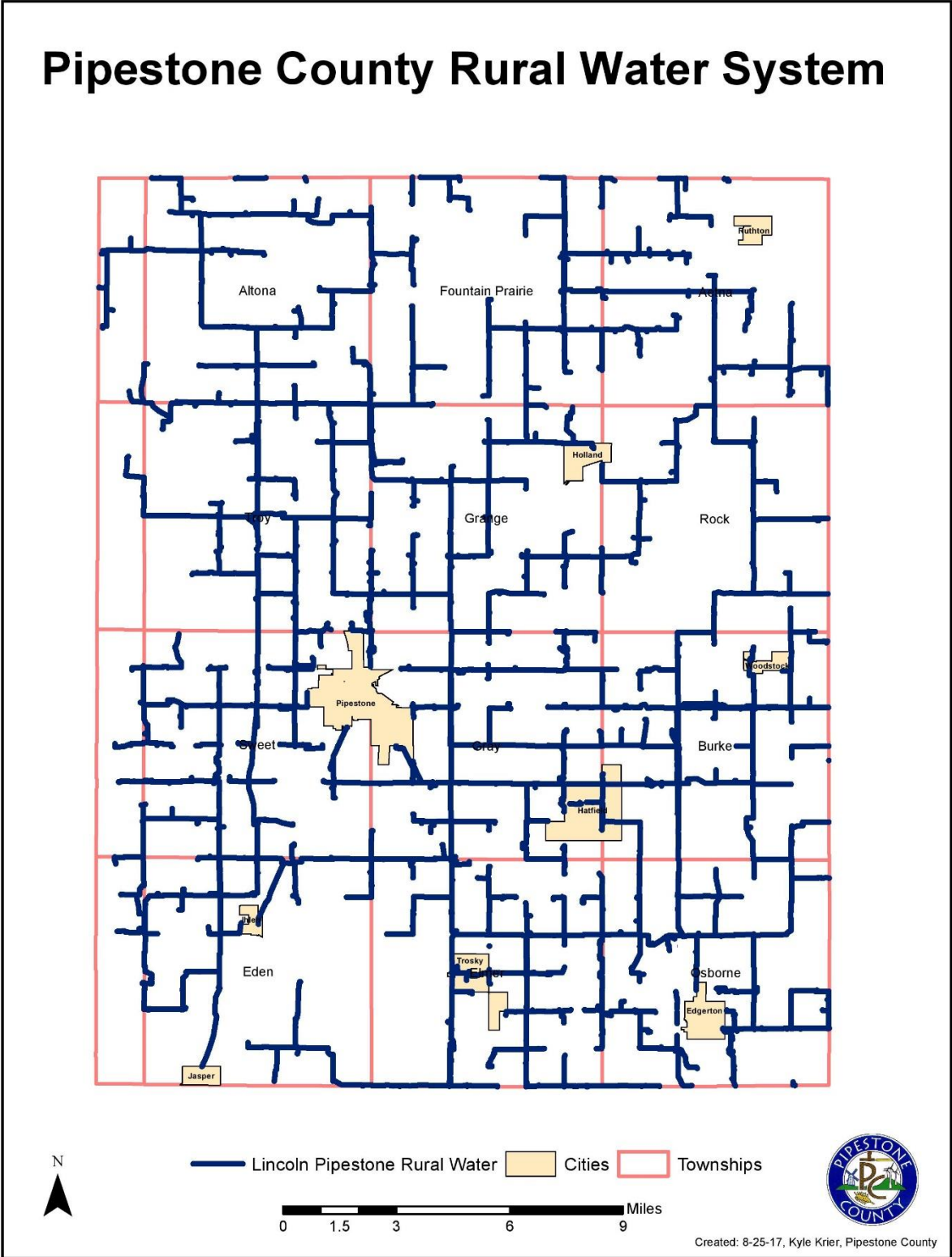


Figure #99  
Feedlots – Pipestone County

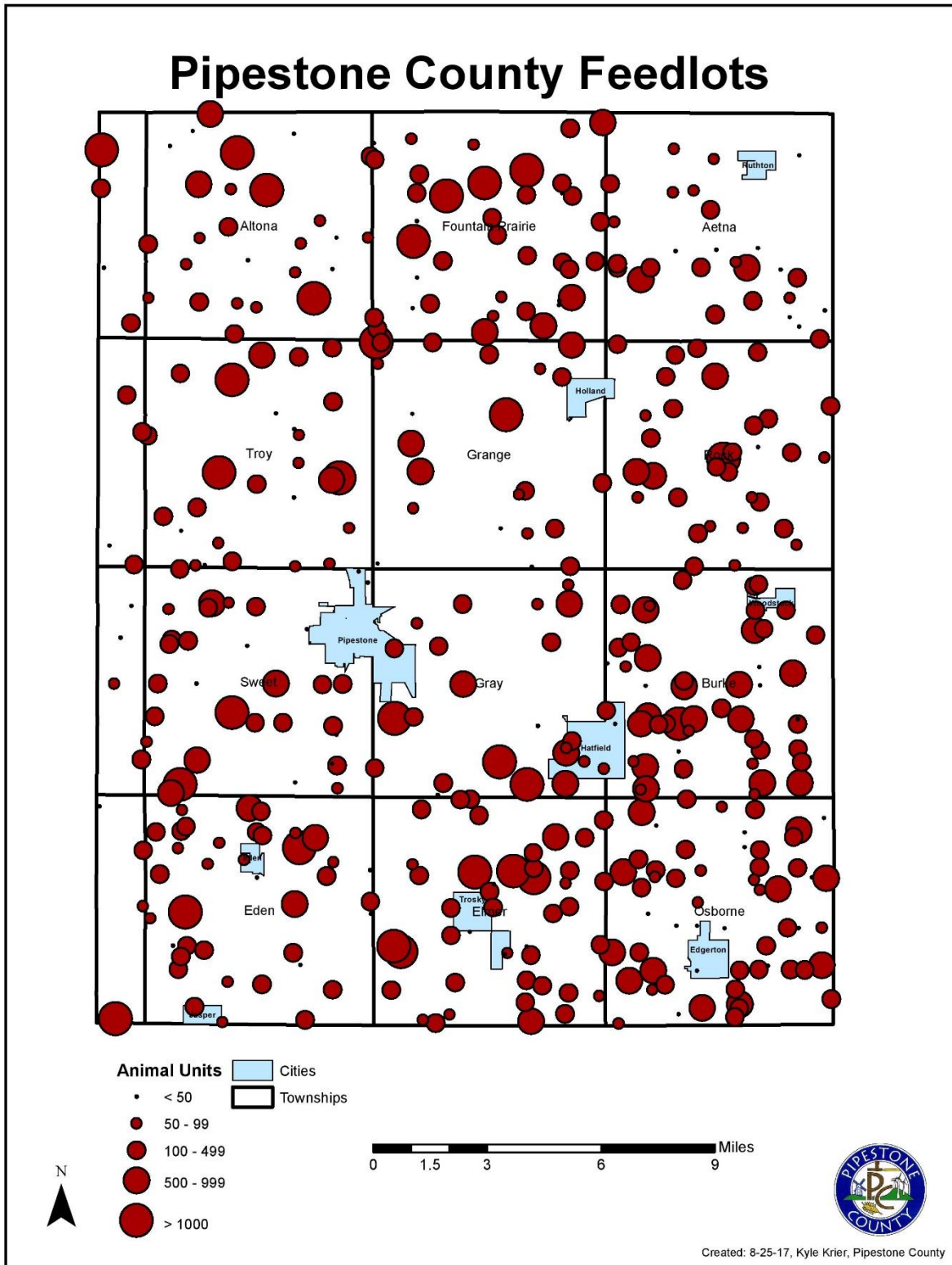




**Figure #101**  
**Dams – Pipestone County**

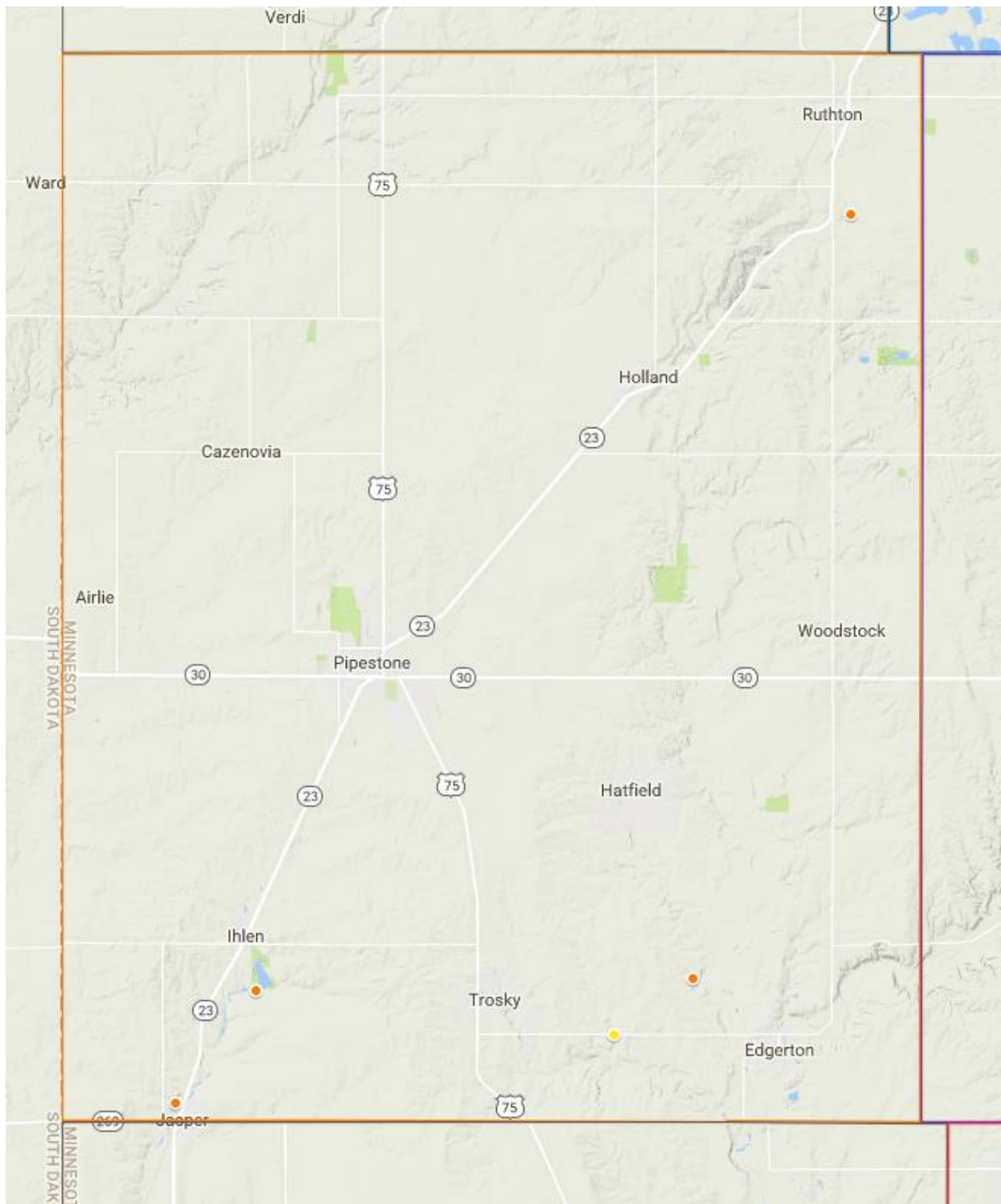


**Figure #102**  
**Hazardous Liquid and Gas Transmission Pipelines – Pipestone County**

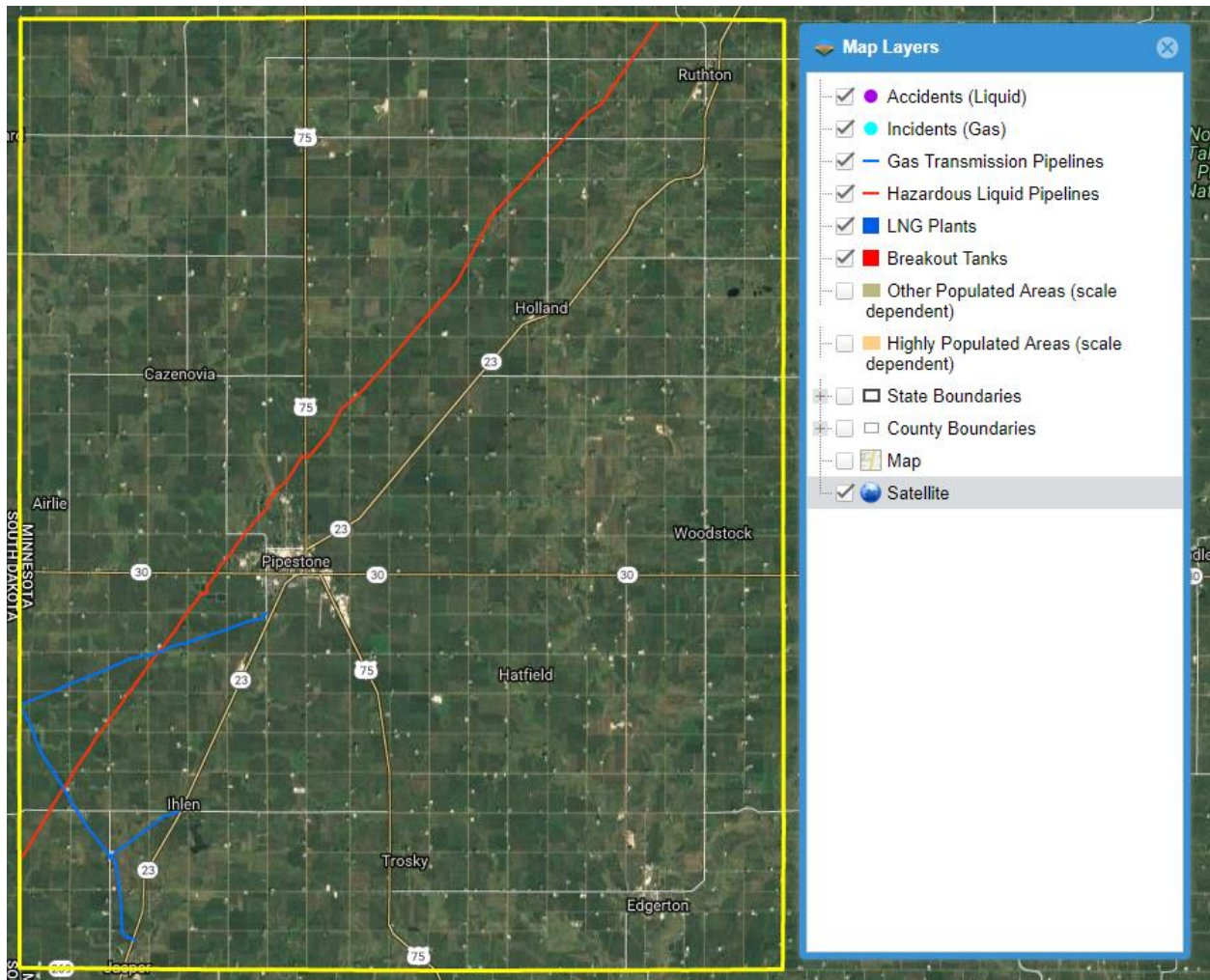
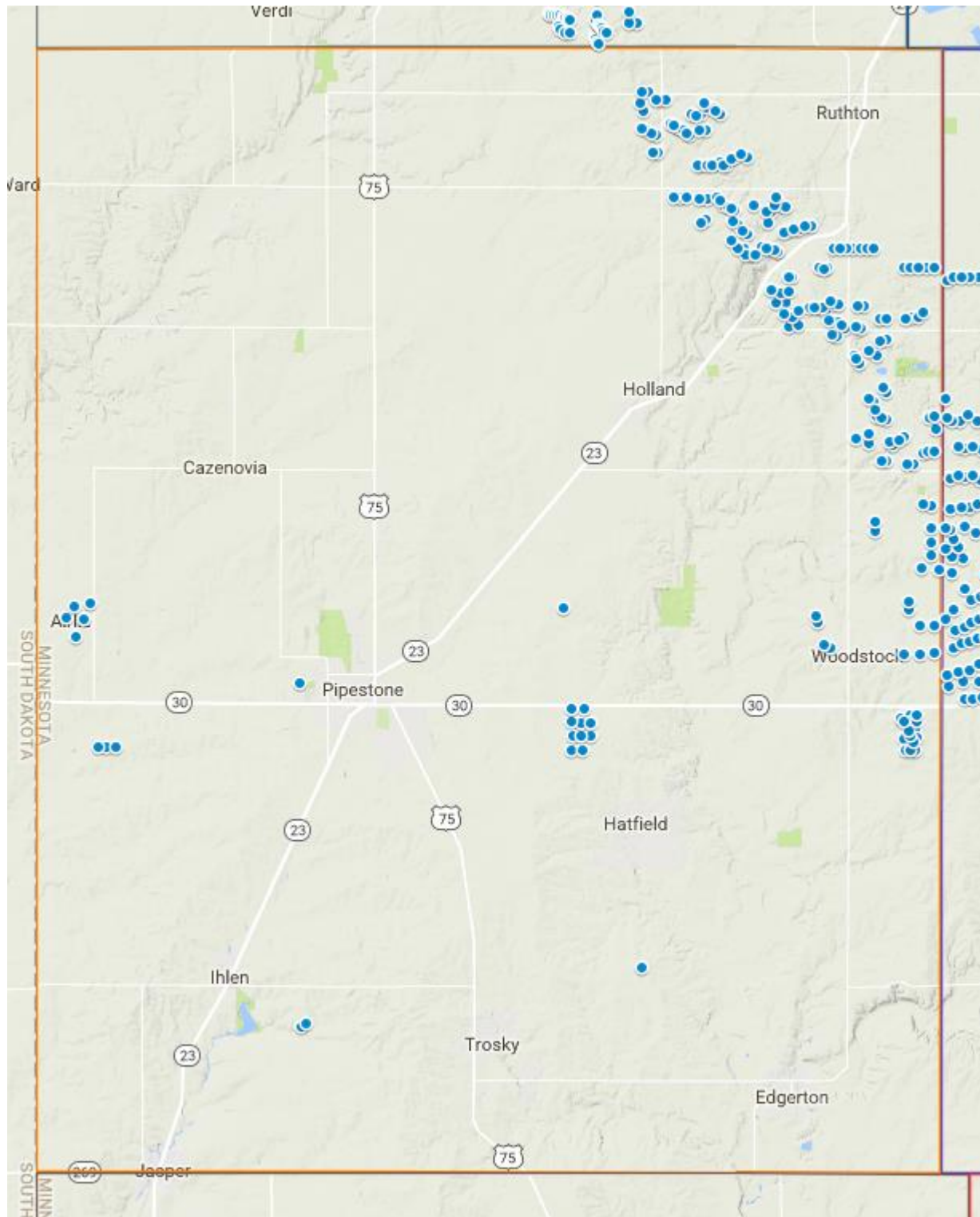


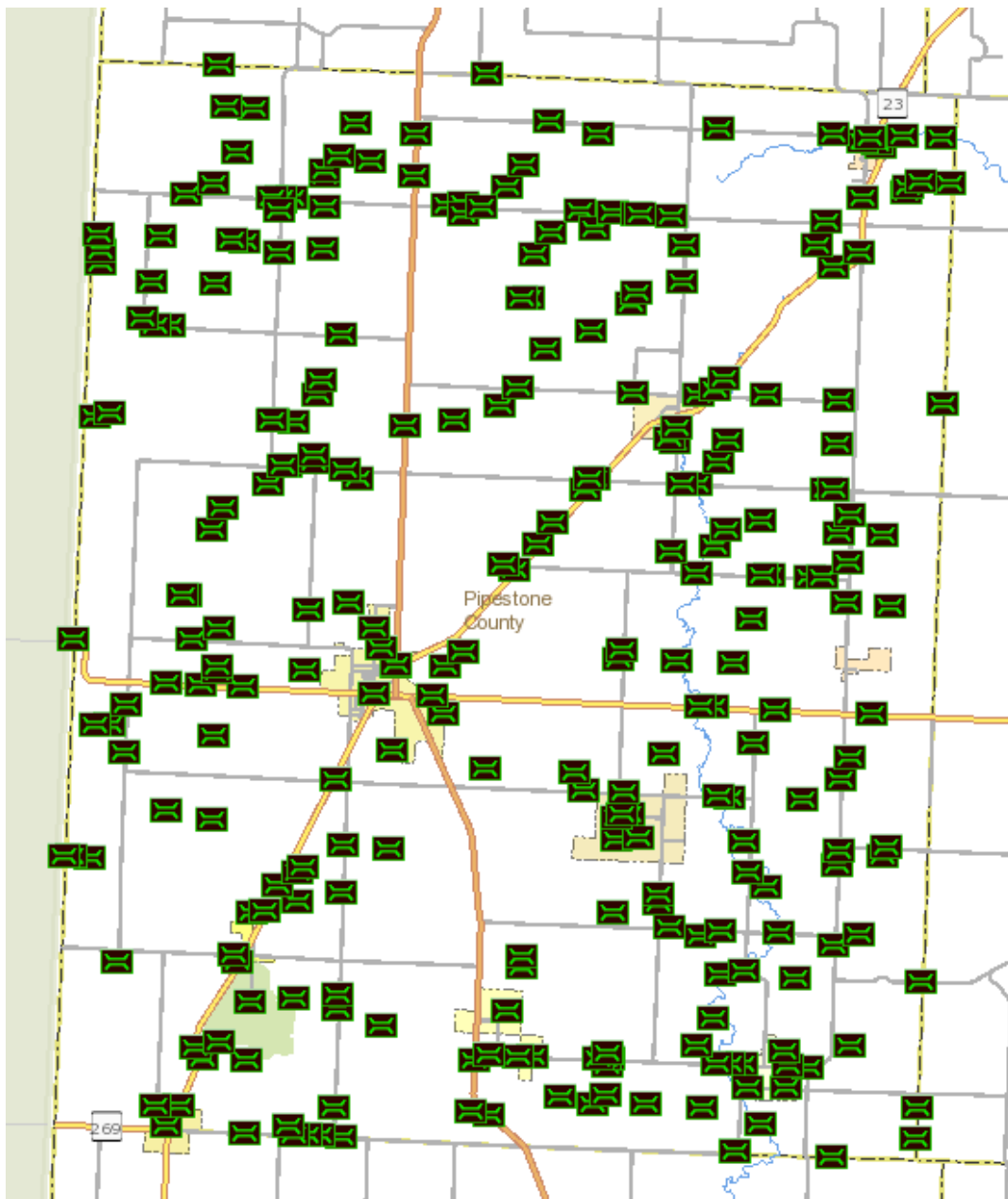
**Figure #103**  
**Wind Towers in Pipestone County<sup>103</sup>**



<sup>103</sup> Source: USGS. Accessed 8/23/2017. Available: <https://eerscmap.usgs.gov/windfarm/>

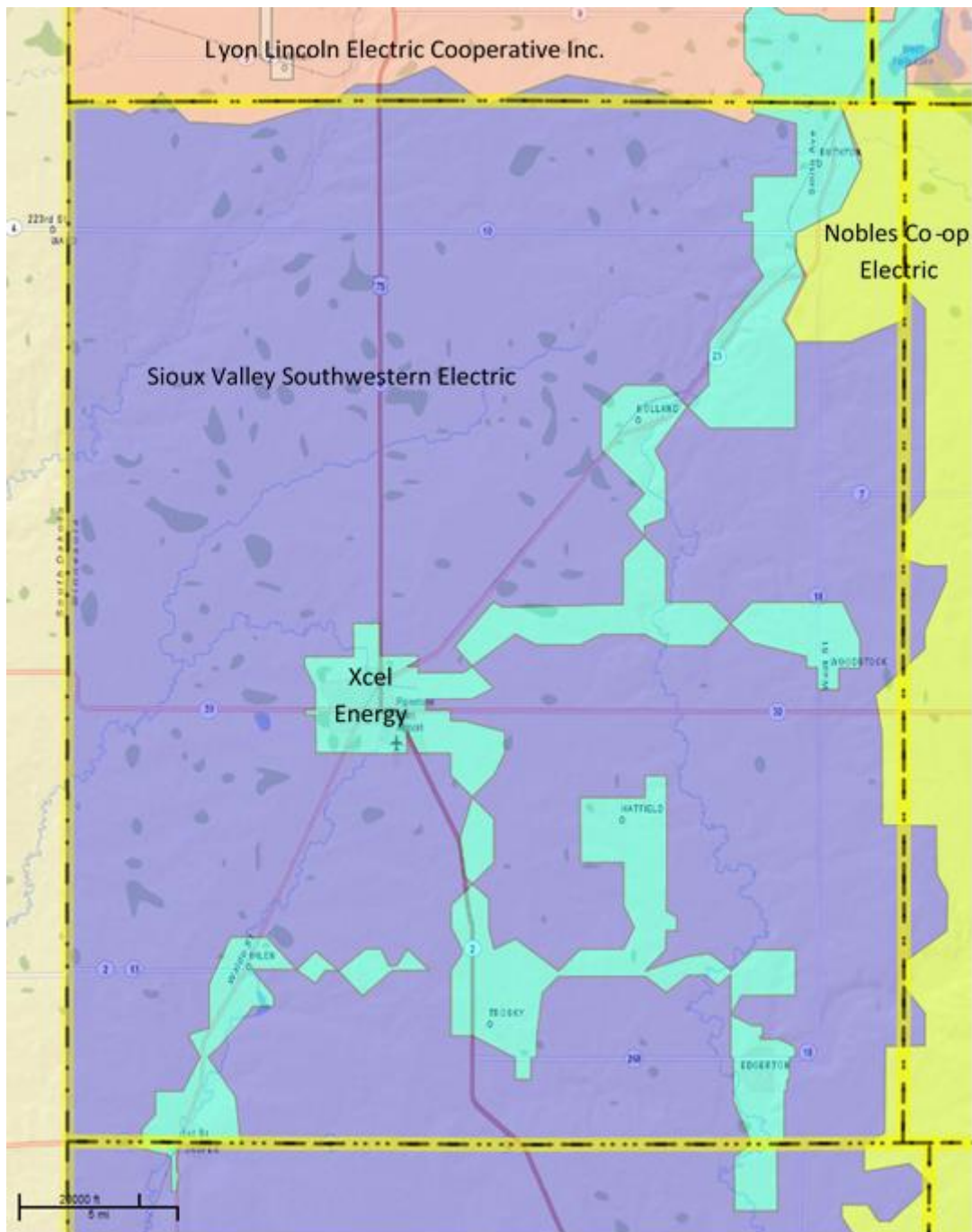


Figure #106  
Bridge Map – Pipestone County<sup>104</sup>



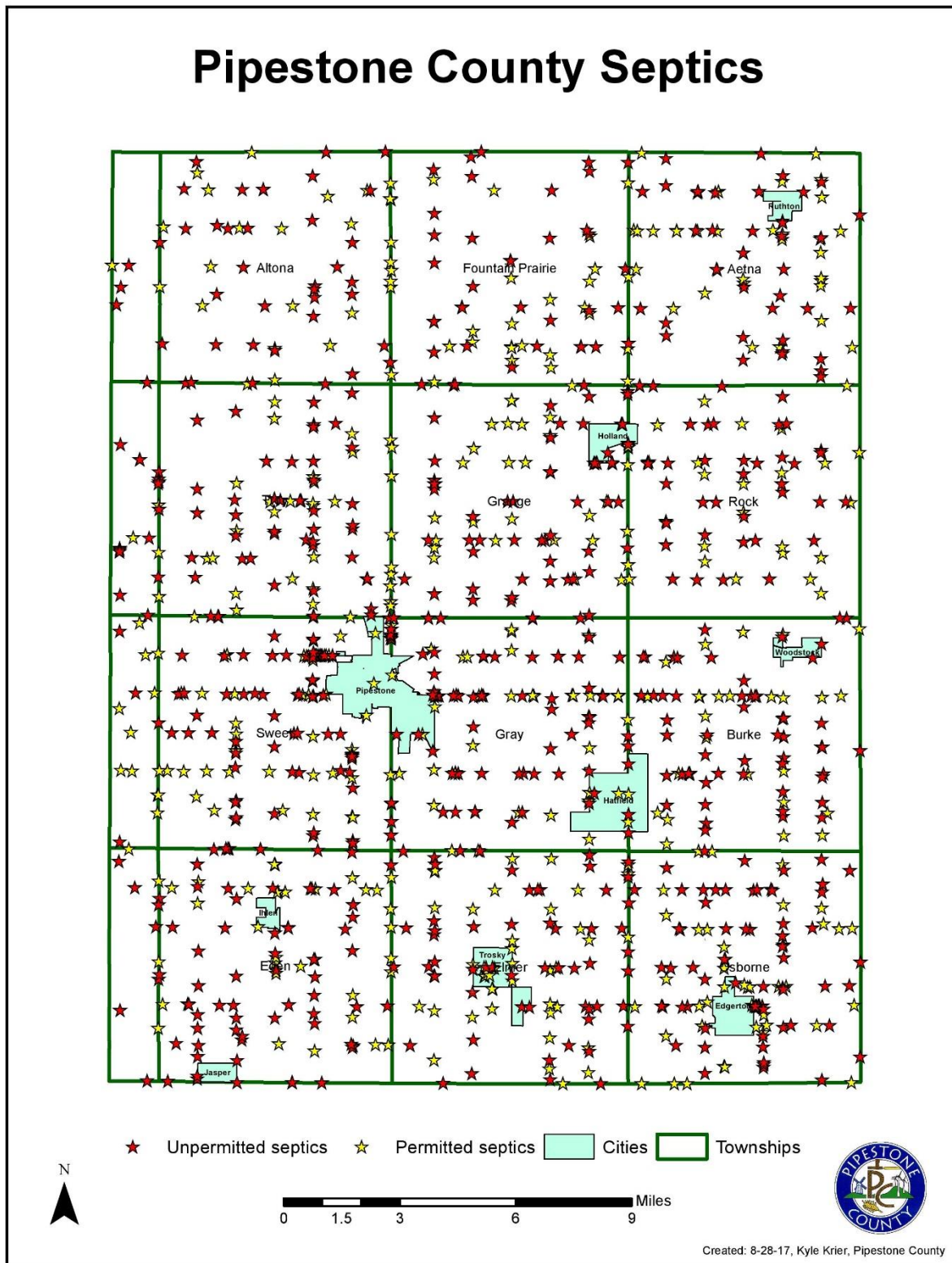
<sup>104</sup> BridgeInfo3 by State Aid and Bridge of MnDOT. Accessed: 8/15/2017. Available: <http://dotapp9.dot.state.mn.us/bridgeinfo3/>

**Figure #109**  
**Electric Utilities – Pipestone County<sup>105</sup>**



<sup>105</sup> <http://www.mngeo.state.mn.us/eusa/index.html>

Figure #112  
 Septic Systems – Pipestone County



# Flood Hazard Analysis for Pipestone County

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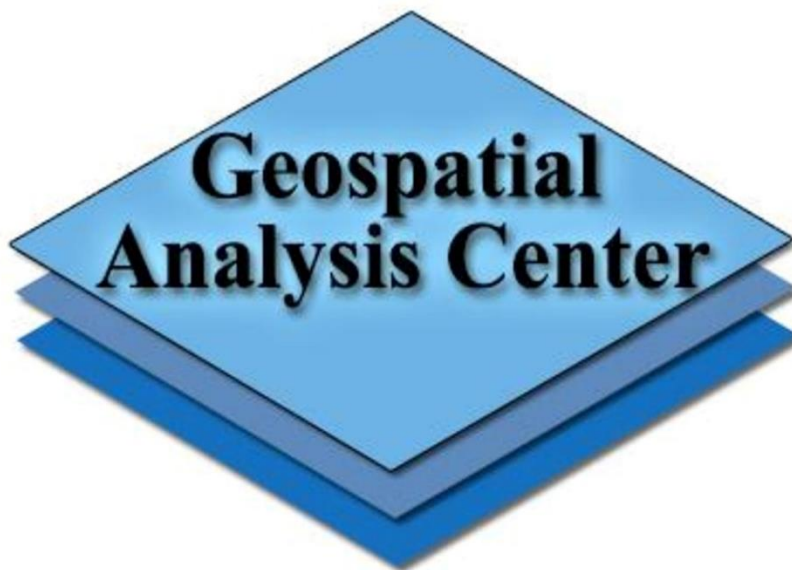
*Prepared for Pipestone County*

*Level II Flood Hazard Analysis performed using FEMA'S Hazus-MH*

**June 2018**

**Contact Information:**

Stacey L. Stark, MS, GISP  
Geospatial Analysis Center  
Swenson College of Science and Engineering  
140 Engr  
1303 Ordean Court  
Duluth, MN 55812  
Email: [slstark@d.umn.edu](mailto:slstark@d.umn.edu)  
Tel: 218-726-7438



## Pipestone County Hazus-MH Hazard Analysis

The University of Minnesota Duluth Geospatial Analysis Center (GAC) performed the hazard risk assessment for 100-year floods using the Hazus-MH GIS tool. In recognition of the importance of planning in mitigation activities, FEMA created **Hazards USA Multi-Hazard** (Hazus-MH), a powerful geographic information system (GIS)-based disaster risk assessment tool. This tool enables communities of all sizes to predict estimated losses from floods, hurricanes, earthquakes, and other related phenomena and to measure the impact of various mitigation practices that might help reduce those losses. The Minnesota Homeland Security and Emergency Management (HSEM) Office has determined that Hazus-MH should play a critical role in Minnesota's risk assessments.

FEMA's Hazus 4.2 in ArcGIS 10.5.1 was used to estimate the potential losses incurred for a 100-year flood event in Pipestone County using a Digital Flood Insurance Rate Map (DFIRM). A 10-meter DEM (digital elevation model) to create a flood depth grid. The resulting HAZUS-MH 100-yr floodplain output is shown in Figure 1.



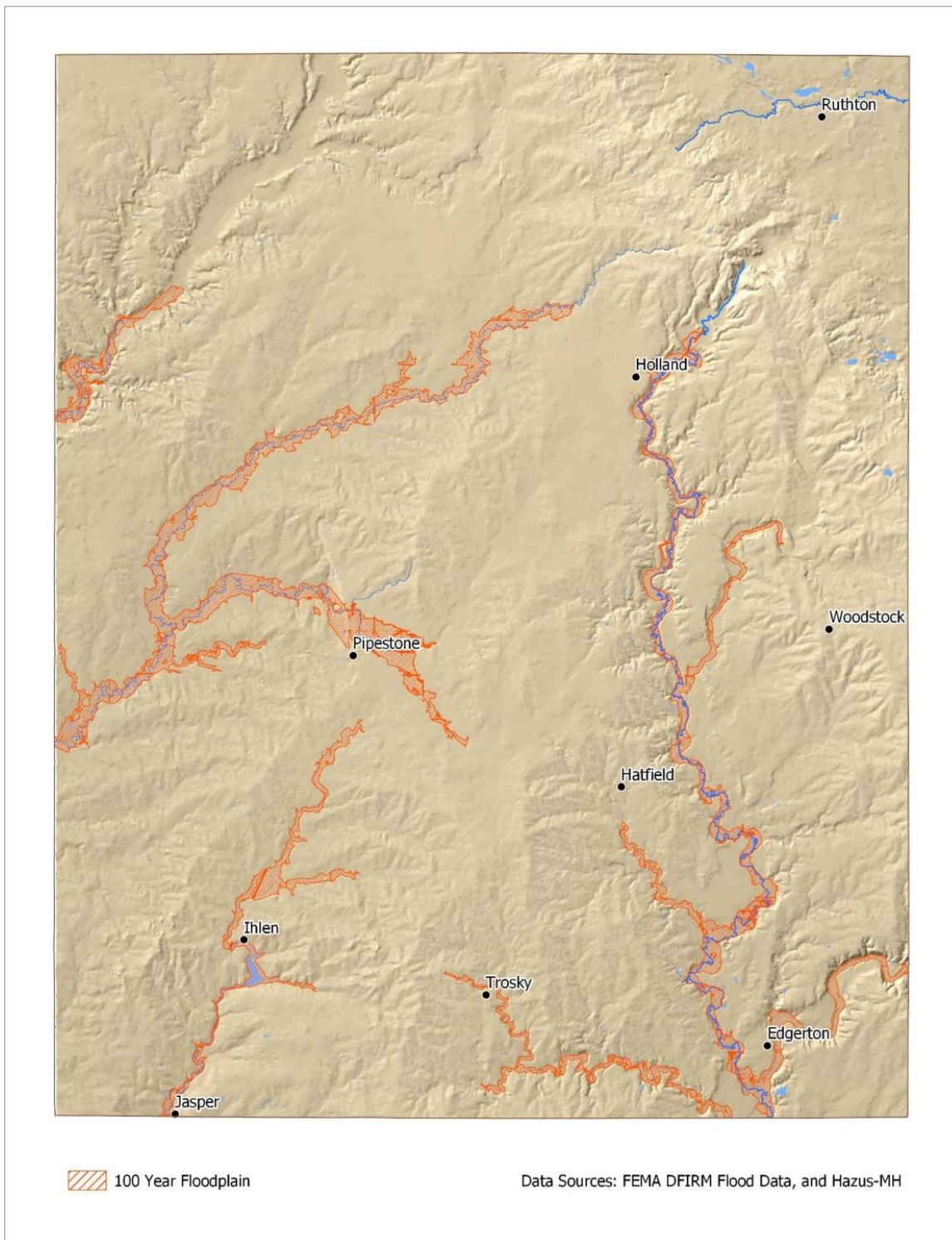


Figure 1. 100-Year Floodplain in Pipestone County

Pipestone County specific building data was sourced from the parcel tax and spatial databases to include building valuations, occupancy class, square footage, year built, and number of stories. A shapefile named ParcelsPipestone.shp (Occupancy class and building value) was obtained from the county to locate buildings within the county. Additionally, an attribute file named Pipestone County Flood Building Data .xlsx (residential stories, square footage, and year built), was used and supplemented with regional averages where values were missing. The resulting spatial dataset included 8,016 unique parcel numbers, 4,963 of these records were identified as having building values and were used in the analyses.

In cases where building value, year built, or number of stories were missing, values were assigned based on best practices from values in the other variables and from the region. Square footage was not available for non-residential building records, so building polygons derived from LiDAR (from the Minnesota GeoCommons) were intersected with the parcel outlines to total building square footage and used average values/square foot by occupancy class from a neighboring county to estimate square footage. The data were then assigned to one parcel centroid or building location, which served as a surrogate for the each parcel's buildings to aggregate to the associated census block for use in the Hazus model.

According to the Pipestone County general building stock (derived from the county's parcel data and imported to the Hazus model), the Hazus model estimates there are 4,963 parcels with buildings in the region with a total replacement value (excluding contents) of \$600 million (2010 dollars). Approximately 66% of the buildings (and 38% of the building value) are associated with residential housing. The Hazus model estimated 34 parcels' buildings will be at least moderately damaged (>10% damage). Zero buildings are estimated to be completely destroyed.

The total economic loss estimated for the flood is \$50.48 million dollars, which represents 44.6% of the total replacement value of the buildings exposed, because the census block in which they reside is in the 100-year floodplain. Building losses are broken into 2 categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood. The total building-related losses were \$10.27 million dollars. 80% of the estimated losses were related to the business interruption of the region. Residential occupancies made up 12% of the total loss.

The reported building counts should be interpreted as degrees of loss rather than an exact number of buildings exposed to flooding. These numbers were derived from aggregate building inventories which are assumed to be dispersed evenly across census blocks. Hazus requires that a predetermined amount of square footage of a typical building sustain damage in order to produce a damaged building count. If only a minimal amount of damage to buildings is predicted, it is possible to see zero damaged building counts while also seeing economic losses.

The total estimated number of damaged buildings (parcels as a surrogate), total building losses, and estimated total economic losses for the countywide 100-year flood are shown in Table 1. The distribution of economic losses for Pipestone County is depicted in Figure 2.



| General Occupancy    | Estimated Total Buildings | Total Damaged Buildings | Total Building Exposure | Total Economic Loss | Building Loss      |
|----------------------|---------------------------|-------------------------|-------------------------|---------------------|--------------------|
| Agricultural         | 1051                      | 0                       | \$160,340,000           | \$17,436,000        | \$575,000          |
| Commercial           | 376                       | 5                       | \$49,776,000            | \$5,999,000         | \$143,000          |
| Education            | 21                        | 0                       | \$55,006,000            | \$0                 | \$0                |
| Government           | 100                       | 0                       | \$37,347,000            | \$17,623,000        | \$227,000          |
| Industrial           | 52                        | 0                       | \$26,202,000            | \$939,000           | \$116,000          |
| Religious/Non-Profit | 78                        | 0                       | \$41,286,000            | \$2,399,000         | \$61,000           |
| Residential          | 3,285                     | 45                      | \$229,679,000           | \$6,084,000         | \$1,575,000        |
| <b>Total</b>         | <b>4,963</b>              | <b>50</b>               | <b>\$599,636,000</b>    | <b>\$50,480,000</b> | <b>\$2,697,000</b> |

*Table 1. Pipestone County Total Economic Loss from 100-Year Flood*

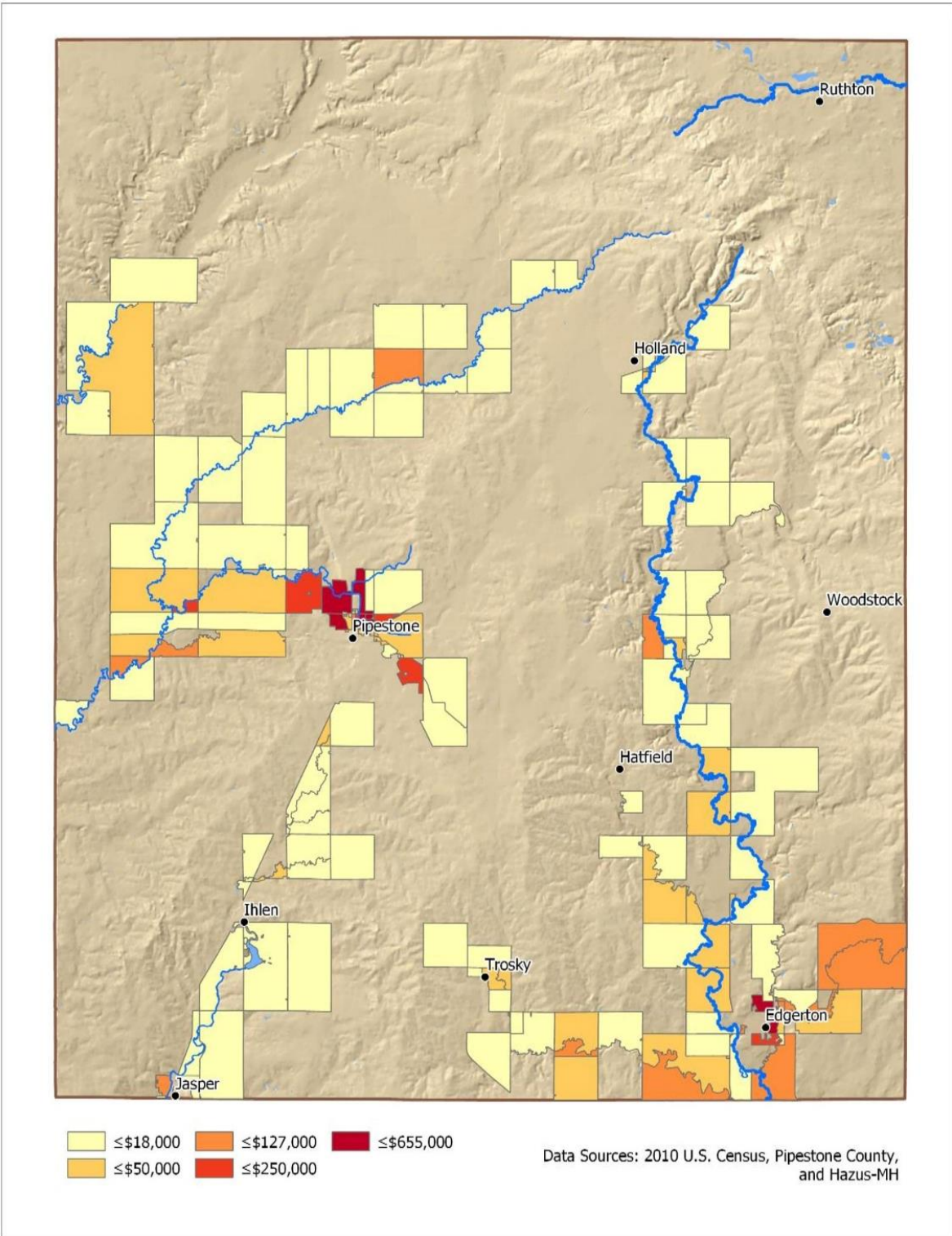


Figure 2. Estimated Economic Building-Related Loss by Census Block within the 100-Year Floodplain



The three most populated cities with a potential economic loss are displayed in Figure 3, Figure 4, and Figure 5.

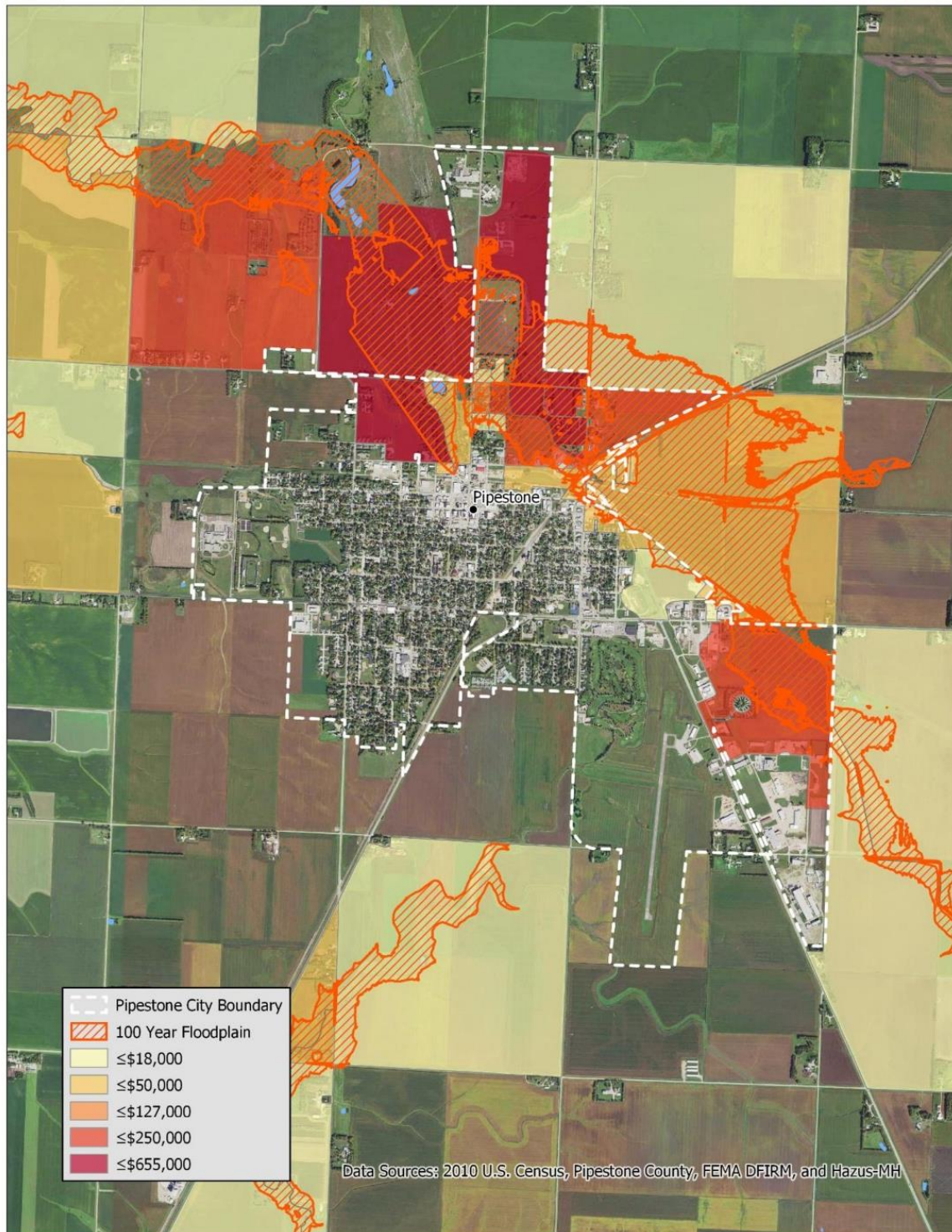


Figure 3. 100-Year Flood Building-Related Loss Estimates in Pipestone



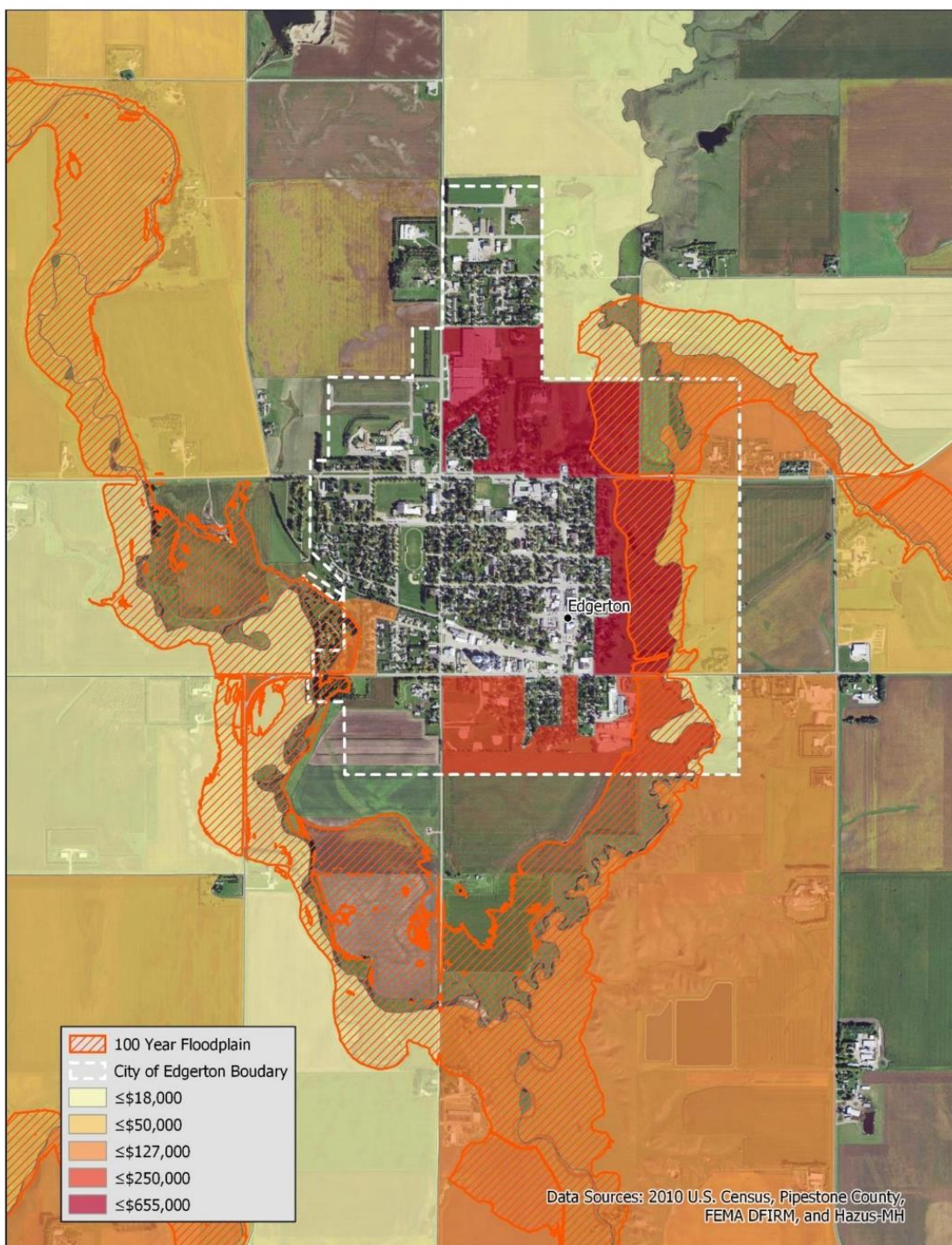


Figure 4. 100-Year Building-Related Flood Loss Estimates in Edgerton

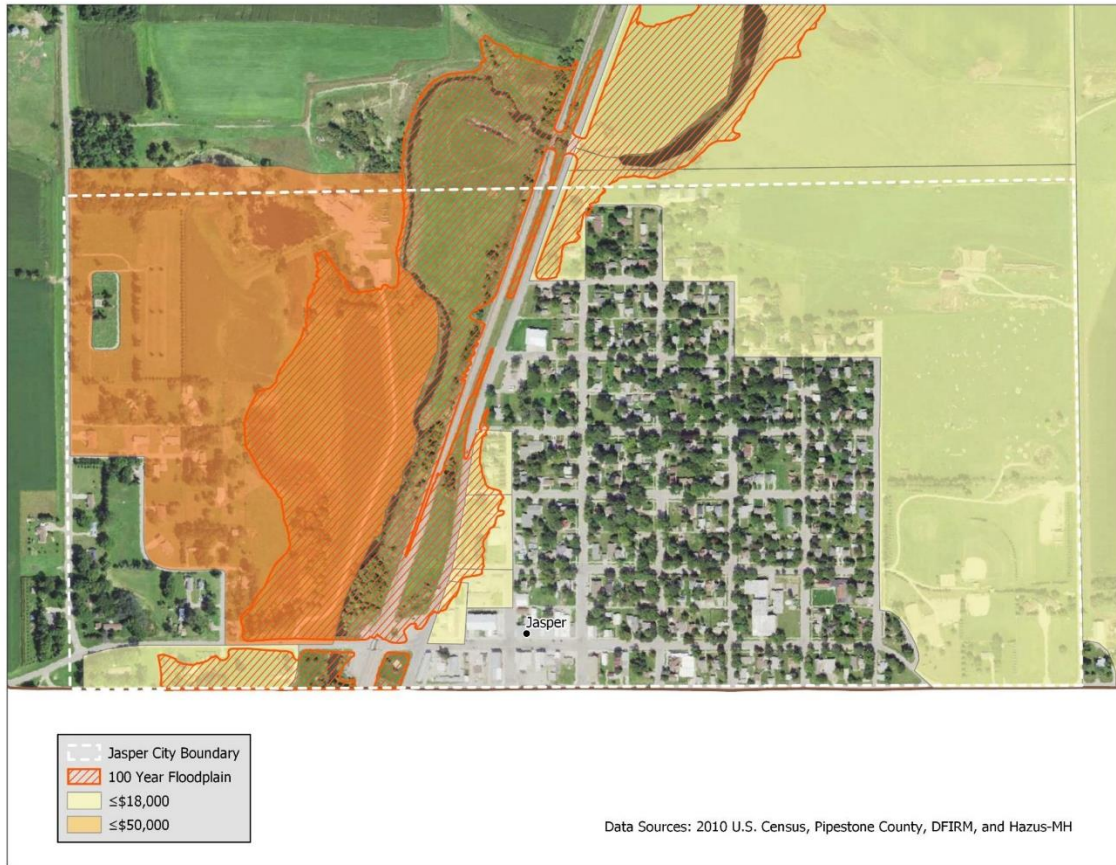


Figure 5. 100-Year Building-Related Flood Loss Estimates in Jasper



Census blocks of concern should be reviewed in more detail to determine the actual location and proximity of facilities with respect to the flood hazard areas. The aggregate losses reported in this study may be overstated due to the fact that values are distributed evenly across a census block. The 3 census blocks with the greatest estimated loss values (calculated by adding the total value of the buildings + the value of the buildings' contents located within a census block), which contain parcels with buildings located within the floodplain, are shown in Table 2. These potentially high loss census blocks, used for the loss estimation, and the Hazus-MH output floodplain are shown in Figure 6, Figure 7, and Figure 8. In some cases, the assets of value may not fall in the floodplain in the same proportion that the floodplain covers the entire census block. For this reason, some potential losses may be overstated.

| Census Block Number | Total Estimated Loss<br>(Building's Value & Contents) | Location  |
|---------------------|-------------------------------------------------------|-----------|
| 271174602002001     | \$655,000                                             | Pipestone |
| 271174605002009     | \$464,000                                             | Edgerton  |
| 271174602002010     | \$443,000                                             | Pipestone |

Table 2. Census Blocks with the greatest estimated losses in the 100-Year Floodplain

An additional analysis was performed to identify the 10 parcels with the highest values (building + contents) that contain buildings which intersect the 100-year floodplain. Some of the parcels are located in one of the 3 census blocks with the greatest estimated loss; these parcels are labeled accordingly. The results of this analysis (and total building values) are shown in Table 3.

| Parcel ID    | Total Value of Building(s) +<br>Building's Contents on Parcel | Class Description | Building<br>Area (ft <sup>2</sup> ) |
|--------------|---------------------------------------------------------------|-------------------|-------------------------------------|
| 11.001.0250  | \$2,460,000                                                   | GOV1              | 17,361                              |
| 18.112.0311  | \$1,509,200                                                   | REL1              | 15,326                              |
| 18.395.0400  | \$1,033,000                                                   | IND2              | 665                                 |
| 18.112.4000  | \$817,200                                                     | COM1              | 4,507                               |
| 11.007.0200  | \$720,600                                                     | AGR1              | 36,704                              |
| 18.007.1410  | \$702,000                                                     | IND2              | 2,165                               |
| 18.112.3300  | \$572,200                                                     | COM1              | 14,636                              |
| 09.020.0400  | \$446,400                                                     | AGR1              | 15,544                              |
| 09.033.0100  | \$402,150                                                     | RES1              | 4,185                               |
| 04.029.0300  | \$389,700                                                     | RES1              | 7,031                               |
| <b>Total</b> | <b>9,052,450</b>                                              |                   |                                     |

Table 3. Pipestone County Properties with Highest Building/Contents Value with Potential Building Flood Damage

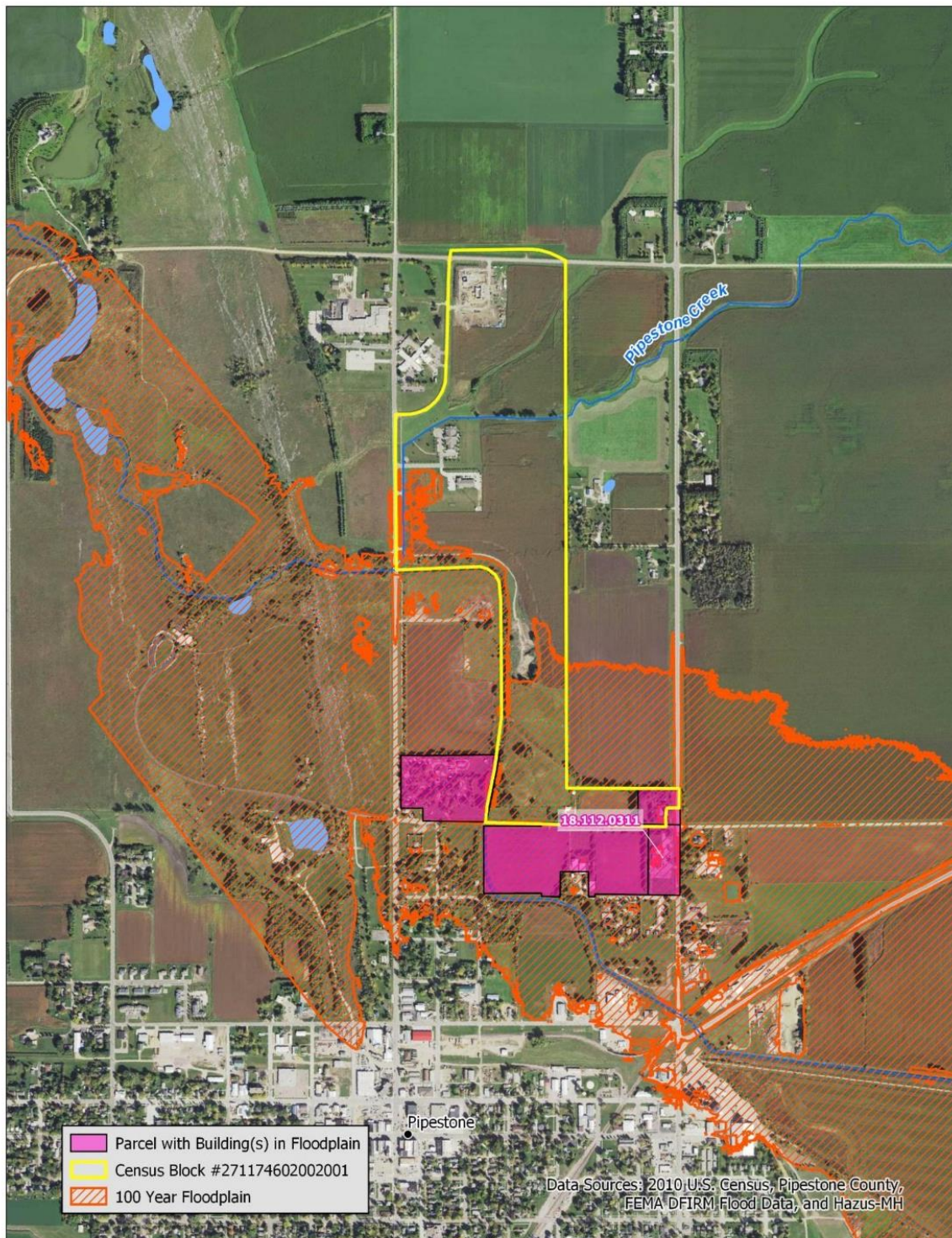


Figure 6. Census Block #271174602002001 and 100-Year Floodplain, Pipestone



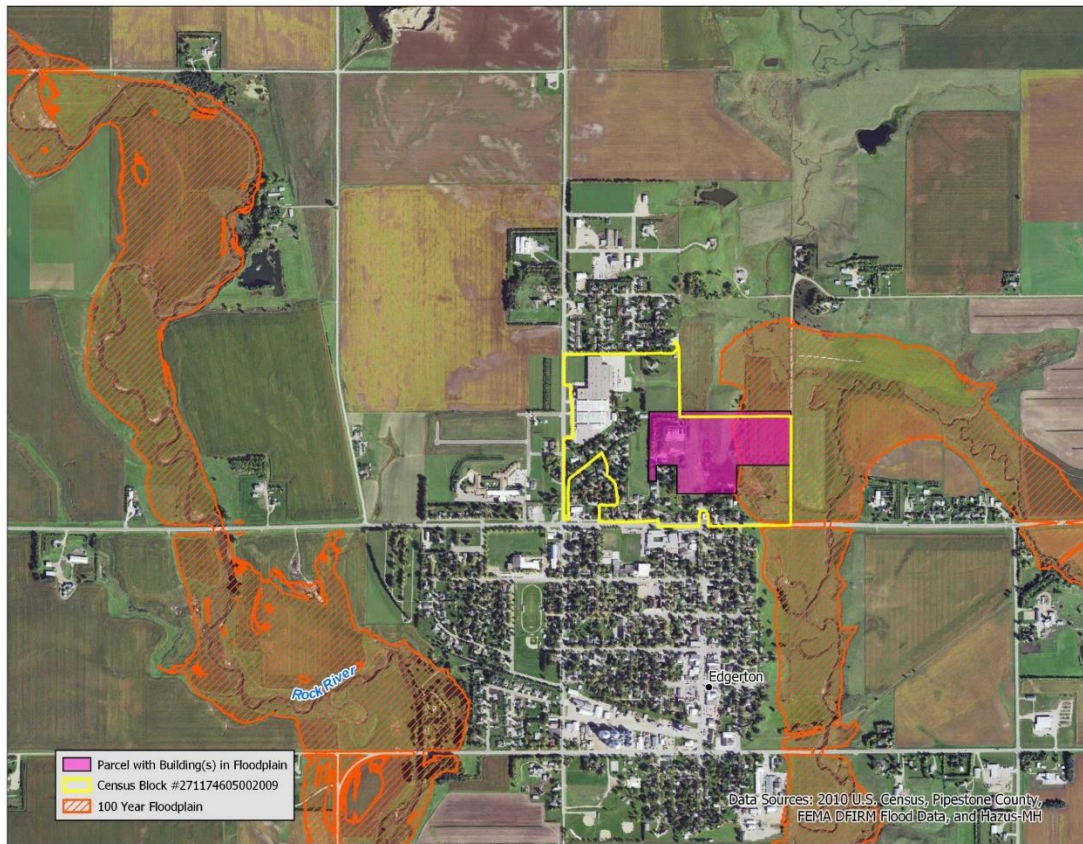


Figure 7. Census Block #271174605002009 and 100-Year Floodplain, Edgerton

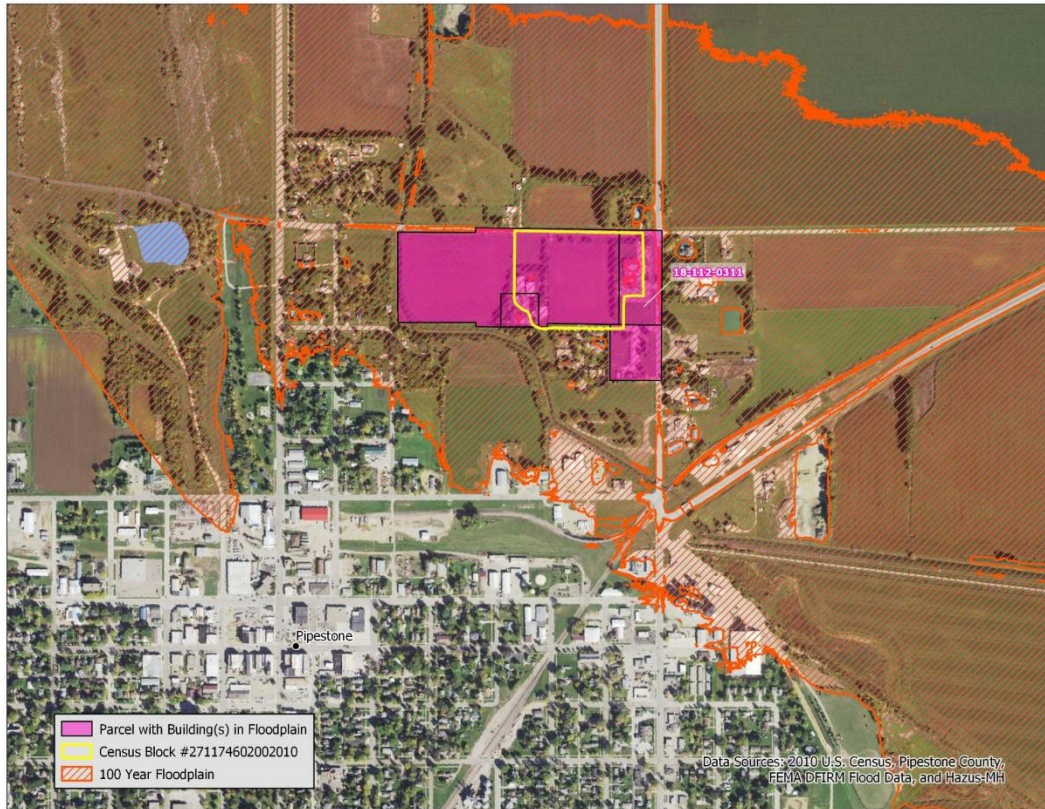


Figure 8. Census Block #271174602002010 and 100-Year Floodplain, Pipestone



## Hazus-MH Essential Facility Loss Analysis

Essential facilities encounter the same impacts as other buildings within the flood boundary: structural failure, extensive water damage to the facility, and loss of facility functionality (i.e. a damaged police station will no longer be able to serve the community). One of Pipestone County's essential facilities (care facilities, fire stations, police stations, and schools) included in the Hazus-MH analysis fall within the flood boundary.

Table 4. Pipestone County Essential Facilities within estimated 100-Year Flood Boundary

| Type           | Name                                     | Site Address       | City      |
|----------------|------------------------------------------|--------------------|-----------|
| Police Station | National Park Service – Pipestone Nation | 36 Reservation Av. | Pipestone |

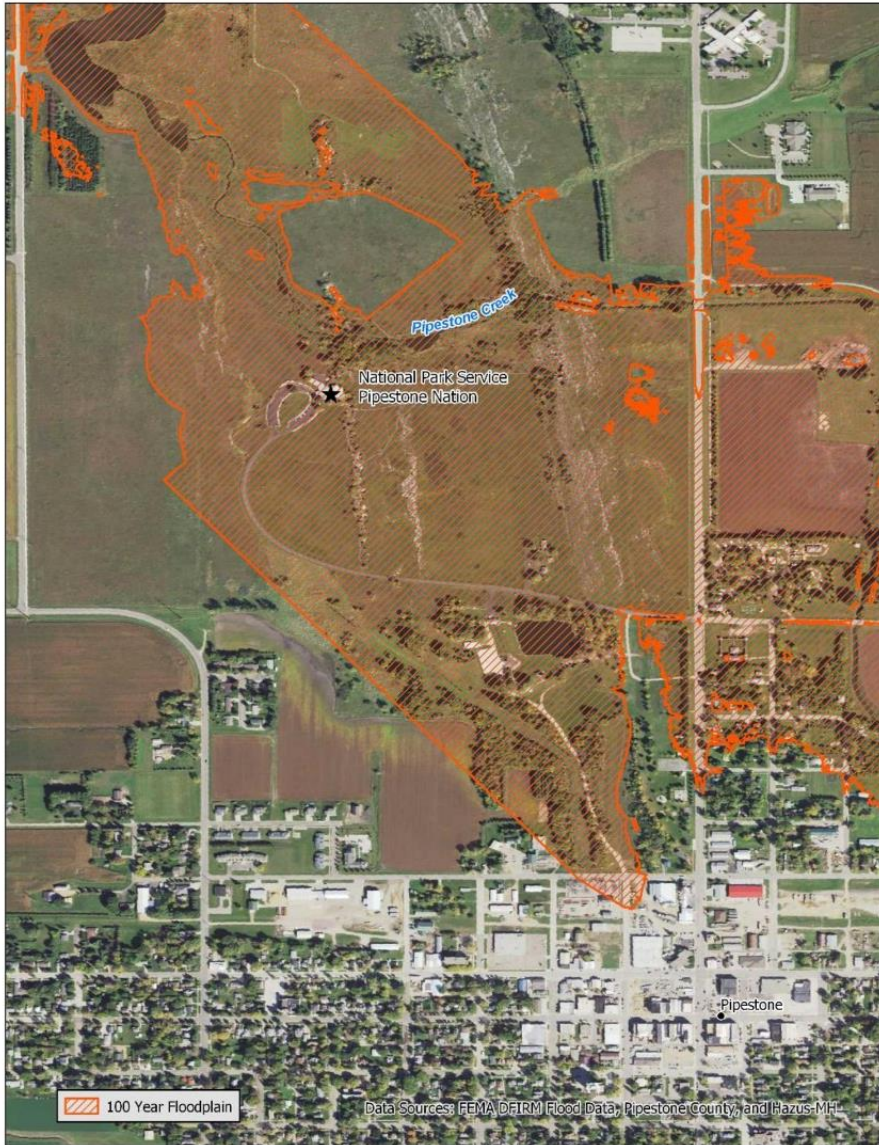


Figure 9. Pipestone County Essential Facilities in 100-Year Floodplain

## **Hazus-MH Shelter Requirement Analysis**

Hazus-MH estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus-MH also estimates those displaced people that may require accommodations in temporary public shelters. The countywide 100-year flood model estimates 106 households may be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, the model estimates 6 people (out of 9,596) may seek temporary shelter in public shelters.

## **Hazus-MH Debris Generation Analysis**

Hazus estimates the amount of debris that may be generated by the flood. The countywide 100-year flood model breaks debris into 3 general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.

The model estimates that a total of 1,790 tons of debris may be generated. Of the total amount, Finishes comprises 72% of the total, Structure comprises 16% of the total, and Foundation comprises 12%. If the debris tonnage is converted into an estimated number of truckloads, it will require 72 truckloads (@25 tons/truck) to remove the debris generated by the flood.

## **Appendix B - Pipestone County Hazard Events**

The National Climatic Data Center Database was queried for all notable events through December 2018. However, some categories of events do not have records prior to 1996.

**Figure B-1: All blizzard events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type     | Deaths | Injuries | Property Damage |
|------------------|------------|----------|--------|----------|-----------------|
| PIPESTONE (ZONE) | 01/17/1996 | Blizzard | 0      | 0        | 20.00K          |
| PIPESTONE (ZONE) | 03/24/1996 | Blizzard | 0      | 0        | 10.00K          |
| PIPESTONE (ZONE) | 12/16/1996 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/04/1997 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/09/1997 | Blizzard | 0      | 0        | 30.00K          |
| PIPESTONE (ZONE) | 11/10/1998 | Blizzard | 0      | 0        | 25.00K          |
| PIPESTONE (ZONE) | 12/16/2000 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 11/28/2005 | Blizzard | 0      | 0        | 10.00K          |
| PIPESTONE (ZONE) | 03/01/2007 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/10/2008 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/20/2008 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/12/2009 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/08/2009 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/25/2010 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/11/2010 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/10/2013 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/08/2015 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/02/2016 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/07/2016 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 11/18/2016 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/23/2017 | Blizzard | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/13/2018 | Blizzard | 0      | 0        | 0.00K           |

**Figure B-2: All cold/wind chill events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type            | Deaths | Injuries | Property Damage |
|------------------|------------|-----------------|--------|----------|-----------------|
|                  |            |                 | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/29/1996 | Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/19/2008 | Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/20/2013 | Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/25/2017 | Cold/wind Chill | 0      | 0        | 0.00K           |



|                  |            |                 |   |   |       |
|------------------|------------|-----------------|---|---|-------|
| PIPESTONE (ZONE) | 01/06/2018 | Cold/wind Chill | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/11/2018 | Cold/wind Chill | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/04/2018 | Cold/wind Chill | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/28/2018 | Cold/wind Chill | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/31/2018 | Cold/wind Chill | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/01/2019 | Cold/wind Chill | 0 | 0 | 0.00K |

**Figure B-3: All drought events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type    | Deaths | Injuries | Property Damage |
|------------------|------------|---------|--------|----------|-----------------|
| PIPESTONE (ZONE) | 11/01/1999 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/01/1999 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/01/2000 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 03/01/2000 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/01/2000 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 07/01/2007 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 07/01/2012 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 08/01/2012 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 09/01/2012 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 10/01/2012 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 11/01/2012 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/01/2012 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/01/2013 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/01/2013 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 03/01/2013 | Drought | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/01/2013 | Drought | 0      | 0        | 0.00K           |

**Figure B-4: All excessive heat events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type           | Deaths | Injuries | Property Damage |
|------------------|------------|----------------|--------|----------|-----------------|
| PIPESTONE (ZONE) | 07/15/2011 | Excessive Heat | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 06/27/2012 | Excessive Heat | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 07/02/2012 | Excessive Heat | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 07/16/2012 | Excessive Heat | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 06/10/2016 | Excessive Heat | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 07/20/2016 | Excessive Heat | 0      | 0        | 0.00K           |

**Figure B-5: All extreme cold/wind chill events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type                    | Deaths | Injuries | Property Damage |
|------------------|------------|-------------------------|--------|----------|-----------------|
| PIPESTONE (ZONE) | 01/14/2009 | Extreme Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/07/2010 | Extreme Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/01/2011 | Extreme Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/23/2013 | Extreme Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/23/2014 | Extreme Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 03/02/2014 | Extreme Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/16/2016 | Extreme Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/17/2016 | Extreme Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/30/2017 | Extreme Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/01/2018 | Extreme Cold/wind Chill | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/15/2018 | Extreme Cold/wind Chill | 0      | 0        | 0.00K           |

**Figure B-6: All flash flood events recorded by NCDC, 1950 through December 2018**

| Location/County | Date       | Type        | Deaths | Injuries | Property Damage |
|-----------------|------------|-------------|--------|----------|-----------------|
| PIPESTONE       | 06/02/2002 | Flash Flood | 0      | 0        | 0.00K           |
| PIPESTONE       | 05/29/2004 | Flash Flood | 0      | 0        | 0.00K           |
| TROSKY          | 06/20/2005 | Flash Flood | 0      | 0        | 0.00K           |
| TROSKY          | 09/22/2010 | Flash Flood | 0      | 0        | 25.00K          |
| HOLLAND         | 06/14/2011 | Flash Flood | 0      | 0        | 0.00K           |
| IHLEN           | 06/16/2014 | Flash Flood | 0      | 0        | 100.00K         |
| HOLLAND         | 07/03/2018 | Flash Flood | 0      | 0        | 0.00K           |
| IHLEN           | 08/15/2018 | Flash Flood | 0      | 0        | 0.00K           |

**Figure B-7: All flood events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type  | Deaths | Injuries | Property Damage |
|------------------|------------|-------|--------|----------|-----------------|
| PIPESTONE (ZONE) | 03/25/1997 | Flood | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/01/1997 | Flood | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/22/2001 | Flood | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 05/30/2004 | Flood | 0      | 0        | 0.00K           |
| PIPESTONE        | 03/14/2010 | Flood | 0      | 0        | 0.00K           |
| PIPESTONE        | 09/22/2010 | Flood | 0      | 0        | 0.00K           |
| CAZENOVIA        | 03/16/2011 | Flood | 0      | 0        | 0.00K           |

|           |            |       |   |   |         |
|-----------|------------|-------|---|---|---------|
| CAZENOVIA | 04/01/2011 | Flood | 0 | 0 | 100.00K |
| PIPESTONE | 06/14/2011 | Flood | 0 | 0 | 0.00K   |
| IHLEN     | 06/14/2011 | Flood | 0 | 0 | 0.00K   |
| PIPESTONE | 07/11/2011 | Flood | 0 | 0 | 0.00K   |
| IHLEN     | 07/14/2011 | Flood | 0 | 0 | 0.00K   |
| PIPESTONE | 05/06/2012 | Flood | 0 | 0 | 30.00K  |
| IHLEN     | 05/06/2012 | Flood | 0 | 0 | 0.00K   |
| PIPESTONE | 05/26/2012 | Flood | 0 | 0 | 0.00K   |
| PIPESTONE | 06/23/2013 | Flood | 0 | 0 | 0.00K   |
| IHLEN     | 06/24/2013 | Flood | 0 | 0 | 0.00K   |
| IHLEN     | 06/14/2014 | Flood | 0 | 0 | 0.00K   |
| RUTHTON   | 06/15/2014 | Flood | 0 | 0 | 0.00K   |
| PIPESTONE | 06/15/2014 | Flood | 0 | 0 | 0.00K   |
| CAZENOVIA | 06/16/2014 | Flood | 0 | 0 | 50.00K  |
| IHLEN     | 03/05/2018 | Flood | 0 | 0 | 0.00K   |
| TROSKY    | 03/05/2018 | Flood | 0 | 0 | 0.00K   |
| AIRLIE    | 03/20/2018 | Flood | 0 | 0 | 0.00K   |
| IHLEN     | 04/20/2018 | Flood | 0 | 0 | 0.00K   |
| AIRLIE    | 04/22/2018 | Flood | 0 | 0 | 0.00K   |
| CAZENOVIA | 04/23/2018 | Flood | 0 | 0 | 0.00K   |
| TROSKY    | 04/23/2018 | Flood | 0 | 0 | 0.00K   |
| IHLEN     | 06/21/2018 | Flood | 0 | 0 | 0.00K   |
| AIRLIE    | 06/21/2018 | Flood | 0 | 0 | 0.00K   |
| TROSKY    | 06/21/2018 | Flood | 0 | 0 | 0.00K   |
| CAZENOVIA | 06/25/2018 | Flood | 0 | 0 | 0.00K   |
| CAZENOVIA | 07/01/2018 | Flood | 0 | 0 | 0.00K   |
| IHLEN     | 07/01/2018 | Flood | 0 | 0 | 0.00K   |
| AIRLIE    | 07/03/2018 | Flood | 0 | 0 | 0.00K   |
| TROSKY    | 07/04/2018 | Flood | 0 | 0 | 0.00K   |
| IHLEN     | 09/20/2018 | Flood | 0 | 0 | 0.00K   |
| AIRLIE    | 09/20/2018 | Flood | 0 | 0 | 0.00K   |
| AIRLIE    | 09/20/2018 | Flood | 0 | 0 | 0.00K   |
| CAZENOVIA | 09/20/2018 | Flood | 0 | 0 | 0.00K   |
| TROSKY    | 09/21/2018 | Flood | 0 | 0 | 0.00K   |
| CAZENOVIA | 09/21/2018 | Flood | 0 | 0 | 0.00K   |
| IHLEN     | 10/10/2018 | Flood | 0 | 0 | 0.00K   |

**Figure B-8: All hail events recorded by NCDC, 1950 through December 2018**

| Location/County     | Date       | Type | Magnitude | Deaths | Injuries | Property Damage |
|---------------------|------------|------|-----------|--------|----------|-----------------|
| PIPESTONE CO.       | 08/24/1955 | Hail | 1.00 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 08/14/1958 | Hail | 1.75 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 06/18/1959 | Hail | 1.00 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 07/09/1964 | Hail | 2.00 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 06/28/1969 | Hail | 1.00 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 06/15/1973 | Hail | 0.75 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 06/15/1973 | Hail | 1.75 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 06/15/1977 | Hail | 1.00 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 04/02/1982 | Hail | 0.75 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 07/06/1982 | Hail | 1.75 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 04/20/1985 | Hail | 2.75 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 07/28/1986 | Hail | 4.50 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 05/23/1989 | Hail | 1.75 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 05/23/1989 | Hail | 1.75 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 06/12/1990 | Hail | 1.75 in.  | 0      | 0        | 0.00K           |
| Jasper              | 05/07/1993 | Hail | 1.75 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 05/07/1993 | Hail | 1.00 in.  | 0      | 0        | 0.00K           |
| Holland / Woodstock | 06/06/1994 | Hail | 1.00 in.  | 0      | 0        | 0.00K           |
| PIPESTONE CO.       | 07/18/1994 | Hail | 1.00 in.  | 0      | 0        | 0.00K           |
| Ruthton             | 07/18/1994 | Hail | 1.75 in.  | 0      | 0        | 0.00K           |
| Edgerton            | 07/19/1995 | Hail | 0.00 in.  | 0      | 0        | 0.00K           |
| PIPESTONE           | 06/19/1996 | Hail | 1.75 in.  | 0      | 0        | 10.00K          |
| PIPESTONE           | 08/10/1996 | Hail | 0.75 in.  | 0      | 0        | 0.00K           |
| PIPESTONE           | 06/22/1997 | Hail | 2.00 in.  | 0      | 0        | 100.00K         |
| IHLEN               | 07/13/1997 | Hail | 1.50 in.  | 0      | 0        | 0.00K           |
| EDGERTON            | 03/29/1998 | Hail | 2.00 in.  | 0      | 0        | 0.00K           |
| EDGERTON            | 10/14/1998 | Hail | 1.00 in.  | 0      | 0        | 0.00K           |
| PIPESTONE           | 10/16/1998 | Hail | 0.75 in.  | 0      | 0        | 0.00K           |
| RUTHTON             | 06/08/1999 | Hail | 1.75 in.  | 0      | 0        | 0.00K           |
| RUTHTON             | 09/11/1999 | Hail | 0.88 in.  | 0      | 0        | 0.00K           |
| RUTHTON             | 05/30/2000 | Hail | 0.75 in.  | 0      | 0        | 0.00K           |
| HOLLAND             | 06/13/2001 | Hail | 0.75 in.  | 0      | 0        | 0.00K           |
| PIPESTONE           | 06/13/2001 | Hail | 1.00 in.  | 0      | 0        | 0.00K           |

|           |            |      |          |   |   |       |
|-----------|------------|------|----------|---|---|-------|
| PIPESTONE | 05/08/2002 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| HOLLAND   | 05/08/2002 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| HOLLAND   | 05/08/2002 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| RUTHTON   | 05/08/2002 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| HOLLAND   | 07/28/2002 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| PIPESTONE | 08/03/2002 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| HOLLAND   | 08/03/2002 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| PIPESTONE | 06/24/2003 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| PIPESTONE | 06/24/2003 | Hail | 1.75 in. | 0 | 0 | 0.00K |
| PIPESTONE | 06/27/2003 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| PIPESTONE | 04/18/2004 | Hail | 2.00 in. | 0 | 0 | 0.00K |
| PIPESTONE | 05/26/2004 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| PIPESTONE | 05/26/2004 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| HOLLAND   | 05/26/2004 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| HOLLAND   | 05/26/2004 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| PIPESTONE | 07/12/2004 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| EDGERTON  | 07/31/2004 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| EDGERTON  | 07/31/2004 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| TROSKY    | 04/17/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| IHLEN     | 06/20/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| IHLEN     | 06/20/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| IHLEN     | 06/20/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| IHLEN     | 06/20/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| RUTHTON   | 06/20/2005 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| PIPESTONE | 06/24/2005 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| PIPESTONE | 06/24/2006 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| HOLLAND   | 06/24/2006 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| HOLLAND   | 06/24/2006 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| PIPESTONE | 06/24/2006 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| PIPESTONE | 06/24/2006 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| EDGERTON  | 06/24/2006 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| EDGERTON  | 06/24/2006 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| EDGERTON  | 06/24/2006 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| PIPESTONE | 09/16/2006 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| PIPESTONE | 05/08/2007 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| PIPESTONE | 05/08/2007 | Hail | 1.75 in. | 0 | 0 | 0.00K |

|                |            |      |          |   |   |       |
|----------------|------------|------|----------|---|---|-------|
| PIPESTONE      | 05/08/2007 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 05/08/2007 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| WOODSTOCK      | 06/16/2007 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 08/27/2007 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 08/27/2007 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| WOODSTOCK      | 08/13/2008 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| EDGERTON       | 08/13/2008 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| EDGERTON       | 08/13/2008 | Hail | 3.50 in. | 0 | 0 | 0.00K |
| EDGERTON       | 08/13/2008 | Hail | 1.75 in. | 0 | 0 | 0.00K |
| CAZENOVIA      | 07/14/2009 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 07/14/2009 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 07/14/2009 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 08/08/2009 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 08/08/2009 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| AIRLIE         | 09/22/2010 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| EDGERTON       | 09/22/2010 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 04/09/2011 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 04/09/2011 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 04/09/2011 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| WOODSTOCK      | 07/10/2011 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| CAZENOVIA      | 07/25/2011 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| HOLLAND        | 07/25/2011 | Hail | 1.25 in. | 0 | 0 | 0.00K |
| HOLLAND        | 04/15/2012 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| HOLLAND        | 05/01/2012 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| RUTHTON        | 05/01/2012 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| PIPESTONE ARPT | 05/01/2012 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| IHLEN          | 05/01/2012 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 05/26/2012 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| HOLLAND        | 06/29/2012 | Hail | 1.50 in. | 0 | 0 | 0.00K |
| RUTHTON        | 06/29/2012 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| RUTHTON        | 06/29/2012 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| RUTHTON        | 06/29/2012 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| RUTHTON        | 06/29/2012 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| TROSKY         | 06/19/2013 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| IHLEN          | 05/08/2014 | Hail | 1.75 in. | 0 | 0 | 0.00K |
| IHLEN          | 05/08/2014 | Hail | 1.75 in. | 0 | 0 | 0.00K |



|                |            |      |          |   |   |       |
|----------------|------------|------|----------|---|---|-------|
| PIPESTONE ARPT | 05/08/2014 | Hail | 1.75 in. | 0 | 0 | 0.00K |
| EDGERTON       | 05/08/2014 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| EDGERTON       | 06/16/2014 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| EDGERTON       | 06/16/2014 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| PIPESTONE      | 07/24/2014 | Hail | 0.75 in. | 0 | 0 | 0.00K |
| TROSKY         | 07/24/2014 | Hail | 1.25 in. | 0 | 0 | 0.00K |
| EDGERTON       | 07/24/2014 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| AIRLIE         | 06/09/2015 | Hail | 1.00 in. | 0 | 0 | 0.00K |
| AIRLIE         | 06/09/2015 | Hail | 0.88 in. | 0 | 0 | 0.00K |
| PIPESTONE ARPT | 07/12/2018 | Hail | 0.75 in. | 0 | 0 | 0.00K |

**Figure B-9: All heat events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type | Deaths | Injuries | Property Damage |
|------------------|------------|------|--------|----------|-----------------|
| PIPESTONE (ZONE) | 07/11/2018 | Heat | 0      | 0        | 0.00K           |

**Figure B-10: All heavy rain events recorded by NCDC, 1950 through December 2018**

| Location/County | Date       | Type       | Deaths | Injuries | Property Damage |
|-----------------|------------|------------|--------|----------|-----------------|
| EDGERTON        | 06/29/1997 | Heavy Rain | 0      | 0        | 10.00K          |
| HATFIELD        | 06/14/2014 | Heavy Rain | 0      | 0        | 0.00K           |
| WOODSTOCK       | 07/06/2015 | Heavy Rain | 0      | 0        | 0.00K           |
| IHLEN           | 08/15/2018 | Heavy Rain | 0      | 0        | 0.00K           |

**Figure B-11: All heavy snow events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type       | Deaths | Injuries | Property Damage |
|------------------|------------|------------|--------|----------|-----------------|
| PIPESTONE (ZONE) | 01/24/1996 | Heavy Snow | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/14/1996 | Heavy Snow | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/03/1997 | Heavy Snow | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 03/31/1998 | Heavy Snow | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 10/01/1999 | Heavy Snow | 0      | 0        | 5.00K           |
| PIPESTONE (ZONE) | 04/07/2000 | Heavy Snow | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 11/26/2001 | Heavy Snow | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/20/2002 | Heavy Snow | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/06/2003 | Heavy Snow | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/10/2007 | Heavy Snow | 0      | 0        | 0.00K           |

|                  |            |            |   |   |       |
|------------------|------------|------------|---|---|-------|
| PIPESTONE (ZONE) | 12/01/2007 | Heavy Snow | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/20/2010 | Heavy Snow | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/20/2011 | Heavy Snow | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 11/05/2013 | Heavy Snow | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 03/12/2017 | Heavy Snow | 0 | 0 | 0.00K |

**Figure B-12: All high wind events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type      | Magnitude  | Deaths | Injuries | Property Damage |
|------------------|------------|-----------|------------|--------|----------|-----------------|
| PIPESTONE (ZONE) | 02/10/1996 | High Wind | 52 kts.    | 0      | 0        | 10.00K          |
| PIPESTONE (ZONE) | 04/25/1996 | High Wind | 52 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 10/29/1996 | High Wind | 50 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/06/1997 | High Wind | 55 kts.    | 0      | 0        | 2.86K           |
| PIPESTONE (ZONE) | 05/05/1997 | High Wind | 52 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 07/02/1997 | High Wind | 35 kts.    | 0      | 0        | 7.14K           |
| PIPESTONE (ZONE) | 04/12/1998 | High Wind | 48 kts.    | 0      | 0        | 30.00K          |
| PIPESTONE (ZONE) | 03/17/1999 | High Wind | 52 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/05/2000 | High Wind | 54 kts. E  | 0      | 0        | 12.50K          |
| PIPESTONE (ZONE) | 04/07/2001 | High Wind | E          | 0      | 0        | 14.00K          |
| PIPESTONE (ZONE) | 04/29/2001 | High Wind | 50 kts. E  | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/12/2004 | High Wind | 35 kts. ES | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 03/10/2005 | High Wind | 35 kts. ES | 0      | 0        | 10.00K          |
| PIPESTONE (ZONE) | 10/26/2008 | High Wind | 39 kts. ES | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 10/26/2010 | High Wind | 52 kts. EG | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/26/2014 | High Wind | 50 kts. EG | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/19/2016 | High Wind | 36 kts. ES | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/25/2016 | High Wind | 51 kts. MG | 0      | 0        | 0.00K           |

**Figure B-13: All ice storm events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type      | Deaths | Injuries | Property Damage |
|------------------|------------|-----------|--------|----------|-----------------|
| PIPESTONE (ZONE) | 11/14/1996 | Ice Storm | 0      | 0        | 1.500M          |
| PIPESTONE (ZONE) | 01/03/1997 | Ice Storm | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 03/13/1997 | Ice Storm | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 04/16/2000 | Ice Storm | 0      | 0        | 2.86K           |

**Figure B-14: All lightning events recorded by NCDC, 1950 through December 2018**

| Location/County | Date       | Type      | Deaths | Injuries | Property Damage |
|-----------------|------------|-----------|--------|----------|-----------------|
| EDGERTON        | 05/08/1996 | Lightning | 0      | 0        | 0.50K           |
| RUTHTON         | 09/24/2005 | Lightning | 0      | 0        | 0.00K           |
| PIPESTONE       | 06/14/2011 | Lightning | 0      | 0        | 25.00K          |

**Figure B-15: All thunderstorm wind events recorded by NCDC, 1950 through December 2018**

| Location/County | Date       | Type              | Magnitude | Deaths | Injuries | Property Damage |
|-----------------|------------|-------------------|-----------|--------|----------|-----------------|
| PIPESTONE CO.   | 08/24/1955 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 06/16/1956 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 10/09/1973 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 08/04/1977 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 07/06/1978 | Thunderstorm Wind | 61 kts.   | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 07/06/1978 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 06/16/1979 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 10/16/1980 | Thunderstorm Wind | 57 kts.   | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 07/06/1982 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 10/05/1982 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 04/26/1984 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 07/16/1984 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 07/28/1986 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 07/11/1987 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 06/20/1989 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 07/08/1990 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 04/26/1991 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 05/28/1991 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 05/28/1991 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 06/20/1991 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 06/30/1991 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 06/16/1992 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 06/16/1992 | Thunderstorm Wind | 52 kts.   | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 06/16/1992 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| Pipestone       | 05/07/1993 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| Ruthton         | 05/07/1993 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 07/15/1994 | Thunderstorm Wind | 0 kts.    | 0      | 0        | 0.00K           |

|                |            |                   |            |   |   |        |
|----------------|------------|-------------------|------------|---|---|--------|
| PIPESTONE      | 06/24/1998 | Thunderstorm Wind | 52 kts.    | 0 | 0 | 0.00K  |
| EDGERTON       | 07/14/1998 | Thunderstorm Wind | 52 kts.    | 0 | 0 | 0.00K  |
| PIPESTONE      | 07/18/1998 | Thunderstorm Wind | 61 kts.    | 0 | 0 | 0.00K  |
| WOODSTOCK      | 07/03/1999 | Thunderstorm Wind | 61 kts.    | 0 | 0 | 20.00K |
| RUTHTON        | 07/13/1999 | Thunderstorm Wind | 52 kts.    | 0 | 0 | 5.00K  |
| RUTHTON        | 09/11/1999 | Thunderstorm Wind | 50 kts.    | 0 | 0 | 5.00K  |
| IHLEN          | 08/07/2000 | Thunderstorm Wind | 52 kts. E  | 0 | 0 | 0.00K  |
| EDGERTON       | 08/07/2000 | Thunderstorm Wind | 65 kts. E  | 0 | 0 | 0.00K  |
| PIPESTONE      | 06/10/2001 | Thunderstorm Wind | 52 kts. E  | 0 | 0 | 0.00K  |
| CAZENOVIA      | 06/13/2001 | Thunderstorm Wind | 52 kts. E  | 0 | 0 | 0.00K  |
| PIPESTONE      | 07/28/2002 | Thunderstorm Wind | 52 kts. E  | 0 | 0 | 0.00K  |
| RUTHTON        | 08/11/2002 | Thunderstorm Wind | 52 kts. E  | 0 | 0 | 0.00K  |
| PIPESTONE      | 06/23/2003 | Thunderstorm Wind | 52 kts. EG | 0 | 0 | 0.00K  |
| PIPESTONE      | 05/16/2004 | Thunderstorm Wind | 57 kts. EG | 0 | 0 | 5.00K  |
| PIPESTONE      | 05/16/2004 | Thunderstorm Wind | 57 kts. EG | 0 | 0 | 0.00K  |
| PIPESTONE      | 06/08/2005 | Thunderstorm Wind | 52 kts. EG | 0 | 0 | 0.00K  |
| IHLEN          | 06/20/2005 | Thunderstorm Wind | 61 kts. EG | 0 | 0 | 0.00K  |
| EDGERTON       | 06/20/2005 | Thunderstorm Wind | 61 kts. EG | 0 | 0 | 0.00K  |
| PIPESTONE      | 06/24/2005 | Thunderstorm Wind | 52 kts. EG | 0 | 0 | 0.00K  |
| PIPESTONE      | 07/20/2005 | Thunderstorm Wind | 57 kts. EG | 0 | 0 | 0.00K  |
| PIPESTONE      | 08/03/2005 | Thunderstorm Wind | 57 kts. EG | 0 | 0 | 0.00K  |
| PIPESTONE      | 07/23/2010 | Thunderstorm Wind | 51 kts. MG | 0 | 0 | 0.00K  |
| PIPESTONE      | 07/23/2010 | Thunderstorm Wind | 61 kts. EG | 0 | 0 | 0.00K  |
| IHLEN          | 08/12/2010 | Thunderstorm Wind | 52 kts. EG | 0 | 0 | 5.00K  |
| EDGERTON       | 08/12/2010 | Thunderstorm Wind | 61 kts. EG | 0 | 0 | 15.00K |
| EDGERTON       | 09/22/2010 | Thunderstorm Wind | 60 kts. EG | 0 | 0 | 0.00K  |
| RUTHTON        | 07/01/2011 | Thunderstorm Wind | 70 kts. EG | 0 | 0 | 50.00K |
| WOODSTOCK      | 07/10/2011 | Thunderstorm Wind | 52 kts. EG | 0 | 0 | 0.00K  |
| PIPESTONE ARPT | 05/04/2012 | Thunderstorm Wind | 52 kts. MG | 0 | 0 | 0.00K  |
| AIRLIE         | 05/05/2012 | Thunderstorm Wind | 56 kts. EG | 0 | 0 | 1.00K  |
| PIPESTONE ARPT | 05/08/2014 | Thunderstorm Wind | 52 kts. EG | 0 | 0 | 0.00K  |
| HATFIELD       | 05/08/2014 | Thunderstorm Wind | 52 kts. EG | 0 | 0 | 1.00K  |
| IHLEN          | 08/09/2015 | Thunderstorm Wind | 52 kts. EG | 0 | 0 | 0.00K  |
| TROSKY         | 08/09/2015 | Thunderstorm Wind | 52 kts. EG | 0 | 0 | 0.00K  |
| RUTHTON        | 06/03/2016 | Thunderstorm Wind | 61 kts. EG | 0 | 0 | 0.00K  |
| EDGERTON       | 09/24/2016 | Thunderstorm Wind | 56 kts. EG | 0 | 0 | 0.00K  |

|                |            |                   |            |   |   |       |
|----------------|------------|-------------------|------------|---|---|-------|
| CAZENOVIA      | 07/11/2017 | Thunderstorm Wind | 61 kts. EG | 0 | 0 | 0.00K |
| PIPESTONE      | 07/22/2017 | Thunderstorm Wind | 56 kts. EG | 0 | 0 | 0.00K |
| IHLEN          | 09/19/2017 | Thunderstorm Wind | 70 kts. EG | 0 | 0 | 0.00K |
| PIPESTONE ARPT | 07/12/2018 | Thunderstorm Wind | 57 kts. MG | 0 | 0 | 0.00K |
| PIPESTONE ARPT | 07/12/2018 | Thunderstorm Wind | 52 kts. EG | 0 | 0 | 0.00K |

**Figure B-16: All tornado events recorded by NCDC, 1950 through December 2018**

| Location/County | Date       | Type    | Magnitude | Deaths | Injuries | Property Damage |
|-----------------|------------|---------|-----------|--------|----------|-----------------|
| PIPESTONE CO.   | 06/05/1966 | Tornado | F0        | 0      | 0        | 2.50K           |
| PIPESTONE CO.   | 06/25/1969 | Tornado | F2        | 0      | 0        | 250.00K         |
| PIPESTONE CO.   | 05/31/1971 | Tornado | F0        | 0      | 0        | 2.50K           |
| PIPESTONE CO.   | 06/16/1979 | Tornado | F1        | 0      | 0        | 250.00K         |
| PIPESTONE CO.   | 06/16/1979 | Tornado | F0        | 0      | 0        | 25.00K          |
| PIPESTONE CO.   | 04/20/1985 | Tornado | F3        | 0      | 0        | 2.500M          |
| PIPESTONE CO.   | 06/16/1992 | Tornado | F1        | 0      | 0        | 0.00K           |
| PIPESTONE CO.   | 05/07/1993 | Tornado | F2        | 0      | 0        | 5.000M          |
| PIPESTONE       | 07/26/1997 | Tornado | F0        | 0      | 0        | 0.00K           |
| IHLEN           | 06/20/2005 | Tornado | F0        | 0      | 0        | 0.00K           |
| RUTHTON         | 07/01/2011 | Tornado | EF1       | 0      | 0        | 50.00K          |
| CAZENOVIA       | 06/03/2016 | Tornado | EF0       | 0      | 0        | 0.00K           |
| PIPESTONE ARPT  | 06/14/2016 | Tornado | EF0       | 0      | 0        | 0.00K           |

**Figure B-17: All winter storm events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type         | Deaths | Injuries | Property Damage |
|------------------|------------|--------------|--------|----------|-----------------|
| PIPESTONE (ZONE) | 01/01/1999 | Winter Storm | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 03/08/1999 | Winter Storm | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 11/11/2000 | Winter Storm | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/29/2001 | Winter Storm | 0      | 0        | 10.00K          |
| PIPESTONE (ZONE) | 02/24/2001 | Winter Storm | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/09/2002 | Winter Storm | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 03/14/2002 | Winter Storm | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/14/2003 | Winter Storm | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 11/23/2003 | Winter Storm | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/08/2003 | Winter Storm | 0      | 0        | 0.00K           |

|                  |            |              |   |   |        |
|------------------|------------|--------------|---|---|--------|
| PIPESTONE (ZONE) | 12/15/2003 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 01/25/2004 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 01/21/2005 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 03/18/2005 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 03/12/2006 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 02/24/2007 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 12/23/2009 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 01/06/2010 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 01/31/2011 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 04/09/2013 | Winter Storm | 0 | 0 | 1.000M |
| PIPESTONE (ZONE) | 04/18/2013 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 12/03/2013 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 12/15/2014 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 01/05/2015 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 11/30/2015 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 12/01/2015 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 12/25/2015 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 03/23/2016 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 12/16/2016 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 02/22/2018 | Winter Storm | 0 | 0 | 0.00K  |
| PIPESTONE (ZONE) | 03/23/2018 | Winter Storm | 0 | 0 | 0.00K  |

**Figure B-18: All winter weather events recorded by NCDC, 1950 through December 2018**

| Location/County  | Date       | Type           | Deaths | Injuries | Property Damage |
|------------------|------------|----------------|--------|----------|-----------------|
| PIPESTONE (ZONE) | 11/03/2003 | Winter Weather | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/02/2003 | Winter Weather | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/01/2004 | Winter Weather | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/05/2004 | Winter Weather | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 02/11/2004 | Winter Weather | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/20/2004 | Winter Weather | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 11/30/2005 | Winter Weather | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/13/2005 | Winter Weather | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 12/29/2005 | Winter Weather | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 01/01/2006 | Winter Weather | 0      | 0        | 0.00K           |
| PIPESTONE (ZONE) | 11/26/2006 | Winter Weather | 0      | 0        | 0.00K           |



|                  |            |                |   |   |       |
|------------------|------------|----------------|---|---|-------|
| PIPESTONE (ZONE) | 12/20/2006 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/14/2007 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/21/2007 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/25/2007 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 03/31/2008 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 04/25/2008 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 11/06/2008 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/08/2008 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/14/2008 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/16/2009 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 04/04/2009 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/26/2009 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/07/2010 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/13/2010 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 11/29/2010 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/03/2010 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/23/2010 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/09/2011 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/17/2011 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/31/2011 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/20/2012 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/13/2012 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/27/2012 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/27/2013 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/20/2014 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 03/04/2014 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 04/03/2014 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 11/15/2014 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/26/2014 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/31/2015 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/01/2015 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/08/2015 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/09/2015 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/25/2015 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 03/03/2015 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/15/2015 | Winter Weather | 0 | 0 | 0.00K |

|                  |            |                |   |   |       |
|------------------|------------|----------------|---|---|-------|
| PIPESTONE (ZONE) | 12/28/2015 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/06/2016 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/07/2016 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/03/2016 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/08/2016 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/13/2016 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/29/2016 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 03/01/2016 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 03/26/2016 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/10/2016 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/24/2016 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/01/2017 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/10/2017 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/24/2017 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/21/2017 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/29/2017 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/11/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 01/21/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/08/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/19/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 02/24/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 03/05/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 03/10/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 04/02/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 04/08/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 10/14/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 11/16/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/01/2018 | Winter Weather | 0 | 0 | 0.00K |
| PIPESTONE (ZONE) | 12/31/2018 | Winter Weather | 0 | 0 | 0.00K |

## Appendix C - Adopting Resolutions



## **Appendix D - Planning Team Meetings, Sign-In Sheets, and Notes**

**Pipestone County All-Hazard Mitigation Plan Update**  
Meeting #1 – Planning Process

Date: Wednesday, October 11, 2017  
Time: 6:30 PM – 8:00 PM  
Location: Pipestone County Emergency Management Building, 811 5<sup>th</sup> St SE, Pipestone, MN 56164

**Agenda**

6:30 PM      Introductions

6:35 PM      Presentation – Max Kaufman, SW Regional Development Commission

Intro to Hazard Mitigation Planning & Benefits

- Planning Process/Timeline
  - Meeting #2
  - Meeting #3
  - Public Hearing
  - Up to 4 sub-committee meetings
- Types of Mitigation Assistance

Hazards identified in initial plan

- Hazards from 2010 plan will be reviewed and updated per their current status. Historical data since the initial plan will be discussed to determine if a hazard/mitigation strategy is still applicable or should be deleted.
- Hazards not addressed in the initial plan may also be added. All participating jurisdictions should be involved with hazard validation.

7:00 PM      Sub-Committee Formation

- Mitigation Strategies Subcommittee
- Plan Review Subcommittee
- Other Committees Needed?

7:15 PM      CPRI Worksheet “Homework” Handout & Explanation

7:30 PM      Questions, Comments, Observations – Schedule Meeting #2 and Adjourn

Meeting #1 Deliverables

- Better understanding of planning process



- Better understanding of research and data gathering responsibilities
- Updated list of hazards
- Schedule Meeting #2

## Pipestone County All-Hazard Mitigation Plan Update

### Meeting #1 – Planning Process

Date: Wednesday, October 11, 2017  
Time: 6:30 PM – 8:00 PM  
Location: Pipestone County Emergency Management Building, 811 5<sup>th</sup> St SE, Pipestone, MN 56164

### Notes

Attendees: Steve Ewing, Chris Hollingsworth, Lauren Mellenthin, Mike Appel, Bill Folger, Max Kaufman

6:30 PM Introductions

6:35 PM Presentation – Max Kaufman, SW Regional Development Commission

(Information found on the presentation slides, additional comments here)

- This is an update of the 2010 plan, so we are not starting from scratch.
- One of the key aspects of hazard mitigation is that the actions take place *before* the hazard occurs.
- In terms of funding, FEMA has limited funds for Hazard Mitigation Assistance. With continued disasters nationwide, that funding is even more limited. It is good to move forward with the idea that while HMA funds are available for certain projects, many projects will have to be funded locally.
- This plan should be viewed as a long-term plan. Not every mitigation strategy will be completed in 1 year – some may take little time, others may take years to work toward and fund.

Hazards to Include for Mitigation

- Extreme Cold:
  - This might affect individuals more than public infrastructure.
  - This could be something that is a public awareness campaign more than a high-cost mitigation strategy.
  - SMOC does home winterization.
- Extreme Heat:
  - With an increasing number of high-temperature days, there might need to be a mitigation strategy for this.
- Lightning
  - What about personal home fires from lightning strikes?
  - There are phone apps to notify people of lightning strikes within one mile.
  - Lightning struck the Pipestone County Courthouse and they lost multiple chillers and had \$40,000 in damage.
  - Hard to mitigate for lightning other than surge protectors and insurance.

- Public education is another possibility.
- Subsidence
  - This is when the land sinks due to topographic properties (Karst topography) or due to human activities like mining, groundwater pumping, aquifer system compaction, drainage of organic soils, underground mining, hydrocompaction, natural compaction, sinkholes, and thawing permafrost.
  - No mining in Pipestone County. Mostly rolling hills and not Karst topography (this is mostly limited to southeast MN).
  - Aquifers are located north of Pipestone, in northwest Grange Township, north Osborne Township.
    - Lincoln-Pipestone Rural Water pumps from these aquifers and gives water to Lewis & Clark and gets water from South Dakota.
- Erosion
  - Bank erosion are more of an issue than landslides and subsidence. Landslides could be left out as well as subsidence.
- Public Health Emergencies
  - SW Health & Human Services has data on previous public health emergencies that they can bring. One example would be the Hepatitis A outbreak in Murray County (around 2004).
- Utility Failure
  - This can include communications equipment (specifically emergency services communications).
- Safe rooms are needed at the private campground in Pipestone and the trailer park.

7:00 PM      Sub-Committee Formation

- No subcommittees will be needed because it is an update and we can do this together as one planning committee.

7:15 PM      CPRI Worksheet “Homework” Handout & Explanation

7:30 PM      Questions, Comments, Observations, and Adjourn

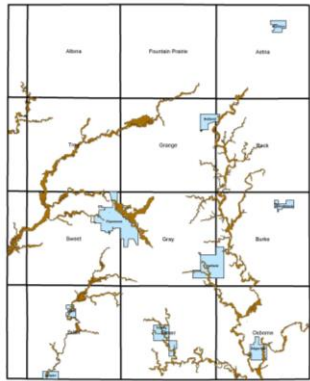
- Future Meetings
  - 6:30 PM works ok.
  - Not the 2<sup>nd</sup> Wednesday for Hollingsworth
  - A letter to Township officials would be helpful

Meeting #1 Deliverables

- Better understanding of planning process

- Better understanding of research and data gathering responsibilities
- Updated list of hazards (This will come from the CPRI sheets)
- Schedule Meeting #2 (This will happen once we have the map data)

# Pipestone County All-Hazard Mitigation Plan



*Planning Team Kickoff Meeting*

*October 11, 2017*

Pipestone County Emergency Management  
+  
Southwest Regional Development Commission

## Agenda

- Welcome & Introductions
  - Steve Ewing, Pipestone County Emergency Management Director
- Presentation: Pipestone County All-Hazard Mitigation Plan
  - Maxwell Kaufman, Southwest Regional Development Commission
  - AHMP Overview
  - Hazard Ranking
  - Mitigation Actions
- Feedback
- Next Steps

## What is Hazard Mitigation?

- HM is sustained action to reduce or eliminate long-term risk to people and their property from hazards.
- HM planning is the process local governments use to identify risks and vulnerabilities associated with natural disasters, and develop long-term strategies for protecting people and property from future hazard events.
- HM planning allows communities to strategically plan for and work together to implement activities that are cost-effective, technically feasible and environmentally sound BEFORE a disaster strikes.

## Planning Process Timeline

- *Kickoff (HSEM, EMDs, SRDC)*
- *Meeting 1 (Overview, Choose & Rank Hazards, Update Strategies)*
- *Meeting 2 (Discuss Rankings and Existing & Potential Mitigation Projects)*
- *Meeting 3 as full team or Mitigation Strategies Subcommittee (Confirm updated mitigation strategies)*
- *Plan Review Subcommittee Meeting (review via email)*
- *Public Hearing*



## AHMP Planning Team

### **Role of the Planning Team**

1. Provide input on development of the plan
2. Rank hazards, prioritize mitigation strategies, and identify projects for implementation.
3. Assist with public outreach and participate in public meetings.
4. Review draft plans and provide feedback.
5. Facilitate final adoption of the AHMP by local governments.

## About the Plan

- The All-Hazard Mitigation Plan (AHMP) is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000). The development of a local government plan is required in order to maintain eligibility for certain federal disaster assistance and hazard mitigation funding programs.
- Content:
  - Pipestone County physical and social profile
  - Asset Inventory
  - Hazard Assessment and Vulnerability Analysis
  - Mitigation Actions

## Hazard Identification

- This plan is a multi-jurisdictional plan that covers Pipestone County, including all 9 incorporated cities.
- Hazard Identification
  - Existing County Plans
  - Hazard Ranking
  - Record of Events (FEMA, NCDC)
  - GIS and HAZUS (Flood only)

While only cities passed resolutions of participation in the plan, any townships can also participate and are encouraged to participate if they have specific hazard mitigation needs.

## What hazards can be addressed?

- An All-Hazard Mitigation Plan looks primarily at natural disasters, which can include any of the following (not all required):

|                     |             |                       |                      |
|---------------------|-------------|-----------------------|----------------------|
| Drought             | Earthquake  | Erosion               | Extreme Temperatures |
| Flood (+Dam/Levees) | Hail        | Landslide             | Lightning            |
| Sea Level Rise      | Severe Wind | Severe Winter Weather | Storm Surge          |
| Subsidence          | Tornado     | Tsunami               | Wildfire             |

## Man-Made Hazards

- Non-natural hazards (man-made) are not required by the DMA 2000 to be addressed in the AHMP and are not eligible for FEMA mitigation funds, but may be eligible for mitigation funds from other departments.
- Can include, but not limited to:
  - Civil Disturbance/Terrorism
  - Dam, Impoundment, & Culvert Failure
  - Hazardous Materials
  - Public Health Emergencies
  - Transportation Infrastructure
  - Utility Failure
  - Water Supply Contamination

## Hazard Events (2000-2017)

### Natural

- Blizzards: 15
- Drought: 14
- Earthquake: 0
- Extreme Cold: 8
- Extreme Heat: 6
- Flash Floods: 6
- Floods: 16
- Hail: 35

- Lightning: 2
- Thunderstorm Wind: 23
- Tornadoes: 4
- Wildfire: 0
- Winter Storms: 27

### Man-Made

- Aviation: 3
- Hazardous Materials: 10

1 earthquake in 1964.

Lightning is much larger, but these are only the events recorded by NOAA.

Hail events are the largest in terms of number.

Flooding is what FEMA likes to focus on and what will be done by UMD with the HAZUS analysis.

## FEMA-Declared Disasters in Pipestone County

| Incident                                                                | Declaration Date and Disaster Number | Incident Period           | Total PA Obligated by FEMA for Disaster in Minnesota | Total PA Obligated by FEMA for Disaster in Pipestone County | Individual Assistance in Minnesota | Individual Assistance in Pipestone County |
|-------------------------------------------------------------------------|--------------------------------------|---------------------------|------------------------------------------------------|-------------------------------------------------------------|------------------------------------|-------------------------------------------|
| Flooding                                                                | DR-255<br>4/18/1969                  | 4/18/1969-<br>4/18/1969   | Yes – Unknown Amount                                 | Unknown                                                     | Yes – Unknown Amount               | Unknown                                   |
| Severe Storms, Tornadoes, & Flooding                                    | DR-993<br>6/11/1993                  | 5/6/1993-<br>8/25/1993    | Yes – Unknown Amount                                 | Unknown                                                     | Yes – Unknown Amount               | Unknown                                   |
| Severe Ice Storm                                                        | DR-1151<br>1/7/1997                  | 11/14/1996-<br>11/30/1996 | Yes – Unknown Amount                                 | Unknown                                                     | \$0                                | \$0                                       |
| Severe Winter Storms                                                    | DR-1158<br>1/16/1997                 | 1/3/1997-<br>2/3/1997     | Yes – Unknown Amount                                 | Unknown                                                     | \$0                                | \$0                                       |
| Severe Storms and Flooding                                              | DR-1941<br>10/13/2010                | 9/22/2010-<br>10/14/2010  | \$25,963,422.37                                      | \$383,595.44                                                | \$0                                | \$0                                       |
| Severe Storms, Flooding and Tornadoes                                   | DR-4009<br>7/28/2011                 | 7/1/2011-<br>7/11/2011    | \$11,519,032.40                                      | \$87,876.99                                                 | \$0                                | \$0                                       |
| Severe Storms, Straight-Line Winds, Flooding, Landslides, and Mudslides | DR-4182<br>7/21/2014                 | 6/11/2014-<br>7/11/2014   | \$41,013,709.98                                      | \$487,192.01                                                | \$0                                | \$0                                       |

7 FEMA-Declared Disasters

5 included flooding

4 included severe storms

2 included tornadoes

2 included severe ice/winter storms

1 included straight-line winds, landslides, and mudslides

## Hazard Ranking – CPRI Worksheet

- Worksheet that allows each jurisdiction to rank the risk that each hazard poses to the jurisdiction.

- Probability
- Magnitude/Severity
- Warning Time
- Duration

| 0.45<br>Probability                                                                                                                                                                                                                                                                                                                                       | 0.3<br>Magnitude / Severity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 0.15<br>Warning Time                                                                   | 0.1<br>Duration                                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>1 - Very Low</b><br><input type="checkbox"/> Event is probable within the calendar year.<br><input type="checkbox"/> Event has up to 1 in 1 year chance of occurring (1% = 100%).<br><input type="checkbox"/> Chance of event is greater than 33% (1x3) per year.<br><input type="checkbox"/> Event is "highly likely" to occur.                       | <b>1 - Catastrophic</b><br><input type="checkbox"/> Local jurisdiction is overwhelmed and unable to effectively respond to the hazard. Local resources are inadequate or non-existent. Complete loss of communications. Massive regional, state, EMAC and federal response is required. Federal disaster declaration.<br><input type="checkbox"/> Local and regional medical services are unable to manage the volume of injuries and fatalities. Mass evacuation, sheltering, and care of displaced residents, medical patients, high risk and vulnerable populations are required.<br><input type="checkbox"/> Loss of public utilities, government and essential services for more than 1 month. Widespread destruction of critical infrastructure, public and private property. More than 50% of critical and non-critical facilities and infrastructure damaged or destroyed. Extended emergency response operations lasting more than 1 month may be required.                                                                                                                                    | <input type="checkbox"/> Hours to 6 Hours<br><input type="checkbox"/> More Than 1 Week | <input type="checkbox"/> Up to 1 Week<br><input type="checkbox"/> More Than 1 Week |
| <b>2 - Low</b><br><input type="checkbox"/> Event is probable within the next three years.<br><input type="checkbox"/> Event has up to 1 in 3 years chance of occurring (1/3 = 33%).<br><input type="checkbox"/> Chance of event is greater than 20% but less than or equal to 33% per year.<br><input type="checkbox"/> Event is "likely" to occur.       | <b>2 - Critical</b><br><input type="checkbox"/> Local jurisdiction is unable to effectively respond without District level mutual aid support and significant state assistance. Local resources have been expended and local agencies have reached the limits of their capabilities. Communications seriously degraded with significant impact on operations. State disaster declaration.<br><input type="checkbox"/> Local medical services are unable to manage number of injuries and fatalities. Patients require transportation to regional medical facilities outside of the affected areas. Local area evacuation, sheltering, and care of displaced residents, medical patients, high risk and vulnerable populations are required.<br><input type="checkbox"/> Loss of public utilities, government and essential services for up to 1 month. Significant damage to critical infrastructure, public and private property over a large area. Up to 50% of critical and non-critical facilities and infrastructure damaged. Emergency response operations lasting up to 1 month may be required. | <input type="checkbox"/> 6 to 12 Hours<br><input type="checkbox"/> Up to 1 Week        | <input type="checkbox"/> Up to 1 Week<br><input type="checkbox"/> Up to 1 Week     |
| <b>3 - Possible</b><br><input type="checkbox"/> Event is probable within the next five years.<br><input type="checkbox"/> Event has up to 1 in 5 years chance of occurring (1/5 = 20%).<br><input type="checkbox"/> Chance of event is greater than 10% but less than or equal to 20% per year.<br><input type="checkbox"/> Event could "possibly" occur. | <b>3 - Moderate</b><br><input type="checkbox"/> Local jurisdiction is able to effectively respond with significant inter-local mutual aid support and limited state assistance. Local and mutual aid resources are adequate to support response. Communications systems operating near capacity. Local medical services are able to manage volume of injuries and fatalities but are near the limits of their capabilities. Only critically injured patients are diverted to facilities outside of the affected areas. Limited evacuation and sheltering required.<br><input type="checkbox"/> Loss of public utilities, government and essential services for up to 1 week. Significant damage to critical infrastructure, public and private property over a localized area. Up to 25% of critical and non-critical facilities and infrastructure damaged. Response operations lasting up to 1 week may be required.                                                                                                                                                                                  | <input type="checkbox"/> 12-24 Hours<br><input type="checkbox"/> Up to 1 Day           | <input type="checkbox"/> Up to 1 Day<br><input type="checkbox"/> Up to 1 Day       |
| <b>4 - Unlikely</b><br><input type="checkbox"/> Event is probable within the next 10 years.<br><input type="checkbox"/> Event has up to 1 in 10 years chance of occurring (1/10 = 10%).<br><input type="checkbox"/> Chance of event occurrence is less than or equal to 10%.<br><input type="checkbox"/> Event is "unlikely" to occur.                    | <b>4 - Manageable</b><br><input type="checkbox"/> Local jurisdiction is able to manage incident with standard mutual aid and little or no state assistance. Local resources are adequate to support response. Communications system operating normally. Local emergency response operations are able to manage number of injuries and fatalities with on-hand personnel and resources.<br><input type="checkbox"/> Loss of public utilities, government and essential services for up to 24 hours. Damage contained to a single incident scene and immediate area. Up to 5% of critical and non-critical facilities and infrastructure damaged. Response operations lasting up to 72 hours may be required.                                                                                                                                                                                                                                                                                                                                                                                             | <input type="checkbox"/> 24+ Hours<br><input type="checkbox"/> Up to 6 Hours           | <input type="checkbox"/> Up to 6 Hours<br><input type="checkbox"/> Up to 6 Hours   |

## Mitigation Strategies

- **Prevention:** Government, administrative, or regulatory actions.
- **Property Protection:** Removal or modification of existing buildings or structures to protect them from a hazard.
- **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.
- **Natural Resource Protection:** Actions that minimize hazard losses and preserve or restore the functions of natural systems.
- **Emergency Services:** Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard, for example: floodwalls, safe rooms.

6 categories of mitigation strategies (for our purposes). This is not any official categorization.

## Historical Hazard Mitigation Funding in Pipestone County

| Year | Project Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Sub-Grantee                               | Federal Share |
|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|---------------|
| 1997 | Planting of indigenous vegetation for living snowfence.                                                                                                                                                                                                                                                                                                                                                                                                                                         | MN Department of Transportation           | \$107,608     |
| 1997 | Installation of living snow fences (2 rows of shrubs and 50 feet of grasses) along roads and highways in Pipestone County                                                                                                                                                                                                                                                                                                                                                                       | Pipestone County                          | \$76,390      |
| 2004 | Southwest Regional Development Commission will be assisting Pipestone County in preparing and developing an All Hazard Mitigation Plan. SRDC will create a Community Profile and use demographic data along with developing a hazard identification section.-CRAMSEY-08/26/2005 22:25 GMT                                                                                                                                                                                                       | Southwest Regional Development Commission | \$20,000      |
| 2006 | To complete an all-hazard mitigation plan.-KSAILER-08/29/2006 18:28 GMT<br>To complete an all-hazard mitigation plan for Pipestone County.-KSAILER-08/29/2006 19:08 GMT<br>Southwest Regional Development Commission will complete an All-Hazard Mitigation Plan for Lyon County and Pipestone County (Two (2) plans).-KSAILER-11/27/2006 16:10 GMT<br>Project closeout per State's request in letter dated 3/11/11, no deobligation of funds, all funds expended-EHARDIMO-03/18/2011 18:49 GMT | Southwest Regional Development Commission | \$43,500      |

Two of these were for mitigation planning, but the first two in 1997 were for living snowfences in Pipestone County.

## Implementation of Mitigation Actions

- Happens at every jurisdictional level.
- Happens in partnership with other local, State, and Federal agencies and non-profit organizations.
- Can be inexpensive (“low-hanging fruit”)
- Can be high-cost (some are HMA-eligible)
- Some may be implemented quickly, others may be ongoing, and some may occur over several years.

**The impact of hazards on people and property can only be reduced when efforts are made to mitigate against them before they occur.**

Not everything will be something that FEMA can cover. Their funds are limited. So sometimes things might have to be written in to a budget at a county or city level.

## Mitigation Actions Eligible for HMA

1. Retrofit or construction of safe room facilities to protect public during extreme wind events.
2. Purchase of generators for backup power to support the operation of essential function in critical facilities in the event of severe storms.
3. Burying or strengthening of power lines to reduce the risk of power outages from downed lines during a severe storm.
4. Install new warning systems in identified vulnerable locations
5. Mitigation measures to reduce the threat of wildfire.
6. Infrastructure retrofit for flood prone areas.
7. Minor localized flood reduction projects to lessen the frequency of severity of flooding and decrease predicted flood damages.
8. Relocate flood-prone properties or acquire and demolish flood prone properties.
9. Dry-proof or wet-proof facilities that are flood prone.

- Retrofit or construction of safe room facilities to protect public during extreme wind events.

- Locations may include schools, mobile home parks, campgrounds, or other areas where there are populations vulnerable to high winds and tornado events.

- Purchase of generators for backup power to support the operation of essential function in critical facilities in the event of severe storms.



- Critical facilities may include police and fire stations, hospitals, and water and sewer treatment facilities, and other facilities that the county deems critical.
- Burying or strengthening of power lines to reduce the risk of power outages from downed lines during a severe storm.
  - Where it is feasible and cost-effective as part of new construction or retrofit.
- Install new warning systems in identified vulnerable locations
  - Used to alert people in high-risk, vulnerable areas such as campgrounds, parks and rural residents out of reach of other existing warning siren systems to approaching severe weather.
- Mitigation measures to reduce the threat of wildfire.
  - Activities such as creation of defensible space, application of ignition-resistant construction, hazardous fuels reduction, and installation of external wildfire sprinkler systems.
- Infrastructure retrofit for flood prone areas.
  - To make mitigation improvements for structures such as culverts, road, bridges, and government buildings.
- Minor localized flood reduction projects to lessen the frequency of severity of flooding and decrease predicted flood damages.
  - Such as installation or modification of culverts; stormwater management activities, such as creating retention and detention basins, protection of sanitary sewer lift stations in flood-prone areas, installation of flow-rate meters (stream gauges) on rivers and streams that are prone to flooding high-risk, vulnerable properties.
- Relocate flood-prone properties or acquire and demolish flood prone properties.
  - Located in the special flood hazard area and outside of the special flood hazard area.
- Dry-proof or wet-proof facilities that are flood prone.
  - Reduce potential infrastructure flood damages on utilities such as wastewater treatment, pipelines, and power facilities by dry-proofing or wet-proofing facilities that are flood prone.

## Discussion: Hazards to Include for Mitigation

### NATURAL

- Drought
- *Earthquake*
- Erosion
- Extreme Temperatures
- Flood (+Dam/Levee Failure)
- Hail
- Landslide
- Lightning
- ~~Sea Level Rise~~
- Severe Wind
- Severe Winter Weather
- ~~Storm Surge~~
- Subsidence
- Tornado
- ~~Tsunami~~
- Wildfire

### MAN-MADE

- Agricultural Disease (animal/crop)
- Civil Disturbance/Terrorism
- Dam, Impoundment, & Culvert Failure
- Hazardous Materials
- Public Health Emergencies
- Transportation Infrastructure
- Utility Failure
- Structure Fire
- Water Supply Contamination
- Others?

Those in red had mitigation strategies in the 2010 plan.

## Next Steps

- 2<sup>nd</sup> Planning Team meeting
- Subcommittee Formation (if needed)
  - Mitigation Strategies Subcommittee
  - Plan Review Subcommittee
- CPRI Worksheet
  - Explanation
  - Will be sent as Excel File (unless paper copy is needed)

## Pipestone County AHMP Contacts:

Steve Ewing

Emergency Management Director – Pipestone County

811 5<sup>th</sup> St. SE, Pipestone MN 56164

[steve.ewing@co.pipestone.mn.us](mailto:steve.ewing@co.pipestone.mn.us) | 507-825-1170

Maxwell Kaufman

Development Planner – Southwest Regional Development Commission

2401 Broadway Ave, Slayton, MN 56172

[maxk@swrdc.org](mailto:maxk@swrdc.org) | 507-836-1633

**Public Meeting Sign In Sheet**

Date: 10/11/17

Time Held: 6:30 PM to 8:00 PM

City/ County Location: Pipestone Emergency Services Building, Pipestone MN Purpose: AHMP Planning Team Meeting #1

| PRINT NAME          | SIGNATURE          | COMMUNITY AFFILIATION             |
|---------------------|--------------------|-----------------------------------|
| Steve Ewing         | <i>[Signature]</i> | Pipestone Co. Emerg. Mgmt.        |
| Chris Hollingsworth | <i>[Signature]</i> | Pipestone County Commissioner     |
| Mike Appel          | <i>[Signature]</i> | Orange & P                        |
| Bill Falack         | <i>[Signature]</i> | Pipestone County IT               |
| Lauren Mellenthin   | <i>[Signature]</i> | Southwest Health & Human Services |
|                     |                    |                                   |
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|                     |                    |                                   |
|                     |                    |                                   |

Reported by: *[Signature]*  
Signature

Agency: Stl Regional Development Commission

The value of participation by volunteer members of the public is \$25.20/hour.

The Community Affiliation is if the attendee wish to state a public or private organization they are representing or if they are representing themselves.

**Pipestone County All-Hazard Mitigation Plan Update**  
*Planning Team Meeting #2*

**Monday, August 20, 2018**  
4:00 PM – 5:45 PM

***Pipestone County Emergency Services Building,***  
***811 5<sup>th</sup> Street SE, Pipestone, MN 56164***

**Agenda**

- |         |                                                                                                                                                                                                              |
|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4:00 PM | HAZUS Flood Hazard Analysis Review                                                                                                                                                                           |
| 4:15 PM | Review completed CPRI Rankings                                                                                                                                                                               |
| 4:20 PM | Review Existing Plans/Programs and Gaps/Deficiencies for Each Hazard<br>Identify new strategies for updated plan<br>*Handout: Updated list of 2010 Mitigation Strategies                                     |
| 5:30 PM | Sub-Committee Formation & scheduling of subcommittee meetings (if needed) <ul style="list-style-type: none"><li>• Mitigation Strategies Subcommittee (STAPLE+E)</li><li>• Plan Review Subcommittee</li></ul> |
| 5:40 PM | Questions, Comments, Observations                                                                                                                                                                            |
| 5:45 PM | Adjourn                                                                                                                                                                                                      |

**Meeting Deliverables**

- Updated list of hazards and prioritized hazards for county as well as plans/programs & gaps/deficiencies.
- Identified carry-over strategies and completed / deleted strategies
- Identify new strategies for insertion into updated plan
- Dedicated team members to review all strategies and the entire plan

## **Pipestone County All-Hazard Mitigation Plan Update**

*Planning Team Meeting #2*

**Monday, August 20, 2018**

4:00 PM – 5:45 PM

***Pipestone County Emergency Services Building,***

***811 5<sup>th</sup> Street SE, Pipestone, MN 56164***

### **Notes**

- I. HAZUS Flood Hazard Analysis Review**
  - a. (See meeting slides & flood hazard analysis)
- II. Review completed CPRI Rankings**
  - a. All CPRI's have been received and so the rankings will not change unless a jurisdiction would like to join in the planning process.
- III. Review Existing Plans/Programs and update strategies**
  - a. Jasper has raised the concrete pedestal for the lift station generator 1 foot after the June 2014 flood.
  - b. A.1.a Blizzards & Winter Storms
    - i. #4: Remove this strategy as burying of lines is no longer done (in fact, some are being un-buried).
  - c. A.1.b Public Health Emergencies
    - i. #2: Change references from LLMP to SWHHS.
  - d. A.1.c Tornado & Winds / Severe Summer Storms
    - i. #2: Some schools have built safe rooms as part of their new building construction (not necessarily an unoccupied room, but a room that also functions as a safe room). We will add the school as a responsible partner in this strategy and this could be particularly applicable if Pipestone Area Schools constructs a new school. The MN Building Code requires all new mobile home parks to have safe rooms, but not existing parks.
    - ii. #4: Combine this with strategy #2.
    - iii. #5: Not many mobile home parks left in the county (1 in Pipestone and then campgrounds, in a sense). Add campgrounds to this strategy. As a side note, mobile home parks cannot be built in floodplains.
    - iv. #6: Sirens are radio-controlled by dispatch. All have batteries. Ruthton's is the only siren that is manually-operated. Cities are responsible for their own sirens. Remove Egerton and Jasper from this strategy since they have completed.
  - e. A.1.d Transportation Infrastructure
    - i. #3: PCHwy has a tree-planting program in problem snow areas. Also doing temporary snow fences. Add SWCD as a responsible party.
    - ii. #4: PCHwy stakes the highways already (metal stakes most effective).
  - f. A.2.a Drought
    - i. #1: Cities should be responsible parties, not BWSR.
  - g. A.2.b Structure Fires & Wildfires
    - i. #1: Is this program still going?
    - ii. #3: For cities less than 2,500 people, this is not required. There is also a very high cost involved in re-writing and enforcing these codes to the point that it is not feasible for small cities. This strategy could be removed because it is highly unlikely that this will happen. Contractors are already required to build within the State Building Code – only large assembly buildings (300+ occupants) are inspected by state inspectors.



- iii. #7: SW Regional Mutual Aid agreement includes all fire departments in the Southwest fire district (Cottonwood, Jackson, Murray, Nobles, Pipestone, Redwood, Rock).
  - h. A.3.a Ag Disease
    - i. #1: Add SWCD (covered under PCZA)
    - ii. #2: When this happens, USDA and other state & federal agencies take over.
  - i. A.3.b Domestic Preparedness / Earthquake
    - i. #2 Add reference to implementing safety & security measures in public buildings (schools, etc.)
  - j. A.4.a. Mitigation Plan Maintenance
    - i. #2 & #3 Also complete.
  - k. B.1.a Flooding / Dam Failure
    - i. #2: City of Pipestone is complete.
    - ii. #3: List of structures exists. Needs to be elevated 1' above and verified before permit. City of Pipestone is complete – add PCZA.
    - iii. #4: City of Pipestone is complete. Any condition use permits goes through the commission.
    - iv. #5: City of Pipestone: Any property with mortgage in the flood plain must have flood insurance.
    - v. #7: Add SWCD (covered under PCZA).
- IV. Gaps/Deficiencies for Each Hazard | Identify new strategies for updated plan**
  - a. Tornado/Severe Wind
    - i. Strategy: Promote multiple ways to receive weather warnings/alerts.
  - b. Drought
    - i. Strategy: Have secondary water sources (i.e. rural water as backup)
  - c. Hazardous Materials
    - i. Trains (oil, chlorine, ethanol) and old transformers pose a risk.
    - ii. Educating the public would be a potential strategy (CodeRED already notifies people).
  - d. Utility Failure
    - i. Strategy: Ensure cities have backup power supplies for critical infrastructure (e.g. lift stations, city buildings, fire stations, community centers)
- V. Sub-Committee Formation & scheduling of subcommittee meetings (if needed)**
  - a. Mitigation strategy review and ranking will be done via online survey. Likewise, plan review will be done online.
- VI. Comments**
  - a. We should contact Southwest Electric Cooperative and Xcel Energy to see if they want to be participating jurisdictions (required if they are to be eligible for HMA, which utilities now are).
- VII. Adjourn**

#### Meeting Deliverables

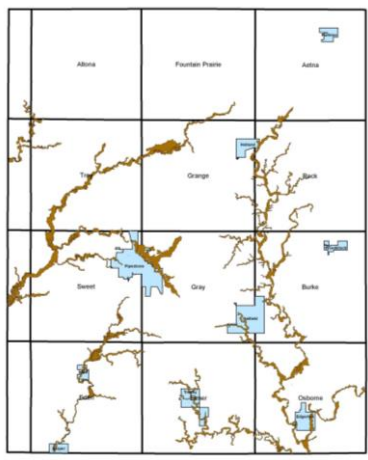
- Updated list of hazards and prioritized hazards for county as well as plans/programs & gaps/deficiencies.
- Identified carry-over strategies and completed / deleted strategies
- Identify new strategies for insertion into updated plan

- Dedicated team members to review all strategies and the entire plan

# Pipestone County All-Hazard Mitigation Plan Update

*Planning Team Meeting #2  
August 20, 2018*

Pipestone County Emergency Management  
+  
Southwest Regional Development Commission



## Agenda

- HAZUS Flood Assessment
- CPRI Rankings
- Plans/Programs and Gaps/Deficiencies
- New Mitigation Strategies
- Subcommittees (If Needed)
  - Mitigation Strategies Subcommittee
  - Plan Review Subcommittee

## HAZUS Flood Assessment

- 8,016 parcels in Pipestone County – 4,963 with buildings on them.
  - 34 parcels' buildings will be at least moderately damaged (>10% damage) in a 100-year flood. Zero are estimated to be completely destroyed.
- Total Economic Loss: \$50.48 million (44.6% of total replacement value of scenario buildings).
- Total Building-Related Losses: \$10.27 million
- 80% of estimated losses were related to business interruption.
- Residential occupancies made up 12% of total loss.

| General Occupancy    | Estimated Total Buildings | Total Damaged Buildings | Total Building Exposure | Total Economic Loss | Building Loss  |
|----------------------|---------------------------|-------------------------|-------------------------|---------------------|----------------|
| Agricultural         | 1051                      | 0                       | \$160,340               | \$17,436            | \$575          |
| Commercial           | 376                       | 5                       | \$49,776                | \$5,999             | \$143          |
| Education            | 21                        | 0                       | \$55,006                | \$0                 | \$0            |
| Government           | 100                       | 0                       | \$37,347                | \$17,623            | \$227          |
| Industrial           | 52                        | 0                       | \$26,202                | \$939               | \$116          |
| Religious/Non-Profit | 78                        | 0                       | \$41,286                | \$2,399             | \$61           |
| Residential          | 3,285                     | 45                      | \$229,679               | \$6,084             | \$1,575        |
| <b>Total</b>         | <b>4,963</b>              | <b>50</b>               | <b>\$599,636</b>        | <b>\$50,480</b>     | <b>\$2,697</b> |

Table 1. Pipestone County Total Economic Loss from 100-Year Flood

Estimated  
Economic Loss By  
Block

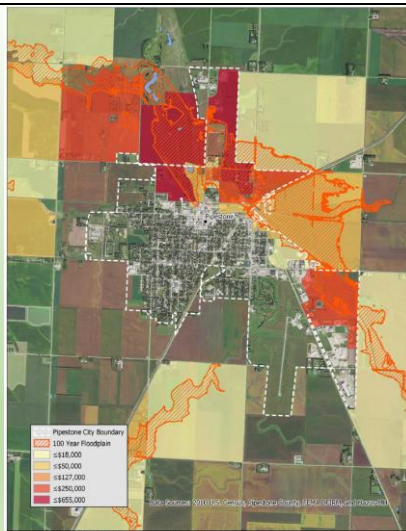
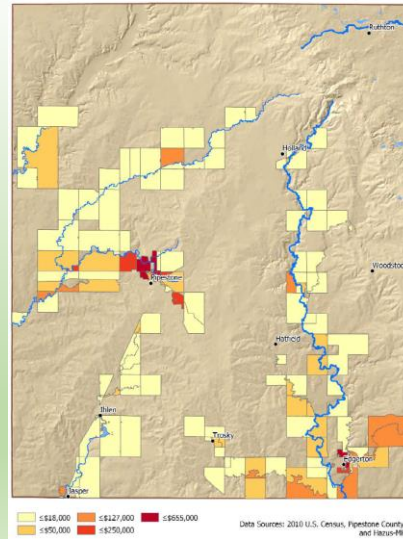


Figure 3. 100-Year Flood Building-Related Loss Estimates in Pipestone

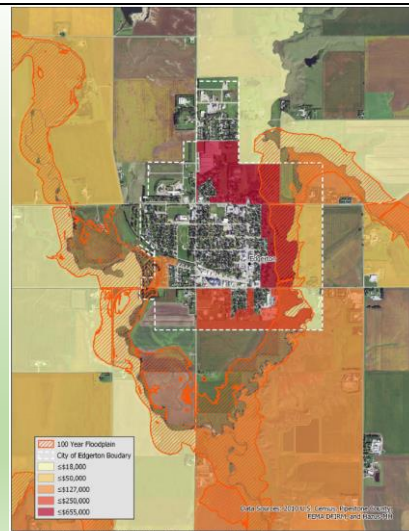
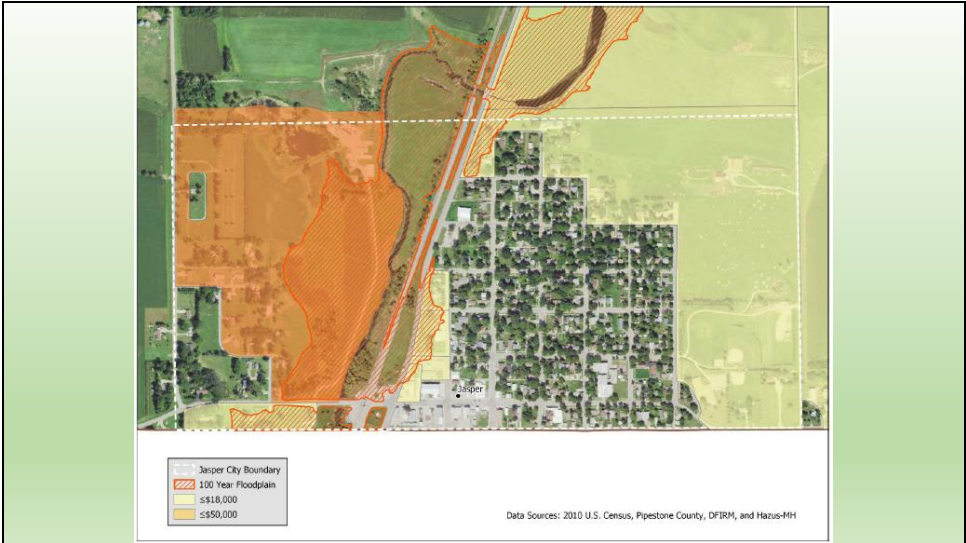


Figure 4. 100-Year Building-Related Flood Loss Estimates in Edgerton



| Census Block Number | Total Estimated Loss<br>(Building's Value & Contents) | Location  |
|---------------------|-------------------------------------------------------|-----------|
| 271174602002001     | \$655,000                                             | Pipestone |
| 271174605002009     | \$464,000                                             | Edgerton  |
| 271174602002010     | \$443,000                                             | Pipestone |

Table 2. Census Blocks with the greatest estimated losses in the 100-Year Floodplain

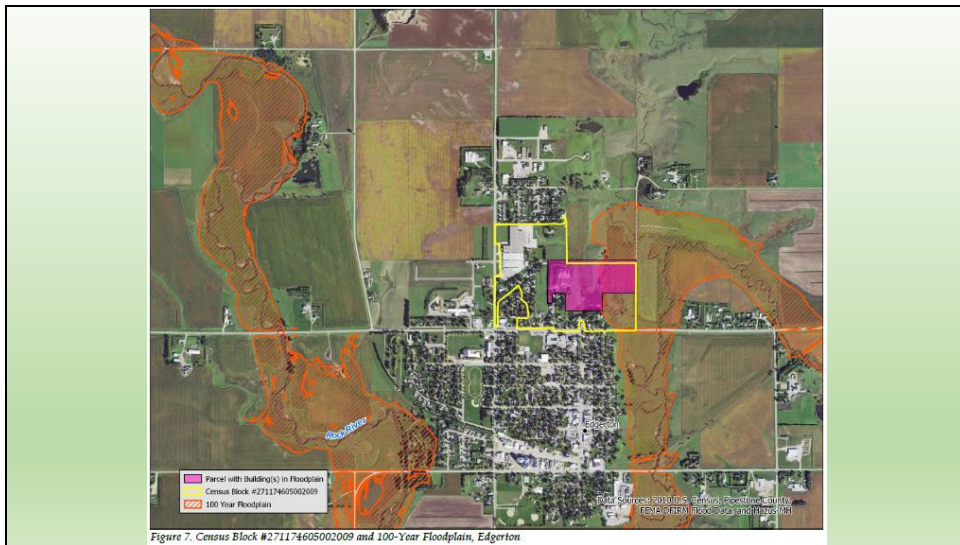
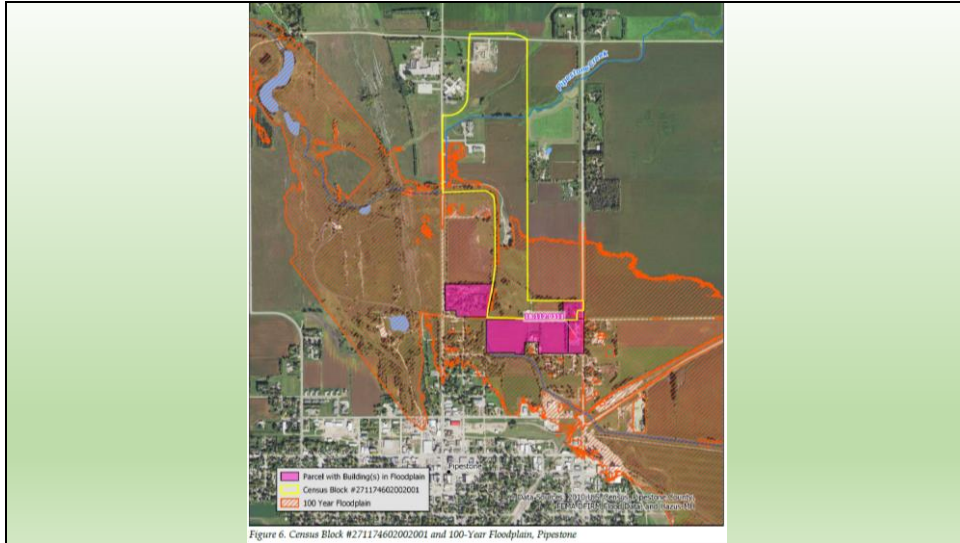
### Census Blocks of Concern

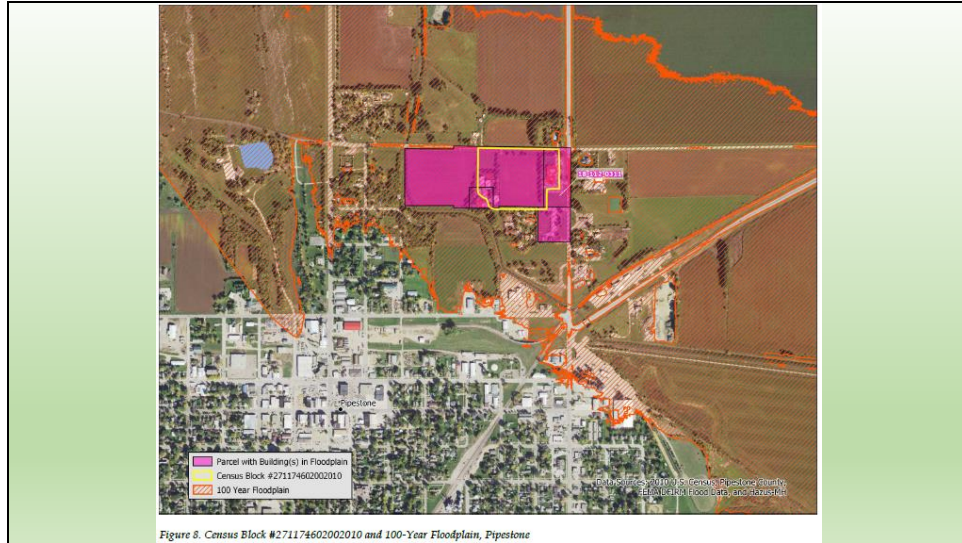
### Parcels of Concern

| Parcel ID    | Total Value of Building(s) +<br>Building's Contents on Parcel | Class Description | Building Area (ft <sup>2</sup> ) |
|--------------|---------------------------------------------------------------|-------------------|----------------------------------|
| 11.001.0250  | \$2,460,000                                                   | GOV1              | 17361                            |
| 18.112.0311  | \$1,509,200                                                   | REL1              | 15326                            |
| 18.395.0400  | \$1,033,000                                                   | IND2              | 665                              |
| 18.112.4000  | \$817,200                                                     | COM1              | 4507                             |
| 11.007.0200  | \$720,600                                                     | AGR1              | 36704                            |
| 18.007.1410  | \$702,000                                                     | IND2              | 2165                             |
| 18.112.3300  | \$572,200                                                     | COM1              | 14636                            |
| 09.020.0400  | \$446,400                                                     | AGR1              | 15544                            |
| 09.033.0100  | \$402,150                                                     | RES1              | 4185                             |
| 04.029.0300  | \$389,700                                                     | RES1              | 7031                             |
| <b>Total</b> | <b>9,052,450</b>                                              |                   |                                  |

Table 3. Pipestone County Properties with Highest Building/Contents Value with Potential Building Flood Damage

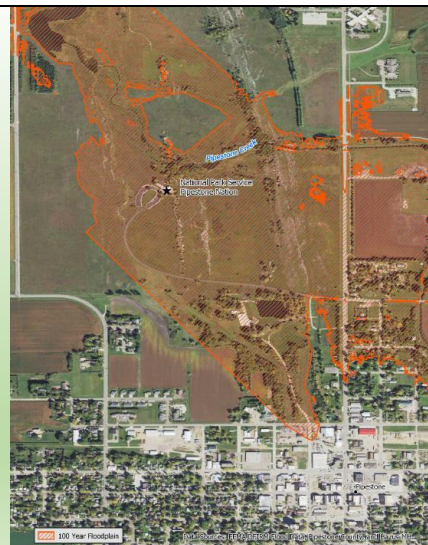






## Essential Facilities within 100-Year Flood Boundary

- National Park Service – Pipestone National Monument



## Shelter Requirement

- 106 households are estimated to be displaced. 6 people estimated to seek temporary shelter in public shelters.

## Debris Generation

- 1,790 tons of debris may be generated by a 100-year flood. It would require 72 truckloads to remove that debris.

## Hazard Ranking – CPRI Worksheet

- Worksheet that allows each jurisdiction to rank the risk that each hazard poses to the jurisdiction.

- Probability
- Magnitude/Severity
- Warning Time
- Duration

| 0.41<br>Probability                                                                                                                                                                                                                                                                                                                                    | 0.51<br>Magnitude / Severity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0.16<br>Warning Time                                                               | 0.1<br>Duration                                                                    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>1 - Highly Likely</b><br><input type="checkbox"/> Event is probable within the calendar year.<br><input type="checkbox"/> Event has up to 1 in 1 year chance of occurring (10% = 32%)<br><input type="checkbox"/> Chance of event is greater than 20% likely per year.<br><input type="checkbox"/> Event is "highly likely" to occur                | <b>1 - Catastrophic</b><br><input type="checkbox"/> Local jurisdiction is overwhelmed and unable to effectively respond to the hazard. Local resources are inadequate or non-existent. Complete loss of communications. Massive regional, state, FEMA, and federal response is required. Federal disaster declaration.<br><input type="checkbox"/> Local and regional medical services are unable to manage the volume of injuries and fatalities. Mass evacuation, sheltering, and care of displaced residents, medical patients, high risk and vulnerable populations are required.<br><input type="checkbox"/> Loss of public utilities, government and essential services for more than 1 month. Widespread destruction of critical infrastructure, public and private property. More than 50% of critical and non-critical facilities and infrastructure damaged or destroyed. Extended emergency response operations lasting more than 1 month may be required.                                                                                                                                           | <input type="checkbox"/> 6 to 8 Hours<br><input type="checkbox"/> More Than 1 Week | <input type="checkbox"/> Up to 1 Week<br><input type="checkbox"/> More Than 1 Week |
| <b>2 - Likely</b><br><input type="checkbox"/> Event is probable within the next three years.<br><input type="checkbox"/> Event has up to 1 in 3 year chance of occurring (33% = 32%)<br><input type="checkbox"/> Chance of event is greater than 20% but less than or equal to 30% per year.<br><input type="checkbox"/> Event is "likely" to occur    | <b>2 - Significant</b><br><input type="checkbox"/> Local jurisdiction is unable to effectively respond without District level mutual aid and support and significant state assistance. Local resources have been expended and local agencies have reached the limits of their capabilities. Communications seriously degraded with significant impact on operations. State disaster declaration.<br><input type="checkbox"/> Local medical services are unable to manage number of injuries and fatalities. Patients require transportation to regional medical facilities outside of the affected areas. Local area evacuations, sheltering, and care of displaced residents, medical patients, high risk and vulnerable populations are required.<br><input type="checkbox"/> Loss of public utilities, government and essential services for up to 1 month. Significant damage to critical infrastructure, public and private property over a large area. Up to 50% of critical and non-critical facilities and infrastructure damaged. Emergency response operations lasting up to 1 month may be required. | <input type="checkbox"/> 6 to 12 Hours<br><input type="checkbox"/> Up to 1 Week    | <input type="checkbox"/> Up to 1 Week<br><input type="checkbox"/> Up to 1 Week     |
| <b>3 - Possible</b><br><input type="checkbox"/> Event is probable within the next five years.<br><input type="checkbox"/> Event has up to 1 in 5 year chance of occurring (20% = 32%)<br><input type="checkbox"/> Chance of event is greater than 10% but less than or equal to 20% per year.<br><input type="checkbox"/> Event could "possibly" occur | <b>3 - Moderate</b><br><input type="checkbox"/> Local jurisdiction is able to effectively respond with significant inter-local mutual aid and support and limited state assistance. Local and mutual aid resources are adequate to support response. Communications systems operating near capacity. Local medical services are able to manage volume of injuries and fatalities but are near the limits of their capabilities. Only critically injured patients are diverted to facilities outside of the affected areas. Limited evacuations and sheltering required.<br><input type="checkbox"/> Loss of public utilities, government and essential services for up to 1 week. Significant damage to critical infrastructure, public and private property over a localized area. Up to 25% of critical and non-critical facilities and infrastructure damaged. Response operations lasting up to 1 week may be required.                                                                                                                                                                                     | <input type="checkbox"/> 12-24 Hours<br><input type="checkbox"/> Up to 1 Day       | <input type="checkbox"/> Up to 1 Day<br><input type="checkbox"/> Up to 1 Day       |
| <b>4 - Unlikely</b><br><input type="checkbox"/> Event is probable within the next 10 years.<br><input type="checkbox"/> Event has up to 1 in 10 year chance of occurring (10% = 32%)<br><input type="checkbox"/> Chance of event occurrence is less than or equal to 10%<br><input type="checkbox"/> Event is "unlikely" to occur                      | <b>4 - Minimal</b><br><input type="checkbox"/> Local jurisdiction is able to manage incident with standard mutual aid and little or no state assistance. Local resources are adequate to support response. Communications system operating normally. Local emergency response operations are able to manage number of injuries and fatalities with on hand personnel and resources.<br><input type="checkbox"/> Loss of public utilities, government and essential services for up to 24 hours. Damage contained to a single incident scene and immediate area. Up to 5% of critical and non-critical facilities and infrastructure damaged. Response operations lasting up to 72 hours may be required.                                                                                                                                                                                                                                                                                                                                                                                                        | <input type="checkbox"/> 24+ Hours<br><input type="checkbox"/> Up to 6 Hours       | <input type="checkbox"/> Up to 6 Hours<br><input type="checkbox"/> Up to 6 Hours   |

## CPRI Risk Index

- Highest Ranked
  - Winter Storm
  - Windstorm
  - Tornado
  - Flash Flood
  - Lightning
- Lowest Ranked
  - Subsidence
  - Landslide/Mudslide
  - Erosion
  - Earthquake
  - Riverine Flood

| Type            | Threat/Hazard/Technological<br>Accident - do not alter order -<br>calculation in next categories are<br>tied to the order of the hazards | Probability<br>Magnitude/Severity<br>Warning Time<br>Duration |      |      |      |      |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|------|------|------|------|
|                 |                                                                                                                                          | 1.88                                                          | 1.59 | 1.71 | 1.76 | 1.76 |
| Natural Hazards | Flood (Riverine)                                                                                                                         | 1.88                                                          | 1.59 | 1.71 | 1.76 | 1.76 |
| Natural Hazards | Flash Flood                                                                                                                              | 2.29                                                          | 1.94 | 2.71 | 2.06 | 2.23 |
| Natural Hazards | Dam Failure                                                                                                                              | 1.55                                                          | 2.27 | 2.82 | 2.73 | 2.07 |
| Natural Hazards | Tornado                                                                                                                                  | 2.29                                                          | 2.82 | 3.82 | 2.65 | 2.72 |
| Natural Hazards | Wildfire                                                                                                                                 | 1.41                                                          | 1.82 | 3.35 | 2.59 | 1.94 |
| Natural Hazards | Windstorm                                                                                                                                | 2.53                                                          | 1.94 | 2.79 | 2.18 | 2.36 |
| Natural Hazards | Winter Storm                                                                                                                             | 3.24                                                          | 1.71 | 1.53 | 2.35 | 2.43 |
| Natural Hazards | Lightning                                                                                                                                | 2.59                                                          | 1.29 | 3.24 | 1.94 | 2.23 |
| Natural Hazards | Hail                                                                                                                                     | 2.59                                                          | 1.41 | 3.12 | 1.47 | 2.20 |
| Natural Hazards | Drought                                                                                                                                  | 1.94                                                          | 1.71 | 1.18 | 3.76 | 1.94 |
| Natural Hazards | Extreme Heat                                                                                                                             | 2.24                                                          | 1.47 | 1.24 | 3.29 | 1.96 |
| Natural Hazards | Extreme Cold                                                                                                                             | 2.47                                                          | 1.53 | 1.29 | 3.06 | 2.07 |
| Natural Hazards | Erosion                                                                                                                                  | 1.67                                                          | 1.00 | 1.93 | 1.40 | 1.48 |
| Natural Hazards | Subsidence                                                                                                                               | 1.00                                                          | 1.00 | 2.00 | 0.80 | 1.13 |
| Natural Hazards | Landslide/Mudslide                                                                                                                       | 1.10                                                          | 1.00 | 2.30 | 1.80 | 1.32 |
| Natural Hazards | Earthquake                                                                                                                               | 1.00                                                          | 1.81 | 3.00 | 2.50 | 1.69 |

## Discussion: Hazards to Include for Mitigation

### NATURAL

- Drought
- Earthquake (*risk assessment only*)
- Extreme Temperatures
- Flood (+Dam/Levee Failure)
- Hail
- Lightning
- Severe Wind
- Severe Winter Weather
- Tornado
- Wildfire

### MAN-MADE

- Agricultural Disease (animal/crop)
- Civil Disturbance
- Hazardous Materials
- Public Health Emergency
- Transportation Infrastructure
- Utility Failure
- Water Supply Contamination

## Mitigation Strategies (Handout)

- Carryover Strategies
- Deleted/Completed Strategies
- New Strategies Discussion
  - Mitigation Ideas ([https://www.fema.gov/media-library-data/20130726-1904-25045-0186/fema\\_mitigation\\_ideas\\_final508.pdf](https://www.fema.gov/media-library-data/20130726-1904-25045-0186/fema_mitigation_ideas_final508.pdf))

## Mitigation Strategies

- **Prevention:** Government, administrative, or regulatory actions.
- **Property Protection:** Removal or modification of existing buildings or structures to protect them from a hazard.
- **Public Education and Awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.
- **Natural Resource Protection:** Actions that minimize hazard losses and preserve or restore the functions of natural systems.
- **Emergency Services:** Actions that protect people and property during and immediately after a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- **Structural Projects:** Actions that involve the construction of structures to reduce the impact of a hazard, for example: floodwalls, safe rooms.

## Mitigation Actions Eligible for HMA

1. Retrofit or construction of safe room facilities to protect public during extreme wind events.
2. Purchase of generators for backup power to support the operation of essential function in critical facilities in the event of severe storms.
3. Burying or strengthening of power lines to reduce the risk of power outages from downed lines during a severe storm.
4. Install new warning systems in identified vulnerable locations
5. Mitigation measures to reduce the threat of wildfire.
6. Infrastructure retrofit for flood prone areas.
7. Minor localized flood reduction projects to lessen the frequency of severity of flooding and decrease predicted flood damages.
8. Relocate flood-prone properties or acquire and demolish flood prone properties.
9. Dry-proof or wet-proof facilities that are flood prone.

## Existing Plans/Programs and Gaps/Deficiencies

- Take a look at the large Plans/Programs and Gaps/Deficiencies sheets placed around the room.
- Write any additions you have to these directly on the sheets.
- Feel free to look at *Mitigation Ideas* as well for ideas on where there might be gaps.
- Afterward we'll discuss new mitigation strategies.

## Next Steps

- Subcommittee Formation (if needed)
  - Mitigation Strategies Subcommittee
  - Plan Review Subcommittee
- Finalize Plan
- Public Hearing & Comment Period (30 Days)
- All participating jurisdictions must adopt the plan by resolution in order to be eligible for Hazard Mitigation Assistance.
  - Once Pipestone County has adopted the plan, it will be reviewed by HSEM and FEMA, any changes will be made, and the plan will be finalized.



4:00 PM to 5:45 PM 8/20/18

# Pipestone County Hazard Mitigation Meeting #2 Pipestone County EMS Building

| <u>Name</u>         | <u>Agency</u>               | <u>Signature</u>    |
|---------------------|-----------------------------|---------------------|
| Lauren Mellenthin   | SWHHS                       | Lauren Mellenthin   |
| DOUG FORTUNE        | CITY OF PIPESTONE           | Doug Fort           |
| Kyle Krier          | Pipestone Co. zoning        | Kyle Krier          |
| Joyce Schmidt       | Pipestone Co. Assessor      | Joyce Schmidt       |
| Les NATH            | Pipestone Co. Comm.         | Les NATH            |
| Luke Johnson        | Pipestone Co. Comm.         | Luke Johnson        |
| Bruce Koorman       | Pipestone Co. Comm.         | Bruce Koorman       |
| Chris Hollingsworth | Pipestone Co. Comm.         | Chris Hollingsworth |
| Bill Folger         | Pipestone Co. IT            | Bill Folger         |
| Steve Ewing         | Pipestone Co. Administrator | Steve Ewing         |
| Casey Sievert       | Pipestone Co. EM            | Casey Sievert       |
| Nick BERGMAN        | Pipestone Co. Hwy. Engineer | Nick BERGMAN        |

Reported by: Max Krier, Agency: SW Regional Development Commission

The value of participation by a volunteer member of the public is \$26.40/hour.



## **Appendix E - Public Hearing Notices and Notes/Comments**

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## **Appendix F - Completed and Deleted Actions from the 2010 Plan**

| Hazard - Strategy                                   | Mitigation Action                                                                                                                                       | Status   | Jurisdictions                               | Responsibility      | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                                              | Est. Cost/ Source |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| Winter Storms – Prevention                          | Work with utility providers to have power lines buried and/or hardened against hazards.                                                                 | Deleted  | Pipestone County                            | PCZA, Utilities     | This is no longer relevant as line burying is no longer done.                                                                                                                                    | High              |
| Tornado / Winds / Severe Summer Storms – Structural | Encourage construction of safe rooms in public facilities, manufactured home parks.                                                                     | Deleted  | Pipestone County                            | PCEM, PCZA          | This was combined with another similar strategy.                                                                                                                                                 | High              |
| Structure Fires & Wildfires – Prevention            | Ensure property owners construct new facilities to Minnesota Uniform Building Code.                                                                     | Complete | Pipestone                                   | CiP                 | Pipestone adopted the Minnesota Uniform Building Code in 2017.                                                                                                                                   | Low               |
| Structure Fires & Wildfires – Prevention            | Consider adopting building code for new construction.                                                                                                   | Deleted  | Pipestone County, Edgerton, Jasper, Ruthton | PCZA, CiE, CiJ, CiR | Ruthton: By resolution adopt either state or county code. Overall: This strategy should be removed since the cost of continued code enforcement and writing is too high for cities to implement. | Medium            |
| Hazardous Materials – Protection                    | Enforce county ordinances that deal with responsibility for cleanup of a meth lab.                                                                      | Deleted  | Pipestone County, Pipestone                 | SWHHS, PCSO, CiP    | SWHHS: Complete. Pipestone: No action on this because the problem has shifted from local labs to out-of-area super labs. Overall: This strategy can be removed.                                  | Medium            |
| Mitigation Plan Maintenance – Prevention            | Budget for specialized databases and/or Spatial Analyst extension to ArcMap GIS to utilize HAZUS-MH flood hazard analysis software in next plan update. | Complete | Pipestone County                            | PCEM                | This is was budgeted for the current and following plans.                                                                                                                                        | Medium            |
| Mitigation Plan Maintenance – Prevention            | Budget to perform additional data collection and analysis to identify vulnerable structures in specific detail in next plan update.                     | Complete | Pipestone County                            | PCEM                | This is was budgeted for the current and following plans.                                                                                                                                        | Medium            |
| Mitigation Plan Maintenance – Prevention            | Budget to perform estimates of potential monetary loses to structures, contents and functions in specific detail in next plan update.                   | Complete | Pipestone County                            | PCEM                | This was budgeted for the current and following plans.                                                                                                                                           | Medium            |

| Hazard - Strategy                   | Mitigation Action                                    | Status   | Jurisdictions                                                         | Responsibility                     | Pipestone County Comments on Planning Mechanisms for Implementation                                                | Est. Cost/ Source |
|-------------------------------------|------------------------------------------------------|----------|-----------------------------------------------------------------------|------------------------------------|--------------------------------------------------------------------------------------------------------------------|-------------------|
| Flooding / Dam Failure – Prevention | Work with DNR and FEMA to modernize floodplain maps. | Complete | Pipestone County, Edgerton, Ihlen, Jasper, Pipestone, Ruthton, Trosky | PCZA, CiE, CiI, CiJ, CiP, CiR, CiT | Pipestone County is in the process of doing so and this will be done soon enough that the strategy can be removed. | Medium            |

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## Appendix G - Mitigation Actions by Jurisdiction

Figure G-1: Mitigation Actions for the City of Edgerton

Figure G-2: Mitigation Actions for the City of Hatfield

Figure G-3: Mitigation Actions for the City of Holland

Figure G-4: Mitigation Actions for the City of Ihlen

Figure G-5: Mitigation Actions for the City of Jasper

Figure G-6: Mitigation Actions for the City of Pipestone

Figure G-7: Mitigation Actions for the City of Ruthton

Figure G-8: Mitigation Actions for the City of Trosky

Figure G-9: Mitigation Actions for the City of Woodstock



**Figure G-1: Mitigation Actions for the City of Edgerton**

| Action # | Hazard - Strategy                 | Mitigation Action                                                                                                                                                                                            | Priority | Status       | Time-frame | Jurisdictions                                                                                       | Responsibility                                           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                                                                                                                                                      | Est. Cost/ Source |
|----------|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1        | Winter Storms – Prevention        | Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, with Specific Alert Message Encoding (SAME) capability.                                                                |          | Revised      | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper                                        | PCEM, CiE, CiHa, CiI, CiJ                                | Holland talked to citizens about radios. Ruthton uses CodeRED & IPAWS. Woodstock has a siren, uses CodeRED, and reminds residents to use weather radios. Pipestone: Cable access CodeRED, website crawl, contact TV & radio. Hatfield: No longer working on this. Trosky: Complete soon.                 | Low               |
| 10       | Severe Summer Storms – Structural | Conduct a study to determine areas that are deficient in safe rooms and/or not covered by warning systems; construct at least one new safe room (including in public facilities or manufactured home parks). |          | Revised      | 2019-2024  | Pipestone County, Edgerton, , Holland, Ihlen, Jasper, Pipestone, Trosky                             | PCEM, PCSO, PCZA, CiE, CiHo, CiI, CiJ, CiP, CiT, Sch     | Holland's siren is 15 years old – they have a safe room in their shop, but no city safe room. Edgerton: Perhaps the fire hall basement? A safe room at Pipestone's private campground and trailer park is an option. The Cities of Ruthton, Pipestone, Hatfield consider this strategy cost-prohibitive. | High              |
| 18       | Drought – Awareness               | Educate the public on the importance of wellhead protection and water conservation in times of low rainfall.                                                                                                 |          | Revised      | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | PCZA, RWS, CiE, CiHa, CiHo, CiI, CiJ, CiP, CiR, CiT, CiW | BWSR removed from and cities added to responsible parties.                                                                                                                                                                                                                                               | Low               |
| 19       | Drought – Prevention              | Identify the location of adequate amounts of bottled water in case of prolonged utility outage.                                                                                                              |          | Carried Over | 2019-2024  | Pipestone County, Edgerton                                                                          | PCEM, RWS, CiE                                           | Edgerton: New gen-set at well location.                                                                                                                                                                                                                                                                  | Low               |
| 20       | Drought – Prevention              | Work with MDH to complete and implement Wellhead Protection Plans.                                                                                                                                           |          | In Progress  | 2019-2024  | Pipestone County                                                                                    | PCZA, RWS, CiE, CiP                                      | Ruthton has this in place and renewed theirs in 2014. Pipestone is currently in progress. Edgerton: Currently working on their Wellhead Protection Action Plan (WHP complete).                                                                                                                           | Medium            |

| Action # | Hazard - Strategy                        | Mitigation Action                                                                                                                                                                                      | Priority | Status       | Time-frame | Jurisdictions                                                                                       | Responsibility           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                 | Est. Cost/ Source |
|----------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|------------|-----------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 27       | Structure Fires & Wildfires – Emerg Svcs | Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives. |          | In Progress  | 2019-2029  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | ALL                      | SWHHS & Edgerton: In progress. Holland: Part of SW Region Mutual Aid Agreement with other mutual aid agreements. Ruthton: In place. | Low               |
| 35       | Flooding / Dam Failure – Prevention      | Work with DNR to review and update floodplain protection in zoning ordinance. Add check box on building/zoning permit forms indicating flood hazard areas.                                             |          | Carried Over | 2019-2024  | Pipestone County, Edgerton, Jasper                                                                  | PCZA, CiE, CiJ           | Pipestone: Complete.                                                                                                                | Low               |
| 37       | Flooding / Dam Failure – Prevention      | Work closely with DNR on all development applications in identified flood hazard areas; discourage zoning variances in identified flood hazard areas.                                                  |          | Revised      | 2019-2024  | Pipestone County, Edgerton, Jasper                                                                  | PCZA, CiE, CiJ           | Pipestone: Complete – Building & Zoning currently working with DNR and state officials.                                             | Low               |
| 38       | Flooding / Dam Failure – Awareness       | Encourage all property owners in flood hazard areas to purchase flood insurance.                                                                                                                       |          | Revised      | 2019-2024  | Pipestone County, Edgerton, Jasper                                                                  | PCZA, CiE, CiJ           | Pipestone: Complete and ongoing.                                                                                                    | Low               |
| 41       | Flooding / Dam Failure – Awareness       | Prepare Public Service Announcements for local media to use during flood hazard events.                                                                                                                |          | Carried Over | 2019-2024  | Pipestone County, Edgerton, Jasper, Pipestone                                                       | DNR, PCZA, CiE, CiJ, CiP | Pipestone: Currently does this. Edgerton: Utilizes local TV channel & social media.                                                 | Low               |

**Figure G-2: Mitigation Actions for the City of Hatfield**

| Action # | Hazard - Strategy                        | Mitigation Action                                                                                                                                                                                      | Priority | Status      | Time-frame | Jurisdictions                                                                                       | Responsibility                                           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                                                                                                                                      | Est. Cost/ Source |
|----------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1        | Winter Storms – Prevention               | Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, with Specific Alert Message Encoding (SAME) capability.                                                          |          | Revised     | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper                                        | PCEM, CiE, CiHa, CiI, CiJ                                | Holland talked to citizens about radios. Ruthton uses CodeRED & IPAWS. Woodstock has a siren, uses CodeRED, and reminds residents to use weather radios. Pipestone: Cable access CodeRED, website crawl, contact TV & radio. Hatfield: No longer working on this. Trosky: Complete soon. | Low               |
| 18       | Drought – Awareness                      | Educate the public on the importance of wellhead protection and water conservation in times of low rainfall.                                                                                           |          | Revised     | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | PCZA, RWS, CiE, CiHa, CiHo, CiI, CiJ, CiP, CiR, CiT, CiW | BWSR removed from and cities added to responsible parties.                                                                                                                                                                                                                               | Low               |
| 27       | Structure Fires & Wildfires – Emerg Svcs | Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives. |          | In Progress | 2019-2029  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | ALL                                                      | SWHHS & Edgerton: In progress. Holland: Part of SW Region Mutual Aid Agreement with other mutual aid agreements. Ruthton: In place.                                                                                                                                                      | Low               |

**Figure G-3: Mitigation Actions for the City of Holland**

| Action # | Hazard - Strategy                        | Mitigation Action                                                                                                                                                                                            | Priority | Status      | Time-frame | Jurisdictions                                                                                       | Responsibility                                           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                                                                                                                                                      | Est. Cost/ Source |
|----------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 10       | Severe Summer Storms – Structural        | Conduct a study to determine areas that are deficient in safe rooms and/or not covered by warning systems; construct at least one new safe room (including in public facilities or manufactured home parks). |          | Revised     | 2019-2024  | Pipestone County, Edgerton, , Holland, Ihlen, Jasper, Pipestone, Trosky                             | PCEM, PCSO, PCZA, CiE, CiHo, CiI, CiJ, CiP, CiT, Sch     | Holland’s siren is 15 years old – they have a safe room in their shop, but no city safe room. Edgerton: Perhaps the fire hall basement? A safe room at Pipestone’s private campground and trailer park is an option. The Cities of Ruthton, Pipestone, Hatfield consider this strategy cost-prohibitive. | High              |
| 18       | Drought – Awareness                      | Educate the public on the importance of wellhead protection and water conservation in times of low rainfall.                                                                                                 |          | Revised     | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | PCZA, RWS, CiE, CiHa, CiHo, CiI, CiJ, CiP, CiR, CiT, CiW | BWSR removed from and cities added to responsible parties.                                                                                                                                                                                                                                               | Low               |
| 27       | Structure Fires & Wildfires – Emerg Svcs | Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives.       |          | In Progress | 2019-2029  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | ALL                                                      | SWHHS & Edgerton: In progress. Holland: Part of SW Region Mutual Aid Agreement with other mutual aid agreements. Ruthton: In place.                                                                                                                                                                      | Low               |

**Figure G-4: Mitigation Actions for the City of Ihlen**

| Action # | Hazard - Strategy                          | Mitigation Action                                                                                                                                                                                            | Priority | Status  | Time-frame | Jurisdictions                                                                                       | Responsibility                                           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                                                                                                                                                      | Est. Cost/ Source |
|----------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------|------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1        | Winter Storms – Prevention                 | Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, with Specific Alert Message Encoding (SAME) capability.                                                                |          | Revised | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper                                        | PCEM, CiE, CiHa, CiI, CiJ                                | Holland talked to citizens about radios. Ruthton uses CodeRED & IPAWS. Woodstock has a siren, uses CodeRED, and reminds residents to use weather radios. Pipestone: Cable access CodeRED, website crawl, contact TV & radio. Hatfield: No longer working on this. Trosky: Complete soon.                 | Low               |
| 10       | Severe Summer Storms – Structural          | Conduct a study to determine areas that are deficient in safe rooms and/or not covered by warning systems; construct at least one new safe room (including in public facilities or manufactured home parks). |          | Revised | 2019-2024  | Pipestone County, Edgerton, , Holland, Ihlen, Jasper, Pipestone, Trosky                             | PCEM, PCSO, PCZA, CiE, CiHo, CiI, CiJ, CiP, CiT, Sch     | Holland's siren is 15 years old – they have a safe room in their shop, but no city safe room. Edgerton: Perhaps the fire hall basement? A safe room at Pipestone's private campground and trailer park is an option. The Cities of Ruthton, Pipestone, Hatfield consider this strategy cost-prohibitive. | High              |
| 14       | Transportation Infrastructure – Prevention | Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.                                                                                                        |          | Revised | 2019-2029  | Pipestone County, Jasper, Ihlen, Pipestone                                                          | PCHWY, PCZA, CiJ, CiI, CiP, Twp, RR                      | Holland: Hwy 23 & CSAH 16 lights installed. Ruthton: No issues. Pipestone: Flood of underpass – all new infrastructure. 8 <sup>th</sup> Ave & 2 <sup>nd</sup> St NW infrastructure work to alleviate flooding.                                                                                           | High              |
| 18       | Drought – Awareness                        | Educate the public on the importance of wellhead protection and water conservation in times of low rainfall.                                                                                                 |          | Revised | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | PCZA, RWS, CiE, CiHa, CiHo, CiI, CiJ, CiP, CiR, CiT, CiW | BWSR removed from and cities added to responsible parties.                                                                                                                                                                                                                                               | Low               |

| Action # | Hazard - Strategy                        | Mitigation Action                                                                                                                                                                                      | Priority | Status      | Time-frame | Jurisdictions                                                                                       | Responsibility | Pipestone County Comments on Planning Mechanisms for Implementation                                                                 | Est. Cost/ Source |
|----------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|------------|-----------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 27       | Structure Fires & Wildfires – Emerg Svcs | Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives. |          | In Progress | 2019-2029  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | ALL            | SWHHS & Edgerton: In progress. Holland: Part of SW Region Mutual Aid Agreement with other mutual aid agreements. Ruthton: In place. | Low               |

**Figure G-5: Mitigation Actions for the City of Jasper**

| Action # | Hazard - Strategy                          | Mitigation Action                                                                                                                                                                                            | Priority | Status  | Time-frame | Jurisdictions                                                                                       | Responsibility                                           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                                                                                                                                                      | Est. Cost/ Source |
|----------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|---------|------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 1        | Winter Storms – Prevention                 | Encourage all residents to have and use NOAA All Hazards Public Alert weather radios, with Specific Alert Message Encoding (SAME) capability.                                                                |          | Revised | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper                                        | PCEM, CiE, CiHa, CiI, CiJ                                | Holland talked to citizens about radios. Ruthton uses CodeRED & IPAWS. Woodstock has a siren, uses CodeRED, and reminds residents to use weather radios. Pipestone: Cable access CodeRED, website crawl, contact TV & radio. Hatfield: No longer working on this. Trosky: Complete soon.                 | Low               |
| 10       | Severe Summer Storms – Structural          | Conduct a study to determine areas that are deficient in safe rooms and/or not covered by warning systems; construct at least one new safe room (including in public facilities or manufactured home parks). |          | Revised | 2019-2024  | Pipestone County, Edgerton, , Holland, Ihlen, Jasper, Pipestone, Trosky                             | PCEM, PCSO, PCZA, CiE, CiHo, CiI, CiJ, CiP, CiT, Sch     | Holland's siren is 15 years old – they have a safe room in their shop, but no city safe room. Edgerton: Perhaps the fire hall basement? A safe room at Pipestone's private campground and trailer park is an option. The Cities of Ruthton, Pipestone, Hatfield consider this strategy cost-prohibitive. | High              |
| 14       | Transportation Infrastructure – Prevention | Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.                                                                                                        |          | Revised | 2019-2029  | Pipestone County, Jasper, Ihlen, Pipestone                                                          | PCHWY, PCZA, CiJ, CiI, CiP, Twp, RR                      | Holland: Hwy 23 & CSAH 16 lights installed. Ruthton: No issues. Pipestone: Flood of underpass – all new infrastructure. 8 <sup>th</sup> Ave & 2 <sup>nd</sup> St NW infrastructure work to alleviate flooding.                                                                                           | High              |
| 18       | Drought – Awareness                        | Educate the public on the importance of wellhead protection and water conservation in times of low rainfall.                                                                                                 |          | Revised | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | PCZA, RWS, CiE, CiHa, CiHo, CiI, CiJ, CiP, CiR, CiT, CiW | BWSR removed from and cities added to responsible parties.                                                                                                                                                                                                                                               | Low               |



| Action # | Hazard - Strategy                        | Mitigation Action                                                                                                                                                                                      | Priority | Status       | Time-frame | Jurisdictions                                                                                       | Responsibility           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                 | Est. Cost/ Source |
|----------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|------------|-----------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 27       | Structure Fires & Wildfires – Emerg Svcs | Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives. |          | In Progress  | 2019-2029  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | ALL                      | SWHHS & Edgerton: In progress. Holland: Part of SW Region Mutual Aid Agreement with other mutual aid agreements. Ruthton: In place. | Low               |
| 35       | Flooding / Dam Failure – Prevention      | Work with DNR to review and update floodplain protection in zoning ordinance. Add check box on building/zoning permit forms indicating flood hazard areas.                                             |          | Carried Over | 2019-2024  | Pipestone County, Edgerton, Jasper                                                                  | PCZA, CiE, CiJ           | Pipestone: Complete.                                                                                                                | Low               |
| 37       | Flooding / Dam Failure – Prevention      | Work closely with DNR on all development applications in identified flood hazard areas; discourage zoning variances in identified flood hazard areas.                                                  |          | Revised      | 2019-2024  | Pipestone County, Edgerton, Jasper                                                                  | PCZA, CiE, CiJ           | Pipestone: Complete – Building & Zoning currently working with DNR and state officials.                                             | Low               |
| 38       | Flooding / Dam Failure – Awareness       | Encourage all property owners in flood hazard areas to purchase flood insurance.                                                                                                                       |          | Revised      | 2019-2024  | Pipestone County, Edgerton, Jasper                                                                  | PCZA, CiE, CiJ           | Pipestone: Complete and ongoing.                                                                                                    | Low               |
| 41       | Flooding / Dam Failure – Awareness       | Prepare Public Service Announcements for local media to use during flood hazard events.                                                                                                                |          | Carried Over | 2019-2024  | Pipestone County, Edgerton, Jasper, Pipestone                                                       | DNR, PCZA, CiE, CiJ, CiP | Pipestone: Currently does this. Edgerton: Utilizes local TV channel & social media.                                                 | Low               |

**Figure G-6: Mitigation Actions for the City of Pipestone**

| Action # | Hazard - Strategy                          | Mitigation Action                                                                                                                                                                                            | Priority | Status      | Time-frame | Jurisdictions                                                                                       | Responsibility                                           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                                                                                                                                                      | Est. Cost/ Source |
|----------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 10       | Severe Summer Storms – Structural          | Conduct a study to determine areas that are deficient in safe rooms and/or not covered by warning systems; construct at least one new safe room (including in public facilities or manufactured home parks). |          | Revised     | 2019-2024  | Pipestone County, Edgerton, , Holland, Ihlen, Jasper, Pipestone, Trosky                             | PCEM, PCSO, PCZA, CiE, CiHo, CiI, CiJ, CiP, CiT, Sch     | Holland's siren is 15 years old – they have a safe room in their shop, but no city safe room. Edgerton: Perhaps the fire hall basement? A safe room at Pipestone's private campground and trailer park is an option. The Cities of Ruthton, Pipestone, Hatfield consider this strategy cost-prohibitive. | High              |
| 14       | Transportation Infrastructure – Prevention | Work with MnDOT / local road authorities to identify and improve hazardous intersections and bridges.                                                                                                        |          | Revised     | 2019-2029  | Pipestone County, Jasper, Ihlen, Pipestone                                                          | PCHWY, PCZA, CiJ, CiI, CiP, Twp, RR                      | Holland: Hwy 23 & CSAH 16 lights installed. Ruthton: No issues. Pipestone: Flood of underpass – all new infrastructure. 8 <sup>th</sup> Ave & 2 <sup>nd</sup> St NW infrastructure work to alleviate flooding.                                                                                           | High              |
| 18       | Drought – Awareness                        | Educate the public on the importance of wellhead protection and water conservation in times of low rainfall.                                                                                                 |          | Revised     | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | PCZA, RWS, CiE, CiHa, CiHo, CiI, CiJ, CiP, CiR, CiT, CiW | BWSR removed from and cities added to responsible parties.                                                                                                                                                                                                                                               | Low               |
| 20       | Drought – Prevention                       | Work with MDH to complete and implement Wellhead Protection Plans.                                                                                                                                           |          | In Progress | 2019-2024  | Pipestone County                                                                                    | PCZA, RWS, CiE, CiP                                      | Ruthton has this in place and renewed theirs in 2014. Pipestone is currently in progress. Edgerton: Currently working on their Wellhead Protection Action Plan (WHP complete).                                                                                                                           | Medium            |
| 22       | Drought – Structural/ Prevention           | Continue sewer infiltration improvements to reduce pressure on treatment capacity.                                                                                                                           |          | Ongoing     | 2019-2029  | Pipestone                                                                                           | CiP                                                      | Every street project with storm & sanitary sewer is helping improve I&I.                                                                                                                                                                                                                                 | High              |

| Action # | Hazard - Strategy                           | Mitigation Action                                                                                                                                                                                      | Priority | Status       | Time-frame | Jurisdictions                                                                                       | Responsibility           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                 | Est. Cost/ Source |
|----------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|--------------|------------|-----------------------------------------------------------------------------------------------------|--------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 27       | Structure Fires & Wildfires – Emerg Svcs    | Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives. |          | In Progress  | 2019-2029  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | ALL                      | SWHHS & Edgerton: In progress. Holland: Part of SW Region Mutual Aid Agreement with other mutual aid agreements. Ruthton: In place. | Low               |
| 33       | Civil Disturbance – Prevention              | Local governments complete and maintain thorough community risk and threat assessments.                                                                                                                |          | Revised      | 2019-2024  | Pipestone County, Pipestone                                                                         | PCEM, PCSO, CiP          | Pipestone needs to update theirs.                                                                                                   | Low               |
| 34       | Civil Disturbance / Earthquake – Prevention | Consider zoning and building code provisions to protect facilities from intentional or natural destruction. Implement applicable safety and security measures in public buildings.                     |          | Revised      | 2019-2029  | Pipestone County, CiP                                                                               | PCZA, CiP                | Pipestone: City code & uniform building code cover this – Building & Zoning Dept. will help recommend a safe room.                  | Medium            |
| 41       | Flooding / Dam Failure – Awareness          | Prepare Public Service Announcements for local media to use during flood hazard events.                                                                                                                |          | Carried Over | 2019-2024  | Pipestone County, Edgerton, Jasper, Pipestone                                                       | DNR, PCZA, CiE, CiJ, CiP | Pipestone: Currently does this. Edgerton: Utilizes local TV channel & social media.                                                 | Low               |

**Figure G-7: Mitigation Actions for the City of Ruthton**

| Action # | Hazard - Strategy                        | Mitigation Action                                                                                                                                                                                      | Priority | Status      | Time-frame | Jurisdictions                                                                                       | Responsibility                                           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                 | Est. Cost/ Source |
|----------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 13       | Severe Summer Storms – Prevention        | Evaluate and upgrade siren warning systems (considering study outcomes from Action 10).                                                                                                                |          | Revised     | 2019-2029  | Pipestone County, Ruthton, Trosky                                                                   | PCEM, CiR, CiT                                           | Trosky looking at siren grants. Ruthton looking into USDA grants. Pipestone, Edgerton, & Jasper consider this complete.             | High              |
| 18       | Drought – Awareness                      | Educate the public on the importance of wellhead protection and water conservation in times of low rainfall.                                                                                           |          | Revised     | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | PCZA, RWS, CiE, CiHa, CiHo, CiI, CiJ, CiP, CiR, CiT, CiW | BWSR removed from and cities added to responsible parties.                                                                          | Low               |
| 27       | Structure Fires & Wildfires – Emerg Svcs | Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives. |          | In Progress | 2019-2029  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | ALL                                                      | SWHHS & Edgerton: In progress. Holland: Part of SW Region Mutual Aid Agreement with other mutual aid agreements. Ruthton: In place. | Low               |

**Figure G-8: Mitigation Actions for the City of Trosky**

| Action # | Hazard - Strategy                        | Mitigation Action                                                                                                                                                                                            | Priority | Status      | Time-frame | Jurisdictions                                                                                       | Responsibility                                           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                                                                                                                                                                                      | Est. Cost/ Source |
|----------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 10       | Severe Summer Storms – Structural        | Conduct a study to determine areas that are deficient in safe rooms and/or not covered by warning systems; construct at least one new safe room (including in public facilities or manufactured home parks). |          | Revised     | 2019-2024  | Pipestone County, Edgerton, , Holland, Ihlen, Jasper, Pipestone, Trosky                             | PCEM, PCSO, PCZA, CiE, CiHo, CiI, CiJ, CiP, CiT, Sch     | Holland's siren is 15 years old – they have a safe room in their shop, but no city safe room. Edgerton: Perhaps the fire hall basement? A safe room at Pipestone's private campground and trailer park is an option. The Cities of Ruthton, Pipestone, Hatfield consider this strategy cost-prohibitive. | High              |
| 13       | Severe Summer Storms – Prevention        | Evaluate and upgrade siren warning systems (considering study outcomes from Action 10).                                                                                                                      |          | Revised     | 2019-2029  | Pipestone County, Ruthton, Trosky                                                                   | PCEM, CiR, CiT                                           | Trosky looking at siren grants. Ruthton looking into USDA grants. Pipestone, Edgerton, & Jasper consider this complete.                                                                                                                                                                                  | High              |
| 18       | Drought – Awareness                      | Educate the public on the importance of wellhead protection and water conservation in times of low rainfall.                                                                                                 |          | Revised     | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | PCZA, RWS, CiE, CiHa, CiHo, CiI, CiJ, CiP, CiR, CiT, CiW | BWSR removed from and cities added to responsible parties.                                                                                                                                                                                                                                               | Low               |
| 27       | Structure Fires & Wildfires – Emerg Svcs | Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives.       |          | In Progress | 2019-2029  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | ALL                                                      | SWHHS & Edgerton: In progress. Holland: Part of SW Region Mutual Aid Agreement with other mutual aid agreements. Ruthton: In place.                                                                                                                                                                      | Low               |

**Figure G-9: Mitigation Actions for the City of Woodstock**

| Action # | Hazard - Strategy                        | Mitigation Action                                                                                                                                                                                      | Priority | Status      | Time-frame | Jurisdictions                                                                                       | Responsibility                                           | Pipestone County Comments on Planning Mechanisms for Implementation                                                                 | Est. Cost/ Source |
|----------|------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-------------|------------|-----------------------------------------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|-------------------|
| 18       | Drought – Awareness                      | Educate the public on the importance of wellhead protection and water conservation in times of low rainfall.                                                                                           |          | Revised     | 2019-2024  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | PCZA, RWS, CiE, CiHa, CiHo, CiI, CiJ, CiP, CiR, CiT, CiW | BWSR removed from and cities added to responsible parties.                                                                          | Low               |
| 27       | Structure Fires & Wildfires – Emerg Svcs | Continue to expand the use of mutual aid agreements and memoranda of understanding to improve coordination between state, local, and federal agencies, and appropriate private sector representatives. |          | In Progress | 2019-2029  | Pipestone County, Edgerton, Hatfield, Holland, Ihlen, Jasper, Pipestone, Ruthton, Trosky, Woodstock | ALL                                                      | SWHHS & Edgerton: In progress. Holland: Part of SW Region Mutual Aid Agreement with other mutual aid agreements. Ruthton: In place. | Low               |

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