ROCK COUNTY MINNESOTA



2021

Multi-Hazard Mitigation Plan

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ROCK COUNTY MINNESOTA

MULTI-HAZARD MITIGATION PLAN

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Section 1 – Introduction

1.1 Introduction

Hazard mitigation is defined as any sustained action to reduce or eliminate long-term risk to human life and property from hazard events. The Federal Emergency Management Agency (FEMA) has made reducing hazards one of its primary goals, and a primary mechanism in achieving this goal is both the hazard mitigation planning process and the subsequent implementation of resulting projects, measures, and policies (FEMA, 2015).

From 1980 to 2020, damages due to natural disasters in the U.S. exceeded $1.875 trillion. 2017 was the costliest year on record with $306 billion in damage, and while the costliest disasters may occur in coastal states, in 2020, wildfires, hailstorms, drought, and tornadoes caused a record amount of billion-dollar disasters across the nation (Smith, 2020). Hazard mitigation planning is an effective process to prepare communities and lessen the impact of loss of life and property from future disasters. Although mitigation efforts will not eliminate all disasters, government at all levels should strive to be as prepared as possible for a disaster for the wellbeing of its citizens.

The Multi-Hazard Mitigation Plan (MHMP) is a requirement of the Federal Disaster Mitigation Act of 2000. The development of a local government plan is required to maintain eligibility for federal hazard mitigation grant funding programs. For communities to be eligible for future mitigation funds, they must adopt an MHMP.

Researchers at the National Institute of Building Sciences looked at the results of 23 years of federally funded mitigation grants provided by FEMA, the U.S. Economic Development Administration (EDA), and the U.S. Department of Housing and Urban Development (HUD). Their findings revealed that for every $1 spent on hazard mitigation funding in the nation, $6 is saved in future disaster costs (Multi-Hazard Mitigation Council, 2019).

Rock County is vulnerable to a variety of natural hazards that threaten the loss of life and property in the county. Hazards such as tornadoes, flooding, wildfires, blizzards, straight-line winds, and droughts have the potential for inflicting vast economic loss and personal hardship.

This MHMP represents the efforts of Rock County and its local governments to fulfill the responsibility of hazard mitigation planning. The intent of the plan is to limit the damages and losses caused by specific hazards.

1.1.1 SCOPE

U-Spatial, University of Minnesota, was contracted by MN Homeland Security and Emergency Management using FEMA Pre-Disaster Mitigation (PDM) grant funds to work with Rock County Emergency Management to facilitate an update to the 2014 Rock County MHMP. U-Spatial brings extensive geographic data analysis skills and hazard risk assessment expertise to the process. U-Spatial also employed the services of Hundrieser Consulting LLC for county and stakeholder outreach as well as mitigation action development related to this plan.

This MHMP evaluates and prioritizes the major natural hazards affecting Rock County as determined by frequency of event, economic impact, deaths, and injuries. Mitigation recommendations are based on input from state and local agencies, the public, and national best practices.

U-Spatial performed the hazard risk assessment for 1-percent annual chance floods (also known as 100-year floods) using the FEMA Hazus GIS tool. The Minnesota Homeland Security and Emergency Management (HSEM) office, which is a division of the Minnesota Department of Public Safety, has determined that Hazus should play a critical role in Minnesota's risk assessments.

This is a multi-jurisdictional plan that covers Rock County, including the cities of Beaver Creek, Hardwick, Hills, Jasper, Kenneth, Luverne, Magnolia, and Steen. The Rock County mitigation activities identified in this plan also incorporate the concerns and needs of townships, school districts, and other participating entities.

Members from each of these jurisdictions actively participated in the planning process by assisting with public outreach, attending planning team meetings, providing local information, identifying mitigation actions, and reviewing the plan document (see Appendix C). The information in these forms was used to help identify mitigation actions for local implementation (see also Section 2.2). Each jurisdiction will adopt the plan by resolution after the plan is approved by FEMA. County and local city resolutions will be added by Rock County after final approval by FEMA (see Appendix D).

Rock County has specified the following goals for this MHMP update:

- Include more recent data documenting the critical infrastructure and hazards faced by Rock County.
- Reformat and reorganize the plan to reflect definitions of hazards as expressed in the 2019 State of Minnesota Multi-Hazard Identification and Risk Assessment Plan.
- Reflect current hazard mitigation priorities in Rock County.

1.1.2 HAZARD MITIGATION DEFINITION

Hazard mitigation may be defined as any action taken to eliminate or reduce the long-term risk to human life and property from natural hazards. The benefits of hazard mitigation planning include the following:

- saving lives, protecting the health of the public, and reducing injuries
- preventing or reducing property damage

- reducing economic losses
- minimizing social dislocation and stress
- reducing agricultural losses
- maintaining critical facilities in functioning order
- protecting infrastructure from damage
- protecting mental health
- reducing legal liability of government and public officials

1.2 State Administration of Mitigation Grants

FEMA currently has three mitigation grant programs that are administered by the State of Minnesota: the Hazard Mitigation Grant Program (HMGP), the Building Resilient Infrastructure and Communities (BRIC) program, and the Flood Mitigation Assistance (FMA) program. The HMGP, BRIC, and FMA programs are administered through the state of Minnesota Department of Public Safety HSEM Division. All applicants must have or be covered under an approved Hazard Mitigation Plan. Eligible applicants include state and local governments, certain private non-profit organizations or institutions, and tribal communities.

Section 2 – Public Planning Process

2.1 Planning Team Information

The Rock County MHMP planning team is headed by the Rock County emergency manager, who is the primary point of contact. Members of the Rock County MHMP planning team include representatives from the public and governmental sectors. Table 1 identifies the planning team individuals and the organizations they represent.

Jurisdictional representatives were contacted throughout the HMP process to help facilitate local participation and provide feedback on the hazards of concern to their communities. This feedback was used to develop local mitigation actions that they would seek to implement upon plan adoption (see Section 6.3 and Appendix J).

Table 1. Multi-Hazard Mitigation Planning (MHMP) Team

Name	Agency/Organization	Participant Title
Kyle Oldre	Rock County Administration/Emergency Management	County Board Chair/Emergency Management Director
Susan Skattum	Rock County Administration	Deputy Administrator
Ashely Kurtz	Rock County Auditor-Treasurer's Office	Auditor-Treasurer
Evan Verbrugge	Rock County Sheriff's Office	County Sheriff
Mark Sehr	Rock County Highway Department	County Engineer
Gary Overgaard	Rock County Board of Commissioners	Commissioner
Arlyn Gehrke	Rock County Land Management Office	Engineering Technician/GIS
Susan Skattum	Rock County Administration	Deputy Administrator
Eric Hartman	Rock County Land Management Office	Director
Jane Blank	City of Beaver Creek	City Clerk-Treasurer
Joshua Teune	City of Beaver Creek	Mayor
William Baker	City of Hardwick	Mayor
Gordon Hansen	City of Hardwick	City Councilor
Connie Wiertzema	City of Hills	City Clerk-Treasurer
Keith Elbers	City of Hills	Mayor
Cortney Kounkel	City of Jasper	City Clerk-Treasurer
John Call	City of Luverne	City Administrator
Jessica Mead	City of Luverne	City Clerk
Dennis Madison	City of Magnolia	Mayor
Kyle Jemme	Denver Township	Supervisor
Brad Skattum	Vienna Township	Chairman
Doug Eeten	Vienna Township	Clerk
Craig Oftedahl	Luverne Public School	Superintendent
Todd Holthaus	Hills-Beaver Creek Schools	Superintendent
Jason Kloss	Southwest Health and Human Services	Environmental Health Manager

Name	Agency/Organization	Participant Title
Mark Marcy	MN DPS / HSEM	HSEM Region V Regional Program Coordinator
Chris Ingebretsen	State of MN – Blue Mounds State Park	Park Manager
Casey Sievert	Pipestone County	Director of EMS and Emergency Management

2.2 Review of Existing Plans, Capabilities & Vulnerabilities

Rock County and its local communities utilized a variety of planning documents to direct plan development. These documents included a Comprehensive/Master Plan, Emergency Operations Plan, Transportation Plan, etc. (see Appendix D for a full listing of plans and programs in place in Rock County). The planning process also incorporated the existing natural hazard mitigation elements from previous planning efforts. In addition, the 2019 Minnesota All-Hazard Mitigation Plan was consulted.

In the development of the Rock County MHMP, U-Spatial consultants reviewed and incorporated a variety of planning documents that direct community development and influence land use decisions for the county and its jurisdictions. In addition, U-Spatial consultants worked closely with the Rock County Emergency Management Director and other key county staff and local city officials to collect feedback on local mitigation capabilities and vulnerabilities that either support or hinder the ability to mitigate against natural hazards at the county and local level. Following is a summary of the assessment tools used to gather information on local capabilities and vulnerabilities during the planning process:

Capabilities Assessment (*hazard-specific*): In this assessment, detailed information was collected from Rock County on current plans and programs in place (i.e., existing programs, plans, or policies) as well as program gaps or deficiencies that currently exist to mitigate against damages caused by each natural hazard addressed in the plan. Section 5 identifies current gaps and deficiencies for mitigation and Section 6.1.3 describes the mitigation capabilities that are in place by Rock County to support mitigation.

Local Mitigation Surveys: As part of Rock County's 2021 MHMP update, participating jurisdictions and key county personnel were asked to fill out a Local Mitigation Survey (LMS) form. Questions in the LMS form addressed the following:

- Part A: Hazard Identification, Risk Assessment & Vulnerability Analysis
- Part B: Local Mitigation Capabilities Assessment
- Part C: Local Mitigation Projects
- Part D: Survey Participants

The purpose of the survey was to gather jurisdictionally specific information needed to support the update of the plan and to help inform development of local-level mitigation actions for the next five-year planning cycle (for the full Rock County LMS report, see Appendix C).

2.3 Planning Process Timeline and Steps

In order to update the 2014 Rock County MHMP, U-Spatial consultants worked in coordination with the Rock County Emergency Management and members of the planning team. The updated plan includes new data documenting the types of hazards faced by Rock County residents and emergency planning officials as well as new thinking on how to address these hazards.

2.3.1 ROCK COUNTY STAKEHOLDER COORDINATION

On May 1, 2020, U-Spatial hosted an online kickoff meeting that was attended by the Rock County Emergency Manager. The webinar included a project overview, U-Spatial's background, the roles and responsibilities of the Emergency Manager, the contents of the MHMP, the planning process, and the projected timeline of the project (see Appendix F for webinar slides).

On September 2, 2020, Rock County issued a news release inviting public feedback and participation for the Rock County MHMP update (for complete documentation, see Appendix G).

A planning team meeting took place on October 28, 2020, via Zoom video conference hosted by U-Spatial. Meeting participants included representatives from Rock County, city and township governments, neighboring jurisdictions, and other key stakeholders. The planning team was provided with an overview of the purpose, process, and timeline for the Rock County MHMP update, as well as the roles and responsibilities of planning team members. During the meeting, participants discussed the prioritization of natural hazards facing the county and local jurisdictions, provided feedback on plans and programs in place, and identified mitigation actions that would reduce future risk. Information gathered during this meeting was used to inform the development of mitigation strategies in the updated plan. See Appendix F for a full meeting summary.

On November 18, 2021, members of the MHMP planning team convened again via Zoom video conference with U-Spatial presenters. Together, they conducted a review of and discussed the updated risk assessment for Rock County. Draft mitigation strategies were developed for Rock County and each city participating in the plan (see Appendix F).

In order to provide opportunity for public input, Rock County issued a second news release on January 3, 2022, inviting public review and feedback on the draft plan. The news release provided information on where to view the plan and submit comments. U-Spatial hosted a webpage to post the full draft of the Rock County MHMP, including excerpts of the Rock County Master Mitigation Action Chart, each jurisdictional mitigation action chart, and an electronic feedback form.

Table 2 documents Hazard Mitigation update meetings and public outreach. Appendix G provides documentation of the public outreach for feedback on the draft plan by Rock County and jurisdictions. The public feedback period for the draft plan was open from from 1/3/21 to 1/16/22, for a total of 14 days.

Table 2. Rock County Hazard Mitigation Update meetings and public outreach

Event	Date	Appendix
Kickoff Webinar	5/1/20	Appendix F, Planning Team Meetings
News Release #1	9/2/20	Appendix G, Public Outreach & Engagement Documentation
Planning Team Meeting #1	10/28/20	Appendix F, Planning Team Meetings
Planning Team Meeting #2	11/18/21	Appendix F, Planning Team Meetings
News Release #2	1/3/21	Appendix G, Public Outreach & Engagement Documentation

At the close of the public outreach period, the U-Spatial consultants worked with the Rock County Emergency Manager and members of the planning team to incorporate feedback from the public into the Multi-Hazard Mitigation Plan.

For more information on the planning process, see Sections 6 and 7.

2.3.2 OVERVIEW OF JURISDICTIONAL PARTICIPATION

Throughout the planning process, Rock County and the U-Spatial team worked to engage representatives from the county and each city in the update of the plan. Key activities for jurisdictions included assisting with public outreach, participating in planning team meetings, providing local-level information, reviewing and providing feedback to the plan update.

U-Spatial and Rock County actively used the following methods to engage jurisdictions in the MHMP plan update process:

- **Zoom Video Conferencing**: Planning team meetings were conducted via Zoom video conferencing hosted by U-Spatial. The use of virtual meetings was used to engage stakeholders remotely during Covid-19 pandemic restrictions. Virtual meetings proved to be a beneficial addition to the planning process, resulting in a high turnout from jurisdictional representatives and other stakeholders, as well as providing the ability for presenters to collect, respond to, and document feedback from participants through Zoom functions such as surveys, chat, and Q&A.

- **Email Correspondence**: Email was a primary tool used to communicate with representatives from Rock County, municipal governments, and other stakeholders. Emails were used to distribute news releases for public outreach, to invite participation in meetings and to share meeting summaries, as well as to request local-information and final review of the draft plan. Email proved to be an effective tool that resulted in increased jurisdictional participation and collection of locally specific information. Email was also used by the public to submit feedback to Rock County following news releases on the MHMP.

- **Phone Calls**: Phone calls were frequently used to conduct direct outreach or follow-up to jurisdictions to ensure participation or to collect information via one-on-one interviews. Phone calls proved to be an effective tool that resulted in increased jurisdictional participation and collection of quality information. Phone calls were especially useful in engaging very small communities that had limited staff or technological capabilities.

Cities participating in Rock County MHMP update varied by population and associated government resources to participate in the planning process (i.e., personnel, time, and technology). Rural communities with smaller populations (under 500) typically had part-time elected officials, limited to no city staff, and reduced City Hall hours in which to conduct business. Rock County and U-Spatial were sensitive to these local challenges and worked to help these local governments to participate using the methods that worked best to accommodate them, such as phone interviews to complete local mitigation survey forms (see Appendix C).

Table 3 provides an overview of the participation of each city that took part in the Rock County MHMP update planning process, with reference to the location of supporting documentation.

Table 3. Jurisdictional participation in planning process

Jurisdiction (Population)	News Release #1	Planning Team Mtg. #1	Local Mitigation Survey	Mitigation Action Chart	Planning Team Mtg. #2	News Release #2 & Plan Review
Rock County (9704)	X	X	X	X	X	X
City of Beaver Creek (280)	X	X	X	X	X	X
City of Hardwick (189)	X	X	X	X	X	X
City of Hills (686)	X	X	X	X	X	X
City of Jasper (60)	X	X	X	X	X	X
City of Kenneth (60)	X		X	X		X
City of Luverne (4946)	X	X	X	X	X	X
City of Magnolia (196)	X	X	X	X	X	X
City of Steen (171)	X		X	X		
Neighboring Jurisdictions:						
Pipestone County					X	
Nobles County						
Murray County						

Section 3 – Rock County Profile

3.1 General County Description

Rock County is located in southwest Minnesota approximately 217 miles southwest of the Twin Cities. It is bounded on the north by Pipestone County, on the east by Nobles County, on the south by the state of Iowa, and by the state of South Dakota to the east. The land area of the county is comprised of approximately 483 square miles and there are three lakes and two major watersheds.

There are eight cities and twelve townships in Rock County. The City of Luverne is the county seat and most populated city and contained a population of 4,745 in 2010. The county had an estimated total population of 9,315 in 2019.

Rock County is largely agricultural. The majority of the county's land is cropland, producing primarily corn and soybeans. U.S Highway 75 and Interstate 90 provide thoroughfares into and out of the county from the north and south and east and west respectively. There is one municipal airport in Rock County.

3.2 Environmental and Geologic Characteristics

Land within Rock County is typical of a prairie environment. Areas northwest of Beaver Creek are hilly in comparison with the gently rolling topography over the rest of the county. The highest elevation in Rock County is a gravelly ridge in the north central part of the county. It is about 1,790 feet above sea level. The lowest elevation is about 1,340 feet above sea level.

Precambrian Red Sioux Quartzite underlies Rock County at varying depths. In eastern and southern Rock County, younger cretaceous formations overlies the Red Sioux Quartzite. Glacial till covers the bedrock in most places except where the rock is exposed at the surface. The glacial till is covered by windblown loess. The loess covers the county at various depths from less than one foot to over ten feet.

Two distinct surficial deposits exist in Rock County. The first deposit is the Cretaceous Aquifer. The Cretaceous Aquifer is made up of sandstone, quartzose, and is fine-to-course grained. The second deposit is the Sioux Quartzite Aquifer from the Proterozoic Age. The Sioux Quartzite is made up of quartzite, fractured, and weathered near the present upper surface.

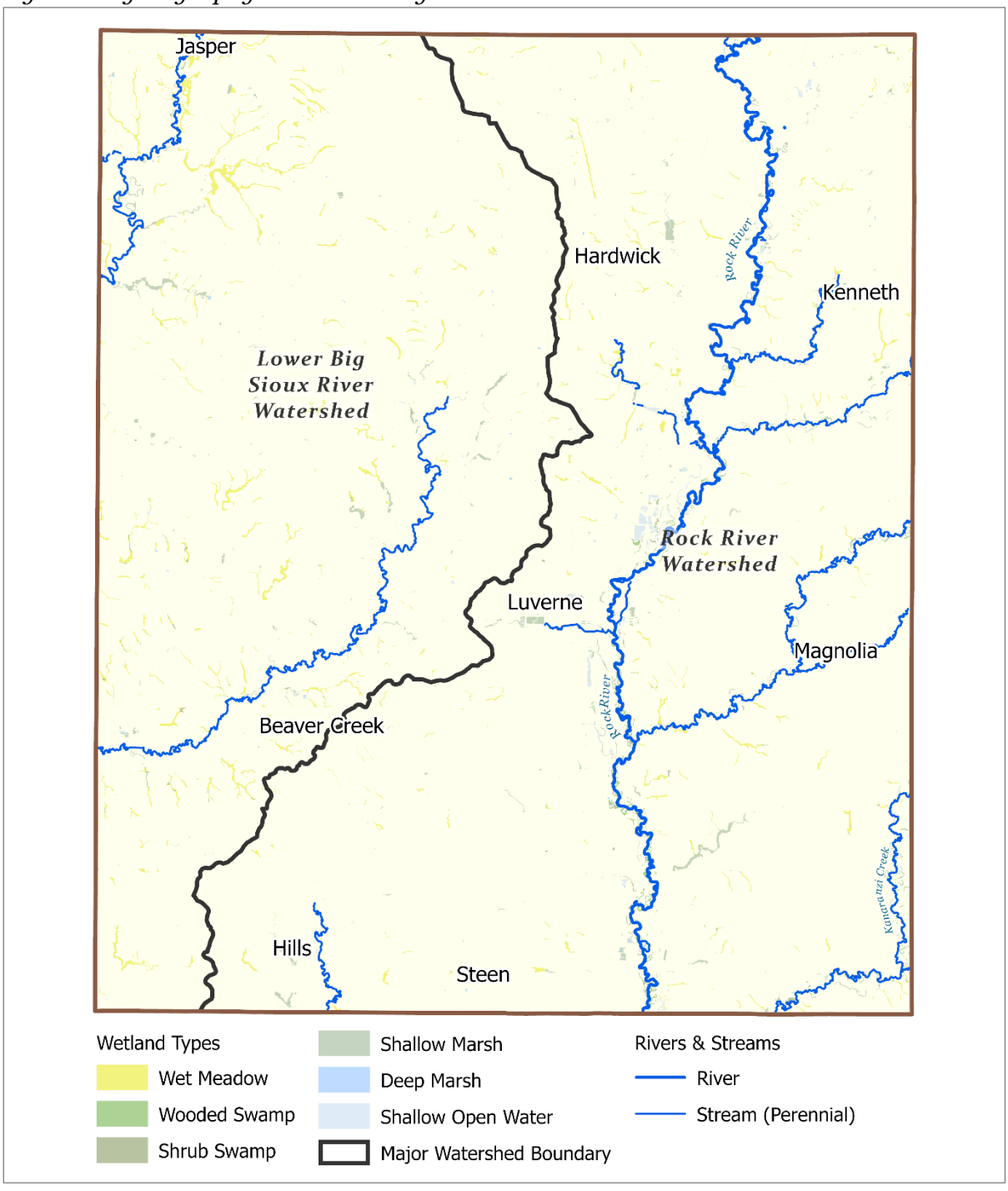
Land use within Rock County remains primarily agricultural with urbanization typically occurring in and around established communities. Rock County has a great deal of prime agricultural land located in the county.

3.3 Hydrography

Rock County lies within the Missouri River basin and is the only Minnesota county to lie entirely within this basin. There are two major watersheds in Rock County, including the Big Sioux–Pipestone River and the Rock River watersheds. The Rock River watershed is the largest, spanning over 280 square miles within Rock County or 58% of the county.

Rock County contains a number of Protected Waters (formerly called Public Waters), which are lakes, wetlands, and watercourses regulated by the Minnesota DNR. The inventory of the protected waters in the county includes two lakes, 63 watercourses (rivers and streams), and few wetlands (MN DNR, 2019a). The basic hydrography of Rock County is mapped in Figure 1.

Figure 1. Hydrography in Rock County



SOURCE: (MN DNR, 2013, 2019c, 2021c)

3.3.1 LAKES

There are three man-made lakes and nine gravel pits in Rock County. The county contains no natural lakes. In all of the man-made lakes in Rock County there is the possibility of winterkill due to the shallow depths. The man-made lakes are stocked with black and white crappies along with blue gills.

The MPCA classifies no lakes as impaired (MPCA, 2020). Impaired waters do not meet the State's water quality standards and they affect growth and health of communities and economies. The Clean Water Act has a mandate requiring every state to address impairments (US EPA, 2015).

Lakes that are infested with an aquatic invasive species are also of concern (MN DNR, 2020d). Fortunately, the MN DNR does not document any lakes in Rock County as infested with an invasive aquatic species.

3.3.2 RIVERS

Rock River is the one major river that flows through Rock County. Rock River is a tributary of the Sioux River, flowing for around 144 miles until its confluence with the Sioux River near Hawarden, Iowa. Rock River drains a total of 1,680 square miles. The are no state water trails in the county (MN DNR, 2020d).

The MPCA classifies a number of rivers in Rock County as impaired, including the Rock River (MPCA, 2020).

3.3.3 WETLANDS

The term "wetland" is defined by the Minnesota Legislature as "…areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (Wetland Standards and Mitigation, 2016). Important benefits of wetlands include storage area for excess water during flooding; filtering of sediments and harmful nutrients before they enter lakes, rivers, and streams; and fish and wildlife habitat.

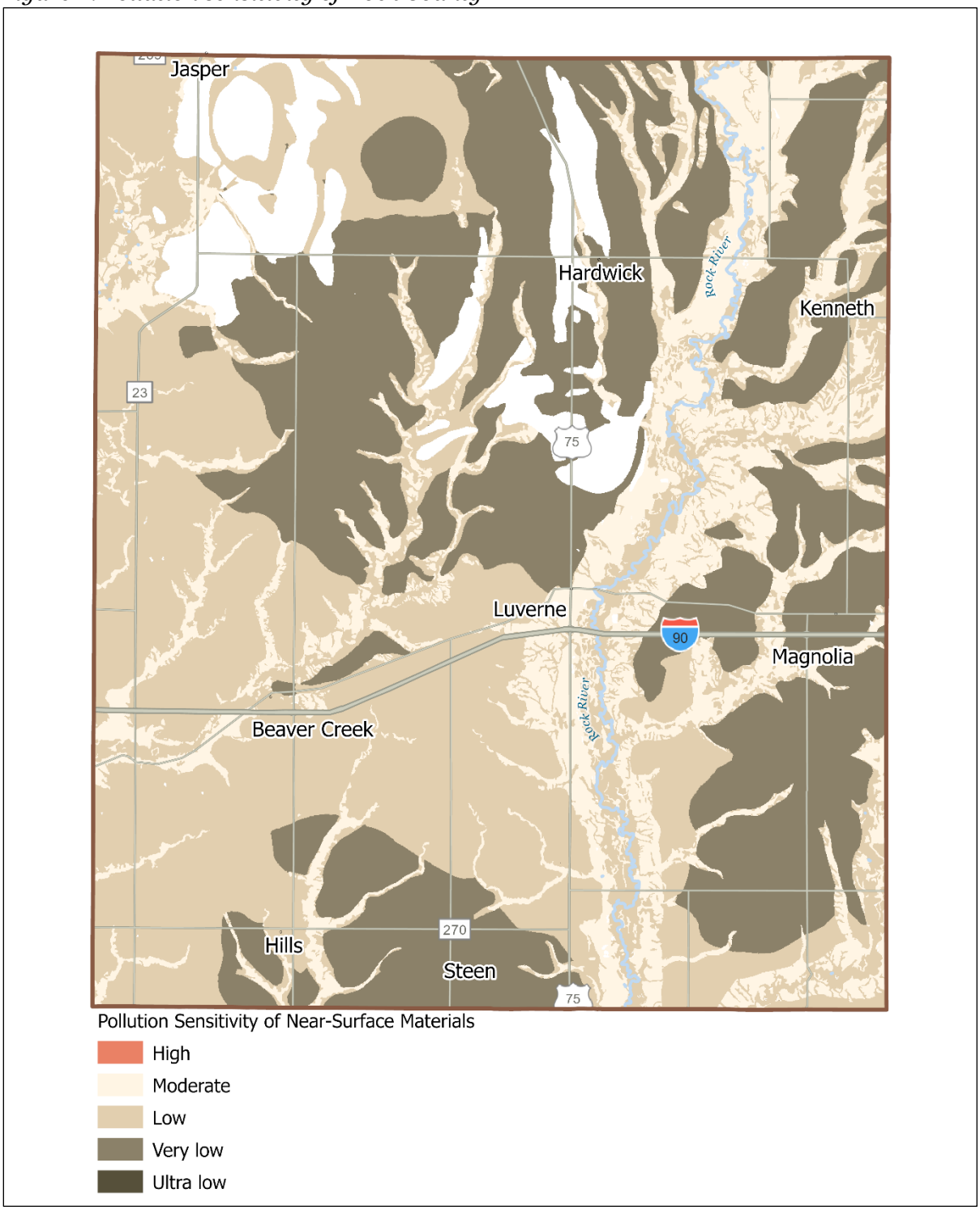
Rock County contains wetlands scattered throughout the county. These wetlands total 16,490 acres and cover 5.3% of the county (MN DNR, 2019c). These wetlands are mostly seasonally flooded basin (8,625 acres), wet meadow (3,307 acres) and shallow marsh (2,026 acres) (MN DNR, 2019d). The variety of wetland types are presented in the hydrography map in Figure 1.

Although not as prevalent as in lakes and rivers, the MPCA has identified several impaired wetlands throughout Minnesota; fortunately, none of these wetlands are located in Rock County.

3.3.4 GROUNDWATER

Groundwater serves a variety of vital functions in Rock County and is used to supply water for public water supply, private domestic use, irrigation, and farm wells. The primary uses of groundwater are public water supplies and private domestic use. Groundwater is Rock County's most abundant water resource.

Figure 2. Pollution sensitivity of Rock County



SOURCE: (MPCA, 2018A)

Groundwater in Rock County is sourced from three types of aquifers: unconsolidated glacial-drift deposits, the Sioux Quartzite, and the Cretaceous bedrock aquifer. Unconsolidated glacial drift aquifers are surficial-drift aquifers made up of sand and/or gravel deposits located at or near the land surface and are generally unconfined. The well depths range from 30 to 240 feet and yield 25 to 500 gallons per minute. The Sioux Quartzite aquifer is a well-cemented aquifer. The aquifer is also unconfined in a number of locations and the well depths range from 120 to 1,300 feet and yield five to 100 gallons per minute. The Cretaceous aquifer is commonly between 300 and 400 feet deep and yields five to 25 gallons per minute. The Cretaceous aquifer is a layer of sand or sandstone in a thicker deposit of Cretaceous clay and shale. The aquifer is used when both surface and buried sand aquifers are missing within the glacial drift (MPCA, 2015).

With such an abundance of groundwater available, it is important to examine how sensitive this natural resource is to pollution. Groundwater sensitivity to pollution is measured by flow rate and soil permeability. Figure 2 maps pollution sensitivity of near-surface materials based on the time it takes water to travel through three feet of soil and seven feet of surficial geology, to a depth of ten feet from the land surface (Adams, 2016). The total travel time is then categorized into five sensitivity classes, ranging from high (<=170 hours) to ultra-low (>8,000 hours). Areas with special geologic conditions, such as karsts, peatlands, bedrock at or near the surface, and disturbed lands (e.g., open pit mines) require individual consideration. Of these special condition areas, only karst areas have been assigned a sensitivity ranking ("very high") due to karst areas consistently showing very fast water infiltration rates. The remaining special condition areas are classified together as they cannot be assigned a sensitivity ranking using the same methodology (MN DNR, 2020c).

3.4 Climate

According to the Köppen climate classification system, McLeod County's climate is classified as "Dfa" – a humid continental climate region with large seasonal temperature contrasts with precipitation distributed throughout the year (no dry season) and at least four months of the year averaging above 50° F but the warmest month averaging below 71.6 F° and at least one month averaging above 71.6 F° (Arnfield, 2020).

Since 1895, climate in the United States has been analyzed using the Climate Divisional Dataset. The boundaries of climate divisions have evolved significantly over the years: beginning in 1909 with 12 climatological districts that followed the principal drainage basins, to the current 344 climate divisions based largely on the USDA Bureau of Agricultural Economics Crop Reporting Districts (Guttman & Quayle, 1996). Climate division temperature, precipitation, and drought values are derived from the values reported by the weather stations in each climate division. In 2014, new methodologies to compute the climate division data were implemented, improving the data coverage and quality of the dataset (NOAA, 2020).

Table 4 displays monthly Climate Normals (three-decade averages) of temperatures as reported by the climate division in which Rock County is located.

Table 4. Rock County average monthly temperature, 1981–2010; 1990–2020

Month	MN Climate Division 7 1981–2010	MN Climate Division 7 1990–2020	MN Statewide 1981–2010	MN Statewide 1990–2020
January	14.6°F	14.4°F	9.9 °F	10.1 °F
February	19.6°F	18.8°F	15.4 °F	14.7 °F
March	31.2°F	31.2°F	27.9 °F	27.8 °F
April	45.5°F	44.6°F	42.9 °F	41.9 °F
May	57.8°F	57.3°F	55.1 °F	54.8 °F
June	67.4°F	67.8°F	64.4 °F	64.8 °F
July	71.6°F	71.5°F	69.0 °F	69.0 °F
August	69.0°F	68.8°F	66.8 °F	66.8 °F
September	60.3°F	61.2°F	57.7 °F	58.6 °F
October	47.5°F	47.7°F	44.8 °F	45.1 °F
November	31.9°F	32.5°F	29.2 °F	29.8 °F
December	18.1°F	19.9°F	14.5 °F	16.5 °F

SOURCE: (MIDWESTERN REGIONAL CLIMATE CENTER, 2021)

3.4.1 CLIMATE CHANGE ADAPTATION

Minnesota's climate is currently changing in ways that are pushing us to adapt to weather patterns and extreme events that pose major threats to our health, homes, environment, and livelihoods. These events cost our state millions in property loss, damaged infrastructure, disrupted business, medical care, and support services, and put residents and responders at risk. Understanding how our weather is changing now and into the future will help planners and decision-makers in emergency management and supporting fields extend our progress in climate adaptation and lead to more resilient communities (MDH, 2018).

The National Climate Assessment suggests that infrastructure planning (particularly water resources infrastructure) should "be improved by incorporating climate change as a factor in new design standards and asset management and rehabilitation of critical and aging facilities, emphasizing flexibility, redundancy, and resiliency" (Georgakakos, et al., 2014).

Federal, state, and tribal governments are increasingly integrating climate change adaptation into existing decision-making, planning, or infrastructure-improvement processes (Georgakakos, et al., 2014). Definite predictions are difficult to make, as changes may vary depending on geographical location, even within Minnesota. Intense study of these topics is ongoing.

Rural communities are particularly vulnerable to climate change, due to their dependence upon natural resources, physical isolation, limited economic diversity, higher poverty rates and aging populations. According to *Climate Change Impacts in the United States: The Third National Climate Assessment*,

> Warming trends, climate volatility, extreme weather events, and environmental change are already affecting the economies and cultures of rural areas. Many rural communities face considerable risk to their infrastructure, livelihoods, and quality of life from observed and projected climate shifts. These changes will progressively increase volatility in food commodity markets, shift the ranges of

> plant and animal species, and, depending on the region, increase water scarcity, exacerbate flooding and coastal erosion, and increase the intensity and frequency of wildfires across the rural landscape (Hales et al., 2014).

The Assessment also notes that transportation systems in rural areas are more vulnerable to risks such as flooding since there are typically fewer transportation options and infrastructure redundancies. In addition, power and communication outages due to severe weather events typically take longer to repair in rural areas, which can increase the vulnerability of elderly populations. Rural area populations are also more vulnerable since they typically have limited financial resources to deal with the effects of climate change.

The composition of the region's forests is expected to change as increasing temperatures shift tree habitats northward. While forests in the Midwest are currently acting as a net absorber of carbon, this could change in the future due to projected increases in insect outbreaks, forest fires, and drought, which will result in greater tree mortality and carbon emissions (Pryor et al., 2009).

3.4.2 CLIMATE DATA TRENDS

Over 50 years of storm data on record document that Minnesota has experienced an increase in the number and strength of weather-related natural disasters, particularly those related to rising temperatures and heavy downpours.

According to the 2015 Minnesota Weather Almanac,

> During the three most recent decades, the Minnesota climate has shown some very significant trends, all of which have had many observable impacts…Among the detectable measured quantity changes are: (1) warmer temperatures, especially daily minimum temperatures, more weighted to winter than any other season; (2) increased frequency of high dew points, especially notable in mid- to late summer as they push the Heat Index values beyond 100°F; and (3) greater annual precipitation, with a profound increase in the contribution from intense thunderstorms (Seeley M. , 2015).

Temperature and precipitation projections below are taken from the Minnesota Department of Health (MDH) Region 5 profile. Appendix H provides the full MDH profile for Region 5, which includes McLeod County. This report is one of a series of custom climate profile reports produced for each of the six HSEM regions in the state for reference to climate change projection data, impacts, and considerations for emergency management and preparedness professionals in this HSEM region. The information in this report was used to help inform the updated risk assessments in Section 4 of this plan for natural hazards and their relationship to climate change.

Temperature

The 2018 MDH report details how average temperatures have been affected by climate change:

> There has been an increase in winter and summer temperatures. Our average winter lows are rising rapidly, and our coldest days of winter are now warmer than we have ever recorded. In fact, Minnesota winters are warming nearly 13 times faster than our summers. The continued rise in winter

temperatures will result in less snowpack, which will increase chances for grassland/wildfires as well as drought. The warmer winter temperatures will also have major consequences for our ecosystems, including native and invasive species, whose growth, migration, and reproduction are tied to climate cues. The increase in Lyme disease across Minnesota is also likely influenced in part by the loss of our historical winters, due to a longer life-cycle period for ticks. Freeze-thaw cycles are likely to increase as well, damaging roads, power lines, and causing hazardous travel conditions. By mid-century our average summer highs will also see a substantial rise, coupled with an increase in more severe, prolonged heat waves that can contribute to drought and wildfires and pose a serious health threat, particularly to children and seniors. (MDH, 2018)

Expected changes in average temperatures are detailed in Table 5.

Table 5. Temperature trends for HSEM Region 5

Average Summer Maximum Temperature			Average Winter Minimum Temperature		
1981–2010	2050–2075	Change	1981–2010	2050–2075	Change
82.1 °F	89.6 °F	+7.5 °F	7.9 °F	16.9 °F	+9.0 °F

SOURCE: (MDH, 2018)

Increasing temperatures impact Minnesota's agricultural industry. 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 two 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 be higher livestock losses during periods of extreme heat and humidity. Losses of livestock from extreme heat led to a challenge in the disposal of animal carcasses. Currently there are only two rendering facilities in Minnesota available for livestock disposal. To minimize the detrimental effects of heat stress on animal metabolism and weight gain, Minnesota farmers have also begun redesigning and retrofitting dairy, hog, and poultry barns with better watering, feeding, and ventilation systems (Seeley, 2015).

Precipitation

Climate change has also affected precipitation, as described in detail in the 2018 MDH report:

> There has been an increase in total average as well as heavy precipitation events, with longer periods of intervening dry spells. Our historical rainfall patterns have changed substantially, giving rise to larger, more frequent heavy downpours. Minnesota's high-density rain gauge network has captured a nearly four-fold increase in "mega-rain" events just since the year 2000, compared to the previous three decades. Extreme rainfall events increase the probability of disaster-level flooding. However, there is also an increased probability that by mid-century heavy downpours will be separated in time by longer dry spells, particularly during the late growing season. Over the past century, the Midwest

has not experienced a significant change in drought duration. However, the average number of days without precipitation is projected to increase in the future, leading Minnesota climate experts to state with moderate-to-high confidence that drought severity, coverage, and duration are likely to increase in the state. Modeling future precipitation amounts and patterns is less straight-forward compared to temperature. Some climate models do a better job than others representing rainfall for the Midwest, and available data sources only provide average estimates on a monthly scale, masking the spikes in extremes that trigger flood and drought disasters. (MDH, 2018)

3.5 Demographics

Rock County contains 8 cities and 12 townships. In 2020, Rock County had a population of 9,704, averaging 20 people per square mile of land area (U.S. Census Bureau, 2020b). The county seat, Luverne, is the largest city in the county with a 2010 population of 4,946. Table 6 lists the communities in Rock County along with their respective population numbers.

Population growth trends have an important influence on the needs and demands of a variety of services such as transportation, law enforcement, and emergency response. Understanding population trends and location of population concentrations is essential for making projections regarding potential impacts in the event of a disaster.

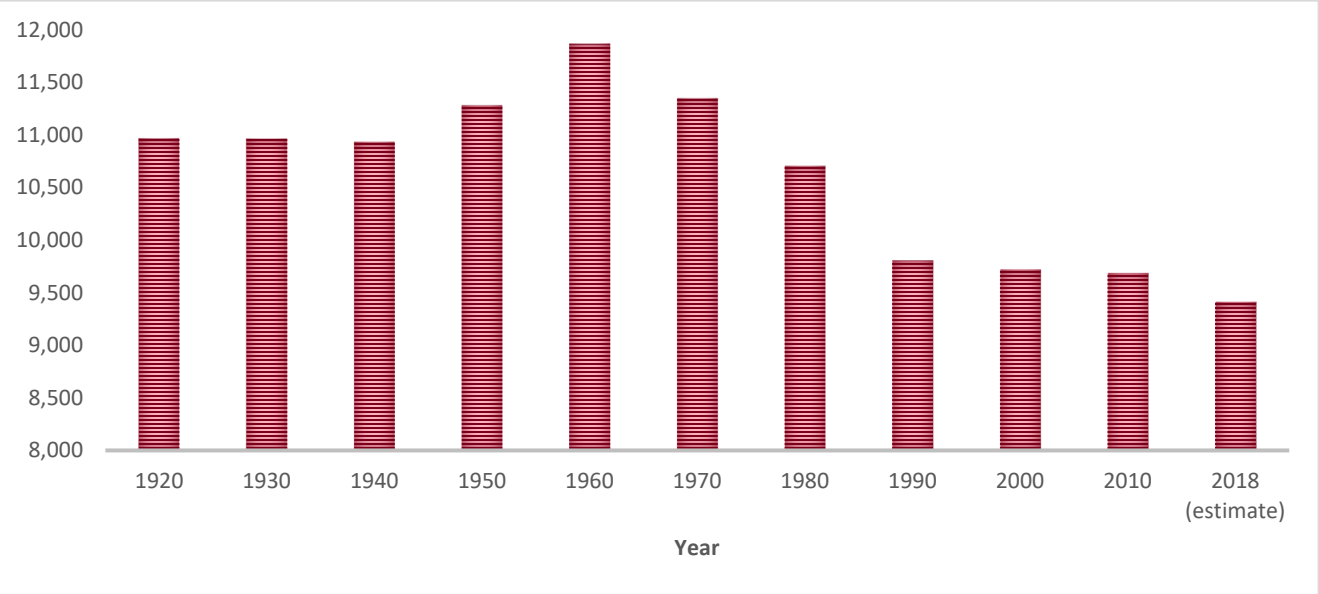
Table 6. Rock County population by community, 2010 and 2020

Community	2010 Population	2020 Population	% of County
Battle Plain Township	199	200	2.06%
Beaver Creek City	297	280	2.89%
Beaver Creek Township	386	384	3.96%
Clinton Township	277	236	2.43%
Denver Township	173	164	1.69%
Hardwick City	198	189	1.95%
Hills City	686	686	7.07%
Jasper City	60	60	0.62%
Kanaranzi Township	247	249	2.57%
Kenneth City	68	60	0.62%
Luverne City	4,745	4,946	50.97%
Luverne Township	479	468	4.82%
Magnolia City	222	196	2.02%
Magnolia Township	212	222	2.29%
Martin Township	382	382	3.94%
Mound Township	252	235	2.42%
Rose Dell Township	216	154	1.59%
Springwater Township	252	267	2.75%
Steen City	180	171	1.76%
Vienna Township	156	155	1.60%
Total	**9,687**	**9,704**	**100.00%**

SOURCE: (U.S. CENSUS BUREAU, 2020B).

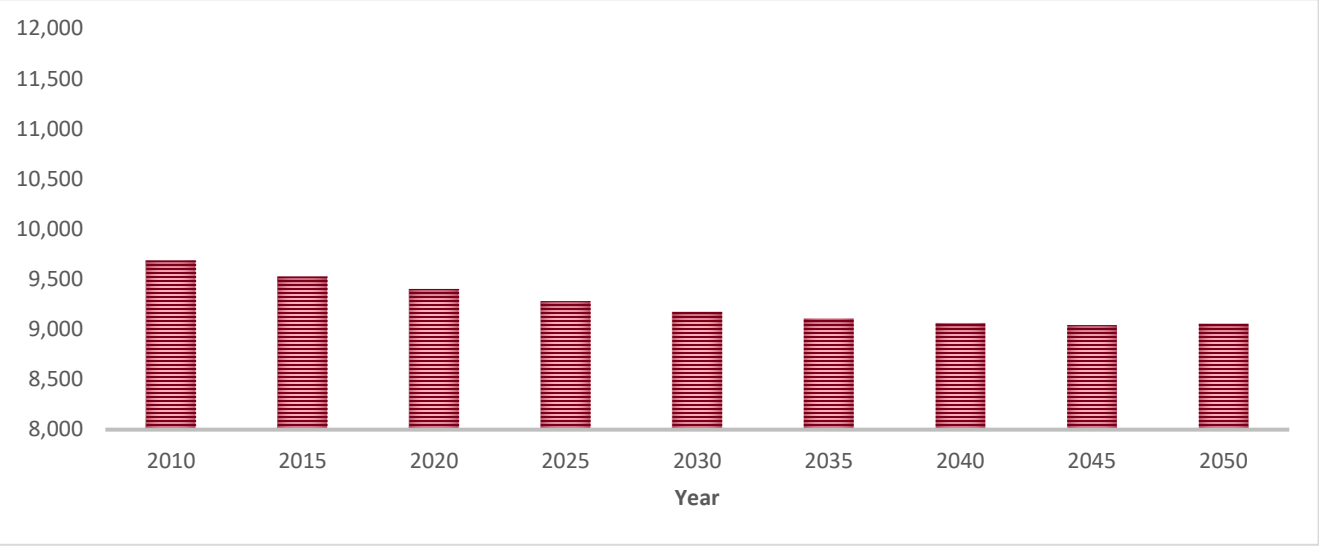
The county's population grew from the 1940s to the 1960s and reached its record high population of 11,864 in 1960. The county's population then shrank by 17% from 1960–1990 and has continued to trend downwards since then, falling just over one percent from 1990–2010, and an estimated nearly three percent from 2010–July 2018 (U.S. Census Bureau, 2020b). Minnesota State Demographic Center has projected a continuous, but slowing, upward trend (Minnesota State Demographic Center, 2020). Figure 3 provides an overview of the county's historic population change, and projected population is detailed in Figure 4.

Figure 3. Rock County's population change, 1920–2018



SOURCE : (U.S. CENSUS BUREAU, 2020A)

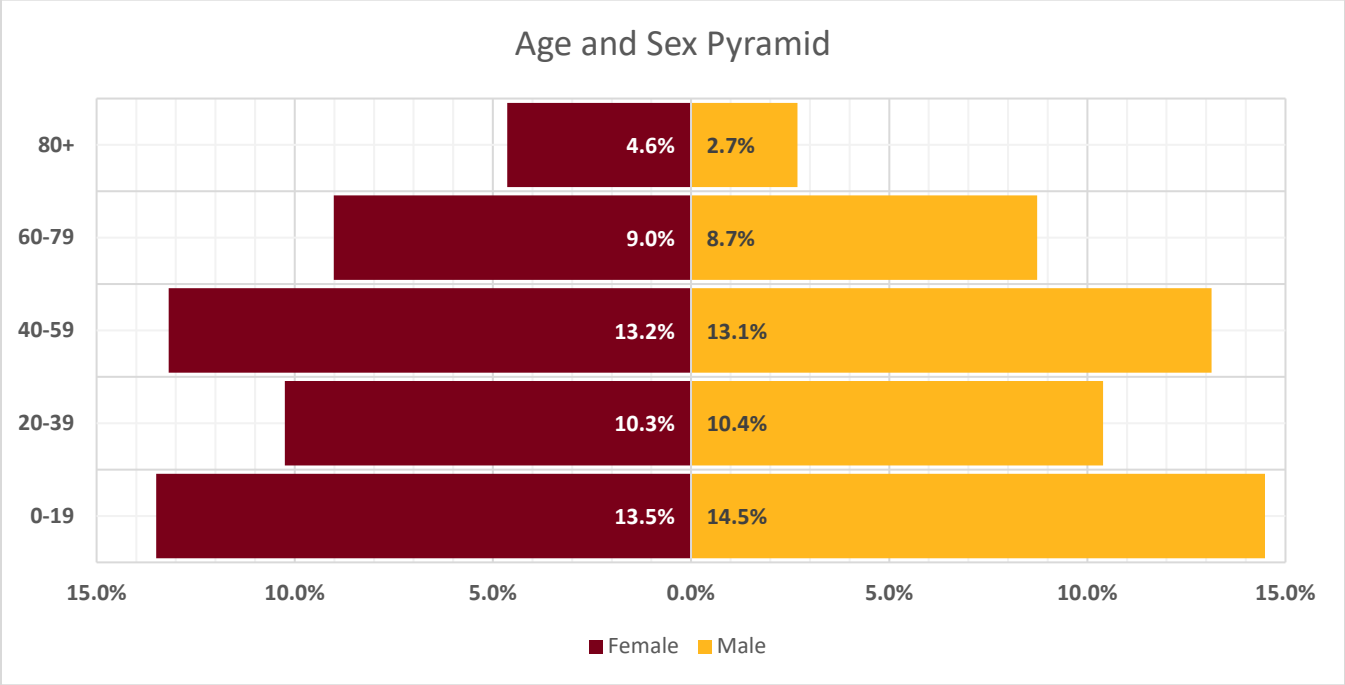
Figure 4. Rock County's projected population change, 2010–2050



SOURCE: (MINNESOTA STATE DEMOGRAPHIC CENTER, 2020)

Rock County's total population consists of 50.6% females and 49.4% males. 7.3% of the total population is aged 80 and older. 0–19-year-olds, who make up the largest age category in Mahnomen County, are 28% of the total population. Figure 5 breaks down the percentage of the total population into categories of age and sex.

Figure 5. Rock County's age (years) and sex percentage of total population



SOURCE: (U.S. CENSUS BUREAU, 2020B)

3.6 Economy

As of 2018, the Education and Health Services industry supersector employed (33%) of people in Rock County, followed by Trade, Transportation and Utilities (22%), and Financial Activities (11%). The total number of jobs in the county increased by over 9.4% between 2008 and 2018. The 10-year change in the average annual employment of each industry supersector in Rock County is in Table 7.

Table 7. Average annual employment by Industry Supersector, Rock County

Industry Supersector	Average # of Employees (2008)	Average # of Employees (2018)	% Change
Natural Resources and Mining	60	120	100.00%
Construction	94	110	17.02%
Manufacturing	290	170	−41.38%
Trade, Transportation and Utilities	674	737	9.35%
Information	47	41	−12.77%
Financial Activities	382	365	−4.45%
Professional and Business Services	120	127	5.83%

Industry Supersector	Average # of Employees (2008)	Average # of Employees (2018)	% Change
Education and Health Services	873	1122	28.52%
Leisure and Hospitality	254	284	11.81%
Other Services	59	77	30.51%
Public Administration	243	235	−3.29%
Total, All Industries	**3,099**	**3,398**	**9.36%**

SOURCE: (MN DEED, 2020)

The 2017 median household income in Rock County was $42,439 compared to a Minnesota average of $65,699. The median household income in Rock County increased by 10% from 2010 to 2017. The percent of the county's population living below the poverty level in 2017 was 11%, compared to an 11.8% average for the state of Minnesota (U.S. Census Bureau, 2020c).

3.7 Critical Infrastructure

Critical infrastructure systems are among the most important assets of a community. While different infrastructures accomplish different goals, their continued operations are integral to the health, safety, and economic and cultural well-being of the residents of Rock County. Critical infrastructure is identified based on FEMA guidelines (FEMA, 2013a) as well as input from Rock County and classified into the following groups: Emergency and Shelter Facilities, Infrastructure Systems, High Potential Loss Structures, and Significant County Assets. For the complete list of critical infrastructure in Rock County, see Appendix I.

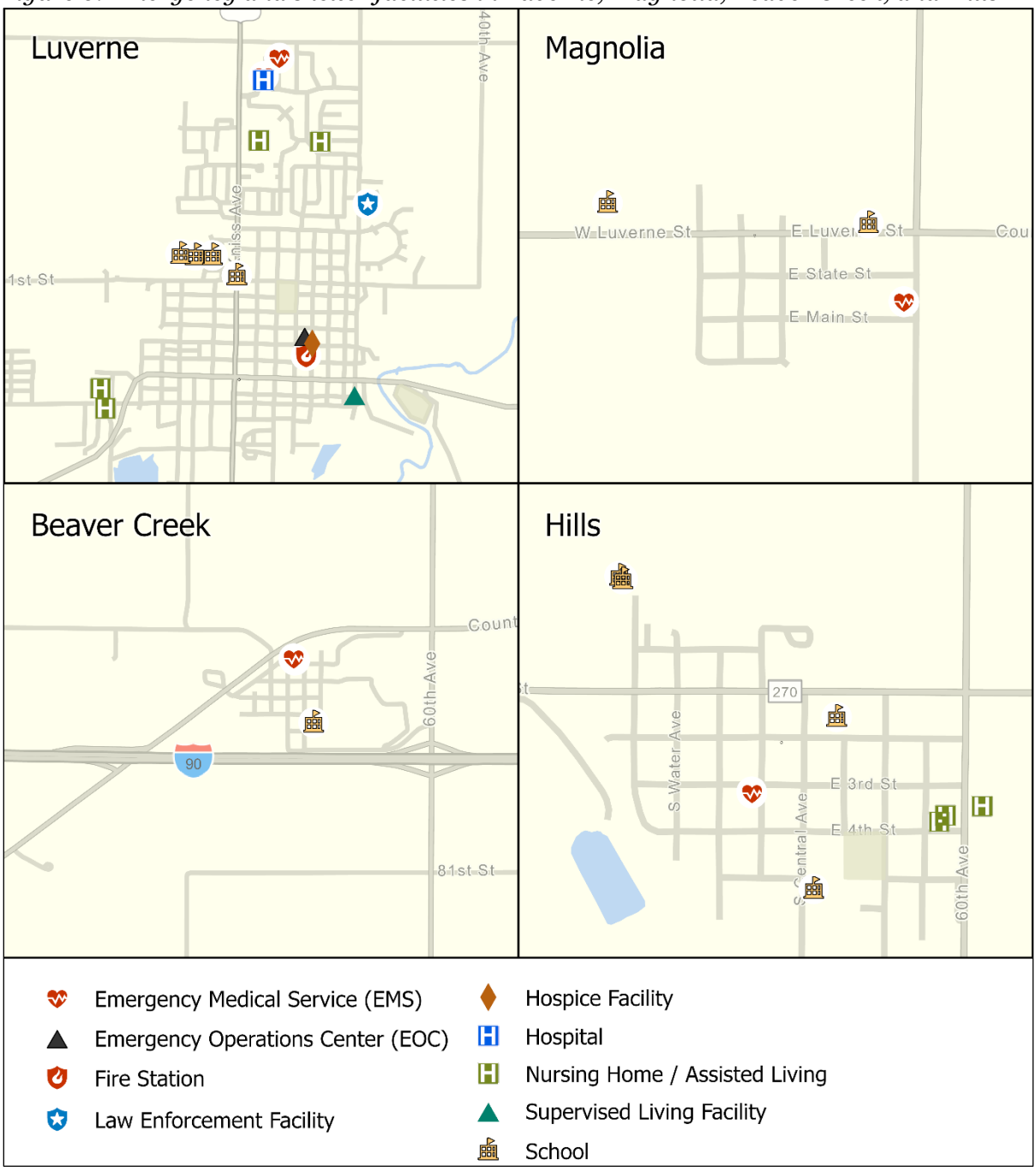
3.7.1 ESSENTIAL FACILITIES

Emergency and shelter facilities are vital to the health and welfare of entire populations, providing services and functions essential to communities, especially during and after a disaster. Emergency and shelter facilities include healthcare facilities, emergency services, evacuation centers/shelters, and schools (often used as evacuation centers/shelters). U-Spatial provided Rock County with an interactive online application to verify the names and locations of all emergency and shelter facilities. The verified locations were mapped, and the resulting spatial data were provided to the county. Figure 6 shows the emergency and shelter facilities within Rock County.

Healthcare Facilities

Rock County is served by 10 healthcare facilities. The hospital and hospice are located in Luverne, as well as one supervised living facility and four nursing homes. The other three healthcare facilities in the county, all nursing homes, are in Hills.

Figure 6. Emergency and shelter facilities in Luverne, Magnolia, Beaver Creek, and Hills



SOURCE: (HIFLD, 2021; MDH, 2021A; ROCK COUNTY)

Emergency Services

Law Enforcement: Law enforcement in Rock County consists of the county sheriff's department, the office of which is located in Luverne. The one Emergency Operation Center in the county is also in Luverne.

Fire & Rescue Services: Seven fire departments and eight EMS serve the county. The fire departments are in Luverne, Hills, Hardwick, Magnolia, Beaver Creek, Jasper, and Kenneth.

Schools & Evacuation Centers/Shelters

There are twelve schools in the county. Four are located in Hills, four in Luverne, two in Magnolia, and one each in Pipestone and Beaver Creek.

3.7.2 INFRASTRUCTURE SYSTEMS

Infrastructure systems include the transportation systems and utility systems fundamental to the functioning of communities. These systems allow for emergency facilities to operate and connect to residents; they are the lifelines for communities.

Transportation Systems

Major roadways in Rock County include I-90 and several trunk highways. The trunk highways include U.S. 75, Minnesota 23, and Minnesota 270. These roadways connect the major population areas in the county and serve as vital farm to market routes. There are 1,010 miles of roadway in the county, in addition to 350 bridges and culverts.

The Minnesota Department of Transportation classifies roads into route systems according to the services a road is intended to provide. Table 8 lists the total miles of road for each route system within Rock County.

Table 8. Road miles by route system

Route System Defined	Miles
County Road	55
County State Aid Highway (CSAH)	261
Interstate	41
MN Highway	26
Municipal	48
Ramp or Connector	4
Township Road	550
US Highway	25
Total	**1,010**

SOURCE: (MNDOT, 2012)

Railways: There are two railroads within Rock County, operated by Burlington Northern Sante Fe and Minnesota Southern. The Minnesota Southern line crosses the county from east to west through Beaver Creek, Luverne, and Magnolia. The BNSF operates a main line, which enters the county on the northwest edge of Jasper then passes into South Dakota. The railroad then reenters the Rock County in the southwest corner of Rock County near Interstate 90 and passes through Manley.

Airports: There is one municipal airport in Rock County. The Luverne Municipal Airport, also known as the Quentin Aanenson Field, has one runway designated 18/36 with an asphalt surface measuring 4,200 by 75 feet. The airport is operational 12 months out of the year and averages 23 aircrafts per day.

Utility Systems

The infrastructure of utility system networks facilitates the process of providing essential utilities to consumers. A map of the major utilities systems in Rock County is displayed in Figure 7.

Water & Sewer: Rock County is home to ten wastewater treatment plants, three of which are located in Luverne.

Energy: Three electrical substations are located within the county along with three major electric transmission lines. Most communities are served by Alliant, while Xcel Energy operates one power line.

A petroleum product pipeline, operated by Midstream Partners, is located in the southeast corner of the county. Two natural gas pipelines, operated by Northern Natural Gas, are located in the north and south parts of the county.

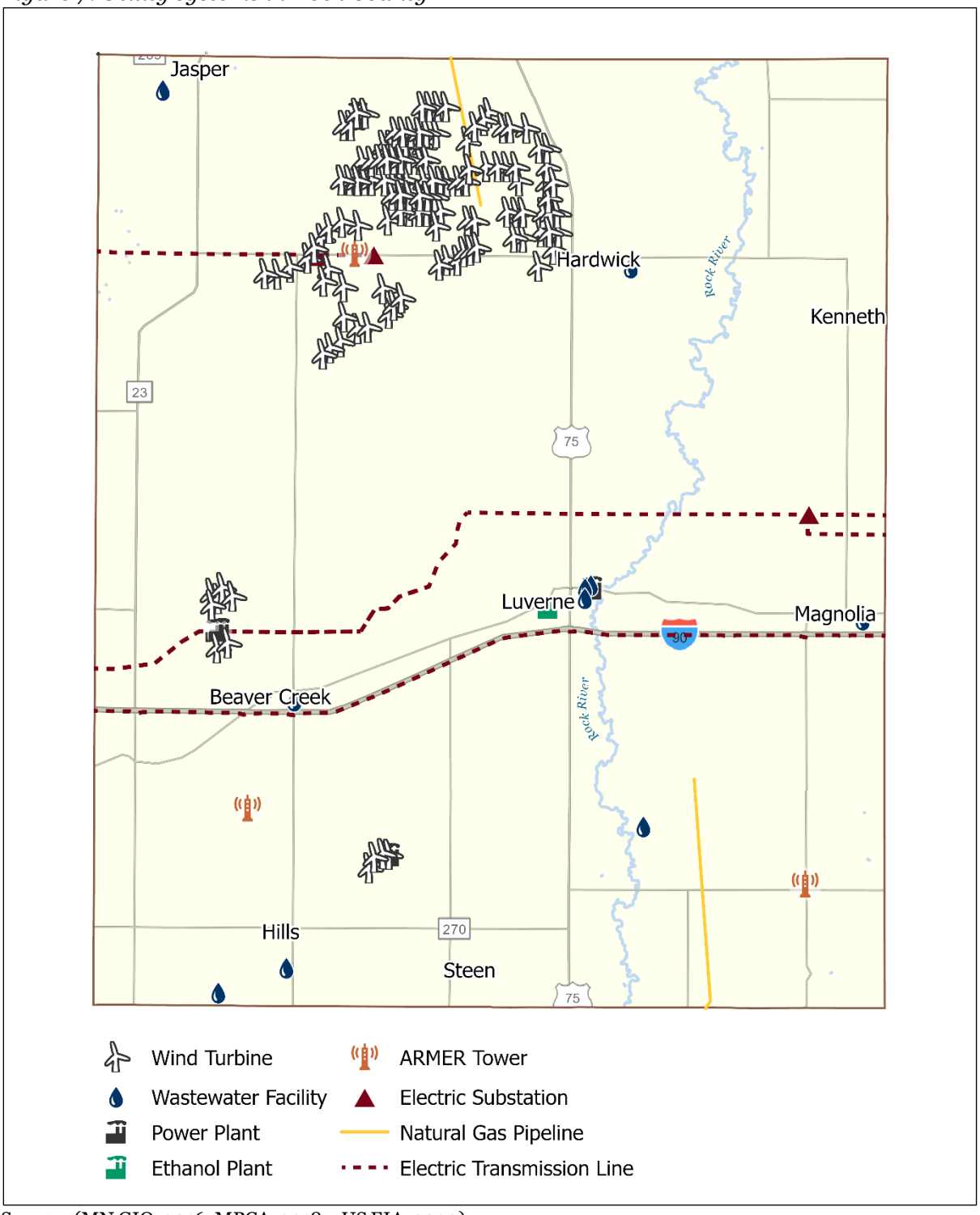
Communication: Administered in coordination with the Minnesota Statewide Radio Board, the Allied Radio Matrix for Emergency Response (ARMER) Program manages the implementation of a 700/800 megahertz (MHz) shared digital trunked radio communication system capable of servicing the radio communication needs of every public safety entity operating in Minnesota (MN DPS, 2021). There are three ARMER towers in Rock County.

3.7.3 HIGH POTENTIAL LOSS STRUCTURES

High potential loss structures are structures which would have a high loss or negative impact on the community if they were damaged or destroyed (FEMA, 2004b). These structures include dams, levees (see Section 3.4.4), and facilities storing hazardous materials.

A hazardous materials facility contains materials that would threaten the public if released. The inventory of these facilities in Rock County includes those required to register with the EPA due to the type and quantity of hazardous materials being stored or produced at the facility. Ten of these facilities have been identified in Rock County. Due to the sensitive nature of these data, the locations of these facilities have not been mapped in this plan.

Figure 7. Utility systems in Rock County



SOURCE: (MN GIO, 2016; MPCA, 2018B; US EIA, 2020)

3.7.4 SIGNIFICANT COUNTY ASSETS

Significant county assets include larger employers which represent a primary economic sector of a community, buildings of government services deemed to be significant, and cultural or historic assets that are important to a community.

Employers: While every employer is an important asset to a community, the loss or disruption of certain employers, or the primary economic sector of a community, will have a large negative impact on the respective communities.

Government Buildings: Some government buildings deemed to be significant due to a critical service operating at the location but not previously mentioned may be considered critical infrastructure. These buildings often include government service centers, the courthouse, jails, and prisons.

Cultural Resources: Cultural resources are cultural or historic assets that are unique, irreplaceable, or important to a community. Nineteen such assets have been identified in the county, including many buildings, five bridges, a quarry, and Blue Mounds State Park.

3.8 Land Use and Ownership

Rock County is a largely agricultural county. The county is 483 square miles, 85% of which is covered by cultivated crops, followed by hay/pasture (7%), and developed open space (4%) (USGS, 2016). A map of Rock County's land cover is displayed in Figure 8.

Nearly 92% of the land in Rock County is cropland. The term "cropland" encompasses five components: harvested cropland, crop failure, cultivated summer fallow, cropland used only for pasture, and idle cropland (USDA ERS, 2019). Between 2012 and 2017 the area of total cropland in the county grew by nearly 5.5%, from 252,671 acres in 2012 to 266,434 acres in 2017 (USDA, 2012, 2017). "Harvested cropland" are the acres of cropland that are planted and successfully harvested. Table 9 shows a breakdown of Rock County's harvested cropland in 2017.

In addition to growing crops, Rock County is also home to a few hundred feedlots. A 2016 inventory counted 815 active feedlots in the county. Nearly 64% of the feedlots raise cattle as the primary stock and 31% raise pigs. An average of 810 animals are on each feedlot (MPCA, 2016).

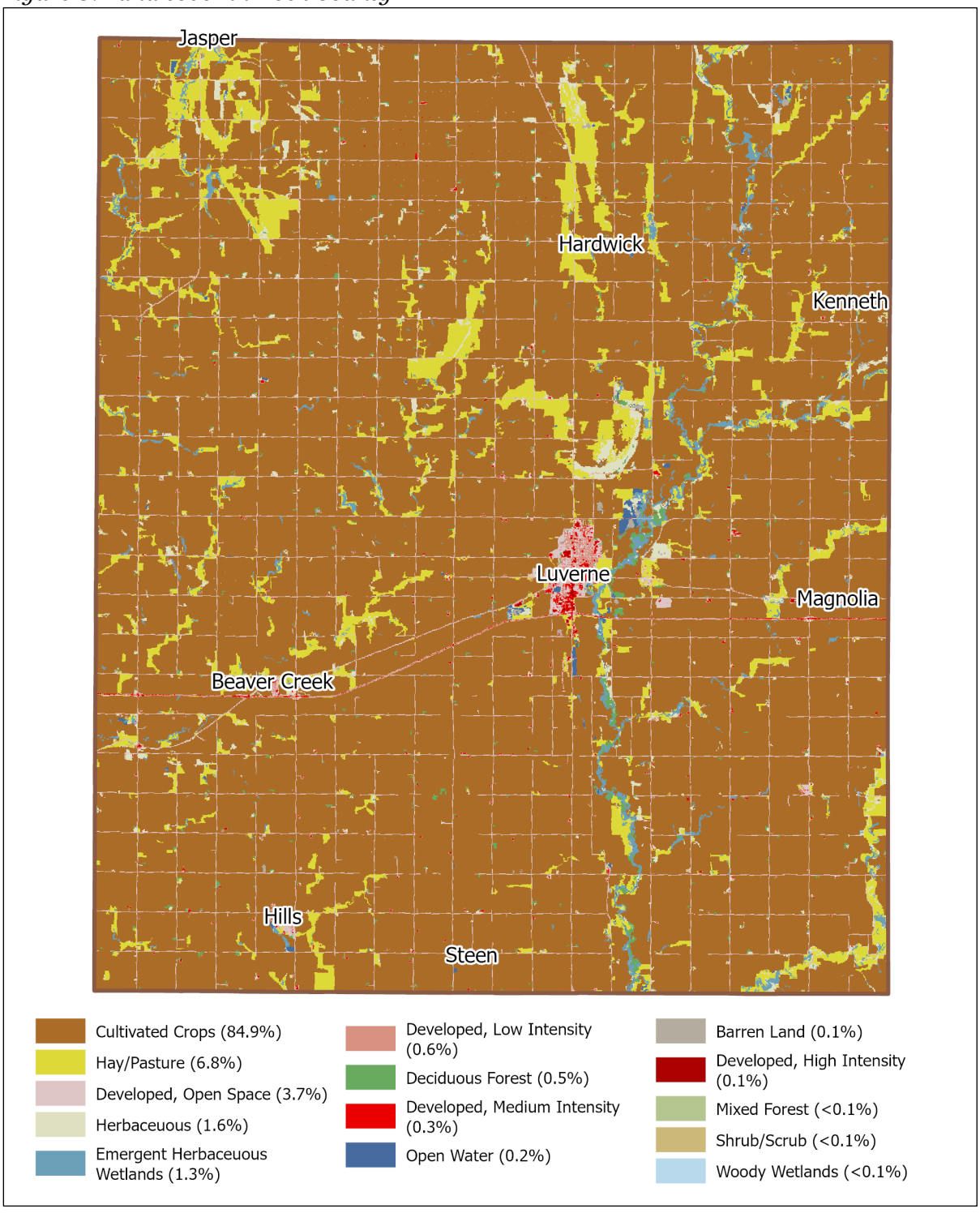
Ownership of the county is divided between five different agencies; the majority being privately owned (98%). Land ownership is displayed in Figure 9.

Table 9. Rock County's harvested cropland, 2017

Crop	Acres	% of Harvested Cropland
Corn (grain & silage)	136,208	52.44%
Soybeans	113,772	43.80%
Hay & Haylage	7,463	2.87%
Oats	1,544	0.59%
Other	775	0.30%
Total	**259,762**	**100%**

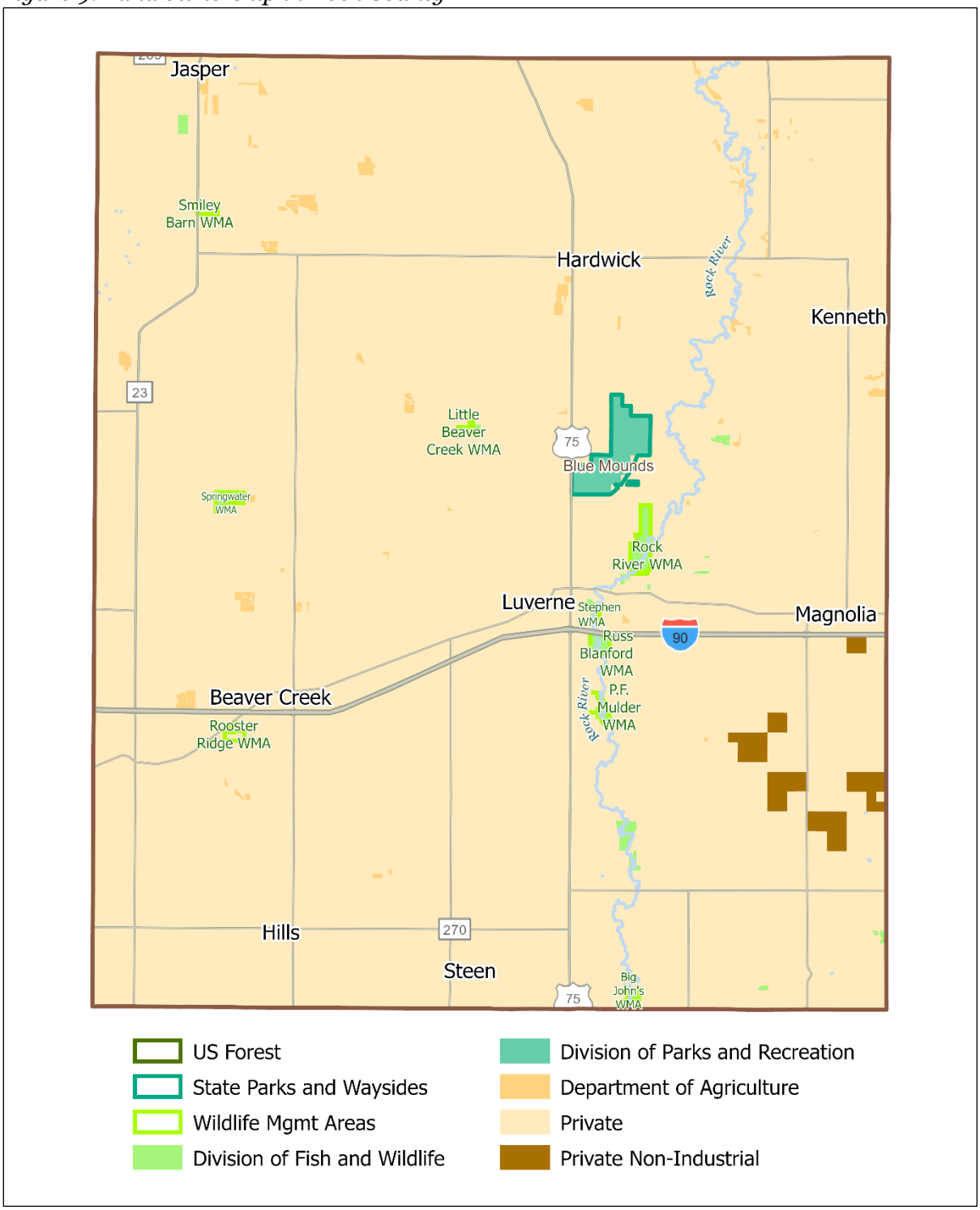
SOURCE: (USDA NASS, 2017)

Figure 8. Land cover in Rock County



SOURCE:(USGS, 2016)

Figure 9. Land ownership in Rock County



SOURCE: (MN DNR, 2008)

Section 4 – Risk Assessment and Vulnerability Analysis

The goal of mitigation is to reduce or eliminate 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.

The risk assessments in this plan are based on widely accepted tools and databases as well as consultation with hazard mitigation planning expertise at FEMA and HSEM as well as technical guidance from the MN DNR State Climatology Office. Geographic Information System (GIS) tools are used throughout to demonstrate geographically based risk and vulnerabilities.

This assessment identifies the characteristics of natural hazard events, the severity of the risk, the likelihood of these events occurring, and the vulnerability of each jurisdiction's population and assets.

4.1 Hazard Identification and Prioritization

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. Listed below are the natural hazards addressed in the 2019 Minnesota State Hazard Mitigation Plan:

- Flooding
- Dam/Levee Failure
- Wildfires
- Windstorms
- Tornadoes
- Hail
- Lightning
- Winter Storms
- Landslides (Erosion and Mudslides)
- Land Subsidence (Sinkholes and Karst)
- Drought
- Extreme Heat
- Extreme Cold
- Earthquakes
- Coastal Erosion & Flooding

4.1.1 HAZARD PRIORITIZATION

As part of the plan update process, the planning team reviewed, updated, and prioritized the hazards faced by residents of Rock County, updated the existing mitigation actions published in the 2014 Multi-Hazard Mitigation Plan, and proposed new mitigation actions.

To engage in this process, the planning team drew on a number of data sources. First, the team examined the hazards identified in the 2014 Multi-Hazard Mitigation Plan. The natural hazards that pose risk to Rock County were discussed and adjusted to reflect the definitions of natural hazards used in the 2019 Minnesota State Hazard Mitigation Plan.

While the focus of this MHMP is on natural hazards, 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 downed powerlines from heavy snow, ice storms, or high wind events).

The prioritization of hazards for the Rock County MHMP Update (Table 10) was based upon group review and discussion of the natural hazards that pose risk to the county during the MHMP Planning Team Meeting #1 on October 28, 2020. In the review of each hazard, the group was asked to consider if the risk to severe natural hazards had increased or decreased since the last plan, and if this affected their priority level to mitigate against that hazard. The group agreed that since the last plan the prioritization of flooding should be moved from moderate to high due to an increase in high rain and flooding events. The prioritization for tornadoes, hail, and lightning were reduced from moderate to low due to a less-frequent experience of those hazards occurring in the county and causing damages. The prioritization of all other natural hazards was unchanged since the last plan. Appendix F provides the discussion notes from the October 28, 2020 meeting.

Table 10. Prioritization of hazards for 2021 Rock County MHMP Update

Natural Hazards	Hazard Priority
Blizzards	High
Heavy Snow	High
Ice Storms	High
Windstorms	Moderate
Lightning	Low
Hailstorms	Low to Moderate
Tornadoes	Moderate
Flooding	High
Landslides	Low
Extreme Cold	High
Extreme Heat	Moderate
Drought	Moderate
Dam Failure	Low
Wildfire	Low

4.1.2 NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION (NCEI) STORM EVENTS DATABASE

Much of the storm data used in this plan is from the NOAA National Centers for Environmental Information's (NCEI) Storm Events Database. The NCEI receives storm data from the National Weather Service (NWS), which receives the information from various local, state, and federal sources. The Storm Events Database contains records documenting:

- the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce;

- rare, unusual weather phenomena that generate media attention, such as snow flurries in South Florida or the San Diego coastal area; and
- other significant meteorological events, such as record maximum or minimum temperatures or precipitation that occur in connection with another event (NCEI, 2021).

Records in the Storm Events Database go back as far as January 1950; however, only tornado events were being reported from the beginning. Revisions to the type of storm events reported to the database are ongoing. As of July 16, 2018, 55 different types of storm events were being reported to the Storm Events Database (NCEI, 2021). Storm Events Database hazard categories used in this plan are listed in Table 11 below. For some hazards, other sources are used in the hazard histories to create a more comprehensive record.

Table 11. National Centers for Environmental Information event types

Hazard	NCEI Event Types	Period of Record
Flooding	Flood, Flash Flood, Heavy Rain	1996–present
Windstorms	Thunderstorm Wind, High Wind, Strong Wind	1955–present
Tornadoes	Tornado	1950–present
Wildfire*	Wildfire	1996–present
Hail	Hail	1955–present
Lightning	Lightning	1996–present
Winter Storms	Winter Weather, Winter Storm, Blizzard, Heavy Snow, Ice Storms, Lake Effect Snow, Sleet	1996–present
Extreme Cold	Cold, Wind Chill	1996–present
Extreme Heat	Excessive Heat, Heat	1996–present

SOURCE (NCEI, 2021)

A summary table of events related to each hazard type is included in the hazard profile sections that follow in Section 5. Please note, frequency statements in hazard profile sections are based on the hazards reported for the entire period of record. In some cases, events may be underreported.

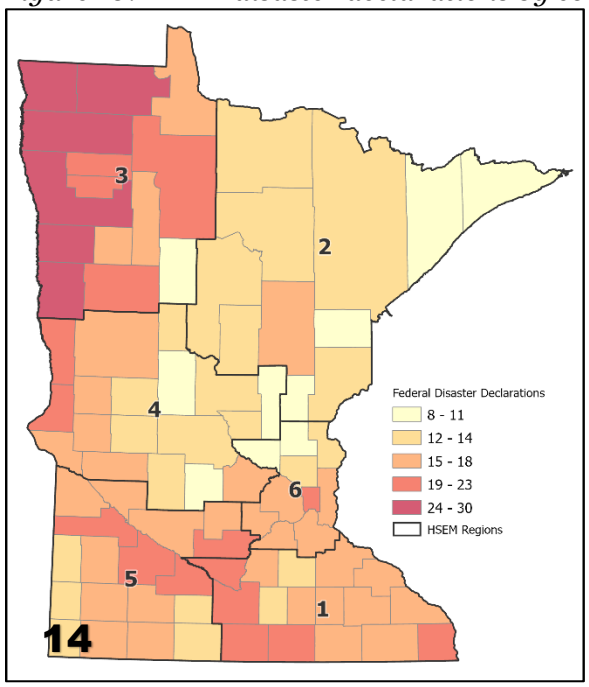
The Storm Events Database is updated regularly. NCEI receives data from the NWS approximately 75 days after the end of a data month; therefore, during the timeframe of compiling this plan, data more current than what is used in this report will become available (NCEI, 2021).

The economic and property loss estimates in the Storm Events Database are often preliminary in nature and may not match the final assessment of losses related to given weather events.

4.1.3 FEMA- AND MINNESOTA-DECLARED DISASTERS AND ASSISTANCE

Another historical perspective is derived from FEMA-declared disasters. Eleven major disaster and three emergency declarations in Rock County have been made between 1957 and January 2021 (Figure 10), for a total of 14. These are listed in Table 12.

Figure 10. FEMA disaster declarations by county



SOURCE: (FEMA, 2021A)

Table 12. FEMA-declared major disasters and emergency declarations in Rock County (1957–April 2021)

Declaration Number	Declaration Year	Incident	Incident Period
EM-3453-MN	2020	Covid-19	01/20/2020–current
DR-4531-MN	2020	Covid-19 Pandemic	01/20/2020–current
DR-4442-MN	2019	Severe Winter Storm, Straight-Line Winds, and Flooding	03/12/2019–04/28/2019
DR-4390-MN	2018	Severe Storms, Tornadoes, Straight-Line Winds, and Flooding	06/15/2018–07/12/2018
DR-4182-MN	2014	Severe Storms, Straight-Line Winds, Flooding, Landslides, and Mudslides	06/11/2014–07/11/2014
DR-4113-MN	2013	Severe Winter Storm	04/09/2013–04/11/2013
DR-1941-MN	2011	Severe Storms and Flooding	09/22/2010–10/14/2010
EM-3242-MN	2005	Hurricane Katrina Evacuation	08/29/2005–10/01/2005
DR-1151-MN	1997	Severe Ice Storm	11/14/1996–11/30/1996
DR-1158-MN	1997	Severe Winter Storms	01/03/1997–02/03/1997
DR-993-MN	1993	Severe Storms, Tornadoes & Flooding	05/06/1993–08/25/1993
EM-3013-MN	1976	Drought	06/17/1976–06/17/1976
DR-255-MN	1969	Flooding	04/18/1969–04/18/1969
DR-268-MN	1969	Heavy Rains & Flooding	08/05/1969–08/05/1969

SOURCE: (FEMA, 2021A)

Minnesota Statutes Chapter 12A established a framework for state agencies to help communities recover from disaster. In 2014, Governor Mark Dayton signed legislation establishing the state's Disaster Assistance Contingency Account to assist local communities after a natural disaster when federal aid is not available. Damage required to declare a disaster is half the threshold of the federal/FEMA public assistance (only) program threshold (MN HSEM, 2019). Rock County was included in two State Disaster Declarations (Table 13).

The Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC), and Flood Mitigation Assistance (FMA) Program are FEMA-administered hazard mitigation assistance programs which provide funding for eligible mitigation planning and projects which reduce disaster losses and protect life and property from future disaster damages (FEMA, 2021b). Table 14 lists the projects in the county funded by a hazard mitigation assistance program.

Table 13. State disaster declarations in Rock County, 2014–2021

DR	Date Declared	Incident Period	Incident Type	Eligible Counties & Tribes
SD-035	11/8/2019	9/10–9/15/2019	Severe thunderstorms with heavy rainfalls and flooding	Murray, Pipestone, Rock, Traverse
SD-025 (open)	5/25/2018	4/13–5/4/2018	Spring flooding	Nobles, Rock, St. Louis

SOURCE: (MN HSEM, 2021)

Table 14. Historical hazard mitigation funding awarded in Rock County

DR/project #	Sub-Grantee	Project Type		Federal Share (%75)
1990.05	Rock County	Mitigation Plan	$	27,717

SOURCE: (MN HSEM, 2021)

4.2 Jurisdictional Change in Risk or Vulnerability Assessment

Jurisdictions in Rock County have varying vulnerabilities to and concerns about impacts to their communities. Interviews with jurisdictional representatives in addition to the Local Mitigation Survey resulted in some specific concerns (see Appendix C: Local Mitigation Surveys). Participants were asked to provide feedback on how their community's vulnerability to natural hazards had either increased (due to changes such as development) or decreased (due to local mitigation efforts) over the past 5 years.

At the local jurisdictional level, several communities did note an increase in development over the last five years as a factor for an increase in vulnerability to severe weather or disaster events.

4.2.1 JURISDICTIONAL RESPONSES

As part of the Local Mitigation Survey form, Rock County Emergency Management and each city jurisdiction were asked to provide a vulnerability assessment that described what structures, systems, populations, or other community assets were susceptible to damage and loss from specific hazard events. Following are examples of common responses related to noted local vulnerabilities (as preserved in

Appendix C: Part A, Question 3) for each jurisdiction. This information was used to help tie local vulnerability back to the exposure of people, buildings, infrastructure, and the environment to the natural hazards listed in Table 10 and to assist local governments in development of related local mitigation actions to reduce risk.

Rock County

Ice Storms, Blizzards: We have powerlines and power poles that have failed or may fail due to heavy snow and ice storms.

Flooding: Rock County Rural Water wellfield is on opposite side of the Rock River, water not available for treatment. Our county road network is also susceptible to closure due to flooding.

City of Beaver Creek

Flooding: City lift station and wastewater ponds are susceptible to damage during high water situations. Private properties take on water into the basement due to the high water table and water seeping into homes and businesses.

Ice Storms, Blizzards: We have power lines and power poles that have failed or may fail due to heavy snow and ice storms. Trees that are close to the power lines can cause the lines to be damaged from ice on branches. Power outages wreak havoc on all populations of citizens particularly children and the elderly

Windstorms, Tornadoes: Windstorms in the past have caused damage at the city ballfield as well as trees. During a windstorm a 50,000-bushel grain storage bin was destroyed.

Extreme Cold: We have seniors & children who are vulnerable to extreme cold, especially if the power goes down during storm events.

City of Hardwick

Flooding: Residential homes experience flooded basements with heavy rains and flooding.

Ice Storms, Blizzards: We have experienced down power lines and down power poles due to heavy snow and ice storms.

Windstorms, Tornadoes: We have a municipal campground without storm shelters where residents are vulnerable to high wind events.

Extreme Cold: We have seniors & children that are vulnerable to extreme cold, especially if the power goes down during storm events. Our community has an elderly population, some who are

dependent on an oxygen concentrator for survival. Losing power for a significant length of time could prove fatal.

City of Hills

Flooding: Some storm sewers/culverts are still a concern for back-up. The city replaced a few culverts after the ice storm, but will continue replacements in problem areas.

Ice Storm: Our local power company, Sioux Valley Energy, has been working at, and will continue to gradually install underground service, but this will take a number of years to complete this project.

Extreme Cold: We have a nursing home and assisted living facility that are vulnerable to extreme cold especially if the power goes out.

City of Jasper

Flooding: Our city sewer lift station is vulnerable to failure during flood events if the power goes down or the lift station is flooded. We also have homes with basements that continue to be flooded.

Ice Storms, Blizzards: We have power lines and power poles that have failed or may fail due to heavy snow and ice storms.

Windstorms, Tornadoes: We have a municipal campground without a storm shelter where residents are vulnerable to high wind events.

Extreme Cold: We have seniors & children are vulnerable to extreme cold, especially if the power goes down during storm events.

City of Kenneth

Ice Storms: We have power lines and poles that have failed due to heavy snow and ice storms.

Windstorms, Tornadoes: Possibilities of home damage. We have no mobile home parks or campground.

Extreme Cold: Residents without propane heaters or backup generators would be vulnerable to extreme cold if there is an extended power outage.

City of Luverne

Flooding: We do have some remaining structures that are in close proximity to both the Poplar Creek and Rock River Floodway and susceptible to flooding. The wastewater treatment facility

loses vehicular access during flood events. Depending how bad the flood is, the wastewater plant and the wells could get flooded. This would also affect the lift station that we have in Luverne.

Ice storms, Strong Winds: The city of Luverne does benefit from electrical supply redundancy, however the potential for power loss is present. We have powerlines and poles that have failed in the past.

Windstorm, Tornadoes: Our water towers or filter plants could be damaged from severe wind events.

City of Magnolia

Ice Storms, Blizzards: We have powerlines and power poles that have failed or may fail due to heavy snow and ice storms.

Flooding: Our city sewer lift station is vulnerable to failure during flood events if the power goes down or the lift station is flooded or overwhelmed because of the volume of water that comes into the system from inflow and infiltration.

Windstorms, Tornadoes: We have a municipal campground without storm shelters where residents are vulnerable to high wind events.

Extreme Cold: We have seniors & children who are vulnerable to extreme cold, especially if the power goes down during storm events.

City of Steen

Ice Storms: We have power lines and power poles that have failed or may fail due to heavy snow and ice storms.

Flooding: Sewer lift stations can't keep up during high rain events.

4.2.2 FUTURE DEVELOPMENT

Because Rock County is vulnerable to a variety of natural hazards, the county government—in partnership with the state government—must make a commitment to prepare for the management of these events. Rock 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.

As part of the vulnerability assessment conducted for the Rock County MHMP update, jurisdictions were asked to describe if there were any factors related to population growth, zoning, or development they felt have increased their community's vulnerability to future severe weather or disaster events (see Section 4.1.2). Following is a compilation of common responses as noted in Appendix C: Part A, Question 5.

City of Jasper

> Four homes within the city of Jasper were newly constructed. Therefore, our population has increased in the past 5 years.

In the development of local mitigation actions, all jurisdictions were encouraged to consider hazard mitigation strategies that would reduce risk in relation to future development, such as the update of local comprehensive plans, enforcement of ordinances, and incorporation of infrastructure improvements to reduce local vulnerabilities (see Appendix J).

The Rock County emergency management director will work to keep the jurisdictions covered by the MHMP engaged and informed during the plan's cycle. By keeping jurisdictional leaders involved in the monitoring, evaluation, and update of the MHMP, 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.

Section 6 of this plan further outlines the process by which Rock County will address the maintenance of this plan, including monitoring, evaluation, and update of the plan, as well as implementation and continued public involvement.

4.3 Shared Vulnerabilities for all Hazards

Vulnerability is the susceptibility to physical injury, harm, damage, or economic loss (FEMA, 2006). While a community's vulnerability may vary by hazard, certain population groups and structures are vulnerable to multiple hazard types. This section highlights the population groups and structures which may not be as resilient to natural hazards or deserve special attention.

4.3.1 POPULATION VULNERABILITY

The degree to which a person is vulnerable to the impacts of a hazard depends on how well they can react before, during, and after a hazardous event. The Centers for Disease Control and Prevention (CDC) Agency for Toxic Substances & Disease Registry (ATSDR) defines social vulnerability as "…the resilience of communities when confronted by external stresses on human health, stresses such as natural or human-caused disasters, or disease outbreaks" (ATSDR, 2020). Exacerbating these stressors are the increasing number of extreme weather events attributed to Minnesota's changing climate (MPCA, 2018c).

The ATSDR created the CDC Social Vulnerability Index (SVI) to help identify vulnerable communities who may need support in preparing for hazardous or recovering from disaster. The CDC SVI is created at the census tract level using American Community Survey (ACS) five-year data. Table 15 displays how the ACS data is organized into 15 social variables, which are further grouped into four themes (ATSDR, 2020).

Table 15. Social Vulnerability Index (SVI) Variables

Overall vulnerability	Socioeconomic status	Below poverty Unemployed Income No high school diploma
	Household composition & disability	Aged 65 or older Aged 17 or younger Older than age 5 with a disability Single-parent households
	Minority status & language	Minority Speaks English "less than well"
	Housing type & transportation	Multi-unit structures Mobile homes Crowding No vehicle Group quarters

SOURCE: (ATSDR, 2020)

Census tracts within Minnesota were ranked and given a percentile value from 0 to 1, with higher values indicating greater vulnerability compared to other census tracts in the state. Theme-specific percentile rankings were generated by summing the percentiles of the variables comprising each theme and ordering the summed percentiles. For more information about the SVI methodology, visit https://svi.cdc.gov. A map of each SVI theme for Rock County is displayed in Figure 11.

4.3.2 STRUCTURE VULNERABILITY

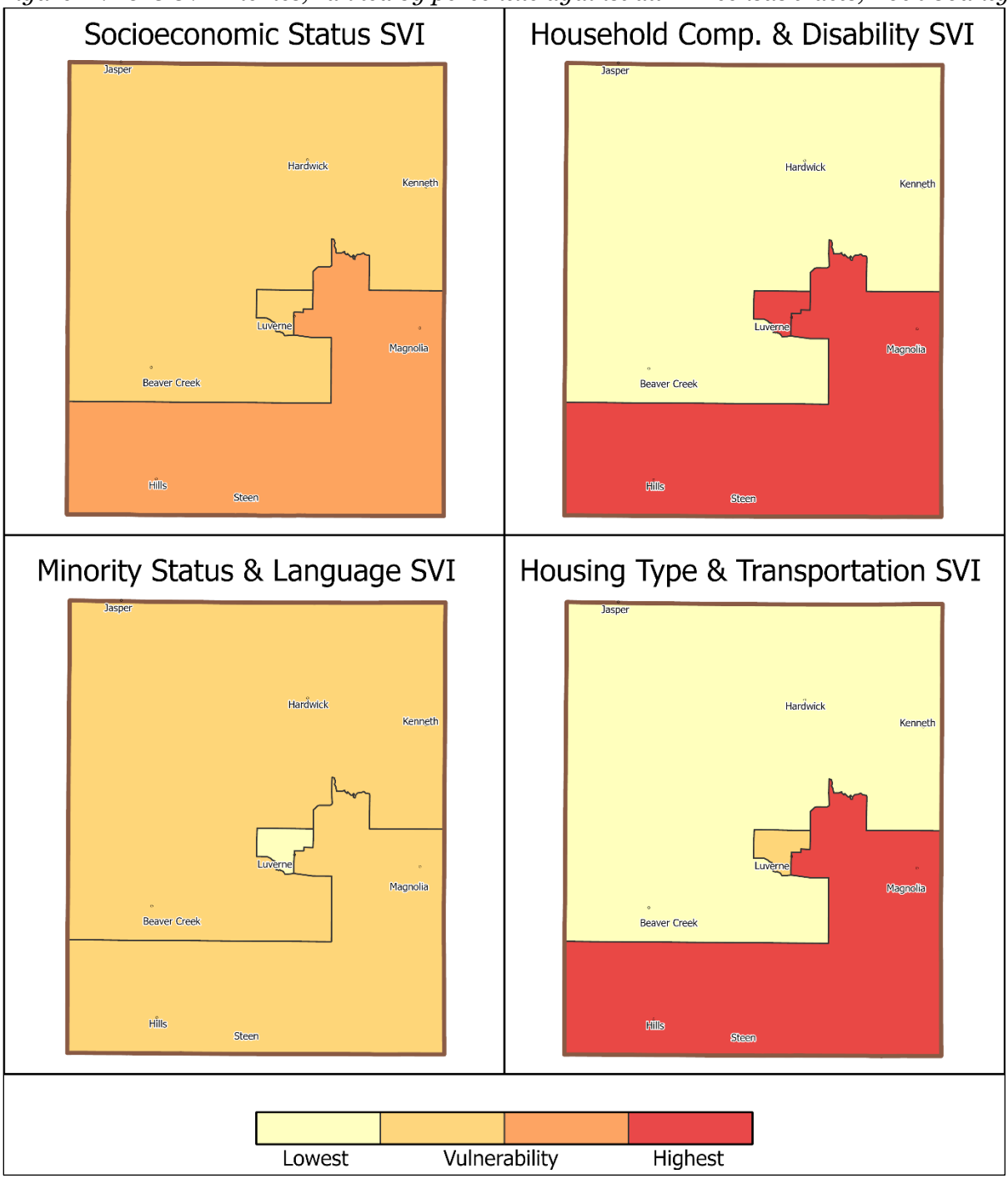
Rock County-specific building data was sourced from the county tax databases and parcel polygon data. The total estimated building exposure for the county is shown in Table 16.

Table 16. Rock County Total Building Exposure

General Occupancy	County Total Buildings	County Building and Contents Value
Residential	5,379	$613,026,130
Commercial	395	$119,330,672
Other	5,209	$647,445,284
Totals	**10,983**	**$1,379,802,086**

SOURCE: ROCK COUNTY

Figure 11. 2018 SVI Themes, ranked by percentile against all MN census tracts, Rock County



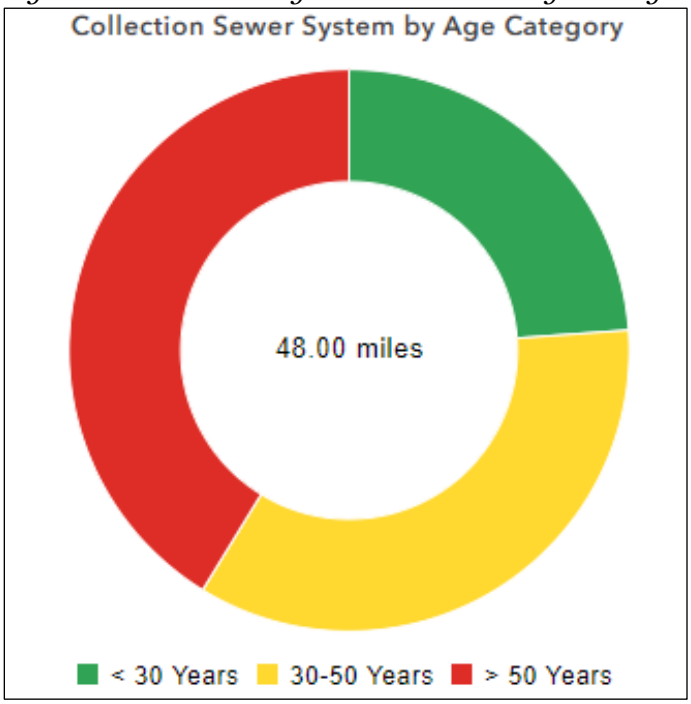
SOURCE: (ATSDR, 2020)

Rock County's infrastructure systems are outlined in Section 3.7. Estimates of county infrastructure economic exposure were not available. Because infrastructure protects public health and provides vital services to residents and Minnesota's infrastructure is aging, the State Auditor's office hosts an online infrastructure stress visualization tool to assist with planning and to provide transparency about the condition of water and wastewater infrastructure systems in the state. This tool indicates that 41% of the 48 miles of sewer collection system in the county are over 50 years old. 24% of the collection system is less than 30 years old (OSA, 2020). A chart of this age distribution is located in Figure 12.

Water and wastewater utilities provide critical services to the community that need to remain in operation for as long as possible and return to operation quickly following a severe storm situation. Undersized sewer systems can experience capacity issues following heavy rain events, resulting in overflows containing stormwater as well as untreated human and industrial waste, toxic substances, debris, and other pollutants.

Mobile homes, and therefore the people living in mobile homes, are particularly vulnerable to natural hazards. Evidence show that mobile home parks are disproportionately located in more hazard-prone regions, often undesirable or marginal lands like floodplains, and that mobile homes are particularly vulnerable to high-wind events (Rumbach et al., 2020). While Minnesota law requires most mobile home parks to have storm shelters, many do not (Sepic, 2017). Given the vulnerability of mobile home residents it is important to have a general understanding of where mobile homes are located. There is one licensed mobile home park location in Rock County. This mobile home park is Maple Aire Acres in Luverne.

Figure 12. Rock County sewer collection system ages



SOURCE: (OSA, 2020)

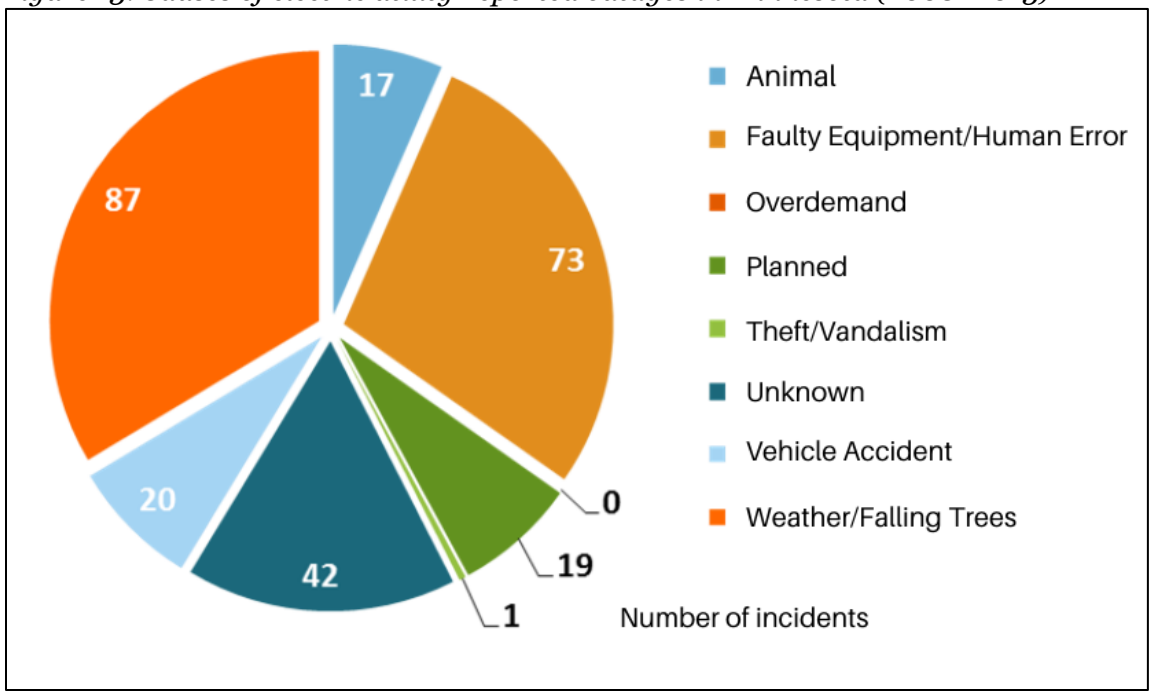
4.3.3 ELECTRIC UTILITIES AND OUTAGES

Loss of power is often the result of a natural hazard. According to the U.S. Department of Energy (2016), the leading cause of electric outages in Minnesota from 2008 through 2013 was severe weather/falling trees (see Figure 13), affecting nearly half a million Minnesotans annually. While the power grid is vulnerable to weather-induced power outages, certain communities are more vulnerable to prolonged outages, which are dependent on a few factors, including the type of severe weather event (the grid being the most vulnerable to high wind events); the transmission and distribution infrastructure (overhead infrastructure being the most exposed and therefore susceptible to failure); and the density of the community (a greater number of customers affected by power outage in rural areas than in urban areas) (Mukherjee et al., 2018).

Because of the significance of physical and economic disruption power outages can cause, HSEM prepared a Rural Electric Annex to the MN State All Hazard Mitigation Plan to make rural electric cooperatives eligible for FEMA's Hazard Mitigation Assistance (HMA) Program. Thirty-five percent of Minnesota's population, and 85% of Minnesota's territory, is covered by electrical distribution cooperatives. Flooding, windstorms, tornado, and winter storms are the greatest risks to electric utilities.

The damage to rural electric cooperative infrastructure has often been how Minnesota reaches economic damage thresholds for federal disaster declaration (MN HSEM, 2014). Rural electric cooperatives are vulnerable and could very well be becoming more vulnerable without mitigation against future damages.

Figure 13. Causes of electric utility-reported outages in Minnesota (2008–2013)



SOURCE: (US DOE, 2016)

In a survey to Minnesota electric cooperatives, 59% of respondents indicated that flooding has adversely affected or damaged critical infrastructure in their service area. Debris may damage the infrastructure immediately or decrease the life of the utility poles, which may be more easily damage in a subsequent event. Eighty-three percent of respondents indicated that windstorms have a high potential to impact electrical infrastructure, and nearly all (94%) cooperatives surveyed indicated that they have been affected or damaged by a tornado in the past. The most vulnerable electrical structures to wind events are overhead utility lines and the poles (MN HSEM, 2014).

Winter storms are another very common risk to electric utilities and pose additional challenges that put crews and equipment in danger. Difficult winter driving conditions put crews on icy or wind-drifted and snowy roads. And in the case of ice storms and extreme cold winter temps, crews are subject to harsh conditions when repairing utility lines.

Power outages can also make vulnerable populations more vulnerable. Outages may force the closure of businesses, schools, and government offices. State and local governments may experience economic challenges related to large-scale power outages when they must open shelter facilities and to care for people displaced from their homes. Public agencies are frequently responsible for debris removal and clean-up in the event of a storm or tornado. Police and fire personnel may be responsible for securing downed power lines if they are dangerous to nearby residents.

People recovering from illnesses, the elderly, children, and low-income populations may be more vulnerable to the impacts of power outages than others. Those who are dependent on power for their health care needs become immediately at risk. Homeowners may see food spoiled, move to a temporary shelter, experience flooding inside of their homes, or have their pipes burst all due to the lack of power (MN HSEM, 2014).

Section 5 – Hazard Profiles

As part of the risk assessment, each natural hazard that poses risk to the county was independently reviewed for its past hazard history, relationship to future trends, and jurisdictional vulnerability to future events. A capabilities assessment was also conducted by the county to review the plans and programs that are in place or that are lacking (program gaps or deficiencies) for the implementation of mitigation efforts, as related to each natural hazard. An assessment was also conducted for local jurisdictions to identify the plans, policies, programs, staff, and funding they have in place in order to incorporate mitigation into other planning mechanisms (see Section 7.1 and Appendix C).

Hazards that were deemed by Rock County to be of moderate to high risk are addressed in the following hazard profiles. Hazards that were determined to be of low risk or without substantive mitigation actions to address them are not required to be included (see Section 4.1.1).

5.1 Flooding

Flooding is the most significant and costly natural hazard in Minnesota. The type, magnitude, and severity of flooding are functions of the amount and distribution of precipitation over a given area, the rate at which precipitation infiltrates the ground, the geometry and hydrology of the catchment, and flow dynamics and conditions in and along the river channel.

Flash floods generally occur in the upper parts of drainage basins and are typically characterized by periods of intense rainfall over a short duration. These floods arise with very little warning and often result in locally intense damage, and sometimes loss of life, due to the high energy of the flowing water. Flood waters can snap trees, topple buildings, and easily move large boulders or other structures. Six inches of rushing water can upend a person; another 18 inches might carry off a car. Generally, flash floods cause damage over relatively localized areas, but they can be quite severe. Flash floods in urban areas involve the overflow of storm drain systems and can be the result of inadequate drainage combined with heavy rainfall or rapid snowmelt. Flash floods can occur at any time of the year in Minnesota, but they are most common in the spring and summer.

Riverine floods refer to floods on large rivers at locations with large upstream catchments. Riverine floods are typically associated with precipitation events that are of relatively long duration and occur over large areas. Flooding on small tributary streams may be limited, but the contribution of increased runoff may result in a large flood downstream. The lag time between precipitation and the flood peak is much longer for riverine floods than for flash floods, generally providing ample warning for people to move to safe locations and, to some extent, secure some property against damage.

During the past several decades, agencies have used the “100-year floodplain” as the design standard for projects funded by the federal government. However, today floods of that magnitude are occurring far more often than once per century (Natural Resources Defence Council, 2015). In recognition of increasing risks, in January of 2015 the President issued an executive order that updates flood protection standards that guide federally funded projects in or near floodplains or along coastlines. These new standards

require federally-funded projects to either build two feet above the 100-year flood elevation for standard projects and three feet above for critical buildings like hospitals and evacuation centers; or build to the 500-year flood elevation (The White House, 2015).

Please note, the term "100-year floodplain" has largely been discontinued in favor of "1-percent annual chance floodplain."

5.1.1 HISTORY OF FLOODING

Minnesota experienced the wettest year on record in 2019, when heavy precipitation between February and May contributed to flooding throughout the state. Rock County was included in DR-4442 for extensive flooding in April 2019 (FEMA, 2021a). In September 2019, over half the state received at least two times the normal amount of precipitation. The average precipitation for the year statewide was 35.51 inches, with many stations of over 50 years of observations breaking their own precipitation records (MN DNR, 2019e). . Rock County had 37.64 inches of rain in 2019. This total was the fourth highest annual precipitation in the county. The record precipitation in Rock County was 39.17 inches and occurred in 2010(MN DNR, 2020a).

Table 17 lists all Rock County's historical flood events from 2014–2021 as recorded by the NCEI. No deaths or injuries have been reported as a result of flooding. The cumulative property damage estimate is greater than $25 million dollars (CEMHS, 2019).

Table 17. Flood events in Rock County, January 2014–August 2021

Date	Event Type	Description
7/6/2020	Flash Flood/ Flood	Two events were reported on this day. Over two inches of rain caused Rock River to briefly rise with a 0.27 feet crest above flood stage. Low-lying agricultural lands near the river were flooded. Water was reported flowing over roads north of Kenneth.
9/12/2019	Flood	Four events were reported on this day. After excessive two-day rainfall, Split Rock Creek below Jasper reached the highest stage on record of 9.39 feet above flood stage. The Rock River near Hardwick crested 6.14 feet above flood stage, the second highest on record. Numerous county roads were under water near Sherman, including 250th Street, and Luverne's city park was under several feet of water. Significant amounts of agricultural land were flooded, and crop losses occurred throughout the area.
6/1/2019	Flood	During crop planting season, prolonged flooding led to the loss of ability to plant crops across the area.
5/27/2019	Flash	Split Rock Creek below Jasper reached a peak of 1.31 feet above flood stage. The main impact was inundation of agricultural land and additional delays to spring planting in the flood plain. The low water crossing on 250th Street along the MN/SD border flooded.
5/1/2019	Flash	This was a continuation of flooding from April. Split Rock Creek below Jasper saw flooding. Low water crossings on 250th and 251st Streets on the MN/SD border were flooded.
4/16/2019	Flood	Runoff following the major winter storm in mid-April produced brief flooding of agricultural land.

Date	Event Type	Description
4/6/2019	Flood	Two events were reported on this day. Runoff from occasional precipitation produced considerable flooding of agricultural land. Split Rock Creek below Jasper crested in major flood stage (5.49 feet above flood stage), the third highest crest on record.
3/18/2019	Flood	Snow melt and heavy rainfall resulted in flooding of agricultural lands. The Rock River at Luverne crested 0.47 feet above flood stage.
3/15/2019	Flood	Snow melt and heavy rainfall resulted in significant flooding of agricultural lands. The Rock River near Hardwick crested 2.63 feet above flood stage, the fifth highest on record.
3/14/2019	Flood	Snow melt and heavy rainfall resulted in significant flooding of agricultural lands. 250th Street along the MN/SD border was flooded for numerous days. Split Rock Creek below Jasper crested 4.53 feet above flood stage, the fourth highest on record.
3/13/2019	Flood	Water flowed over multiple areas of U.S. Highway 71, mainly in areas east of Steen and near Hardwick. Numerous other roads were covered by water at times.
10/10/2018	Flood	Crop and pastureland were inundated as Split Rock Creek climbed to a crest of 2.2 feet above flood stage below Jasper.
9/21/2018	Flood	Heavy rainfall brought three to five inches of rainfall resulting in minor flooding of agricultural land.
9/20/2018	Flood	Heavy rainfall brought three to five inches of rain. Moderate flooding occurred with crop and pastureland inundated, as well as the low water crossing on 250th Street near the South Dakota border, as Split Rock Creek below Jasper crested 4.6 feet above flood stage.
7/5/2018	Flood	Significant amounts of crop and pastureland near the Rock River were impacted by minor flooding as river levels climbed to 0.3 feet above flood stage near Luverne.
7/4/2018	Flood	Significant amounts of crop and pastureland near the Rock River were impacted by minor flooding as river levels climbed to 2.7 feet above flood stage near Hardwick.
7/1/2018	Flood	Crop and pastureland were inundated as levels on Split Rock Creek climbed to 2.9 feet above flood stage below Jasper.
6/21/2018	Flood	Snow melt and heavy rainfall resulted in agricultural lands flooding. The Rock River at Luverne reached a 0.47-foot crest above flood stage.
3/18/2019	Flood	Three events were reported on this day. A week of periodic heavy rainfall resulted in three to eight inches of rainfall. Major flooding occurred with significant amounts of crop and pastureland inundated, along with several low water crossings as Split Rock Creek crested 5.7 feet above flood stage below Jasper.
4/23/2018	Flood	Snow melt and runoff from periods of heavier rainfall briefly produced minor flooding. River levels reached 0.5 feet above flood stage on Rock River near Hardwick.
4/20/2018	Flood	Snow melt and runoff from periods of heavier rainfall briefly produced minor flooding. River levels reached 1.6 feet above flood stage on Split Rock Creek below Jasper.

Date	Event Type	Description
3/5/2018	Flood	Three events were reported on this day. Heavy rainfall along with snow melt caused minor flooding of lowland agricultural areas along Split Rock Creek near Jasper. The river reached a crest of 1.9 feet above flood stage. Upper portions of Rock River also flooded, reaching a crest of 2.2 feet above flood stage near Hardwick.
9/15/2016	Flash Flood	Heavy rain caused flash flooding of ditches and small streams in the Luverne area. A few small creeks were also flooded.
6/16/2014	Flood	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.
6/15/2014	Flash Flood / Flood	Five events were reported on this day. Persistent moderate to heavy rain caused flooding of some fields and lowlands, as well as several roads. Flooding occurred over part of Interstate 90 by Beaver Creek. The river crested at a record 7.18 feet above flood stage at Hardwick, and at a record 6.85 feet above flood stage at Luverne. A dam also partially gave way on Blue Mounds Creek. The dam break drained the lake and flooded roads downstream to the Rock River.

SOURCE: (NCEI, 2021)

The USGS provides information from gauge locations at points along various rivers across the United States. There are two active USGS gauging stations located in Rock County according to the National Water Information System. Table 18 shows data on its highest-recorded annual peaks (gauge heights). Three discontinued gauge stations on Mound Creek and Rock River are not included. If the two highest peaks for the last five years are not in the top five peaks on record, they are included with their overall risk indicated in parentheses (USGS, 2021).

Table 18. Historical peak streamflow data (in feet) for USGS gauging stations

USGS 06483000 Rock River near Luverne Rock, MN 1912-2019			USGS 06483240 Kanaranzi Creek near Kanaranzi Rock, MN 2007-2019		
(1)	Jun. 17, 2014	14.86	(1)	Mar. 18, 2019	17.99
(2)	May 8, 1993	14.20	(2)	Jun. 22, 2018	17.87
(3)	Sep. 13, 2019	13.89	(3)	Jun. 17, 2014	17.80
(4)	Jun. 13, 1914	13.20	(4)	Mar. 1, 2007	17.67
(5)	Apr. 8, 1969	13.13	(5)	Mar. 25, 2013	17.39
(10)	Jun. 22, 2018	11.68			

SOURCE: (USGS, 2021)

5.1.2 PROBABILITY OF OCCURRENCE

A potential risk and economic loss analysis for a 1-percent annual chance flood was performed using a FEMA tool, Hazus for ArcGIS. A Digital Flood Insurance Rate Map (DFIRM) defined the 1-percent annual chance flood boundary. Where available, stream base flow elevation and cross-section data were used to generate a depth grid with a 10-meter horizontal resolution. The resulting Hazus 1-percent annual chance floodplain output is shown in Figure 14. Rock County has preliminary modernized FEMA flood maps, which should be fully effective in early 2023.

5.1.3 CLIMATE CHANGE PROJECTIONS

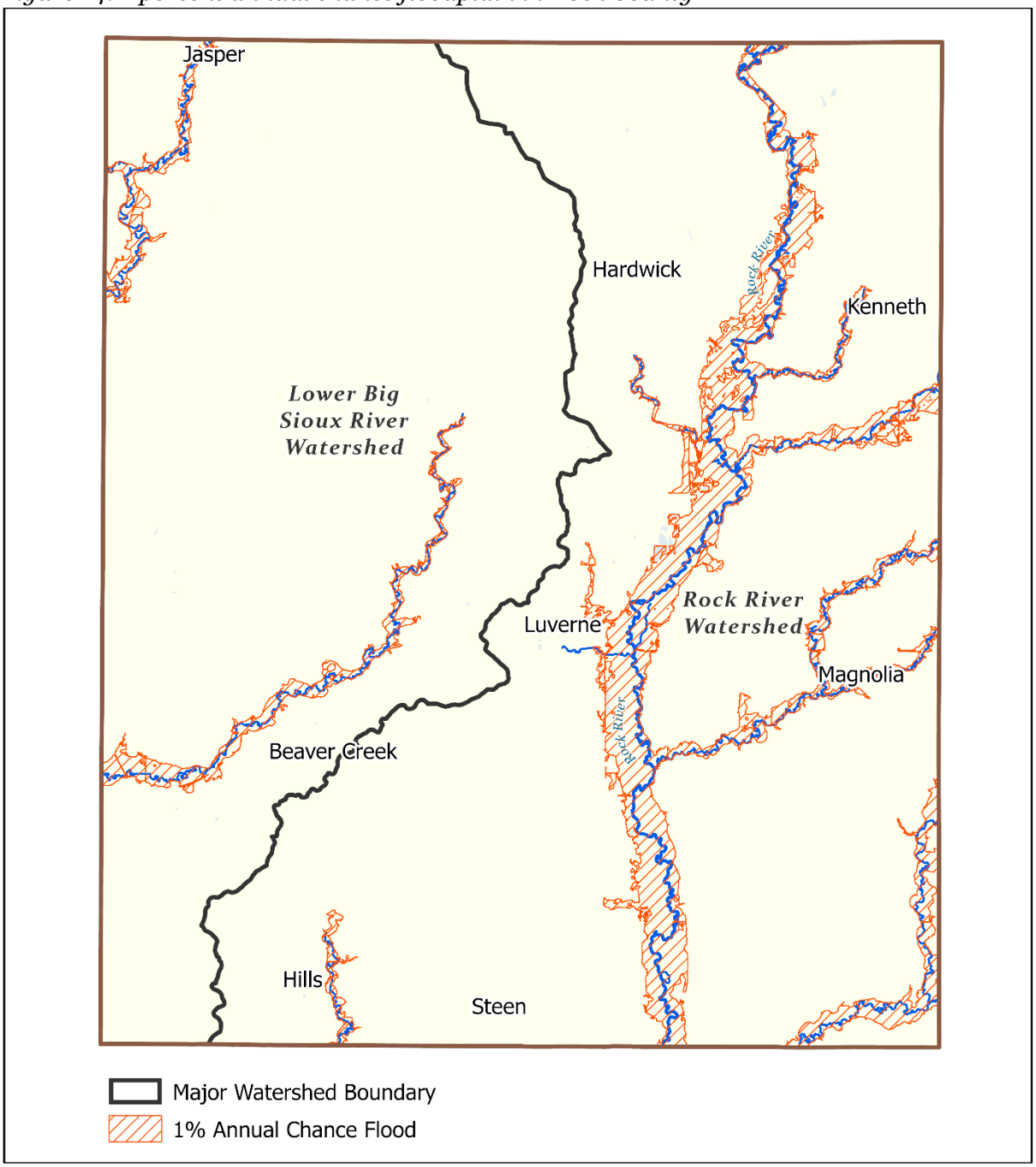
As Minnesota's climate changes, the quantity and character of precipitation is changing. Average precipitation has increased in the Midwest since 1900, with more increases in recent years. According to the Minnesota DNR State Climatology Office "Since 2000, Minnesota has seen a significant uptick in devastating, large-area extreme rainstorms as well. Rains that historically would have been in the 98th percentile annually (the largest 2%) have become more common. Climate projections indicate these big rains will continue increasing into the future."

The Midwest has seen a 45% increase in very heavy precipitation (defined as the heaviest 1% of all daily events) from 1958 to 2011 (*National Climate Assessment Development Advisory Committee*, 2013). This precipitation change has led to amplified magnitudes of flooding. Increased precipitation may also show seasonal changes, trending toward wetter springs and drier summers and falls. An example of a recent year with this character was 2012, when many MN counties were eligible for federal disaster assistance for drought, while others were eligible for flooding, and 7 were eligible for both in the same year (Seeley, 2015). 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. In addition, the yearly frequency of the largest storms—those with 3 inches or more of rainfall in a single day—has more than doubled in just over 50 years. In the past decade, such dramatic rains have increased by more than 7% (MN EQB, 2014).

Southeastern Minnesota has experienced three 1000-year floods in the past decade: in September 2004, August 2007, and September 2010 (Meador, 2013). The 2004 flood occurred when parts of south- central Minnesota received over 8 inches of precipitation. Faribault and Freeborn counties received over 10 inches in 36 hours. The deluge led to numerous reports of stream flooding, urban flooding, mudslides, and road closures (MN DNR, 2004). During the 2007 event, 15.10 inches fell in 24 hours in Houston County, the largest 24-hour rainfall total ever recorded by an official National Weather Service reporting location. The previous Minnesota record was 10.84 inches in 1972. The resulting flooding from the 2007 rainfall caused 7 fatalities (MN DNR, 2007). In September 2010, a storm on the 22-23rd resulted in more than 6 inches of rain falling over 5,000 square miles in southern Minnesota. Rainfall totals of more than 8 inches were reported in portions of 10 counties. The heavy rain, falling on soils already sodden from a wet summer, led to numerous reports of major rural and urban flooding. For many monitoring locations in southern Minnesota, stream discharge resulting from the deluge was the highest ever seen during an autumn flood (Minnesota Climatology Working Group, 2010).

The three of the five wettest years in Rock County all occurred in the last two decades (MN DNR, 2020a).

Figure 14. 1-percent annual chance floodplain in Rock County



SOURCE: (MN DNR, 2021A)

5.1.4 VULNERABILITY

Potential economic loss estimates were based on county-specific building data. Rock County provided parcel tax and spatial databases that included building valuations, occupancy class, square footage, year built, and number of stories. The quality of the inventory is the limiting factor to a Hazus flood model loss

estimation. Best practices were used to use local data and assumptions were made to populate missing (but required) values.

Hazus reports the percent damage of each building in the floodplain, defined by the centroid of each building footprint. After formatting the tax and spatial data, 10,983 points were input to Hazus to represent buildings with a total estimated building plus contents value of $1.4 billion. Approximately 49% of the buildings (and 44% of the building value) are associated with residential housing.

The estimated loss by occupancy class for the entire county is shown in Table 19.

Table 19. Summary of 1-percent annual chance flood loss estimation by occupancy class

General Occupancy	County Total Buildings	County Building and Contents Value	Floodplain Total Buildings	Floodplain Building + Contents Value	Buildings with damage	Building + Contents Loss
Residential	5,379	$613,026,130	179	$15,021,750	174	$2,241,585
Commercial	395	$119,330,672	33	$4,028,600	33	$763,829
Other	5,209	$647,445,284	76	$12,732,400	75	$5,460,758
Totals	10,983	$1,379,802,086	288	$31,782,750	282	$8,466,172

SOURCE: (FEMA, 2021C)

The distinction between building attributes within a parcel was not known, so the maximum percent damage to a building in that parcel was used to calculate loss estimates for the entire parcel. The sum of all the losses in each census block were aggregated for the purposes of visualizing the loss. An overview of these results with the percent damage of buildings is shown in Figure 15. Please note: It is possible for a building location to report no loss even if it is in the flood boundary. For example, if the water depth is minimal relative to 1st-floor height, there may be 0% damage.

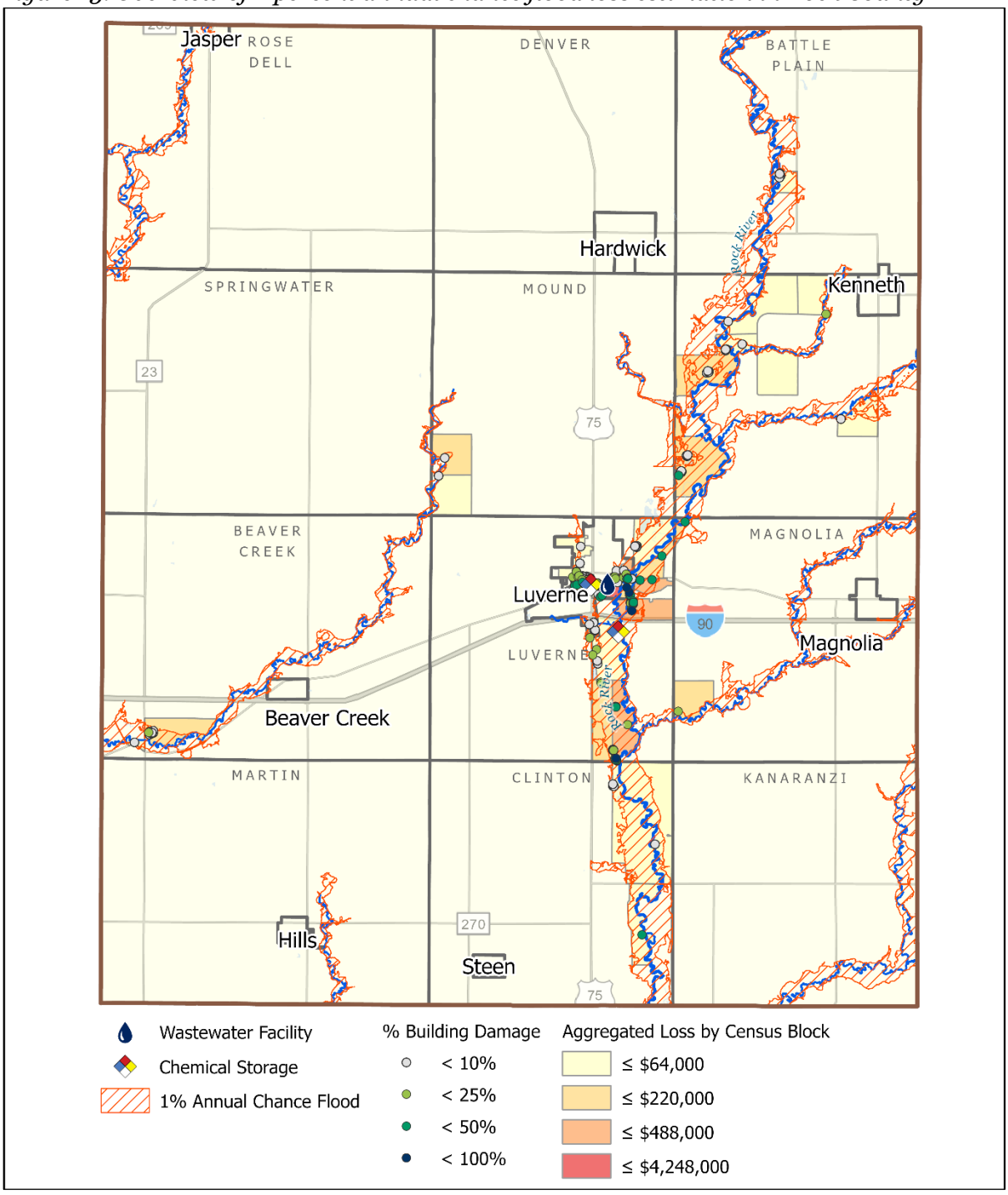
Hazus Critical Infrastructure Loss Analysis

Critical facilities and infrastructure are vital to the public and their incapacitation or destruction would have a significant negative impact on the community. These facilities and infrastructure were identified in Section 3.7 and verified by Rock County.

Buildings identified as essential facilities for the Hazus flood analysis include hospitals, police and fire stations, and schools (often used as shelters). Loss of essential facilities are vulnerable to structural failure, extensive water damage, and loss of facility functionality during a flood, thereby negatively impacting the communities relying on these facilities' services. Fortunately, none of Rock County's essential facilities included in the Hazus flood analysis are located within the 1-percent annual chance floodplain.

Extreme precipitation resulting in flooding may overwhelm water infrastructure, disrupt transportation and cause other damage. Particularly where stormwater, sewage and water treatment infrastructure is aging or undersized for more intense rainstorms, extreme rain events may pose both health and ecological risks in addition to costly damage (USGCRP, 2018).

Figure 15. Overview of 1-percent annual chance flood loss estimation in Rock County



SOURCE: (FEMA, 2021c)

It is important to identify any critical infrastructure within the 1-percent annual chance floodplain, given the higher risk of the facility or infrastructure being incapacitated or destroyed during a flood. In Rock County, three critical infrastructure facilities were found to be at risk in the 1-percent annual chance flood.

These facilities include the Luverne Water Treatment Plant and two EPA RMP (Risk Management Plan) Chemical Storage facilities in Luverne. No other information is available.

Community Vulnerability

Potential economic losses were estimated by Census Minor Civil Division. The City of Luverne was identified as having a significant estimated loss. All jurisdictions with buildings identified in the 1-percent annual chance flood zone listed in Table 20.

Table 20. 1-percent annual chance flood building-related loss estimates by jurisdiction

Jurisdiction (county subdivision)	Count of Buildings in Floodplain	Estimated Building and Contents Loss*
Battle Plain Township	7	$ 29,662
Beaver Creek Township	10	$ 92,749
Clinton Township	5	$ 36,485
Luverne City	184	$ 6,428,727
Luverne Township	50	$ 1,213,257
Magnolia Township	2	$ 271,742
Mound Township	2	$ 129,388
Vienna Township	22	$ 264,162
Total	282	$8,466,172

SOURCE: (FEMA, 2021C)
*It is possible for a building to register no loss even if it is in the flood boundary. For example, if the water depth is minimal relative to 1st-floor height, there may be 0% damage.

The City of Luverne and neighboring Luverne Township, as well as the communities of Kenneth and Clinton Townships, are shown in Figure 16. In addition to the aggregate economic loss by census block, the point locations used to represent flooded buildings are symbolized by percent damage to the building.

The status of jurisdictional participation in the National Flood Insurance Program and any repetitive loss properties are detailed in Section 6.1.1. National Flood Insurance Program (NFIP).

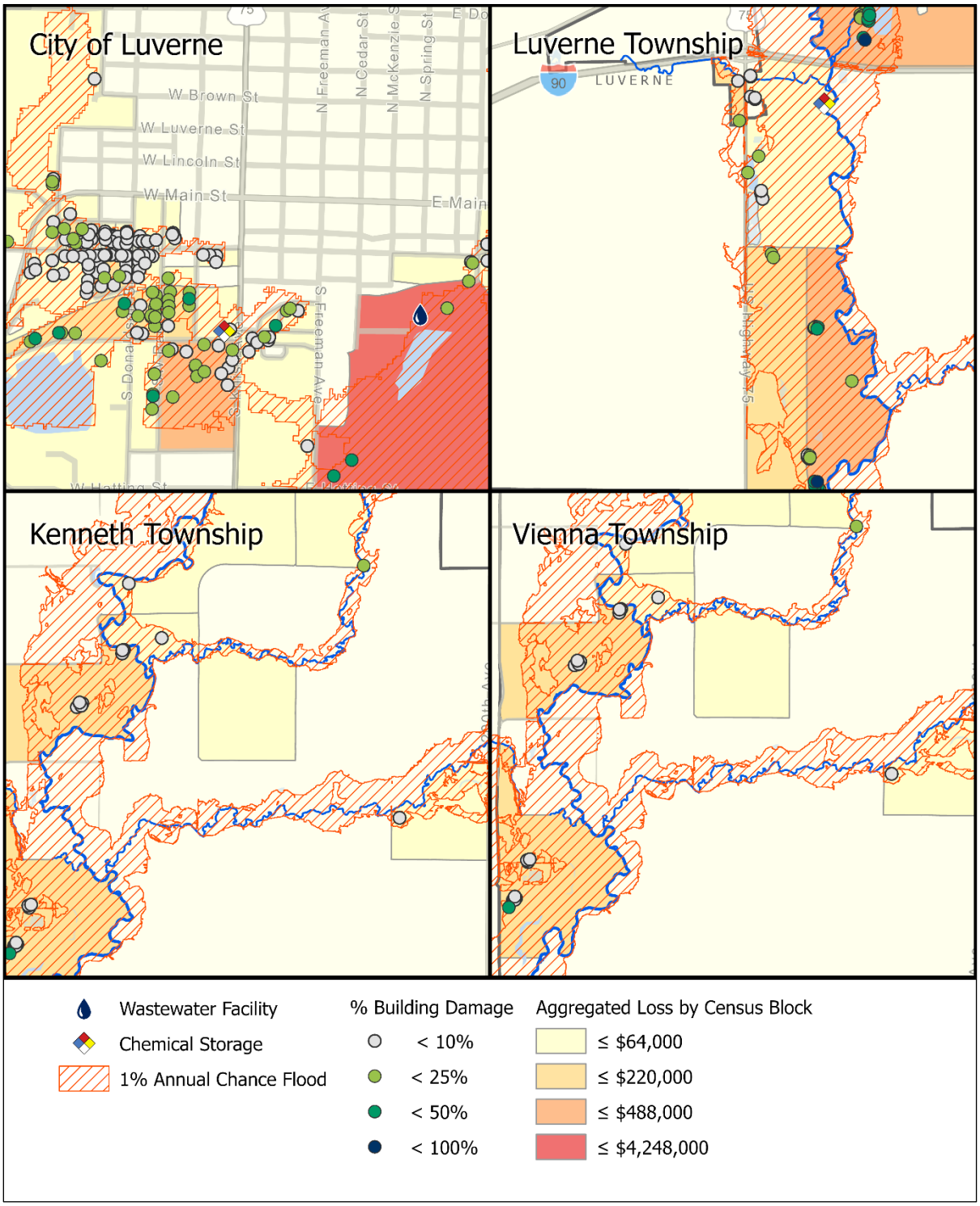
5.1.5 PROGRAM GAPS AND DEFICIENCIES

Rock County Emergency Management identified several program gaps and deficiencies that make its citizens more vulnerable to flooding. The following gaps and deficiencies should be addressed with new mitigation efforts to reduce that vulnerability:

Increasing Culverts and Raising Roads: Some roads, bridges, and culverts within Rock County continue to need improvements as they are impacted by annual high rain events. The county needs funding assistance to improve roads and culverts that experience repetitive flooding.

Road Infrastructure: Continued culvert replacement to prevent road flooding is a strain on our smaller townships that have limited funding for road infrastructure. There are several major township road improvement projects that the county seeks to address.

Figure 16. Communities with significant estimated 1-percent annual chance flood loss



SOURCE: (FEMA, 2021C)

5.2 Windstorms

A windstorm is a wind strong enough to cause damage to trees and buildings and typically exceeding 34 mph (Pielke, 2012). Windstorm events encompass a variety of types of damaging wind, including:

- *straight-line wind*: a thunderstorm wind not associated with rotation,
- *downdraft*: a small-scale column of air that rapidly sinks toward the ground,
- *downburst*: a strong downdraft with an outrush of damaging winds at or near the earth's surface,
- *macroburst* and *microburst*: outward bursts of strong winds at or near the earth's surface, differentiated by the diameter of the burst,
- *gustnado*: a small whirlwind originating from the ground and not connected to any cloud-based rotation), and
- *derecho*: a widespread, long-lived windstorm associated with a band of rapidly moving showers or thunderstorms (NSSL, 2020).

Tornadoes are categorized as separate hazards from windstorms.

The National Weather Service (2018) classifies windstorm events using the following criteria.

- *Strong wind events* are non-convective winds gusting less than 50 knots (58 mph), or sustained winds less than 35 knots (40 mph), resulting in a fatality, injury, or damage.
- *High wind events* are sustained non-convective winds of 35 knots (40 mph) or greater lasting for one hour or longer or gusts of 50 knots (58 mph) or greater for any duration.
- *Thunderstorm wind events* are winds arising from convection (occurring within 30 minutes of lightning being observed or detected), with speeds of at least 50 knots (58 mph), or lower wind speeds producing a fatality, injury, or damage. Downbursts and gustnadoes are classified as thunderstorm windstorm events.

When wind speeds are not able to be measured, they are estimated. Part of the process to determine wind speed is observing the damage. Table 21 lists the expected effects of increasing wind speeds.

Table 21. Effects of wind speed

Wind Speed	Effects
26–38 knots (30–44 mph)	Trees are in motion. Lightweight loose objects (e.g., lawn furniture) may be tossed or toppled.
39–49 knots (45–57 mph)	Large trees bend; twigs, small limbs, and a few larger dead or weak branches may break. Old/weak structures may sustain minor damage. Buildings under construction may be damaged. A few loose shingles may be removed from houses. Carports may be uplifted and minor cosmetic damage may occur to mobile homes.
50–64 knots (58–74 mph)	Large limbs break; shallow rooted trees may be pushed over. Semi-trucks may be overturned. Significant damage to old/weak structures may occur. Shingles and awnings may be removed from houses, damage may occur to chimneys and antennas, mobile homes and carports may incur minor structural damage, and large billboard signs may be toppled.

Wind Speed	Effects
65–77 knots (75–89 mph)	Trees experience widespread damage, including breaking and uprooting. Mobile homes may incur significant structural damage, including being pushed off foundations or overturned. Roofs may be partially peeled off industrial/commercial/warehouse buildings. Some minor roof damage may occur to homes. Weak structures (e.g., farm buildings, airplane hangars) may be severely damaged.
78+ knots (90+ mph)	Many large trees may be broken and uprooted. Mobile homes may be severely damaged; moderate roof damage to homes may occur, roofs may be partially peeled off homes and buildings. Moving automobiles may be pushed off dry roads. Barns and sheds may be demolished.

SOURCE: (NWS, 2018)

5.2.1 HISTORY

Rock County experienced 20 high wind and 93 thunderstorm wind events between 1955 and August 2021, with wind speeds up to 78 knots (90 mph) (NCEI, 2021). The majority of these windstorms occurred in June (29%) and July (29%). Wind damage to property and crops have cost the county more than $9.7 million since 1960 (CEMHS, 2019). Table 22 lists the wind-related events that have occurred in the county since 2014. Thunderstorm wind events from 1955–2018 are mapped in Figure 17.

Table 22. Wind events in Rock County, January 2014–August2021

Date	Event Type	Description
8/28/2021 (7 events)	Thunderstorm wind	An approaching weak impulse spurred rapid development of multiple rounds of storms near the warm front. Secondary development occurred during the evening along the cold front, which evolved into a slow-moving linear system with hail, wind, and heavy rainfall with shear vectors increasingly parallel to the boundary. Events recorded in Beaver Creek, Hills, Magnolia, Hardwick, and at the Luverne Airport.
10/21/2019	High wind	Strong northwest winds of 30-40 mph developed across the area, with gusts occurring of around 60 mph.
7/28/2019	Thunderstorm wind	A strong cold front helped to spark a small complex of thunderstorms. These storms produced isolated damaging winds before dissipating.
7/20/2019	Thunderstorm wind	Winds averaged from 60-80 mph along the path of a large-scale bow echo, producing significant damage to trees and power lines, and minor damage to buildings along the path.
7/4/2019	Thunderstorm wind	A cluster of thunderstorms developed during the evening. The initial storm development produced a weak funnel cloud, but the main impact was from a couple hours of torrential rainfall.
4/13/2018 (2 events)	Thunderstorm wind	An intense low-level jet ahead of a developing winter storm spawned a cluster of elevated thunderstorms early during the morning of April 13. Westerly winds reached the surface and caused significant damage. $728,000 in property damages occurred.
9/19/2017 (3 events)	Thunderstorm wind	Widespread thunderstorms produced strong winds, which caused localized damage to trees.
6/13/2017	Thunderstorm wind	Severe thunderstorms moved out of southeast South Dakota into areas of southwest Minnesota, transitioning into wind producers across the area.

Date	Event Type	Description
5/28/2017 (2 events)	Thunderstorm wind	Severe thunderstorms moved through southwest Minnesota and produced strong winds, downing at least one tree.
12/25/2016	High wind	Very strong winds developed over southwest Minnesota. Sustained winds reached up to 51 mph, and gusts were measured as high as 74 mph. There were several reports of downed power lines and branches, resulting in power outages. Traffic lights and some signs were damaged
2/19/2016	High wind	Strong and gusty westerly winds behind a cold front caused sustained winds above 40 mph, with some gusts above 70 mph. The high winds caused spotty power line and traffic light damage.
6/22/2015 (2 events)	High wind	Damaging winds, directly and indirectly associated with thunderstorms, were reported at several locations in southwest Minnesota.
6/20/2015 (3 events)	Thunderstorm wind	Thunderstorms produced damaging winds at several locations in southwest Minnesota during the predawn hours of June 20th. The storms blew down large branches and trees.
1/26/2014	High wind	Very strong northwest winds were sustained at above 40 mph, with gusts of over 60 mph.

SOURCE: (NCEI, 2021)

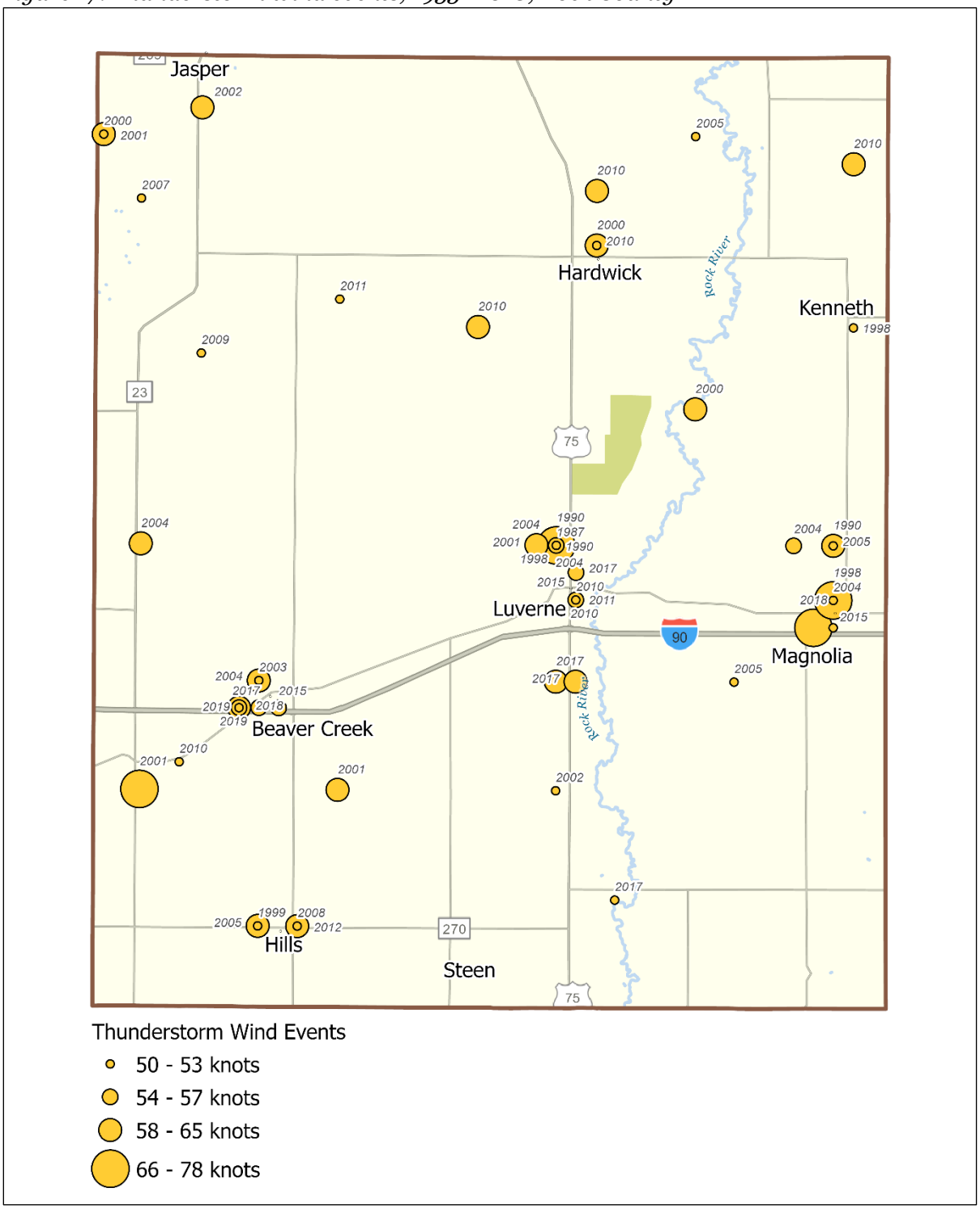
5.2.2 PROBABILITY OF OCCURRENCE

To determine the probability of future wind-related events in Rock County, records of previous wind-related events (strong wind, high wind, and thunderstorm wind) in the county were examined for the period of record. Because the datasets have two different periods of record, separate relative frequencies were calculated. Thunderstorm wind events, which date back to January of 1955, have a relative frequency of 1.4 per year. The relative frequency of all wind-related events since January of 1996 is 3.1 per year. These relative frequencies can be used to infer the probability of these events occurring in the future.

5.2.3 CLIMATE CHANGE PROJECTIONS

Lack of high-quality long-term data sets make assessment of changes in wind speeds very difficult (Kunkel et al., 2013). One analysis generally found no evidence of significant changes in wind speed distribution (Pryor et al., 2009), while other models suggest an increase in the frequency and intensity of severe thunderstorms as the climate changes (USGCRP, 2018). The lack of confidence in the projections of future changes in thunderstorms, tornadoes, hail, and windstorms, is in part due to the difficulty in monitoring and modeling these small-scale and short-lived events (USGCRP, 2018). Since the impact of more frequent or intense storms can be significant, climate scientists are actively researching the connections between climate change and severe weather.

Figure 17. Thunderstorm wind events, 1955–2018, Rock County



SOURCE: (NCEI, 2021)

5.2.4 VULNERABILITY

The likelihood of a windstorm event does not vary geographically within the county, but the vulnerability of its citizens is not constant. Vulnerability to injury from all kinds of windstorms decreases with adequate warnings, warning time, and sheltering in a reinforced structure. Therefore, residents living in rural areas, living alone or with limited mobility, or living in a manufactured home may be more vulnerable. Also at a higher risk to windstorms are those who work outdoors or do not have permanent housing.

Structural vulnerability depends in part upon the construction of a building and its infrastructure. Residents of mobile homes are more vulnerable to fatality or injury from windstorms because mobile homes are not able to withstand high winds as well as other structural dwellings, with 50 mph (43.4 knots) being the lower limit of wind speeds capable of damaging mobile homes (AMS, 2004). Steps to mitigate these vulnerabilities have been taken by the state, requiring all mobile home parks to provide an evacuation plan, and parks with at least 10 homes licensed after March 1, 1988 to provide a storm shelter (MDH, 2020). However, mobile home parks often do not provide the required storm shelters (Sepic, 2017). Building codes have also changed to improve the strength of new mobile home construction but there are still many older mobile homes in use that do not meet these new standards.

The Housing Type & Transportation and Household Composition & Disability themes of the Social Vulnerability Index (Table 15) include variables that can be helpful in identifying where these vulnerable citizens are concentrated within the county.

5.2.5 PROGRAM GAPS AND DEFICIENCIES

Rock County Emergency Management identified several program gaps and deficiencies that make its citizens more vulnerable to summer storms, including windstorms, that should be addressed with new mitigation efforts to reduce vulnerability. These include:

Above-Ground Power Lines: Some of the power lines as well as all of the transmission lines in the county are above ground and subject to damage from high winds and falling tree limbs from severe summer storms. Power lines that are above ground are susceptible to coming down during severe storm events, resulting in power outages.

Public Education: Continued public education needs to be conducted during tornado season to inform the public on what is a tornado watch and what is a warning and what to do when warning sirens are activated. Rock County Emergency Management and local cities need to continue to encourage all residents to be ready for long-term power outages resulting from severe spring & summer storm events such as thunderstorms or straight-line winds.

Additional Storm Shelters/Tornado Safe Rooms: Communities should evaluate where there is a need for construction of storm shelters or tornado safe rooms to protect those who are vulnerable, such as mobile home parks and outdoor recreation areas.

County Parks & Campgrounds: The Rock County Parks Department desires to construct storm shelter-rated facilities as it replaces restrooms and comfort stations within the park system. Priorities will be

given to parks with campground facilities. Specifically, Lake Washington Regional Park & Campground has RV and tent campers that are vulnerable to severe weather events such as high winds and damaging hail and thunderstorms. The campground utilizes the Shower House Facility and Community Building for its guests in the event of severe weather. Clear Lake Park is open to primitive camping and does not have any on-site buildings for storm shelter. Ney Nature Center utilizes the Education Building in the event of severe weather.

Additional Storm Shelters/Tornado Safe Rooms: Additional storm shelter areas in the county would enhance public safety. Construction or retrofit of facilities should be evaluated for areas where there are vulnerable populations, such as municipal campgrounds, mobile home parks and schools. Many of the cities in Rock County do not have a specially designated tornado shelter.

5.3 Tornadoes

Tornadoes are violently rotating columns of air formed in a thunderstorm when the rotating air of an updraft meets the spinning air of a downdraft, which has turned upward (UCAR, 2021). With wind speeds reaching up to 300 mph, they are one of nature's most violent storms (Hogeback, 2020).

Since 2007, tornado strength in the United States has been measured using the Enhanced Fujita Scale (EF Scale), which replaced the original Fujita Scale (F Scale). The EF Scale is a set of estimated wind speeds based on damage (Table 23). The EF Scale incorporates the use of 28 damage indicators to derive estimated wind speeds and assign an associated EF rating (NWS, 2020b; SPC, 2007). The EF Scale is used extensively by the NWS to investigate tornadoes, and by engineers in correlating damage to buildings and building techniques.

Table 23. Enhanced Fujita Scale (EF Scale)

EF Rating	3-second gust (mph)
0	65–85
1	86–110
2	111–135
3	136–165
4	166–200
5	Over 200

SOURCE: (NWS, 2020B)

5.3.1 HISTORY

From 1950 through 2018, 1,940 tornadoes occurred throughout Minnesota, resulting in 99 deaths and nearly 2,000 injuries (MN DNR, 2019b). While most tornadoes in Minnesota are minor (F0/EF0) and occur without injury, a number of the tornadic events will forever be remembered due to the sheer death and destruction they left behind. Examples include the St. Cloud/Sauk Rapids tornado of 1886, which claimed 72 lives, injured 213, and remains the deadliest tornado in the State's history. May 6, 1965 is another day often remembered for tragedy when six tornadoes ravaged the Twin Cities, killing 13, injuring 683, and causing $51 million in damages (without inflation adjustment) (MN DNR, 2019b).

The peak months of tornadic activity in Minnesota are June and July respectively (MN DNR, 2019b). According to the NCEI Storm Events Database, 13 tornadoes have occurred in Rock County between 1950 and August 2021, resulting in seven injuries (NCEI, 2021), and an estimated $106,000–538,000 in property and crop damage (CEMHS, 2019; NCEI, 2021). The strength of these tornadoes ranged from F0/EF0 to F2. The costliest of these tornadoes occurred on June 25, 1969, when an F2 tornado formed in Rock County west of Luverne near the South Dakota boarder. It traveled north and dissipated in Jasper, just north of Rock County, injuring five people and costing a quarter of a million U.S. dollars (NCEI, 2021).

Only one tornado has occurred in Rock County since the county's last hazard mitigation plan in 2014. This EF0 tornado occurred briefly on June 5, 2014, causing no reported damages and no injuries or deaths (NCEI, 2021).

5.3.2 PROBABILITY OF OCCURRENCE

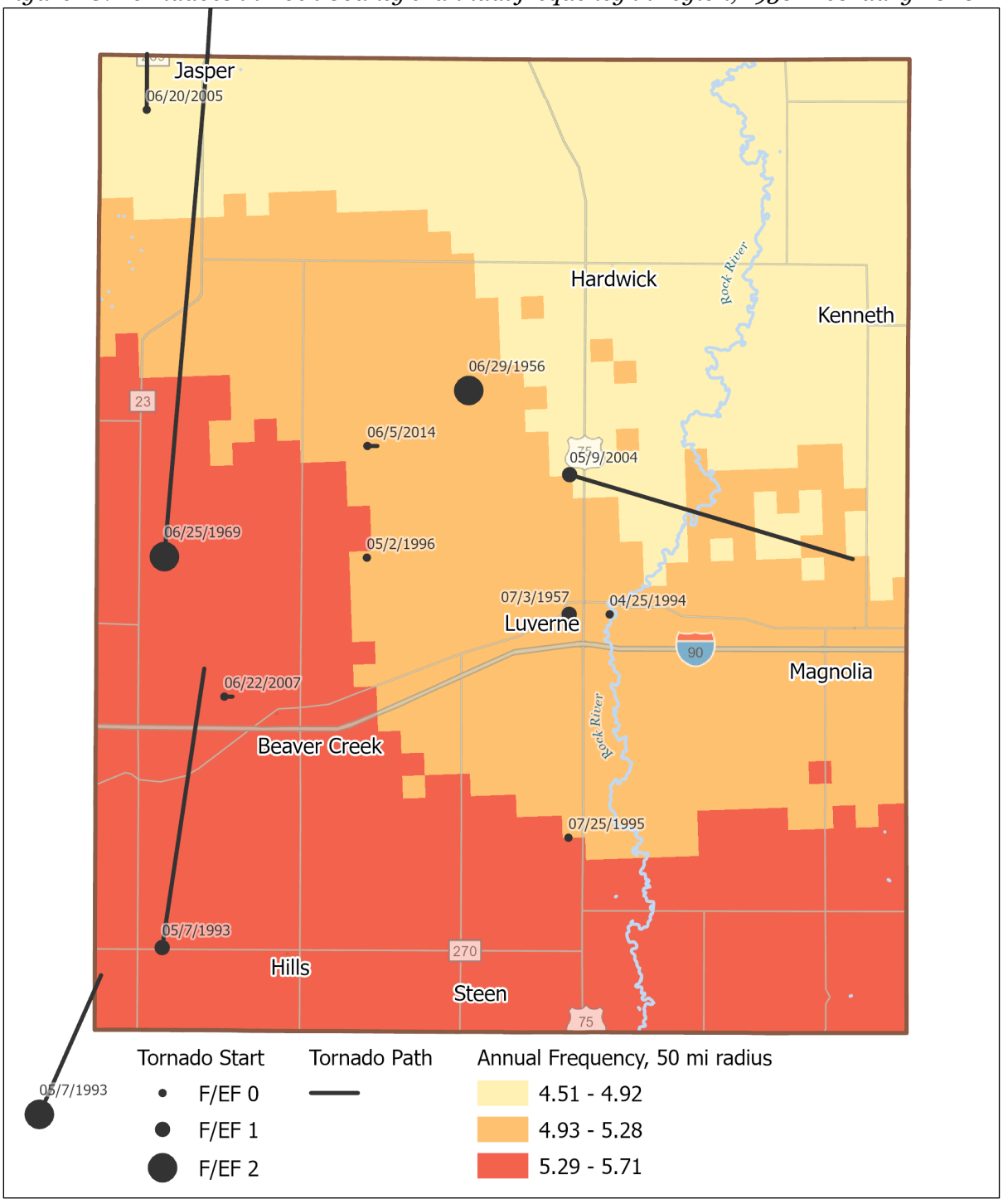
Estimating the probability of future tornadoes in Rock County was done using two methods. The first method summed the total number of tornadoes which either touched down in or traveled through the county. This sum was divided by the number of years tornado data was recorded, resulting in the annual relative frequency of tornado occurrences in the county. Based on records in the NCEI Storm Events Database through February 2020, the relative frequency of tornados in Rock County is 0.2 per year. (These 13 tornadic events occurred in 12 of the 70 years on record.)

Because tornadoes often cross county lines and tornadic frequency may be better understood using events from a larger area, a second method was used to describe the frequency of tornadic events within a 50-mile radius of any location within the county. A grid of 900 square-meter cells was used to cover Minnesota and 50 miles beyond its border. From the center of each cell, the number of tornadoes that intersected a 50-mile radius was counted. Each cell was assigned a total tornado line count, which was then divided by the tornado dataset's period of record, resulting in the annual relative frequency of tornadoes occurring within 50 miles of the respective cell.

For any location in Rock County, there was an annual frequency of 4.5–5.7 tornadoes within a 50-mile radius. The historical frequency was only slightly higher in the southeast than the northwest. These relative frequencies can be used to infer the probability of these events occurring in the future.

Figure 18 shows the tornadoes that have occurred in Rock County from 1950 through February 2020, as well as the annual frequency of tornado occurrences within 50 miles of any location within the county.

Figure 18. Tornadoes in Rock County & annual frequency in region, 1950–February 2020



SOURCES: (MN DNR, 2019b; NCEI, 2021)

5.3.3 CLIMATE CHANGE PROJECTIONS

Tornadoes and other severe convective storms are the largest annual aggregated risk peril to the insurance industry, costing the U.S. $11.23 billion (in 2016 USD) each year (Gunturi & Tippett, 2017). Although recent research has yielded insights into the connections between global warming and the factors that cause tornados and severe thunderstorms, such as atmospheric instability and increases in wind speed with altitude (Del Genio et al., 2007), these relationships remain mostly unexplored, largely because of the challenges in observing thunderstorms and tornadoes and simulating them with computer models (USGCRP, 2018).

According to Brooks et al., while the mean annual number of tornadoes in the U.S. has remained relatively consistent the variability of tornado occurrences has increased since the 1970s. According to the data, tornadoes have been occurring in larger clusters since the 1970's, with an overall decrease in the number of tornado days but an increase in the number of tornadoes that occur on tornado days (2014).

An increase in the variability of tornado occurrences affects the timing of the start of the tornado season (Brooks et al., 2014). The earliest reported tornado in Minnesota occurred on March 6, 2017, when two tornadoes touched down in southern Minnesota. These tornadoes occurred 12 days earlier and 115 miles further north than the previous record from 1968. According to State Meteorologist Paul Huttner, "Those records fit seasonally and geographically with longer term climate trends pushing weather events earlier in the season and further northward" (Huttner, 2017).

5.3.4 VULNERABILITY

The likelihood of a tornado does not vary significantly across geography within Rock County; however, certain populations may be more vulnerable and less resilient to the impacts of a tornado. In general, tornado casualties decrease when people receive adequate warnings with sufficient time to seek shelter in a reinforced structure. Because communication is critical before a tornadic event, certain citizens may be more negatively impacted by a tornado, including those living in rural areas, individuals with limited mobility, people who do not live near an outdoor warning siren, or those who do not use social media.

As discussed in section 4.4.3, people living in mobile homes are particularly vulnerable to tornadoes due to them not being able to withstand the strong winds produced by a tornado. According to NOAA's Storm Prediction Center, from 1985–2002, 49% of tornado fatalities in the United States were people who remained within or attempted to flee from mobile homes (AMS, 2004). While Minnesota law requires most mobile home parks to have storm shelters, many do not (Sepic, 2017). Section 4.3 lists the mobile home parks in Rock County.

Some of the vulnerability factors mentioned above are included as social factors in the Housing Type & Transportation and Household Composition & Disability themed SVI map (Table 15*)* and may provide general insight on where in the county these vulnerable communities are located.

5.3.5 PROGRAM GAPS AND DEFICIENCIES

Rock County Emergency Management identified that there are several program gaps and deficiencies that make its citizens more vulnerable to summer storms, including hail. The following gaps and deficiencies should be addressed with new mitigation efforts to reduce that vulnerability:

Above-Ground Power Lines: Some of the power lines as well as all of the transmission lines in the county are above ground and subject to damage from high winds and falling tree limbs from severe summer storms. Power lines that are above ground are susceptible to coming down during severe storm events, resulting in power outages.

Public Education: Continued public education needs to be conducted during tornado season to inform the public on what is a tornado watch and what is a warning and what to do when warning sirens are activated. Rock County Emergency Management and local cities need to continue to encourage all residents to be ready for long-term power outages resulting from severe spring & summer storm events such as thunderstorms or straight-line winds.

Additional Storm Shelters/Tornado Safe Rooms: Communities should evaluate where there is a need for construction of storm shelters or tornado safe rooms to protect those who are vulnerable, such as mobile home parks and outdoor recreation areas.

5.4 Hail

A hailstorm is a storm producing spherical balls of ice. Hailstones form in a thunderstorm's unstable air mass when warm moist air rises rapidly into the upper atmosphere and subsequently cools, leading to the formation of ice crystals. The ice crystals grow into hailstones through the storm's updraft and downdraft cycle, each time being coated with a layer of ice until the hailstone becomes too heavy to be carried by the updraft and falls to the ground.

A number of factors determine the damage potential from hail including hailstone size, texture, numbers, fall speed, speed of storm translation, and strength of the accompanying wind (TORRO, 2021). The maximum hailstone size is the most important parameter relating to structural damage. Studies have determined that most property damage begins when hailstone diameters are ≥ .75 in., while crop damage can occur from hailstones as small as .25 in (Changnon et al., 2009) depending on the crop and growth stage. Table 25 shows the TORnado and storm Research Organization's (TORRO) Hailstorm Intensity Scale, which describes the typical damage from different sized hailstones.

Table 24. TORRO Hailstorm Intensity Scale

	Intensity Category	Typical Hail Diameter (in.)	Typical Damage Impacts
H0	Hard Hail	.2	No damage
H1	Potentially Damaging	.2–.6	Slight general damage to plants, crops
H2	Significant	.4–.8	Significant damage to fruit, crops, vegetation
H3	Severe	.8–1.2	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	1–1.6	Widespread glass damage, vehicle bodywork damage

	Intensity Category	Typical Hail Diameter (in.)	Typical Damage Impacts
H5	Destructive	1.2–2	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	1.6–2.4	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	2–3	Severe roof damage, risk of serious injuries
H8	Destructive	2.4–3.5	Severe damage to aircraft bodywork
H9	Super Hailstorms	3–4	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	> 4	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

SOURCE: (TORRO, 2021)

Hailstorms occur throughout the year though are most frequent between May and August (NWS, 2020c). Although hailstorms rarely cause injury or loss of life, they do cost Minnesota nearly $16 million in property and crop damage each year (CEMHS, 2019). In 2017, 44% of properties in Minnesota were affected by damaging hail events (Samanta & Wu, 2017).

5.4.1 HISTORY

Rock County experienced 123 hail events from 1955 through August 2021; 46% of these hailstorms produced hailstones ≥ 1 in. diameter. The largest hailstone recorded in Rock County was 4 in., which occurred in Luverne on June 12, 1994 (NWS, 2020c). Hail damage to property and crops have cost the county more than 5.6 million dollars since 1960, ranking the county 42th for hail damage incurred by Minnesota counties (CEMHS, 2019). Table 25 lists hail events in Rock County that produced hailstones ≥ 1 in. diameter since January 2014, and

Table 25. Storms producing hail ≥ 1 in. diameter, Rock County, January 2014–August 2021

Date	Location	Hailstone Diameter (in.)	Damage
8/28/2021 (2 events)	Hills	1.75	An approaching weak impulse spurred rapid development of multiple rounds of storms near the warm front. Secondary development occurred during the evening along the cold front, which evolved into a slow-moving linear system with hail, wind, and heavy rainfall.
8/22/2021	Kanaranzi	1	Forty knots of deep-layer shear allowed storms to produce marginally large hail during the afternoon.
6/24/2019	Kanaranzi	1.25	An isolated hail-producing storm occurred in the county. Leaves were stripped from trees.
7/10/2016	Luverne Airport	1.75	A thunderstorm produced golf ball size hail as well as smaller hail, in the Beaver Creek area of Rock County in southwest Minnesota during the morning of July 10th.

Date	Location	Hailstone Diameter (in.)	Damage
6/19/2015	Luverne Airport	1	Thunderstorms produced large hail in Rock and Nobles Counties in southwest Minnesota during the early evening of June 19th.
4/7/2015	Ash Creek	1	Thunderstorms produced nickel to quarter size hail in Rock and Jackson Counties in southwest Minnesota during the late morning and early afternoon of April 7th.
6/16/2014 (2 events)	Multiple	1–1.75	Thunderstorms produced large hail, damaging winds, flash flooding, and areal flooding across most of southwest Minnesota during the afternoon and evening of June 16th. Golf ball size hail caused an unknown amount of damage to vehicles. Hail occurred in Jasper and Hardwick.
6/5/2014 (2 events)	Multiple	1–1.75	Thunderstorms produced marginally large hail and two tornadoes in southwest Minnesota during the afternoon and early evening of June 5th. Hail occurred in Jasper and Luverne.
5/8/2014	Beaver Creek	1	Thunderstorms produced marginally large hail at a few places in southwest Minnesota on the afternoon of May 8th.

SOURCE: (NWS, 2020C)

Figure 19 shows the hail events in Rock County from 1955 through February 2020 that produced hailstones ≥ 1 in. in diameter.

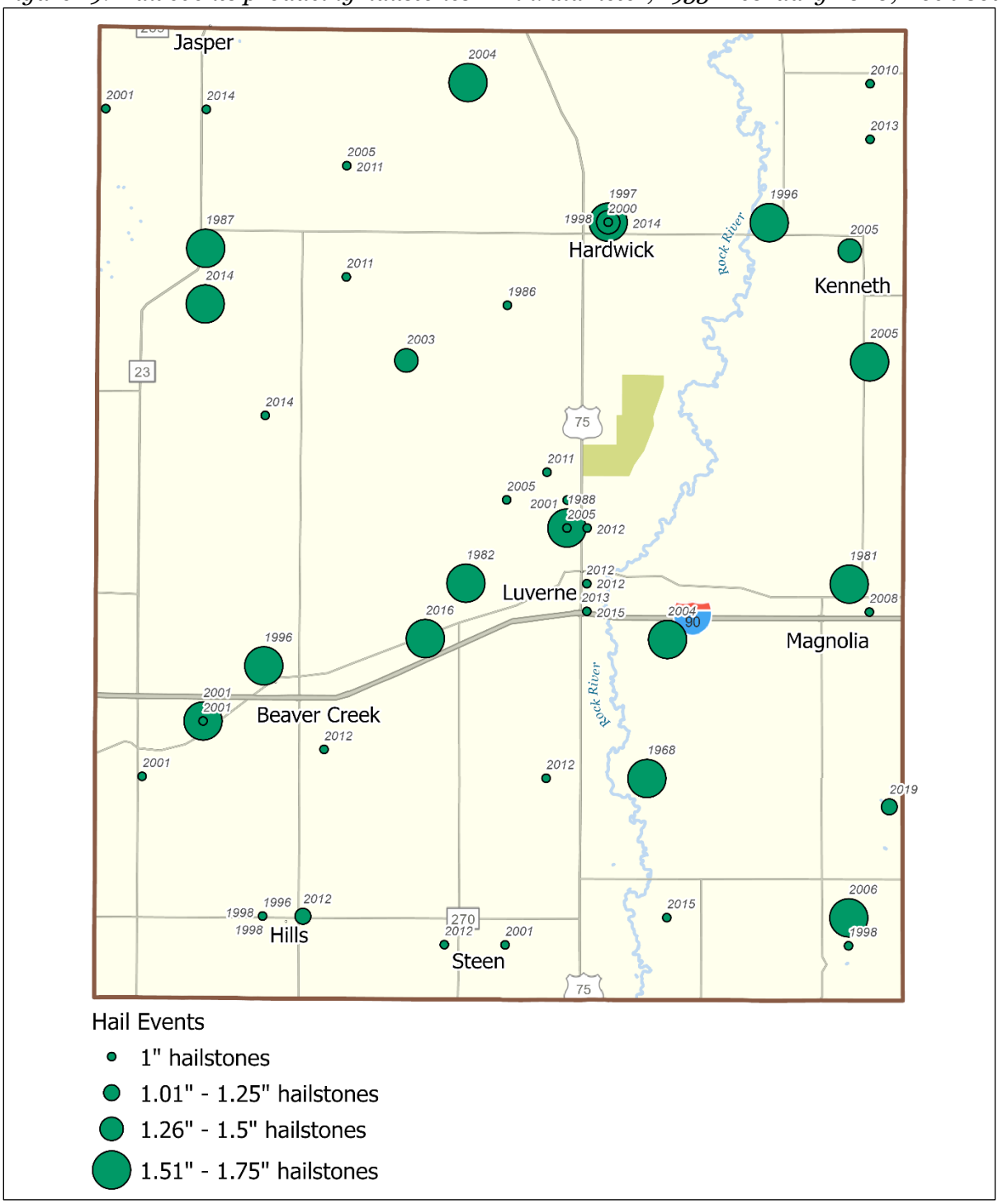
5.4.2 PROBABILITY OF OCCURRENCE

To determine the probability of future hailstorms in Rock County, records of previous hail events in the county were examined for the period of record. From January 1955 through February 2020, the relative frequency of hail events was 1.9 per year. This relative frequency can be used to infer the probability of hail events occurring in the future. Please note that public reports of hail are often secondary to those of thunderstorm winds or tornadoes because if either damaging winds or tornadoes occur, the damaging wind and/or tornado are more important to the reporter and may result in underreporting of hail events.

5.4.3 CLIMATE CHANGE PROJECTIONS

Numerous models suggest an increase in the frequency and intensity of severe thunderstorms as the climate changes (USGCRP, 2018) but scientists are less confident of how it will specifically affect hail. Some studies indicate climate changes will result in fewer overall hail days but an increase in the mean hail size, the frequency of large hail events, and the overall damage potential of hail (Brimelow et al., 2017). The lack of confidence in the projections of future changes in thunderstorms, tornadoes, hail, and windstorms is in part due to the difficulty in monitoring and modeling these small-scale and short-lived events (USGCRP, 2018). Since the impact of more frequent or intense storms can be significant, climate scientists are actively researching the connections between climate change and severe weather.

Figure 19. Hail events producing hailstones ≥ 1 in. diameter, 1955–February 2020, Rock County



SOURCE: (NWS, 2020C)

5.4.4 VULNERABILITY

Rock County's agricultural lands and structures are vulnerable to hail damage and its citizens to injury and possibly death. Data from the Spatial Hazard Events and Losses Database for the United States (SHELDUS) was examined to identify the county's monetary losses due to hail damage to crops, property, injury, and death. From 1960 through 2018 Rock County reported $5,559,260 in hail damages, ranking 42nd among Minnesota counties in total hail damages. Rock County losses are primarily due to crop damages reported at $5,272,528, followed by $286,732 in property damages. Crop indemnity payments due to hail totaled $21,312,046 for the period of record spanning 1989–2018 (CEMHS, 2019).

Within Rock County, the vulnerability of jurisdictions to hailstorms does not vary geographically. As with all summer storms, those who work outdoors or do not have permanent housing are at greater risk during hailstorms.

5.4.5 PROGRAM GAPS AND DEFICIENCIES

Rock County Emergency Management identified that there are several program gaps and deficiencies that make its citizens more vulnerable to summer storms, including hail. The following gaps and deficiencies should be addressed with new mitigation efforts to reduce that vulnerability:

Above-Ground Power Lines: Some of the power lines as well as all of the transmission lines in the county are above ground and subject to damage from high winds and falling tree limbs from severe summer storms. Power lines that are above ground are susceptible to coming down during severe storm events, resulting in power outages.

Public Education: Continued public education needs to be conducted during tornado season to inform the public on what is a tornado watch and what is a warning and what to do when warning sirens are activated. Rock County Emergency Management and local cities need to continue to encourage all residents to be ready for long-term power outages resulting from severe spring & summer storm events such as thunderstorms or straight-line winds.

Additional Storm Shelters/Tornado Safe Rooms: Communities should evaluate where there is a need for construction of storm shelters or tornado safe rooms to protect those who are vulnerable, such as mobile home parks and outdoor recreation areas.

5.5 Winter Storms

Winter storms encompass a number of winter weather events which the National Weather Service (NWS) organizes into the following categories: blizzard, heavy snow, ice storm, winter storm, and winter weather. Winter weather events are common in Minnesota and can be costly. According to the Spatial Hazard Events and Losses Database (SHELDUS), winter weather events in Minnesota have cost more than $957 million dollars in damages since 1960 (CEMHS, 2019).

The definitions below are used to record winter storm events in the NWS Storm Events Database (NCEI, 2021).

Blizzard: A blizzard (Figure 20) is a winter storm that has the following conditions for at least three consecutive hours: (1) sustained winds or frequent gusts of 35 mph or greater, and (2) falling and/or blowing snow which reduces visibility to less than ¼ mile. Blizzards are the most dramatic and destructive of all winter storms generally characterized as bearing large amounts of snow accompanied by strong winds. They have the ability to completely immobilize travel in large areas and can be life threatening to humans and animals in their path. Blizzards in Minnesota have claimed the lives of 10 people since 1996: (NCEI, 2021).

According to the NWS, there is no fixed temperature requirement for blizzard conditions, but the life-threatening nature of low temperatures in combination with blowing snow and poor visibility increases dramatically when temperatures fall below 20° F. In Minnesota, blizzards typically occur between October and April, with the majority occurring the months of January, March, and November, respectively.

Figure 20. Thanksgiving Weekend Blizzard, 2019

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Damages from blizzards can range from human and livestock deaths to significant snow removal costs. Stranded drivers can make uninformed decisions, such as leaving the car to walk in conditions that put them at risk. Because of the blinding potential of heavy snowstorms, drivers are also at risk of collisions with snowplows or other road traffic. Drivers and homeowners without emergency plans and kits are vulnerable to the life-threatening effects of heavy snowstorms such as power outages, cold weather, and inability to travel, communicate, obtain goods, or reach their destinations. Heavy snow loads can cause structural damage, particularly in areas where there are no building codes or where residents live in manufactured home parks. The frequency of structural fires tends to increase during heavy snow events, primarily due to utility disruptions and the use of alternative heating methods by residents.

Heavy Snow: A heavy snow event is characterized as snow accumulation meeting or exceeding the local/regional defined 12 and/or 24-hour warning criteria. Depending on the area, this could mean 4–8 inches or more of snow in 12 hours or less, or 6–10 inches or more of snow in 24 hours or less. Heavy snow events may cause structural damage due to the weight of snow accumulation.

Ice Storm: An ice storm is characterized by a buildup of ice (typically ¼–½ inch or more) due to freezing rain or other type of precipitation; however, even small accumulations of ice on sidewalks, streets, and highways may create extremely hazards conditions to motorists and pedestrians. The terms “freezing rain” and “freezing drizzle” warn the public that a coating of ice is expected on the ground and other exposed surfaces.

Heavy accumulations of ice can bring down electrical wires, telephone lines, and even trees, telephone poles, and communication towers. The NWS notes that over 85% of ice storm-related deaths are the result of traffic accidents.

Winter Storm & Winter Weather: A winter storm is an event that has more than one winter hazard (i.e., heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet, and ice) and meets or exceeds locally/regionally defined 12- and/or 24-hour warning criteria for at least one of the precipitation elements. Winter weather is a winter precipitation event that causes a death, injury, or a significant impact to commerce or transportation, but does not meet locally/regionally defined warning criteria. The winter weather classification is also used to document out-of-season occurrences of winter precipitation.

5.5.1 HISTORY

Rock County has an active history of winter-related weather events. Since 1996, the county experienced 160 events, including blizzards, heavy snows, ice storms, winter storms, and winter weather (NCEI, 2021). Winter weather events in the county have cost over $25.2 million dollars in property and crop damages since 1960 (CEMHS, 2019). Table 26 provides descriptions from the NCEI Storm Events Database of the events that have occurred since 2014, the year the county's MHMP was last updated.

Table 26. Winter-related weather events in Rock County, Jan. 2014–Aug. 2021

Date	Type	Description
3/14/2021	Winter Storm	Snowfall was heavy at times, resulting in very hazardous travel conditions. A total of nearly nine inches of snow was recorded at Hills.
2/4/2021	Winter Weather	Snowfall was briefly heavy and totaled just over three inches at Hills. Frequent wind gusts reached as high as 37 mph at Beaver Creek and 32 mph at Luverne, which resulted in several hours of blowing snow with visibility as low as one-half to one mile. This resulted in hazardous roads.
1/23/2021	Winter Weather	Snowfall totaled 2.6 inches at Hills.
1/14/2021	Blizzard	As snow developed and began to accumulate, the increase in winds to a sustained 30 to 35 mph, with a few gusts as high as 54 mph, resulted in widespread near white-out conditions. Interstate 90 and most state roads were closed by early evening as plows were pulled due to dangerous conditions. Snowfall totaled three inches at Hills.
12/29/2020	Winter Weather	Snowfall totaled 3.3 inches four miles east of Hardwick.
12/23/2020	Blizzard	Winds gusted as high as 59 mph near Beaver Creek and resulted in widespread whiteout conditions for several hours. Minnesota Department of Transportation shut down all main roads during the blizzard across all of southwest MN due to poor visibility and numerous accidents. A two-vehicle accident occurred on U.S. Highway 75 north of Luverne, when a vehicle travelling slowly due to visibility was rear-ended, resulting in indirect injury to the driver of the rear-ended vehicle.
11/10/2020	Winter Storm	Snowfall, heavy at times, totaled 7.2 inches at Hills.
10/24/2020	Winter Weather	Snowfall totaled 4.8 inches at Hills.

Date	Type	Description
10/22/2020	Winter Weather	Light freezing drizzle started prior to sunrise and continued into early afternoon. Ice accumulation on elevated surfaces reached upward of one tenth of an inch, with lesser ice also accumulating on roads and bridges which produced dangerous conditions for several hours.
4/12/2020	Winter Storm	Snowfall totaled four inches at Luverne. Winds near Beaver Creek gusted frequently from 30 to 40 mph, and as high as 45 mph, with visibilities less than a mile, and frequently as low as one-quarter to one-half mile.
3/19/2020	Winter Weather	Rain changed quickly to snowfall late afternoon, with visibility one-quarter to one-half mile at times. The intense snowfall rate made travel hazardous during the evening as winds increased to a peak of 50 mph near Beaver Creek and 40 mph at Luverne. Snowfall totaled 4.1 inches at Hills.
2/12/2020	Winter Weather	Winds gusted to 35 to 45 mph and combined with snowfall to produce visibility of less than one mile for several hours.
1/17/2020	Blizzard	Heavy snowfall with 30 to 40 mph winds moved through the area before becoming freezing drizzle. Ice accumulations were a glaze to a tenth of an inch. Precipitation changed back to snow and northwest wind speeds increased, with peak wind gusts reaching up to 59 mph. Winds combined with snow to produce visibility of around one-quarter mile or less. Total snowfall reached seven inches.
1/12/2020	Winter Weather	Moderate snowfall resulted in just over two inches of accumulation, causing hazardous road conditions.
12/28/2019	Winter Weather	Mixed precipitation resulted in a minor glaze of ice accumulation. Snowfall produced hazardous travel and totaled just over three inches. Heavy winds resulted in blowing and drifting snow.
11/28/2019	Winter Weather	Light snow and freezing drizzle resulted in a light accumulation of icing. Snowfall totaled one to two inches.
11/26/2019	Winter Storm	Four to nine inches of snow blanketed the area. The snow was accompanied by northwest winds with 35 to 50 mph gusts, which resulted in periodic visibility from one-quarter to one-half mile.
11/5/2019	Winter Weather	A period of light snowfall resulted in accumulations of two to three inches.
4/10/2019	Ice Storm	Ice accumulated one-half to three quarters of an inch. 40 to 50 mph wind gusts and the weight of the ice accumulation snapped more than one hundred poles holding electrical lines. Warming shelters were set up in several communities which were without power for a day or two. The rough estimate of damage costs was just over $600,000.
3/9/2019	Winter Weather	Freezing rain created up to a tenth of an inch ice accumulation. Snowfall followed and reduced visibility with total accumulations of up to five inches.
3/1/2019	Winter Weather	Snowfall accumulated three to five inches over a six to nine-hour period.
2/3/2019	Winter Weather	Freezing drizzle caused a glaze of ice accumulation ranging from a few hundredths to a tenth of an inch.
12/31/2018	Winter Weather	Snow accumulated to around one inch and winds gusted as high as 42 mph, creating periods of blowing snow with reduced visibility.
12/27/2018	Winter Weather	Snowfall totaled three to five inches. Visibility was reduced to a mile or less while heavier snowfall occurred, and winds were gusting to 46 mph.
12/1/2018	Winter Weather	Snowfall produced an accumulation of two to four inches. Hazardous travel resulted as winds gusted to 30 to 35 mph and combined with snowfall.

Date	Type	Description
11/16/2018	Winter Weather	Periods of late evening freezing drizzle resulted in a light glaze on roadways.
10/14/2018	Winter Weather	Light to occasionally moderate snow accumulated two to six inches across most of southwest Minnesota. Visibility dropped to a mile or less for almost two hours, creating hazardous travel conditions.
4/18/2018	Winter Weather	Snow developed rapidly and lowered visibility to one mile or less.
4/13/2018	Blizzard	An earlier mix of rain, sleet and snow changed to all snow, and winds gusting as high as 58 mph reduced visibility to less than a quarter mile. A storm total snowfall of 8.5 inches was measured at Luverne. During the storm, a male riding a snowmobile was killed when his vehicle hit a guard rail at high speed along Interstate 90.
4/8/2018	Winter Weather	Southeast winds of 25-35 mph resulted in periods of visibility from one-quarter to one-half mile at times. Snowfall reached four inches at Luverne.
4/3/2018	Winter Weather	Winds of 30 to 35 mph lowered visibility to under a mile at times. Snowfall totaled almost five inches at Hills City.
3/23/2018	Winter Weather	Visibility dropped to less than a mile at times, with snowfall accumulating two to five inches.
3/10/2018	Winter Weather	Light freezing rain produced less than a tenth of an inch of ice accumulation. Light snowfall produced less than an inch of snow.
3/5/2018	Winter Weather	Total snowfall was three to six inches and was accompanied by winds gusting as high as 35 mph.
2/24/2018	Winter Weather	Four to six hours of moderate snowfall accumulated up to five inches of snow in the county.
2/22/2018	Winter Weather	Snowfall in the county varied from three to five inches.
2/19/2018	Winter Weather	Most precipitation was a mix of light freezing rain, freezing drizzle, and light snow which resulted in ice accumulation. A second round of precipitation coated the ice with less than an inch of snow and produced hazardous travel conditions.
2/8/2018	Winter Weather	Visibility dropped to less than a mile at times, producing hazardous travel conditions. Snowfall totaled up to three inches.
2/5/2018	Winter Weather	Light to moderate snow over a period of several hours brought two to four inches of snowfall across portions of southwest Minnesota.
1/21/2018	Winter Storm	Snow and widespread blowing snow developed in Rock County, with visibility frequently at a mile or less. Total snowfall was reported at four to seven inches.
1/11/2018	Winter Weather	Less than an inch of snowfall occurred, but with 40 to 50 mph winds visibility briefly fell to a mile or less.
12/29/2017	Winter Weather	Snowfall of three to five inches produced hazardous road conditions. Weak winds caused only minor drifting.
12/21/2017	Winter Weather	Snowfall accumulated two to four inches, including 3.3 inches in Luverne.
3/12/2017	Heavy Snow	Six to eight inches of snow fell across the county. The heaviest snowfall was north of Interstate 90. Strong northwest winds of 20 to 35 mph caused widespread blowing and drifting snow.
2/23/2017	Blizzard	Two to six inches of snowfall combined with strong winds of 30 to 40 mph and created localized blizzard conditions with widespread visibilities below a half mile.

Date	Type	Description
1/24/2017	Winter Storm	Snow accumulated four to seven inches, including five inches in Luverne. Winds of 20 to 30 mph caused significant blowing and drifting snow, closing several roads.
1/16/2017	Winter Weather	Freezing rain and freezing drizzle caused icy roads, and accumulated lightly on trees, power lines, and other surfaces. Law enforcement agencies reported a few vehicles accidents on the ice but no known injuries.
1/10/2017	Winter Weather	Light freezing rain caused a few icy surfaces before the precipitation changed to snow. The snow accumulated up to one inch. Northwest winds gusting to 45 mph combined with the light snowfall and existing snow cover to reduce visibility to below a mile at times.
12/24/2016	Winter Weather	Freezing drizzle and freezing rain caused icy surfaces, resulting in a few vehicle accidents.
12/16/2016	Winter Storm	Snow accumulated five to eight inches, including 7.8 inches in Luverne. Northerly winds increased to around 20 mph and caused drifting and some blowing snow.
12/10/2016	Winter Weather	Snow accumulated two to five inches, including four inches in Hills City. Winds were moderate, gusting at times to around 20 mph.
11/18/2016	Winter Storm	Wet snow accumulated three to six inches. It was accompanied by northwest winds gusting to 55 mph, which combined with the falling snow to produce visibilities less than a quarter mile at times.
3/26/2016	Winter Weather	Snow accumulated two to four inches over the western part of the county, including three inches near Beaver Creek.
3/23/2016	Winter Weather	Snowfall ranged from one to four inches, including three inches west of Hardwick City, was accompanied by north to northeast winds gusting to over 40 mph. The winds caused some blowing snow.
2/29/2016	Winter Weather	Snow accumulated two to five inches, including five inches in Luverne. The snow caused slippery roads which resulted in a few accidents. The snow continued to a little past midnight on March 1, 2016.
2/13/2016	Winter Weather	Snowfall of one to three inches combined with southeast winds gusting around 30 mph to produce areas of blowing snow, with visibilities lowering.
2/7/2016	Winter Weather	Northerly winds gusting to near 50 mph combined with existing snow cover to cause areas of blowing snow, with visibilities lowering to below a half mile at times. New snow of less than a half inch fell during this time.
2/2/2016	Blizzard	Heavy snow combined with 20 to 35 mph north to northwest winds to produce near zero visibilities in falling and blowing snow. Snow accumulations ranged from six to twelve inches with twelve inches reported in Luverne. Numerous vehicles slid off roads due to the combination of snowy roads and low visibility.
12/28/2015	Heavy Snow	Snow accumulated five to ten inches. Winds were light to moderate with no blowing snow reported.
12/25/2015	Winter Storm	The county received six to nine inches of snow. North to northwest winds gusted to around 30 mph and caused areas of blowing snow with visibilities below a half mile in places. The storm affected mainly Christmas weekend travel.
11/30/2015	Winter Storm	Freezing drizzle was quickly followed by snow. The snow accumulated five to nine inches.

Date	Type	Description
11/20/2015	Winter Weather	Snow accumulated two to six inches. The lightest accumulations were along the northern edge of the county. The snowfall was accompanied by light winds.
3/3/2015	Winter Weather	The county received one to two inches of snow. This combined with north to northwest winds gusting up to 40 mph to reduce visibilities.
2/25/2015	Winter Weather	Snow accumulated two to four inches. Northeast winds gusting to 30 mph caused areas of blowing snow.
2/9/2015	Winter Weather	Light freezing rain and freezing drizzle caused icy travel.
1/31/2015	Winter Storm	Snow accumulated four to seven inches. Accompanying northwest winds gusting to 35 mph caused areas of blowing snow, reducing visibility to a quarter of a mile at a few places.
1/5/2015	Winter Storm	Snow accumulated three to six inches. Up to 50 mph Northwest winds combined with snow cover to cause blowing snow, reducing visibilities.
12/26/2014	Winter Weather	Snow accumulated two to four inches. The snow was accompanied by minor drifting.
12/15/2014	Winter Weather	Freezing rain produced ice accumulations of up to a tenth of an inch, causing icy roads, as well as cancellations or early dismissals at some schools. The freezing rain was followed by snowfall of around one inch.
11/15/2014	Winter Weather	Snow accumulated four to seven inches across the county.
4/3/2014	Heavy Snow	Wet snow accumulated two to seven inches, with the heavier accumulations in the southern and eastern parts of Rock County.
2/20/2014	Winter Weather	Snowfall of one to two inches was accompanied by over 40 mph northwest winds. This caused areas of blowing snow, with visibilities lowering.
2/14/2014	Winter Weather	Snow accumulated three to four inches in the county.
1/16/2014	Blizzard	Northwest winds gusting to over 50 mph combined with existing snow cover and new snowfall of up to two inches to cause widespread frequent visibilities below a quarter mile in blowing snow.

SOURCE: (NCEI, 2021)

5.5.2 PROBABILITY OF OCCURRENCE

To determine the probability of future winter-related storm events in Rock County, records of previous events (blizzards, heavy snows, ice storms, winter storms, and winter weather) were summed and divided by the dataset's period of record, resulting in the annual relative frequency of winter-related storms. Based on records in the NCEI Storm Events Database through February 2020, the relative frequency of winter-related storm events in Rock County is 6.2 per year. This relative frequency can be used to infer the probability of these events occurring in the future.

5.5.3 CLIMATE CHANGE PROJECTIONS

Historically, winter storms have had a large impact on public safety in Minnesota. This will continue, with a possible increase in annual total snowfall (MPCA, 2018c). Winter weather is often the cause of power outages. Pressures on energy use, reduced reliability of services, potential outages, and the potential rise in household costs for energy are major climate change risks to public health.

According to the 2015 Minnesota Weather Almanac, seasonal snowfall records across the state from 1890–2000 showed that 41 of 46 climate stations recorded an increase in average annual snowfall, by as much as 10 inches. Climate change is causing the atmosphere to hold more moisture, that drives heavier than normal precipitation. Higher snowfall levels can result in greater runoff potential during spring snowmelt, and many watersheds in Minnesota have shown more consistent measures of high-volume flows during spring, often at or above flood stage (Seeley, 2015).

5.5.4 VULNERABILITY

Transportation systems, electrical distribution systems, and structures are vulnerable to winter storms throughout the county. These events do not vary geographically within the county; all jurisdictions are equally vulnerable. While it is highly likely these events will continue occurring annually, the amount of snow and ice and number of winter-related storm events to occur each year are unpredictable. Citizens living in climates such as these must always be prepared for situations that put their lives or property at risk. It is important that extra consideration be given to the vulnerable populations and energy infrastructure discussed in Section 4.3.

5.5.5 PROGRAM GAPS AND DEFICIENCIES

Rock County Emergency Management identified several program gaps and deficiencies that make its citizens more vulnerable to severe winter storms. The following gaps and deficiencies should be addressed with new mitigation efforts to reduce that vulnerability:

Above-Ground Power Lines: Some of the power lines as well as all of the transmission lines in Rock County are above ground and subject to damage from ice storms, wind, and falling tree limbs. Power lines that are above ground are susceptible to coming down during severe winter storm events, resulting in power outages.

Backup Power: Not all designated shelter facilities have generator back-up power to provide the ability to care for residents if displaced during a severe winter event coupled with an extended power outage.

Snow Fences: Living snow fences as well as permanent snow fences would help with blowing snow and ice. Finding private property owners to work with may be a challenge.

5.6 Extreme Cold

Due to Minnesota's position in the middle of the continent and subsequent climate, the state may experience extremely frigid temperatures in winter. Winter in Rock County can be especially dangerous when low temperatures and wind create arctic-like wind chills.

Wind chill, defined as how cold people and animals feel when outside, is based on the rate of heat loss from exposed skin caused by wind and cold. As wind increases it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

The National Weather Service (NWS) issues a wind chill warning when life-threatening wind chill values are expected or occurring. The criteria for issuing official wind chill warnings and advisories are set by the local weather forecasting office (WFO). The Sioux Falls WFO (SFD) uses a wind chill warning criteria

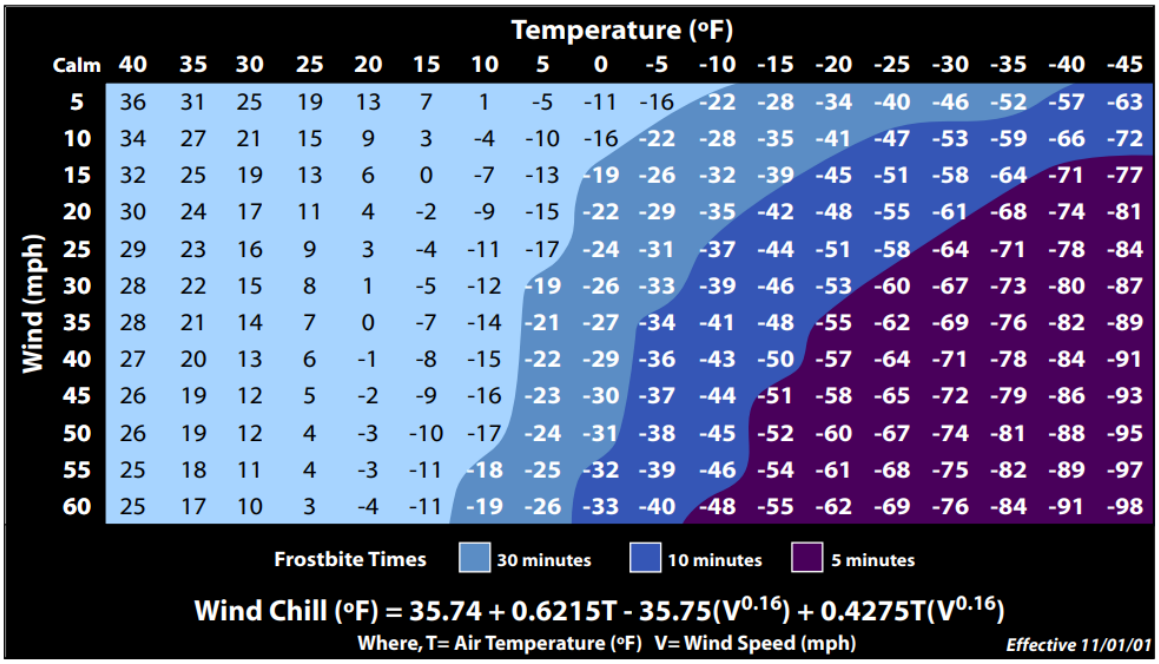
of −35 °F or colder to issue a wind chill warning and −25 °F and colder for a wind chill advisory in Rock County (NWS, 2010). Figure 21 shows the relationship between temperature and wind speed to measure wind chill.

5.6.1 HISTORY

Extreme cold temperatures affect Rock County nearly every year. January is the coldest month in the West Central Minnesota climate division, with an average monthly minimum temperature of 5.9 °F (Vose et al., 2021). Extreme cold data was compiled from the Midwestern Regional Climate Center (MRCC) using daily minimum temperature data from weather stations in Rock County, which have complete datasets (< 10% missing data), as well as cold-related events reported in the NCEI Storm Events Database. Extreme cold days in Rock County were counted each day a station's daily minimum temperature reached −18 °F, a standard used by the National Weather Service to report cold weather events (2018).

There are no weather stations in the county currently reporting daily temperature. The station referenced is located in Pipestone, MN, approximately ten miles from the Rock County line. From January 1, 2014 through June 5, 2020, daily low temperatures ≤ −18 °F were recorded 18 times at the Pipestone weather station (NWS COOP, 2020). Rock County experiences an average of 2–3 extreme cold days each year. The lowest daily low temperature reported since January 2014 was −32°F recorded by the Pipestone station on January 30, 2019. This date corresponds with the "Polar Vortex" of late January 2019 that affected most of the state. Strong winds and arctic air on the heels of a snowstorm brought bitter cold to Minnesota. Schools closed and postal mail service stopped statewide. The extreme cold also brought some natural gas shortages, power outages, and broken water mains.

Figure 21. NWS wind chill temperature index



SOURCE: (NWS, 2010)

The lowest temperature ever reported in Rock County occurred on January 19, 1970 when temperatures plummeted to −37 °F at the Luverne station (NWS COOP, 2020).

Daily minimum temperatures mentioned above do not factor in wind chill. The NCEI Storm Events Database includes ten cold/wind chill and 13 extreme cold/wind chill events affecting Rock County since 1996 (NCEI, 2021). No one in Rock County died or was injured from these events; however, indirect deaths due to stress on those with other serious health conditions were likely to have occurred.

Table 27 shows cold-related events in Rock County as reported to the NCEI Storm Events Database since January 2014.

Table 27. Cold events in Rock County, January 2014–August 2021

Date	Event Type	Description
2/13/2021	Extreme cold / wind chill	A massive Arctic plunge brought almost a week of dangerous and life-threatening wind chills to the region. The worst conditions were recorded between February 13 and 16. Wind chill temperatures reached a minimum of −44 °F at Beaver Creek and −39 °F at Luverne.
2/12/2020	Extreme cold / wind chill	Continued strong winds and plummeting temperatures brought wind chills to −35 °F to −50 °F during the overnight and early morning hours. Wind chills dipped as low as −40 °F at Beaver Creek and Luverne.
1/18/2020	Cold / wind chill	Brisk winds brought wind chill readings to −25 °F to −35 °F. The coldest wind chills reached −29 °F at Luverne.
3/3/2019	Extreme cold / wind chill	Winds were 20 to 35 mph and, when coupled with temperatures of −10 °F to −20 °F, produced wind chills below −20 °F. March 3 was one of the coldest March days on record for the area.
12/31/2018	Cold / wind chill	Winds increased to 35 to 45 mph as temperatures plummeted, creating wind chill values as low as −22 °F near Beaver Creek during the evening hours. Dangerous wind chills persisted into early morning of the next day.
2/4/2018	Cold / wind chill	Northerly winds from 20 to 35 mph brought dangerous wind chills below −20 °F, reaching as low as −25 °F at Luverne.
1/15/2018	Cold / wind chill	Northwest winds of 25 to 35 mph along with temperatures at subzero levels produced dangerous wind chills from −25 °F to −35 °F. The wind chill at Luverne dipped to −31 °F.
1/11/2018	Cold / wind chill	Northerly winds at 10 to 20 mph combined with near zero and subzero temperatures to produce wind chills from −20 °F to −30 °F.
1/6/2018	Cold / wind chill	Southerly winds increased to 10 to 20 mph in the predawn hours with lingering below zero temperatures, driving wind chills to −20 °F to −25 °F.
1/1/2018	Extreme cold / wind chill	Winds of up to 12 mph combined with temperatures of −20 °F to −30 °F to produce bitterly cold wind chills of around −35 °F to −45 °F through the morning hours of New Year's Day. The coldest wind chills during the early hours of the new year −44 °F at Luverne.
12/31/2017	Extreme cold / wind chill	Bitterly cold wind chills of −35 °F to −45 °F prevailed over much the two-day period as temperatures plummeted to −20 °F and winds persisted at 10 to 20 mph. The lowest wind chill was at Luverne and reached −38 °F.
12/25/2017	Cold / wind chill	Winds of 10 to 20 mph and bitterly cold arctic air produced wind chills from −25 °F to −35 °F.

Date	Event Type	Description
12/17/2016	Extreme cold / wind chill	Strong northwest winds combined with falling temperatures to create wind chills of −40 °F to −55 °F.
1/16/2016	Extreme cold / wind chill	Wind chills ranged from −35 °F to −45 °F. Northwest winds gusted up to 20 mph, but generally averaged 10 to 15 mph when the coldest wind chills were reached, during which time actual temperatures were −15 °F to −20 °F.
3/2/2014	Extreme cold / wind chill	Temperatures dropped to −15 °F and combined with 5 to 15 mph northwest winds to produce wind chill readings of around −35 °F for several hours.
1/23/2014	Extreme cold / wind chill	Subzero temperatures and 10 to 15 mph combined to produce wind chills of −35 °F to −40 °F.

SOURCE: (NCEI, 2021)

5.6.2 PROBABILITY OF OCCURRENCE

To determine the probability of future cold-related events in Rock County, records of previous cold/wind chill and extreme cold/wind chill events were summed and divided by the dataset's period of record, resulting in the annual relative frequency. Based on records in the NCEI Storm Events Database through January 2020, the relative frequency of cold-related events in Rock County is .9 per year. (NCEI, 2021). These 22 events occurred in 12 of the 24 years on record. This relative frequency can be used to infer the probability of these events occurring in the future.

5.6.3 CLIMATE CHANGE PROJECTIONS

Although climate research indicates that Minnesota's average winter lows are rising rapidly and our coldest days of winter are now warmer than we have ever recorded (MN DNR, 2020a) cold temperatures have always been a part of Minnesota's climate and extreme cold events will continue. 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.

5.6.4 VULNERABILITY

The risk of extreme cold does not vary geographically within the county. Citizens living in climates such as these must always be prepared for situations that put their lives or property at risk. The youngest and more elderly citizens, homeless persons, individuals with chronic medical conditions, and those who are working or recreating outdoors are most at risk for frostbite and hypothermia (MDH, 2021b)

It is not always the depth of the cold that poses a threat but rather unpreparedness for the cold, such as an individual with a vehicle breakdown who lacks a personal winter safety kit in the vehicle. The cost of propane can make rural citizens more vulnerable to issues with extreme cold. A propane shortage and resulting crisis, such as that which occurred in 2014, may increase the cost of heating homes and farms to a prohibitive amount (Eaton, 2014). The Minnesota Department of Commerce presents options and suggestions for homeowners who use propane on their website: https://mn.gov/commerce/consumers/tips-tools/propane/

The CDC publication "Extreme Cold: A Prevention Guide to Promote Your Personal Health and Safety"

outlines preparation measures that individuals can take to reduce their vulnerability to extreme cold. Highlights in this document include advice about travel preparations, securing your home water supply, and safety during recreation (CDC, 2021).

5.6.5 PROGRAM GAPS AND DEFICIENCIES

Rock County Emergency Management identified several program gaps and deficiencies that make its citizens more vulnerable to extreme cold. The following gaps and deficiencies should be addressed with new mitigation efforts to reduce that vulnerability:

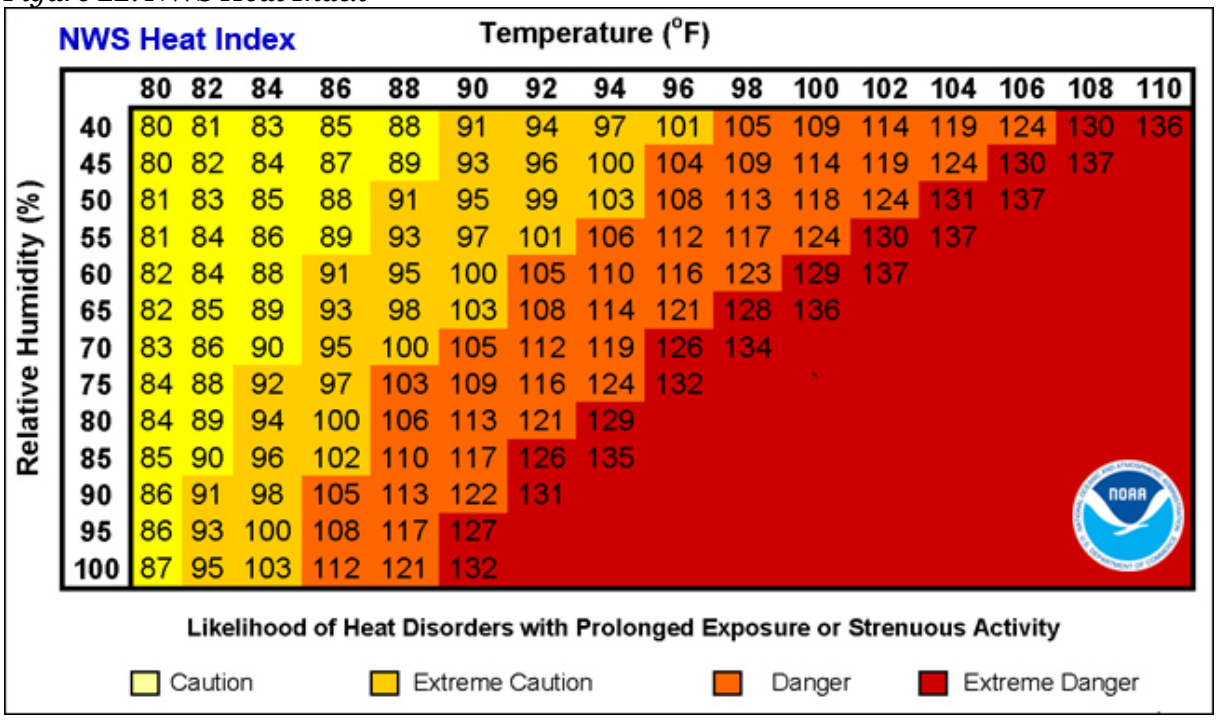
Generators for Backup Power to Healthcare Facilities: Not all local residents or long-term care facilities have backup generator power. In the event of extreme cold periods, coupled with a power outage, these facilities would be at high risk with vulnerable populations.

Generators for Backup Power to Shelter Facilities: Not all designated shelter facilities have generator back-up power to provide heat if there is a loss of power during an extreme cold event.

5.7 Extreme Heat

Extreme heat is the combination of very high temperatures and exceptionally humid conditions. When the atmospheric moisture content is high, the rate of perspiration from the body decreases and the human body feels warmer (NWS, 2021). Heat stress can be indexed by combining the effects of temperature and humidity. The NWS Heat Index in Figure 13 is a measure of how hot the body feels when relative humidity is factored in with actual air temperature. The heat index values are for shady locations—exposure to direct sunlight may increase these values by up to 15 °F.

Figure 22. NWS Heat Index



SOURCE: (NWS, 2021)

Extreme heat events are linked to a range of illnesses, even death, and can exacerbate pre-existing chronic conditions (Moss, 2017). Medical costs related to extreme heat can be enormous: in 2005, the total was $1.5 billion nationwide, or more than $16,000 per patient (Union of Concerned Scientists, 2009). Heat-related hazards have cost Rock County over $349,000 in property damages since 1960 (CEMHS, 2019). Figure 23 describes the effects increasing levels of heat has on the body during prolonged exposure and/or physical activity.

Figure 23. Heat effects on the body

Classification	Heat Index	Effect on the body
Caution	80°F - 90°F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution	90°F - 103°F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger	103°F - 124°F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged exposure and/or physical activity
Extreme Danger	125°F or higher	Heat stroke highly likely

SOURCE: (NWS, 2021)

5.7.1 HISTORY

According to data obtained from the Midwestern Regional Climate Center (MRCC), July is the warmest month in South West Minnesota, the climate division in which Rock County is located, with a mean high temperature of 82.4 °F (Vose et al., 2021). To measure the frequency of extreme heat days in Rock County, the county's weather station's daily maximum temperatures were examined with 90 °F used as the benchmark. Rock County contains no active weather stations with complete datasets (< 10% missing data). Instead, the station referenced is located in Pipestone, MN. From January 1, 2014 through June 5, 2020, daily high temperatures ≥ 90 °F were reported 30 times from the Pipestone station (GHCN, 2020; NWS, 2020a; NWS COOP, 2020). Rock County experiences an average of 4-5 extreme heat days each year. The highest daily maximum temperature reported during this time was 98 °F recorded by the Pipestone station on June 10, 2015.

The highest temperature ever reported in Rock County occurred on July 9, 1976 when temperatures reached 106 °F at Luverne station (GHCN, 2020; NWS, 2020a; NWS COOP, 2020).

Daily maximum temperatures do not factor in humidity. For this information, we look to the NCEI Storm Events Database, which receives data on heat and excessive heat events from NWS. According to the NWS, a heat event results from a combination of above normal high temperatures and relative humidity, while an excessive heat event is characterized by well above normal high temperatures and high humidity (2018). Heat-related events are reported to the Storm Events Database whenever heat index values meet or exceed locally/regionally established heat thresholds. In Minnesota, a heat advisory is issued when the maximum heat index is around 100 °F or higher. An excessive heat warning occurs when the maximum heat index is around 105 °F and the minimum heat index is around 75 °F or higher (NWS, 2019).

Since January 1996, two heat and seven excessive heat events occurred in Rock County (NCEI, 2021). No one in Rock County died or was injured from these events; however, indirect deaths due to stress on those with other serious health conditions were likely to have occurred. Table 28 shows heat-related events in Rock County as reported to the NCEI Storm Events Database since January 2010.

Table 28. Heat events in Rock County, January 2014–August 2021

Date	Event Type	Description
6/30/2019	Heat	Temperatures were in the mid to upper 90s and dew points in the lower to mid- 70s. Heat index values ranged from 100 °F to 108 °F during the afternoon and early evening hours.
6/29/2019	Excessive heat	Temperatures in the mid-90s to around 100 °F along with dew point readings in the mid to upper 70ss produced very dangerous heat conditions. Heat index readings rose over 105 °F for much of the afternoon and early evening.
7/11/2018	Heat	Significant evapotranspiration along with very warm temperatures produced dangerous heat index values from 100 °F to 105 °F over a two-day period.
7/20/2016	Excessive heat	Temperatures reaching daytime highs in the 90s were accompanied by very humid conditions. The heat index rose to 100 °F to 110 °F. Hospital emergency rooms reported numerous cases of heat stress, heat exhaustion, and dehydration.
6/10/2016	Excessive heat	Temperatures reaching daytime highs in the mid to upper 90s were accompanied by humid condition. The heat index rose over 100 °F. Hospital emergency rooms reported numerous cases of heat stress, heat exhaustion, and dehydration.

SOURCE: (NWS, 2020B)

5.7.2 PROBABILITY OF OCCURRENCE

To determine the probability of future heat-related events in Rock County records of previous heat and excessive heat events were summed and divided by the dataset's period of record, resulting in the annual relative frequency of heat-related events. Based on records in the NCEI Storm Events Database through January 2020, the relative frequency of heat-related events in the county is .3 per year. These nine events occurred in five of the 24 years on record. This relative frequency can be used to infer the probability of these events occurring in the future.

5.7.3 CLIMATE CHANGE PROJECTIONS

Seven of Minnesota's ten warmest years occurred in the last 15 years. Projected increases of 2°F to 6°F more are expected by 2050 and 5°F to 10°F more by 2100 (MN EQB, 2014). The Midwest has experienced major heat waves, and their frequency has increased over the last six decades (Perera et al., 2012). For the U.S., mortality increases 4% during heat waves compared with non-heat wave days (Anderson & Bell, 2011). Heat stress is projected to increase as a result of climbing summer temperatures and humidity (Schoof, 2012).

Rock County's exposure to extreme heat is expected to increase if no action is taken to reduce heat-trapping emissions. Several factors are used to indicate changes in extreme heat exposure, including cooling degree days. Cooling degree days are used to indicate the amount of cooling a building will need in response to weather, based on a threshold of 65 °F. Days with a daily average temperature above this threshold are known as cooling degree days referencing the need for cooling inside buildings. Cooling degree days are calculated from the daily average temperature minus 65 °F. For example, if a weather station recorded an average daily temperature of 78 °F, cooling degree days for that station would be 13. In 2019, Rock County had 442 cooling degree days. With medium action to curb climate change, Rock County is projected to have 522 cooling degree days by 2050. With low action to curb climate change the expected number of cooling degree days within the county jumps to 651 days by 2050 (MDH & University of Minnesota, 2019).

5.7.4 VULNERABILITY

The Minnesota Department of Health released a 2012 Minnesota Extreme Heat Toolkit, to help local governments prepare for extreme heat events. In their toolkit, they note extreme heat events are often dubbed "silent killers" because deaths and illnesses from these events are often misunderstood and underreported. Minnesota has no official system to report deaths and illnesses linked to extreme heat (MDH, 2012). It is important to not underestimate the danger of extreme heat events within the state.

High temperatures can be exacerbated by the urban heat island effect in densely developed areas, an effect that amplifies higher temperatures in areas with a higher concentration of impervious and paved surfaces. These types of surfaces absorb more heat and hold it for longer than vegetation cover (EPA, 2019). Impervious surfaces cover 3% of Rock County (MDH & University of Minnesota, 2019). Impervious surfaces are not spread evenly throughout the county and attention should be given to cities or areas within the county that contain the largest amounts of this type of surface cover. Except for these areas, the risk of extreme heat does not vary geographically.

The impact extreme heat has on individuals is not equal. According to the Center for Disease Control and Prevention (CDC), population groups more vulnerable to extreme heat include:

- Older adults (≥65 years old). The elderly are not able to easily adjust to sudden changes in temperature and are more likely to have a chronic medical condition, or take medication affecting their body's ability to control its temperature.
- Infants and children. Young children and infants have limited control with their surroundings and rely on others to keep them cool and hydrated.
- Individuals with chronic health conditions. These individuals are less likely to respond to changes in temperature, may be taking a medication which exacerbates the effects of extreme heat, or have a condition which is a risk-factor for heat-related illness (e.g., heart disease, mental illness, poor blood circulation, and obesity).
- People with low income. These individuals may not be able to afford to properly cool their home and may face transportation challenges when trying to access cooling shelters.
- Athletes and people working outdoors. Both groups are likely to exert energy while being exposed to the heat (CDC, 2020).

Warming temperatures will continue to increase the risk of extreme heat, especially among these already vulnerable populations. In 2018, 21% of Rock County's population was over 65 years old, 26% of the county was classified as low income, and 23% of the county were beneficiaries of Medicare (MDH & University of Minnesota, 2019). Many of the population groups vulnerable to extreme heat are included as social variables in the CDC's SVI data, specifically in the Socioeconomic Status, and Household Composition & Disability themes. See Section 4.3.1 for information on geographic variability of social vulnerabilities in SVI themes.

5.7.5 PROGRAM GAPS AND DEFICIENCIES

Rock County Emergency Management identified several program gaps and deficiencies that make its citizens more vulnerable to extreme heat. The following gaps and deficiencies should be addressed with new mitigation efforts to reduce that vulnerability:

Generators for Backup Power to Healthcare Facilities: Not all local residents or long-term care facilities have backup generator power. In the event of extreme heat periods coupled with a power outage these facilities would be at high risk with vulnerable populations.

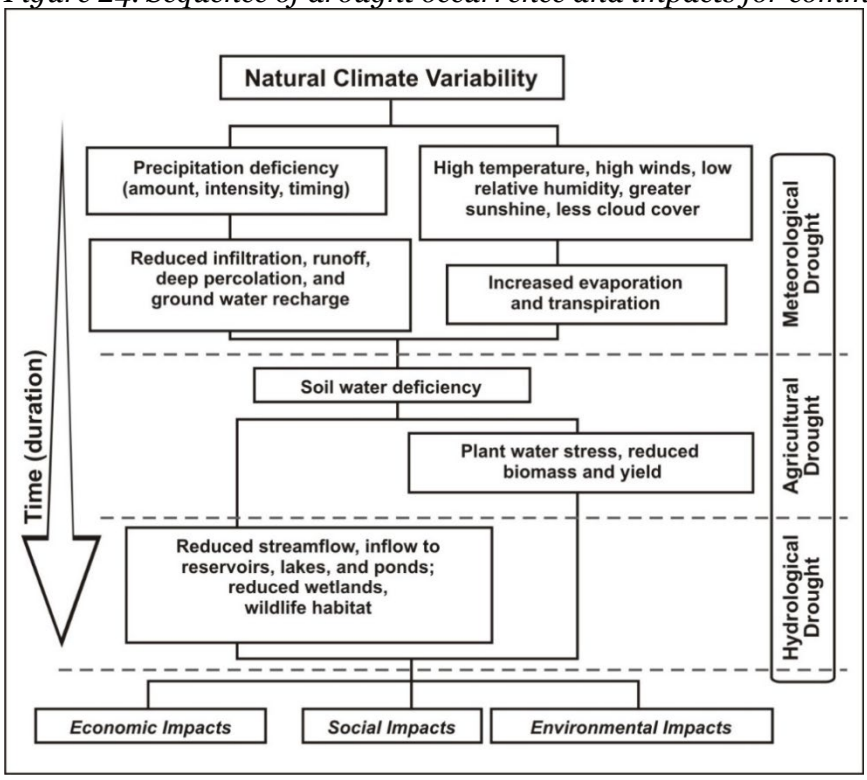
Generators for Backup Power to Shelter Facilities: Not all designated shelter facilities have generator back-up power to provide cooling if there is a loss of power during an extreme heat event.

5.8 Drought

Within the broad domain of natural hazards that comprise disaster science, drought is unequivocally the most difficult to define. This is primarily due to its insidious nature, and because the parameters that typically control it vary both spatially and temporally. For instance, the hydro-meteorological conditions that constitute drought in one location may not necessarily qualify as drought in a contrasting climate. Even in regions that share a statistically similar climate, other factors such as soil type, antecedent moisture conditions, ground cover, and topography all play a vital role in dictating drought emergence. To further complicate matters, drought is associated with a diverse number of climatic and hydrological stressors, all of which come with a unique set of collective impacts that affect nearly every corner of our economy and environment. Subsequently, there are over 150 different definitions of drought, not just because it is difficult to define, but precisely on the grounds that drought affects different regions in different ways (Fu et al., 2013). When one attempts to merge and understand these various definitions and impacts, it is evident that drought can be integrated into five principal categories, including: meteorological, agricultural, hydrological, ecological, and socio-economic drought (Figure 24).

Meteorological drought is qualified by any significant deficit of precipitation. Hydrological drought is manifest in noticeably reduced river and stream flow and critically low groundwater tables. The term agricultural drought indicates an extended dry period that results in crop stress and harvest reduction. Socioeconomic drought refers to the situation that occurs when water shortages begin to affect people and their lives. It associates economic goods with the elements of meteorological, agricultural, and hydrological drought. Many supplies of economic goods (e.g., water, food grains, and hydroelectric power) are greatly dependent on the weather.

Figure 24. Sequence of drought occurrence and impacts for commonly accepted drought types



SOURCE: (NDMC, 2021)

There are numerous approaches to assessing drought conditions. The current gold standard for accurate drought conditions in the United States is the United States Drought Monitor (USDM) Map. Established by the National Drought Mitigation Center (NDMC) in 1999, the Drought Monitor is a weekly map that depicts drought conditions in all 50 states and Puerto Rico. Each weekly map is produced by a NDMC-assigned author. Though drought map authors utilize a broad domain of geospatial, climatic data, as well as drought indices that cover every aspect of drought, perhaps their most valuable resource is the input they receive each week from hundreds of drought experts throughout the country. The drought monitor map is thus a collective synthesis of the best quantitative and the most reliable qualitative information available. Figure 25 displays an example map and statistics table prepared by the USDM for Minnesota on August 17, 2021. This figure shows the first introduction of a D4 area in the state on MN since the USDM process began in early 2000.

In total, there are four drought categories:

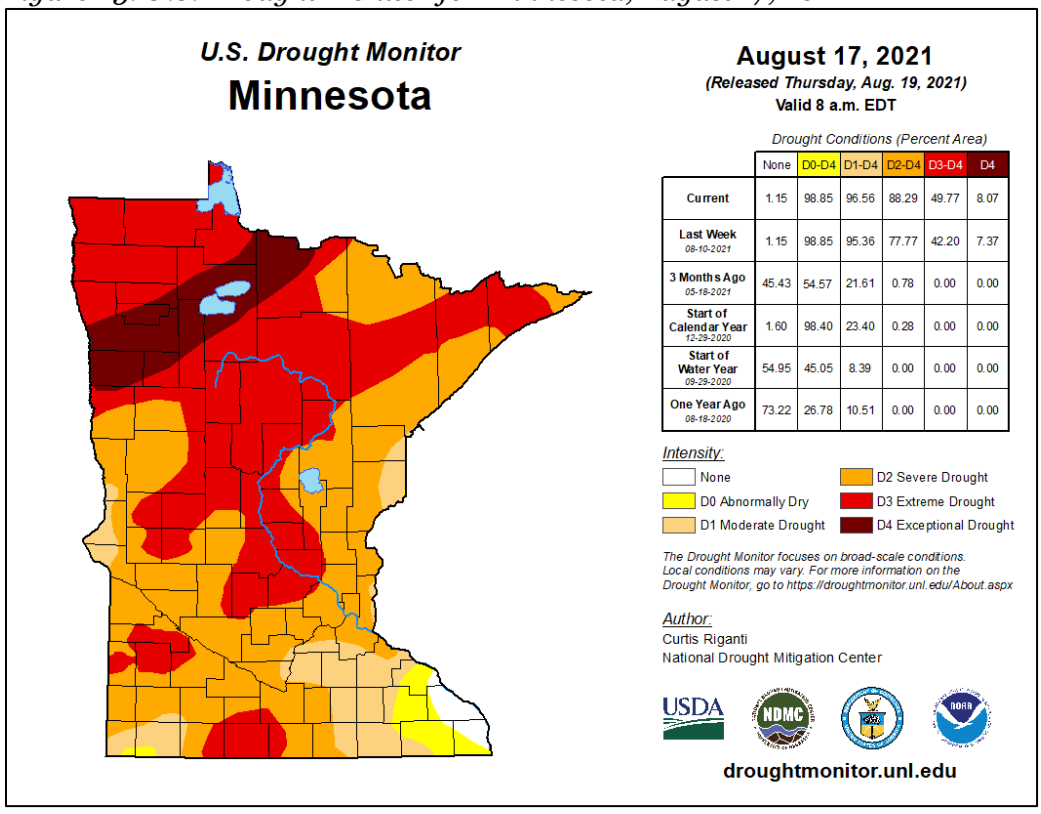
- moderate (D1)
- severe (D2)
- extreme (D3)
- exceptional (D4)

A fifth category, abnormally dry (D0), is used to depict areas that are abnormally dry but not yet in drought. Abnormally dry conditions are indicative of the meteorological circumstances that precede drought onset and those that are coming out of drought. D0 is often considered a bellwether of drought,

but it is also an accurate warning sign that crop growth may be slowed, and wildfire risk may be elevated (NDMC et al., 2021). Table 29 describes the impacts reported from previous droughts in Minnesota for each drought level.

The decision to declare or alter a drought category in each location is dependent upon a comprehensive set of climate products that are specifically manufactured to quantify drought. Many of these products are referred to as drought indices, and these indices each serve a specific purpose. There are indices that are designed for measuring short-term drought, and there are indices that are built to reflect long-term drought. Similarly, other indices are useful for sector-specific areas such as water resources or agriculture. The NCEI Storm Events Database uses the US Drought Monitor's drought classification system as a guide to determine which droughts to include in the database. For locations east of the Rocky Mountains, only drought events categorized as severe (D2) or higher are included (NWS, 2018).

Figure 25. U.S. Drought Monitor for Minnesota, August 17, 2021



SOURCE: (NDMC et al., 2021)

Table 29. Observed drought impacts in Minnesota

Category		Impact
D0	Abnormally Dry	Soil moisture is low; pasture and row crops are stressed Fire danger increases Weather is good for construction projects Lake and river levels decline; water temperatures rise
D1	Moderate Drought	Winter snow events are canceled River and lake levels are lower than normal

Category		Impact
D2	Severe Drought	Ground is hard; seed corn is short; feed is expensive; crop yields are low Fire danger is high; burn permits are required Landscaping is stressed; leaves change colors early Bears search for food; trout runs are hampered; fish kills occur River flow is very low; snowpack is significantly lower; well levels decrease Corn is harvested early; emergency haying and grazing are authorized
D3	Extreme Drought	Wildfires are widespread Surface waters are near record lows
D4	Exceptional Drought	Minnesota has had little or no experience in D4, so no impacts have been recorded at that level in the Drought Impact

SOURCE: (NDMC ET AL., 2021)

5.8.1 HISTORY

According to the USDM, since 2000, the longest drought ≥ D2 in Rock County is 45 consecutive weeks, which occurred July 17, 2012–May 27, 2013. This is also the most intense drought the county has experienced. For 37 weeks about 90% of the county was classified as being in a D3 extreme level drought (NDMC et al., 2021). The long-term dry soil conditions damaged crops and resulted in local water use restrictions (NCEI, 2021). Currently, the county is experiencing its worst drought since its last Hazard Mitigation Plan in 2014. The drought has been ongoing since August 2020 and covers the entire county, with 72% of the county being in a D1 level drought and the remaining 28% in level D2 (NDMC et al., 2021). As of August, 2021 is the 22nd driest year in Rock County in 127 years; rainfall is 3 inches below normal as of the writing of this plan (NIDIS, 2021). Drought conditions in 2021 are the worst Minnesota has experienced since 1988. By the end of July 2021, the DNR had suspended water appropriations in 17 major watersheds, mostly in northern Minnesota. Suspension of more surface water appropriations is expected, unless there is a dramatic change in the current precipitation pattern (MN DNR, 2021b).

The drought of 1988 is another significant drought that impacted all of Minnesota. Below normal precipitation coupled with declining lake levels, ground water levels, and stream flow created statewide concern. To facilitate coordination of drought response actions, a State Drought Task Force was convened by the Director of the Division of Waters. The State Drought Task Force brought together local, state, and federal officials to share information and coordinate drought response strategies. Several actions were taken following the summer of 1988 to better prepare the state for the next drought. The Governor appointed a Twin Cities Water Supply Task Force specifically to make recommendations on how to meet future water demands in the event of low flow conditions on the Mississippi River. The U.S. Corps of Engineers initiated review of its operating plans for the Mississippi River headwater reservoirs, and the 1989 legislature charged the Metropolitan Council with preparing water use and supply plans for the metropolitan area. Today the responsibilities, plans and actions related to drought planning are outlined in the Minnesota Statewide Drought Plan (MN DNR, 2009).

When comparing the two most recent 5-year timeframes the USDM data shows a reduction in the percent of county land affected by drought at all levels. Table 30 shows the breakdown of this comparison.

Table 30. Average percent of Rock County's land area by drought category

Timeframe	No Drought	D0	D1	D2	D3	D4
(T1) 8/30/11–8/29/16	40%	24%	10%	13%	13%	0%
(T2) 8/30/16–8/30/21	72%	8%	13%	7%	0%	0%
% Change (T1 to T2)	+80%	−67%	30%	−46.2%	−100%	0%

(NDMC ET AL., 2021)

5.8.2 PROBABILITY OF OCCURRENCE

To determine the probability of future droughts in Rock County, records of previous droughts were summed and divided by the dataset's period of record, resulting in the annual relative frequency of droughts. The USDM database was examined from January 4, 2000–September 13, 2021 for any occurrence of drought ≥ D1 in Rock County, regardless of the duration of the drought. According to the weekly reported data, the relative frequency of the county experiencing drought conditions ≥ D1 is 10.4 weeks per year, and the relative frequency of drought conditions ≥ D2 is 6.4 weeks per year (NDMC et al., 2021). The relative frequency of past droughts can be used to infer the probability of similar droughts occurring in the future.

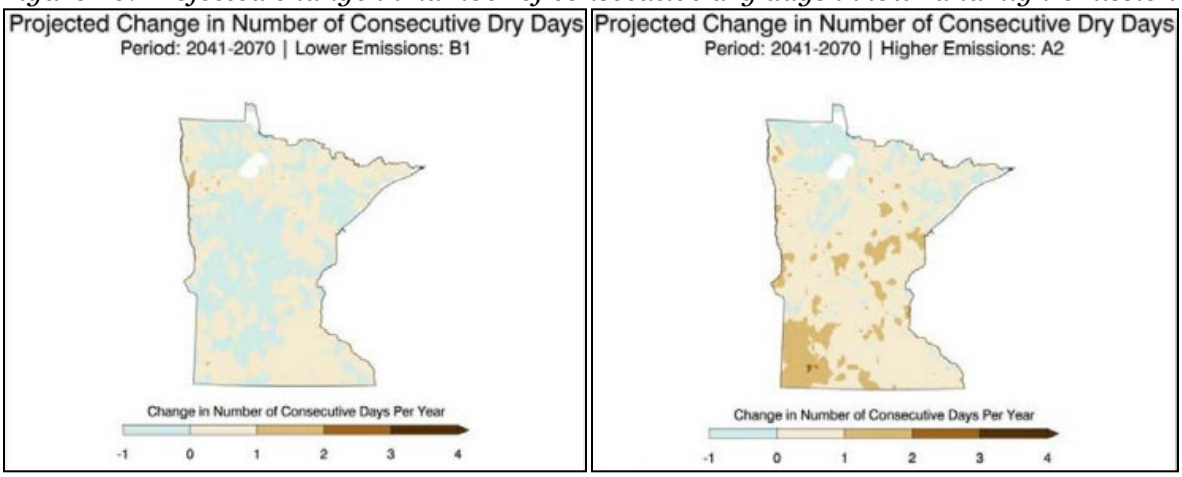
5.8.3 CLIMATE CHANGE PROJECTIONS

In 2007, 24 Minnesota counties received drought designation, while seven counties were declared flood disasters; in 2012, 55 Minnesota counties received federal drought designation at the same time 11 counties declared flood emergencies (MN EQB, 2014); and as of the writing of this plan, August 2021, 100% of Minnesota is experiencing a level of drought, with nearly a third of Rock County being in a severe drought (D2) (NDMC et al., 2021). Droughts have been happening throughout Minnesota's history, but it is not yet clear the degree to which climate change may impact future droughts (Moss, 2017). 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 (USGCRP, 2018).

The climate models used in the 2014 National Climate Assessment projects Minnesota to have an increase in days over 90°F by mid-century, however, the future drought situation is less clear. The climate model run with the lower-emissions scenario projects no significant change in the number of consecutive days of no rain, while the higher emissions scenario show an increase in dry periods, increasing Minnesota's drought risk (Moss, 2017). These climate models are shown in Figure 26.

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 (Mueller & Seneviratne, 2012).

Figure 26. Projected change in number of consecutive dry days in low- and high-emission scenarios



SOURCE: (PRYOR ET AL., 2014)

5.8.4 VULNERABILITY

One way to identify county assets vulnerable to drought is by examining the impacts of previous droughts. Overseen by the National Drought Mitigation Center (NDMC), the Drought Impact Reporter (DIR) is a comprehensive database that gathers drought-related reports from a variety of sources and identifies the sector(s) impacted by each drought. The NDMC (NDMC et al., 2021) defines a drought impact as "[a]n observable loss or change that occurred at a specific place and time because of drought." A drought meeting this definition is categorized based on the sector(s) the drought impacts; therefore, a single drought affecting multiple sectors will be counted once for each respective sector it impacted.

DIR records show eight drought incidents impacting three categories in Rock County. All incidents occurred between May 2007 and June 2017 and are displayed in Table 31.

Table 31. Reported drought impacts for Rock County

Sector	# of drought impacts reported
Agriculture	5
Business & Industry	0
Energy	0
Fire	0
Plants & Wildlife	1
Relief, Response & Restrictions	6
Society & Public Health	0
Tourism & Recreation	0
Water Supply & Quality	0

(NDMC ET AL., 2021)

Since droughts are regional in nature, jurisdictions within Rock County do not vary in their vulnerability to drought; however, the impact from droughts are not equal.

Drought conditions may impact soil moisture reserves, groundwater supplies, lake levels and stream flows. Water-dependent industries that experience the greatest impacts include: agriculture, public

utilities, forestry and tourism (MN DNR, 2021b). In addition, droughts may negatively affect an individual's health by contributing to poor air quality caused by wildfire smoke and particulate, or a dusty environment. The 2021 drought resulted in elevated fire danger in roughly the northern two-thirds of the state, and record high particulate readings across Minnesota due to the Canadian wildfires (Huttner, 2021). Populations vulnerable to these conditions include children, older adults, and those with respiratory issues. The Household Composition & Disability SVI theme map is made up of these population groups and should be reviewed to better understand the vulnerability of each jurisdiction (ATSDR, 2020).

According to the DIR, Rock County's agriculture sector has been impacted by drought more than once, and with 85% of the county's land devoted to cultivated crops and another 7% to hay and pasture, the county's agriculture community is vulnerable to the economic impact a drought may have on crops. From 1989–2018, Rock County received $19,378,210 (2018 ADJ) in crop indemnity payments due to drought, placing it as the 38th-highest-paid county in Minnesota (CEMHS, 2019).

5.8.5 PROGRAM GAPS AND DEFICIENCIES

Rock County Emergency Management identified several program gaps and deficiencies that make its citizens more vulnerable to drought. The following gaps and deficiencies should be addressed with new mitigation efforts to reduce that vulnerability:

Water Conservation Provisions/Use Restrictions: Water conservation provisions and use restrictions in times of drought should be included in county or city ordinances.

5.9 Dam & Levee Failure

A dam is a structure built across a stream or river to retain water for the purpose of storage or control. The difference in elevation between the water at the top and bottom of a dam creates large amounts of potential energy, allowing the chance for failure. Dam failures are typically not caused by storm events. In the U.S., 36% of dam failures are due to mechanical reasons (malfunctioning gates, conduits, or values); 34% are from hydraulic failures (overtopping due to inadequate spillway design, debris blockage, or the settlement of the dam crest), and 30% are caused by structural failures (foundation defects from settlement and slope instability) (FEMA, 2013b).

A levee is a structure, typically made from embankments of dirt, built along the edges of rivers and streams to contain, control, or divert the flow of water to prevent flooding of the adjacent land (Lotha et al., 2019). Common causes for levees failing include foundation failure, surface erosion, or overtopping (USACE, 2010). Both dam and levee failures can be devastating, resulting in loss of human life, downstream property damage, lifeline disruption (transportation routes and utility lines required to maintain or protect life), and environmental damage. Dams and levees require constant monitoring and regular maintenance to ensure their integrity.

Dam & Levee Regulation: There are over 1,150 dams in Minnesota (MN DNR, 2020b). Dam regulatory authorities vary between state and federal agencies based mainly on the ownership of the dam.

The MN DNR Dam Safety Program has the mission of protecting the life and safety of people by ensuring that dams are safe. Minnesota's Dam Safety Program sets minimum standards for dams and regulates the design, construction, operation, repair, and removal of both privately and publicly (non-federal) owned dams (MN DNR, 2020b). The federal government is responsible for regulating and maintaining dam safety of federally owned dams. No single agency regulates all federally owned dams. 42% of federal dams are owned and managed by the U.S. Army Corp of Engineers (USACE) and the Bureau of Reclamation. The remaining federal dams are owned and managed by other federal agencies, including the Fish and Wildlife Service, Forest Service, the Department of Defense, and the Bureau of Indiana Affairs, among others (Normand, 2019).The Federal Energy Regulatory Commission (FERC) Dam Safety Program is the largest dam safety program in the U.S. The Commission works with federal and state agencies to ensure and promote dam safety of over 3,000 dams across the U.S. The Commission inspects projects on an unscheduled basis to investigate potential dam safety problems; complaints about constructing and operating a project; safety concerns related to natural disasters; and issues concerning compliance with the term and conditions of a license (FERC, 2020).

Similar to dams, levees in Minnesota are regulated by various federal, state, and local entities that own the levee. While the USACE has designed and built many of the levees in the U.S., the USACE is only responsible for the maintenance of federally owned levees in the USACE system.

Dam & Levee Inventory: There are six dams and no levees in Rock County.

Table 32 provides the properties of each dam in the county.

Table 32. Dams in Rock County

Dam Name	Owner	Waterway	Type	Height (ft)	Length (ft)	Purpose	Condition	Rating
Mound Creek South Pool	MNDNR-Parks	Mound Creek	Gravity	20	847	Recreation	Fair	Class III
Mound Creek North Pool	MNDNR-Parks	Mound Creek	Gravity	15	400	Recreation	Fair	Class III
Luverne North	County of Rock	Rock River-TR	Earth	21	2700	Flood Control	Satisfactory	Class III
Luverne West	County of Rock	Rock River-TR	Earth	13	1050	Flood Control	Satisfactory	Class III
Battle Plain 10	Pronk, Terrence	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Springwater 36	Kelm, Darwin E.	Beaver Creek-TR	Rockfill	19.4	275	Fire Protection, Stock, or Small Fish Pond	No Data	Class III

SOURCES: (MN DNR, 2014; USACE, 2021)

5.9.1 HISTORY

According to the State Dam Safety Engineer at the MN DNR, there are three records of a dam failure in Rock County.

The Mound Creek South Pool and Mound Creek North Pool failed due to a six-inch rainstorm in May 1938. A flash flood was followed from the rainstorm. The right and left earthen embankments for the South and the right earthen embankment for the North dams were overtopped and washed out. Both dams were repaired.

In June 2014, the Mound Creek South pool failed again. A large flood after very heavy rains overtopped the spillway. It has since been repaired (Boyle, Jason (MN Dam Safety Engineer), personal communication, October 22, 2019).

5.9.2 PROBABILITY OF OCCURRENCE

To determine the probability of future dam failures in Rock County, records of previous failures and the period in which they occurred were examined. There MN DNR has three records of dam failures occurring in the county; therefore, the relative frequency of these events is 0 per year. This relative frequency can be used to infer that the probability of dam failures occurring in the future is very low. However, the Mound Creek South Pool and Mound Creek North Pool are regularly overtopping during large rain events (Oldre, 2021). These two dams may have a greater likelihood of failure than other dams in the county.

5.9.3 CLIMATE CHANGE PROJECTIONS

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 change the expected flow pattern, and indirectly increase the likelihood of dam failures. 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.

Minnesota had a dam failure due to a large storm event in June 2012. The Forebay Canal in Carlton County 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.

5.9.4 VULNERABILITY

Although dam regulatory authorities differ between various federal and state agencies, all authorities attempt to classify dams according to the potential impacts from a dam failure or mis-operation. In response to the numerous classification systems, FEMA's Interagency Committee on Dam Safety created a downstream hazard potential classification system that is adaptable to any agency's current system. Table 33 provides an overview of the main criteria agencies consider when determining a dam's downstream hazard potential. This classification system does not imply that the dam is unsafe, but rather categorizes dams based on the probable loss of human life and the impacts on economic, environmental, and lifeline interests (FEMA, 2004a).

Table 33. Downstream hazard potential classification criteria

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Class III (Low)	None expected	Low and generally limited to owner
Class II (Significant)	None expected	Yes
Class I (High)	Probable - one or more expected.	Yes (but not necessary for this classification)

SOURCE: (USACE, 2008)

Dams for which a hazard potential has not been designated, or is not provided, are classified as "Undetermined."

An Emergency Action Plan (EAP) is a document which identifies potential emergency conditions at a dam and specifies preplanned actions to be followed during a dam failure to minimize property damage or loss of life. An EAP is required for Class I dams and strongly recommended for Class II dams (MN DNR, 2020b).

Five of the dams in Rock County are a Class III (low hazard potential), and no hazard information is available for the other dam. None of the dams have an Emergency Action Plan (EAP); therefore, no information is available or required about vulnerable structures or populations in the event of a failure.

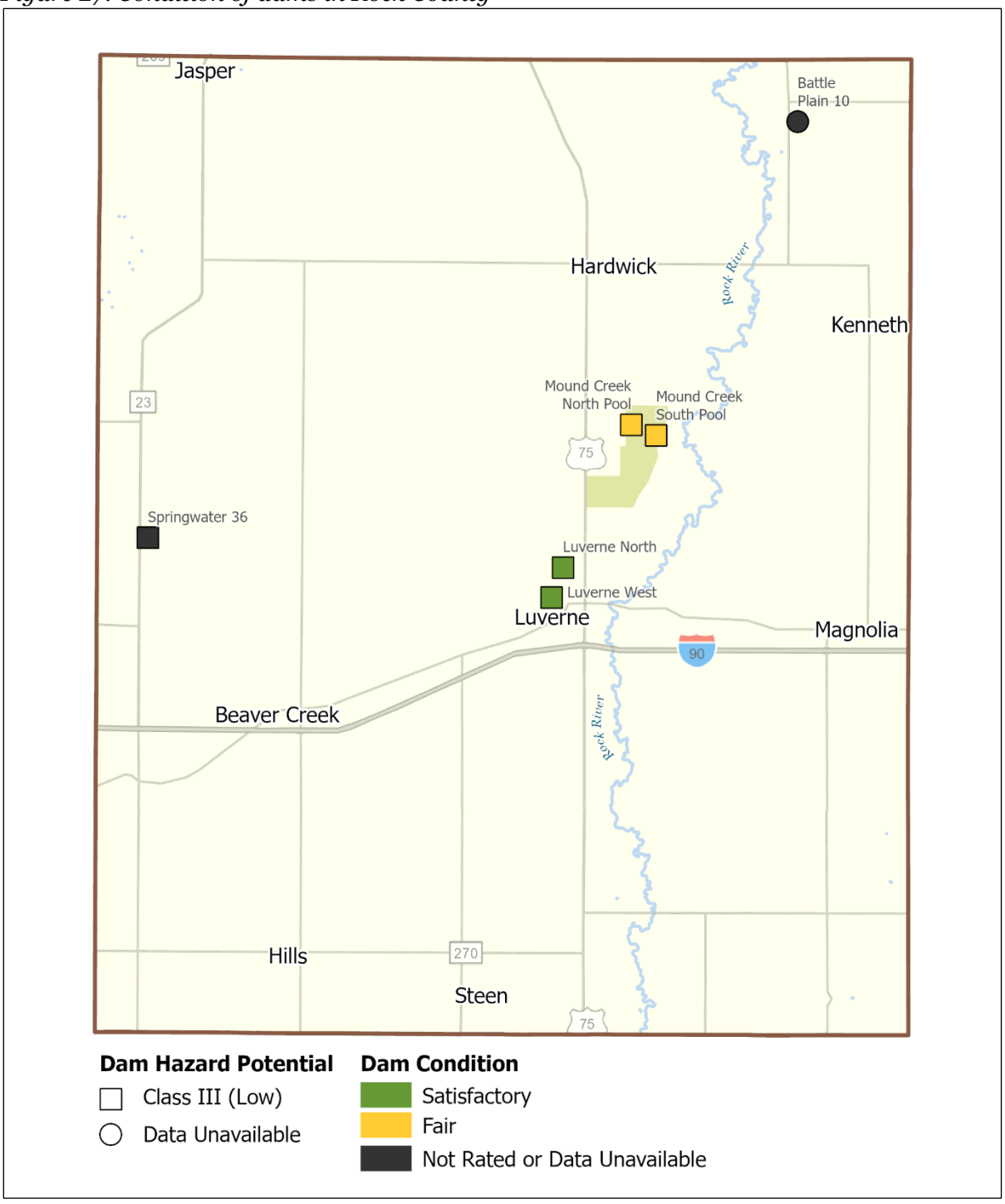
In addition to dams being classified by their hazard potential, the physical condition of dams is inspected and given a condition ranking. The condition of a dam is categorized into one of the following classifications:

> *Satisfactory*: No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.
>
> *Fair*: No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.
>
> *Poor*: A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. "Poor" may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.
>
> *Unsatisfactory*: A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.
>
> *Not Rated*: The dam has not been inspected, is not under state jurisdiction, or has been inspected but, for whatever reason, has not been rated. (USACE, 2008)

Dams in "Poor" or "Unsatisfactory" conditions may be more vulnerable to failure and pose a greater threat to the surrounding community and infrastructure. Fortunately, of the dams in Rock County that have

been given a condition ranking, none are ranked below "Fair." The location and condition of dams in Rock County are mapped in Figure 27.

Figure 27. Condition of dams in Rock County



SOURCE: (USACE, 2021)

According to Rock County Emergency Manager Kyle Oldre, the 80-year-old dam at the Blue Mound State Park has not been replaced by the MN DNR as requested. During heavy rain, the dam allows "additional water to come through Mound Creek and across County Road 8. During high-rain events this results in water over-topping the road and damages due to erosion. Rock County has requested that the MN DNR address replacement of this dam to mitigate against future issues" (Oldre, 2021).

5.9.5 PROGRAM GAPS AND DEFICIENCIES

Rock County Emergency Management did not identify any program gaps or deficiencies that make its citizens more vulnerable to dam and levee failure.

Section 6 – Mitigation Strategy

The goal of mitigation is to protect lives and reduce the impacts of future hazard events 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 a well-constructed risk assessment, 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 Assessments

The capability assessment identifies current activities and existing planning tools 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 hazard events. The following sections identify existing plans and mitigation capabilities within all of the communities:

- Appendix D: Lists the plans and programs in place in Rock County as related to hazard mitigation.
- Appendix C: As part of the Rock County MHMP update, the county and city governments were asked to participate in filling out a "Local Mitigation Survey" (LMS) form to report on their current mitigation capabilities and program gaps. Appendix C provides the LMS reports gathered for Rock County.

Information from the capability assessments was used to support development of local mitigation actions for implementation over the next five years (see column *Comments on Implementation & Integration)*.

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.

Table 34 lists and describes jurisdictional participation in the National Flood Insurance Program (NFIP).

Table 34. NFIP participation in Rock County

Community Name	Participation in the NFIP	FEMA Map	Description of Participation
Rock County	Participating	FEMA-mapped high-risk areas	Rock County participates in the National Flood Insurance Program (NFIP). Rock County Land Management /Planning & Zoning Department maintains the flood rate insurance maps for the county. Rock County Planning and Zoning includes Ordinance, Section 19, Floodplain Management District.
Beaver Creek	Participating	No FEMA-mapped high-risk areas	The City of Beaver Creek participates in the NFIP with Rock County. Rock County's Land Management Office maintains the flood maps for the City of Beaver Creek.
Hardwick	Participating	No FEMA-mapped high-risk areas	The City of Hardwick has No Special Flood Hazard Area mapped and does not have a specific floodplain ordinance. The City participates in NFIP to allow citizens access to cheaper flood insurance if they so choose to participate in it. We also take continuing steps towards managing localized flooding events through storm water management improvements and maintenance of the existing system.
Hills	Participating	No FEMA-mapped high-risk areas	The City of Hills has No Special Flood Hazard Area mapped and does not have a floodplain ordinance in place. By participating in the NFIP we provide the option to homeowners to buy floodplain insurance if they wish to do so.
Kenneth	Not Participating	No FEMA-mapped high-risk areas	The city does not have a FEMA map and is not participating.

Community Name	Participation in the NFIP	FEMA Map	Description of Participation
Luverne	Participating	FEMA-mapped high-risk areas	The City of Luverne's Zoning Code Official administers and enforces the City's Floodplain District by ordinance. The Floodplain District boundaries are established, and adopted by reference on the official zoning maps, including explanatory materials which include the *Flood Insurance Study* dated 11-17-1981, the *Flood Boundary and Floodway Map,* and *Flood Insurance Rate map* dated 5-17-1982. Enforcement is consistent with the standards established by the state's Department of Natural Resources.
Magnolia	Not Participating	No FEMA-mapped high-risk areas	The city does not have a FEMA map and is not participating.
Steen	Not Participating	No FEMA-mapped high-risk areas	The city does not have a FEMA map and is not participating.

SOURCE: (CEIL STRAUSS, MN FLOODPLAIN MANAGER, PERSONAL COMMUNICATION, APRIL 6, 2020)

Repetitive loss properties are defined as properties that have had two or more flood insurance claims of $1,000 or more in any rolling 10-year period. Property owners are asked to consider mitigation activities such as acquisition, relocation, or elevation, among other options. FEMA's Repetitive Loss (RL) properties strategy is to eliminate or reduce the damage to property and the disruption to life caused by repeated flooding of the same properties. Property owners are notified of their status by FEMA.

Rock County has two RL properties, one single-family and one non-residential property, in the city of Luverne. A combined five losses resulted in payments totaling $78,618 as of February 2022. There are no severe repetitive loss properties (SRL) in Rock County. For more on the areas that flood repeatedly in Rock County, see Section 5.1.

6.1.2 PLANS AND ORDINANCES

Rock 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, Emergency Operations Plan, and Wellhead Protection Plan.

6.1.3 PLANS AND PROGRAMS IN PLACE TO ADDRESS NATURAL HAZARDS

Rock County has numerous plans and programs in place to address natural hazards. Some of these programs are specific to a hazard and others address impacts and human safety for many types of events

("All-Hazards"). For the purpose of grouping related natural hazards, "Summer Storms" encompasses Tornadoes, Windstorms, Lightning, and Hail. Following is a description of the plans and programs in place by Rock County to support mitigation for the hazards addressed in this plan.

All Hazards

All-Hazards Emergency Operations Plan: Rock County Emergency Management maintains an all-hazards Emergency Operations Plan which details key emergency management functions (e.g., Public Information and Warning, Evacuation, Mass Care Sheltering, etc.) that may be necessary in advance of, during and following hazard events that pose risk to life safety. This includes events such as severe summer and winter storms, tornadoes, extreme temperatures, flooding, and wildfire.

Public Warning and Emergency Notification: In the event of emergencies or hazardous conditions that require timely and targeted communication to the public, Rock County utilizes the Nixle emergency notification system which users must sign up for ("opt-in service"). A link for signup is provided on the Rock County website Emergency Management page. The Rock County Sheriff's Office Facebook page is also used to disseminate emergency information when needed. Severe spring and summer storm warnings are initiated by the National Weather Service or by local trained SkyWarn spotters. Extreme cold temperature warnings and extreme heat warnings, and winter weather warnings are issued by the National Weather Service. Residents receive warnings by NOAA weather radio, local media, Nixle, cell phone apps and the outdoor warning siren system.

Preparedness Outreach: Rock County Emergency Management posts information on the Rock County Sheriff's Office Facebook page for the public on severe weather awareness and preparedness information. Information is also shared with local news media.

Shelter Facilities: There are designated shelter facilities within Rock County that have an MOU with the American Red Cross. A severe storm or a period of extreme heat/cold coupled with a major power outage may require emergency sheltering for those in need. Rock County Emergency Management and the Rock Public Health Department maintain a list of shelters within the county and have trained staff for shelter operations. Rock County has sheltering and pet sheltering plans in place.

Backup Power: Generator back-up power is in place for the Rock County Sheriff's Office, the City of Luverne (generator that is capable to power 1/3 of the city at a time), the National Guard Armory, Luverne Community Hospital, and long-term care facilities (Mary Jane Brown Home, Tuff Home and the Veterans Home), and Assisted Living facilities (Tuff Village, The Oaks and Poplar Creek).

School Closings: All school districts within Rock County have a school closing policy and communications plan in place if inclement weather or other event creates a hazardous situation for students or staff.

Severe Winter Storms

Winter Hazard Awareness Week: Rock County Emergency Management helps promote and participates in the National Weather Service's "Winter Hazard Awareness Week" held in November each year. The event provides education to residents on the dangers of winter weather and how to properly deal with it. We utilize our Rock County website and local news media to share information with the public.

Severe Winter Weather Information: The Rock County Sheriff's Office Facebook page is used to provide information to the public on winter weather advice and an overview of the different kinds of advisories they may receive through the winter (Blizzard Warning, Travelers Advisory, Winter Storm Warning, Winter Storm Watch).

Snow Removal: The Rock County Highway Department is responsible for the removal of snow and ice from county roads, as well as some township roads and city streets based on interagency agreements. The department completes its snow removal process in accordance with the Rock County Highway Department snow removal policy. MnDOT removes snow from State Highways as well as disperses salt/sand as needed.

Severe Summer Storms

Outdoor Warning Sirens: There are 15 outdoor warning sirens located in Rock County, located in the cities of Luverne (8), Hills (2), Magnolia (1), Kenneth (1), Steen (1), Beaver Creek (1), and Hardwick (1). Sirens are activated when the National Weather Service notifies Dispatch of high winds or tornado conditions that pose a risk to the public.

Severe Summer Weather Information: The Rock County Sheriff's Office Facebook page is used to provide information to the public on severe summer weather, include tornado precautions, severe thunderstorm warnings, and actions to take when inside or outside during severe summer storms.

SKYWARN Program: Rock County Emergency Management works with the National Weather Service to offer training on a semi-annual basis to local fire and law enforcement departments and local residents that wish to be trained as volunteers. SkyWarn Spotters help to keep their local communities safe by providing timely and accurate reports of severe weather to their local National Weather Service office.

Severe Weather Awareness Week: Rock County Emergency Management helps promote and participates in the National Weather Service's "Severe Weather Awareness Week" held in April each year. The week-long event seeks to educate residents on the dangers of severe storms and highlights the importance of preparing for severe weather before it strikes. We utilize the Rock County Facebook page, Sheriff's Office Facebook page, and local news media to share information with the public.

Tree Management: The Rock County Highway Department works to clears trees on the right-of-way of county-owned roads to reduce the danger of trees falling on roads during severe storm events such as thunderstorms, straight-line winds or ice storms. Local road authorities are encouraged to do the same.

MDH Requirements for Manufactured Home Parks: The Rock County Public Health Department works with the owners of manufactured home parks (MHP's) within the County to ensure that they are meeting Minnesota Department of Health (MDH) requirements for storm shelters and evacuation plans. Shelter and evacuation plans must be approved by the municipality in which they are located and submitted to MDH.

Flooding

Floodplain Mapping & Ordinance: Rock County Land Management/Planning & Zoning Department maintains the flood rate insurance maps for the county. Rock County Planning and Zoning includes Ordinance, Section 19, Floodplain Management District.

National Flood Insurance Program (NFIP): Rock County and the City of Luverne participate in the NFIP and have FEMA-mapped high-risk areas. The remaining cities in the county do not have FEMA-mapped high-risk areas and do not participate in the NFIP.

Transportation Plan & Drainage Maintenance: The Rock County Highway Department maintains a five-year transportation plan that is updated annually. The department manages and maintains the county highway system, including roadway surfaces, bridges, and the drainage system on 261.65 miles of County State Aide Highways and 57.10 miles of county highways.

Rock County Land Management Office/Soil & Water Conservation District: The Rock County Land Management Office is combined with the Rock County Soil & Water Conservation District to be a one stop approach to assist landowners with all aspects of land use from compliance with state and local rules to conservation and environmental programs at the local level. Our office works with landowners to help them manage and protect land and water resources on all private lands.

Extreme Cold

Extreme Cold Safety Awareness: Rock County Emergency Management and Public Health promote public awareness of personal safety measure to take during periods of extreme cold, such as minimizing exposure and being prepared with survival kits in vehicles during winter.

Drought

Missouri River One-Watershed One Plan (1W1P): Rock County participates in the Missouri River Watershed One-Watershed One Plan. The plan brings six counties, six Soil and Water

Conservation Districts, and two Watersheds together to develop a comprehensive plan that will address water management in the Missouri River Watershed.

Public Awareness: In the event of drought conditions, Rock County Emergency Management works in concert with the NWS and MN DNR to raise public awareness of the dry conditions and increased danger of wildland fire.

Dam Failure

None

6.2 Mitigation Goals

The goals and strategies for natural hazards in the 2019 Minnesota State Hazard Mitigation Plan were adopted for use in the Rock County Plan. This framework, as outlined below, will allow for integration of the mitigation actions that are listed by Rock County and its jurisdictions into the state plan. The state will then be able to develop a statewide strategy that will benefit all of Minnesota.

Flooding Goal: Reduce deaths, injuries, property loss and economic disruption due to all types of flooding (riverine, flash, coastal, dam/levee failure).

Wildfire Goal: Reduce deaths, injuries, property loss, natural resource and economic disruption due to wildfires (forest, prairie, grass, and peat bogs).

Windstorms Goal: Reduce deaths, injuries, property loss, and economic disruption due to windstorms.

Hail Goal: Reduce deaths, injuries, property damage, and economic disruption due to hailstorms.

Winter Storms Goal: Reduce deaths, injuries, property loss, and economic disruption due to winter storms (blizzard, ice, and ice storm).

Lightning Goal: Reduce deaths, injuries, property losses, loss of services, and economic disruption due to lightning.

Tornado Goal: Reduce deaths, injuries, property loss, and economic disruption due to tornadoes.

Drought Goal: Reduce economic loss and environmental impacts due to drought.

Extreme Heat Goal: Reduce deaths, injuries, and economic disruption due to extreme heat.

Extreme Cold Goal: Reduce deaths, injuries, and economic disruption due to extreme cold.

Dam/Levee Failure Goal: Reduce deaths, injuries, property loss, natural resource and economic disruption due to dam/levee failure.

Erosion/Landslide/Mudslide Goal: Reduce deaths, injuries, property loss, and economic disruption due to hillside, coastal, bluff: caused primarily by oversaturation of soil.

6.3 Mitigation Action and Project Strategies

The mitigation actions in this plan are summarized into four main strategy types, as described in the FEMA publications *Local Mitigation Planning Handbook* (2013) and *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* (2013). A fifth strategy type was determined by Minnesota HSEM for use within the state: Mitigation Preparedness and Response. The strategies and example actions are listed in Table 35 below:

Table 35. Mitigation strategies and action types

Mitigation Strategy	Description	Example Mitigation Actions
Local Plans and Regulations	These actions include government authorities, policies, or codes, that influence the way land and buildings are developed and built.	• Comprehensive plans • Land use ordinances • Planning and zoning • Building codes and enforcement • Floodplain ordinances • NFIP Community Rating System • Capital improvement programs • Open space preservation • Shoreline codes • Stormwater management regulations and master plans
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards. Many of these types of actions are projects eligible for funding through the FEMA Hazard Mitigation Assistance program.	• Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits • Floodwalls and retaining walls • Detention and retention structures • Culverts • Safe rooms
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	• Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements • Wetland restoration and preservation

Mitigation Strategy	Description	Example Mitigation Actions
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions.	• Radio or television spots • Websites with maps and information • Real estate disclosure • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas. • StormReady Certification • Firewise Communities
Mitigation Preparedness and Response	This is a State of Minnesota mitigation strategy with the intent of covering preparation and actions that protect life and property during a natural disaster.	• Emergency operations plan • Flood fight plans and preparedness • Dam emergency action plans • Warning • Backup power • Emergency capabilities

Local leaders work together with the Rock County emergency management director to assure that the hazards and mitigation actions included in this plan are accurate and addressed in their jurisdictions. Development of mitigation actions for the county and each city was informed by a community's hazard and risk assessment; identification of local vulnerabilities, and review of capabilities in place to address mitigation. Planning team members, local elected officials and staff from Rock County and each city actively participated in the development and review of mitigation action charts for implementation through participation in planning team meetings (see Appendix F) and development of Local Mitigation Surveys (see Appendix C). Additional jurisdictional and public feedback was incorporated following news releases inviting public input to the planning process (see Appendix G).

The Rock County risks and mitigation activities identified also incorporate the concerns and needs of townships, school districts, and other entities participating in this plan. Appendix J contains the jurisdictional mitigation action charts for the cities of Beaver Creek, Hardwick, Hills, Jasper, Kenneth, Luverne, Magnolia, and Steen.

Following is an overview the mitigation action charts and description of each element of the chart.

Number (#)
Each mitigation action is identified by a number.

Hazard
Each mitigation action is identified by the natural hazard that it relates to. Actions that fall under "All-Hazards" relate to both natural and non-natural hazards.

Mitigation Strategy
Each mitigation action is identified by one of the following five mitigation strategies.

- Local Planning and Regulations
- Structure and Infrastructure Projects
- Natural Systems Protection
- Education and Awareness Programs
- Mitigation Preparedness and Response Support

See Table 35 for a description of each mitigation strategy and related types of actions.

Mitigation Action
Each mitigation action provides a concise, action-oriented description of the action or project to be undertaken. If a mitigation reduces risk to new or existing buildings/infrastructure it is noted.

Status
The status of each mitigation action is indicated by one of the following categories:

- New – New actions that have been identified since the last plan.
- Existing – Actions that are carried over from the last plan or have been updated.
- In Progress – Actions from the last plan that are currently being acted upon.

Mitigation actions that have been completed or deleted from the 2014 Rock County Multi Hazard Mitigation Plan are identified and reported on in Appendix H. Completed and deleted mitigation actions are not carried over into the updated mitigation action chart.

Priority
In the review and discussion of selected mitigation strategies and actions, the planning team ranked of mitigation actions by priority for implementation. Table 36 provides criteria that were taken into consideration in the process.

Table 36. Criteria for Mitigation Action Priority Ranking

Ranking	Criteria
High Priority	• Methods for reducing risk from the hazard are technically reliable. • The County has experience in implementing mitigation measures. • Mitigation measures are eligible under federal grant programs. • There are multiple mitigation measures for the hazard. • The mitigation measure(s) are known to be cost effective. • The mitigation measures protect lives and property for a long period of time or are permanent risk reduction solutions.

Ranking	Criteria
Moderate Priority	• Mitigation methods are established. • The County has limited experience with the kinds of measures that may be appropriate to mitigate the hazard. • Some mitigation measures are eligible for federal grants. • There is a limited range of effective mitigation measures for the hazard. • Mitigation measures are cost-effective only in limited circumstances. • Mitigation measures are effective for a reasonable period of time.
Low Priority	• Methods for reducing risk from the hazard are not well-established, are not proven reliable, or are experimental. • The State or Counties have little or no experience in implementing mitigation measures, and/or no technical knowledge of them. • Mitigation measures are ineligible under federal grant programs. • There is a very limited range of mitigation measures for the hazard, usually only one feasible alternative. • The mitigation measure(s) have not been proven cost effective and are likely to be very expensive compared to the magnitude of the hazard. • The long-term effectiveness of the measure is not known or is known to be relatively poor.

Time frame
Each mitigation action identifies the anticipated timeframe for implementation of the action within the next five-year planning cycle.

- Ongoing – Implementation of the action will require continued application.
- Defined (year) – Implementation of the action will occur within a defined time frame that is noted.
- TBD – The anticipated time frame for implementation of an action is to be determined.

Responsibility
Each mitigation action identifies what personnel, department or agency will be lead for the administration or implementation of the action.

Comments on Implementation & Integration
Each mitigation action provides a description of how the jurisdiction will work to implement the mitigation action and incorporate the activity into other existing planning mechanisms.

Possible Funding
Each mitigation action identifies where potential funding may come from to support implementation of the mitigation activity, such as existing county or city funding, state or federal funding. Projects that may be eligible for future FEMA Hazard Mitigation Assistance grant funding are noted.

The Rock County Mitigation Action Chart is provided in Table 37. Appendix J provides the mitigation action charts developed for each city participating in the MHMP update.

Table 37. Rock County Mitigation Action Chart (2021–2026)

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all county residents to sign-up for the county's Nixle emergency notification alert system and the Rock County Sheriff's app to get push notifications.	Existing High Ongoing	Rock County Emergency Management (RCEM) & Rock County Sheriff's Office	A link for the Nixle emergency notification system is located on the Rock County Emergency Management website page. We also use the Rock County Sheriff's Office website page and Facebook page to promote residents to sign up for the Sheriff's Office phone app to receive push notifications.	County
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the Rock County Emergency Operations Plan (EOP) is updated and addresses policies & procedures needed to support EM functions prior to, during, and following a disaster.	Existing Moderate Ongoing	RCEM	RCEM has an EOP that is updated on a regular basis which helps the county be ready to respond to disasters across a range of EM functions. This includes plans in place for sheltering of displaced residents and pet sheltering.	County
3	All-Hazards	Mitigation Preparedness & Response Support	Ensure designated facilities are in place and prepared for providing mass care sheltering and county staff are trained in sheltering operations.	Existing Moderate Ongoing	RCEM, RC Public Health (RCPH)	RCEM and RCPH maintain a list of shelters within the county and have trained staff for shelter operations. We partner with the American Red Cross to establish MOU's with facilities in the county to serve as official shelter locations that meet ARC shelter requirements for space and accessibility. We will continue to work to ensure that portable generators are available for use at shelters if needed.	County
4	All-Hazards	Mitigation Preparedness & Response Support	Continue to work in cooperation with jurisdictions and other key stakeholders on emergency management planning & project efforts.	Existing Moderate Ongoing	RCEM	RCEM convenes the Rock County Local Emergency Preparedness Committee (LEPC) on an as-needed basis and consists of RCEM and other county departments, the park manager from Blue Mound State Park, and fire chiefs and city staff from the cities of Beaver Creek, Hardwick, Hills, Jasper, Kenneth, Luverne, Magnolia, and Steen.	County

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
5	Severe Winter & Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events and extended power outages. Coordinate with local jurisdictions to share information locally.	Existing High Ongoing	RCEM in coord with Local Gov't	RCEM utilizes the Rock County Sheriff's Office Facebook page and local news media to communicate with residents and visitors on emergency preparedness. A link for the Nixle emergency notification system is located on the Rock County website. RCEM participates in and promotes the NWS Severe Weather Awareness Weeks in spring and fall each year. We also promote residents to be prepared for emergencies, to have NOAA weather radios, and to sign up for the county's Nixle system to receive emergency notifications and other information. RCEM shares information with local governments and encourages them to use their communication platforms to keep residents informed. We maintain an effective relationship with the NWS out of Sioux Falls, SD for the relay and dissemination of emergency weather information in Rock County.	County
6	Severe Winter & Summer Storms	Structure & Infrastructure Systems	Work with municipal & rural electric coops to encourage them to address burying powerlines or strengthening power poles to avoid power outages from high wind events and storms.	Existing High Ongoing	RCEM in coord with Local Gov't and Sioux Valley Energy	Sioux Valley Energy continues to address where power lines can be strengthened or buried underground. RCEM will assist as needed with applications to FEMA for eligible project measures that help to eliminate or reduce risk of power outages by these coops.	Sioux Valley Energy, FEMA HMA grant
7	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Work with local jurisdictions to acquire generator backup power to support critical infrastructure and delivery of essential services during an extended power outage due to storms.	Existing Moderate Ongoing	RCEM in coord with Local Gov't	RCEM continues to provide assistance to local jurisdictions that need to acquire portable generators to power infrastructure such as lift stations and other key facilities such as City Hall /community shelters in the event of a power outage. In some cases, this may include helping to identify where used portable generators may be obtained or helping to prepare a funding application.	County, Local Gov't
8	Severe Winter & Summer Storms	Natural Systems Protection	Conduct vegetation management along county-owned roads to reduce the risk of downed trees and branches resulting from severe storms.	Existing Moderate Ongoing	RC Hwy. Dept.	The Rock County Highway Department actively clears trees on the right-of-way of county-owned roads to reduce the danger of trees falling on roads during severe storm events such as thunderstorms, straight-line winds or ice storms. Townships & cities are encouraged to do the same for roads under their authority.	County

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
9	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Encourage schools and long-term facilities that house senior citizens or other vulnerable populations to have emergency plans and generators in place to deal with severe weather, extreme temperatures, and power outages.	Existing High Ongoing	RCEM & RCPH in coord with Schools & Other Facilities, and Local Govt's	RCEM & RCPH continue to work with schools and other long-term care facilities across the county and will encourage them to have plans in place for when the need arises. RCEM encourages local jurisdictions to work directly with facilities in their community to be prepared.	County, Local Facilities
10	Severe Winter Storms	Natural Systems Protection	Work with MnDOT on the planting of living snow fences along high-drift road corridors.	New Moderate TBD	RC Hwy. Dept and RC Land Mgmt. / SWCD in coord with MnDOT	RC Highway Dept. and RC Land Management Office / SWCD will seek to work with MnDOT and willing landowners to plant living snow fences on high-drift snow corridors to help improve safety for motorists during winter storms.	County, State, SWCD
11	Severe Summer Storms	Local Planning & Regulations	Work with owners of mobile home parks (MHP's) to ensure they are in compliance with the Minnesota Department of Health (MDH) requirements for evacuation plans and storm shelters.	Existing High Ongoing	RCPH in coord with Local Gov't and MHP's	The Rock County Public Health Department works with the owners of manufactured home parks within the County to ensure that they are meeting MDH requirements for storm shelters and evacuation plans.	County, MHP Owners
12	Severe Summer Storms	Education & Awareness Programs	Encourage campground operators to post information regarding storm shelters and safety during strong summer storms.	Existing Moderate Ongoing	RCEM in coord with Blue Mound State Park & Local Parks	RCEM will encourage campground operators to take action on this locally.	County, State/Local
13	Severe Summer Storms	Mitigation Preparedness & Response Support	Ensure there is a network of trained Storm Spotters throughout the county.	Existing Moderate Ongoing	RCEM in coord with NWS & Local Gov't	RCEM works with the NWS to provide SKYWARN storm spotter training on a semi-annual basis to local law enforcement, fire departments, and local residents who wish to participate. Storm Spotters help to support situational awareness of and public notification for dangerous storms such as severe thunderstorms and tornadoes.	County, NWS
14	Severe Summer Storms	Local Planning & Regulations / Structure & Infrastructure Projects	Provide assistance to local jurisdictions that require purchase & installation of new outdoor warning sirens and ensure they are connected to the county's remote activation system.	Existing High Ongoing	RCEM in coord with Local Gov't	The city of Hills has identified a need to upgrade its 2 existing warning sirens. RCEM will assist the city as needed with applying for funding to the USDA Community Facilities Grant Program which is a source for funding outdoor warning sirens. All new sirens will be connected to the county's remote activation system.	County, Local Gov't, USDA CF Grant Program

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
15	Severe Summer Storms	Structure & Infrastructure Projects	Address the need for the construction of storm shelters or tornado safe rooms in communities, parks, or other locations in the county where people are vulnerable to high wind or tornadic events.	Existing Moderate Ongoing	RCEM in coord with Local Gov't	The cities of Hardwick, Jasper, and Magnolia have identified a need for either a storm shelter or tornado safe room to help protect residents/visitors that are vulnerable to high wind events (i.e., mobile home parks, campgrounds). Blue Mound State Park is another location that is of interest to construct a storm shelter. RCEM will provide assistance as requested to help assess need, possible construction options, and development of grant applications as needed (i.e., FEMA HMA safe room grant).	County, FEMA HMA, Other (TBD)
16	Flooding	Local Planning & Regulations	Participate in the National Flood Insurance Program and enforce policies that address development in high-risk flood areas.	Existing High Ongoing	RC Land Management / P&Z Dept.	Rock County participates in the National Flood Insurance Program (NFIP). Rock County Land Management /Planning & Zoning Department maintains the flood rate insurance maps for the county. Rock County Planning and Zoning includes Ordinance, Section 19, Floodplain Management District.	County
17	Flooding	Local Planning & Regulations / Structure & Infrastructure Projects	Work with township and city governments to plan for and implement measures to address minor localized flood reduction projects for roads, bridges, and culverts throughout the county.	In-Progress High 2019-2023	RC Hwy. Dept. in coord with Local Gov'ts	The Rock County Highway Department maintains a 5-year transportation plan that is updated annually. The Hwy. Dept. maintains an inventory of the condition of county roads and bridges and slates improvement projects as needed. Following high-rain events or flood disasters the Hwy. Dept. assesses damages due to erosion and flood damage and implements mitigation for those areas such as road re-surfacing, culvert replacement, and ditch/bank stabilization.	County, State, Federal
18	Flooding	Local Planning & Regulations / Structure & Infrastructure Projects	Conduct property buyouts to acquire homes affected by repetitive flooding and physically relocate or remove those homes to eliminate future flood damages.	Existing High Ongoing	RCEM & RC Land Management / P&Z Dept. in coord with Local Gov'ts	Currently the City of Luverne wishes to conduct property buyouts for 3 homes. Rock County will work with the city of Luverne as needed on this effort, including assistance in development of a grant application to the MN DNR or FEMA to conduct the property acquisitions.	County, MN DNR, FEMA HMA, Local Gov't

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
19	Flooding	Local Planning & Regulations	Enforce county policies that regulate zoning for new development, setbacks in shoreline areas, and stormwater management.	Existing Moderate Ongoing	RC Land Management / P&Z Dept.	The Rock County Zoning Ordinance addresses Shoreland Management Regulations including building regulations to mitigate against flooding during high-water elevation (for structures along lakes, ponds, flowages, rivers, and streams). Rock County Land Management Office / SWCD enforces the State Buffer Initiative. Enforcement of the ordinance helps to stabilize soils, shores and banks.	County
20	Flooding	Local Planning & Regulations	Work in partnership with the Rock County SWCD and area watershed districts to coordinate planning and project efforts that address flooding and erosion concerns.	Existing Moderate Ongoing	RC Land Management/SWCD, in coord with Watershed Districts	The Rock County Land Management Office / SWCD participates in the Missouri River Watershed One-Watershed One Plan. The plan brings 6 counties, 6 Soil and Water Conservation Districts and 2 Watersheds together to develop a comprehensive plan that will address water management in the Missouri River Watershed.	County, SWCD Cost Share Grant Program, & Watershed Districts
21	Drought	Local Planning & Regulations	Work with the MN DNR to ensure adequate draw down studies are completed prior to irrigation permits being issued.	Existing Moderate Ongoing	RCPH in coord with MN DNR	RCPH and the MNDNR conduct a review prior to permitting of any additional wells.	County, MN DNR
22	Drought	Local Planning & Regulations	Encourage water conservation provisions and use restrictions during periods of severe drought (i.e.; watering lawns).	Existing Low Ongoing	RCEM, RC Land Management in coord with Local Gov'ts	During times of severe drought, RCEM / Land Management Office will work to promote drought awareness and water conservation strategies. Local governments would be encouraged to do the same or to utilize local ordinances to enforce restrictions.	County, Local Gov't

Section 7 – Plan Maintenance

7.1 Monitoring, Evaluation, and Updating the Plan

The Rock County Multi-Hazard Mitigation Plan should be considered a living document. The plan should be updated and approved by FEMA at a minimum of every five years. The guidance in this section will function as the primary tool when reviewing progress on the implementation of the Rock County MHMP.

The Rock County Emergency Management Director is the individual responsible for leading all efforts to monitor, evaluate, and update the hazard mitigation plan within the five-year window. Throughout the 5-year planning cycle, the Rock County Emergency Management Director will work with the Rock County Local Emergency Preparedness Committee (LEPC) to serve as the committee to help monitor, review, evaluate, and update the Multi-Hazard Mitigation Plan. The LEPC normally meets on an as-needed basis and consists of Rock County Emergency Management and other county departments, the park manager from Blue Mound State Park, and fire chiefs and city staff from the cities of Beaver Creek, Hardwick, Hills, Jasper, Kenneth, Luverne, Magnolia, and Steen. Additional stakeholders will be added based on need. If necessary, the Rock County Emergency Management Director will convene the committee to meet on a more regular basis to monitor plan implementation progress and reassess needs and opportunities. This could be done in response to funding cycles of programs that provide resources for hazard mitigation activities. If there is a need for a special meeting due to new developments or a declared disaster occurring in the county, the committee will meet to update pertinent mitigation strategies. Depending on Rock County opportunities and fiscal resources, mitigation projects may be implemented independently by individual communities or through local partnerships.

The committee will continue to review the MHMP goals and objectives to determine their relevance to changing situations in Rock County. In addition, state and federal policies will be reviewed to ensure they are addressing current and expected conditions. The committee will also review the risk assessment portion of the plan to determine if this information should be updated or modified. The parties responsible for the various implementation actions will report on the status of their projects, and will include which implementation processes worked well, any difficulties encountered, how coordination efforts are proceeding, and which strategies should be revised.

Updates or modifications to the MHMP during the five-year planning process will require a public notice and a meeting prior to submitting revisions to the individual jurisdictions for approval. The plan will be updated via written changes, submissions as the committee deems appropriate and necessary, and as approved by county commissioners.

Throughout the five-year window of the plan, Rock County Emergency Management Director will request updates from county departments and jurisdictions on that status of mitigation efforts so that progress notes may be maintained for the next plan update.

7.2 Implementation

Rock County and its included municipalities share a common Multi-Hazard Mitigation Plan and work together closely to develop, revise, and implement it. This MHMP provides a comprehensive chart of mitigation actions for Rock County and its jurisdictions (see Section 6.3). The cities of Beaver Creek, Hardwick, Hills, Jasper, Kenneth, Luverne, Magnolia, and Steen participated in the MHMP planning process and identified the specific mitigation strategies that they would seek to implement in their communities during the five-year planning cycle. These mitigation actions are provided in Appendix J.

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 Rock County looks for opportunities for plan implementation. The following tools will 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 region 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 Rock 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 Multi-Hazard Mitigation Plan. The Rock County Emergency Management Director and the MHMP planning team members will continue to engage new public stakeholders in planning discussions and project implementation during the five-year cycle of this plan.

In order to seek continued public participation after the plan has been approved and during the five-year window of implementation for this plan, Rock County will take the following measures:

- The plan will be posted on the Rock County Emergency Management website for the public to read and provide feedback. Collected feedback will be reviewed and the plan will be amended as necessary.
- Following any major storms or natural disasters, Rock County Emergency Management will seek to gather concerns and new ideas for mitigation from local residents to include in the next update of the plan. This may be done through public meetings, outreach via social media (e.g., Rock County Facebook page), or news releases via local media.
- Each community participating in the plan will be responsible to keep their local government, schools and community members updated and engaged in the implementation of their respective mitigation action charts (see Appendix J). Each respective jurisdiction will be required to report on the status of mitigation actions in their charts to the Rock 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 / township board 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 mitigation projects are implemented, jurisdictions will work to keep the public updated and engaged in those local efforts.

APPENDICES

Appendix A – References

Appendix B – Adopting Resolutions

Appendix C – Local Mitigation Survey Report

Appendix E – Past Mitigation Action Review Status Report

Appendix F – Planning Team Meetings

Appendix G – Public Outreach & Engagement Documentation

Appendix H – Minnesota Department of Health Climate & Health Report

Appendix I – Critical Infrastructure

Appendix J – Mitigation Actions by Jurisdiction

Appendix A – References

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Appendix B – Adopting Resolutions

Appendix C – Local Mitigation Survey Report

Rock County
Local Mitigation Survey Report

Overview
As part of Rock County's Multi-Hazard Mitigation Plan update, participating jurisdictions and county personnel were asked to fill out a Local Mitigation Survey (LMS) form. The purpose of the survey was to gather jurisdictionally-specific information needed to support update of the plan and to help inform development of local-level mitigation actions for the next five-year planning cycle. Following are the responses from the county and jurisdictions that participated in the survey.

LMS Forms

ROCK COUNTY

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

1. **Hazard Identification & Risk Prioritization: Please fill out the following chart, indicating the natural hazards that pose risk to your community, your priority level of those hazards and if the priority of those hazards has changed over the last 5 years or since the last plan.**

Natural Hazard	History Mark "X" for hazard events that have occurred within your jurisdiction.	Risk Prioritization Indicate the priority level of this hazard in your jurisdiction using **HIGH, MODERATE** or **LOW**. Consider the anticipated likelihood of future events and the potential impacts to life safety, structures, systems, vulnerable populations or other community assets.	Change in Risk Note if you feel the risk of this hazard is **INCREASING, DECREASING,** or has had **NO CHANGE** in your jurisdiction. You may add comments if needed.
Blizzards	X	High	No Change
Ice Storms	X	High	No Change
Tornadoes	X	Moderate	No Change
Windstorms	X	Moderate	No Change
Lightning	X	Low	No Change
Hail	X	Low to Moderate	No Change
Flooding	X	High	Increasing
Extreme Cold	X	High	No Change
Extreme Heat	X	Moderate	No Change
Drought	X	Moderate	No Change
Wildfire			
Landslides			
Dam Failure			

2. **Recent Hazard Events: Please describe any severe weather or disaster events that have occurred over the last 5 years that caused damages or loss of life in your community.**

   In spring, 2014 a major ice storm took down major electrical lines causing power outages in major sections of the county and resulted in a State disaster declaration.

   In the spring of 2018 and summer of 2019, major flooding outside of city limits resulted in road closures including Interstate 90, which made it impossible to cross from east to west anywhere in the county. Damage from the flooding events also caused major damage to roads and bridges. The events also flooded our wellfield, risking contamination of our county water supply.

3. **Local Vulnerabilities: Please use the chart below to identify what specific critical infrastructure (i.e., structures or systems), populations, or other assets in your community are suspectable to damage and loss from specific hazard events.**

Natural Hazard (please list)	Vulnerability Assessment List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.
Ice Storms, Blizzards	We have powerlines and power poles that have failed or may fail due to heavy snow and ice storms.
Flooding	Rock County Rural Water wellfield is on opposite side of the Rock River, water not available for treatment. Our county road network is also susceptible to closure due to flooding.

4. **Reduction in Vulnerability - Please describe any particular actions your community has taken to reduce vulnerability against future severe weather or disaster events. This can include examples of any work that has been completed or is underway that you would consider mitigation, such as developing plans or implementing projects to deal with future heavy rainfall.**

   Rock County has implemented the Nixle emergency alert system. In 1996 the Rock County Land Management Office / SWCD installed a water retention basin to Poplar Creek to control flooding.

5. **Increase in Vulnerability – Please describe any current conditions or changes that you feel has increased your community's vulnerability to future severe weather or disaster events. Please include anything related to population growth, zoning or development.**

   The State of Minnesota did not replace the 80-year-old dam at the Blue Mound State Park allowing for additional water to come through Mound Creek and across County Road 8.

PART B: LOCAL MITIGATION CAPABILITIES ASSESSMENT

1. **Plans, Authorities & Policies: Please describe what specific plans, authorities or policies are in place to help accomplish mitigation in your community.**

   Rock County has a comprehensive plan (adopted 2000) in place and a capital improvements plan (annual adoption) that plan for future development within the county.

   Rock County Emergency Management has an Emergency Operations Plan that is updated on a regular basis which helps the county be ready to respond to disasters across a range of emergency management functions. This includes plans in place for sheltering and pet sheltering in the event that people are displaced from their homes following a disaster.

   Rock County participates in the National Flood Insurance Program (NFIP). Rock County Land Management /Planning & Zoning Department maintains the flood rate insurance maps for the county. Rock County Planning and Zoning includes Ordinance, Section 19, Floodplain Management District.

The Rock County Highway Department maintains a 5-year transportation plan that is updated annually. The highway department maintains an inventory of the condition of county roads and bridges and slates improvement projects as needed. Following high-rain events or flood disasters the department assesses damages due to erosion and flood damage and implements mitigation for those areas such as road re-surfacing, culvert replacement, and ditch/bank stabilization.

Rock County Highway Department has a snow removal policy in place.

The Rock County Public Health Department works with the owners of manufactured home parks within the County to ensure that they are meeting Minnesota Department of Health (MDH) requirements for storm shelters and evacuation plans.

Burning permits are issued by the Rock County Sheriff's Department.

2. **Organizational Capacity: Please describe what staff or partnerships are in place to help accomplish mitigation in your community.**

Rock County staff related to mitigation efforts include the county administrator/emergency management director and emergency management deputy director; county highway engineer, and public health director. The Rock County Land Management Office (Planning & Zoning) is combined with the Rock County Soil & Water Conservation District to be a one stop approach to assist land owners.

Rock County Emergency Management and Rock County Public Health Department work with the American Red Cross to establish MOU's with facilities in the county to serve as designated shelter locations.

Rock County participates in the Missouri River Watershed One-Watershed One Plan. The plan brings 6 counties, 6 Soil and Water Conservation Districts and 2 watersheds together to develop a comprehensive plan that will address water management in the Missouri River Watershed.

We have close working relationships with emergency managers in MN HSEM Region 5 and support each other in emergency mitigation and preparedness planning, exercises and emergency response, when needed.

We also maintain an effective relationship with the National Weather Service out of Sioux Falls, SD for the relay and dissemination of emergency weather information in Rock County.

3. **Programs: Please describe any programs in place that to help accomplish mitigation in your community.**

Rock County utilizes the Nixle emergency notification system which users must sign up for ("opt-in service"). Rock County also has IPAWS (Integrated Public Alert Warning System) which allows for both targeted and county-wide emergency notifications to both residents and visitors (not an "opt-in" service).

Rock County Emergency Management participates in and promotes the NWS Severe Weather Awareness Weeks in spring and fall each year and also works with the NWS to provide SKYWARN storm spotter training on a semi-annual basis.

Rock County Emergency Management utilizes the Rock County Sheriff's Office Facebook page and local news media to communicate with residents and visitors on emergency preparedness. A link for the Nixle emergency notification system is located on the Rock County website.

Rock County Emergency Management promotes the use of NOAA weather radios by schools, long-term care facilities, county buildings, local residents, and visitors to receive information broadcast from the National Weather Service.

The Rock County Highway Department maintains an annual program of tree management within the right-of-way of county-owned roads to reduce the danger of trees falling on roads during severe storm events such as thunderstorms, straight-line winds or ice storms. The department also annually maintains an inventory of the condition of county roads and bridges and slates improvement projects as needed.

4. **Funding: Please describe any agency partnerships, funding or other resources to help accomplish mitigation in your community.**

   The county has worked with the MN DNR to fund berm projects along the Rock River to protect properties from flooding.

5. **Other Questions:**

   - **Does your jurisdiction have any plans or policies in place (or in development) related to resilience and adaptation for climate change?**

     No

   - **Who is your local municipal or rural electric coop provider?**

     Sioux Valley Energy

   - **How do you encourage residents to sign up for emergency notifications?**

     A link for signup is provided on the Rock County website emergency management page.

   - **Do you have (or need) portable or permanent back-up generators for specific critical facilities?**

     Generator back-up power is in place for the Rock County Sheriff's Office, the City of Luverne (generator that is capable to power 1/3 of the city at a time), the National Guard Armory, Luverne Community Hospital, and long-term care facilities (Mary Jane Brown Home, Tuff Home and the Veterans Home), and Assisted Living facilities (Tuff Village, The Oaks and Poplar Creek).

PART C: LOCAL MITIGATION PROJECTS

1. **Local Mitigation Projects: Please describe any specific mitigation activities you think would help to address local vulnerabilities and reduce risk against future hazard events in your community.**

   Continue to promote residents to be prepared for severe weather and extreme cold temperatures, to have NOAA weather radios, and to sign up for the county's Nixle emergency notification system and Sheriff's Office Facebook page to receive emergency notifications and other information.

   Work with municipalities / rural electric coops to encourage them to address burying powerlines or strengthening power poles to avoid power outages from high wind events and storms. (Burying transmission lines is not as feasible).

   Plant living snow fences along key road corridors to reduce the dangers of blowing and drifting snow to motorists.

   Work with communities in the county on the construction of storm shelters or tornado safe rooms in areas where there are vulnerable populations, such as at municipal campgrounds, mobile home parks and schools.

   Obtain portable generators to deploy to county-critical facilities and designated shelter facilities.

   Address improvements for roads, bridges, culverts and, ditches needed to mitigate against high rain events as identified by the Rock County highway engineer and feedback from townships. There are several townships that have high-priority road improvement projects for flood mitigation. Also continue to support cities in the county with localized flood mitigation planning to handle future high rain events.

   Continue to identify and prepare resources for emergency structure flooding protection in the event of major high-rain events.

   During extended periods of drought, promote water use conservation and water use restrictions.

   Review list of Past Mitigation Actions from our last plan and update those actions deemed as "ongoing" for continued implementation.

2. **Gaps or Deficiencies: Please describe any specific gaps or deficiencies that are a barrier to implementing local mitigation measures.**

   Project financing and permitting continue to be the biggest barrier to mitigation projects.

PART D: SURVEY PARTICIPANTS

Kyle Oldre, County Administrator/Emergency Management Director, 2 hours

CITY OF BEAVER CREEK

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

1. **Hazard Identification & Risk Prioritization: Please fill out the following chart, indicating the natural hazards that pose risk to your community, your priority level of those hazards and if the priority of those hazards has changed over the last 5 years or since the last plan.**

Natural Hazard	History Mark "X" for hazard events that have occurred within your jurisdiction.	Risk Prioritization Indicate the priority level of this hazard in your jurisdiction using **HIGH, MODERATE** or **LOW**. Consider the anticipated likelihood of future events and the potential impacts to life safety, structures, systems, vulnerable populations or other community assets.	Change in Risk Note if you feel the risk of this hazard is **INCREASING, DECREASING,** or has had **NO CHANGE** in your jurisdiction. You may add comments if needed.
Blizzards	X	High	No Change
Ice Storms	X	High	No Change
Tornadoes			
Windstorms	X	High	No Change
Lightning	X	High	No Change
Hail	X	Moderate	No Change
Flooding			
Extreme Cold	X	High	No Change
Extreme Heat			
Drought	X	Moderate	No Change
Wildfire			
Landslides			
Dam Failure			

2. **Recent Hazard Events: Please describe any severe weather or disaster events that have occurred over the last 5 years that caused damages or loss of life in your community.**

   In 2014 the city of Beaver Creek received several inches of rain over a very short period of time. Many roads leaving the city were completely submerged including Interstate 90 south of town. Several private properties had damage to structures caused by water entering the homes through the basement walls and floors. The city lift station required monitoring due to the high volume of water entering the system.

   In 2018 we experienced a blizzard that caused a power outage throughout the town. The high winds caused damage to the lights at the city ballfield. Power outage was also experienced in the city due to the power lines bringing power to the city being down outside of city limits.

3. **Local Vulnerabilities: Please use the chart below to identify what specific critical infrastructure (i.e., structures or systems), populations, or other assets in your community are suspectable to damage and loss from specific hazard events.** .

Natural Hazard (please list)	Vulnerability Assessment List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.
Flooding	City lift station and wastewater ponds are susceptible to damage during high water situations. Private properties take on water into the basement due to the high water table and water seeping into homes and businesses.
Ice Storms, Blizzards	We have power lines and power poles that have failed or may fail due to heavy snow and ice storms. Trees that are close to the power lines can cause the lines to be damaged from ice on branches. Power outages wreak havoc on all populations of citizens particularly children and the elderly
Windstorms and Tornadoes	Windstorms in the past have caused damage at the city ballfield as well as trees. During a windstorm a 50,000-bushel grain storage bin was destroyed.
Extreme Cold	We have seniors & children are vulnerable to extreme cold, especially if the power goes down during storm events.

4. **Reduction in Vulnerability - Please describe any particular actions your community has taken to reduce vulnerability against future severe weather or disaster events. This can include examples of any work that has been completed or is underway that you would consider mitigation, such as developing plans or implementing projects to deal with future heavy rainfall**

   The city purchased a large 2 phase generator, and we've been a member of MnWARN for several years.

5. **Increase in Vulnerability – Please describe any current conditions or changes that you feel has increased your community's vulnerability to future severe weather or disaster events. Please include anything related to population growth, zoning or development.**

   None.

PART B: LOCAL MITIGATION CAPABILITIES ASSESSMENT

1. **Plans, Authorities & Policies: Please describe what specific plans, authorities or policies are in place to help accomplish mitigation in your community.**

   The city participates in the National Flood Insurance Program. We are covered under the Rock County hazard mitigation plan.

2. **Organizational Capacity: Please describe what staff or partnerships are in place to help accomplish mitigation in your community.**

   We have several people that have been cross-trained on handling the lift station if it floods and needs to be discharged manually. These individuals are also trained on the water system.

3. **Programs: Please describe any programs in place that to help accomplish mitigation in your community.**

   The city participates in Rock County's Nixle emergency notification system. We also have an outdoor warning siren to warn residents of severe wind events.

4. **Funding: Please describe any agency partnerships, funding or other resources to help accomplish mitigation in your community.**

   The city uses its own funding and works with Rock County as needed.

5. **Other Questions:**

   - **Does your jurisdiction have any plans or policies in place (or in development) related to resilience and adaptation for climate change?**

     No

   - **Who is your local municipal or rural electric coop provider?**

     Sioux Valley Energy

   - **How do you encourage residents to sign up for emergency notifications?**

     We have not done anything to date.

   - **Do you have (or need) portable or permanent back-up generators for specific critical facilities?**

     Yes, we could use a portable generator for emergency backup power.

PART C: LOCAL MITIGATION PROJECTS

1. **Local Mitigation Projects: Please describe any specific mitigation activities you think would help to address local vulnerabilities and reduce risk against future hazard events in your community.**

   Encourage residents to sign up for the county's emergency notification system through our city Facebook page and other means. Consider development of a city website. Promote use of the city's FB page so that the information reaches more residents.

   Encourage our local residents to be prepared for extreme weather and extended power outages. We have seniors & children are vulnerable to extreme cold, especially if the power goes down during storm events. We can use our city FB page and perhaps a future city website to post information.

   Obtain a generator for backup power.

Encourage homeowners to make sure that sump pumps are maintained and functional to handle high rain events and avoid basement flooding.

Work with Sioux Valley Energy to address trees that are close to power lines and can cause the lines to be damaged during ice storms or other storm events.

2. **Gaps or Deficiencies: Please describe any specific gaps or deficiencies that are a barrier to implementing local mitigation measures.**

   We do not have a city website. Our city does have a Facebook page but not all residents are utilizing that page info.

PART D: SURVEY PARTICIPANTS

Jane Blank, City Clerk

CITY OF HARDWICK

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

1. **Hazard Identification & Risk Prioritization: Please fill out the following chart, indicating the natural hazards that pose risk to your community, your priority level of those hazards and if the priority of those hazards has changed over the last 5 years or since the last plan.**

Natural Hazard	History Mark "X" for hazard events that have occurred within your jurisdiction.	Risk Prioritization Indicate the priority level of this hazard in your jurisdiction using **HIGH, MODERATE** or **LOW**. Consider the anticipated likelihood of future events and the potential impacts to life safety, structures, systems, vulnerable populations or other community assets.	Change in Risk Note if you feel the risk of this hazard is **INCREASING, DECREASING,** or has had **NO CHANGE** in your jurisdiction. You may add comments if needed.
Blizzards	X	High	No change
Ice Storms	X	High	Increasing
Tornadoes		Moderate	No Change
Windstorms	X	High	Increasing
Lightning	X	Moderate	No Change
Hail	X	Moderate	No Change
Flooding	X	Moderate	Increasing
Extreme Cold	X	High	No Change
Extreme Heat	X	Moderate	No Change
Drought	X	Moderate	No Change
Wildfire		Low	No Change
Landslides		Low	No Change
Dam Failure		Low	No Change

2. **Recent Hazard Events: Please describe any severe weather or disaster events that have occurred over the last 5 years that caused damages or loss of life in your community.**

   In the summer of 2013 and 2014 the city of Hardwick experienced significant summer storms with high winds and hail that caused significant damage to buildings and trees. Both of these storms qualified the city for FEMA assistance.

   Several winters with extremely low temperatures have caused damage to city streets due to frost boils.

   In April of 2018 there was a significant ice storm that caused power outages to the area that lasted several days.

3. **Local Vulnerabilities: Please use the chart below to identify what specific critical infrastructure (i.e., structures or systems), populations, or other assets in your community are suspectable to damage and loss from specific hazard events.**

Natural Hazard (please list)	Vulnerability Assessment List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.
Flooding	Homes experience flooded basements with heavy rains and flooding.
Ice Storms, Blizzards	We have experienced down power lines and down power poles due to heavy snow and ice storms.
Windstorms and Tornadoes	We have a municipal campground without storm shelters where residents are vulnerable to high wind events.
Extreme Cold	We have seniors & children that are vulnerable to extreme cold, especially if the power goes down during storm events. Our community has an elderly population, some who are dependent on an oxygen concentrator for survival. Losing power for a significant length of time could prove fatal.

4. **Reduction in Vulnerability - Please describe any particular actions your community has taken to reduce vulnerability against future severe weather or disaster events. This can include examples of any work that has been completed or is underway that you would consider mitigation, such as developing plans or implementing projects to deal with future heavy rainfall.**

   We have encouraged city residents to download the Rock County Sheriff's App on their phones or sign up for Nixle alerts to get current, by-the-minute updates.

   We are in the process of strictly enforcing our sump pump ordinance to reduce I & I and overwhelming our lagoons. We were going to conduct house-to-house basement, sump pump inspections prior to the pandemic. That will be done when pandemic restrictions have been lifted.

5. **Increase in Vulnerability – Please describe any current conditions or changes that you feel has increased your community's vulnerability to future severe weather or disaster events. Please include anything related to population growth, zoning or development.**

   Our area has been experiencing frequent, high volume rainfall events.

PART B: LOCAL MITIGATION CAPABILITIES ASSESSMENT

1. **Plans, Authorities & Policies: Please describe what specific plans, authorities or policies are in place to help accomplish mitigation in your community.**

   The city of Hardwick works with the county hazard mitigation plan because of our small size, limited staff and resources available. The city is currently working with an engineering firm, DGR, Rock Rapids, IA, to address frequent and heavy rainfall protocol to protect our lagoons. We will be enforcing and modifying, if needed, our current sump pump ordinance.

2. **Organizational Capacity: Please describe what staff or partnerships are in place to help accomplish mitigation in your community.**

   The city has limited resources; however, we utilize our fire department, first responders, council members and volunteers as a source of manpower when needed. We work with Rock County as needed.

3. **Programs: Please describe any programs in place that to help accomplish mitigation in your community.**

   The city participates in the county's emergency alert system, Nixle and we encourage residents, via word of mouth and our FB page, to sign up for these alerts. We have an outdoor warning siren that the county tests monthly.

4. **Funding: Please describe any agency partnerships, funding or other resources to help accomplish mitigation in your community.**

   The city uses general funds to address local mitigation measures.

5. **Other Questions:**

   - **Does your jurisdiction have any plans or policies in place (or in development) related to resilience and adaptation for climate change?**

     The city is working with an engineering firm, DGR, Rock Rapids, IA, to address frequent and heavy rainfall protocol to protect our lagoons. We will be enforcing and modifying, if needed, our current sump pump ordinance.

   - **Who is your local municipal or rural electric coop provider?**

     Sioux Valley Energy

   - **How do you encourage residents to sign up for emergency notifications?**

     Meetings, word of mouth, FB page and we are in the process of developing a city website.

   - **Do you have (or need) portable or permanent back-up generators for specific critical facilities?**

     We do have a generator but it has not been used in many years. We will be working to get that up and running. The city has to set a building up to work with a generator.

PART C: LOCAL MITIGATION PROJECTS

1. **Local Mitigation Projects: Please describe any specific mitigation activities you think would help to address local vulnerabilities and reduce risk against future hazard events in your community.**

   The city should investigate building a storm shelter for the campground. The city park bathrooms would serve as the best storm shelter for campers, however they are small and not close in location.

   The city is working with an engineering firm, DGR, Rock Rapids, IA, to address frequent and heavy rainfall protocol to protect our lagoons. We will be enforcing and modifying, if needed, our current sump pump ordinance.

   Complete development of a city website. When it is completed, we can use it to help promote sign up for the county's emergency notification system Nixle and provide other information on emergency preparedness for severe weather.

2. **Gaps or Deficiencies: Please describe any specific gaps or deficiencies that are a barrier to implementing local mitigation measures.**

   Communication. We are optimistic that a city website will improve communication in the city. Currently information is shared through posters at the post office & City Hall, and on the city Facebook page.

PART D: SURVEY PARTICIPANTS

Caleb Hansel, Hardwick Maintenance Supervisor
Verlyn Van Batavia, Water/Sewer Supervisor
Tammy Johnson, City Clerk

CITY OF HILLS

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

1. **Hazard Identification & Risk Prioritization: Please fill out the following chart, indicating the natural hazards that pose risk to your community, your priority level of those hazards and if the priority of those hazards has changed over the last 5 years or since the last plan.**

Natural Hazard	History Mark "X" for hazard events that have occurred within your jurisdiction.	Risk Prioritization Indicate the priority level of this hazard in your jurisdiction using **HIGH, MODERATE** or **LOW**. Consider the anticipated likelihood of future events and the potential impacts to life safety, structures, systems, vulnerable populations or other community assets.	Change in Risk Note if you feel the risk of this hazard is **INCREASING, DECREASING,** or has had **NO CHANGE** in your jurisdiction. You may add comments if needed.
Blizzards	X	Moderate	Decreasing
Ice Storms	X	Moderate	No Change
Tornadoes			
Windstorms			
Lightning			
Hail			
Flooding	X	Moderate	No Change
Extreme Cold	X	Low	No Change
Extreme Heat	X	Low	No Change
Drought			
Wildfire			
Landslides			
Dam Failure			

2. **Recent Hazard Events: Please describe any severe weather or disaster events that have occurred over the last 5 years that caused damages or loss of life in your community.**

   In April, 2018 the city experienced a windstorm followed by an ice storm where numerous power lines and poles failed due to heavy ice. Homeowners were without electricity for five days.

   In 2017 and 2018 the city had flooding events where storm sewers were backed-up. Both lagoons were damaged due to high water and wind. Homeowners had problems with sump pumps that were unable to keep up.

3. **Local Vulnerabilities: Please use the chart below to identify what specific critical infrastructure (i.e., structures or systems), populations, or other assets in your community are suspectable to damage and loss from specific hazard events.**

Natural Hazard (please list)	Vulnerability Assessment **List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.**
Flooding	Some storm sewers/culverts are still a concern for back-up. The City replaced a few culverts after the ice storm, but will continue replacements in problem areas.

Ice Storm	Our local power company, Sioux Valley Energy, has been working at, and will continue to gradually install underground service, but this will take a number of years to complete this project.
Extreme Cold	We have a nursing home and assisted living that are vulnerable to extreme cold especially if the power goes out.

4. **Reduction in Vulnerability - Please describe any particular actions your community has taken to reduce vulnerability against future severe weather or disaster events. This can include examples of any work that has been completed or is underway that you would consider mitigation, such as developing plans or implementing projects to deal with future heavy rainfall.**

   In 2018 and 2019 the city reconstructed a drain field and tiling to eliminate ground water flooding. The city also replaced and enlarged culverts in areas prone to flooding.

   The city has recently increased use of our website and city television channel to communicate with residents regarding emergency situations.

   The city installed a backup generator to maintain our water and sewer systems during an outage.

   The Tuff Nursing Home and Assisted Living have also installed back-up generators. This will help to reduce the risk to senior citizens in the event of a power outage from any storms.

5. **Increase in Vulnerability – Please describe any current conditions or changes that you feel has increased your community's vulnerability to future severe weather or disaster events. Please include anything related to population growth, zoning or development.**

   The city has observed an increase in stormwater discharging and felt that our new waterway and drainage ditch is more impermeable to handle groundwater run-off. In frequent years, we have noticed increased rain events.

PART B: LOCAL MITIGATION CAPABILITIES ASSESSMENT

1. **Plans, Authorities & Policies: Please describe what specific plans, authorities or policies are in place to help accomplish mitigation in your community.**

   The city of Hills works extensively with our county emergency management team.

2. **Organizational Capacity: Please describe what staff or partnerships are in place to help accomplish mitigation in your community.**

   The city council along with our public works department coordinates any maintenance issues due to flooding; and also coordinates with our local power company, Sioux Valley Energy.

3. **Programs: Please describe any programs in place that to help accomplish mitigation in your community.**

   Our city participates in the county's emergency alert system and our civil defense sirens are tested monthly. A backup generator has been installed to maintain our water and sewer systems during an outage.

4. **Funding: Please describe any agency partnerships, funding or other resources to help accomplish mitigation in your community.**

   Most of which we use our own city budget. At this time, the city is awaiting funding from FEMA, and also from an MPCA grant.

5. **Other Questions:**

   - **Does your jurisdiction have any plans or policies in place (or in development) related to resilience and adaptation for climate change?**

     No, not at this time.

   - **Who is your local municipal or rural electric coop provider?**

     Sioux Valley Energy

   - **How do you encourage residents to sign up for emergency notifications?**

     Announcements at city council meetings, city website, and city's television channel.

   - **Do you have (or need) portable or permanent back-up generators for specific critical facilities?**

     The city purchased a portable generator for our water and sewer facilities approximately one year after we experienced the ice storm.

PART C: LOCAL MITIGATION PROJECTS

1. **Local Mitigation Projects: Please describe any specific mitigation activities you think would help to address local vulnerabilities and reduce risk against future hazard events in your community.**

   The city would like to update both of our outdoor warning sirens.

   We would like to continue to improve our stormwater drainage ditch and upgrade culverts.

   We will continue to encourage residents to sign up for emergency notifications and to be prepared for severe weather and power outages. We can also encourage homeowners to maintain sump pumps in order to handle high rain events and avoid basement flooding.

2. **Gaps or Deficiencies: Please describe any specific gaps or deficiencies that are a barrier to implementing local mitigation measures.**

   None.

PART D: SURVEY PARTICIPANTS

Keith Elbers, Mayor
Connie Wiertzema, City Clerk-Treasurer

CITY OF JASPER

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

1. **Hazard Identification & Risk Prioritization: Please fill out the following chart, indicating the natural hazards that pose risk to your community, your priority level of those hazards and if the priority of those hazards has changed over the last 5 years or since the last plan.**

Natural Hazard	**History** Mark "X" for hazard events that have occurred within your jurisdiction.	**Risk Prioritization** Indicate the priority level of this hazard in your jurisdiction using **HIGH, MODERATE** or **LOW**. Consider the anticipated likelihood of future events and the potential impacts to life safety, structures, systems, vulnerable populations or other community assets.	**Change in Risk** Note if you feel the risk of this hazard is **INCREASING, DECREASING,** or has had **NO CHANGE** in your jurisdiction. You may add comments if needed.
Blizzards	X	High	No change
Ice Storms	X	High	No change
Tornadoes		Moderate	No change
Windstorms	X	Moderate	No change
Lightning	X	Moderate	No change
Hail	X	Moderate	No change
Flooding	X	Moderate	No change
Extreme Cold	X	High	No change
Extreme Heat	X	Moderate	No change
Drought		Moderate	No change
Wildfire		Low	No change
Landslides		Low	No change
Dam Failure		Low	No change

2. **Recent Hazard Events: Please describe any severe weather or disaster events that have occurred over the last 5 years that caused damages or loss of life in your community.**

   In the summer of 2014, the city of Jasper experienced significant hail damage to many municipally owned facilities.

   In the winter/spring of 2018, the city experienced severe cold weather resulting in many streets receiving damage due to the large amount of frost in the ground.

   In April, 2018 the city experienced a significant ice storm that resulted in an electrical outage for the city.

3. **Local Vulnerabilities: Please use the chart below to identify what specific critical infrastructure (i.e., structures or systems), populations, or other assets in your community are suspectable to damage and loss from specific hazard events.**

Natural Hazard (please list)	**Vulnerability Assessment** **List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.**
Flooding	Our city sewer lift station is vulnerable to failure during flood events if the power goes down or the lift station is flooded. We also have homes with basements that continue to be flooded.
(Ice Storms, Blizzards	We have power lines and power poles that have failed or may fail due to heavy snow and ice storms.
Windstorms and Tornadoes	We have a municipal campground without a storm shelter where residents are vulnerable to high wind events.
Extreme Cold	We have seniors & children are vulnerable to extreme cold, especially if the power goes down during storm events.

4. **Reduction in Vulnerability - Please describe any particular actions your community has taken to reduce vulnerability against future severe weather or disaster events. This can include examples of any work that has been completed or is underway that you would consider mitigation, such as developing plans or implementing projects to deal with future heavy rainfall.**

   Each sewer lift station in the city has a generator connected to it in case of an electrical outage.

   The city of Jasper has encouraged businesses and residents to enroll in the city's Public Alert System so they will be aware when inclement weather is in the area. The city has increased our use of our website and Facebook page to communicate with residents on emergency preparedness. The city has also encouraged businesses and residents to enroll in the Pipestone County or Rock County CodeRed emergency alert system.

5. **Increase in Vulnerability – Please describe any current conditions or changes that you feel has increased your community's vulnerability to future severe weather or disaster events. Please include anything related to population growth, zoning or development.**

   Four homes within the city of Jasper were newly constructed. Therefore, our population has increased in the past 5 years.

PART B: LOCAL MITIGATION CAPABILITIES ASSESSMENT

1. **Plans, Authorities & Policies: Please describe what specific plans, authorities or policies are in place to help accomplish mitigation in your community.**

   The city of Jasper has a 20-year comprehensive plan that is designed to plan for the future physical growth of the city and appropriate land uses. The city also has a floodplain ordinance in place. Our city provides information to new residents on how to sign up for emergency notifications.

2. **Organizational Capacity: Please describe what staff or partnerships are in place to help accomplish mitigation in your community.**

   Our ambulance president is the city's designated emergency manager. Our city council includes a public safety committee. We have a public works director that address road maintenance issues for flooding (culverts, repetitive flooding).

3. **Programs: Please describe any programs in place that to help accomplish mitigation in your community.**

   The city participates in Rock County's emergency alert system Nixle and we promote residents to sign up for it by having a link on our website to the registration site. The city also has its own emergency alert system called Public Alert.

   Our city participates in the National Weather Service's annual Severe Winter/Spring Weather Awareness Week by posting severe weather awareness information out on our city Facebook page and website.

4. **Funding: Please describe any agency partnerships, funding or other resources to help accomplish mitigation in your community.**

   The city primarily uses its own budget to address local mitigation measures.

5. **Other Questions:**

   - **Does your jurisdiction have any plans or policies in place (or in development) related to resilience and adaptation for climate change?**

     No

   - **Who is your local municipal or rural electric coop provider?**

     Xcel Energy

   - **How do you encourage residents to sign up for emergency notifications?**

     Facebook, Website, City Brochure, and Bi-Monthly Newsletters

   - **Do you have (or need) portable or permanent back-up generators for specific critical facilities?**

     Our Emergency Services Building is equipped with a permanent back-up generator.

PART C: LOCAL MITIGATION PROJECTS

1. **Local Mitigation Projects: Please describe any specific mitigation activities you think would help to address local vulnerabilities and reduce risk against future hazard events in your community.**

   The city of Jasper needs a storm shelter or tornado safe room constructed at the local campground and trailer park within the city.

   Public education is a standing need and homeowners would benefit from more information on how to be prepared for bad storms and extended power outages. We also need to continue to encourage residents to sign up for the city's & county's emergency notification systems.

   We need a portable generator for our emergency services building, which is our designated community mass care shelter.

   Encourage homeowners with basements to maintain sump pumps to avoid basement flooding during high rain events.

2. **Gaps or Deficiencies: Please describe any specific gaps or deficiencies that are a barrier to implementing local mitigation measures.**

   Not all of our residents are signed up for the city's/county's emergency notification system.

PART D: SURVEY PARTICIPANTS

Cortney Kounkel, City Clerk-Treasurer
Brian Thode, Public Works Superintendent

CITY OF KENNETH

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

1. **Hazard Identification & Risk Prioritization: Please fill out the following chart, indicating the natural hazards that pose risk to your community, your priority level of those hazards and if the priority of those hazards has changed over the last 5 years or since the last plan.**

Natural Hazard	History Mark "X" for hazard events that have occurred within your jurisdiction.	Risk Prioritization Indicate the priority level of this hazard in your jurisdiction using **HIGH, MODERATE** or **LOW**. Consider the anticipated likelihood of future events and the potential impacts to life safety, structures, systems, vulnerable populations or other community assets.	Change in Risk Note if you feel the risk of this hazard is **INCREASING, DECREASING,** or has had **NO CHANGE** in your jurisdiction. You may add comments if needed.
Blizzards	X	Moderate	No Change
Ice Storms	X	Moderate	No Change
Tornadoes	X	Moderate	No Change
Windstorms	X	Moderate	No Change
Lightning	X	Low	No Change
Hail	X	Low	No Change
Flooding			
Extreme Cold			
Extreme Heat			
Drought	X	Low	No Change
Wildfire			
Landslides			
Dam Failure			

2. **Recent Hazard Events: Please describe any severe weather or disaster events that have occurred over the last 5 years that caused damages or loss of life in your community.**

   The city experienced and ice storm that caused tree damage in our park. We also have experienced several severe winter storms and spring/summer strong windstorms.

3. **Local Vulnerabilities: Please use the chart below to identify what specific critical infrastructure (i.e., structures or systems), populations, or other assets in your community are suspectable to damage and loss from specific hazard events.**

Natural Hazard (please list)	Vulnerability Assessment **List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.**
Ice Storms	We have power lines and poles that have failed due to heavy snow and ice storms.
Wind Storms / Tornadoes	Possibilities of home damage. We have no mobile home parks or campground.
Extreme Cold	Residents without propane heaters or backup generators would be vulnerable to extreme cold if there is an extended power outage.

4. **Reduction in Vulnerability - Please describe any particular actions your community has taken to reduce vulnerability against future severe weather or disaster events. This can include examples of any work that has been completed or is underway that you would consider mitigation, such as developing plans or implementing projects to deal with future heavy rainfall.**

   None. We are not in a floodplain. We have our sewer system pumped to a drain field outside of town.

5. **Increase in Vulnerability – Please describe any current conditions or changes that you feel has increased your community's vulnerability to future severe weather or disaster events. Please include anything related to population growth, zoning or development.**

   None. We have no new homes being built in this city and we are down to 1 business.

PART B: LOCAL MITIGATION CAPABILITIES ASSESSMENT

1. **Plans, Authorities & Policies: Please describe what specific plans, authorities or policies are in place to help accomplish mitigation in your community.**

   None. We fall under the county's hazard mitigation plan and zoning.

2. **Organizational Capacity: Please describe what staff or partnerships are in place to help accomplish mitigation in your community.**

   We are a very small city with a population of 50. We have no public works department. We contract with the city of Lismore for fire services. We have no special committees.

3. **Programs: Please describe any programs in place that to help accomplish mitigation in your community.**

   We have an outdoor warning siren that is tested monthly by Rock County.

4. **Funding: Please describe any agency partnerships, funding or other resources to help accomplish mitigation in your community.**

   None. We are a very small city. We receive assistance from Rock County if needed.

5. **Other Questions:**

   - **Does your jurisdiction have any plans or policies in place (or in development) related to resilience and adaptation for climate change?**

     No

   - **Who is your local municipal or rural electric coop provider?**

     Sioux Valley Electric

- **How do you encourage residents to sign up for emergency notifications?**

  We have not done this yet.

- **Do you have (or need) portable or permanent back-up generators for specific critical facilities?**

  We could use a backup generator possibly for our community center.

PART C: LOCAL MITIGATION PROJECTS

1. **Local Mitigation Projects: Please describe any specific mitigation activities you think would help to address local vulnerabilities and reduce risk against future hazard events in your community.**

   We would like to get a generator for our community center in case we have a big power outage.

   We can also encourage residents to sign up for the county's emergency notification system by posting flyers at our community center. We do not have a city website or Facebook page.

2. **Gaps or Deficiencies: Please describe any specific gaps or deficiencies that are a barrier to implementing local mitigation measures.**

   None.

PART D: SURVEY PARTICIPANTS

Sue Tweet, City Clerk

CITY OF LUVERNE

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

1. **Hazard Identification & Risk Prioritization: Please fill out the following chart, indicating the natural hazards that pose risk to your community, your priority level of those hazards and if the priority of those hazards has changed over the last 5 years or since the last plan.**

Natural Hazard	**History** Mark "X" for hazard events that have occurred within your jurisdiction.	**Risk Prioritization** Indicate the priority level of this hazard in your jurisdiction using **HIGH, MODERATE** or **LOW**. Consider the anticipated likelihood of future events and the potential impacts to life safety, structures, systems, vulnerable populations or other community assets.	**Change in Risk** Note if you feel the risk of this hazard is **INCREASING, DECREASING,** or has had **NO CHANGE** in your jurisdiction. You may add comments if needed.
Blizzards	X	Moderate	No Change
Ice Storms	X	Moderate to High	No change
Tornadoes			No change
Windstorms	X	Moderate	Increasing
Lightning	X	Low	No change
Hail	X	Low	No change
Flooding	X	High	Increasing
Extreme Cold	X	moderate	Decreasing
Extreme Heat	X	Low	No change
Drought	X	Low	decreasing
Wildfire		Low	No change
Landslides		Low	No change
Dam Failure	X	Low	Decreasing

2. **Recent Hazard Events: Please describe any severe weather or disaster events that have occurred over the last 5 years that caused damages or loss of life in your community.**

   In the winter of 2017, our transmission provider experienced the loss of many poles that disrupted electric service temporarily.

   Heavy rains/flooding;2014 record high flooding; 2019 twice

   Ice storm 2014-2015

   Flood damage 2014—$400,000 and $175,000 in 2019

3. **Local Vulnerabilities: Please use the chart below to identify what specific critical infrastructure (i.e., structures or systems), populations, or other assets in your community are suspectable to damage and loss from specific hazard events.**

Natural Hazard (please list)	Vulnerability Assessment List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.
Flooding	We do have some remaining structures that are in close proximity to both the Poplar Creek and Rock River Floodway and susceptible to flooding. The waste water treatment facility loses vehicular access during flood events. Depending how bad the flood is the wastewater plant, and the wells could get flooded. This would also affect the lift station that we have in Luverne. Depending how bad the flood is the wastewater plant, and the wells could get flooded. This would also affect the lift station that we have in town.
Ice storms & Strong Winds	The city of Luverne does benefit from electrical supply redundancy, however the potential for power loss is present. We have powerlines and poles that have failed in the past.
Tornadoes	Depending how bad the flood is the wastewater plant, and the wells could get flooded. This would also affect the lift station that we have in Luverne.
	We have backup generation at the north water plant, one lift station and also at the wastewater plant.
Windstorm/Tornadoes	Our water towers or filter plants could be damaged.

4. **Reduction in Vulnerability - Please describe any particular actions your community has taken to <u>reduce</u> vulnerability against future severe weather or disaster events. This can include examples of any work that has been completed or is underway that you would consider mitigation, such as developing plans or implementing projects to deal with future heavy rainfall.**

   The city's public works department continues to address flooding issues due to heavy rain events, with upgrades to storm sewer infrastructure and maintenance of the poplar creek floodway.

   The city's zoning department implements floodplain management practices that discourage floodplain developments, and works toward the elimination of flood prone structures.

   The Luverne City Council recently approved the design and construction of additional power generation infrastructure, in collaboration with Missouri River Energy Services (MRES).

   The city of Luverne has been recently connected to the Lewis and Clark water supply system, to provide additional supplies of water.

   The city's collaboration with MRES to incentivize high efficiency electrical systems, which reduces individual structures and the city's critical electrical supply needs in emergency events.

   In 2020 all transmission and distribution poles were inspected and treated. Poles that were tagged for replacement have been changed out.

There has been extensive work done to our existing standby generator with plans in place for added generation, as mentioned above.

We have backup generation at the north water plant, one lift station and also at the wastewater plant.

Flooding—retention pond added to Roundwind Road in Tristate Addition. River Berm added by Red Bird Field Area. Drainage ditch cleaning has been done (Poplar Creek, etc.)

5. **Increase in Vulnerability – Please describe any current conditions or changes that you feel has increased your community's vulnerability to future severe weather or disaster events. Please include anything related to population growth, zoning or development.**

   We have noticed that heavy rain events (3" to 8") of rain are not uncommon and that more ice storms are occurring in late fall and early spring.

PART B: LOCAL MITIGATION CAPABILITIES ASSESSMENT

1. **Plans, Authorities & Policies: Please describe what specific plans, authorities or policies are in place to help accomplish mitigation in your community.**

   The city follows MPCA guidelines on water retention basins for development. We keep our FEMA floodplain map updated. We are continually updating our infrastructure by 5-year CIP plan we have in place.

2. **Organizational Capacity: Please describe what staff or partnerships are in place to help accomplish mitigation in your community.**

   The city owns its municipal electric system which handles power outages. The city is also partnered with Missouri River Energy Services which provides many different services to help communities in need.

   The city and county work together with emergency planning. The city and county have a good emergency radio system.
   The Minnesota National Guard is locating a new Armory for the consolidated Pipestone-Luverne unit in the city of Luverne north of I-90. Having the Armory here will definitely help as a local emergency resource.

3. **Programs: Please describe any programs in place that to help accomplish mitigation in your community.**

   The city has a phone system with contacts of the customers in case there is an emergency (water main break, electrical outage). The city also has a Facebook page, a city website, and a city television access channel to notify customers.

   The city participates in the Rock County Nixle emergency notification system.

The city budgets money to update our emergency outdoor warning sirens. We have also updated our emergency radio system.

4. **Funding: Please describe any agency partnerships, funding or other resources to help accomplish mitigation in your community.**

   River Berm construction was funded by a grant from the State. River project (widen river by old dam) was funded by MN DNR.

5. **Other Questions:**

   - **Does your jurisdiction have any plans or policies in place (or in development) related to resilience and adaptation for climate change?**

     No

   - **Who is your local municipal or rural electric coop provider?**

     The city of Luverne receives all power from WAPA and Missouri River Energy Services. City has all power wheeled by L&O transmission

   - **How do you encourage residents to sign up for emergency notifications?**

     The city encourages residents to sign up for notifications through utility billing, Facebook, website, and our local T.V. access channel.

   - **Do you have (or need) portable or permanent back-up generators for specific critical facilities?**

     The city has a 3.5-megawatt standby generator. We also have a small portable for emergency situations with very limited capabilities. Several critical facilities have their own backup generators. The city also has permanent generators at the north water plant, one major lift station, and at the wastewater treatment plant.

PART C: LOCAL MITIGATION PROJECTS

1. **Local Mitigation Projects: Please describe any specific mitigation activities you think would help to address local vulnerabilities and reduce risk against future hazard events in your community.**

   The city is planning on adding 2 standby generators in conjunction with the current unit. Electric Supervisor Remme would like to see a larger portable unit for smaller designated areas.

   Work with the local campground to submit an emergency evacuation and notification plan, prior to issuance of the required use permit.

The city is exploring options to improve stormwater drainage through the low-lying area that feeds Poplar Creek south of the railroad, and east of the fairgrounds (this area receives discharge from the entire downtown area).

The city just built a third electrical substation, and is preparing plans for a large electrical generation project.

Continue the city's current policy which address substandard residential properties, which are most likely to provide insufficient protection during extreme weather events.

Add a generator at the booster station by the Veteran's home. This supplies water to the water tower on the North end which serves the hospital.

Buy out flooded house on Walnut Street and two houses on Poplar Creek.

The city will continue to work on river bank repairs.

2. **Gaps or Deficiencies: Please describe any specific gaps or deficiencies that are a barrier to implementing local mitigation measures.**

   There has always been a gap with the school gymnasium not having a generator. The school rebuild & bond issue has corrected that as a new 2 MW generator will power the gym area for a mass evacuation area.

PART D: SURVEY PARTICIPANTS

Chad McClure, Building/Zoning Official
Brian Remme, Electric Supervisor
Al Lais, Water/Wastewater Supervisor
John Stoffel, Public Works Director
John Call, City Administrator
Jessica Mead, City Clerk

CITY OF MAGNOLIA

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

1. **Hazard Identification & Risk Prioritization: Please fill out the following chart, indicating the natural hazards that pose risk to your community, your priority level of those hazards and if the priority of those hazards has changed over the last 5 years or since the last plan.**

Natural Hazard	History Mark "X" for hazard events that have occurred within your jurisdiction.	Risk Prioritization Indicate the priority level of this hazard in your jurisdiction using **HIGH, MODERATE** or **LOW**. Consider the anticipated likelihood of future events and the potential impacts to life safety, structures, systems, vulnerable populations or other community assets.	Change in Risk Note if you feel the risk of this hazard is **INCREASING, DECREASING,** or has had **NO CHANGE** in your jurisdiction. You may add comments if needed.
Blizzards	X	High	No Change
Ice Storms	X	High	Increasing
Tornadoes		Moderate	No Change
Windstorms	X	High	Increasing
Lightning	X	Moderate	No Change
Hail	X	Moderate	No Change
Flooding	X	Moderate	Increasing
Extreme Cold	X	High	No Change
Extreme Heat	X	Moderate	No Change
Drought	X	Moderate	No Change
Wildfire		Low	No Change
Landslides		Low	No Change
Dam Failure		Low	No Change

2. **Recent Hazard Events: Please describe any severe weather or disaster events that have occurred over the last 5 years that caused damages or loss of life in your community.**

   In April of 2018 we experienced a windstorm followed by a blizzard that resulted in the power company losing 100 or so poles just outside of town. We lost power for several days to the entire town.

   On several occasions we have experienced heavy rains of four or more inches in a 24-hour period that has caused local flooding in town and overwhelmed the lift station, resulting in discharges to the surface ground. This happened because of the amount of rain that came down within a short time period. Almost none of the town is within a floodplain.

3. **Local Vulnerabilities: Please use the chart below to identify what specific critical infrastructure (i.e., structures or systems), populations, or other assets in your community are suspectable to damage and loss from specific hazard events.**

Natural Hazard (please list)	Vulnerability Assessment List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.
Ice Storms, Blizzards	We have power lines and power poles that have failed or may fail due to heavy snow and ice storms.
Flooding	Our city sewer lift station is vulnerable to failure during flood events if the power goes down or the lift station is flooded or overwhelmed because of the volume of water that comes into the system from inflow and infiltration.
Windstorms and Tornadoes	We have a municipal campground without storm shelters where residents are vulnerable to high wind events.
Extreme Cold	We have seniors & children who are vulnerable to extreme cold, especially if the power goes down during storm events.

4. **Reduction in Vulnerability - Please describe any particular actions your community has taken to reduce vulnerability against future severe weather or disaster events. This can include examples of any work that has been completed or is underway that you would consider mitigation, such as developing plans or implementing projects to deal with future heavy rainfall.**

   We have encouraged residents to sign up for the Nixle alerts through Rock County Sheriff's dispatch for local severe weather alerts.

   We are also looking at implementing a sump pump ordinance to reduce inflow and infiltration into our sewer system at the encouragement of the state of MN.

5. **Increase in Vulnerability – Please describe any current conditions or changes that you feel has increased your community's vulnerability to future severe weather or disaster events. Please include anything related to population growth, zoning or development.**

   We are seeing more of the high volume and quick rainfall events.

PART B: LOCAL MITIGATION CAPABILITIES ASSESSMENT

1. **Plans, Authorities & Policies: Please describe what specific plans, authorities or policies are in place to help accomplish mitigation in your community.**

   We work with the county plan, because of our small size and resources, when needed.

2. **Organizational Capacity: Please describe what staff or partnerships are in place to help accomplish mitigation in your community.**

   We are a member of the MnWARN system. Otherwise, we have very limited resources and equipment. We use our small fire department as a source of manpower on a voluntary basis.

3. **Programs: Please describe any programs in place that to help accomplish mitigation in your community.**

   The city participates in the county's emergency alert system (Nixle) and we promote residents to sign up for it. We also have an outdoor warning siren that is tested by Rock County on a monthly basis.

4. **Funding: Please describe any agency partnerships, funding or other resources to help accomplish mitigation in your community.**

   The city primarily uses its own small budget to address local mitigation measures, such as replacement of culverts.

5. **Other Questions:**

   - **Does your jurisdiction have any plans or policies in place (or in development) related to resilience and adaptation for climate change?**

     We are currently looking at a sump pump ordinance, but no other sort of plan.

   - **Who is your local municipal or rural electric coop provider?**

     Sioux Valley Energy

   - **How do you encourage residents to sign up for emergency notifications?**

     We make announcements during meetings.

   - **Do you have (or need) portable or permanent back-up generators for specific critical facilities?**

     It would be good to have a backup generator for our fire hall and for our lift station as currently we have none.

PART C: LOCAL MITIGATION PROJECTS

1. **Local Mitigation Projects: Please describe any specific mitigation activities you think would help to address local vulnerabilities and reduce risk against future hazard events in your community.**

   Public education is a standing need and homeowners would benefit from more information on how to be prepared for bad storms and extended power outages.

   Encourage more residents to sign up for the county's emergency notification system, Nixle.

   We need a portable generator for our fire hall and lift station.

We need a storm shelter or tornado safe room constructed at the local campground within the city.

We are also looking at implementing a sump pump ordinance to reduce inflow and infiltration into our sewer system at the encouragement of the state of MN.

2. **Gaps or Deficiencies: Please describe any specific gaps or deficiencies that are a barrier to implementing local mitigation measures.**

   Our city does not have its own website or Facebook page to do better outreach to our residents. We just got the internet into the city office at the beginning of this year when the COVID 19 was coming in. Not all of our residents are signed up for the county's Nixle alerts. Our budget is very small and the city needs significant funding assistance to do any minor or major mitigation projects at this time.

PART D: SURVEY PARTICIPANTS

Dennis W Madison, Mayor
Glenda Schumacker, City Clerk
Melanie Madison, City Councilor
Robert Somnis, City Councilor
Jeff DeGroot, City Councilor
Mary Smook, City Councilor

CITY OF STEEN

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

1. **Hazard Identification & Risk Prioritization: Please fill out the following chart, indicating the natural hazards that pose risk to your community, your priority level of those hazards and if the priority of those hazards has changed over the last 5 years or since the last plan.**

Natural Hazard	History Mark "X" for hazard events that have occurred within your jurisdiction.	Risk Prioritization Indicate the priority level of this hazard in your jurisdiction using **HIGH, MODERATE** or **LOW**. Consider the anticipated likelihood of future events and the potential impacts to life safety, structures, systems, vulnerable populations or other community assets.	Change in Risk Note if you feel the risk of this hazard is **INCREASING, DECREASING,** or has had **NO CHANGE** in your jurisdiction. You may add comments if needed.
Blizzards	X	Moderate	No change
Ice Storms	X	Moderate	No change
Tornadoes		Low	No change
Windstorms	X	Moderate	No change
Lightning	X	Moderate	No change
Hail	X	Moderate	No change
Flooding	X	Moderate	No change
Extreme Cold		Low	No change
Extreme Heat		Low	No change
Drought		Low	No change
Wildfire		Low	No change
Landslides		Low	No change
Dam Failure		Low	No change

2. **Recent Hazard Events: Please describe any severe weather or disaster events that have occurred over the last 5 years that caused damages or loss of life in your community.**

   In April, 2018 the city experienced major ice storms and had no electricity for 5 days.

   In July 17, 2019 the city received 10" rain resulting in some flooding. Half the basements in town had water in them because the sewer system couldn't handle the water.

3. **Local Vulnerabilities: Please use the chart below to identify what specific critical infrastructure (i.e., structures or systems), populations, or other assets in your community are suspectable to damage and loss from specific hazard events.**

Natural Hazard (please list)	Vulnerability Assessment **List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.**
Ice Storms	We have power lines and power poles that have failed or may fail due to heavy snow and ice storms.
Flooding	Sewer lift stations can't keep up during high rain events.

4. **Reduction in Vulnerability - Please describe any particular actions your community has taken to reduce vulnerability against future severe weather or disaster events. This can include examples of any work that has been completed or is underway that you would consider mitigation, such as developing plans or implementing projects to deal with future heavy rainfall.**

   Some power lines have been put underground. Sewer influent problems are being corrected with help from the MPCA.

5. **Increase in Vulnerability – Please describe any current conditions or changes that you feel has increased your community's vulnerability to future severe weather or disaster events. Please include anything related to population growth, zoning or development.**

   None

PART B: LOCAL MITIGATION CAPABILITIES ASSESSMENT

1. **Plans, Authorities & Policies: Please describe what specific plans, authorities or policies are in place to help accomplish mitigation in your community.**

   The city has no particular plans or policies in place related to mitigation. We are covered under the Rock County hazard mitigation plan.

2. **Organizational Capacity: Please describe what staff or partnerships are in place to help accomplish mitigation in your community.**

   We are a small city with a mayor and 4 city councilors. We work with Rock County as needed on any mitigation projects.

3. **Programs: Please describe any programs in place that to help accomplish mitigation in your community.**

   The city participates in the county's emergency notification system Nixle. We also have a tornado warning siren that can be turned on by the police department in Luverne or activated manually in Steen.

4. **Funding: Please describe any agency partnerships, funding or other resources to help accomplish mitigation in your community.**

   MPCA has awarded a $20,000 grant to the city to repair influent water into sewer line problems.

5. **Other Questions:**

   - **Does your jurisdiction have any plans or policies in place (or in development) related to resilience and adaptation for climate change?**

     No

   - **Who is your local municipal or rural electric coop provider?**

     Sioux Valley Energy

   - **How do you encourage residents to sign up for emergency notifications?**

     To date we have not done anything with this.

   - **Do you have (or need) portable or permanent back-up generators for specific critical facilities?**

     We have both permanent and portable generators for sewer lift stations.

PART C: LOCAL MITIGATION PROJECTS

1. **Local Mitigation Projects: Please describe any specific mitigation activities you think would help to address local vulnerabilities and reduce risk against future hazard events in your community.**

   The city will be working with the MPCA in 2021 on our storm sewer project.

   Encourage residents to sign up for emergency notifications by posting on city bulletin boards, making announcements at city council meetings or by sending out direct letters.

2. **Gaps or Deficiencies: Please describe any specific gaps or deficiencies that are a barrier to implementing local mitigation measures.**

   Our city is too small to have full-time employees.

PART D: SURVEY PARTICIPANTS

Melvin VanBatavia, Mayor

Appendix D – Plans & Programs in Place

Rock County

MHMP Plans in Place Form

Planning & Regulatory

Plans/Programs	*Yes/No*	*Comments*
Comprehensive/Master Plan	Yes	Adopted in 2000
Capital Improvements Plan	Yes	Annual Adoption
Economic Development Plan	No	
Emergency Operations Plan	Yes	Under Rock County Emergency Mgmt.
Climate Adaptation Plan	No	
Continuity of Operations Plan	Yes	Not a public document
Transportation Plan	Yes	Hwy. Dept. 5 Year Construction Plan (2020)
Stormwater Management Plan	No	
Community Wildfire Protection Plan	No	
FireWise Program	No	
Water Conservation/Emergency Preparedness Plan	No	
Wellhead Protection Plan	Yes	City of Luverne & Rock Co. Rural Water
Database of dry hydrants/well access	No	
Burning permits/restrictions	Yes	Issued by Rock Co. Sheriff's Dept.
Water Management Plan	Yes/No	No central plan. Water management planning falls under Rock County SWCD/Land Management Office
Zoning ordinance	Yes	Adopted August 22, 2000
Subdivision ordinance	Yes	County Ordinances, Section 17, Suburban Residence District
Floodplain ordinance	Yes	County Ordinances, Section 19, Floodplain Management District
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	No	

Flood insurance rate maps	Yes	Maps are currently being updated.
Acquisition of homes (buyouts) due to repetitive flood damage or imminent risk of failure from erosion/ Acquisition of land for open space and public recreation uses	No	Rock County has never been the lead on purchasing homes. The City of Luverne did purchased homes following the 1993 floods.
School closing policy/communications plan in event of inclement weather/temperatures	Yes	Schools establish their own policies.
Mass Care Sheltering Plan	Yes	Falls under Rock County PH and EM
Designated Mass Care Sheltering Facilities (list available)	Yes	Falls under Rock County PH and EM
Tornado Safe Rooms/Outdoor Storm Shelters (list available)	No	
Warning sirens (list all locations)	Yes	There are 15 outdoor warning sirens located in Rock County, located in the cities of Luverne (8), Hills (2), Magnolia (1), Kenneth (1), Steen (1), Beaver Creek (1), and Hardwick (1).
SKYWARN Program	Yes	Semi-annual trainings held with NWS
Emergency Mass Notification System (i.e., CodeRed, Everbridge)	Yes	Nixel cell phone notification system
Severe Weather Awareness Week	Yes	Annual participation in NWS event (April)
Winter Weather Awareness Week		Annual participation in NWS event (November)
NOAA Weather Radios	Yes	We promote use of NOAA weather radios
THIRA	No	No longer required
*Other *please describe*		

Administrative & Technical

Administration	*Yes/No*	*Comments*
Planning Commission	Yes	Appointed by the County Board
Mitigation Planning Committee	Yes	2020 MHMP planning team

Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	Hwy. Dept.
Mutual aid agreements	Yes	
Staff	*Yes/No*	*Comments*
Chief Building Official	No	
Floodplain Administrator	Yes	Planning & Zoning Dept.
Emergency Manager	Yes	Full time EM
Community Planner	No	
Civil Engineer	Yes	County Engineer
GIS Coordinator	Yes	County GIS Dept.
Technical	*Yes/No*	*Comments*
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	Nixel cell phone notification system
Hazard data and information	Yes	Data on record from past storm & disasters
Hazus analysis	No	

Education & Outreach

Program/Organization	*Yes/No*	*Comments*
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Rock County is covered under the Southwest MN Chapter of the American Red Cross
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	No	
Natural disaster or safety related school programs	No	
StormReady certification	No	
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues	No	
*Other *please list & describe*		

Appendix E – Past Mitigation Action Review Status Report

Rock County

Past Mitigation Action Review Status Report

Following is a report on the status of mitigation actions related to natural hazards listed in *Chapter 7: Mitigation Strategy* of the Rock County 2014 Hazard Mitigation Plan. This report identifies those actions that have been completed, are being deleted, or are ongoing. Mitigation actions that are noted as "ongoing" will be reviewed & revised as necessary based on the updated risk assessment and local input. This report covers the mitigation actions that were listed for implementation by the county and by city jurisdictions, as applicable.

Hazard	Mitigation Action	Jurisdiction	Status	Comments
Violent Storms / Extreme Temperatures	Distribute educational materials regarding the risks associated with violent storms that occur in Rock County when building licenses are applied for and issued. This will help emphasize the importance of have an adequate safety shelter.	RC, All Cities, All Townships	Ongoing	RCEM will continue to lead education and outreach efforts to raise awareness of severe weather and personal preparedness.
Violent Storms / Extreme Temperatures	Increase signage at public campgrounds warning campers of weather risks (i.e. those sites not covered by sirens)	RC, All Cities, All Townships, Blue Mound State Park	Ongoing	Owners of campgrounds will be encouraged to post safety information at campgrounds.
Violent Storms / Extreme Temperatures	Build a safety shelter at Blue Mound State Park. Identify other municipal and county parks where safety shelters are need.	RC, Blue Mound State Park	Ongoing	The plan update will look at where storm shelters or tornado safe rooms are needed in the county, including the state park.
Violent Storms / Extreme Temperatures	Conduct a study to determine where additional safety shelters are needed within cities (mobile home parks and other areas where basements are uncommon).	RC, RCSO, All Cities	Ongoing	RCEM and municipalities will all be encouraged to identify and address where storm shelters or tornado safe rooms may be needed as part of the plan update.

Hazard	Mitigation Action	Jurisdiction	Status	Comments
Violent Storms / Extreme Temperatures	Each spring, Rock 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 safety shelters, along with other important information.	RC, Sch, Hosp	Ongoing	RCEM will continue to participate in the NWS Severe Weather Awareness weeks and share information with the public using different outreach methods.
Violent Storms / Extreme Temperatures	Encourage Rock County residents to sign up for emergency alerts through the Nixle Alert System. The Nixle Alert System allows verified government agencies to send out messages to residents via phone, email, and internet. The Nixle Alert System allows local government to send out information to residents regarding current weather conditions and other precautionary measures.	RC, All Cities	Ongoing	RCEM and local governments will continue to promote sign up for the Nixel cell phone notification system.
Violent Storms / Extreme Temperatures	Encourage residents to purchase NWS weather radios, especially those in rural areas away from community sirens.	RC	Ongoing	NOAA weather radios are promoted in advance of severe weather.
Violent Storms / Extreme Temperatures	Evaluate the recommendations made by Federal Warning Systems, Inc. regarding emergency sirens in Rock County and implement said recommendations.	RC, All Cities	Completed	Warning sirens are located in the cities of Luverne, Hills, Magnolia, Kenneth, Steen, Beaver Creek, and Hardwick
Violent Storms / Extreme Temperatures	Ensure critical facilities such as hospitals and rural water suppliers have access to back up power generators.	RC, CL, Hosp, RWS, VH	Ongoing	RC and local governments will continue to identify critical facilities that may need back up power and obtain generators.
Violent Storms / Extreme Temperatures	Identify old Fallout Shelters as locations to be used during severe weather events.	RC, All Cities	Ongoing	Modify for plan update. The plan update will look at where storm shelters or tornado safe rooms are needed in the county.

Hazard	Mitigation Action	Jurisdiction	Status	Comments
Violent Storms / Extreme Temperatures	Work with fire and ambulance volunteers to develop a safe shelter plan for the county including shelters, shelter capacity, and transportation routes.	RC, All Cities, LMO, RCSO, Fire, Amb, Hosp, Sch, VH	Ongoing	Revise for plan update - This is a planning effort by Rock County Public Health and Emergency Management, not First Responders.
Drought	Perform necessary studies 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.	LMO, CL, RWS, USGS	Ongoing	Keep/modify as appropriate for plan update. May be under the responsibility of MN DNR.
Drought	Work with public water supplies to develop or update their wellhead protection plans.	SRDC, LMO, RWS, All Cities, All Townships	Ongoing	Municipalities are encouraged to update wellhead protection plans.
Drought	Educate the public and private leaders of the importance of wellhead protection and water conservation in times of low rainfall.	LMO, CL, RWS	Ongoing	Modify as needed for plan update.
Drought	Expand rural water systems to help ensure safe and reliable drinking water throughout Rock County.	LMO, CL, RWS, RC	Ongoing	Looking to add water tower on the west side of system to ensure a supply during short time power interruptions.
Drought	Hookup to Lewis and Clark Rural Water where appropriate to ensure water supplies are sufficient to meet demands.	LMO, CL, RWS, RC	Completed	Project completed.
Drought	Expand rural water systems to the water desert in Rock County. This area is in the northwest section of the county, south of Jasper along Buffalo Ridge. Residents in this area have to rely on cisterns and private wells.	LMO, RWS	Ongoing	Continue to explore delivery methods through the challenge of quartzite rock outcroppings.
Drought	Work with Department of Natural Resources (DNR) to ensure adequate draw down studies are completed prior to irrigation permits being issued.	LMO, RWS	Ongoing	DNR and Public Health review prior to any additional wells are permitted.

Hazard	Mitigation Action	Jurisdiction	Status	Comments
Wildfire	Encourage road authorities to cut back road ditches and bale where appropriate, which will limit potential for spreading of wildfires.	RC, LMO, All Townships, Fire, MnDOT	Deleted	Wildfire has been prioritized as a low-risk hazard for the plan update and will not be addressed.
Wildfire	Encourage fire breaks on private roads to help prevent wildfires from spreading.	RC, LMO, All Townships, Fire	Deleted	Wildfire has been prioritized as a low-risk hazard for the plan update and will not be addressed.
Wildfire	Participate in the nationally coordinated "Firewise" program to increase resident education.	All Cities, Fire, Sch, Hosp	Deleted	Wildfire has been prioritized as a low-risk hazard for the plan update and will not be addressed.
Wildfire	Participate in Fire Prevention Month with the Minnesota State Fire Marshall.	LMO, All Cities, Fire, MNFIRE, RCSO, Sch	Deleted	Wildfire has been prioritized as a low-risk hazard for the plan update and will not be addressed.
Utility Failure	Ensure critical facilities such as hospitals and rural water suppliers have access to back up power generators.	RC, CL, Hosp, RWS, VH	Ongoing	Cities will be encouraged to identify where generator backup power is needed for critical facilities.
Utility Failure	Add a backup generator to the Luverne High School. This will allow the Luverne High School to be better equipped to be an emergency primary care facility.	RC, CL, FIRE, RCSO, Luverne HS	Ongoing	Keep as relevant for City of Luverne. As noted above all cities will be encouraged to address backup power.
Utility Failure	Ensure critical facilities, like hospitals, run simulations to confirm the generators will power all the critical infrastructure in the facility.	RC, All Cities, Hosp, FIRE, RCSO, RWS	Deleted	Not a necessary mitigation action for the plan.
Utility Failure	Examine the needs and costs for providing back up generation where none currently exists.	RC, CL, RWS	Ongoing	Keep as relevant for the county and local jurisdictions in addressing the need for backup power.
Utility Failure	Promote redundancy in the power grid. Redundancy helps to contain power outages to smaller areas and for power to be maintained throughout most of the county. The utility grid system as a whole will become more reliable as redundancy is increased.	RC, All Cities, Utilities	Ongoing	Revise as needed. We will engage the electrical coops in the plan update process in the discussion of how to reduce vulnerability to power failure.

Hazard	Mitigation Action	Jurisdiction	Status	Comments
Utility Failure	Use all available technologies to help decrease the probability of large-scale outages. Replace overhead power lines with underground lines or use new overhead line technologies.	RC, All Cities, Utilities	Ongoing	Considerations for burying powerlines or strengthening utility systems above ground will be included in the plan update.
Flood / Dam Failure	Encourage Beaver Creek to adopt Rock County's zoning regulations in regards to development within the flood plain. Rock County's zoning regulations prohibits any further development within the floodplains. The cities of Jasper and Luverne have adopted similar regulation in regards to flood plain development as Rock County.	RC, BC, CL, CJ	Ongoing	Beaver Creek should adopt the County Zoning.
Flood / Dam Failure	Continuation of flood plain mapping and zoning in the county's official land use maps and in its zoning ordinances.	LMO, BC, CL, Hills, CJ, FEMA	Ongoing	Draft maps have been re-drawn in 2018 and are still pending adoption.
Flood / Dam Failure	Promote a buffer system along creeks and streams that are prone to flooding (Grass Strips, CRP, RIM, etc).	LMO, BWSR, SWCD	Ongoing	Ongoing efforts.
Flood / Dam Failure	Encourage Rock County communities to advocate that the FIRM maps in Rock County be updated.	RC, LMO, All Cities, All Townships, FEMA	Completed / Ongoing	New FIRM maps have been drawn up and we are moving towards the adoption process.
Flood / Dam Failure	Ensure cities that utilize centralized sewer treatment systems have compliant systems that keep inflow to a minimum.	LMO, All Cities	Ongoing	Cities are encouraged to evaluate their sewer treatment & stormwater management capabilities to handle impacts of high rain events.
Flood / Dam Failure	Ensure septic tank systems are in compliance with state regulations.	LMO, All Cities, All Townships	Ongoing	Keep as appropriate for flood mitigation by cities to consider.

Appendix F – Planning Team Meetings

Rock County MHMP Update

Appendix F - Kickoff Meeting Documentation

Overview:

On May 1, 2020, U-Spatial@UMD hosted a kickoff meeting online that was attended by the Rock County Emergency Manager. The webinar included a project overview, U-Spatial@UMD's background, the roles and responsibilities of the Emergency Manager, the contents of the Multi-Hazard Mitigation Plan, the planning process, and the projected timeline of the project.

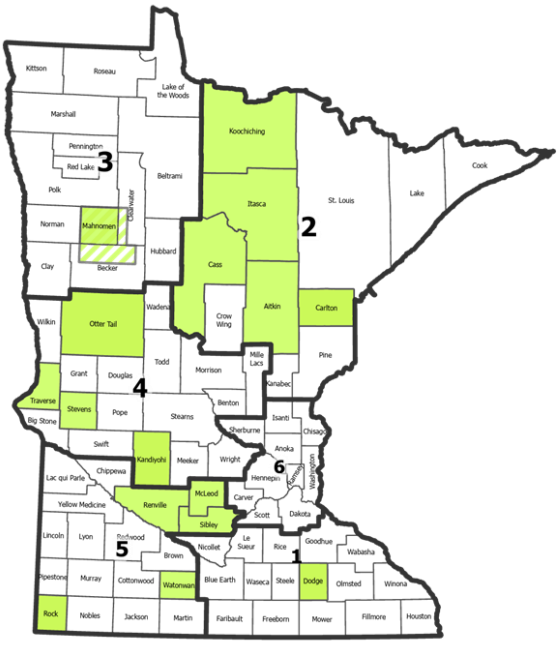
Attached Documentation:

- **Project Handout**: "Minnesota 2020-2021 Multi-Hazard Mitigation Plan Update Project Overview".

- **Webinar Slides**: "Minnesota 2020-2021 Multi-Hazard Mitigation Plan Update Project Kickoff Orientation Webinar"

Minnesota 2020-2021
Multi-Hazard Mitigation Plan Update Project Overview

During 2020-2021, U-Spatial from the University of Minnesota Duluth (U-Spatial@UMD) will be working to update Multi-Hazard Mitigation Plans (MHMPs) for 17 counties and 1 tribe. Our team consists of UMD staff who specialize in GIS applications and research and Hundrieser Consulting LLC, who specializes in stakeholder engagement and mitigation strategies.



Participating Jurisdictions

Aitkin, Carlton, Cass, Dodge, Itasca, Kandiyohi, Koochiching, LeSueur, Mahnomen, McLeod, Otter Tail, Renville, Rock, Sibley, Stevens, Traverse, Watonwan, White Earth Reservation.

Overview of Update Process

The U-Spatial@UMD team will coordinate with each Emergency Manager throughout the plan update process to engage participating jurisdictions and other stakeholders in the planning process. Following is an overview of key tasks that the U-Spatial@UMD team will facilitate to meet FEMA requirements in the update of each plan:

- Conduct 2 planning team meetings
- Conduct 2 periods of public outreach & engagement
- Assess Plans & Programs in Place to address natural hazards
- Conduct a Past Mitigation Action Review from past plan
- Update prioritization of natural hazards that pose risk
- Complete jurisdictional Local Mitigation Surveys (hazards, vulnerabilities & capabilities)
- Conduct hazard risk assessment for 1% annual chance floods using the Hazus GIS tool
- Inventory critical infrastructure
- Develop hazard profiles for each natural hazard (description, incident history, geographic variability, future probability, relationship to changing climate trends and local vulnerabilities)
- Develop 5-year jurisdictional Mitigation Action Charts

The planning process generally occurs over the course of 14-18 months from start to finish.

Contact

Stacey Stark, U-Spatial@UMD Director (MHMP Project Manager)
Phone: (218) 726-7438 / Email: slstark@d.umn.edu

HUNDRIESER CONSULTING LLC

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Overview of the MHMP Update Process

The U-Spatial@UMD team will coordinate with each Emergency Manager (EM), participating jurisdictions, and other stakeholders throughout the planning process. The plan update generally occurs over the course of 12-18 months from start to finish. Following is an overview of key tasks that will occur and the approximate timeline for completion. This list not represent a complete list of what the plan update entails.

Stage 1 Tasks (4-5 months)

- HMP kickoff meeting/webinar with U-Spatial@UMD
- Develop jurisdictional contact list for MHMP planning team
- Disseminate & document News Release #1 (plan update announcement)
- Complete Plans & Programs in Place Checklist
- Conduct a Past Mitigation Action Review from prior plan
- Complete Capabilities Assessment to address natural hazards
- Hold & document Planning Team Meeting #1
- Complete Local Mitigation Surveys (hazards, vulnerabilities & capabilities)
- Revisit prioritization of natural hazards that pose risk
- Assist U-Spatial@UMD with provision of key data
- Complete inventory of Critical Infrastructure

Stage 2 Tasks (4-6 months)

- Develop 5-year Jurisdictional Mitigation Action Charts
- Conduct hazard risk assessment for 1% annual chance floods using the Hazus GIS tool
- Develop hazard profiles for each natural hazard (description, incident history, geographic variability, future probability)
- Complete county profile sections and maps
- Complete hazard profiles for each natural hazard
- Complete Plan Maintenance section of draft plan

Stage 3 Tasks (2-3 months)

- EM review of Draft Plan
- Hold & document Planning Team Meeting #2
- Finalize Mitigation Action Charts
- Disseminate & document News Release #2 (Public Review & Comment Period)
- EM coordination of plan review by local government(s) & other stakeholders

Stage 4 Tasks (2-3 months)

- Post-public review revisions made to plan (as necessary)
- Draft Plan sent to HSEM for review & approval
- Draft Plan sent to FEMA for review & approval
- Post FEMA review revisions made to plan (as necessary)
- FEMA to send letter stating “Approval Pending Adoption” to EM
- EM to facilitate MHMP jurisdictional adoptions (County/Tribe and cities)

Ongoing - Quarterly 25% Local Match Tracking Quarterly to HSEM

As part of the MHMP plan update, EM’s are required to submit quarterly reports to HSEM on their local 25% match accrued through MHMP activities during that quarter.

Minnesota 2020-2021 Multi-Hazard Mitigation Plan Update Project
Kick-off Orientation Webinar

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Webinar Purpose & Goals

The purpose of this webinar is to provide an orientation for Emergency Managers participating in 2020-2021 Multi-Hazard Mitigation Plan Updates.

- Introduce the U-Spatial@UMD Team and county contacts.
- Provide an overview of the project.
- Clarify roles and responsibilities.
- Outline the planning process, discuss key tasks and timelines.
- Discuss next steps and answer your questions.

Introductions

U-Spatial@UMD Project Team


Stacey Stark
Project Manager
U-Spatial@UMD


Bonnie Hundrieser
Emergency Management Planning Consultant
Hundrieser Consulting LLC


Zach Vavra
GIS Specialist and Researcher
U-Spatial@UMD


Steve Graham
Research Associate, Flood Modeling Specialist
U-Spatial@UMD

Emergency Managers:

- Name, Title, and Jurisdiction
- Past Experience with MHMP?

Minnesota HSEM:

Jennifer Davis, MN HSEM
State Hazard Mitigation Officer

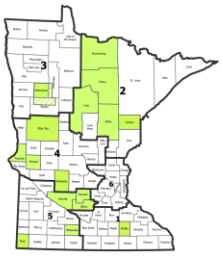
Project Overview

17 Counties:

Aitkin, Carlton, Cass, Dodge, Itasca, Kandiyohi, Koochiching, Le Sueur, Mahnomen, McLeod, Otter Tail, Renville, Rock, Sibley, Stevens, Traverse, Watonwan

1 Tribal Nation:

White Earth Band of Chippewa



Purpose

The Federal Disaster Mitigation Act of 2000 (DMA 2000) established programs and funding:

*"to reduce the loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from **natural disasters**"*

A local government plan is required in order to maintain eligibility for FEMA hazard mitigation grant programs.

MHMP's must be updated every 5 years

Flooding	Hail	Drought
Dam/Levee Failure	Lightning	Extreme Heat
Wildfire	Winter Storms	Extreme Cold
Windstorms	Landslides	Earthquakes
Tornadoes	Sinkholes & Karst	Coastal Erosion

Natural hazard categories for Minnesota MHMPs. Hazards may be omitted if low risk is demonstrated.

Why U-Spatial@UMD?

- **Proven experience**
  Our updates of 30+ MHMPs, as well as the State MHMP, have been quickly approved by FEMA and adopted by counties.
- **Advanced Capabilities**
  Expertise in the application of GIS, HAZUS, and research supports plan development and meeting all FEMA requirements.
- **Ability to Expedite**
  A consistent and proven approach for multiple counties supports State & FEMA review of draft plans.
- **Planning Team**
  Our project team includes advanced GIS students and Hundrieser Consulting.

Overview of MHMP Update Process

U-Spatial@UMD Team Roles & Responsibilities

- Keep you informed about the progress of your plan.
- Facilitate Planning Team meetings.
- Provide guidance to EM to conduct & document effective public outreach.
- Guide EM and planning team to complete key tasks for plan update.
- Keep up-to-date on FEMA requirements and Minnesota guidance.
- Produce a quality plan that FEMA will approve.
- Answer questions in a timely fashion.
- Provide quarterly reports to HSEM on your plan progress

EM Roles & Responsibilities

- Act as main Point of Contact.
- Track required local 25% match.
- Coordinate engagement of MHMP Planning Team.
- Conduct & document effective public outreach.
- Participate in completion of key assignments for plan update.
- Coordinate with other county/tribal staff to obtain information.
- Assist in timely review of draft document.
- Facilitate completion of local adoptions.

MHMP Planning Team

The MHMP planning team must include representation from local government, related stakeholders and neighboring jurisdictions.

- County/Tribal Government key officials and staff
- Cities – required; Townships – optional
- Other Related Stakeholders (i.e., Schools, Coops, MN DNR, etc.)
- Neighboring county/tribal jurisdictions

Key Tasks:

- Develop Jurisdictional Contact List.
- Hold & document Planning Team Meeting #1.
- Hold & document Planning Team Meeting #2.

Public Outreach

The plan update must document how the public was given the opportunity to be involved in the planning process and how their feedback was incorporated into the plan.

- Collect feedback on local-level concerns & mitigation actions.
- Use of local/social media, websites & community bulletin boards.
- Other outreach (i.e., attendance at City Council mtgs)

Key Tasks:

- Distribute & document News Release #1.
- Distribute & document News Release #2.
- Conduct other public outreach (optional).

Hazard Risk Assessment and Vulnerability Analysis

The U-Spatial@UMD Team will work closely with each EM and key departments to provide information as needed.

Key Tasks

- Review and contribute to critical infrastructure inventory.
- Identify specific, local-level impacts and vulnerabilities.
- Identify if and how risk priorities have changed since the last plan.
- Identify any factors (i.e., new development) that may increase the community's vulnerability to natural hazard events.
- Review social vulnerability factors.

Key Task Assignments

Hundrieser Consulting will coordinate with each EM and participating cities on key task assignments that will provide information required for the plan update.

Key Tasks

- Complete Plans in Place Checklist.
- Complete Capabilities Assessment for Mitigation.
- Conduct Past Mitigation Action Review.
- Coordinate Local Mitigation Survey (LMS) Forms.

Mitigation Action Charts

Hundrieser Consulting will coordinate development of draft 5-year jurisdictional Mitigation Action Charts (MACs) for the county/tribe and each participating city jurisdiction.

Key Tasks

- Complete Planning Team Mtg. #1 & Key Task Assignments.
- Conduct local-level development of MACs.
- Hold Planning Team Mtg. #2 for MAC review.
- Complete final MAC revisions.

Draft Plan Review

The U-Spatial@UMD Team will work with each EM to conduct a review of the draft MHMP and provide an opportunity for public review & comment on the plan.

Key Tasks

- EM review of initial draft plan > Revisions made as needed.
- Distribute News Release #2 - public review & comment period.
- EM coordination of review by key stakeholders.
- Posting of draft plan online with comment form.
- Documentation and incorporation of public feedback.

Plan Submission

The draft MHMP will be submitted to HSEM and FEMA for review & approval. Timing for review & approval is generally within 1-2 months.

Key Steps

- U-Spatial@UMD will submit the draft plan & Plan Review Tool (PRT) to HSEM.
- HSEM will submit the draft plan & PRT to FEMA reviewer.
- FEMA may respond with requests for revisions > U-Spatial@UMD to address revisions and resubmit plan.
- FEMA will send a letter of Approval Pending Adoption (APA status)

Plan Adoption

After FEMA has provided APA status, the county/tribe and all participating jurisdictions must formally adopt the plan.

Notes

- Good jurisdictional participation will facilitate local adoptions.
- Adoption of the plan is required for HMA grant program eligibility.
- Example adoption resolutions are provided for county/tribal adoption and local city adoption. Townships may elect to adopt (not required).
- Resolutions are incorporated into the final MHMP (PDF) by the Emergency Manager or included as hard copies.

Timeline Overview

- 22-Month total timeline (March 2020 – December 2021)
- Most plans take 14-18 months.
- Staggering of plans will be required to complete update of risk assessments, research of hazard histories, etc. for each jurisdiction.
- Many tasks occur concurrently, others must be done in succession.

Due to the COVID-19 Pandemic, we recognize that timing for completing the update of all 18 plans may be affected. If necessary, HSEM will work to extend our project contracts with FEMA to accommodate an extended timeline.

Possible timeline for your plan		Red includes county action items
Stage 1 Tasks (4-5 months)	April – August 2020	HMP kickoff meeting/webinar with U-Spatial@UMD Develop jurisdictional contact list for MHMP planning team Disseminate & document News Release #1 Hold & document Planning Team Meeting #1 Complete Plans & Programs in Place Checklist Complete Capabilities Assessment to address natural hazards Conduct a Past Mitigation Action Review from prior plan Complete Local Mitigation Surveys Revisit prioritization of natural hazards that pose risk Assist U-Spatial@UMD with provision of key data Complete inventory of Critical Infrastructure
Stage 2 Tasks (4-6 months)	August – November 2020	Develop 5-year Jurisdictional Mitigation Action Charts Hazus hazard risk assessment for flooding Develop hazard profiles for each natural hazard Complete county profile sections and maps Complete Draft Plan
Stage 3 Tasks (2-3 months)	December – February 2021	EM review of Draft Plan Hold & document Planning Team Meeting #2 Finalize Mitigation Action Charts Disseminate & document News Release #2 EM coordination of plan review by stakeholders
Stage 4 Tasks (2-3 months)	March – May 2021	Post-public review revisions made to plan (as necessary) Draft Plan sent to HSEM for review & approval Draft Plan sent to FEMA for review & approval

Local 25% Match

Each quarter EM's will be responsible to track and submit local match documentation to HSEM.

Notes:

- EM's are provided with a "Master Match Tracking" Excel Workbook to document match MHMP activities, participants, and amount accrued.
- Regular reminders & guidance will be provided on tracking match.

Next Steps

U-Spatial@UMD Team members will coordinate each EM to commence work on several tasks that will take place over the next several months.

Notes:

- We are sensitive to the workloads of EM's, particularly during COVID-19.
- All information requests or assignments are in prepared form.
- Please communicate your availability to complete/not complete work.
- Plans most expired are priority; however, EM's with completed tasks move up in the que for plan development.

Questions?

What questions do you have for U-Spatial@UMD or HSEM about the MHMP update process?

Contact Information

Stacey Stark, MS, GISP

U-Spatial@UMD

slstark@d.umn.edu

218-726-7438

Example Plans:

https://z.umn.edu/hazardmitigation

Rock County MHMP Update
JURISDICTIONAL CONTACT LIST

County Contacts

Name	Title	Phone	Email
Kyle Oldre	County Administrator / Emergency Management Director	507-283-5065	kyle.oldre@co.rock.mn.us
Evan Verbrugge	Sheriff	507-283-5000	evan.verbrugge@co.rock.mn.us
Eric Hartman	Land Management Office (Planning & Zoning, SWCD)	507-283-8862	eric.hartman@co.rock.mn.us
Mark Sehr	County Engineer, Highway Department	507-283-5010	mark.sehr@co.rock.mn.us
Gary Overgaard	County Board Chair	507-920-9178	gary.overgaard@co.rock.mn.us
Ashley Kurtz	Auditor/Treasurer	507-283-5060	ashley.kurtz@co.rock.mn.us
Arlyn Gerhke	GIS Director	507-283-8862	Arlyn.Gehrke@co.rock.mn.us

City Contacts

CITY OF BEAVER CREEK

Name	Title	Phone	Email
Josh Tuene	Mayor	507-227-4481	Josh.teune@cityofbeavercreekmn.com
Jane Blank	Clerk-Treasurer	507-673-2266	jane@cityofbeavercreekmn.com

CITY OF HARDWICK

Name	Title	Phone	Email
Willy Baker	Mayor	507-920-5500	cityofhardwick@alliancecom.net
Tamara Johnson	Clerk-Treasurer	507-669-6635	cityofhardwick@alliancecom.net
Tom Haas	City Council Member	605-359-3340	thomashaas25@yahoo.com

CITY OF HILLS

Name	Title	Phone	Email
Keith Elbers	Mayor	507-962-3433	kaelbers@alliancecom.net
Connie Wiertzema	Clerk-Treasurer	507-962-3290	ctyhills@alliancecom.net

CITY OF JASPER (partial with Pipestone County)

Name	Title	Phone	Email
Mike Baustian	Mayor	507-348-3017	
Cortney Kounkel	Clerk-Treasurer	507-348-3701	jasper@iw.net

CITY OF KENNETH

Name	Title	Phone	Email
Keith Hoven	Mayor	507-283-8426	Kdhoven2@gmail.com
Sue Tweet	Clerk-Treasurer	507-283-2466	suetweet@hotmail.com

CITY OF LUVERNE

Name	Title	Phone	Email
John Call	Administrator	507-449-2388	jcall@cityofluverne.org
Jessica Mead	City Clerk	507-449-9898	jmead@cityofluverne.org
Pat Baustian	Mayor	507-283-4180	pbaustian@cityofluverne.org
Chad McClure	Building Official / City EM	507-449-5031	cmcclure@cityofluverne.org

CITY OF MAGNOLIA

Name	Title	Phone	Email
Denis Madison	Mayor	507-227-0495	dmjmadison@yahoo.com
Glenda Schomacker	Clerk-Treasurer	507-283-8677	cityofmagnolia@alliancecom.net

CITY OF STEEN

Name	Title	Phone	Email
Melvin VanBatavia	Mayor	507-855-2333	mvanbata@alliancecom.net
Alan McZenzie	City Clerk	605-659-4890	amckenzie@smithfield.com

Township Contacts

Name of Township	Name & Title	Phone	Email
Beaver Creek	Peter Bakken, Chair	507-597-3745	pcbakken@alliancecom.net
Springwater	Kurt Wenzel, Chair	507-673-2295	jdfarmer@live.com
Vienna	Brad Skattum, Chair	507-920-9553	brad.skattum57@gmail.com
Battle Plain	Aaron Sandbulte, Chair	507-227-0115	a.sandbulte77@gmail.com
Rose Dell	Joe Buysse, Chair	507-204-7722	Jsbuysse7300@gmail.com
Martin	Josh Rheault, Chair	507-673-2590	Josh.rheault@plantpioneer.com
Clinton	Steve Top, Chair	507-283-2926	stovetop@icloud.com
Magnolia	Hunter Riggs, Supervisor	507-220-9009	stacy@riggstrucking.com
Luverne	Mark Overgaard, Chair	507-283-8246	maover@msn.com
Kanaranzi	Nancy Overgaard, Clerk	507-283-8655	nnovergaard@yahoo.com
Denver	Kyle Hemme, Chair	507-669-2076	hemmekya@yahoo.com
Mound	Keith Schmuck, Chair	507-283-9099	ks29rr@gmail.com

Other Stakeholder Contacts

Name of Agency/Org.	Name & Title	Phone	Email
Blue Mounds State Park (MN DNR)	Chris Ingebretsen, Park Manager	507-283-6050	chris.ingebretsen@state.mn.us
Southwest Health and Human Services (SWHHS)	Jason Kloss, Envr. Health Manager	507-829-6502	Jason.Kloss@swmhhs.com
Sioux Valley Energy Cooperative	Michelle Neilson, Manager of Engineering	507-825-3341	Michele.Neilson@siouxvalleyenergy.com
Luverne Public School District	Craig Oftedahl, Superintendent	507-283-8088	c.oftedahl@isd2184.net
Hills-Beaver Creek School District ISD #671	Todd Holthaus, Superintendent	507-962-3240	t.holthaus@isd671.net
USDA Rural Development Community Facilities Program	Edward Gilmore, Area Specialist	507-332-7418 x115	edward.gilmore@usda.gov

Neighboring Jurisdiction Contacts

Name of Jurisdiction	Name & Title	Phone	Email
Nobles County	Bruce Heitkamp	507-360-3351	bheitkamp@co.nobles.mn.us
Pipestone County	Casey Sievert	507-825-1172	casey.sievert@co.pipestone.mn.us
Murray County	Carl Nyquist	507-836-1111	CNyquist@co.murray.mn.us

Rock County MHMP Planning Team Meeting #1
October 28, 2020 - Meeting Summary & Documentation

Summary: On Wednesday, October 28, 2020, Rock County Emergency Management convened key county, city, and township representatives, as well as neighboring jurisdictions and other stakeholders to participate in the 1st Planning Team Meeting for the update of the Rock County Multi-Hazard Mitigation Plan (MHMP). The purpose of the meeting was to formally present information about the Rock County MHMP update and to discuss key items that would inform plan development. The meeting was held via Zoom webinar video conference and was facilitated by Stacey Stark and Bonnie Hundrieser of the U-Spatial@UMD project team.

Stakeholder Invitations: Rock County Emergency Management invited all stakeholders included on the county's MHMP Update Jurisdictional Contact List (JCL), which includes the key County Contacts, City Contacts, Township Contacts, Other Stakeholder Contacts, and Neighboring Jurisdiction Contacts identified to be invited to participate in the plan update process. Contacts were encouraged to engage additional staff or to send someone in their stead if they could not attend. A copy of the county's Jurisdictional Contact List is provided in *Appendix F Steering Committee Meetings*.

Meeting Participants: A total of 22 people attended the meeting. Representation included elected officials and departmental staff from Rock County and the cities of Beaver Creek, Hardwick, Hills, Jasper, Luverne, and Magnolia. The cities of Kenneth and Steen were not in attendance. Other stakeholders also participated in the meeting. Neighboring jurisdictions were invited to participate but were not in attendance. A participant list is included with this meeting summary.

Presentation Overview: The Power Point presentation covered the following items. A PDF of the presentation slides is included with this meeting summary.

- Overview of Hazard Mitigation & the MHMP Update
- Who the Plan Covers & Role of the Planning Team
- Review of Hazards + Overview of Risk Assessment and Vulnerability Analysis
- Update of Risk Priorities
- Review of Mitigation Strategies & Example Actions
- Overview of FEMA HMA grant program
- Discussion of local mitigation ideas
- Discussion of next steps & answer your questions.

Participant Poll: At the start of the meeting participants were presented with an interactive poll asking 2 questions. Following are the questions and poll results.

Question 1: Have you participated in Hazard Mitigation previously?

- Yes, I have previously participated in in a hazard mitigation planning process. **(9) 64%**
- No, but I am familiar with hazard mitigation planning. **(4) 29%**
- No, and this is all new to me. **(1) 7%**

Question 2: What are the top three natural hazards you are most concerned about in your community?

- Flooding (12/14) 86%
- Winter Storms (11/14) 79%
- Extreme Cold (7/14) 50%
- Tornadoes (7/14) 50%
- Windstorms (5/14) 36%
- Wildfire (2/14) 14%
- Lightning (2/14) 14%
- Hail (2/14) 14%
- Drought (1/14) 7%
- Extreme Heat (0/14) 0%

Prioritization of Natural Hazards: The planning team was presented with an overview of each of the natural hazards that were covered in the county's last plan and the risk prioritization at that time. Considerations for the current risk prioritization since the last plan was presented for each hazard, such as events recorded since the last plan, NCEI Storm Data, or known existing local vulnerabilities (i.e., number of mobile home parks). It was noted to participants that:

- Hazards deemed to be of high or moderate risk must result in mitigation actions to address them for the jurisdictions that are affected.
- Hazard prioritization may vary for jurisdictions or may not differ countywide.
- Hazards deemed to be low risk and without significant mitigation actions may be dropped from the plan. This excludes the hazard of Dam/Levee failure, which must be addressed per new FEMA guidelines, even if risk is deemed low.

Following is a chart reflecting the 2014 risk priorities for Rock County and any changes to the current risk prioritization for the plan update. This discussion served as an introduction to updating the risk prioritization and will be followed up with further information gathered from the county and local jurisdictions during the planning process. Any changes to the risk prioritizations will be noted under "2020 Current Priority".

Natural Hazards Addressed in the Last Plan	2014 Priority	2020 Current Priority
Winter Storms	High	High
Extreme Cold	High	High
Flooding	Moderate	High
Drought	Moderate	Moderate
Windstorms	Moderate	Moderate
Tornadoes	High	Moderate
Extreme Heat	Moderate	Moderate
Hail	Moderate	Moderate to Low
Lightning	Moderate	Low
Wildfire-Wildland Fire	Low	Low

Comments, Questions or Mitigation Ideas – Following are the questions, comments or mitigation ideas that were shared by participants and how they will be addressed for the plan update.

Meeting Participant	Comment, Question or Mitigation Idea Submitted	Facilitator Feedback / How to be Addressed in Plan Update
Kyle Oldre, County Board Chair / Emergency Management Director	In regards to discussing prioritization of natural hazards for 2020 plan update: When considering the severity of natural hazards, are impacts to the economy considered in addition to things like structure damage? Rock County is largely agricultural and things like crop damage or loss due to storms or drought is a concern.	Yes, we do take those things into consideration with the data we have for things like crop loss, and indemnity payments. Economic loss is considered an injury to the community, so if a hazard has posed a debilitating impact to a community we want to include it in our risk assessment.
Kyle Oldre, County Board Chair / Emergency Management Director	In regards to hazards covered by the MHMP: In light of COVID, wouldn't pandemic be considered a natural hazard? I just want to make sure we won't be ineligible for grant funding in the future if we don't include it in this plan.	For the purposes of this plan, no, pandemics are not included as a natural hazard. Pandemic is not on the list of natural hazards on the list to be included in the plan by the CFR requirements. There is no FEMA HMA grant funding associated with addressing pandemics, so the County is not at any risk of loosing potential FEMA grant funding for addressing pandemics by not including it in this plan. Public Health is the entity that oversees planning for planning for pandemics and disease outbreaks and associated grant funding for mitigation or response efforts would come from other sources, not FEMA HMA grant programs.
Evan Verbrugge	In regards to hazards covered by the MHMP: If we are looking at man-made hazards, do we need to add a potential Community Protest?	(Kyle Oldre) It was in the old plan, now they are only looking at natural disasters.
Garry Overgaard, Rock County Commissioner	In regards to tornadoes: Tornadoes are probably more occasional than likely.	Noted for changing tornadoes from a high to a moderate priority.
Garry Overgaard, Rock County Commissioner	In regards to extreme heat / extreme cold: Why don't you use the Luverne weather station for data? (Pipestone weather station was referenced instead).	We do look at data from all of the area weather stations. Sometimes there may have been incomplete records from one station, so we go with the one that had more comprehensive data to reflect the total number of days with extreme heat/cold events.

Kyle Oldre, County Board Chair / Emergency Management Director	In regards to flood maps: We are currently going through a flood boundary re-write and are likely a few years away from adoption. The drafts are done but not adopted – are you able to incorporate those changes?	Yes. We can use that data since it is the most current available, even if the maps have not gone through the final adoption process.
Eric Hartmann, Director, Rock County Land Management	Cross Comment: The draft maps have been in place since August of 2018. At that point in time, it was noted we were likely 6 years away from adoption. Based on what other counties have noted, 6 years may be optimistic.	Confirmed again that we can use the draft maps even though it may be some years out until they are adopted.

Following the discussion, participants were encouraged to fill out and return the "Mitigation Ideas" worksheet that they were provided with to Rock County Emergency Management to submit any specific local concerns and related mitigation ideas. The meeting concluded with an overview of next steps and estimated timeline for completion.

Exit Survey: Following the Zoom meeting, participants were provided with a short survey they were invited to fill out before upon their departure in order to gather some final feedback.

1. **Did you learn what you expected/needed about hazard mitigation in today's webinar?**
    - (10/10) Yes

2. **Please provide comments about any of the lower risk hazards if you think they should be addressed in the plan (wildfire, extreme heat, drought)**
    - They are not that pertaining to our county overall except for the impact to agriculture both grains and livestock.

3. **Any other comments (about natural hazards, mitigation actions, or how we might improve this webinar)?**
    - This seemed to work pretty well today. Presenters did a nice job. Kyle here at the County is very knowledgeable about this process, and he is a good go to person for the cities.

Attached are the following documentation items for the Rock County MHMP Meeting #1:

- 10-28-20 Mtg. #1 Email Invitation
- 10-28-20 Mtg. #1 List of Participants
- 10-28-20 Mtg. #1 Power Point Slides
- 10-28-20 Mtg. #1 Handouts

Meeting Summary Prepared By: Bonnie Hundrieser, U-Spatial@UMD Project Team

From:	Kyle Oldre
To:	Arlyn Gehrke; Ashley Kurtz; Blue Mound State Park; City Mayor & Clerks; eric.hartman@mn.nacdnet.net; Evan Verbrugge; Gary Overgaard; Hills-Beaver Creek School; Jason Kloss; Kyle Oldre; Luverne Public School; Mark Sehr; Murray County; Nobles Co. EM; Pipestone Co; Sioux Valley Energy Coop; USDA Rural Development Community Facilities Program
Cc:	Kyle Oldre; Bonnie K Hundrieser (hundrieserconsulting@outlook.com)
Subject:	Rock County_10-28-20 HMP Mtg #1 Invitation (2)
Date:	Friday, August 14, 2020 9:17:59 AM
Attachments:	Rock County_10-28-20 HMP Mtg #1 Invitation (2).docx

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All,
Please see attached meeting notice and ZOOM invite for our Hazard Mitigation Plan Update, your participation is greatly appreciated.

Let me know if you have any questions,
Kyle Oldre
507-283-5065

ROCK COUNTY

MULTI-HAZARD MITIGATION PLAN UPDATE – MEETING INVITATION

Greetings,

Your presence is requested at a Planning Team Meeting for the update of the **Rock County Multi-Hazard Mitigation Plan**. You are requested to participate in this vital meeting because you have a position of administrative or departmental responsibility within either the County, a municipal government, or are a key stakeholder related to the planning process. Emergency Managers from neighboring jurisdictions are also encouraged to attend so we may strengthen our shared mitigation efforts.

We will be holding the meeting using Zoom webinar:

Date: Wednesday, October 28, 2020

Time: 9:00 a.m. – 11:00 a.m.

Registration: **https://umn-private.zoom.us/webinar/register/WN_a18Qus3HT02p_lSTuyhPxA**
Please note that you must register in advance for this webinar. After registering, you will receive a confirmation email containing information about joining the webinar.

RSVP: Please email me to RSVP for all persons planning to attend this meeting so I may keep track. (This is separate from the Zoom registration link).

About the Plan

The update of the Rock County Multi-Hazard Mitigation Plan (MHMP) is a requirement by the State of Minnesota Department of Homeland Security & Emergency Management (HSEM) as well as the Federal Emergency Management Agency (FEMA) every 5 years. Our last plan is due for an update and our planning is currently underway. The plan addresses the natural hazards that face Rock County and will result in the identification of mitigation actions that will help to reduce or eliminate the impact of future hazard events, such as flooding and severe winter or summer storms.

Your participation in this plan update is important for several reasons:

1. You will help to identify critical mitigation projects to implement at the county / municipal level, and how they can be integrated with existing plans, policies, or project efforts.

2. Participating jurisdictions will be eligible to apply for FEMA hazard mitigation grant funding.

3. Mitigation planning is necessary to keep our communities resilient against future disasters and reduce the costs of recovery.

4. FEMA requires documentation of how local government and key stakeholders participated in the planning process.

During this meeting we will review and prioritize the natural hazards that pose risk Rock County and individual communities and discuss a range of mitigation measures for local implementation. The

meeting will be facilitated by personnel from U-Spatial at the University of MN Duluth who are working closely with us on this project.

We look forward to you joining us for this important meeting.

Thank you,
Kyle Oldre
507-283-5065

From:	Bonnie K Hundrieser
To:	evan.verbrugge@co.rock.mn.us; eric.hartman@co.rock.mn.us; mark.sehr@co.rock.mn.us; gary.overgaard@co.rock.mn.us; ashley.kurtz@co.rock.mn.us; arlyn.gerhke@co.rock.mn.us; bcvc@centurytel.net; Josh.teune@cityofbeavercreekmn.com; cityofhardwick@frontiernet.net; ctyhills@alliancecom.net; kaelbers@alliancecom.net; jasper@iw.net; Kdhoven2@gmail.com; suetweet@hotmail.com; jcall@cityofluverne.org; pbaustian@cityofluverne.org; glendaps@vastbb.net; dmjmadison@yahoo.com; mvanbata@alliancecom.net; pcbakken@alliancecom.net; jdfarmer@live.com; brad.skattum57@gmail.com; a.sandbulte77@gmail.com; Jsbuysse7300@gmail.com; Josh.rheault@plantpioneer.com; stovetop@icloud.com; stacy@riggstruckin.com; maover@msn.com; nnovergaard@yahoo.com; hemmekya@yahoo.com; ks29rr@gmail.com; chris.ingebretsen@state.mn.us; Jason.Kloss@swmhhs.com; Michele.Neilson@siouxvalleyenergy.com; c.oftedahl@isd2184.net; t.holthaus@isd671.net; edward.gilmore@usda.gov; bheitkamp@co.nobles.mn.us; casey.sievert@co.pipestone.mn.us; CNyquist@co.murray.mn.us; "Kyle Oldre"; Marcy, Mark (DPS)
Subject:	Handouts for Rock County MHMP Meeting Wed.,10/28
Date:	Monday, October 26, 2020 7:51:00 AM
Attachments:	Mitigation Strategies Action Types.pdf HSEM_HMA Grants Program Overview.pdf Mitigation Ideas Worksheet.docx image003.png

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Greetings,

We look forward to you joining us for the Rock County Multi-Hazard Mitigation Plan meeting on Wednesday, October 28th from 9am – 11am.

Attached please find 3 handouts we will be referencing during the meeting.

If you have not yet registered you can do so by clicking on this link: **https://umn-private.zoom.us/webinar/register/WN_a18Qus3HT02p_lSTuyhPxA**

Thank you!

Bonnie K. Hundrieser, CEM
Hazard Mitigation Planning Specialist
Part of the **U-Spatial@UMD** MHMP Planning Team

HUNDRIESER CONSULTING LLC
Emergency Management and Whole Community Planning
Cell: 218-343-3468
Email: hundrieserconsulting@outlook.com
Web: www.hundrieserconsultingllc.com

Rock County
10/28/20 MHMP Planning Team Meeting #1
List of Participants (22)

	Organization	First Name	Last Name	Job Title	Email
1	Rock County	Kyle	Oldre	County Board Chair / Emergency Management Director	kyle.oldre@co.rock.mn.us
2	Rock County	Ashley	Kurtz	Auditor-Treasurer	ashley.kurtz@co.rock.mn.us
3	Rock County	Evan	Verbrugge	County Sheriff	evan.verbrugge@co.rock.mn.us
4	Rock County	Mark	Sehr	Hwy. Dept., County Engineer	mark.sehr@co.rock.mn.us
5	Rock County	Gary	Overgaard	Commissioner	goandem@gmail.com
6	Rock County	Arlyn	Gehrke	Land Management Office, Engineering Technician / GIS	arlyn.gehrke@co.rock.mn.us
7	Rock County	Susan	Skattum	Deputy Administrator	susan.skattum@co.rock.mn.us
8	Rock County	Eric	Hartman	Director - Rock County Land Management	eric.hartman@co.rock.mn.us
9	City of Beaver Creek	Jane	Blank	City Clerk/Treasurer	jane@cityofbeavercreekmn.com
10	City of Hardwick	William	Baker	Mayor	cityofhardwick@alliancecom.net
11	City of Hills	Connie	Wiertzema	City Clerk-Treasurer	ctyhills@alliancecom.net
12	City of Hills	Keith	Elbers	Mayor	kaelbers@alliancecom.net
13	City of Jasper	Cortney	Kounkel	Clerk-Treasurer	jasper@iw.net
14	City of Luverne	John	Call	City Administrator	Jcall@cityofluverne.org
15	City of Luverne	Jessica	Mead	City Clerk	jmead@cityofluverne.org
16	City of Magnolia	Dennis	Madison	Mayor	dmjmadison@yahoo.com
17	Denver Township	Kyle	Hemme	Supervisor	hemmekya@yahoo.com
18	Vienna township	Brad	Skattum	Chairman	brad.skattum57@gmail.com
19	Luverne Public School	Craig	Oftedahl	Superintendent	c.oftedahl@isd2184.net
20	Hills-Beaver Creek Schools	Todd	Holthaus	Superintendent	t.holthaus@isd671.net
21	Southwest Health and Human Services	Jason	Kloss	Environmental Health Manager	Jason.Kloss@swmhhs.com
22	MN DPS/HSEM	Mark	Marcy	HSEM Region V Regional Program Coordinator	mark.marcy@state.mn.us

ROCK COUNTY
Multi-Hazard Mitigation Plan Update 2020
Planning Team Meeting #1

October 28, 2020

U-SPATIAL
UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover

Welcome & Introductions

U-Spatial@UMD Project Leads

Stacey Stark
Project Manager
U-Spatial@UMD

Bonnie Hundrieser
HM Planning Specialist
Hundrieser Consulting LLC

Rock County Project Lead

- Kyle Oldre, Rock County Emergency Management Director

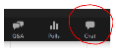
Rock County MINNESOTA

PRESENTER: STACEY STARK

Webinar Logistics

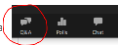
YOU ARE UNABLE TO UNMUTE YOURSELF OR TURN YOUR VIDEO ON

USE CHAT:



- Send a message to everyone or individuals
- Send a message to "panelists" for technical support for a question that isn't for the whole group. The "Panelist" Group includes Bonnie, Stacey, and your County EM and hosts.

USE Q&A (all participants can see these)



- PLEASE USE Q and A for all notes about hazards and mitigation a question as soon as we can
- You can review others' questions and "upvote" their question if you have the same one!
- You can comment on others' questions

RAISE YOUR HAND

If you want to speak

USE LIVE TRANSCRIPT

To view live subtitles or a full transcript

PRESENTER: STACEY STARK

Meeting Purpose & Agenda

2019 flood event

The purpose of this meeting is to formally convene the Rock County MHMP Planning Team for a presentation of the plan update and discussion of key items.

Agenda:

- Overview of Hazard Mitigation & the MHMP Update
- Who the Plan Covers & Role of the Planning Team
- Review of Hazards + Overview of Risk Assessment and Vulnerability Analysis
- Update of Risk Priorities
- Review of Mitigation Strategies & Example Actions
- Overview of FEMA HMA grant program
- Discuss local mitigation ideas & public engagement.
- Discuss next steps & answer your questions.

PRESENTER : STACEY STARK

Why U-Spatial?

U-SPATIAL
UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover

- **Proven experience**
  Our updates of 30+ MHMPs, as well as the State MHMP, have been quickly approved by FEMA and adopted by counties.
- **Advanced Capabilities**
  Expertise in the application of GIS, HAZUS, and research supports plan development and meeting all FEMA requirements.
- **Ability to Expedite**
  A consistent and proven approach for multiple counties supports State & FEMA review of draft plans.
- **Planning Team**
  Our project team includes advanced GIS students and Hundrieser Consulting.

PRESENTER : STACEY STARK

What is Hazard Mitigation?

Hazard Mitigation is any action taken to reduce or eliminate long term risk to people and property from natural disasters.

- HM planning **identifies** risks and vulnerabilities, **develops** a plan of action, and **builds** partnerships to implement efforts.
- HM breaks the **cycle** of disaster and reconstruction.
- HM builds stronger & more **resilient** communities.

PRESENTER : BONNIE HUNDRIESER

MHMP Overview & Timeline

2019 flood damage

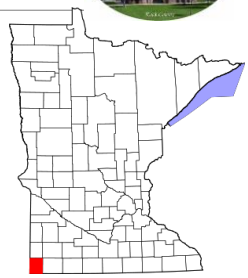
The Multi-Hazard Mitigation Plan (MHMP) is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000).

- ✓ **The development of a local government plan is required in order to maintain eligibility for FEMA hazard mitigation grant programs.**
- ✓ **Plans must be updated every 5 years.**
- ✓ **Must address all jurisdictions and engage key stakeholders.**
- ✓ **Planning process must give an opportunity to the public to provide feedback.**

Rock County MHMP Update 2020

- Last plan adopted in 2014.
- The updated plan will cover a 5-year window (2021-2026).
- County and local-level government participation is required.

Who the Plan Covers



The Rock County MHMP is a multi-jurisdictional plan that covers the county as well as all city & townships within the county.

- ✓ County and city governments are required to adopt the plan.
- ✓ Townships are covered under the umbrella of the county, but may elect to adopt.
- ✓ City-level participation in the plan update must be documented for local adoptions to be approved.

MHMP Planning Team

Rock County Planning Team

- **Rock County Emergency Management**
- **Key County Officials & Staff**
- **City and Township Officials & Staff**
- **Neighboring Jurisdictions**
- **Other Related Agency or Organizational Stakeholders**

- ➢ Assist with public outreach & documentation for news releases (use of websites, social media & community bulletin boards).
- ➢ Participate in 2 planning team meetings.
- ➢ Assist with provision of county/local information
- ➢ Help develop & review local mitigation action charts.
- ➢ Review of the draft plan.
- ➢ Facilitate local-level adoptions.

What Hazards are Addressed in the Plan?

➢ **Natural hazards** that pose risk to the county and its jurisdictions.

➢ Manmade hazards are not required to be addressed (per the DMA 2000).

➢ Hazards may be omitted from the plan if **low risk** is demonstrated.

➢ Hazard Risk may differ in cities and the county overall.

Flooding	Hail	Drought
Dam/Levee Failure	Lightning	Extreme Heat
Wildfire	Winter Storms	Extreme Cold
Windstorms	Landslides	Earthquakes
Tornadoes	Sinkholes & Karst	Coastal Erosion

Natural hazard categories for Minnesota MHMPs.

Hazard Risk Assessment and Vulnerability Analysis

The U-Spatial@UMD Team will work closely with the county and each city to provide information as needed.

➢ Inventory of critical infrastructure.

➢ Identify specific, local-level impacts and vulnerabilities.

➢ Identify any factors (i.e., new development) that may increase the community's vulnerability.

➢ Review social vulnerability factors.

➢ Identify if and how risk priorities have changed since the last plan. (Increased / Decreased)

2019 flood event – road damage

2019 flood event – dam break

Hazard Prioritization

Hazard	Potential Frequency	Spatial Extent	Potential Severity	Warning Time	Risk Level	Hazard Rank
Blizzards, Winter Storms, and Extreme Cold Events	Likely	Countywide	Major	12 - 24 hours	High	High
Extreme Cold						with Winter Storms in 2014 – High
Drought	Likely	Countywide	Major	24+ hours	Average	Moderate
Wildfires	Occasional	Local	Limited	Minimal	Limited	Low
Flooding	Likely	Countywide	Minor	12 - 24 hours	Average	Moderate
Summer Storms	Likely	Countywide	Minor	6 -12 hours	High	Moderate
Lightning						with Summer Storms 2014 - Moderate
Hail						with Summer Storms 2014 - Moderate
Extreme Heat Events						with Summer Storms 2014 - Moderate
Tornadoes	Likely	Countywide	Major	Minimal	High	High
Windstorms						with Tornadoes 2014 - High
Dam Failure	Unlikely	Local	Limited	Minimal	Limited	Low

Winter Storms (high)

- 63 winter weather related events (blizzards, heavy snows, ice storms, winter storms, and winter weather) have occurred since January 2014 (9 year)
- Based on all records in the NCEI Storm Events Database, the relative frequency of winter-related storm events is 6.2 per year.

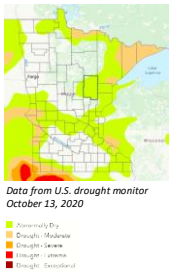
April, 2018 Winter Storm with power line damage

Extreme Cold (high)

- From 2014, -18°F was recorded 18 times at the Pipestone weather station. Rock County experiences an average of 2-3 extreme cold days each year.
- -32°F recorded by the Pipestone station on January 31, 2019
- The relative frequency of cold-related events (NWS Advisory / Warning issued due to wind chill -25 °F / -35 °F or colder) in the county is .9 per year.

Drought (moderate)

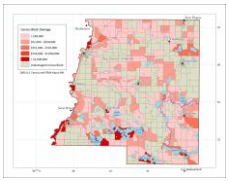
- From 2000 – 2018, Rock County was in Moderate (D1) Drought <20% of the time.
- From January 2000 through February 2013, there were 12 documented droughts in Rock County



Data from U.S. drought monitor October 13, 2020

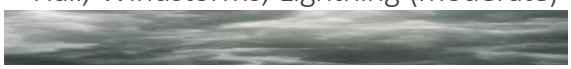
Flooding (moderate)

- A potential economic loss model is run for 1% annual chance flood
- Use of FEMA Flood Insurance Rate Map (FIRM)
- Use of property values from county assessor
- Critical Infrastructure locations from GIS and EM input



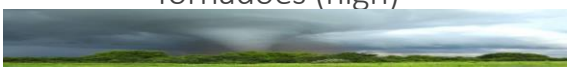
Example: Distribution of Estimated Economic Loss: 1% annual chance flood.

Hail, Windstorms, Lightning (moderate)



- Each addressed individually
- The relative frequency of all wind-related events (strong wind, high wind, and thunderstorm wind) since January of 1996 is 3.1 per year.
- There were nine hailstorms with hail greater or equal to 1-inch since 2014. The relative frequency of all hail events is 1.3 per year.
- Hazards deemed low risk and without significant mitigation actions, can be dropped from the plan.

Tornadoes (high)



- Based NCEI Storm Events Database through February 2020, 13 tornadoes have occurred in Rock County (.18 per year)
- One tornado since last plan, June 5, 2014 (EF0)
- Identify mobile home park locations

Extreme Heat (moderate)

- From 2014 - 2020, the Pipestone weather station reported daily high temperatures ≥ 90 °F 30 times (4-5 days/year).
- The highest daily maximum temperature reported since 2014 was 98 °F recorded by the Pipestone station on June 10, 2015
- Since January 1996, two heat events (heat index 100 °F) and seven excessive heat events (heat index 105 °F) occurred. The relative frequency of heat-related events in the county is .3 per year.

Wildfire – Wildland Fire (low)

- There were zero wildfires in Rock County from January 2000 through February 2013 (2014 HMP)
- One debris fire reported by DNR 4/11/14
- Hazards deemed low risk and without significant mitigation actions, can be dropped from the plan.

Review of Mitigation Strategies & Example Actions

See Handout: Mitigation Strategies & Action Types

#1 - Local Planning & Regulations

These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.

EXAMPLES:

- Establishing & enforcing floodplain & shoreland ordinances
- Participating in the NFIP
- Developing stormwater management plans
- Long-term planning for infrastructure improvements
- Working with MHP operators to be in compliance with State statutes for storm shelters & evacuation plans.

NATIONAL FLOOD INSURANCE PROGRAM

#2 – Structure and Infrastructure Projects

These actions involve modifying existing structures to protect them from a hazard or remove them from a hazard area. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.

EXAMPLES:

- Property acquisitions (repetitive flooding/erosion risk)
- Structural elevations (flooding)
- Utility undergrounding
- Constructing floodwalls & retaining walls
- Improving culverts, roads & bridges
- Green infrastructure projects
- Safe room construction or retrofit

Community Safe Rooms

Wadena-Deer Creek School, June 17 2010

August, 2012 – 1st school based tornado safe room (Wadena)

PRESENTER : BONNIE HUNDRIESER

Power Line retrofit/burial

PRESENTER : BONNIE HUNDRIESER

#3 – Natural Systems Protection

These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.

EXAMPLES:

- Slope management for soil stabilization
- Shoreland restoration
- "Living Fences" for wind/erosion reduction or snow buffer
- Forest management for wildfire mitigation (fuels reduction)
- Flood diversion and storage

PRESENTER : BONNIE HUNDRIESER

#4 – Education & Awareness Programs

These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.

CodeRED®

Ready

SKYWARN WEATHER.GOV

EXAMPLES:

- Promoting sign-up for emergency notifications
- Educate on use of outdoor warning sirens and response
- Participation in the NWS Severe Weather Awareness Weeks
- SKYWARN Storm Spotter Training
- Turn Around Don't Drown
- Promoting personal & family emergency preparedness (i.e. Ready.gov)

PRESENTER : BONNIE HUNDRIESER

#5 – Mitigation Preparedness & Response Support

These are actions that help to protect life and property prior to, during, and immediately after a disaster or hazard event.

These activities are typically not considered mitigation, but support reduction of the effects of damaging events.

EXAMPLES:

- Emergency Notification Systems
- Emergency Operations Plans
- Outdoor warning sirens
- Shelter Planning
- Flood fight plans & equipment
- Training local elected officials in EM responsibilities
- Emergency backup generators for critical facilities

PRESENTER : BONNIE HUNDRIESER

FEMA HMA Grant Program

See Handout: HSEM HMA Grants Program Overview

✓ All applicants must have or be covered under an approved MHMP.

✓ Eligible applicants: State & local governments, Tribal Communities, and certain private non-profit organizations or institutions.

✓ Cost Share: Federal 75%/ Applicant 25%

✓ Eligible projects must be identified in the local MHMP.

Examples of Eligible Activities

- Property Acquisition/Relocation
- Safe Room Construction
- Minor Localized Flood Risk Reduction
- Green Infrastructure
- Infrastructure Retrofits
- Soil Stabilization
- Wildfire Mitigation
- 5% Initiative Projects

PRESENTER : BONNIE HUNDRIESER

Historical Projects in Rock County Resulting from HMA Funding since 2010

DR / project #	subrecipient	project type	100% project cost	federal share (%75)	local match (%25)
1990.05	Rock County	Plan	$36,956.00	$7,717.00	$9,239.00

Mitigation Ideas

Do you have questions or ideas to share about local hazards & vulnerabilities and proposed mitigation actions?

See Handout: Mitigation Ideas Worksheet

Next Steps — Fall 2020

Completion of Local Mitigation Survey (LMS) Forms

- Local hazard identification & risk prioritization.
- Local vulnerabilities (critical infrastructure, populations or assets)
- Local capabilities (programs, polices, staff, funding)
- Local mitigation projects.

Next Steps — Winter 2020

Development of Local Mitigation Action Charts

- County and City-Specific MACs
- 5-year window (2021-2026)
- Mitigation actions must address high and moderate risk hazards.
- Seek to include actions eligible for FEMA HMA grant funding.
- Mitigation actions must be informed by hazards of risk, as well as local capabilities & existing planning mechanisms.

Next Steps — Winter 2020-Spring 2021

Draft Plan Development & Initial Review

- Updated risk assessment & vulnerability analysis
- Development of hazard profiles (history, probability, impacts of climate change)
- GIS mapping
- HAZUS analysis
- EM initial review of draft plan

Next Steps — Spring-Summer 2021

Planning Team Meeting #2 and Public Review & Comment Period

- Hold Planning Team Mtg. #2 – presentation of draft plan and final review of Mitigation Action Charts.
- Disseminate & document news release by county and jurisdictions.
- Conduct draft plan review.
- Document local outreach and feedback.

Next Steps

Fall-Winter 2021

Draft Plan Submission to HSEM & FEMA for Approval

- Draft plan will be submitted first to HSEM and then to FEMA for approval for meeting all Federal requirements.
- Typically requires 1-2 months.
- APA letter
- EM coordination of adopting resolutions

PRESENTER : BONNIE HUNDRIESER

Questions?

What questions do you have for U-Spatial@UMD about the MHMP update process?

PRESENTER : STACEY STARK

Contact Information

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U-SPATIAL
University of Minnesota Duluth
Driven to Discover

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HUNDRIESER CONSULTING LLC

PRESENTER : STACEY STARK

Mitigation Strategies & Action Types

Following are the five types of mitigation strategies that will be used in the update of the Multi-Hazard Mitigation Plan with examples of related mitigation actions. Minnesota HSEM recommends the use of these mitigation strategies to be in alignment with the State plan and those recommended by FEMA. The first four strategies listed are taken from the FEMA publications *Local Mitigation Planning Handbook* (2013) and *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* (2013). The fifth strategy type was determined by Minnesota HSEM for use within the state.

These strategies will provide the framework for identification of new jurisdictional-level mitigation actions for implementation over the next 5-year planning cycle.

Mitigation Strategy	Description	Example Mitigation Actions
Local Planning and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	• Comprehensive plans • Land use ordinances • Planning and zoning • Building codes and enforcement • Floodplain ordinances • NFIP Community Rating System • Capital improvement programs • Open space preservation • Shoreline codes • Stormwater management regulations and master plans • Mobile home park compliance for storm shelters
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.	• Property Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits (i.e., metal roofs) • Floodwalls and retaining walls • Detention and retention structures • Culvert Installation/Modification • Roads & Bridge risk reduction • Safe Room (New construction or facility retrofit) • Green Infrastructure Methods *Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.*

Mitigation Strategy	Description	Example Mitigation Actions
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	• Soil stabilization for sediment and erosion control • Floodplain and Stream corridor restoration • Slope management • Forest management (defensible space, fuels reduction, sprinkler systems) • Conservation easements • Wetland restoration and preservation • Aquifer Storage & Recovery • Flood Diversion and Storage *Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.*
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions that support life safety and lessen property damage.	• Radio or television spots • Websites with maps and information • Social media outreach • Promotion of sign-up for emergency warnings • Real estate disclosure • Promotion of NFIP insurance to property owners • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas. • NWS StormReady Program • Firewise Communities *Some of these types of actions may be projects eligible for funding through the FEMA HMA "5 Percent Initiative Program".*
Mitigation Preparedness and Response Support	This is a State of Minnesota mitigation strategy with the intent of covering emergency preparedness actions that protect life and property prior to, during, and immediately after a disaster or hazard event. These activities are typically not considered mitigation, but support reduction of the effects of damaging events.	• Emergency Operations Plan • Flood fight plans and preparedness measures • Dam emergency action plans • Emergency Warning Systems (i.e., CodeRed, warning sirens) • Generator backup power • NWS Storm Spotter Training • Training and education for local elected officials and key partners.

State of Minnesota
Department of Public Safety
Division of Homeland Security and Emergency Management
445 Minnesota Street, Suite 223
St. Paul, MN 55101-6223

HAZARD MITIGATION ASSISTANCE

Hazard Mitigation Assistance (HMA) grant programs provide funding with the aim to reduce or eliminate risk to property and loss of life from future natural disasters. HMA programs are typically a 75%/25% cost share program. The federal share is 75% of total eligible project reimbursement costs. The local applicant is responsible for 25% of the project costs. The amount of HMGP funds availability is based on a percent of Public Assistance provided by Federal Emergency Management Agency (FEMA).

- Hazard Mitigation Grant Program (HMGP) funds assists in implementing long-term hazard mitigation measures following a Presidential major disaster declaration.
- Pre-Disaster Mitigation (PDM) provides funds for hazard mitigation planning and projects on an annual basis.
- Flood Mitigation Assistance (FMA) provides funds on an annual basis to reduce or eliminate risk of flood damage to buildings that are insured under the National Flood Insurance Program (NFIP).

Who is eligible for grant funding?
All applicants must have or be covered under an approved Hazard Mitigation Plan. Eligible applicants include: State and local governments; certain private non-profit organizations or institutions; and Tribal Communities

What types of projects can be funded?
All projects must be eligible, technically feasible, and cost-effective. All projects are subject to environmental and cultural resource review. Examples of projects include:

- **Advance Assistance** may be used to develop mitigation strategies and obtain data, including for environmental and historic preservation compliance considerations, and develop complete project applications in a timely manner.

- **Aquifer Storage and Recovery** (ASR) projects serve primarily as a drought management tool, but can also be used to reduce flood risk and restore aquifers that have been subject to overdraft. The concept is to capture water when there is an abundant supply, store the water in subsurface aquifers, and recover water from the storage aquifer when needed. Storing water underground can help protect it from pollutants, evaporation, and weather events.

- **Floodplain and stream restoration** (FSR) projects are used primarily to reduce flood risk and erosion by providing stable reaches, and may also mitigate drought impacts. FSR projects restore and enhance the floodplain, stream channel and riparian ecosystem's natural function. They provide base flow recharge, water supply augmentation, floodwater storage, terrestrial and aquatic wildlife habitat, and recreation opportunities by restoring the site's soil, hydrology and vegetation conditions that mimic pre-development channel flow and floodplain connectivity.

- **Flood Diversion and Storage** (FDS) projects often are used to reduce flood risk, but also can be used to mitigate drought and improve ecosystem services. These projects involve diverting floodwaters from a stream, river, or other body of water into a conduit such as a canal, pipe, or wetland and storing them in an above-ground storage facility. Water is then slowly released, reducing flood risk.

- **Green Infrastructure Methods** are a sustainable approach to natural landscape preservation and storm water management. Include in *eligible hazard mitigation activities* as well as provide additional ecosystem benefits**.** Ecosystem-based approach to replicate a site's pre-development, natural hydrologic function. Benefits include: Increase water supply, improved water quality, can be scaled to size and designed to fit site conditions.

- **Property Acquisition and Structure Demolition or Relocation –** The voluntary acquisition of an existing at-risk structure and the underlying land, and conversion of the land to open space through the demolition or relocation of the structure. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions.

- **Retrofit Flood-Prone Residential Structures** are changes made to an existing structure to reduce or eliminate the possibility of damage to that structure from flooding, erosion, or other hazards. Examples of this mitigation are primarily elevation of structures above flood levels and floodwalls.

- **Safe Room Construction** - Safe room construction projects are designed to provide immediate life-safety protection for people in public and private structures from tornado and severe wind events. Includes retrofits of existing facilities or new safe room construction projects, and applies to both single and dual-use facilities

- **Minor Localized Flood Reduction Projects** - Projects to lessen the frequency or severity of flooding and decrease predicted flood damages, such as the installation or up-sizing of culverts, and stormwater management activities, such as creating retention and detention basins. These projects must not duplicate the flood prevention activities of other Federal agencies and may not constitute a section of a larger flood control system.

- **Infrastructure Retrofit** - Measures to reduce risk to existing utility systems, roads, and bridges.

- **Soil Stabilization -** Projects to reduce risk to structures or infrastructure from erosion and landslides, including installing geotextiles, stabilizing sod, installing vegetative buffer strips, preserving mature vegetation, decreasing slope angles, and stabilizing with rip rap and other means of slope anchoring. These projects must not duplicate the activities of other Federal agencies. *New tools for Bioengineered Shoreline Stabilization, Bioengineered Streambank Stabilization.*

- **Wildfire Mitigation** - Projects to mitigate at-risk structures and associated loss of life from the threat of future wildfire through: Defensible Space for Wildfire, Application of Ignition-resistant Construction and Hazardous Fuels Reduction. *New tool for Bioengineered Wildfire Mitigation.*

- **HMGP only - 5 Percent Initiative Projects** – These projects, which are only available pursuant to an HMGP disaster, provide an opportunity to fund mitigation actions that are consistent with the goals and objectives of approved mitigation plans and meet all HMGP program requirements, but for which it may be difficult to conduct a standard Benefit-Cost Analysis (BCA) to prove cost-effectiveness.

How do I apply?
Start by submitting a Notice of Interest, available on HSEMs website at:
https://dps.mn.gov/divisions/hsem

Where can I obtain further information?
For additional information about the HMA grant program, you can refer to the FEMA website:
http://www.fema.gov/hazard-mitigation-assistance

MITIGATION IDEAS WORKSHEET

Please use the following worksheet to list your ideas for mitigation actions that you feel will help reduce the impact of future natural hazard events to the county or to your jurisdiction. Following the MHMP planning team meeting, please return this form via email to your county Emergency Manager to submit your feedback.

NAME OF JURISDICTION:

CONTACT INFORMATION
Name:
Phone:
Email:

Hazard	Description of Concern or Proposed Mitigation Action

Rock County MHMP Planning Team Meeting #2
November 18, 2021 - Meeting Summary & Documentation

Summary: On Thursday, November 18, 2021, Rock County Emergency Management convened key county, city, and township representatives, as well as neighboring jurisdictions and other stakeholders to participate in the 2nd and final Planning Team Meeting for the update of the Rock County Multi-Hazard Mitigation Plan (MHMP). The purpose of the meeting was to formally convene the Rock County MHMP Planning Team for a presentation on the draft plan and discussion of key items prior to public review and submission of the plan to HSEM and FEMA. The meeting was held via Zoom webinar video conference and was facilitated by Stacey Stark and Bonnie Hundrieser of the U-Spatial@UMD project team.

Stakeholder Invitations: Rock County Emergency Management invited all stakeholders included on the county's MHMP Update Jurisdictional Contact List (JCL), which includes the key County Contacts, City Contacts, Township Contacts, Other Stakeholder Contacts, and Neighboring Jurisdiction Contacts identified to be invited to participate in the plan update process. Contacts were encouraged to engage additional staff or to send someone in their stead if they could not attend. A copy of the county's Jurisdictional Contact List is provided in *Appendix F Steering Committee Meetings*.

Meeting Participants: A total of 20 people attended the meeting. Representation included elected officials and departmental staff from Rock County and the cities of Beaver Creek, Hardwick, Hills, Jasper, and Luverne. The cities of Kenneth and Steen were not able to attend. Other stakeholders, including neighboring jurisdictions, participated in the meeting. A participant list is included with this meeting summary.

Presentation Overview: The PowerPoint presentation covered the following items about the process and content of the plan update. A PDF of the presentation slides is included with this meeting summary.

- Meeting Purpose and Agenda
- About the Project Team
- Overview of Plan Update
- Who the Plan Covers
- Who Needs to Participate
- Prioritization of Hazards
- Hazards Risk Assessment (Critical Infrastructure, Population Vulnerability Factors, and Review of High/Moderate Priority Natural Hazards)
- Development of Mitigation Actions
- FEMA HMA Grant Funding
- Overview of Mitigation Action Charts and Discussion
- Discussion of Next Steps & answer your questions

The opening PowerPoint presentation covered a re-cap of key points about the plan update, a review of the Risk Assessment & Vulnerability Analysis, an overview of FEMA Hazard Mitigation Assistance (HMA) grant funding; an overview of how mitigation actions are developed and an overview of the jurisdictional Mitigation Action Charts (MACs). Following the presentation, participants were provided with an opportunity to review and discuss the county and local mitigation action charts. This discussion period offered a facilitated opportunity for participants to consider any changes or new additions to the MACs prior to completion of the draft plan for public review.

Discussion Notes: Following is an overview of key discussion points, questions, or mitigation ideas that were shared during the presentation and how they will be incorporated into the plan update.

Meeting Participant	Comment, Question or Mitigation Ideas	Facilitator Feedback / Plan Incorporation
Kyle Oldre, Rock County Administrator / EM Director	During the overview of the prioritization of natural hazards for Rock County, Kyle asked for clarification on why non-natural hazards such as civil disobedience and pandemics were not included in this plan update, since they were included in the last plan.	Stacey Stark explained that the grant funding and contract from FEMA to the State of MN, with a portion of funds allocated to Rock County for their plan update, was limited to address natural hazards (risk assessment, vulnerability analysis, and development of mitigation actions), and that work on non-natural hazards was outside of U-Spatial's realm of expertise. However, Rock County is welcome to develop/submit an appendix for non-natural hazards that we can add to the back of the plan if he would like to do so.

Meeting Conclusion: The meeting concluded with an overview and timeline of the upcoming next steps of posting the plan for public review and input and submitting the draft plan to HSEM and FEMA for final review and approval.

Exit Survey: Following the Zoom meeting, participants were provided with a short survey they were invited to fill out before upon their departure in order to gather some final feedback.

1. **Thank you for attending! Did this webinar meet your expectations? Did you get the information you were hoping to receive?**

   Yes (4), No (0), Not sure (0)

2. **Do you have any comments or questions about hazards or mitigation actions? Do you have any questions for the consultants?**

   - Good meeting.
   - Excellent report.
   - Not at this time.

Attached are the following documentation items for the Rock County MHMP Meeting #2:

- 11-18-21 Mtg. #2 Email Invitation
- 11-18-21 Mtg. #2 List of Participants
- 11-18-21 Mtg. #2 Power Point Slides
- 11-18-21 Mtg. #2 Handouts

Meeting Summary Prepared By: Bonnie Hundrieser, U-Spatial@UMD Project Team

From:	Susan Skattum
To:	Evan Verbrugge; Eric Hartman; Mark Sehr; Gary Overgaard; Ashley Kurtz; Arlyn Gehrke; jane@cityofbeavercreekmn.com; Josh.teune@cityofbeavercreekmn.com; cityofhardwick@frontiernet.net; thomashaas25@yahoo.com; ctyhills@alliancecom.net; kaelbers@alliancecom.net; jasper@iw.net; Kdhoven2@gmail.com; suetweet@hotmail.com; jcall@cityofluverne.org; pbaustian@cityofluverne.org; jmead@cityofluverne.org; cityofmagnolia@alliancecom.net; dmjmadison@yahoo.com; mvanbata@alliancecom.net; amckenzie@smithfield.com; pcbakken@alliancecom.net; jdfarmer@live.com; brad.skattum57@gmail.com; a.sandbulte77@gmail.com; Jsbuysse7300@gmail.com; Josh.rheault@plantpioneer.com; stovetop@icloud.com; stacy@riggstrucking.com; maover@msn.com; nnovergaard@yahoo.com; hemmekya@yahoo.com; ks29rr@gmail.com; chris.ingebretsen@state.mn.us; Jason.Kloss@swmhhs.com; Michele.Neilson@siouxvalleyenergy.com; c.oftedahl@isd2184.net; t.holthaus@isd671.net; edward.gilmore@usda.gov; bheitkamp@co.nobles.mn.us; casey.sievert@co.pipestone.mn.us; CNyquist@co.murray.mn.us; mark.marcy@state.mn.us
Cc:	hundrieserconsulting@outlook.com; Kyle Oldre
Subject:	Rock County MHMP Planning Team Meeting Invitation - Nov 18, 2021
Date:	Wednesday, September 8, 2021 4:12:19 PM
Importance:	High

ROCK COUNTY

MULTI-HAZARD MITIGATION PLAN UPDATE – MEETING INVITATION

Greetings,

Your presence is requested at the **2nd Planning Team Meeting** for the update of the **Rock County Multi-Hazard Mitigation Plan (MHMP).** This meeting will be the final planning meeting for the hazard mitigation planning process for the county, city jurisdictions, and other stakeholders.

You are requested to participate in this vital meeting because you have a position of administrative or departmental responsibility within either the county, a municipal government, or are a key stakeholder related to the planning process. Emergency Managers from neighboring jurisdictions are also encouraged to attend so we may strengthen our shared mitigation efforts.

We will be holding the meeting virtually using Zoom video/phone conferencing:

Date: Thursday, November 18, 2021
Time: 9:00 a.m. – 11:00 a.m.
Zoom Link: **https://umn-private.zoom.us/webinar/register/WN_MhKzrWgSSbG8SpLiUVqDgQ**

You must click on the link above to register. (Ctrl + click to follow link)

The purpose of this meeting is to provide a final overview of the plan, including a review of the updated risk assessment for natural hazards that affect the county (history, local vulnerabilities, and future trends). We will also discuss the Mitigation Action Charts that have been developed for Rock County and each city, as well as funding opportunities for eligible projects under the FEMA Hazard Mitigation Assistance grant program. Your participation in this meeting and feedback on the draft plan is important to us. The draft Rock County MHMP is underway and will be ready for review by planning team members and the public following this meeting.

When you register, you will automatically be placed on an RSVP list. Please be sure to include the name, title and representation (jurisdiction/agency) for all persons planning to attend the meeting.

Thank you,

Kyle J. Oldre, Rock County Administrator/Emergency Management

Rock County
11/18/21 MHMP Planning Team Meeting #2
List of Participants (20)

	First Name	Last Name	Organization	Job Title
1	Kyle	Oldre	Rock County	County Administrator / Emergency Management Director
2	Susan	Skattum	Rock County	Deputy Administrator
3	Gary	Overgaard	Rock County	County Commissioner
4	Mark	Sehr	Rock County Highway Department	County Engineer
5	Eric	Hartman	Rock County Land Management	Director
6	Ashley	Kurtz	Rock County	Auditor-Treasurer
7	Arlyn	Gehrke	Rock County Land Management	Engineering Technician
8	Joshua	Teune	City of Beaver Creek	Mayor
9	Gordon	Hansen	City of Hardwick	Councilman
10	Keith	Elbers	City of Hills	Mayor
11	Cortney	Kounkel	City of Jasper	Clerk-Treasurer
12	John	Call	City of Luverne	City Administrator
13	Brad	Skattum	Vienna Township	Township Chair
14	Doug	Eeten	Vienna Township	Township Clerk
15	Craig	Oftedahl	Luverne Public School	Superintendent
16	Jason	Kloss	Southwest Health and Human Services	Environmental Health Manager
17	Mark	Marcy	MN DPS/HSEM	Regional Coordinator
18	Chris	Ingebretsen	State of MN Blue Mounds State Park	Park Manager
19	Dennis	Madison	City of Magnolia	Mayor
20	Casey	Sievert	Pipestone County	Director of EMS & Emergency Management

ROCK COUNTY
Multi-Hazard Mitigation Plan Update 2021
Planning Team Meeting #2

NOVEMBER 18, 2021

U-SPATIAL
UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover℠

Welcome & Introductions

U-Spatial@UMD Project Leads

Stacey Stark
Project Manager
U-Spatial@UMD

Bonnie Hundrieser
HM Planning Specialist
Hundrieser Consulting LLC

Rock County Project Lead

- Kyle Oldre, Rock County Emergency Management Director

Rock County MINNESOTA

Please type your name and jurisdiction in the CHAT – so others know who is here

PRESENTER: STACEY STARK

Zoom Logistics

If you haven't yet, please type your name and jurisdiction or department in the Chat window

PLEASE REMAIN MUTED AND VIDEO OFF SO EVERYONE CAN HAVE THE BEST EXPERIENCE.

USE CHAT:

- Send a message to everyone
- Send a message to individuals or the presenters
- Send a message to host to ask for help or ask a question that isn't for the whole group. The host is Stacey Stark

ASK TO SPEAK:

PRESENTER: STACEY STARK

Meeting Purpose & Agenda

2019 flood event

The purpose of this meeting is to formally convene the Rock County MHMP Planning Team for a presentation on the draft plan and discussion of key items prior to public review and submission of the plan to HSEM and FEMA.

Hazard Mitigation Planning Meeting #2 Agenda

- Welcome & Introductions
- Recap of Key MHMP Points
- Review of Risk Assessment & Vulnerability Analysis
- Overview of FEMA HMA Funding and Mitigation Action Charts (MAC)
- MAC Review & Feedback
- Next Steps

PRESENTER: STACEY STARK

About your Project Team

U-SPATIAL
UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover℠

U-Spatial at the University of Minnesota Duluth was contracted by MN HSEM to facilitate the development of this plan and to conduct spatial analysis, mapping and research for the plan.

This Hazard Mitigation Plan is one of many we are working on this year.

Working with U-Spatial@UMD is **Bonnie Hundrieser**, who specializes in Emergency Management planning.

PRESENTER: STACEY STARK

Overview of Plan Update

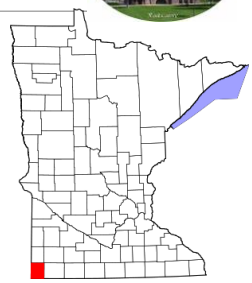
Rock County is updating its **Multi-Hazard Mitigation Plan (MHMP)** to fulfill a state & federal requirement. The plan must be updated every 5 years. The last plan was adopted in 2015.

The purpose of the plan is to identify & assess natural hazards that pose risk to the county and it's jurisdictions and **develop long-term strategies and mitigation actions** that will help to reduce or eliminate the impact of future hazard or disaster events.

Hazard Mitigation is any action taken to reduce or eliminate long term risk to people and property from natural disasters.

PRESENTER: BONNIE HUNDRIESER

Who the Plan Covers



This is a **multi-jurisdictional plan** that covers Rock County, including the cities of Beaver Creek, Hardwick, Hills, Jasper, Kenneth, Luverne, Magnolia, and Steen.

The county and cities are required to adopt the final plan. Townships are covered under the umbrella of the county but may also elect to adopt the plan.

Who Needs to Participate

Key Stakeholders

It is required to provide an opportunity for local county & municipal government, related agency stakeholders and neighboring jurisdictions to participate in the plan update.

- 2 Planning Team Meetings
- Local Mitigation Survey
- Provision of key data
- MAC Review & Feedback
- Review of Draft Plan

The Public

It is required to provide an opportunity for the public to learn about the plan update, ask questions and provide input that may be incorporated into the plan update.

- 2 News Releases
- Outreach conducted via websites, social media and local media
- Online public review & comment period for draft plan

Prioritization of Hazards for Rock County

NATURAL HAZARDS

Prioritization of hazards by the Rock County planning team included consideration of:

- Probability and Severity of natural hazard events (risk)
- Observed increase or decrease in risk since 2015
- Jurisdictional variations in risk (i.e., local vulnerabilities, changes in development)

Hazard	2020 Priority
Winter Storms	High
Extreme Cold	High
Flooding	High
Drought	Moderate
Windstorms	Moderate
Tornadoes	Moderate
Extreme Heat	Moderate
Hail	Moderate to Low
Lightning	Low
Landslides/Land Sub.	Low
Wildfire-Wildland Fire	Low

Questions / Comments?

Hazards Risk Assessment

- Validate prioritization
- Provide probability and severity of future events as possible
- Identify vulnerable populations and structures at risk as possible
- Consider variable jurisdictional vulnerability
- Inform Mitigation Actions in the HMP

2019 flood event – dam break

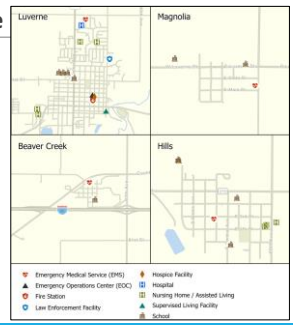
U-Spatial@UMD – County Coordination

U-Spatial@UMD Team has worked closely with personnel from the county to collect key information for the plan update.

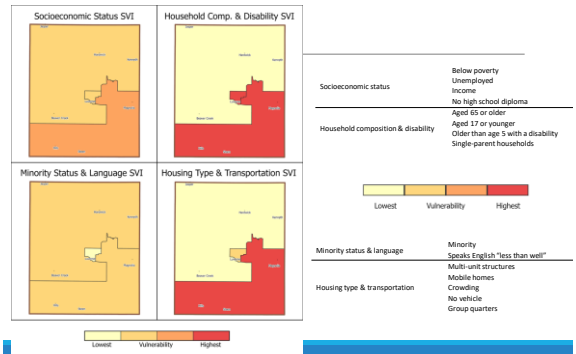
- County Emergency Management Director
- County GIS Specialist
- County Assessor
- County Departments (i.e. Highway, Planning & Zoning, others).
- Others (SWCD, USFS)

All Hazards – Critical Infrastructure

- Healthcare Facilities
- Emergency Services
- Schools and Shelters
- Transportation
- Utilities
- Dams and Levees
- Hazardous Materials Facilities
- Major Employers
- Government Buildings
- Cultural Resources



All Hazards – Population Vulnerability



ROCK COUNTY: Winter Storms (high)

Associated Press

6.2 winter-related storm events per year in Rock County

Vulnerability - Program Gaps & Deficiencies:

- *Aboveground Powerlines*
- *Backup Power for critical facilities*
- *Public sign-up for emergency notifications*

April, 2018 Winter Storm with power line damage

ROCK COUNTY: Extreme Cold (high)

The county experiences an average **of 2-3 extreme cold days each year** (daily minimum temperature reached −18 °F).

The frequency of cold-related events in Rock County is **.9** per year. (−25 °F and colder with wind chill)

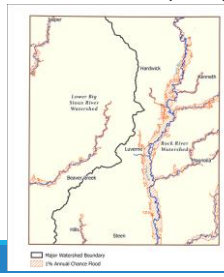
Program Gaps and Deficiencies:
Obtaining generators for backup power to healthcare facilities and designated shelter facilities.

Plans and Programs in Place
Emergency Notifications – NWS & Rock County Emergency Management
School Closings – policy and communication plans
NWS Winter Hazard Awareness Week – public education & awareness

ROCK COUNTY: Flooding (high)

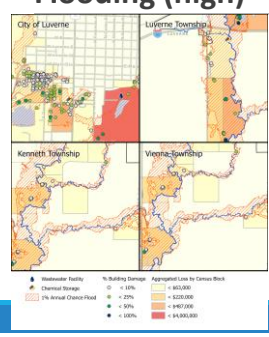
2019 flood damage

- Obtained building and parcel values from County
- Used statewide building footprint data
- Obtained FEMA Flood Insurance Rate Maps
- Ran flood model to estimate economic loss
- Identified Critical Infrastructure in flood zone



ROCK COUNTY: Flooding (high)

2019 flood event – road damage



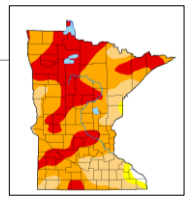
Jurisdiction (county subdivision)	Buildings in Floodplain	Est Building and Contents Loss
Luverne City	184	$ 6,428,727
Luverne Township	50	$ 1,213,257
Beaver Creek Township	10	$ 92,749
Clinton Township	5	$ 36,485
Vienna Township	22	$ 264,162

ROCK COUNTY: Drought (moderate)

- From 2016 – 2021, Rock County was in Moderate (D1) Drought <20% of the time.
- From January 2000 through February 2021:

  Moderate Drought – avg of 10.4 weeks /yr

  Severe Drought – avg of 6.4 weeks /yr



Data from U.S. drought monitor August 3. 2021

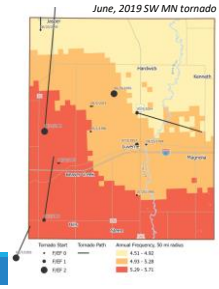
Abnormally Dry
Drought - Moderate
Drought - Severe
Drought - Extreme
Drought - Exceptional

PRESENTER: STACEY STARK

ROCK COUNTY: Tornadoes (moderate)

June, 2019 SW MN tornado

- Based NCEI Storm Events Database through August 2021, 13 tornadoes have occurred in Rock County (.18 per year)
- One tornado since last plan, June 5, 2014 (EF0)
- Current concerns about the availability of tornado safe rooms and upgrade of outdoor warning sirens.
- **Windstorms** are also of moderate priority in Rock County (~3.1/year)



Questions / Comments?

Development of Mitigation Actions

- Must address hazards of high to moderate risk
- Must be jurisdictionally-specific
- Should address local vulnerabilities & reduce risk
- Should incorporate existing planning mechanisms and capabilities

Important

Eligible FEMA HMA project activities must be identified to support a future grant application.

FEMA HMA Grant Funding

FEMA

- All applicants must be covered by an approved MHMP
- Cost share: Federal 75%, Applicant 25%
- Projects must address risk reduction.
- Eligible projects must be identified in the plan of action.

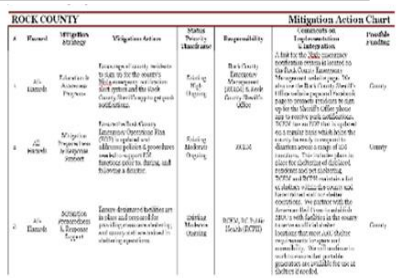
Example Eligible Activities:

- Property Acquisition (flooding/erosion)
- Tornado Safe Rooms (new/retrofit)
- Infrastructure Retrofits (utility systems, roads & bridges)
- Wildfire Mitigation
- Soil Stabilization
- Flood Risk Reduction
- Green Infrastructure
- Other projects difficult to conduct a standard BCA

PRESENTER: BONNIE HUNDRIESER

Mitigation Action Charts Overview

- County MAC (includes townships)
- City MACs
- 5-year window
- Please consider any additional mitigation actions you would like to add to your local MAC.



ROCK COUNTY — Mitigation Action Chart

Local Planning & Regulations

ROCK COUNTY EXAMPLES:

- Participate in the NFIP
- Develop & enforce sump pump ordinances to reduce I&I into city sewer system.
- Collaborate with SWCD and watershed districts to address flooding and erosion.
- Work with MHP operators to be in compliance with Minnesota State statutes for storm shelters & evacuation plans.
- Utilize local ordinances for water use restrictions during periods of severe drought.

Structure & Infrastructure Projects

ROCK COUNTY EXAMPLES:

- Installation of new outdoor warning sirens.
- Construction of safe rooms / storm shelters at MHPs, campgrounds, city parks, fairgrounds.
- Burying powerlines to reduce power failure
- Implementing stormwater improvement projects for high rain and snow melt (i.e. drainage ditches, culvert upsizing).
- Conducting property buyouts of homes at risk from repetitive flooding or erosion and convert to open space.

Natural Systems Protection

ROCK COUNTY EXAMPLES:

- Work with MnDOT on the planting of living snow fences along high-drift road corridors.
- Conduct vegetation management along county roads to reduce downed limbs and trees from severe storms.

Education & Awareness Programs

ROCK COUNTY EXAMPLES:

- Promoting sign-up for the County's Nixle emergency notification system.
- Promoting residents to be aware of and prepared for severe weather and extended power outages.
- Encouraging residents to maintain sump pumps and to clear street drains of debris.
- Participation in the NWS Severe Weather Awareness Weeks
- SKYWARN Storm Spotter Training

Mitigation Preparedness & Response Support

ROCK COUNTY EXAMPLES:

- Purchasing generators for critical services or facilities (i.e., sewer, city well, City Hall, fire hall, community centers).
- Updating EOP's
- Shelter Planning
- Working with long-term care facilities to be prepared for power outages or evacuation.
- Training local elected officials in EM responsibilities

Questions / Comments?

Next Steps

Fall-Winter 2021

Planning Team Meeting #2 and Public Review & Comment Period

- Following Planning Team Mtg. #2, disseminate & document news release by county and jurisdictions.
- Conduct public review & comment period (stakeholder & public review of draft plan).
- Document and incorporate feedback into the plan as appropriate.

PRESENTER: BONNIE HUNDRIESER

Next Steps

Winter 2021 - Spring 2022

Draft Plan Submission to HSEM & FEMA, Plan Approval, and Collection of Adopting Resolutions

- Draft plan will be submitted first to HSEM and then to FEMA for approval for meeting all Federal requirements.
- Typically requires 1-2 months.
- APA letter
- EM coordination of adopting resolutions

PRESENTER: BONNIE HUNDRIESER

Questions?

What questions do you have for U-Spatial@UMD about the draft MHMP or next steps ?

PRESENTER: STACEY STARK

Contact Information

Stacey Stark, MS, GISP
U-Spatial@UMD
slstark@d.umn.edu
218-726-7438

U-SPATIAL
University of Minnesota Duluth
Driven to Discover

Bonnie Hundrieser, HM Planner
Hundrieser Consulting LLC
hundrieserconsulting@outlook.com
218-343-3468

HUNDRIESER CONSULTING LLC

PRESENTER: STACEY STARK

Mitigation Strategies & Action Types

Following are the five types of mitigation strategies that will be used in the update of the Multi-Hazard Mitigation Plan with examples of related mitigation actions. Minnesota HSEM recommends the use of these mitigation strategies to be in alignment with the State plan and those recommended by FEMA. The first four strategies listed are taken from the FEMA publications *Local Mitigation Planning Handbook* (2013) and *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* (2013). The fifth strategy type was determined by Minnesota HSEM for use within the state.

These strategies will provide the framework for identification of new jurisdictional-level mitigation actions for implementation over the next 5-year planning cycle.

Mitigation Strategy	Description	Example Mitigation Actions
Local Planning and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	• Comprehensive plans • Land use ordinances • Planning and zoning • Building codes and enforcement • Floodplain ordinances • NFIP Community Rating System • Capital improvement programs • Open space preservation • Shoreline codes • Stormwater management regulations and master plans • Mobile home park compliance for storm shelters
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.	• Property Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits (i.e., metal roofs) • Floodwalls and retaining walls • Detention and retention structures • Culvert Installation/Modification • Roads & Bridge risk reduction • Safe Room (New construction or facility retrofit) • Green Infrastructure Methods *Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.*

Mitigation Strategy	Description	Example Mitigation Actions
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	• Soil stabilization for sediment and erosion control • Floodplain and Stream corridor restoration • Slope management • Forest management (defensible space, fuels reduction, sprinkler systems) • Conservation easements • Wetland restoration and preservation • Aquifer Storage & Recovery • Flood Diversion and Storage *Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.*
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions that support life safety and lessen property damage.	• Radio or television spots • Websites with maps and information • Social media outreach • Promotion of sign-up for emergency warnings • Real estate disclosure • Promotion of NFIP insurance to property owners • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas. • NWS StormReady Program • Firewise Communities *Some of these types of actions may be projects eligible for funding through the FEMA HMA "5 Percent Initiative Program".*
Mitigation Preparedness and Response Support	This is a State of Minnesota mitigation strategy with the intent of covering emergency preparedness actions that protect life and property prior to, during, and immediately after a disaster or hazard event. These activities are typically not considered mitigation, but support reduction of the effects of damaging events.	• Emergency Operations Plan • Flood fight plans and preparedness measures • Dam emergency action plans • Emergency Warning Systems (i.e., CodeRed, warning sirens) • Generator backup power • NWS Storm Spotter Training • Training and education for local elected officials and key partners.

Appendix G – Public Outreach & Engagement Documentation

Rock County MHMP News Release #1
Record of Public Input & Incorporation

Overview: On September 2, 2020, Rock County Emergency Management put out a news release titled "**Public Input Wanted as County Updates Multi-Hazard Mitigation Plan"** to announce the start of the county's Multi-Hazard Mitigation Plan. The news release provided information on the purpose and content of the plan, who the plan covers, stakeholders involved in the plan update and examples of hazard mitigation activities. Rock County used the news release to gather feedback from residents and businesses from across the County to incorporate into the plan, inviting feedback to the following:

- What are the natural hazards you feel pose the greatest risk to your community?
- Have you experienced a previous disaster event?
- What concerns do you have, and what sorts of mitigation actions or projects do you feel would help to reduce the damages of potential future events for your personal property, your community, or the County as a whole?

The public was strongly encouraged contact Rock County Emergency Management to submit comments, concerns, or questions regarding natural disasters and potential mitigation actions to be included into the plan update process. The public was also able to post comments electronically on county or city Facebook sites where the news release was posted.

Distribution: The following news release was sent via email to the county's MHMP Jurisdictional Contact List, which includes the names, titles, phone numbers, and email addresses of key stakeholders to be engaged in the MHMP update **(County Contacts, City Contacts, Township Contacts, Other Stakeholder Contacts, and Neighboring Jurisdiction Contacts).** The news release was additionally sent to local media contacts such as area newspapers, radio and television channels with a request to carry the news release.

Postings: The news release was shared via numerous channels to reach the public, including the Rock County website, Rock County Facebook Page, and Rock County Star Herald. Cities and townships were encouraged to help share the news release locally by posting it on their websites, social media, or community bulletin boards.

Public Input & Incorporation:
Following is a record of public responses to the news release and how their input will be incorporated into the plan update, and if not relevant to be addressed, why.

> **No Public Input Received:** Rock County Emergency Management did not receive any public feedback via direct feedback or postings to the Rock County Facebook page.

Following is documentation of the means of public outreach for News Release #1.

From:	Kyle Oldre
To:	Evan Verbrugge; Eric Hartman; Ashley Kurtz; "bcvc@centurytel.net"; "Josh.teune@cityofbeavercreekmn.com"; "cityofhardwick@frontiernet.net"; "ctyhills@alliancecom.net"; "kaelbers@alliancecom.net"; "jasper@iw.net"; "Kdhoven2@gmail.com"; "suetweet@hotmail.com"; "jcall@cityofluverne.org"; "pbaustian@cityofluverne.org"; "glendaps@vastbb.net"; "dmjmadison@yahoo.com"; "mvanbata@alliancecom.net"; "pcbakken@alliancecom.net"; "jdfarmer@live.com"; "brad.skattum57@gmail.com"; "a.sandbulte77@gmail.com"; "Jsbuysse7300@gmail.com"; "Josh.rheault@plantpioneer.com"; "stovetop@icloud.com"; "stacy@riggstruckin.com"; "maover@msn.com"; "nnovergaard@yahoo.com"; "hemmekya@yahoo.com"; "ks29rr@gmail.com"; "chris.ingebretsen@state.mn.us"; "Jason.Kloss@swmhhs.com"; "Michele.Neilson@siouxvalleyenergy.com"; "c.oftedahl@isd2184.net"; "t.holthaus@isd671.net"; "edward.gilmore@usda.gov"; "bheitkamp@co.nobles.mn.us"; "casey.sievert@co.pipestone.mn.us"; "CNyquist@co.murray.mn.us"; Mark Sehr; Gary Overgaard; "arlyn.gerhke@co.rock.mn.us"
Cc:	"Cc:"; "mark.marcy@state.mn.us"
Subject:	Rock County Multi-Hazard Mitigation Plan Update 2020
Date:	Wednesday, September 2, 2020 2:35:55 PM
Attachments:	Rock MHMP New Release #1.pdf

Greetings,

Rock County Emergency Management is commencing work on the update of the Rock County 5-year Multi-Hazard Mitigation Plan (MHMP). Attached is a news release for your information.

Over the next year we will be working with a planning team made up of representatives from the County and each city covered by the plan, as well as townships, neighboring jurisdictions, and other key stakeholders to gather feedback and document participation in the planning process. Key activities will include participation in 2 planning team meetings, providing requested information, and identifying local mitigation projects that will help to reduce or eliminate the impacts of future hazard events. Please watch for emails inviting your participation in the coming months.

Cities and Townships: You are requested to post this news release locally to strengthen our public outreach. Please send me a link of the news release posting to your city website, social media, or photo of it posted at a community facility or bulletin board (i.e., City Hall, Township Hall, Post Office, local community center).

I look forward to your participation in the Rock County MHMP update.

If you have any questions, please let me know.

Thank you,
Kyle Oldre
507-283-5065

ROCK COUNTY
BOARD OF COMMISSIONERS

ROCK COUNTY NEWS RELEASE
September 2, 2020, 2020

Public Input Wanted as County Updates
Multi-Hazard Mitigation Plan

Tornadoes, straight-line winds, ice storms, blizzards, flooding, wildland fires and droughts are the kinds of natural disasters most likely to cause widespread economic loss and personal hardship in Rock County. Taking steps to minimize the damage from a natural disaster is key to the County's multi-hazard mitigation plan (MHMP); and as the County works to update the plan, it wants to hear from the public.

The Rock County Office of Emergency Management is currently working with U-Spatial at the University of Minnesota Duluth to update the County's plan. Also working on the update is a planning team of representatives from County departments, local municipalities, school districts and other key stakeholders such as utility providers.

The Rock County MHMP is a multi-jurisdictional plan that covers Rock County, including the cities of Beaver Creek, Hardwick, Hills, Jasper, Kenneth, Luverne, Magnolia, and Steen. The Rock County MHMP also incorporates the concerns and needs of townships, school districts, and other stakeholders participating in the plan.

"Hazard mitigation planning is a central part of our emergency management program," said Kyle Oldre, Rock County Emergency Management Director. "Understanding the natural hazards that can cause serious impact to our communities and taking action to reduce or eliminate the impact of future disasters makes us more resilient. Hazard mitigation helps us to break the cycle of damage and repair caused by things like flooding, ice storms, and severe wind events that can damage property, stress economies, and threaten life safety in our county."

Examples of hazard mitigation include actions include improvement of roads and culverts that experience repetitive flooding; construction of safe rooms at campgrounds, public parks, mobile home parks or schools to protect lives in the event of tornados or severe wind events; burying powerlines that may fail due to heavy snow, ice or wind storms; ensuring timely emergency communication to the public through warning sirens and mass notification systems, and conducting public awareness and education campaigns to help people to be prepared to take safe action before, during, or following a hazard event. Some mitigation activities may be eligible for future FEMA Hazard Mitigation Assistance grant funding.

As part of the planning process, Rock County is seeking feedback from residents and businesses from across the County to incorporate into the plan:

- What are the natural hazards you feel pose the greatest risk to your community?
- Have you experienced a previous disaster event?
- What concerns do you have, and what sorts of mitigation actions or projects do you feel would help to reduce the damages of potential future events for your personal property, your community, or the County as a whole?

Comments, concerns, or questions regarding natural disasters and potential mitigation actions to be included into the plan update process should be submitted to Rock County Emergency Management.

There will be additional opportunities for public feedback throughout the planning process. A draft of the plan will be posted on the County website for public review prior to submission of the plan to the State of Minnesota. Future news releases will be shared with the media to notify the public of these opportunities.

The Federal Disaster Mitigation Act of 2000 (DMA 2000) requires counties to update their plan every 5 years to maintain eligibility for FEMA's Hazard Mitigation Assistance (HMA) grant programs.

Contact

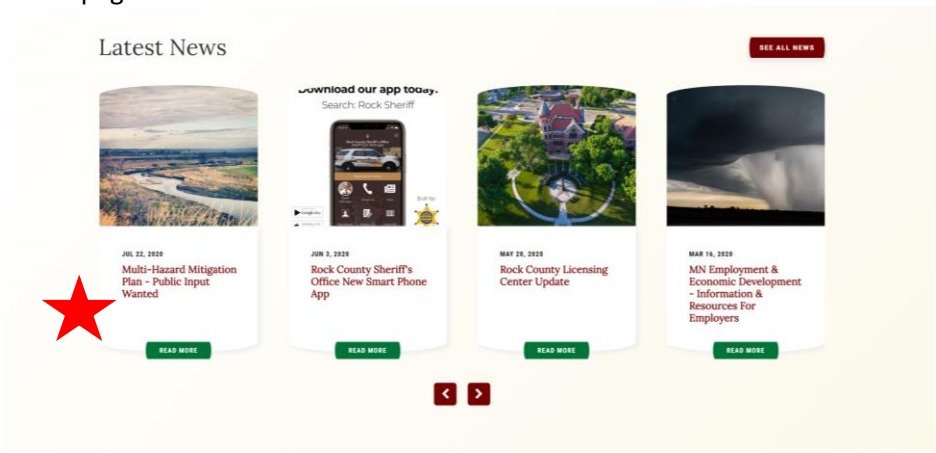
Kyle Oldre
Rock County Emergency Management Director
Phone: 507-283-5065
Email: kyle.oldre@co.rock.mn.us

Rock County MHMP News Release #1
Documentation of News Release Postings

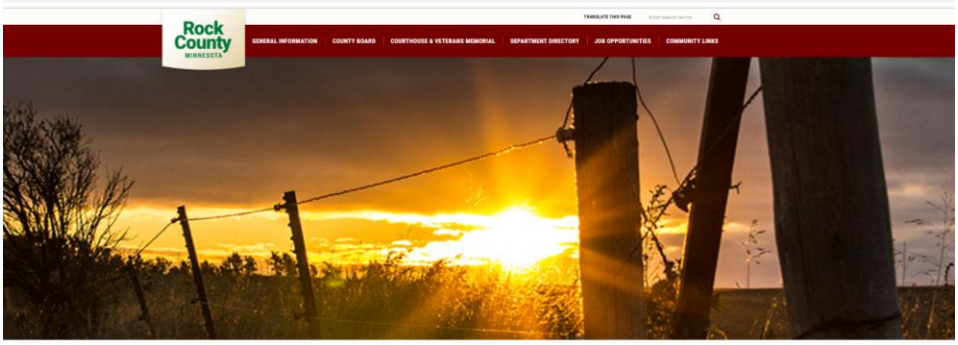
COUNTY POSTINGS

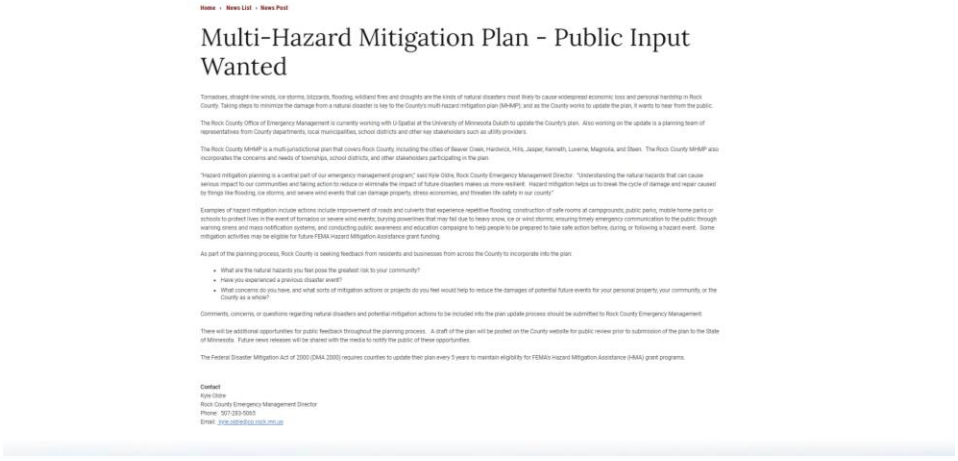
Rock County Website, September 2, 2020

Home page link



Main article





Home › News List › News Post

Multi-Hazard Mitigation Plan - Public Input Wanted

Tornadoes, straight-line winds, ice storms, blizzards, flooding, wildland fires and droughts are the kinds of natural disasters most likely to cause widespread economic loss and personal hardship in Rock County. Taking steps to minimize the damage from a natural disaster is key to the County's multi-hazard mitigation plan (MHMP), and as the County works to update the plan, it wants to hear from the public.

The Rock County Office of Emergency Management is currently working with U-Spatial at the University of Minnesota Duluth to update the County's plan. Also working on the update is a planning team of representatives from County departments, local municipalities, school districts and other key stakeholders such as utility providers.

The Rock County MHMP is a multi-jurisdictional plan that covers Rock County, including the cities of Beaver Creek, Hardwick, Hills, Jasper, Kenneth, Luverne, Magnolia, and Steen. The Rock County MHMP also incorporates the concerns and needs of townships, school districts, and other stakeholders participating in the plan.

"Hazard mitigation planning is a central part of our emergency management program," said Kyle Olzte, Rock County Emergency Management Director. "Understanding the natural hazards that can cause serious impact to our communities and taking action to reduce or eliminate the impact of future disasters makes us more resilient. Hazard mitigation helps us to break the cycle of damage and repair caused by things like flooding, ice storms, and severe wind events that can damage property, stress economies, and threaten life safety in our county."

Examples of hazard mitigation include actions include improvement of roads and culverts that experience repetitive flooding, construction of safe rooms at campgrounds, public parks, mobile home parks or schools to protect lives in the event of tornados or severe wind events; burying powerlines that may fail due to heavy snow, ice or wind storms; ensuring timely emergency communication to the public through warning sirens and mass notification systems; and conducting public awareness and education campaigns to help people to be prepared to take safe action before, during, or following a hazard event. Some mitigation activities may be eligible for future FEMA Hazard Mitigation Assistance grant funding.

As part of the planning process, Rock County is seeking feedback from residents and businesses from across the County to incorporate into the plan:

- What are the natural hazards you feel pose the greatest risk to your community?
- Have you experienced a previous disaster event?
- What concerns do you have, and what sorts of mitigation actions or projects do you feel would help to reduce the damages of potential future events for your personal property, your community, or the County as a whole?

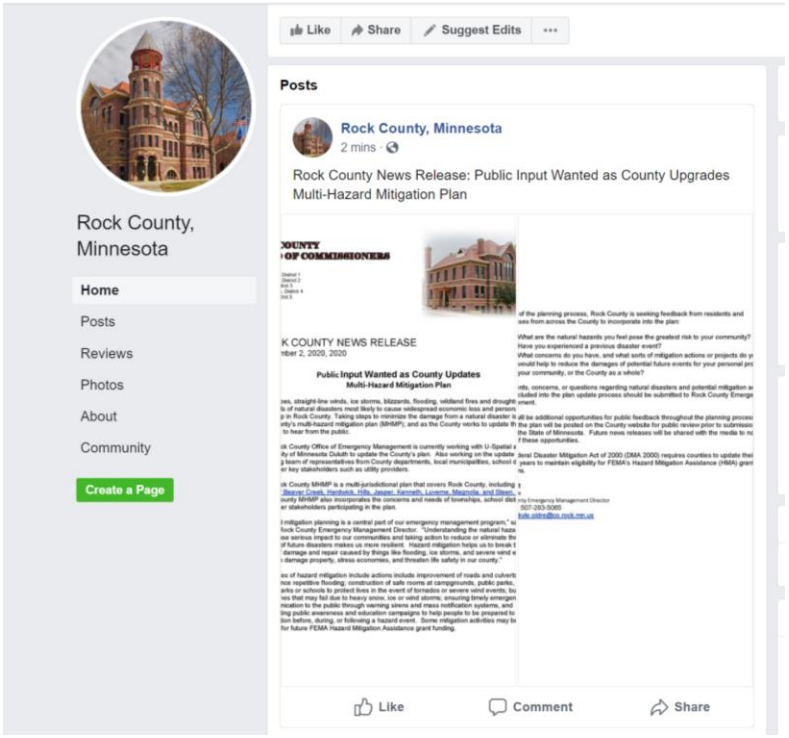
Comments, concerns, or questions regarding natural disasters and potential mitigation actions to be included into the plan update process should be submitted to Rock County Emergency Management.

There will be additional opportunities for public feedback throughout the planning process. A draft of the plan will be posted on the County website for public review prior to submission of the plan to the State of Minnesota. Future news releases will be shared with the media to notify the public of these opportunities.

The Federal Disaster Mitigation Act of 2000 (DMA 2000) requires counties to update their plan every 5 years to maintain eligibility for FEMA's Hazard Mitigation Assistance (HMA) grant programs.

Contact
Kyle Olzte
Rock County Emergency Management Director
Phone: 507-283-5065
Email: kyle.olzte@co.rock.mn.us

Rock County Facebook Page, September 2, 2020



LOCAL MEDIA POSTINGS

Rock County Star Herald, September 10, 2020

Rock County Star Herald September 10, 2020 Page 3

A former hatchery barn is now repurposed as a potting shed at Carol Ceynowa's Crow's Nest Farm in rural Luverne.

Art Walk at Crow's Nest/from 1

history. "They used beeswax and resin to fix their boats," she said. "And then they started adding pigment to it."

She said she enjoys the fact that she can create the entire product from the bottom up.

"You can cut the wood yourself, prepare the oil and wax yourself, and then layer it on the wood," she said.

The surface can have textures carved into it, and photographs can be burnished into it. Some of the byproducts of the process can be used for other art.

Ceynowa's needle felting has become a favorite medium as she continues to create endearing miniature creatures – both animals and fairies – from wool that she

At left, a colorful sunflower is depicted in one of Carol Ceynowa's textured oil paintings. She's pictured above in her tent booth that will join several other regional artists at the Sept. 19 Art Walk at her Crow's Nest Farm in rural Luverne.

ground pool that was lined with Sioux quartzite).

Vendor booths will be spaced for social distancing, and masks will be required for both artists and attendees.

Ceynowa can be reached at cteceynowa@hotmail.com

County seeks input for hazard mitigation plan update

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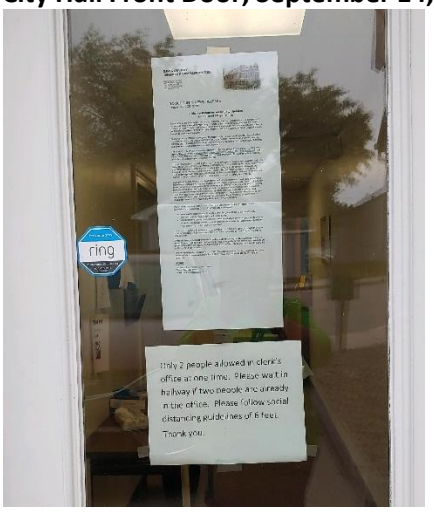
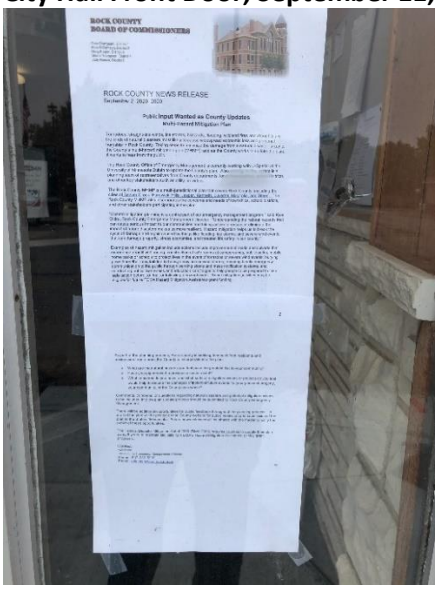
"Hazard mitigation planning is a central part of our emergency management program," said Kyle Oldre, Rock County Emergency Management director.

CITY POSTINGS

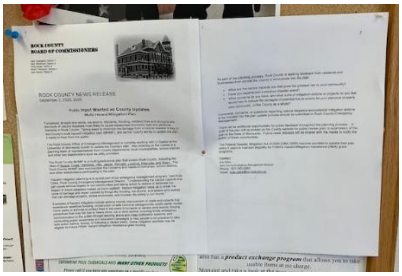
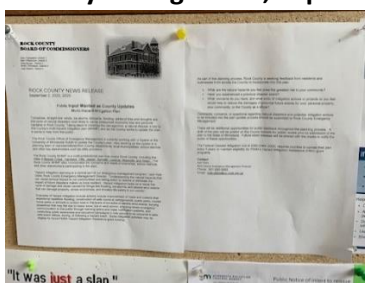
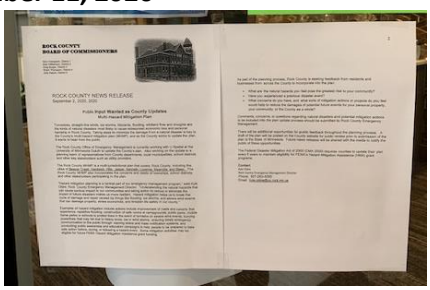
City of Beaver Creek
City Hall Front Door, September 14, 2020



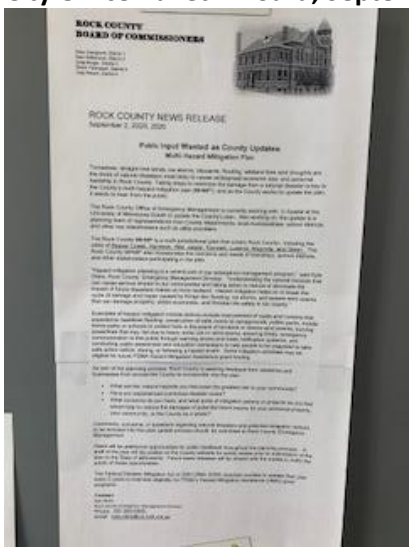
City of Hardwick
City Hall Front Door, September 11, 2020



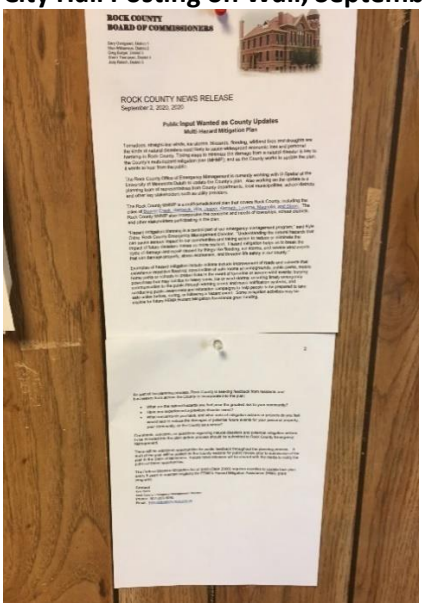
City of Hills
City Office, Post Office, and Hills Security Savings Bank, September 11, 2020

City of Jasper
City Office Bulletin Board, September 10, 2020



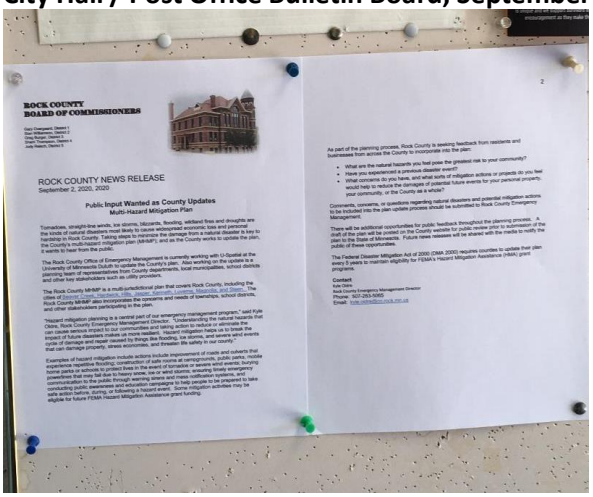
City of Kenneth
City Hall Posting on Wall, September 11, 2020



City of Luverne
City Website, September 11, 2020

City of Luverne
City Facebook Posting, September 14, 2020

City of Magnolia
City Hall / Post Office Bulletin Board, September 3, 2020



City of Steen
City Hall Front Window, September 11, 2020

Rock County MHMP News Release #2
Record of Public Input & Incorporation

Overview: On January 3, 2022 Rock County Emergency Management put out a news release titled **"Public Comment Sought for County's Multi-Hazard Mitigation Plan"** to announce the completion of the draft Rock County Multi-Hazard Mitigation Plan and invitation for public review and comment. The news release informed jurisdictional stakeholders and the public that a copy of the draft plan and a form for public feedback was available online with a website link. The public review period for the draft plan was open from January 3 to January 16, for a total of 14 days.

Distribution: The news release was sent via email to the county's MHMP Jurisdictional Contact List, which includes the names, titles, phone numbers, and email addresses of key stakeholders to be engaged in the MHMP update, including County Contacts, City Contacts, Township Contacts, Other Stakeholder Contacts, and Neighboring Jurisdiction Contacts. (A copy of the Jurisdictional Contact List can be found in Appendix F). The news release was additionally sent to local media contacts such as area newspapers, radio and television channels with a request to carry the news release.

Postings: Attached is documentation of the news release postings by Rock County, participating jurisdictions, and local media. Cities and townships were encouraged to help share the news release locally by posting it on their websites, social media, or community bulletin boards.

Public Input & Incorporation:
Following is a record of public responses to the Rock County news release and how the input will be incorporated into the plan update, and if not relevant to be addressed, why.

- No public input was received by Rock County Emergency Management, local jurisdictions, or via the online comment form.

From:	Kyle Oldre
To:	"Bonnie K Hundrieser"; Susan Skattum; Evan Verbrugge; Eric Hartman; Mark Sehr; Gary Overgaard; Ashley Kurtz; Arlyn Gehrke; jane@cityofbeavercreekmn.com; Josh.teune@cityofbeavercreekmn.com; cityofhardwick@frontiernet.net; thomashaas25@yahoo.com; ctyhills@alliancecom.net; kaelbers@alliancecom.net; jasper@iw.net; Kdhoven2@gmail.com; suetweet@hotmail.com; jcall@cityofluverne.org; pbaustian@cityofluverne.org; jmead@cityofluverne.org; cityofmagnolia@alliancecom.net; dmjmadison@yahoo.com; mvanbata@alliancecom.net; amckenzie@smithfield.com; pcbakken@alliancecom.net; jdfarmer@live.com; brad.skattum57@gmail.com; a.sandbulte77@gmail.com; Jsbuysse7300@gmail.com; Josh.rheault@plantpioneer.com; stovetop@icloud.com; stacy@riggstrucking.com; maover@msn.com; nnovergaard@yahoo.com; hemmekya@yahoo.com; ks29rr@gmail.com; chris.ingebretsen@state.mn.us; Jason.Kloss@swmhhs.com; Michele.Neilson@siouxvalleyenergy.com; c.oftedahl@isd2184.net; t.holthaus@isd671.net; edward.gilmore@usda.gov; bheitkamp@co.nobles.mn.us; casey.sievert@co.pipestone.mn.us; CNyquist@co.murray.mn.us; mark.marcy@state.mn.us
Cc:	Stacey Stark; "Mavis Fodness"; editor@star-herald.com
Subject:	FW: Rock County MHMP News Release #2
Date:	Monday, January 3, 2022 1:10:03 PM
Attachments:	Rock MHMP New Release #2.pdf

All,

Please find the attached news release reference our Hazard Mitigation Plan, if you are a city please post a copy on your bulletin board and let me know you have posted it. You will also find the notice on our web page and on the counties social media sites, you are encouraged to share those if your jurisdiction has a site.

Mavis/Lori-please share on the Star Herald page and if interested in the paper.

I greatly appreciate all of your work on this project and I believe it will be very beneficial as we move forward.

Let me know if you have any questions/concerns.

Thanks,

Kyle Oldre
Rock County Emergency Management Director
507-283-5065

ROCK COUNTY
BOARD OF COMMISSIONERS

ROCK COUNTY NEWS RELEASE
January 03, 2022

Public Comment Sought for County's Multi-Hazard Mitigation Plan

Rock County has completed an updated draft of the of its Multi-Hazard Mitigation Plan (MHMP) and is now seeking public feedback on it. Citizens can find a link to review the plan and offer feedback by visiting z.umn.edu/rock_hmp. The review and comment period is open through Sunday, January 16, 2022. After that, the county will submit the draft plan to the State of Minnesota and the Federal Emergency Management Agency (FEMA) for review.

The Rock County MHMP is a multi-jurisdictional plan that covers Rock County, including the cities of Beaver Creek, Hardwick, Hills, Jasper, Kenneth, Luverne, Magnolia, and Steen. The Rock County MHMP also incorporates the concerns and needs of townships, school districts, and other stakeholders participating in the plan.

Rock County is vulnerable to a variety of potential natural disasters, which threaten the loss of life and property in the county. The plan addresses how to mitigate against hazards such as tornadoes, flooding, wildland fires, blizzards, straight-line winds, ice storms, and droughts which have the potential for inflicting vast economic loss and personal hardship.

Update of the plan has been under direction of Rock County Emergency Management in cooperation with U-Spatial at the University of Minnesota Duluth and representatives from County departments, city and township governments, school districts, and other key stakeholders. Together, the planning team worked to identify cost-effective and sustainable actions to reduce or eliminate the long-term risk to human life or property from natural hazards. Some examples include improvement of roads and culverts that experience repetitive flooding; construction of safe rooms at campgrounds, public parks, mobile home parks or schools to protect lives in the event of tornados or severe wind events; burying powerlines that may fail due to heavy snow, ice or wind storms; ensuring timely emergency communication to the public through warning sirens and mass notification systems, and conducting public awareness and education campaigns to help people be prepared to take safe action before, during, or following a hazard event.

Hazard mitigation planning helps Rock County and other jurisdictions protect their residents. Working with local communities through the process helps identify vulnerabilities and develop strategies to reduce or eliminate the effects of a potential hazard. In addition, increasing public awareness of local hazards and disaster preparedness helps to create a community that is resilient to disaster, and breaks the cycle of response and recovery. Updating the plan further allows the County and its jurisdictions to apply for eligible projects under future Hazard Mitigation Assistance (HMA) grant funding from FEMA for projects that are cost-effective and will help to reduce or eliminate impacts of future natural disaster events.

Community feedback is vital to the success of the plan. Rock County invites public review and feedback of the draft plan prior to submitting it to the State of Minnesota and the Federal Emergency Management Agency (FEMA) for review. Feedback may be provided via the online comment form or directly to Rock County Emergency Management.

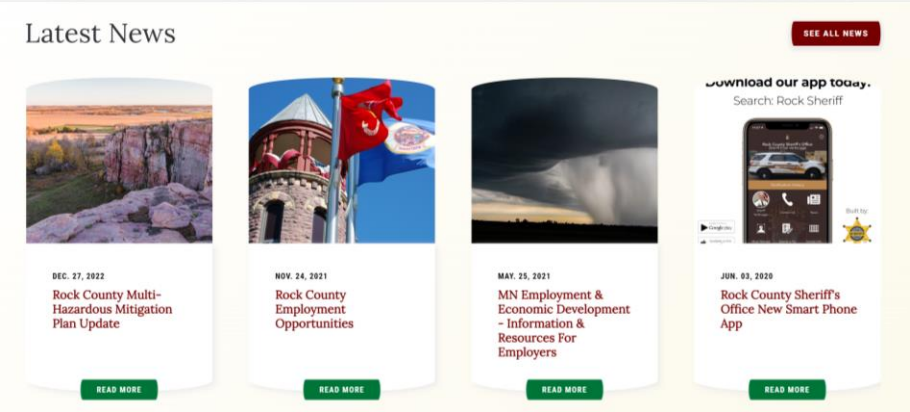
Contact:

Kyle Oldre
Rock County Emergency Management Director
Phone: 507-283-5065
Email: kyle.oldre@co.rock.mn.us

Rock County MHMP News Release #2
Documentation of News Release Postings

COUNTY POSTINGS

Rock County Website, 12/27/21



Rock County Website
Main article, 12/27/21

Home › News List › News Post

Rock County Multi-Hazardous Mitigation Plan Update

ROCK COUNTY NEWS RELEASE
January 03, 2022

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Contact:
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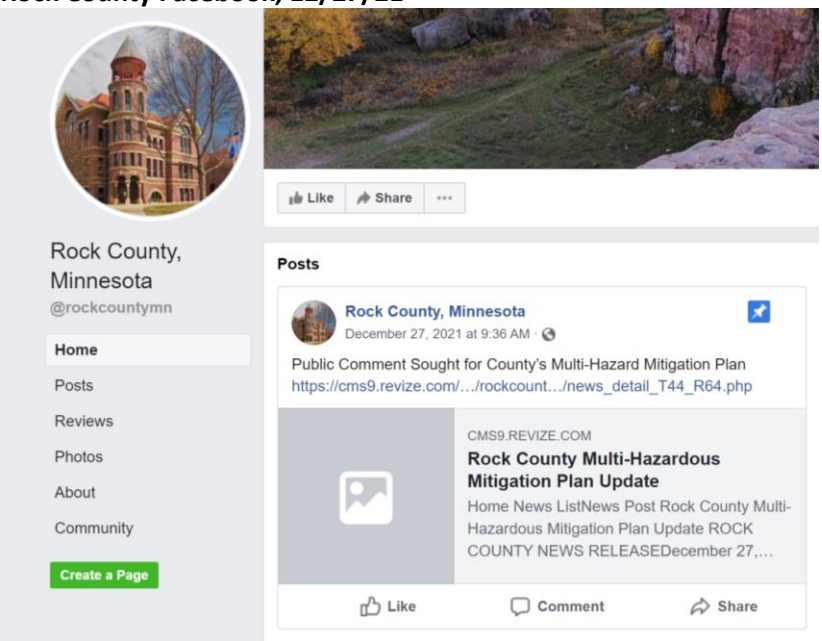
Rock County Emergency Management Director
Phone: 507-283-5065
Email: kyle.oldre@co.rock.mn.us

Rock County Facebook, 12/27/21

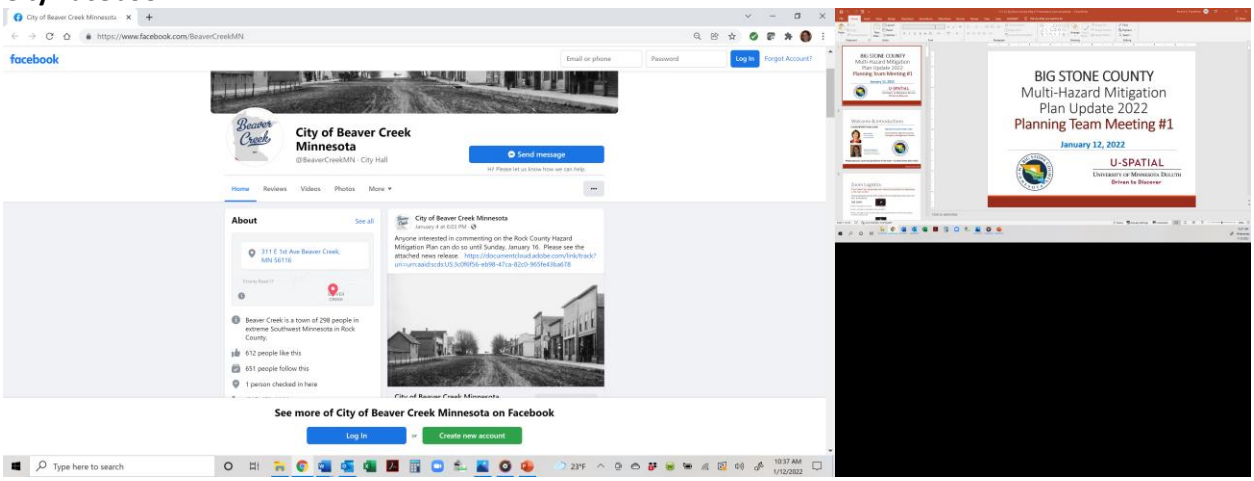


LOCAL MEDIA POSTINGS

No local media coverage

CITY POSTINGS

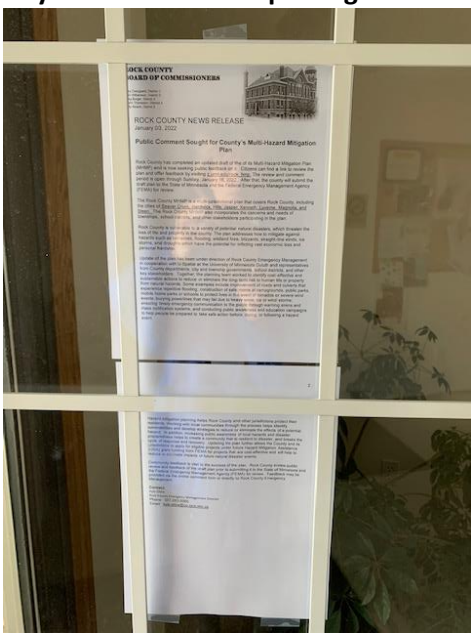
City of Beaver Creek, 1/4/22
City Facebook



City of Hardwick

No posting

City of Hills, 1/4/21
City Office front door posting

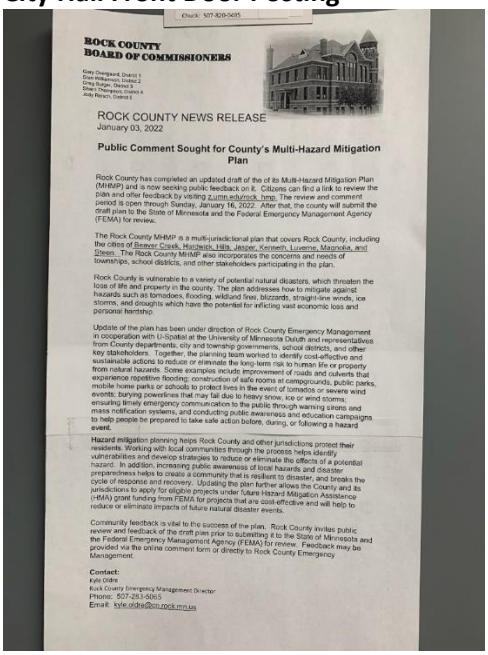


ROCK COUNTY
BOARD OF COMMISSIONERS

ROCK COUNTY NEWS RELEASE
January 03, 2022

Public Comment Sought for County's Multi-Hazard Mitigation Plan

City of Jasper, 1/12/22
City Hall Front Door Posting



ROCK COUNTY
BOARD OF COMMISSIONERS

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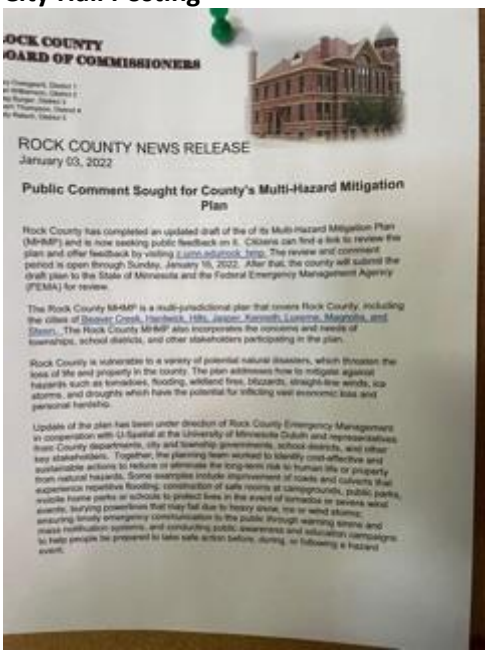
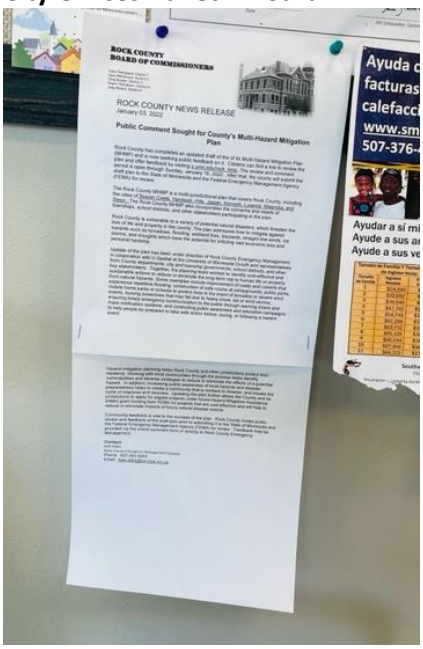
Kyle Oldre
Rock County Emergency Management Director
Phone: 507-283-5065
Email: kyle.oldre@co.rock.mn.us

City of Kenneth, 1/4/22
City Hall Posting



City of Luverne, 1/4/22
City Offices Bulletin Board



City of Magnolia, 1/4/22
No photo; City of Magnolia posted the news release on the bulletin board in the entry to the Post Office/City Hall

City of Steen
No posting

Rock County MHMP 2021
Online Public Review Website & Comment Form

Public Review Website

The Rock County 2021 MHMP Update was made available for public review online with a website hosted by U-Spatial@UMD. The website provided a full draft of the 2021 MHMP update and individual excerpts of the Mitigation Action Charts for the county and each city jurisdiction. An online comment form was also provided for the submission of public comments or questions.

Rock MHMP Feedback & Comments Form

The online comment form provided an opportunity for reviewers to submit feedback on the plan. Feedback submitted was collected by U-Spatial@UMD and reviewed for incorporation into the plan. The form included the following:

Instructions

Upon reviewing the draft Multi-Hazard Mitigation Plan update for Rock County, please answer the following questions to provide feedback and suggestions. Thank you!

Reviewer Information

- Name
- Email
- Job Title and Organization / Community Resident
- Jurisdiction you are representing

Questions

- After reviewing the mitigation actions for your jurisdiction, do you have any ideas for new ones to add? Please explain in as much detail as possible.

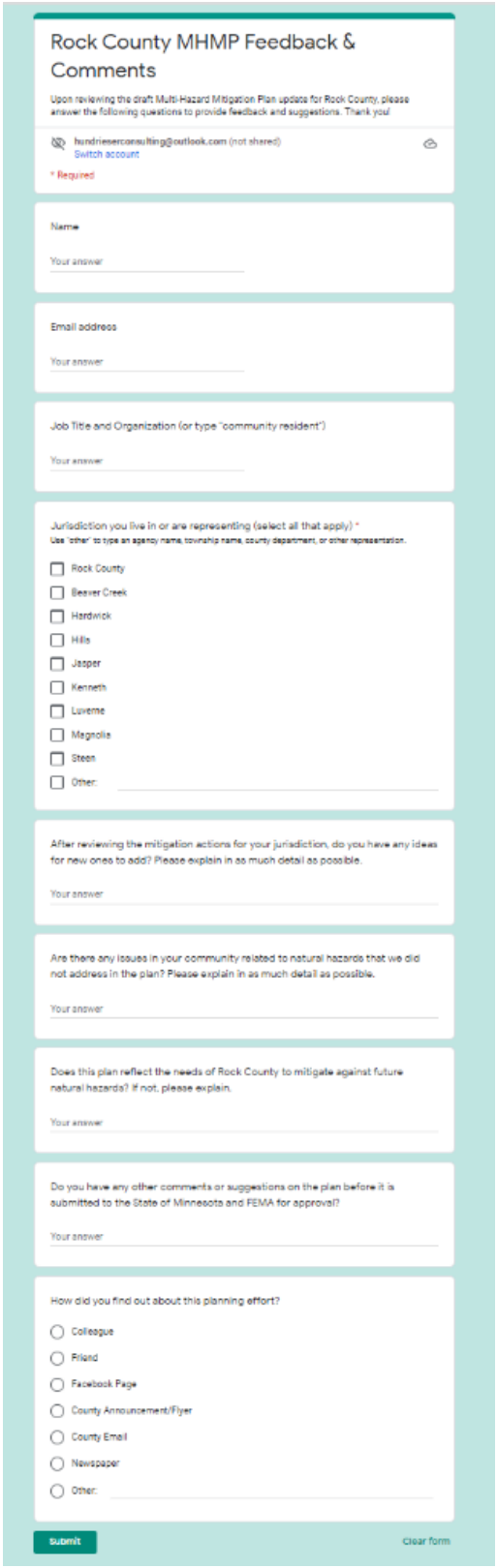
- Are there any issues in your community related to natural hazards that we did not address in the plan? Please explain in as much detail as possible.

- Does this plan reflect the needs of Rock County to mitigate against future natural hazards? If not, please explain.

- Do you have any other comments or suggestions on the plan before it is submitted to the State of Minnesota and FEMA for approval?

- How did you find out about this planning effort?

    - Colleague
    - Friend
    - Facebook Page
    - County Announcement/Flyer
    - County Email
    - Newspaper
    - Other



Appendix H – Minnesota Department of Health Climate & Health Report

Planning for Climate & Health Impacts in Southwest Minnesota

Emergency Management Considerations for HSEM Region 5

Published by the Minnesota Climate & Health Program in August 2018

ABOUT THE REGIONAL PROFILE

EXTREME WEATHER IS A FAMILIAR CONCERN FOR MINNESOTANS

While experience has helped Minnesotans adapt to historical weather patterns, climate change trends are pushing us to adapt even further to weather patterns and extreme events that pose major threats to our health, homes, environment, and livelihood. Over 50 years of storm data on record document that Minnesota has experienced an increase in the number and strength of weather-related natural disasters, particularly those related to rising temperatures and heavy downpours. These events cost our state millions in property loss, damaged infrastructure, disrupted business, medical care and support services, and put residents and responders at risk. Understanding how our weather is changing now and into the future will help planners and decision-makers in emergency management and supporting fields extend our progress in climate adaptation and lead to more resilient communities.

CLIMATE PROJECTION DATA AS A TOOL

Climate projections can help us prepare for the future. These data result from highly sophisticated global climate models and provide a general idea of trends in temperature and precipitation many decades into the future at ever-increasing time and spatial scales. Like every dataset, there are limitations to our understanding and application of the information to real-life decision-making. Yet despite limitations, climate projection data offer a crucial glimpse into our potential futures, and allow us to start considering the best way to allocate our preparedness dollars and management resources to reduce the severe impacts of extreme weather.

Ice storm (Mark Steil, 2013)

PUTTING CLIMATE CHANGE INTO CONTEXT

Sometimes, climate change and extreme weather events and the impact on our communities appear distant and abstract. That is why the Minnesota Department of Health's Minnesota Climate & Health Program teamed up with state and local emergency management and preparedness professionals as well as state climatologists to develop a custom climate profile for each of the six Homeland Security and Emergency Management (HSEM) regions across the state. Each regional profile includes a description of climate change trends along with a summary of climate projection data to illustrate these trends. Regional climate data are presented alongside population projection data, as it's important to consider both our climate future and population future as we plan to minimize risk and build resilience against climate impacts.

Additionally, each regional profile provides a local case study, a "focusing event," to illustrate the links between extreme weather and natural disasters and what climate projection data can (and cannot) signify for similar events in the future. Each case study features a recent natural disaster that impacted the HSEM region and provides a comparison between temperature and precipitation measures related to that event alongside historical baseline trends and future projection estimates. Taken together, the six HSEM regional profiles provide an extensive overview of climate change trends for Minnesota and describe the potential impact of these trends for emergency management and preparedness professionals and their partners.

FOR MORE INFORMATION

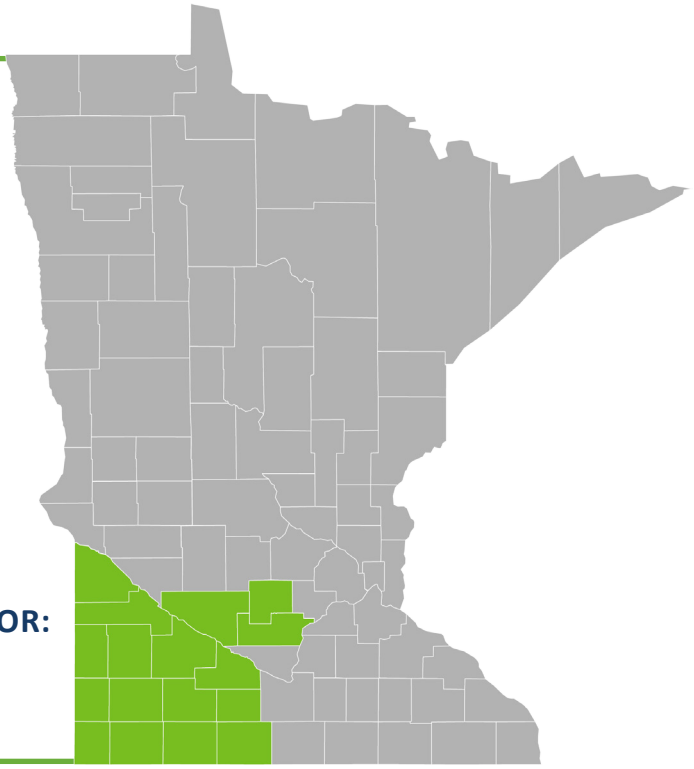
A long form report, including all six profiles, individual county data, and a more comprehensive description of climate change trends and supporting research will be available at:
Minnesota Climate & Health Planning Tools & Data
(www.health.state.mn.us/divs/climatechange/data.html)

REGION 5 OVERVIEW

REGION 5: Southwest Minnesota

COUNTIES

- Brown
- Chippewa
- Cottonwood
- Jackson
- Lac Qui Parle
- Lincoln
- Lyon
- Martin
- McLeod
- Murray
- Nobles
- Pipestone
- Redwood
- Renville
- Rock
- Sibley
- Watonwan
- Yellow Medicine



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MINNESOTA CLIMATE & POPULATION TRENDS

OUR KNOWLEDGE OF CLIMATE CHANGE IS EXPANDING RAPIDLY

Climate records show that across the Midwest and here in Minnesota we are experiencing an increase in warmer, wetter conditions as well as an increase in extreme weather events and related natural disasters. Experts expect these conditions to continue well into the future. By mid-century, Minnesotans can expect much warmer winters, more severe summer heat waves, a higher frequency of very heavy rain events and a higher frequency of late growing season drought conditions.

Many communities in Minnesota rely on economies rooted in agriculture and outdoor recreation, such as wintertime tourism, including snowmobiling, ice fishing, and skiing. Future climate conditions may stress agricultural economies by delaying planting and fieldwork, increasing disease and pest pressure, and reducing crop yields due to cycles of flooding and dry spells. Rapidly warming winter temperatures will turn snowfall into rain and reduce the depth and timing of lake ice cover, affecting winter recreation.

Extreme rainfall events will increase flood risk, particularly in floodplain areas, disrupting transportation and utility service, and damaging property and infrastructure. In addition, surface runoff may lead to soil erosion, lake pollution, and reduced drinking water quality. Nutrient runoff in particular, along with warmer temperatures, are likely to contribute to a larger occurrence of harmful algal blooms on waters, many valued for recreation. Changing climate conditions are likely to strain the viability of native species, including popular recreational fish, invite encroachment by invasive species, and increase the geographic range and types of ticks and mosquitoes.

Some of these trends are evident in the current climate projection data that are available. However, because these data are often averaged or summarized for large areas over large time periods, they can mask the local peaks in temperature and precipitation that can trigger disasters. Until more finely-scaled climate projection data become available to Minnesota planners and decision-makers, the current data still remain useful for exploring the future ahead and establishing a baseline understanding of what our weather challenges may be moving forward.

REGION 5 CLIMATE PROFILE

Use the following information on temperature, precipitation, and vulnerable populations to help plan for future weather-related incidents.

TEMPERATURE

There has been an increase in winter and summer temperatures. Our average winter lows are rising rapidly, and our coldest days of winter are now warmer than we have ever recorded. In fact, Minnesota winters are warming nearly 13 times faster than our summers. The continued rise in winter temperatures will result in less snow pack, which will increase chances for grassland/wildfires as well as drought. The warmer winter temperatures will also have major consequences for our ecosystems, including native and invasive species, whose growth, migration, and reproduction are tied to climate cues. The increase in Lyme disease across Minnesota is also likely influenced in part by the loss of our historical winters, due to a longer life-cycle period for ticks. Freeze-thaw cycles are likely to increase as well, damaging roads, power lines, and causing hazardous travel conditions. By mid-century our average summer highs will also see a substantial rise, coupled with an increase in more severe, prolonged heat waves that can contribute to drought and wildfires and pose a serious health threat, particularly to children and seniors. Here are temperature trends for HSEM Region 5:

Average Summer Maximum Temperature for HSEM Region 5		
1981-2010	2050-2075	Change
82.1 °F	89.6 °F	+7.5 °F

Average Winter Minimum Temperature for HSEM Region 5		
1981-2010	2050-2075	Change
7.9 °F	16.9 °F	+9.0 °F

PRECIPITATION

There has been an increase in total average as well as heavy precipitation events, with longer periods of intervening dry spells. Our historical rainfall patterns have changed substantially, giving rise to larger, more frequent heavy downpours. Minnesota's high-density rain gauge network has captured a nearly four-fold increase in "mega-rain" events just since the year 2000, compared to the previous three decades. Extreme rainfall events increase the probability of disaster-level flooding. However, there is also an increased probability that by mid-century heavy downpours will be separated in time by longer dry spells, particularly during the late growing season. Over the past century, the Midwest hasn't experienced a significant change in drought duration. However, the average number of days without precipitation is projected to increase in the future, leading Minnesota climate experts to state with moderate-to-high confidence that drought severity, coverage, and duration are likely to increase in the state. Modeling future precipitation amounts and patterns is less straight-forward compared to temperature. Some climate models do a better job than others representing rainfall for the Midwest, and available data sources only provide average estimates on a monthly scale, masking the spikes in extremes that trigger flood and drought disasters. Trend data provided here for HSEM Region 5 are summarized for early summer, when historically Minnesota receives most of its rainfall, and for early fall when rainfall scarcity may threaten crop harvests and local agricultural economies:

Average Early Summer Precipitation for HSEM Region 5		
1981-2010	2050-2075	Change
3.8"	4.4"	+0.5"

Average Early Fall Precipitation for HSEM Region 5		
1981-2010	2050-2075	Change
2.5"	2.4"	-0.1"

VULNERABLE POPULATIONS

There has been an increase in the older adult population. Extreme weather events cause a range of health impacts and disruptions that vary across population groups. The vulnerability of a group is a function of its sensitivity to a hazard, exposure to risks, and capacity for responding or coping with the impacts. Children and older adults are often identified as groups vulnerable to climate change threats, including extreme weather and natural disasters. For example, physiologically these groups have a lower capacity to tolerate extreme heat and are often dependent on others for transportation to cooling centers. These groups are also often critically dependent on others during a disaster, such as needing help to evacuate during a flood or wildfire, or to find alternative housing if displaced. Planning for the specific needs of vulnerable populations strengthens local efforts to reduce the impact of extreme weather-related events. Population trend data provided here for HSEM Region 5 are intended to highlight the changes in two key demographic groups for the region, but planners and managers should also consider future changes in other populations of concern, such as those with low incomes, immigrant groups, indigenous peoples, persons with disabilities, or vulnerable occupational groups (such as outdoor workers):

Childhood Population (0-14) Projection Estimates for HSEM Region 5		
2015	2050	Change
51,634	42,313	-18.1%

Elder Population (65+) Projection Estimates for HSEM Region 5		
2015	2050	Change
53,580	59,580	+12.4%

REGION 5 CASE STUDY

The following case study is intended to illustrate the links between climate and weather and natural disasters. Acting as a "focusing event," the case study demonstrates how a previous weather-related event (i.e., ice) impacted important economic drivers, environmental resources, and population health. Then, the Climate Projection Data section compares weather data from the case study with baseline and projected weather data to show the possibilities of future disaster events. This case study highlights the relevancy of climate projection data for understanding future climate and weather risks in Minnesota.

EVENT: ICE STORM **DATE: APRIL 9-12, 2013**

A devastating ice storm hit southwestern Minnesota in the spring of 2013. Southwestern Minnesota is in a relatively high-frequency corridor of ice storms, partially due to the Buffalo Ridge where the higher elevation often cools the air just enough to turn rain into freezing rain. A combination of freezing rain and wet, heavy snow brought down trees and powerlines throughout the area leading to widespread power outages and extremely dangerous driving conditions. The heaviest coating of ice was around the cities of Worthington and Luverne with nearly an inch of ice reportedly coating these areas. Conditions required the city of Worthington to declare a state of emergency and resort to rolling blackouts to keep homes habitable and avoid having to open emergency shelters. To enable disaster relief support, the federal government declared five counties disaster areas in the aftermath of the storm: Cottonwood, Jackson, Murray, Nobles, and Rock.

REGION 5 CASE STUDY: KEY IMPACTS

It is nearly impossible to capture all the various impacts from a natural disaster. These impacts broadly include costly infrastructure damage, disrupted utility service, prolonged work and school absences, acute physical injury, and persistent strains on mental health, on scales ranging from the community to the household to the individual.

The extensive costs associated with the 2013 April ice storm event are difficult to capture in a single estimate. One report puts damage costs at about $71 million. However, this estimate does not take into account the loss to businesses that were forced to close or medical expenses for injuries linked to slips, falls, or car accidents.

The following are just a few examples of the adverse impacts on HSEM Region 5 communities and others from the 2013 April ice storm:

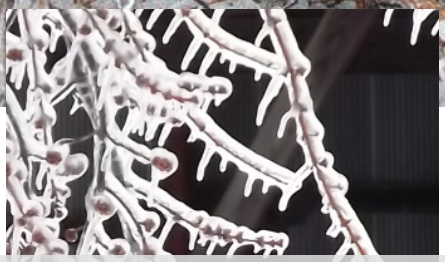
DISRUPTION OF ESSENTIAL SERVICES: Widespread power outages left many communities and farms without electricity or heat during a prolonged period of cold temperatures. More than 100,000 customers across southwest Minnesota were impacted by power disruptions. Some rural customers did not have power restored for multiple days. The widespread loss of power affected communications along with electric, heat, and water services to homes, schools, businesses, and fire stations.

BUDGET STRAINS: In several small communities, costs of responding to the disaster consumed their public works budget for the entire year. To assist with hazards and power loss, the Governor activated the National Guard.

DIRECT HEALTH THREAT: Snow- and ice-covered roads, coupled with downed trees and utility poles, made for extremely dangerous driving conditions. During a single 8-hour period on April 10th, State Patrol reported at least 736 crashes and spinouts, 39 involving serious injuries.

EVACUATIONS & CLOSURES: Due to power outages, one medical center was forced to run entirely on its own generators, while others, including a nursing home and a juvenile detention center, needed to evacuate residents and patients to other areas. In order to reduce demand on the fragile power grid and ensure public safety, a number of businesses, schools, and campgrounds were closed.

Powerlines down in Worthington, Minnesota (Mark Steil, 2013)



During a single 8-hour period on April 10th, State Patrol reported at least 763 crashes and spinouts, 39 involving serious injuries.

Top: Car covered in fallen branches in Worthington, Minnesota (Julie Buntjer, 2013)
Bottom left: Ice storm in Westbrook, Minnesota (Paul Jones, 2013)
Bottom right: Bus off the road in Elk River, Minnesota (Mandi Cline-Elken, 2013)

CLIMATE PROJECTION DATA

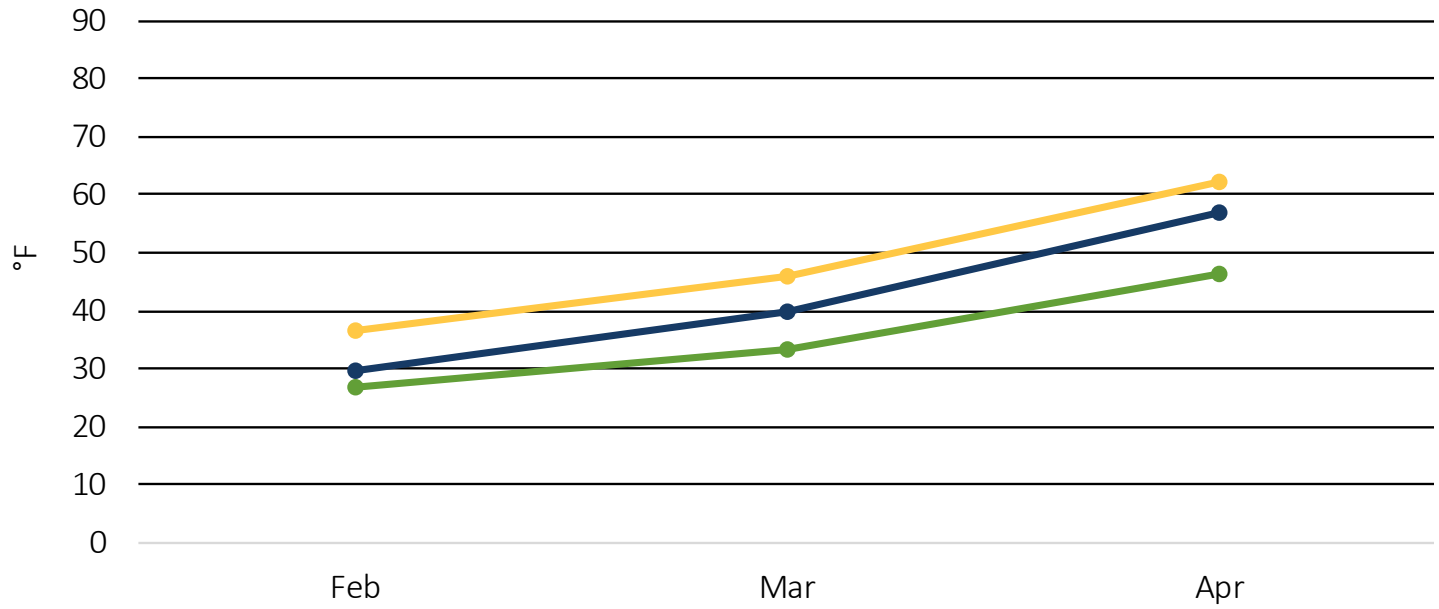
Following are visual representations of climate projection data for Region 5. Data for all counties included in Region 5 were averaged to derive regional estimates. (Data for individual counties are available in the long-form report.) The graphs below compare future temperature and precipitation projection data (in yellow) with a historical climate baseline (in blue) and climate measures from the regional case study event (in green). Because preceding conditions can influence a disaster event, data from February through April are provided to provide context.

LEGEND

- **Historical:** 1981- 2010
- **Case Study:** 2013 ice storm
- **Projected:** 2050- 2074

Maximum Temperature

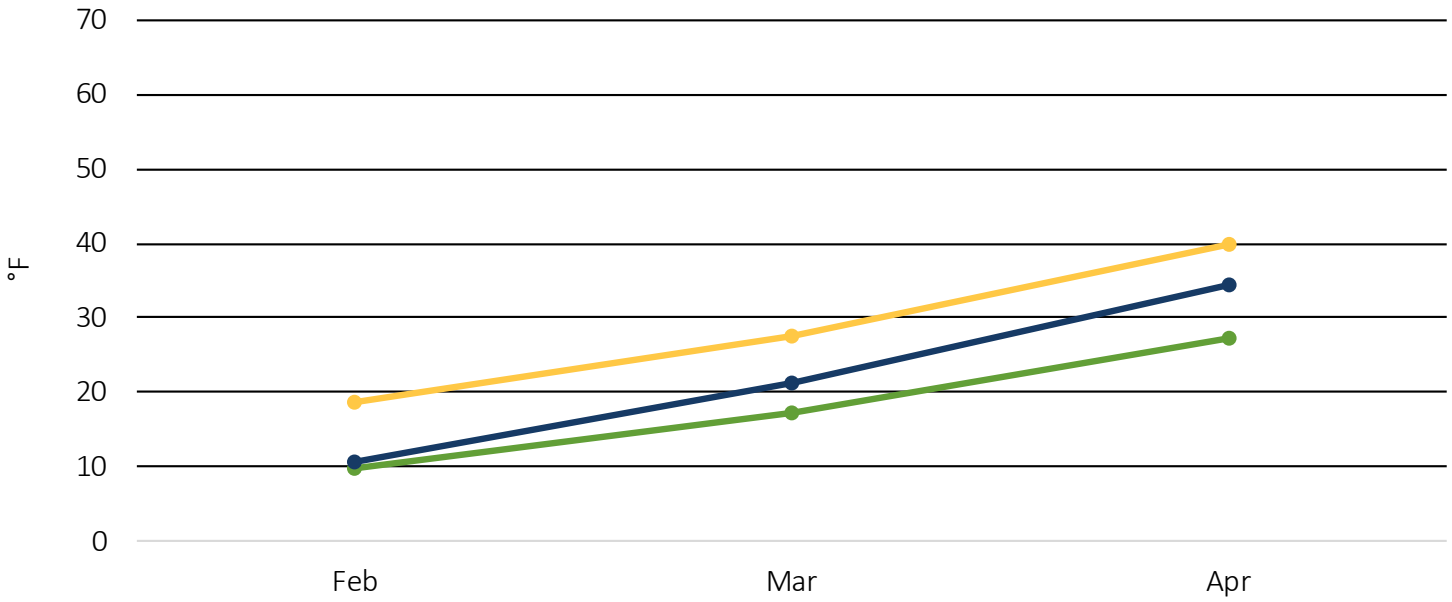
Trend comparison to 2013 ice storm data



	February	March	April
Historical: 1981- 2010	29.7	39.9	57.1
Case Study: 2013 ice storm	26.8	33.3	46.5
Projected: 2050- 2074	36.4	46.0	62.3

Minimum Temperature

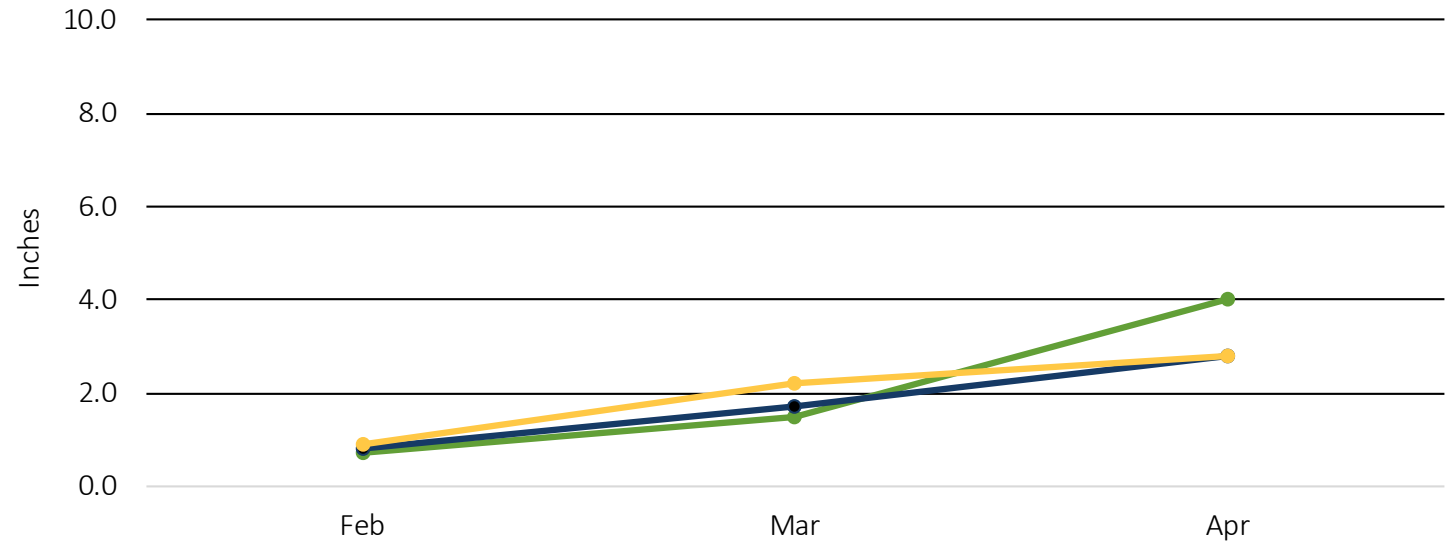
Trend comparison to 2013 ice storm data



	February	March	April
Historical: 1981- 2010	10.7	21.1	34.3
Case Study: 2013 ice storm	9.9	17.2	27.4
Projected: 2050- 2074	18.6	27.6	39.8

Total Precipitation

Trend comparison to 2013 ice storm data



	February	March	April
Historical: 1981- 2010	0.8	1.7	2.8
Case Study: 2013 ice storm	0.7	1.5	4.0
Projected: 2050- 2074	0.9	2.2	2.8

SUMMARY

CLIMATE DATA EXPERTS expect that future climate conditions across the Midwest will continue to change and affect our environment, economy, and public health. Such conditions are projected to lead to a higher frequency of late growing season drought conditions, elevated winter temperatures with reduced snowpack, prolonged high heat days, and extreme rainfall events. Climate experts also anticipate an increased frequency of severe storms, including heavy ice and snowstorms, like the April 2013 event. Yet, researchers are still working to understand the relationships between climate change and these diverse types of hazardous weather. A fair amount of uncertainty exists as to when, where, why, and how these storms will arise. Currently there is no straight-forward answer to the question, "Will Minnesota experience more extreme snow and ice storms in the future?" Although warmer and shorter winters will lead to more liquid-precipitation events, it is also probable that those same conditions will convert some systems that historically would have been snowstorms into ice storms. Additionally, the higher terrain of the Buffalo Ridge will always make freezing rain somewhat more likely than more topographically-even parts of the state, so the odds of additional ice storms in the future are naturally higher than in most other parts of Minnesota.

This is an area where the available climate projection data alone may not be enough to provide a clear picture of future weather events for planning efforts. In fact, a review of the data in the graphs above suggest that Region 5 counties may experience fewer extreme cold-related weather events since temperatures are increasing well above those associated with the 2013 ice storm. Thus, it is important to track climate research and expert consensus on future climate trends in order to critically assess and apply projection data.

CLIMATE DATA IS A CRITICAL TOOL in planning for resilient communities into the future. Assessing threats from climate change and planning effective mitigation and response strategies is a key element for emergency managers and other planners to reduce future risk. It is crucial to understand the potential impacts of climate change and the associated priorities and vulnerabilities of communities, including population, the environment, critical infrastructure, and more. However, vulnerability is a nuanced concept and most effective as an indicator of risk when planners seek to understand and address vulnerability as close to the individual level as possible and in association with a specific hazard.

> *"Climate data is a critical tool in planning for resilient communities into the future."*

Population projections for HSEM Region 5 show a decrease in children but an increase in elders. As older populations tend to have a greater need for health care services, disrupted access due to ice covered roads or power outages is a major concern. Additionally, older individuals are more susceptible to slips, falls, and injures and have a longer recovery period. Considering the impacts of climate change to vulnerable populations is just one example of how to prioritize mitigation and response planning.

CLIMATE PROJECTION DATA continues to improve and should be considered as a priority to advance for Minnesota. Currently, global climate models that produce climate projection data for the Midwest are more accurate at simulating future temperature changes than they are for precipitation. However, the accuracy and resolution of these models are advancing rapidly as are their ability to model the future prevalence in short-duration, high-intensity localized heavy rainfall events.

Minnesota would benefit from a statewide high-quality climate projection dataset that is derived using the climate and environment features unique to our state, similar to datasets developed for other states. Meanwhile, data from national resources, like the U.S. Geological Survey (USGS) and National Oceanic and Atmospheric Administration (NOAA), can still provide a powerful input to regional scenario-planning efforts by allowing planners, managers, and analysts a means of "unpacking" general climate change predictions for the Midwest by looking at potential monthly fluctuations in coarse precipitation and temperature measures for Minnesota and its counties.

NEXT STEPS: MINIMIZE RISK & BUILD RESILIENCE

Prepare today for tomorrow's climate hazards. Emergency managers, planners, elected officials, and the public play a critical role in creating safe and healthy communities, especially in the face of extreme weather events. There are steps you can take to minimize local risk and build more resilient communities:

BRING EVERYONE TO THE TABLE: Build an inclusive yet nimble team to collectively identify climate hazards and potential impacts. Be sure to include members of the community; local department professionals responsible for built, natural, and health resources; planning commissioners; faith-based and cultural organizations; research centers; and commercial organizations. Including diverse perspectives throughout your process will help support more equitable planning efforts that best leverage cross-functional resources.

INCORPORATE CLIMATE INTO PLANNING: Incorporate climate projection data into planning efforts, such as exercise scenarios and long-range planning, to comprehensively identify future climate hazards and potential cascading effects. Explore how these interact with non-climate hazards in the community, such as aging infrastructure, to understand potential exposure to multiple threats and prioritize actions that build the community's capacity to respond.

CHAMPION CLIMATE & HEALTH: Be a champion for climate and health data. Seek opportunities to learn about these data and incorporate it in your work on an iterative basis. Support its application in professional networks and articulate the need to fund dynamically downscaled climate projection datasets for Minnesota. Climate data is a critical multi-discipline tool in proactively planning for resilient communities.

RESOURCES & REFERENCES

TOOLS & DATA

- Climate at a Glance: National Climatic Data Center, National Oceanic and Atmospheric Administration
  Source for all historical and much of the case study data presented in this profile.
  www.ncdc.noaa.gov/cag/
- Minnesota Climate and Health Profile Report (PDF), Minnesota Department of Health
  Profiles historic climate trends, future projections, and likely climate change impacts on the health of Minnesotans.
  http://www.health.state.mn.us/divs/climatechange/docs/mnprofile2015.pdf
- Minnesota Climate Change Vulnerability Assessment (PDF), Minnesota Department of Health
  Assesses five climate hazards and the populations that are most vulnerable to the hazards in Minnesota.
  http://www.health.state.mn.us/divs/climatechange/docs/mnclimvulnreport.pdf
- Minnesota Population Projection Data, Minnesota State Demographic Center
  Source for all population projection data presented in this profile.
  https://mn.gov/admin/demography/data-by-topic/population-data/our-projections/
- National Climate Change Viewer, United States Geological Survey
  Source for all climate projection data presented in this profile.
  www2.usgs.gov/climate_landuse/clu_rd/nccv/viewer.asp

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KNOWLEDGE & CAPACITY

- Climate Change and Minnesota, Minnesota Department of Natural Resources
  Source of information on climate change trends and impacts for Minnesota, with an emphasis on natural resources.
  https://www.dnr.state.mn.us/climate/climate_change_info/index.html
- Five Steps Toward Enhancing Climate Resilience, Emily Wasley, DomesticPreparedness.com
  Practical action steps to help emergency managers build a path to enhance their climate resilience.
  https://www.domesticpreparedness.com/resilience/five-steps-toward-enhancing-climate-resilience/
- Snowstorms and Extreme Cold, Department of Homeland Security
  Health and safety information aimed at individuals and households on responding to snow, ice, and extreme cold.
  https://www.ready.gov/winter-weather
- U.S. Climate Resilience Toolkit, United States Global Change Research Program
  Information and tools to help communities adapt to climate change, featuring real-world case studies.
  https://toolkit.climate.gov/
- Winter Weather, Centers for Disease Control and Prevention
  Health and safety information on preparing for and responding to winter weather, including power outages.
  https://www.cdc.gov/disasters/winter/index.html

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- Cohen et al., 2018. Warm Arctic Episodes Linked with Increased Frequency of Extreme Winter Wetather in the United States (PDF). Nature Communications.
  https://www.nature.com/articles/s41467-018-02992-9.pdf
- Minnesota Department of Natural Resources, 2013. Winter Storm: April 9-12, 2013.
  https://www.dnr.state.mn.us/climate/journal/130412_winter_storm.html
- Minnesota Department of Public Safety, 2013. 2013 Spring Ice Storm in Southwest Minnesota (PDF).
  https://www.ready.gov/winter-weather

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Front cover photo: Residential street during 2013 ice storm (Toronto Hydro Corporation, 2013)

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DEPARTMENT OF HEALTH

Appendix I – Critical Infrastructure

Appendix I
Rock County Critical Infrastructures

Healthcare Facilities

Name	Address	City	Zip	Type
Sanford Luverne Hospice	304 North McKenzie Street	Luverne	56156	Hospice Facility
Residential Advantages LLC	107 South Blue Mound Avenue	Luverne	56156	Supervised Living Facility
MN Veterans Home Luverne	1300 North Kniss PO Box 539	Luverne	56156	Nursing Home / Assisted Living
Tuff Memorial Home	505 East Fourth Street	Hills	56138	Nursing Home / Assisted Living
Good Sam Society Mary Jn Brown	110 South Walnut Avenue	Luverne	56156	Nursing Home / Assisted Living
The Oaks & Poplar Creek Estate	201 Oak Drive	Luverne	56156	Nursing Home / Assisted Living
The Tuff Village	301 County Road 6	Hills	56138	Nursing Home / Assisted Living
Tuff Memorial Home Viste Manor	500 East 4th Street	Hills	56138	Nursing Home / Assisted Living
Sanford Luverne Medical Center	1600 North Kniss Avenue	Luverne	56156	Hospital
Oasis Care Home	514 Britz Dr.	Luverne	56156	Nursing Home / Assisted Living

Emergency Services

Name	Address	City	Zip	Type
Rock County Emergency Operations Center (Alternate)	204 East Brown Street	Luverne	56156	Emergency Operations Center (EOC)
Rock County Ambulance Garage	1510 Sioux Valley Dr.	Luverne	56156	Emergency Medical Service (EMS)
Magnolia Volunteer Fire Department	102 North Brooks Street	Magnolia	56158	Emergency Medical Service (EMS)
Hills Fire Department	302 South Main Avenue	Hills	56138	Emergency Medical Service (EMS)
Beaver Creek Fire Department	311 East 1st Avenue	Beaver Creek	56116	Emergency Medical Service (EMS)
Jasper Community Ambulance Service	221 1st Street West	Jasper	56144	Emergency Medical Service (EMS)
Jasper Fire Department	221 1st Street West	Jasper	56144	Emergency Medical Service (EMS)
Rock County Ambulance	1600 North Kniss Avenue	Luverne	56156	Emergency Medical Service (EMS)
Magnolia Volunteer Fire Department	102 North Brooks Street	Magnolia	56158	Emergency Medical Service (EMS)

Emergency Services

Name	Address	City	Zip	Type
Hills Fire Department	302 South Main Avenue	Hills	56138	Emergency Medical Service (EMS)
Beaver Creek Fire Department	311 East 1st Avenue	Beaver Creek	56116	Emergency Medical Service (EMS)
Jasper Community Ambulance Service	221 1st Street West	Jasper	56144	Emergency Medical Service (EMS)
Jasper Fire Department	221 1st Street West	Jasper	56144	Emergency Medical Service (EMS)
Rock County Ambulance	1600 North Kniss Avenue	Luverne	56156	Emergency Medical Service (EMS)
Rock County Emergency Operations Center	204 East Brown Street	Luverne	56156	Emergency Operations Center (EOC)
Rock County Sheriff's Office	1000 North Blue Mound Avenue	Luverne	56156	Law Enforcement Facility
Luverne Fire Department	213 East Lincoln Street	Luverne	56156	Fire Station
Hills Fire Department	302 South Main Avenue	Hills	56138	Fire Station
Hardwick Fire Department	106 Summit Street	Hardwick	56134	Fire Station
Magnolia Volunteer Fire Department	102 North Brooks Street	Magnolia	56158	Fire Station
Beaver Creek Fire Department	311 East 1st Avenue	Beaver Creek	56116	Fire Station
Jasper Fire Department	221 1st Street West	Jasper	56144	Fire Station
Kenneth Volunteer Fire Department	251 Main Avenue	Kenneth	56147	Fire Station

Schools & Shelters

Name	Address	City	Zip	Type
Hills Christian School	501 S Central Ave.	Hills	56138	School
Southwestern Youth Services	401 W. Luverne St.	Magnolia	56158	School
Luverne Alternative Program	709 N Kniss	Luverne	56156	School
Luverne Middle	709 N Kniss	Luverne	56156	School
Blue Mound Learning Center	1314 N Hiawatha Ave	Pipestone	56164	School
Hills-Beaver Creek Secondary	301 N Summit Ave	Hills	56138	School
Luverne Elementary	709 N Kniss	Luverne	56156	School
Hills-Beaver Creek Elementary	404 S 4th St	Beaver Creek	56116	School
Southwestern Youth Services	401 W Luverne St	Magnolia	56158	School
Luverne Senior High	709 N Kniss	Luverne	56156	School
Hills-Beaver Creek Secondary	301 N Summit Ave	Hills	56138	School
Hills-Beaver Creek Secondary	301 N Summit Ave	Hills	56138	School

Transportation

Name	Address	City	Zip	Type
Quentin Aanenson Field	305 Luverne St., Box 659	Luverne	56156	Airport

Utilities

Name	Address	City	Zip	Type
Beaver Creek Wastewater Treatment Plant	874 60th Ave	Beaver Creek	56116	Wastewater Treatment Plant
Hardwick Wastewater Treatment Plant	County Road 7 & County Road 19	Hardwick	56134	Wastewater Treatment Plant
Hills Wastewater Treatment Plant		Hills	56138	Wastewater Treatment Plant
Luverne Water Treatment Plant - Plant 1	202 N Blue Mound Ave	Luverne	56156	Wastewater Treatment Plant
Magnolia Wastewater Treatment Plant	Brook St	Magnolia	56158	Wastewater Treatment Plant
Steen Wastewater Treatment Plant	152 110th Ave	Steen	56173	Wastewater Treatment Plant
Rock County Rural Water Treatment Plant	541 150th Ave	Luverne	56156-4142	Wastewater Treatment Plant
Luverne Wastewater Treatment Plant	400 Redbird Rd	Luverne	56156	Wastewater Treatment Plant
Jasper Wastewater Treatment Plant	269 241st St	Jasper	56144	Wastewater Treatment Plant
Luverne Water Treatment Plant - Plant 2	996 US Hwy 75	Luverne	56156	Wastewater Treatment Plant
Luverne		Luverne	56156	Petroleum
Minwind		Luverne	56156	Wind
Minwind 3-9		Beaver Creek	56116	Wind
Prairie Rose Wind Farm	119 Towers	Hardwick	56134	Wind
Laverne Battery		Beaver Creek	56616	Batteries
Gevo / Agri-Energy LLC	502 S. Walnut	Luverne	56156	Energy
Magnolia	Alliant			Electrical

Hazardous Materials Facilities

Hazardous Materials Facilities have been omitted from this document due to security considerations.

Appendix J – Mitigation Actions by Jurisdiction

CITY OF BEAVER CREEK Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all city residents to sign-up for the county's Nixle emergency notification alert system.	New High Ongoing	City Admin	We have not done anything to date. The city can work to encourage residents to sign up by using our city Facebook page and other means. We will also consider development of a city website.	City
2	Severe Winter & Summer Storms	Education & Awareness Programs	Encourage residents to be aware of and prepared for severe weather and extended power outages.	New High Ongoing	City Admin	We can use our city FB page and perhaps a future city website to post information.	City
3	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Obtain a generator for backup power.	New High TBD	City Admin	We are a small city with limited resources. We will work with Rock County Emergency Management on this effort.	City, County
4	Severe Winter & Summer Storms	Local Planning & Regulations	Address trees that are close to power lines and can cause the lines to be damaged during ice storms or other storm events.	New High Ongoing	City Admin	Our local energy company. Sioux Valley Energy, is in process of burying power lines in residential areas to reduce this risk.	Sioux Valley Energy
5	Flooding	Education & Awareness Programs	Encourage homeowners to make sure that sump pumps are maintained and functional to handle high rain events and avoid basement flooding.	New Moderate Ongoing	City Admin	The city can conduct outreach on this seasonally during the year (spring/fall) and also during periods of heavy rainfall.	City

CITY OF HARDWICK Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all city residents to sign-up for the county's Nixle emergency notification alert system.	Existing High Ongoing	City Admin	The city encourages residents to sign up during meetings, by word of mouth, and posting on our city Facebook page. We are also in the process of developing a city website which we can use to direct residents to the Rock County website.	City
2	Severe Winter & Summer Storms	Education & Awareness Programs	Encourage residents to be aware of and prepared for severe weather and extended power outages.	New High Ongoing	City Admin	We can use our city FB page and perhaps a future city website to post information.	City
3	Severe Summer Storms	Structure & Infrastructure Projects	Investigate building a storm shelter for the campground.	New Moderate TBD	City Admin	The city park bathrooms would serve as the best storm shelter for campers; however, they are small and not close in location. The city can investigate conducting a facility upgrade in the future.	City, Other (TBD)
4	Flooding	Local Planning & Regulations	Implement city planning & policies efforts that will address ways to reduce localized flooding following high rain events.	Existing High Ongoing	City Admin	The city is working with an engineering firm, DGR, Rock Rapids, IA, to address frequent and heavy rainfall protocol to protect our lagoons. We will be enforcing and modifying, if needed, our current sump pump ordinance.	City

CITY OF HILLS Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all city residents to sign-up for the county's Nixle emergency notification alert system.	Existing High Ongoing	City Admin	Announcements at city council meetings, city website, and city's television channel.	City
2	Severe Winter & Summer Storms	Education & Awareness Programs	Encourage residents to be aware of and prepared for severe weather and extended power outages.	Existing High Ongoing	City Admin	Same as above.	City
3	Severe Winter & Summer Storms	Structure & Infrastructure Projects	Work with Sioux Valley Energy to convert overhead powerlines to underground where feasible to reduce power outages due to severe storms.	Existing Moderate Ongoing	City Admin, City PW	Our local power company, Sioux Valley Energy, has been working at, and will continue to gradually install underground service, but this will take a number of years to complete this project.	Sioux Valley Energy
4	Severe Summer Storms	Structure & Infrastructure Projects	Update both of our outdoor warning sirens.	New High TBD	City Admin, City PW	We will work with Rock County Emergency Management to acquire needed funding and connect the sirens to the county's system. An application may be made to the USDA Community Facilities Grant Program to fund purchase of the new sirens.	City, USDA CF Grant Program
5	Flooding	Structure & Infrastructure Projects	Continue to improve our stormwater drainage ditch and upgrade culverts.	Existing Moderate Ongoing	City Admin, City PW	Some storm sewers/culverts are still a concern for back-up. The City replaced a few culverts after the ice storm, but will continue replacements in problem areas.	City
6	Flooding	Education & Awareness Programs	Encourage homeowners to maintain sump pumps in order to handle high rain events and avoid basement flooding.	Existing Moderate Ongoing	City Admin, City PW	This is something the city continues to do as regular outreach to residents in the spring & fall.	City

CITY OF JASPER Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all city residents to sign-up for the county's Nixle emergency notification alert system.	Existing	City Admin, City EM	We use our city Facebook page, city website, city brochure, and bi-monthly newsletters. Residents are also encouraged to sign up for the Pipestone County emergency notification system (whichever one is more relevant for where they live).	City
2	Severe Winter & Summer Storms	Education & Awareness Programs	Encourage residents to be aware of and prepared for severe weather and extended power outages.	Existing High Ongoing	City Admin, City EM	We participate in the National Weather Service's annual Severe Winter/Spring Weather Awareness Week by posting severe weather awareness information out on our city Facebook page and website.	City
4	Severe Summer Storms	Structure & Infrastructure Projects	Construct a storm shelter or tornado safe room at the local campground within the city.	New High TBD	City Admin, City EM	We will work with Rock County Emergency Management to determine what is the best and most feasible solution for providing storm shelter at the park. Outside additional funding would likely be needed.	City, Other (TBD)
5	Flooding	Education & Awareness Programs	Encourage homeowners with basements to maintain sump pumps to avoid basement flooding during high rain events.	Existing Moderate Ongoing	City Admin, City PW	This is something the city continues to do as regular outreach to residents in the spring & fall.	City

CITY OF KENNETH Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all city residents to sign-up for the county's Nixle emergency notification alert system.	New High Ongoing	City Admin	We have not done this yet. We can encourage residents to sign up by posting flyers at our community center and making reminder announcements at city council meetings. We do not have a city website or Facebook page.	City
2	Severe Winter & Summer Storms	Education & Awareness Programs	Encourage residents to be aware of and prepared for severe weather and extended power outages.	Existing High Ongoing	City Admin, City EM	Same as above.	City
3	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	We would like to get a generator for our community center in case we have a big power outage.	New High TBD	City Admin	We are a small city with limited funding. We will work with Rock County Emergency Management to obtain a generator.	City

CITY OF LUVERNE Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all city residents to sign-up for the county's Nixle emergency notification alert system.	Existing High Ongoing	City Admin, City EM	The city encourages residents to sign up for notifications through utility billing, Facebook, website, and our local T.V. access channel.	City
2	All Hazards	Structure & Infrastructure Projects	Install a second water line to the South Water Plant from Lewis & Clark Regional Water System in order to increase reliability and redundacy of our water system to the city.	New High 2022-2023	City Admin, City PW	The city has requested Minnesota State bonding money for this project. Our goal is to implement this during 2022-2023.	City, State Bonding
3	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Obtain generators to support city-critical infrastructure and essential services in the event of an extended power outage.	Existing High TBD	City Admin, City EM	The city is planning on adding 2 standby generators in conjunction with the current unit. Electric Supervisor Remme would like to see a larger portable unit for smaller designated areas. We also plan to add a generator at the booster station by the Veteran's home. This supplies water to the water tower on the North end which serves the hospital.	City
4	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Increase the city's ability for energy redundancies in the event of power outages.	In-Progress High Ongoing	City Admin, City EM, City PW	The city just built a third electrical substation, and is preparing plans for a large electrical generation project. We have worked extensively on increasing our generator backup capacity for critical infrastructure such as the north water plant and the wastewater plant.	City
5	Severe Summer Storms	Local Planning & Regulations	Work with the local campground to submit an emergency evacuation and notification plan.	In-Progress High Ongoing	City Admin, City EM	This has been completed. The City will continue to work with the campground owner to update these plans as needed.	City

CITY OF LUVERNE — Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
6	Flooding	Local Planning & Regulations	Explore options to improve stormwater drainage through the low-lying area that feeds Poplar Creek south of the railroad, and east of the fairgrounds (this area receives discharge from the entire downtown area).	In-Progress High 2021-2022	City PW	The City is working in coordination with the MPCA and MN DNR on any work related to permitting and plans to address wetland impacts.	City
7	Flooding	Local Planning & Regulations	Buy out flooded house on Walnut Street and two houses on Poplar Creek.	New High TBD	City Admin	Based on our current floodplain ordinance, the City does not encourage long-term sustainability of properties that were previously built within the floodplain area and would like to remove them from the floodplain. The city will seek to work with the property owners to participate in a future buyout so we can remove these properties and covert the area to open space.	City, FEMA HMA grant, MN DNR grant
8	Flooding	Natural Systems Protection	Continue to work on river bank repairs along the Rock River within the City of Luverne.	Existing High Ongoing	City PW	The Rock River runs through a portion of the city. If there is erosion we work with the MN DNR to re-build the river banks to deter erosion. We have also made improvements where the river runs through our city park to remove some riverbank to help the river flow more freely and reduce impacts to the parkland area.	City
9	Extreme Cold	Local Planning & Regulations	Working with Missouri River Energy Services to improve electric redundancy for the city's power plant.	Existing High Ongoing	City PW in coord with MRES	This project is moving forward in 2021-2022 to retrofit the power plant with 9 megawatts. This will help protect residents against power outages in the event of extreme cold.	City, MRES

CITY OF MAGNOLIA Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all city residents to sign-up for the county's Nixle emergency notification alert system.	Existing High Ongoing	City Admin	We make announcements during city council meetings. We do not have a city website or city Facebook page.	City
2	Severe Winter & Summer Storms	Education & Awareness Programs	Encourage residents to be aware of and prepared for severe weather and extended power outages.	Existing High Ongoing	City Admin	Same as above.	City
3	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Obtain a portable generator for our fire hall and lift station.	New High TBD	City Admin	We are a small city with limited resources. We will work with Rock County Emergency Management on this effort.	City
4	Severe Summer Storms	Structure & Infrastructure Projects	Construct a storm shelter or tornado safe room at the local campground within the city.	New High TBD	City Admin	Same as above. If a tornado safe room is determined to be best, we may work with the county to apply for future FEMA HMA grant funding if available.	City, County, FEMA HMA
5	Flooding	Local Planning & Regulations	Develop and enforce a sump pump ordinance to reduce inflow and infiltration into our sewer system.	New High TBD	City Admin	This is something that the city is currently looking at doing upon the encouragement of the State of MN. Implementing this policy will reduce the strain on the city's system during & following high rain events. The lift station can be flooded or overwhelmed because of the volume of water that comes into the system from inflow and infiltration.	City

CITY OF STEEN Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all city residents to sign-up for the county's Nixle emergency notification alert system.	New High Ongoing	City Admin	To date we have not done anything with this. We can encourage residents to sign up for emergency notifications by posting notices on city bulletin boards, making announcements at city council meetings or by sending out direct letters.	City
2	Severe Winter & Summer Storms	Education & Awareness Programs	Encourage residents to be aware of and prepared for severe weather and extended power outages.	Existing High Ongoing	City Admin	Same as above.	City
3	Flooding	Structure & Infrastructure Projects	The city will be working with the MPCA in 2021 on our storm sewer project.	In-Progress High 2021	City Admin	MPCA has awarded a $20,000 grant to the city to repair influent water into sewer line problems.	City, MPCA grant