



Board of County Commissioners Agenda Request

22
Agenda Item #

Requested Meeting Date: November 22, 2022

Title of Item: Adopt Multi - Hazard Mitigation Plan

<input checked="" type="checkbox"/> REGULAR AGENDA <input type="checkbox"/> CONSENT AGENDA <input type="checkbox"/> INFORMATION ONLY	Action Requested: <input type="checkbox"/> Approve/Deny Motion <input checked="" type="checkbox"/> Adopt Resolution (attach draft) <i>*provide copy of hearing notice that was published</i>	<input type="checkbox"/> Direction Requested <input type="checkbox"/> Discussion Item <input type="checkbox"/> Hold Public Hearing*
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Submitted by: Bobbie Danielson	Department: HR
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Presenter (Name and Title):	Estimated Time Needed: 30 min
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Summary of Issue:

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.

Aitkin 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.

Alternatives, Options, Effects on Others/Comments:

Recommended Action/Motion:
Adopt Resolution to Adopt Multi-Hazard Mitigation Plan

Financial Impact:

Is there a cost associated with this request? Yes No

What is the total cost, with tax and shipping? \$

Is this budgeted? Yes No *Please Explain:*

CERTIFIED COPY OF RESOLUTION OF COUNTY BOARD OF AITKIN COUNTY, MINNESOTA

ADOPTED November 22, 2022

By Commissioner: xxx

20221122-xxx

County All Hazard Mitigation Plan

WHEREAS, Aitkin County has participated in the hazard mitigation planning process as established under the Disaster Mitigation Act of 2000, and

WHEREAS, the Act establishes a framework for the development of a county Hazard Mitigation Plan; and

WHEREAS, the Act as part of the planning process requires public involvement and local coordination among neighboring local units of government and businesses; and

WHEREAS, the Aitkin County Plan includes a risk assessment including past hazards, hazards that threaten the County, an estimate of structures at risk, a general description of land uses and development trends; and

WHEREAS, the Aitkin County Plan includes a mitigation strategy including goals and objectives and an action plan identifying specific mitigation projects and costs; and

WHEREAS, the Aitkin County Plan includes a maintenance or implementation process including plan updates, integration of the plan into other planning documents and how Aitkin County will maintain public participation and coordination; and

WHEREAS; the Plan has been shared with the Minnesota Division of Homeland Security and Emergency Management and the Federal Emergency Management Agency for review and comment; and

WHEREAS, the Aitkin County All-Hazard Mitigation Plan will make the county and participating jurisdictions eligible to receive FEMA hazard mitigation assistance grants; and

WHEREAS, this multi-jurisdictional plan and cities that participated in the planning process may choose to adopt to County Plan.

NOW THEREFORE BE IT RESOLVED, that Aitkin County supports the hazard mitigation planning effort and wishes to adopt the Aitkin County All-Hazard Mitigation Plan.

Commissioner xxx moved the adoption of the resolution and it was declared adopted upon the following vote

FIVE MEMBERS PRESENT

All Members Voting Yes

**STATE OF MINNESOTA}
COUNTY OF AITKIN}**

I, Jessica Seibert, County Administrator, Aitkin County, Minnesota do hereby certify that I have compared the foregoing with the original resolution filed in the Administration Office of Aitkin County in Aitkin, Minnesota as stated in the minutes of the proceedings of said Board on the 22nd day of November 2022, and that the same is a true and correct copy of the whole thereof.

Witness my hand and seal this 22nd day of November 2022

J. Mark Wedel – County Board Chair

Jessica Seibert – County Administrator

AITKIN COUNTY MINNESOTA



2021

Multi-Hazard Mitigation Plan



U-SPATIAL

UNIVERSITY OF MINNESOTA DULUTH

Driven to Discover

AITKIN COUNTY MINNESOTA

MULTI-HAZARD MITIGATION PLAN

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Sheriff / Emergency Management Director
Aitkin County Sheriff's Office
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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).

Aitkin 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 Aitkin 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 Aitkin County Emergency Management to facilitate an update to the 2015 Aitkin 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 Aitkin 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 Aitkin County, including the cities of Aitkin, Hill City, McGrath, McGregor, Palisade, and Tamarack. The Aitkin 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 Aitkin County after final approval by FEMA (see Appendix D).

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

- Include more recent data documenting the critical infrastructure and hazards faced by Aitkin 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 Aitkin 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 Aitkin County MHMP planning team is headed by the Aitkin County emergency manager, who is the primary point of contact. Members of the Aitkin 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
Daniel Guida	Aitkin County Sheriff's Office	County Sheriff/Emergency Management Director
Patrice Erickson	Aitkin County Sheriff's Office	Deputy Emergency Management Director
Karla White	Aitkin County Sheriff's Office	Deputy Emergency Management Director
Jessica Siebert	Aitkin County Administration	County Administrator
Stacey Durgin Smith	Aitkin County Health & Human Services	Public Health Emergency Preparedness Coordinator
Steve Hughes	Aitkin County SWCD	District Manager
Rich Courtemanche	Aitkin County Land Department	Land Commissioner
John Welle	Aitkin County Highway Department	County Engineer
Mike Dangers	Aitkin County Assessor's Office	County Assesor
Steve Hughes	Aitkin County Soil & Water Conservation District	District Manager
Bill Bratt	Aitkin County Board of Commissioners	Commissioner
Rosanne Beverly	City of Aitkin	City Administrator
Jen Thompson	City of Aitkin	City Clerk
David Cluff	Aitkin Public Utilities	Manager
Ronald Saxton	City of Hill City	Police Officer/Asst. Fire Chief
Lin Benson	City of Hill City	City Councilor
Tami Meyer	City of Hill City	City Clerk/Treasurer
Dake Olson	City of McGregor	Mayor
Maureen Mischler	City of Palisade	City Clerk-Treasurer
Kathy Haugse	City of Tamarack	City Clerk
Pauline Elling	Hill Lake Township	Clerk/Treasurer
Jerry Weiler	Lee Township	Emergency Coordinator/Clerk

Name	Agency/Organization	Participant Title
Tarina Shade	Lakeside Township	Clerk
Harold Harms	Seavey Township	Board Chairman
Lynn Mizner	Loan Township	Supervisor
Kevin Stromberg	Spenser Township	Chairman
Jane Jewett	Libby Township	Clerk
Rhonda Vedder	Riverwood Healthcare Center	Safety/EM Coordinator
Tina Hughly	Riverwood Healthcare Center	ED Manager
Dan Stifter	Aitkin Public Schools	Superintendent
Adam Johnson	Hill City School District	Principal
Brad Johnson	McGregor School District	Superintendent/Elementary Principal
Todd Sangren	MnDOT (Baxter)	Maintenance Superintendent
Glendon Nyberg	MN DNR Forestry	Assistant Area Supervisor
Jeff Jackson	MN DNR Forestry	NE MN Firewise Coordinator/Forester
Sandi Weller	MN DNR Savanna Portage State Park	Park Manager
Chad Emery	Cass County Sheriff's Office	Deputy Sheriff/Emergency Management Coordinator
Marlyn Halvorson	Carlton County Sheriff's Office	Emergency Management Director
John Linder	Itasca County Sheriff's Office	Emergency Management Coordinator
Monte Fronk	Mille Lacs Band of Ojibwe Emergency Management	Emergency Management Director
Julie Peterson	Mille Lacs County Emergency Management	Emergency Management Director

2.2 Review of Existing Plans, Capabilities & Vulnerabilities

Aitkin County and its local communities utilized a variety of planning documents to direct community 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 Aitkin 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 Aitkin 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 Aitkin 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 Aitkin 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 Aitkin County to support mitigation.

Local Mitigation Surveys: As part of Aitkin 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 Aitkin County LMS report, see Appendix C).

2.3 Planning Process Timeline and Steps

In order to update the 2015 Aitkin County MHMP, U-Spatial consultants worked in coordination with Aitkin County Emergency Management and members of the planning team. The updated plan includes new data documenting the types of hazards faced by Aitkin County residents and emergency planning officials as well as new thinking on how to address these hazards.

2.3.1 AITKIN COUNTY STAKEHOLDER COORDINATION

On May 5, 2020, U-Spatial hosted an online kickoff meeting that was attended by the Aitkin 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 June 23, 2020, Aitkin County issued a news release inviting public feedback and participation for the Aitkin County MHMP update (for complete documentation, see Appendix G).

A planning team meeting took place on October 21, 2020, via Zoom video conference hosted by U-Spatial. Meeting participants included representatives from Aitkin 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 Aitkin 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 September 23, 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 Aitkin County. Draft mitigation strategies were developed for Aitkin County and each city participating in the plan (see Appendix F).

In order to provide opportunity for public input, Aitkin County issued a second news release on October 25, 2021, 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 Aitkin County MHMP, including excerpts of the Aitkin 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 Aitkin County and jurisdictions. The public feedback period for the draft plan was open from from 10/25/21 to 11/7/21, for a total of 14 days.

At the close of the public outreach period, the U-Spatial consultants worked with the Aitkin 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.

Table 2. Aitkin County Hazard Mitigation Update Meetings and Public Outreach

Event	Date	Appendix
Kickoff Webinar	5/5/20	Appendix F, Planning Team Meetings
News Release #1	6/23/20	Appendix G, Public Outreach & Engagement Documentation
Planning Team Meeting #1	10/21/20	Appendix F, Planning Team Meetings
Planning Team Meeting #2	9/23/21	Appendix F, Planning Team Meetings
News Release #2	10/25/21	Appendix G, Public Outreach & Engagement Documentation

2.3.2 OVERVIEW OF JURISDICTIONAL PARTICIPATION

Throughout the planning process, Aitkin 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 Aitkin 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 Aitkin 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 Aitkin 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 Aitkin 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. Aitkin 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 Aitkin 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
Aitkin County (15,697)	X	X	X	X	X	X
City of Aitkin (2169)	X	X	X	X	X	
City of Hill City (613)	X	X	X	X	X	
City of McGrath (96)	X		X	X		X
City of McGregor (170)	X	X	X	X	X	
City of Palisade (162)	X	X	X	X	X	
City of Tamarack (62)	X	X	X	X	X	
Neighboring Jurisdictions:						X
Cass County		X			X	X
Carlton County		X				
Mille Lacs Band of Ojibwe		X			X	
Kanabec County						
Mille Lacs County					X	
Crow Wing County						
Itasca County					X	

Section 3 – Aitkin County Profile

3.1 General County Description

Aitkin County, established in 1857, gets its name from fur trader William Alexander Aitken of the American Fur Company. Originally called Aiken County, the modern spelling has been used since 1872. The county is located in north-central Minnesota, approximately 100 miles north of the Minneapolis-St. Paul metropolitan area and 60 miles west of the Duluth-Superior region. It is bounded on the north by Itasca County on the west by Cass and Crow Wing counties, on the south by Mille Lacs and Kanabec Counties, and by St. Louis, Carlton, and Pine counties to the east. The county covers 1,995 square miles, of which 1,822 are land and 174 are water. Part of the Mille Lacs Indian Reservation is also located in the county.

There are six cities and 55 townships, (41 organized, 14 unorganized) in Aitkin County. The City of Aitkin is both the county seat and most populated city, with an estimated population of 2,274 in 2018. The other five cities in Aitkin County are McGrath, Hill City, Palisade, Tamarack, and McGregor. The county had an estimated total population of 15,902 in 2018.

Aitkin County's landscape consists primarily of rolling hills dotted with lakes, rivers, and streams. Much of the county is state forest land. Notable natural areas include Savanna Portage State Park, home to the historic Savanna Portage, and Grayling State Wildlife Management Area. The Mississippi River flows through the west-central Aitkin County, and Lake Mille Lacs in the southwestern corner is one of the largest lakes in Minnesota, covering over 132,000 acres.

Educataion and health services; trade, transportation, and utiltities; and leisure and hospitality are the largest industries within Aitkin County. The county is connected to the extensive state highway system, and it has three general aviation airports, one in Aitkin (Aitkin Municipal Airport-Steve Kurtz Field), one in McGregor (Isedor Iverson Field), and one in Hill City (Hill City-Quadna Mountain Airport).

3.2 Environmental and Geologic Characteristics

Aitkin County has a variety of surface landforms that are the result of past glacial activities. The glacial lakes of Upham and Aitkin, which once covered most of the area, influence the topography of the Mississippi River corridor. The landscape is flat and the streams meander through glacial material. The shrub swamp is a distinctive vegetative community with speckled alder, willows, bog birch, and pussy willow shrubs growing 10 to 15 feet tall. Ferns, tall asters, sedges, and wildflowers grow beneath these dense thickets. Agriculture has been a significant land use in the past and many parcels are held in large acreage.

The topography of Aitkin County is the result of glacial activity that occurred over 10,000 years ago. The county has land varying from flat to hilly. This varied topography is due to glacial deposition that formed moraines and left outwash sediments. The highest point in the county is Quadna Mountain, 2.5 miles southeast of Hill City. At one time, there were large lakes covering portions of the county. This glacial

activity is important to recognize because it created the landscape, soil types, and watersheds, and therefore affects the county's development patterns.

Aitkin County has a wide variety of soil types, all of which are acidic. Most of them have reddish brown subsoil and a foundation from glacial drift. Approximately 48% of the county consists of nearly level soils. Organic soils make up 50% of these soils, or encompass about 25% of the county.

Most of the terrain in Aitkin County is used for woodland recreation and wildlife habitat. Not much of the soil is used for farming due to short, cool growing seasons that limit the types of crops suitable for the area.

3.3 Hydrography

Water resources within Aitkin County are important to the community because they provide recreational and aesthetic value, as well as enhanced economic opportunity. Important water resources include surface and ground water from aquifers, watersheds, lakes, rivers, and wetlands, providing water for riparian habitats, fish, wildlife, households, livestock, recreation, and aesthetic and industrial uses. Aquifers are supplemented by an average precipitation of 28 inches annually in Aitkin County and flows into three major drainage basins, which are the Great Lakes Basin, the Upper Mississippi River Basin, and the St. Croix River Basin. The county contains 6 major watersheds, including the Mississippi River–Headwaters, Mississippi River–Brainerd, St. Louis River, Rum River, Kettle River, and Snake River watersheds.

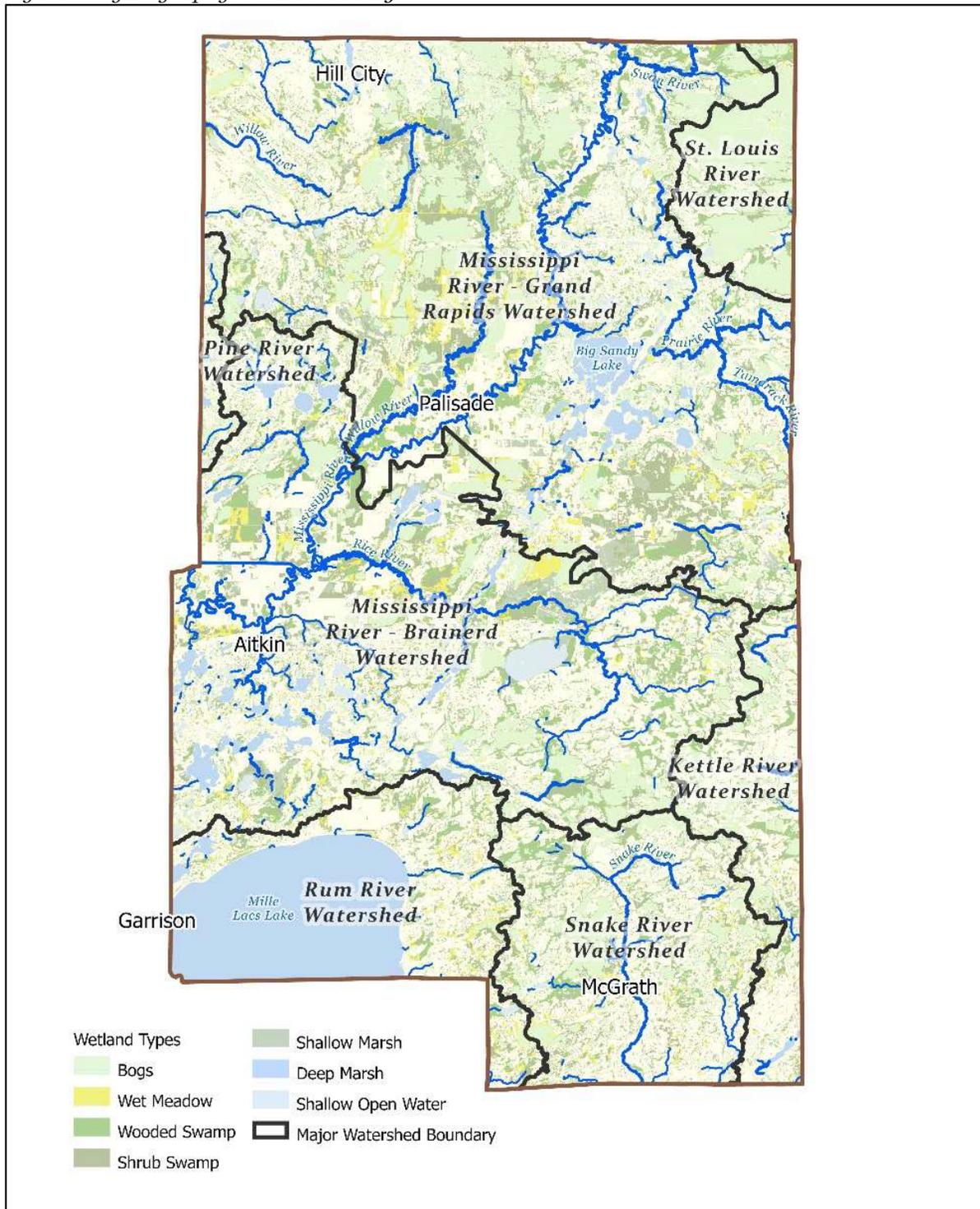
The Mississippi River, flowing south into Aitkin County, enters a flat and forested plain, which makes up the bed of glacial Lake Aitkin. The river is deep and slow in this stretch, with many oxbows forming islands surrounded by slack water.

Aitkin County contains a number of Protected (i.e., Public) Waters, which are lakes, wetlands, and watercourses regulated by the Minnesota DNR. The inventory of the protected waters in the county includes 213 lakes, 120 watercourses (rivers and streams), and 95 wetlands (MN DNR, 2019a).

Waters across the State are continuously monitored for pollution and invasive species. The Minnesota Pollution Control Agency (MPCA) measures water pollutant levels. Waterbodies that do not meet water quality standards are designated as impaired and sent to the Environmental Protection Agency (EPA), along with pollutant-reduction goals to restore these waters (MPCA, 2017). The Minnesota Department of Natural Resources (MN DNR) is responsible for tracking and stopping the spread of aquatic invasive species. Waters with invasive species are labeled as infested.

The basic hydrography of Aitkin County is mapped in Figure 1.

Figure 1. Hydrography in Aitkin County



SOURCE: (MN DNR, 2013, 2019C, 2021B)

3.3.1 LAKES

According to the Minnesota DNR, there are 443 lakes over 2 acres in size in the county, the largest of which is Mille Lacs, (64,895 of its 128,223 acres are in Aitkin County). These lakes cover 112,664 of the county's 1,276,800 acres (8.8%).

Impaired waters are an increasing problem as Aitkin County has many lakes, creeks and rivers that are on the Minnesota Pollution Control Agency Impaired Waters lists, including the Mississippi and Moose Rivers, Mille Lacs, Big Sandy Lake, and Minnewawa Lake (MPCA, 2020). Lakes in Aitkin County have been identified as impaired due to pollutants or stressors found in these waters; examples include E. coli, mercury in fish tissue, and excess levels of nutrients. 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). The MN DNR documents six lakes in Aitkin County as infested with aquatic invasive species: Big Sandy Lake with flowering rush; French Lake with Eurasian water-milfoil; and Big Pine Lake, Farm Island Lake, Little Pine Lake, and Round Lake with zebra mussels.

3.3.2 RIVERS

Three major rivers flow through Aitkin County: the Mississippi River, Snake River, Willow River, Rice River, Sandy River, Swan River, and Prairie River. The Upper Mississippi River Drainage includes nearly two-thirds of Aitkin County. Its major tributaries are the Sandy, Willow, Rice and Prairie Rivers. (MN DNR, 2020d).

The MPCA classifies a number of rivers in Aitkin County as "impaired," including: Mississippi River, Moose River, Pine River, Ricer, Sandy River, Snake River, and Tamarack River.

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.

Wetlands mapped by the National Wetlands Inventory cover 545,063 acres (851 square miles) in Aitkin County. Wetlands are one of the most efficient natural water filters, as wetland plants and soils clean the water before it goes into groundwater or rivers. After being slowed by a wetland, water moves around plants allowing suspended sediments to drop out and settle on the wetland floor. Plant roots and microorganisms in the soil often absorb nutrients from fertilizer application, manure, leaking septic systems, and municipal sewage. Wetlands also serve as a storage area for excess water during times of flooding.

Wetlands in Aitkin County consist of 6 types, including wet meadow, shallow marsh, deep marsh, shrub swamp, wooded swamp and bogs (MN DNR, 2019d). The variety of wetland types are presented in the hydrography map in Figure 1.

Exotic plants such as Eurasian watermilfoil and purple loosestrife have invaded many wetlands in Minnesota. The Minnesota DNR has documented both of these invasive species within Aitkin County. These plants can take over entire native communities and can threaten native wetland ecosystems.

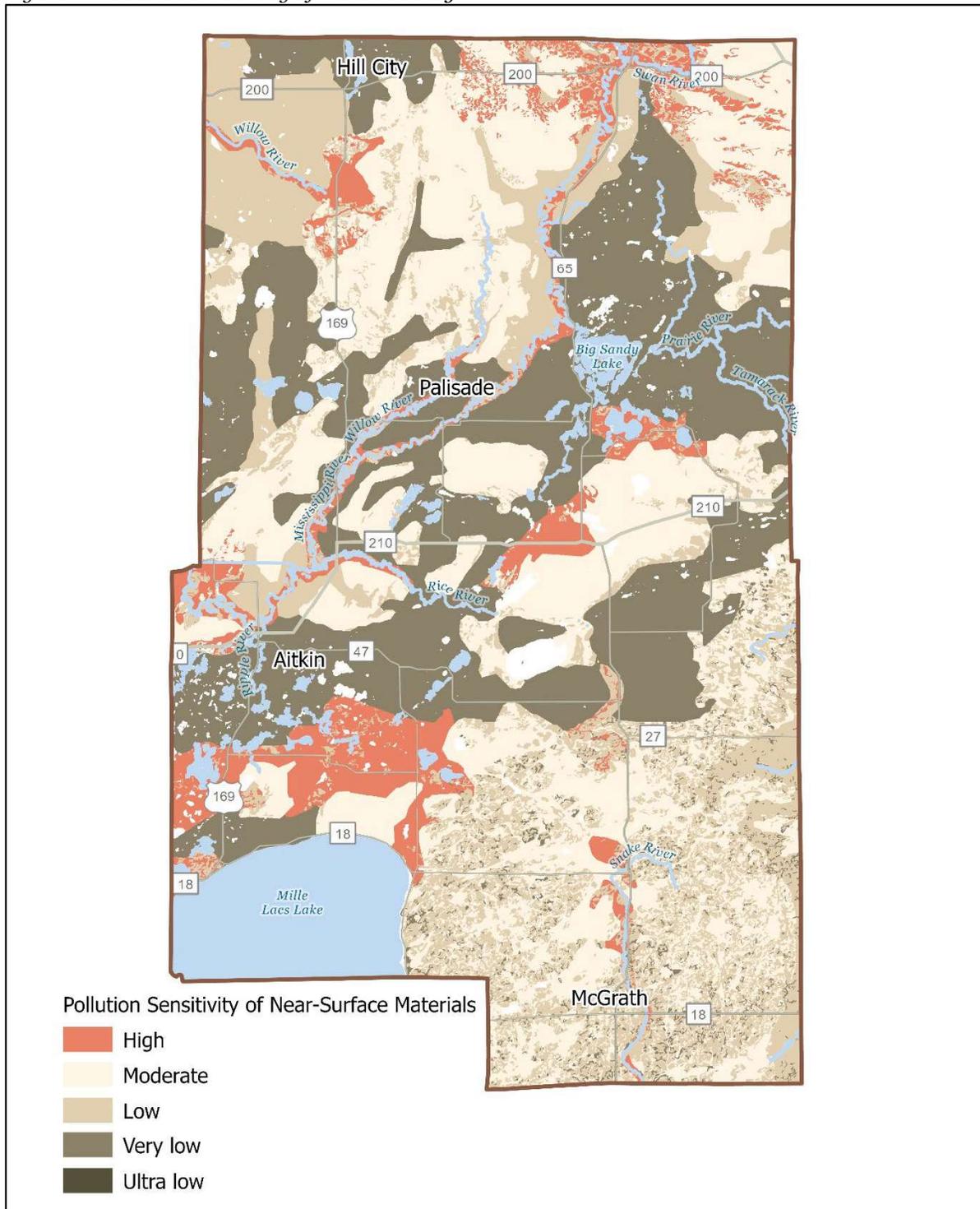
Although impairment is not as prevalent as in lakes and rivers, the MPCA has identified a number of impaired wetlands throughout Minnesota; fortunately, none of these wetlands are located in Aitkin County.

3.3.4 GROUNDWATER

Groundwater serves a variety of vital functions in Aitkin County. The primary water sources within Aitkin County are from sand plain shallow aquifers. Because these aquifers are near the surface, they may be vulnerable to contamination. Septic tanks and nitrate contamination can be a problem, often due to seasonal and permanent lakeshore residences.

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).

Figure 2. Pollution sensitivity of Aitkin County



SOURCE: (MPCA, 2018A)

3.4 Climate

According to the Köppen climate classification system, Aitkin County’s climate is classified as “Dfb” – 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 below 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 Aitkin County is located.

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

Month	MN Climate Division 6	MN Climate Division 6	MN Statewide	MN Statewide
	1981–2010	1990–2020	1981–2010	1990–2020
January	11.0°F	11.2°F	9.9 °F	10.1 °F
February	16.5°F	16.0°F	15.4 °F	14.7 °F
March	28.7°F	28.7°F	27.9 °F	27.8 °F
April	43.2°F	42.2°F	42.9 °F	41.9 °F
May	55.1°F	54.9°F	55.1 °F	54.8 °F
June	64.2°F	64.4°F	64.4 °F	64.8 °F
July	69.1°F	69.2°F	69.0 °F	69.0 °F
August	66.9°F	67.0°F	66.8 °F	66.8 °F
September	57.9°F	58.9°F	57.7 °F	58.6 °F
October	45.3°F	45.5°F	44.8 °F	45.1 °F
November	30.2°F	30.8°F	29.2 °F	29.8 °F
December	15.6°F	17.7°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 2 profile. Appendix H provides the full MDH profile for Region 2, which includes Aitkin 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)

Changes in average temperatures are detailed in Table 5.

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.

Table 5. Temperature trends for HSEM Region 2

Average Summer Maximum Temperature			Average Winter Minimum Temperature		
1981–2010	2050–2075	Change	1981–2010	2050–2075	Change
77.2 °F	84.6 °F	+7.4 °F	1.2 °F	11.3 °F	+10.1 °F

SOURCE: (MDH, 2018)

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

Aitkin County contains six cities, 40 townships, and four unincorporated townships. In 2020, Aitkin County had a population of 15,697, averaging eight people per square mile of land area (U.S. Census Bureau, 2020b). The county seat, Aitkin City, is the largest city in the county with a 2020 population of 2,168. Table 6 lists the communities in Aitkin 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. Aitkin County Population by Community, 2010 and 2020

Community	2010 Population	2020 Population	% of County
Aitkin City	2165	2,168	13.81%
Aitkin Township	856	910	5.80%
Ball Bluff Township	278	272	1.73%

Community	2010 Population	2020 Population	% of County
Balsam Township	42	32	0.20%
Beaver Township	53	62	0.39%
Clark Township	169	116	0.74%
Cornish Township	28	45	0.29%
Davidson Unincorporated Township	42	42	0.27%
Farm Island Township	1099	995	6.34%
Fleming Township	312	329	2.10%
Glen Township	450	432	2.75%
Haugen Township	178	154	0.98%
Hazelton Township	844	792	5.05%
Hill City	633	613	3.91%
Hill Lake Township	430	435	2.77%
Idun Township	259	222	1.41%
Jevne Township	322	334	2.13%
Jewett Unincorporated Township	47	45	0.29%
Kimberly Township	195	188	1.20%
Lakeside Township	463	504	3.21%
Lee Township	50	38	0.24%
Libby Township	45	43	0.27%
Logan Township	184	185	1.18%
Mcgrath City	80	41	0.26%
Mcgregor City	391	384	2.45%
Mcgregor Township	105	96	0.61%
Macville Township	206	170	1.08%
Malmo Township	337	353	2.25%
Millward Township	72	60	0.38%
Morrison Township	200	180	1.15%
Nordland Township	972	983	6.26%
Northeast Aitkin Unincorporated Township	11	8	0.05%
Northwest Aitkin Unincorporated Township	342	355	2.26%

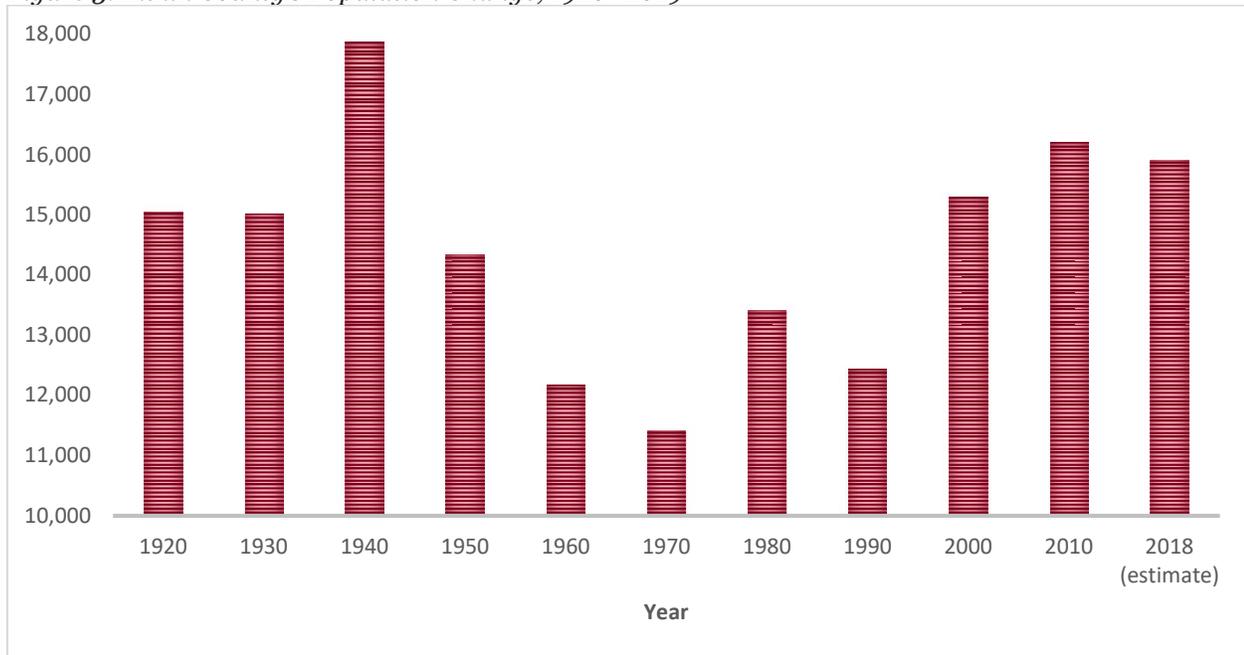
Community	2010 Population	2020 Population	% of County
Palisade City	167	162	1.03%
Pliny Township	109	116	0.74%
Rice River Township	136	120	0.76%
Salo Township	102	85	0.54%
Seavey Township	61	64	0.41%
Shamrock Township	1272	1,215	7.74%
Spalding Township	329	320	2.04%
Spencer Township	518	522	3.33%
Tamarack City	94	62	0.39%
Turner Township	208	137	0.87%
Verdon Township	45	40	0.25%
Wagner Township	332	335	2.13%
Waukenabo Township	316	312	1.99%
Wealthwood Township	268	251	1.60%
White Pine Township	34	38	0.24%
Williams Township	144	120	0.76%
Workman Township	207	212	1.35%
Total	16,202	15,697	100.00%

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

The county's population saw a surge in growth during the 1930's and reached its record high population of 17,865 in 1940. Between 1940-1970 the county's population shrank by 36%. From 1990 to 2010 Aitkin County's population has been steadily rising, growing by 30% during that time period (U.S. Census Bureau, 2020b). However, population predictions show a downward trend, and the Minnesota State Demographic Center projects a 20% decline in Aitkin County's population through 2050 (Minnesota State Demographic Center, 2020). Figure 3 provides an overview of the county's historic population change. Projected population is detailed in Figure 4.

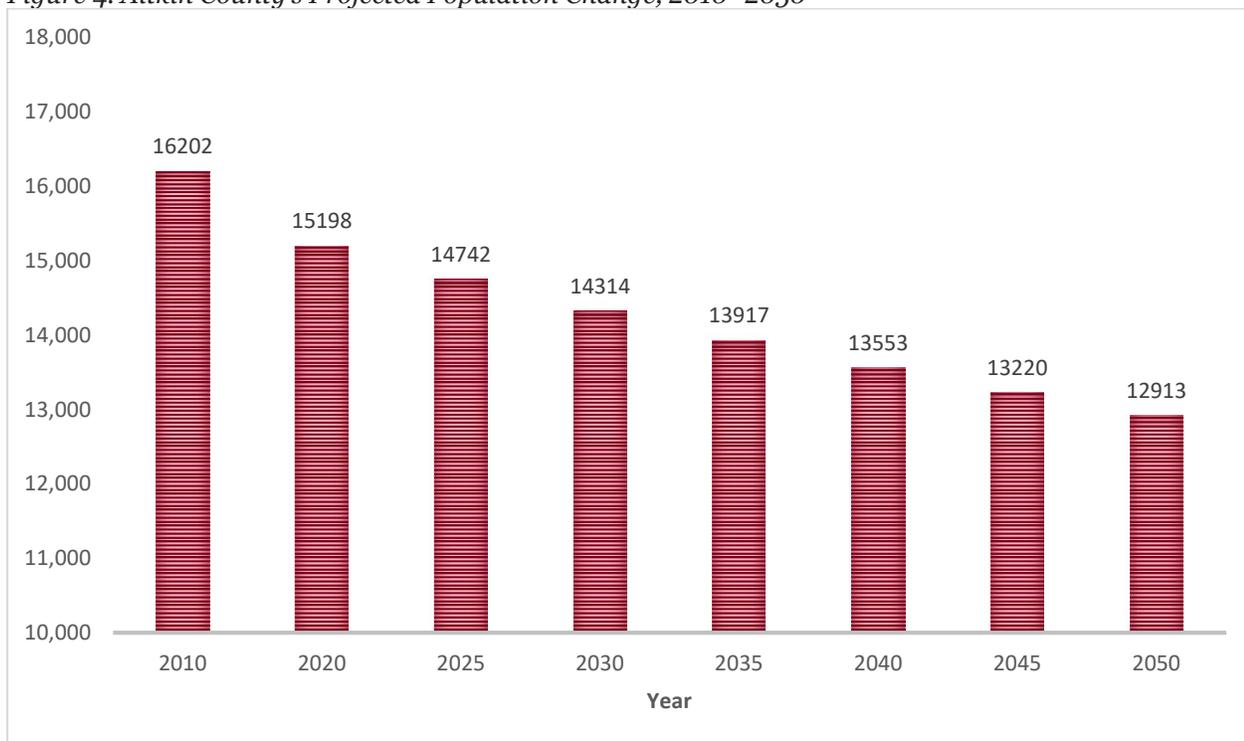
Aitkin County's total population consists of 49.4% females and 50.6% males. 6.3% of the total population is aged 80 and older, and 19.8% of the total population is under 20 years old. 60–79-year-olds make up the largest age category in Aitkin County, at 30.0% of the population. Figure 5 breaks down the percentage of the total population into categories of age and sex.

Figure 3. Aitkin County's Population Change, 1920–2019



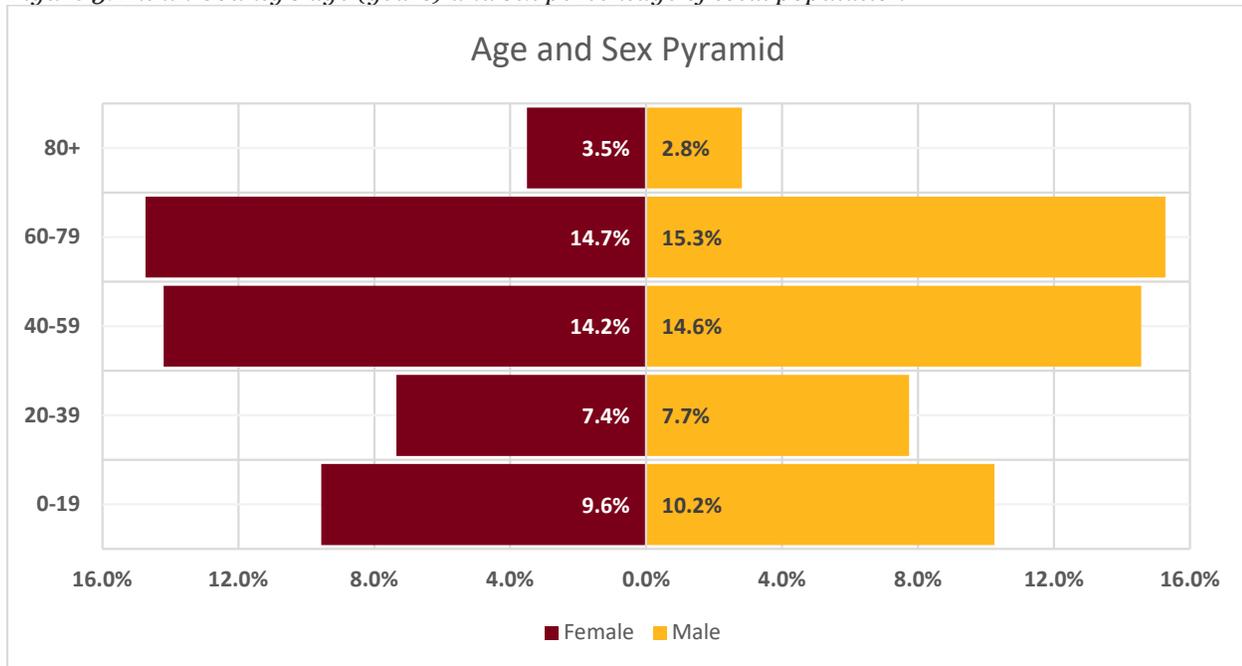
SOURCE : (U.S. CENSUS BUREAU, 2020A)

Figure 4. Aitkin County's Projected Population Change, 2010–2050



SOURCE: (MINNESOTA STATE DEMOGRAPHIC CENTER, 2020)

Figure 5. Aitkin 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 (30%) of people in Aitkin County, followed by Trade, Transportation and Utilities (22%), and Leisure and Hospitality (12%). The total number of jobs in the county decreased by nearly 1.5% between 2008 and 2018. The ten year change in the average annual employment of each industry supersector in Aitkin County is in Table 7.

Table 7. Average Annual Employment by Industry Supersector, Aitkin County

Industry Supersector	Average # of Employees (2008)	Average # of Employees (2018)	% Change
Natural Resources and Mining	103	No Data	NA
Construction	309	205	-33.66%
Manufacturing	No Data	420	NA
Trade, Transportation and Utilities	986	908	-7.91%
Information	No Data	6	NA
Financial Activities	135	112	-17.04%
Professional and Business Services	120	107	-10.83%
Education and Health Services	1,051	1,233	17.32%
Leisure and Hospitality	582	508	-12.71%
Other Services	123	135	9.76%
Public Administration	315	370	17.46%
Total, All Industries	4,151	4,090	-1.47%

SOURCE: (MN DEED, 2020)

The 2017 median household income in Aitkin County was \$30,652, compared to a Minnesota average of \$65,699. The median household income in Aitkin County decreased by 1.7% from 2010 to 2017. The percent of the county's population living below the poverty level in 2017 was 13.7%, 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 Aitkin County. Critical infrastructure is identified based on FEMA guidelines (FEMA, 2013a) as well as input from Aitkin 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 Aitkin 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 Aitkin 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 in a few representative communities with concentrated facilities.

Healthcare Facilities

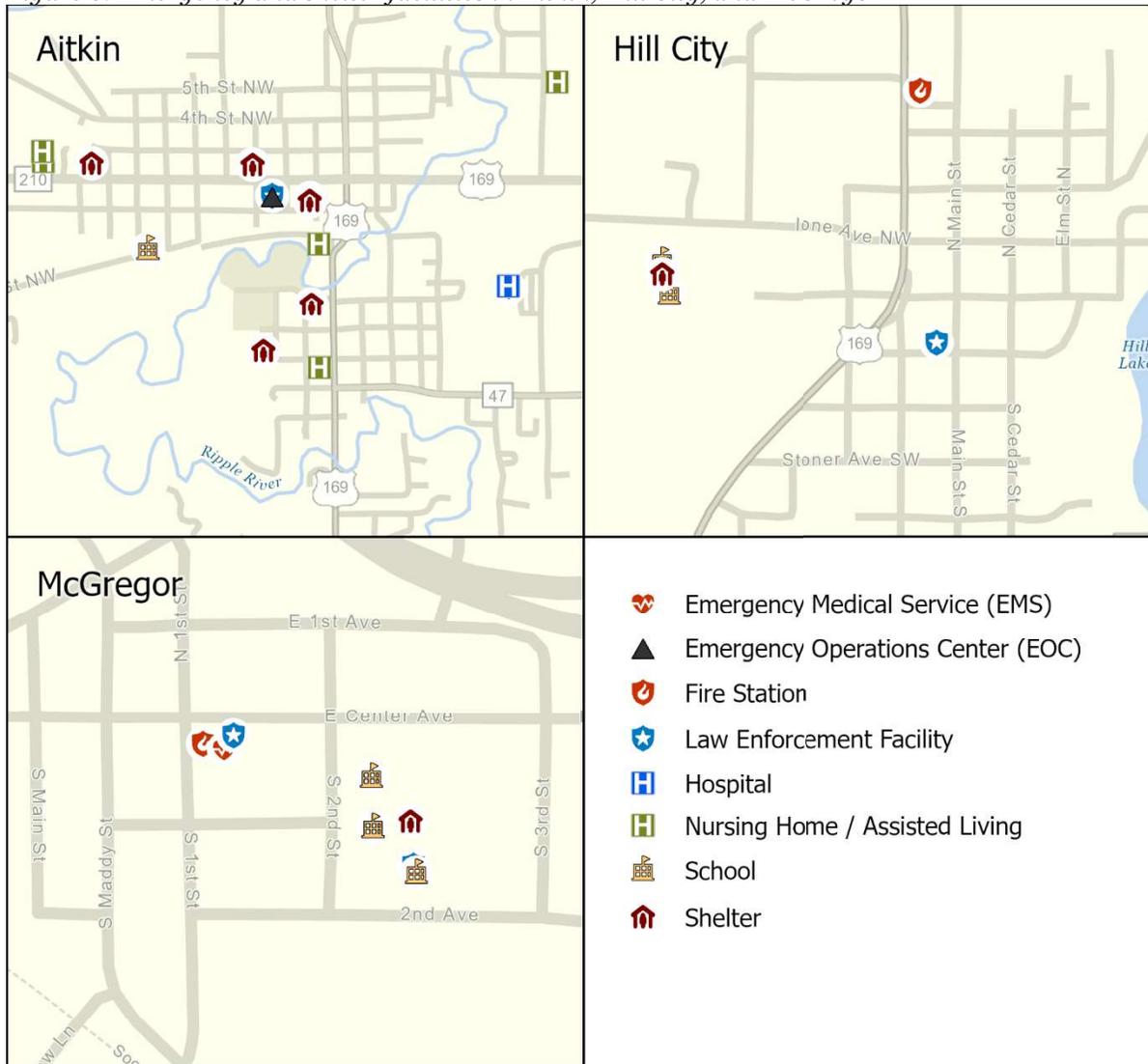
Aitkin County is served by seven healthcare facilities. There is only one hospital, the Riverwood Healthcare Center. It is a 24-bed critical access hospital with primary care clinics in Aitkin, McGregor and Garrison. The other six identified healthcare facilities are nursing homes; five are located in the city of Aitkin, and one in McGregor.

Emergency Services

Law Enforcement: The Aitkin County Sheriff's Department in the city of Aitkin provides services to the entire county. The sheriff's offices also include the county jail. The sheriff is the chief law enforcement officer in the county. The following cities in Aitkin County have police departments: Aitkin, McGregor, and Hill City.

The one Emergency Operation Center in Aitkin is located in the sheriff's office in the city of Aitkin.

Figure 6. Emergency and shelter facilities in Aitkin, Hill City, and McGregor



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

Fire & Rescue Services: The county has seven fire departments including Hill City, Jacobson, Aitkin, and McGrath, as well as the McGregor Volunteer Fire Department, which has two stations, and the Palisade Volunteer Fire Department. EMS services are operated through both McGregor stations, Palisade, and by North Memorial Medical Transportation in the Aitkin area.

Additionally, the Department of Natural Resources operates four stations and can assist in the event of rural wildfires. These stations are Hill City, McGrath, Aitkin Area, and Sandy Lake, which is located in McGregor.

Schools & Evacuation Centers/Shelters

There are 10 schools in Aitkin County: McGregor has an elementary school, a secondary school, and an alternative learning program. The city of Aitkin has two elementary schools, a secondary school, and the

Minisinaakwaang Leadership Academy. Hill City has an elementary school, a middle school and a high school.

FEMA and the American Red Cross have designated 14 facilities within the county as shelters to be used in the event of an issued evacuation. Three are located in Palisade, two each in McGregor and Hill City, and six are located in the city of Aitkin.

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

Eight highways administered by the Minnesota Department of Transportation (Mn/DOT) serve Aitkin County. These highways include U.S. Highways and State Trunk Highways, which are the most heavily used in the county. In total, there are 1,795 miles of roadway in Aitkin County. The primary roadways passing through the county are U.S. Highway 169 and Minnesota State Highways 18, 27, 47, 65, 200, and 210.

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 Aitkin County.

There are 176 bridges and culverts on county, township and city roads. All county bridges are the responsibility of the County Engineer at the Aitkin County Highway Department. The bridges are inspected on a rotating basis depending upon the type of structure.

Table 8. Road miles by route system

Route System Defined	Miles
County Road	137
County State Aid Highway (CSAH)	382
Military Road	1
MN Highway	205
Municipal	32
National Wildlife Refuge	13
Ramp or Connector	0.6
State Forest Road	98
State Park Road	8
Township Road	788
Unorganized Territory Road	81
US Highway	49
Total	1,794.6

SOURCE: (MNDOT, 2012)

Railways: There is one main railroad company operating within Aitkin County. This is the Burlington Northern-Santa Fe (BNSF) Railroad. The largest volumes of goods transported on this railroad are raw materials such as coal to be shipped via the Duluth/Superior Port. The BNSF railroad company is a nationally operated railroad company that serves a variety of industrial and commercial customers. BSNF operates two main lines in northeast Minnesota, including the 39.31 miles of track in Aitkin County.

Airports: Three airports in the county provide air service. The Aitkin Municipal Airport (Steve Kurtz Field) is a public-use airport 2 miles northeast of the city of Aitkin, with Aitkin County having two-thirds ownership and the City of Aitkin one-third ownership. Situated at an elevation of 1,206 feet, the airport has two runways: one asphalt (4,018 feet long) and one turf (3,335 feet). The McGregor Isedor Iverson Airport is owned by the city of McGregor, located at an elevation of 1,228 feet, just north of town. One asphalt runway is extant (3,400 feet long). The Hill City-Quadna Mountain Airport lies south of Hill City at an elevation of 1,289 feet. Owned by the city, the airport has one turf runway (2,850 feet).

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 Aitkin County is displayed in Figure 7.

Water & Sewer: Aitkin County is home to five wastewater treatment plants, in Hill City, Aitkin, Palisade, Tamarack, and McGregor. All are situated in the Upper Mississippi River Basin.

Energy: Eight electrical substations are located within Aitkin County along with 21 major electric transmission lines. Residents of Palisade and Aitkin receive their electricity from Great River Energy. The rest of the county is served by Minnesota Power Company. The electrical substations are all operated by Great River Energy.

A natural gas pipeline, operated by Great Lakes Gas Transmission, cuts across the northeast corner of the county. A crude oil pipeline operated by Enbridge also crosses the county in the northeast corner.

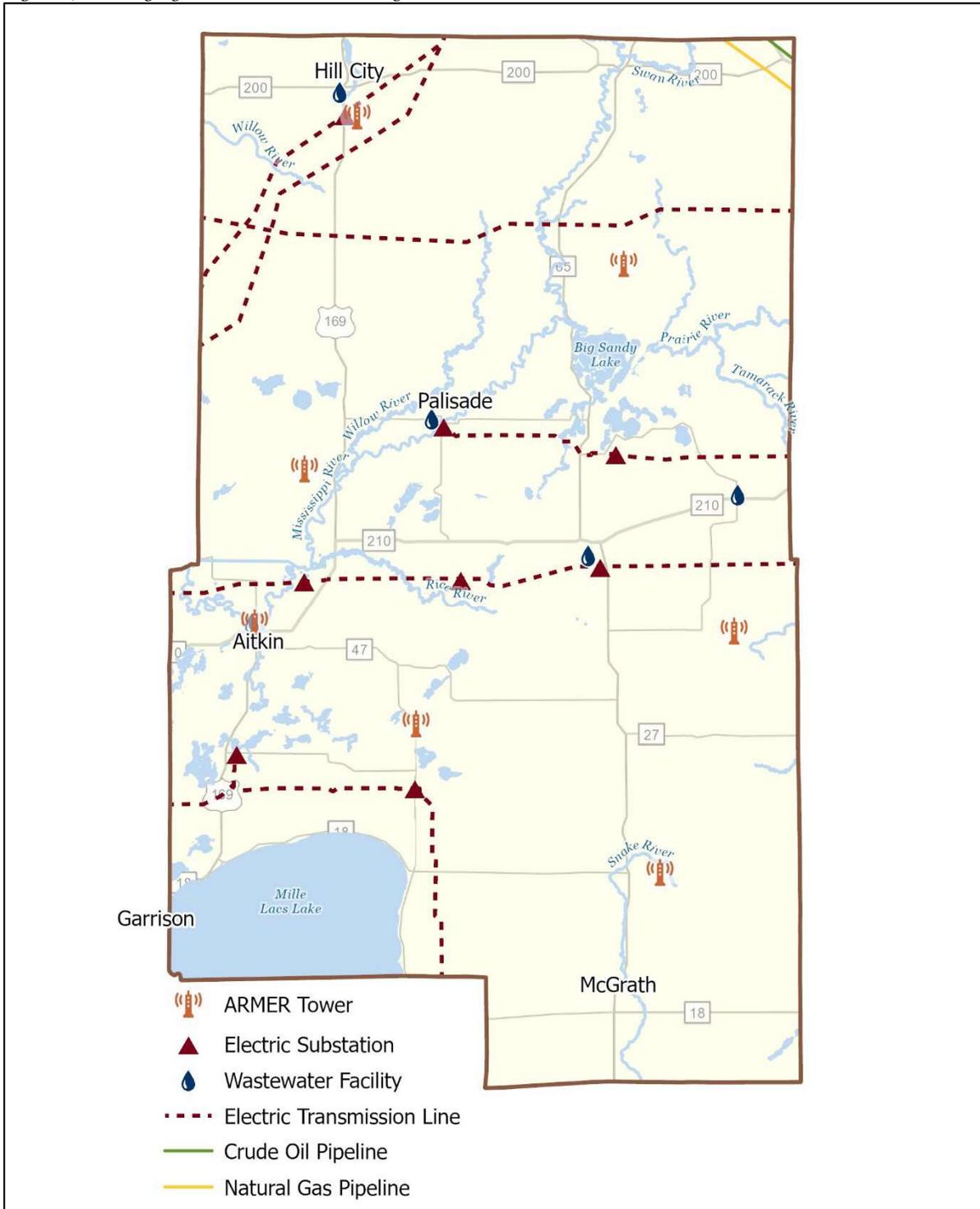
Communication: Communication infrastructure includes the Allied Radio Matrix for Emergency Response (ARMER) system. Administered in coordination with the Minnesota Statewide Radio Board, the ARMER program manages the implementation of a 700/800 megahertz (MHz) shared digital trunked radio communication system capable of servicing the radio communication needs of every public safety entity operating in Minnesota (MN DPS, 2021). There are seven ARMER towers in Aitkin 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, 2004c). 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. These facilities are required to register with the EPA due to the type and quantity of hazardous materials being stored or produced at the facility. None of these facilities have been identified in Aitkin County.

Figure 7. Utility systems in Aitkin 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. Eight employers with more than 70 employees were identified in Aitkin County. Six are located in the city of Aitkin, and the other two are in McGregor. These employers include Aitkin County and the public school system (Aitkin County, 2001).

Government Buildings: Government buildings deemed to be significant is at the discretion of the communities, but often include: government service centers, the court house, jails, and prisons. Previously mentioned government emergency services (police and fire), as well as schools, are not included in this list. Five essential locations have been identified by the county, all in the city of Aitkin. They include: the Aitkin County Land Department, Aitkin County Highway Department, Aitkin County Health & Human Services, Aitkin County Judicial Center, and the Aitkin County Government Center.

Cultural Resources

Cultural resources are cultural or historic assets that are unique, irreplaceable, or important to a community. Twelve such assets have been identified in Aitkin County. These assets include several buildings, a shipwreck, and an historic portage route.

3.8 Land Use and Ownership

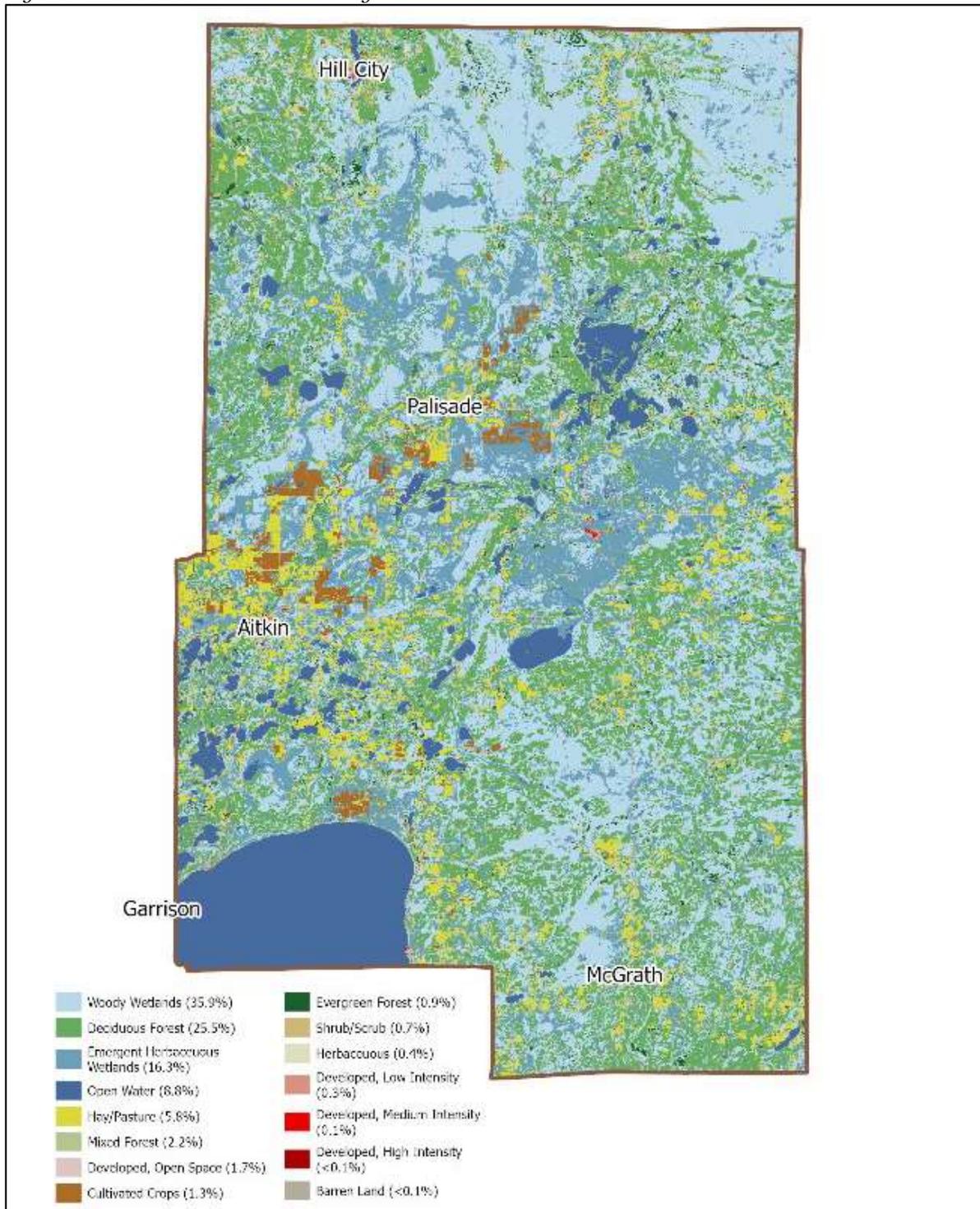
Aitkin County is a large, cultivated county. The county is 1,995 square miles, 39% of which is covered by cultivated crops, 12% of which is unclassified, followed by deciduous forest (10%), and woody wetlands (10%) (USGS, 2016). A map of Aitkin County's land cover is displayed in Figure 8.

Nearly 45% of the land in Aitkin 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 decreased by nearly 12.5%, from 61,792 acres in 2012 to 54,095 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 Aitkin County's harvested cropland in 2017.

In addition to growing crops, Aitkin County is also home to numerous feedlots. A 2016 inventory counted 86 active feedlots in the county. All of these feedlots raise cattle as the primary stock, 95% of which raise beef cattle and 5% of which raise dairy cattle. An average of 68 animals are on each feedlot (MPCA, 2016).

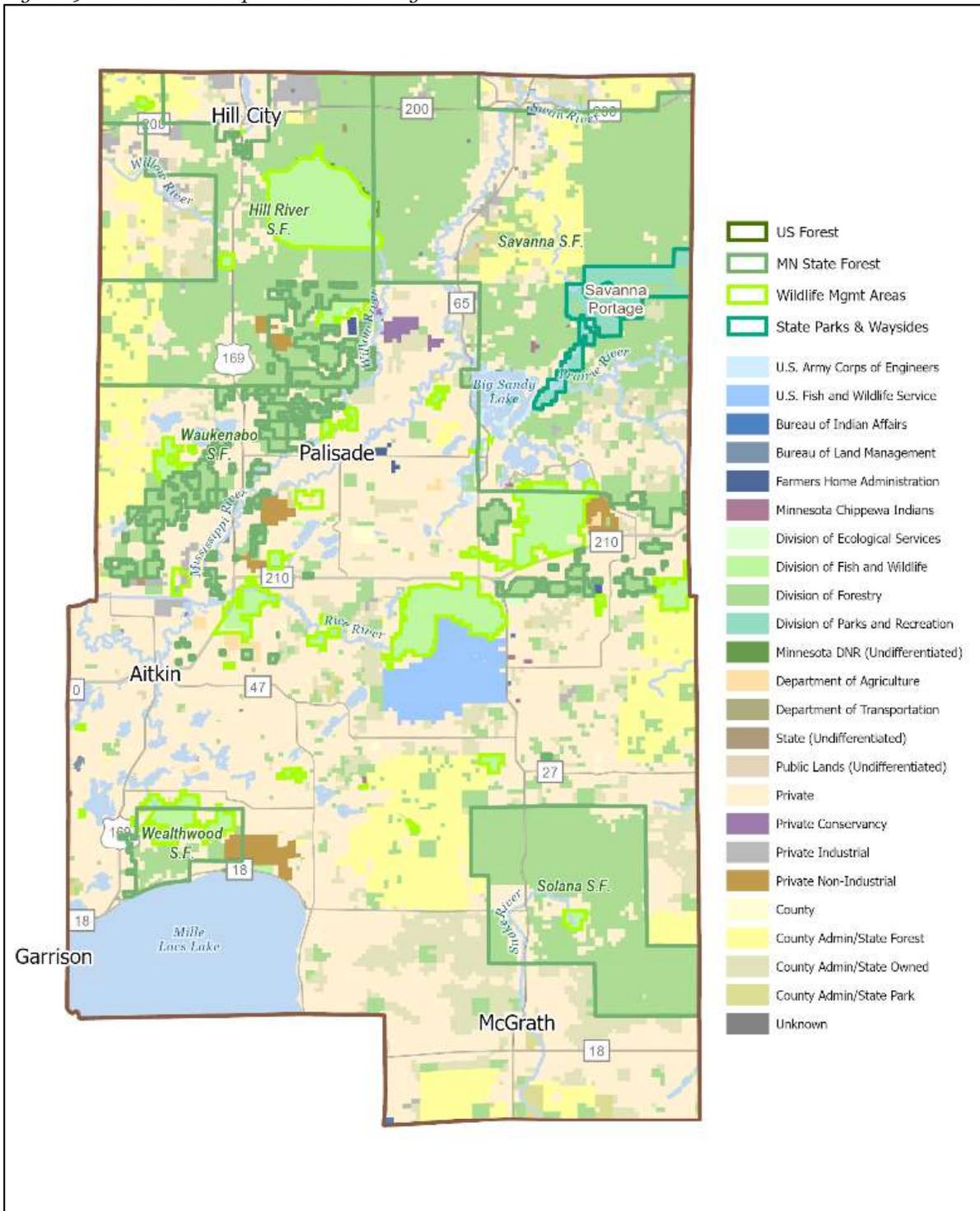
Ownership of the county is divided between 24 different agencies; the majority being privately owned (47%). Land ownership is displayed in Figure 9.

Figure 8. Land cover in Aitkin County



SOURCE:(USGS, 2016)

Figure 9. Land ownership in Aitkin County



SOURCE: (MN DNR, 2008)

Table 9. Aitkin County's Harvested Cropland, 2017

Crop	Acres	% of Harvested Cropland
Hay and Haylage	34,574	75.72%
Soybeans	4,995	10.94%
Corn (grain and silage)	1,715	3.76%
Oats	612	1.34%
Potatoes	11	0.02%
Other	3,754	8.22%
Total	45,661	100%

SOURCE: (USDA NASS, 2017)

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

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 Aitkin County, updated the existing mitigation actions published in the 2015 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 2015 Multi Hazard Mitigation Plan. The natural hazards that pose risk to Aitkin County were discussed and adjusted to reflect the definitions of natural hazards used in the 2021 Minnesota State Hazard Mitigation Plan.

Table 10. Prioritization of hazards for 2015 and in this Update

Natural Hazards Addressed in the Last Plan	2015 Priority	Current Priority
Tornadoes	High	High
Winter Storms	High	High
Flooding	Moderate	High
Windstorms	High	High
Wildfire	Moderate	Moderate
Hail	Low	Low
Lightning	Low	Low
Drought	Moderate	Low
Extreme Cold	Low	Low
Extreme Heat	Low	Low
Landslides	Low	Low

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 Aitkin 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 Meetings. 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 the priority to mitigate against that hazard. After an extensive discussion, stakeholders agreed that all concerns relating to drought were of increased wildfire risk, and those were already addressed in the wildfire mitigation actions. Drought was moved to low priority. Appendix F provides the discussion notes from the meetings.

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).

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)

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.

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.

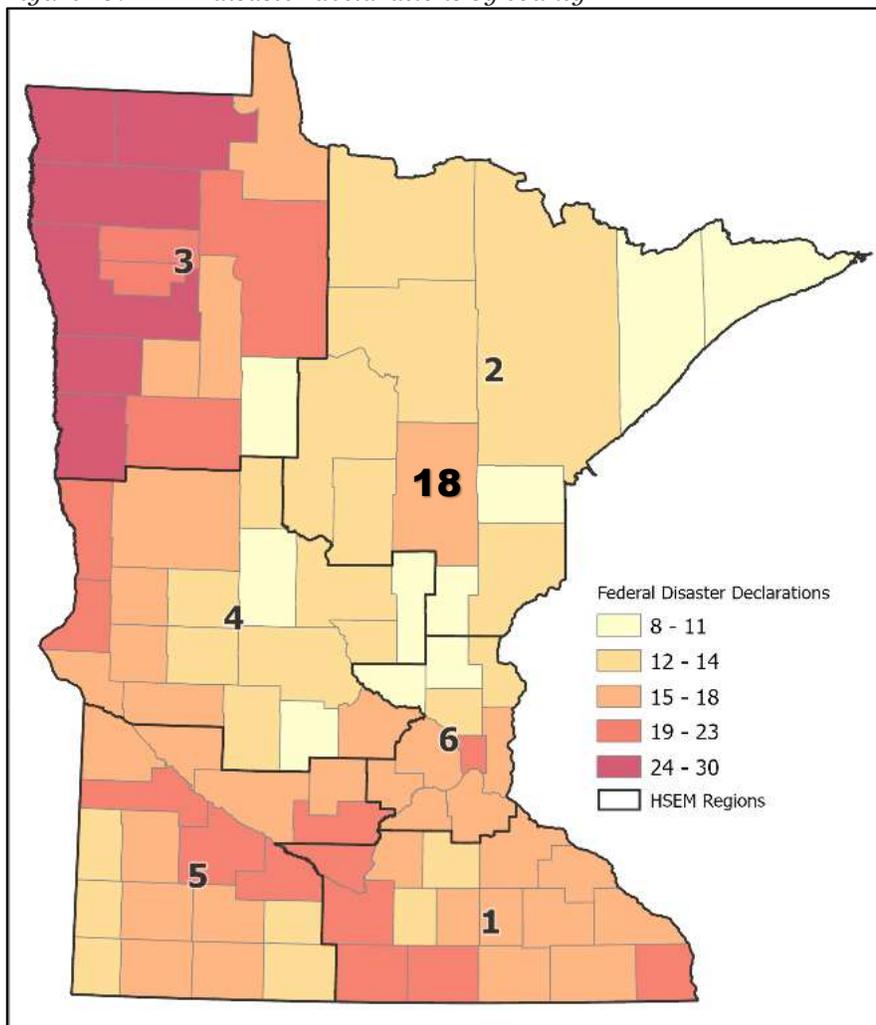
4.1.3 FEMA- AND MINNESOTA-DECLARED DISASTERS AND ASSISTANCE

Another historical perspective is derived from FEMA-declared disasters. Fifteen major disaster and three emergency declarations have been made in Aitkin County between 1957 and January 2021 (Figure 10). These are listed in Table 12.

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). Aitkin County was included in three 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.

Figure 10. FEMA disaster declarations by county



SOURCE: (FEMA, 2021A)

Table 12. FEMA-declared Major Disasters and Emergency Declarations in Aitkin 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-4390-MN	2018	Severe Storms, Tornadoes, Straight-Line Winds, And Flooding	06/15/2018–07/12/2018
DR-4069-MN	2012	Severe Storms And Flooding	06/14/2012–06/21/2012
EM-3242-MN	2005	Hurricane Katrina Evacuation	08/29/2005–10/01/2005
DR-1370-MN	2001	Severe Winter Storms, Flooding, And Tornadoes	03/23/2001–07/03/2001
DR-1283-MN	1999	Severe Storms, Winds, And Flooding	07/04/1999–08/02/1999
DR-1175-MN	1997	Severe Flooding, High Winds, Severe Storms	03/21/1997–05/24/1997
DR-1116-MN	1996	Flooding And Severe Storms	03/14/1996–06/17/1996
DR-1064-MN	1995	Severe Thunderstorms, Winds, Flooding, Tornadoes, And Heat	07/09/1995–07/14/1995
DR-993-MN	1993	Severe Storms, Tornadoes & Flooding	05/06/1993–08/25/1993
DR-582-MN	1979	Severe Storms & Flooding	04/30/1979–04/30/1979
EM-3013-MN	1976	Drought	06/17/1976–06/17/1976
DR-473-MN	1975	Flooding	07/05/1975–07/05/1975
DR-347-MN	1972	Severe Storms & Flooding	08/01/1972–08/01/1972
DR-255-MN	1969	Flooding	04/18/1969–04/18/1969
DR-215-MN	1966	Flooding	03/22/1966–03/22/1966
DR-188-MN	1965	Flooding	04/11/1965–04/11/1965

SOURCE: (FEMA, 2021A)

Table 13. State disaster declarations in Aitkin County, 2015–2021

DR	Date Declared	Incident Period	Incident Type	Eligible Counties & Tribes
SD-030	10/18/2018	8/31–9/2/2018	Severe thunderstorms, strong winds, hail	Aitkin
SD-010	10/9/2019	7/19–7/21/2016	Severe thunderstorms, high winds, flooding	Aitkin, Beltrami, Cass, Clearwater, Crow Wing, Lake, St. Louis, Bois Forte Band of Chippewa, Fond Du Lac Band of Lake Superior Chippewa, Leech Lake Band of Ojibwe
SD-08	8/30/2016	7/9–7/11/2016	Severe storms, tornadoes, heavy rains, flooding	Aitkin, Benton, Carlton, Crow Wing, Kanabec, Meeker, Mille Lacs, Morrison, Pine, Traverse

SOURCE: (MN HSEM, 2021)

Table 14. Historical Hazard Mitigation Funding awarded in Aitkin County

DR/project #	Sub-Grantee	Project Type	Federal Share (%75)
1941.10	Aitkin County	Plan	\$ 25,500.00

SOURCE: (MN HSEM, 2021)

4.2 Jurisdictional Change in Risk or Vulnerability Assessment

Jurisdictions in Aitkin 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 five 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, Aitkin 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.

Aitkin County

Flooding: Aitkin County is susceptible to flooding with its low lands, wetlands, lakes and rivers. Heavy rain events have created problems to our township, county, and state roads by undermining the roads, and washing out culverts. Many lakes now have “no wake” restrictions to lessen the possibility of lakeshore erosion and flooding to homes. In the last few years, there have been several high rain events that have caused flooding in several areas of the county. With the rise in lakes and river waters, there is an old diversion channel and levee on the edge of the city of Aitkin that the Army Corps of Engineers has stated will not function, as it should. The residents in that area are in danger of flooding.

Ice Storms, Blizzards: Aitkin County has power lines, transmission lines and high voltage lines running through several areas of our county. Ice storms or blizzards could cause damage to these. The trees and power lines are susceptible to ice and windstorms that break and blow down them down. This may leave an inordinate amount of debris and cause disposal problems as well as hazardous conditions for anyone traveling our roadways.

Windstorms, Tornadoes: Aitkin County is a tourist destination with several campgrounds, cabins, and seasonal trailers. Only Savanna Portage State Park has a designated shelter. The resorts, campgrounds, and trailer parks are vulnerable to falling trees, hail, and high winds.

Extreme Heat/Cold: Aitkin County has a higher percentage of elderly residents. In cases of extreme heat and cold, any power failures due to over loads or storm events could endanger that population.

Wildfire: Aitkin County is home to commercial peat farms. Once a peat fire is started it is difficult to extinguish and could burn for several months.

City of Aitkin

Flooding: Homes, sewer collection and treatment are vulnerable to flooding.

Ice Storms, Blizzards: We have power lines and power poles that have failed or may fail due to heavy snow and ice. Ice storms are dangerous for the safety of roads. For blizzards it is difficult for the ambulance and first responders to safely respond.

Windstorms, Tornadoes: Downed trees, power outages, and downed power poles can occur. Blocked roads during storms makes it difficult for first responders to get through.

Extreme Cold/Heat: Seniors and children are vulnerable to extreme cold, especially if the power goes down during storm events.

Lightning: Fire damage can occur to houses and buildings, as well as a loss of power.

City of Hill City

Flooding: Our city sewer lift stations are vulnerable to failure during flood events if the power goes down or the lift station is flooded. Heavy rain impacts out city streets and alleys.

Windstorms, Tornadoes: We have a municipal campground without a proper storm shelter where visitors are vulnerable to high winds events.

City of McGrath

Lightning: Lightning can cause a fire if it strikes any structures, or it can damage city infrastructure such as the power to our city sewer system.

City of McGregor

Flooding: Our city sewer lift station is vulnerable to failure during flood events if the power goes down or the lift station is flooded. There are many residents of the city that lack the ability to evacuate on their own and subsequently require shelter during a flood. The ability to sustain

emergency operations is critical to the management of flooding, so having backup power for our fire station will ensure operational success.

Ice Storms, Blizzards: We have power lines and power poles that may fail due to heavy snow and ice storms. Having a location with backup power to house displaced vulnerable residents during prolonged power outages is needed. Our ambulance service has medication and supplies that must be stored at constant temperatures and would be damaged if the fire hall was not heated during an extended power outage. Having a fire station that remains operational in the event of a long-term power outage is mission critical to any other emergency that would arise (i.e., house fire).

Windstorms, Tornadoes: Both of the city's mobile home parks are without storm shelters, which leaves the residents vulnerable to high-wind events. Our current metal frame fire hall is without a shelter for emergency crews during storm events. Having back-up power for our fire station, water tower, and sewer system is critical.

Extreme Cold: Our seniors and children are vulnerable to extreme cold, especially if the power goes down during extreme cold events. To be able to use our fire station, City Hall, and/or community center as a shelter and remain operational, backup generator power is needed.

Extreme Heat: We have a high number of elderly residents in our city, so having a place to shelter this vulnerable population during a heat emergency is critical.

Wildfire/Drought: The entire city is surrounded by grassy wetlands that interface directly with the majority of our residential and commercial structures. Wildland fire could disrupt every system in the city including our sewer system. Wildfire has the potential to damage power poles and our local power substation, so having back-up power for our water tower to sustain firefighting operation would be critical.

Lightning: Our fire department's VHF communications tower was struck by lightning, which disabled our backup emergency communications system. The lightning also did damage to other electronics in the fire hall.

City of Palisade

Flooding: We have an aging population, and some would be unable to evacuate to a safe place on their own; they would require assistance to mobilize and a place to shelter during a flood. Having backup power systems to sustain emergency operations would be critical. The city has no generator.

Ice Storms, Blizzards: Power lines may go down and take-out power for prolonged periods. Having a shelter with back-up power would help those most vulnerable to cold and may require power for oxygen and medications that are temperature sensitive. Having equipment at the fire hall must also be maintained and ready to respond to any other emergencies in the city and our surrounding service area.

Windstorms, Tornadoes: Our outdoor warning siren was struck by lightning and has not been replaced, so we cannot alert our residents to a tornado by this siren. We also have very limited space for citizens to shelter safely that is accessible for the elderly and disabled. We also have more mobile homes that are going up and a county park with RV parking that is managed by the city; it is full from Fishing Opener to hunting season.

Extreme Cold/Heat: Should power go out; we need a place like our community center/fire hall where vulnerable seniors and children can go to be safe.

Wildfire: Having back-up power to our water tower is critical to our fire department fighting fires.

City of Tamarack

Flooding: Although the city of Tamarack wasn't affected within city limits by past flood events, we did become an island because surrounding area highways (Hwy. 210) were flooded, and we couldn't go anywhere.

Windstorms, Tornado: City residents do not have basements because of the high level of the water table, so they cannot take shelter during a severe storm event or tornado. We are in need of a storm shelter or tornado safe room in Tamarack.

Ice Storms: We have had power lines and power poles that have failed.

Extreme Cold: When the power goes, out there is no back up heat.

Extreme Heat: When the power goes out there is no cooling system.

Wildfire: Wildland fire is a real threat as we have swamp and trees surrounding the town. The railroad on the north side of town has set off a number of fires. Highway 210 is on the south side of Tamarack, and people throwing cigarettes out of car windows has started fires.

4.2.2 FUTURE DEVELOPMENT

Because Aitkin 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. Aitkin 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 Aitkin 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 from Appendix C: Part A, Question 5.

City of Aitkin

As the city expands there will be an increase in the area that we are responsible for. Homes are being put into forested areas which makes them vulnerable to forest fires.

City of Hill City

We have added six new RV sites to our campground. This increases the number of people in the park.

City of McGregor

The Riverwood Clinic is constructing a new larger facility, which is an area that was flooded in 2012. Our community has an increasing percentage of elderly and other vulnerable populations. McGregor High School is expanding its footprint and there is a plan to construct a 28-unit affordable housing apartment building in the city.

City of Palisade

Approximately 10 new permanent mobile homes are coming into the city due to Enbridge, as well as other workers temporarily sheltering in RVs. There is no established shelter from storms for these people in mobile homes and RV's so they are at higher risk during severe storms.

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 Aitkin 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 Aitkin 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) 5-year data. Table 15 displays how the ACS data is organized into 15 social variables, which are further grouped into four themes (ATSDR, 2020).

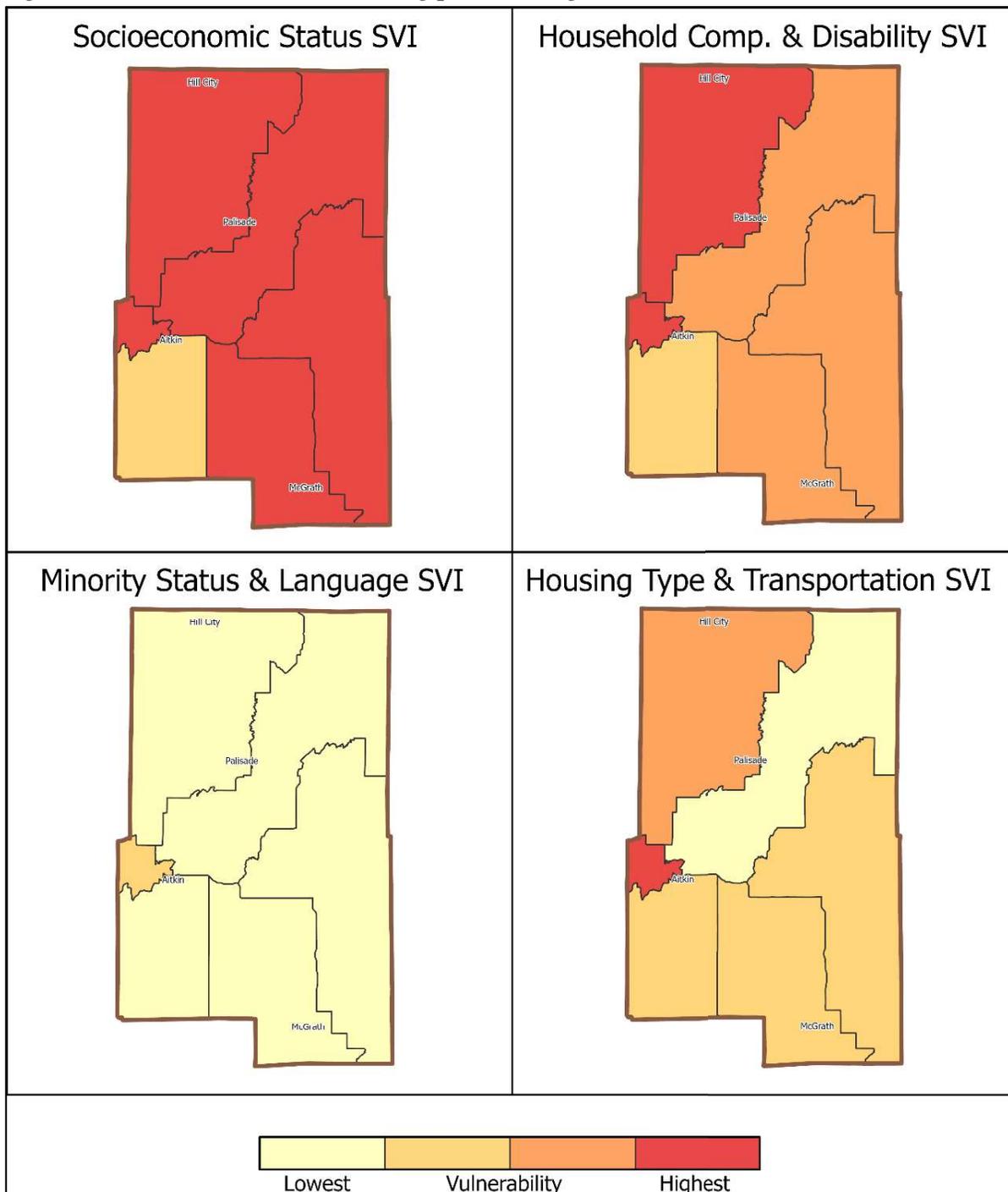
Census tracts within Minnesota were ranked and given a percentile value from 0 to 1, with higher values indicating greater vulnerability compared to other census tracts in the state. Theme-specific percentile rankings were generated by summing the percentiles of the variables comprising each theme and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

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)

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



SOURCE: (ATSDR, 2020)

4.3.2 STRUCTURE VULNERABILITY

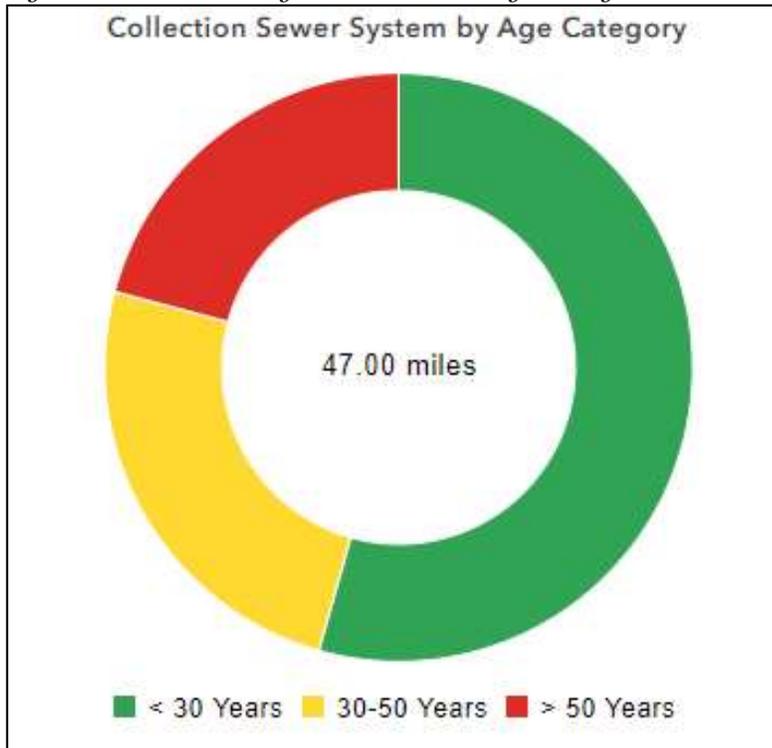
Aitkin County-specific building data was sourced from the county tax databases and parcel polygon data. The total estimated building exposure for the county is shown in Table 16. Aitkin County’s infrastructure systems are outlined in Section 3.7. Estimates of county infrastructure economic exposure were 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 21% of the 47 miles of sewer collection system in the county are over 50 years old. 54% of the collection system is less than 30 years old (OSA, 2020). A chart of this age distribution is located in Figure 12.

Table 16. Aitkin County total building exposure

General Occupancy	County Total Buildings	County Building and Contents Value
Residential	25,461	\$1,851,954,554
Commercial	539	\$120,917,528
Other	4,356	\$490,188,520
Totals	30,356	\$2,463,060,602

SOURCE: AITKIN COUNTY

Figure 12. Aitkin County sewer collection system ages



SOURCE: (OSA, 2020)

Table 17. Mobile home park locations

Name	Address	City
Beulah's Mobile Home Park	219 S Maddy St	McGregor
Boyd's Park	20 S Mable St	McGregor
Castaway's Resort	32360 215th Lane	Isle
Elkhorn Resort Association	20429 326th Avenue	Isle
Lakeshore Summer Breeze	27461 435th Avenue	Aitkin
Ole's Resort	53037 223Rd Place	McGregor
Riverdale Mobile Home Park	410 Riverdale Drive	Aitkin
Sather's Trailer Court	47952 State Hwy 65	McGregor

SOURCE: AITKIN COUNTY

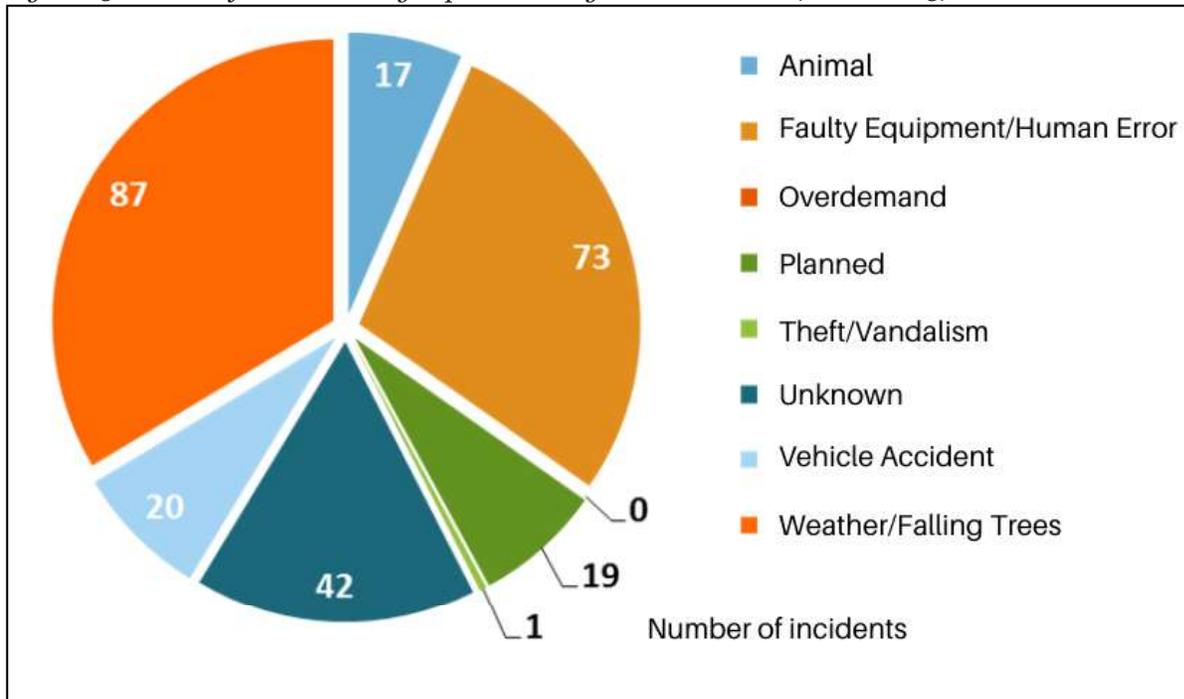
Water and wastewater utilities provide critical services to the community that need to remain in operation for as long as possible and return to operation quickly following a severe storm situation. Undersized sewer systems can experience capacity issues following heavy rain events, resulting in overflows 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. Licensed mobile home park locations in Aitkin County are identified in Table 17.

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).

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



SOURCE: (US DOE, 2016)

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.

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 Aitkin 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. Aitkin County did not receive a disaster declaration for flooding in 2019, but was included in DR-4390 for flooding in June 2018. 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, 2019). Aitkin County had 34.04 inches of rain in 2019. This total was the 13th highest total on record in the county. The record precipitation in Aitkin County was 37.36 inches in 1953.

Table 18 below lists all Aitkin County’s historical flood events from 2015–2021 as recorded by the NCEI. Three deaths have been reported as a result of flooding, along with one injury. No deaths or injuries have been reported as a result of flooding. The cumulative property damage estimate is greater than \$7.2 million dollars (CEMHS, 2019).

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 Aitkin County according to the National Water Information System. Table 19 shows data on its highest-recorded annual peaks (gauge heights). Six discontinued gauge stations in the county 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. Flood events in Aitkin County, January 2015–August 2021

Date	Event Type	Description
8/14/2020	Flash Flood	A strong cold front pushed across Minnesota the evening of the 14th and led to the development of a line of storms ahead of the front. Heavy rainfall led to areas of flash flooding, mainly along the western Iron Range.
9/30/2019	Flash Flood	State Highway 18 was closed at the Snake River due to water over the road.
6/30/2019	Flash Flood	Morrison Brook’s banks overflowed its banks and flooded a portion of West County Line Road.
7/12/2018	Flash Flood	Three flash flood events were reported on this day. Water covered the road at the intersection of State Highway 200 and U.S. Highway 169 in Hill City. State Highway 18 had water over it and several side roads across the county completely washed out. Water was also reported flowing into the first floor of an elderly care facility.

Date	Event Type	Description
6/17/2018	Flash Flood	Two flash flood events were reported on this day. Water covered Aitkin County Trunk 2 about four miles East of Malmo. A vehicle passing through the road hydroplaned into the ditch. State Highway 47 washed out south of the town of Glen.
5/24/2018	Flash Flood	Local law enforcement reported water over Birch Street and 170th Street north of McGrath.
7/11/2016	Flash Flood	Five flash flood events were reported on this day. The roadway at the intersection of 344th Street and County Road 12 was covered by 10-12 inches of water and a car was pushed by the water. County Road 4 near the bridge over Rice River and the intersection of Country Road 5 and Rice River Crossing also had 10-12 inches of water. Additional roads reported to be underwater included Country Road 13 and Highway 27 and 65.

SOURCE: (NCEI, 2021)

Table 19. Historical peak streamflow data (in feet) for USGS gauging stations

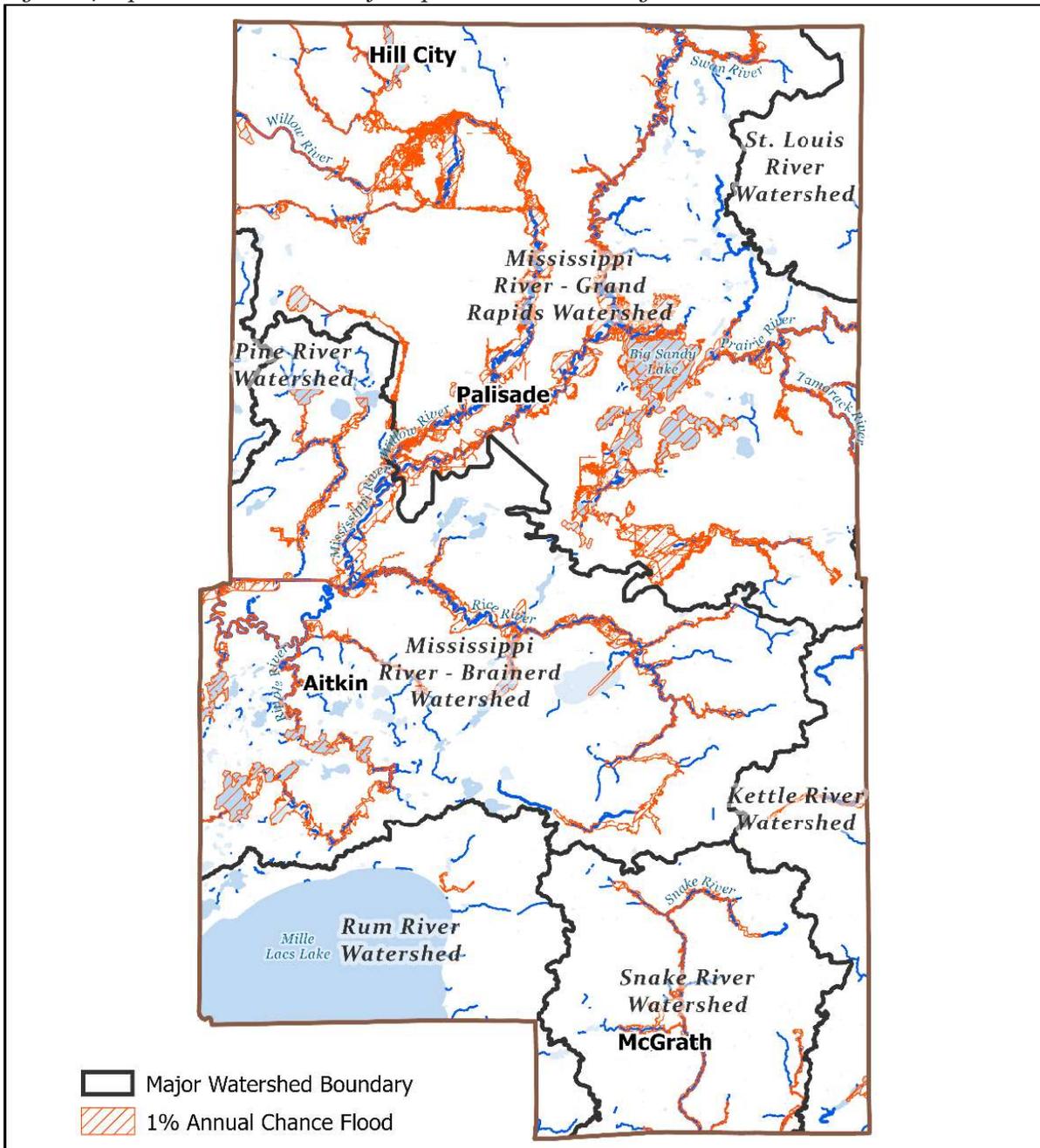
USGS 05221020 Willow River near Palisade Aikin, MN 1972–2020			USGS 05227500 Mississippi River near Aitkin Aitkin, MN 1888–2020		
(1)	6/28/2012	17.43	(1)	5/20/1950	22.49
(2)	4/25/1979	17.25	(2)	June 1888	19.80
(3)	5/1/1975	17.21	(3)	7/6/1905	19.50
(4)	4/22/1982	16.70	(4)	Apr. 29, 1916	19.30
(5)	4/12/2001	16.28	(5)	Jun. 9, 1944	18.80
(12)	4/8/2020	14.86	(31)	Apr. 11, 2020	15.38
(14)	7/18/2018	14.58	(39)	Jul. 15, 2016	14.17

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. Existing 1-percent annual chance depth grids were used for regions of the county where available. The remainder of the 1-percent annual chance depth grids were developed from the Digital Flood Insurance Rate Map (DFIRM) flood boundary. Where no boundary data were available, the hydraulics and hydrology model in Hazus was used to generate a 1-percent annual chance flood boundary with a 10-meter horizontal resolution Digital Elevation Model (DEM). The resulting Hazus 1% annual chance floodplain output is shown in Figure 14.

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



SOURCE: (MN DNR, 2021A)

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 M. , 2013). 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, 2007a). 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).

Only one of the five wettest years in Aitkin County occurred in the last two decades (MN DNR, 2020a).

5.1.4 VULNERABILITY

Potential economic loss estimates were based on Aitkin County-specific building data. Aitkin 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

Table 20. 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	25,461	\$1,851,954,554	644	\$44,886,750	205	\$3,430,239
Commercial	539	\$120,917,528	12	\$1,601,800	11	\$313,395
Other	4,356	\$490,188,520	89	\$10,871,000	21	\$607,542
Totals	30,356	\$2,463,060,602	745	\$57,359,550	237	\$4,351,177

SOURCE: (FEMA, 2021C)

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, 30,356 points were input to Hazus to represent buildings with a total estimated building plus contents value of \$2.5 billion. Approximately 84% of the buildings (and 75% of the building value) are associated with residential housing. The estimated loss by occupancy class for the entire county is shown in Table 20.

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

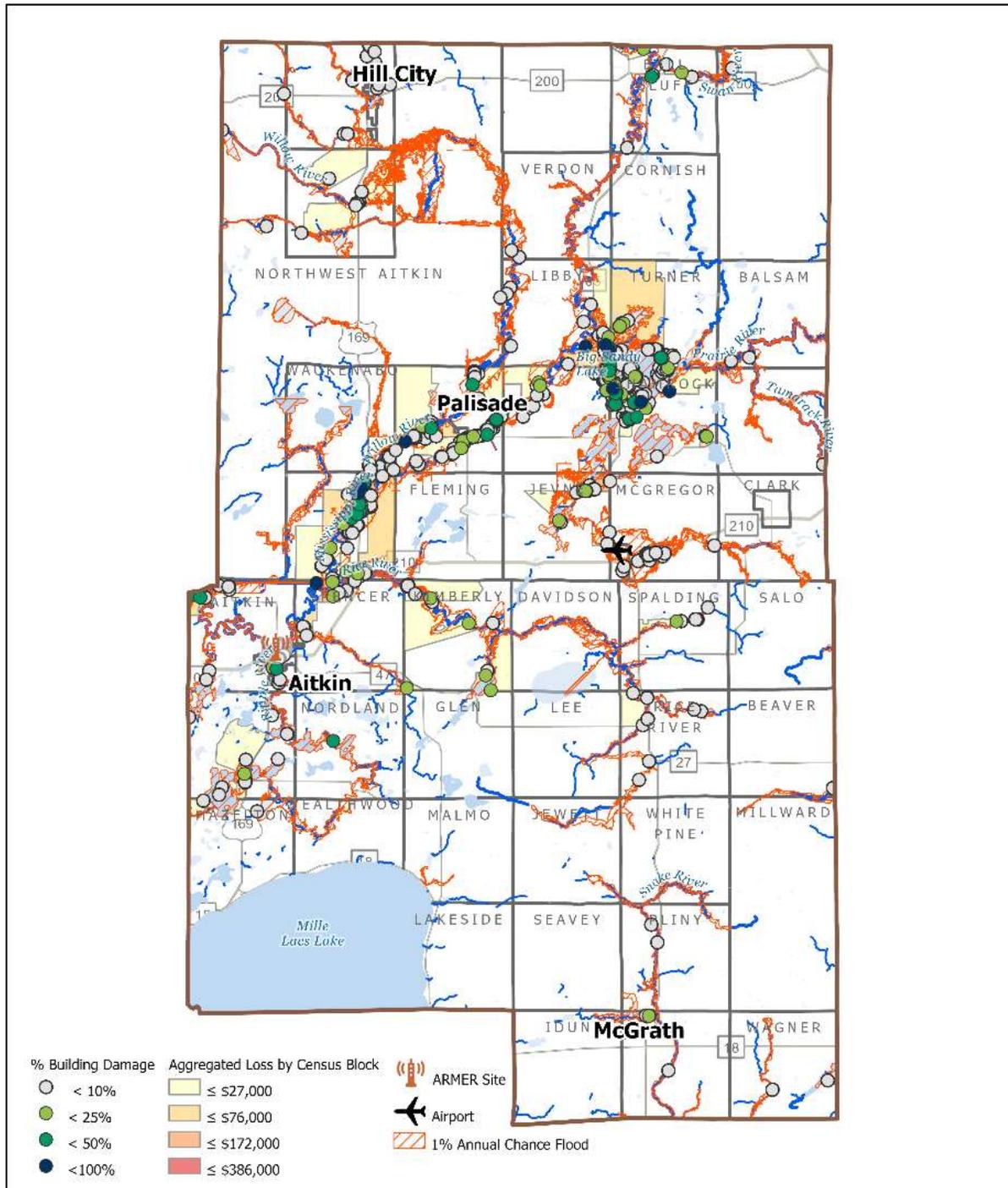
Critical facilities and infrastructure are vital to the public and their incapacitation or destruction would have a significant negative impact on the community. These facilities and infrastructure were identified in Section 3.7 and verified by Aitkin County.

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 Aitkin County's essential facilities included in the Hazus flood analysis are located within the 1% 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).

It is important to identify any critical infrastructure within the 1% annual chance floodplain, given the higher risk of the facility or infrastructure being incapacitated or destroyed during a flood. In Aitkin

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



SOURCE: (FEMA, 2021c)

County, one airport and one ARMER site were found to be at risk in the 1% annual chance flood. This airport is the Isedor Iverson Airport located in McGregor and the ARMER site is located in the City of Aitkin. Both are mapped in Figure 16. No other information is available.

Community Vulnerability

Potential economic losses were estimated by Census County Subdivision. The City of Aitkin and the Townships of Libby, Morrison, and Shamrock were identified as having a significant estimated loss. All jurisdictions with buildings identified in the 1% annual chance flood zone are listed in Table 21. The City of Aitkin as well as the communities of Shamrock, Morrison, McGregor, and Libby 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.

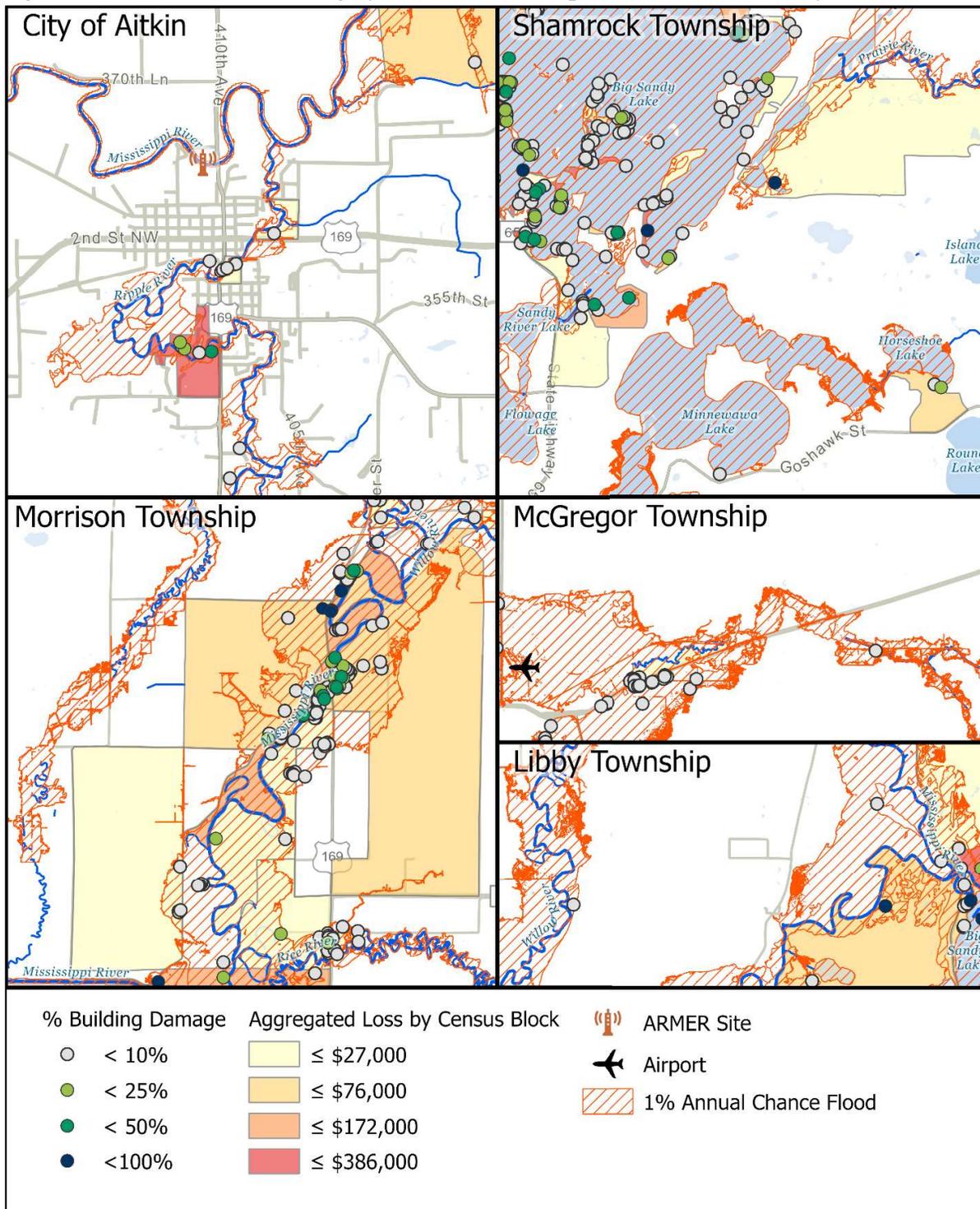
Table 21. 1-percent annual chance flood building-related loss estimates by jurisdiction

Jurisdiction (county subdivision)	Count of Buildings in Floodplain	Estimated Building and Contents Loss*
Aitkin City	7	\$479,156
Aitkin Township	7	\$108,584
Ball Bluff Township	5	\$28,402
Farm Island Township	8	\$70,836
Hazelton Township	1	\$2,550
Jevne Township	11	\$124,764
Kimberly Township	5	\$87,086
Libby Township	8	\$482,206
Logan Township	17	\$240,634
Macville Township	4	\$4,662
McGrath City	2	\$5,407
McGregor Township	1	\$137
Morrison Township	53	\$564,390
Nordland Township	1	\$73,790
Palisade City	5	\$42,581
Rice River Township	3	\$9,684
Shamrock Township	47	\$1,281,186
Spalding Township	1	\$1,231
Spencer Township	8	\$261,451
Turner Township	17	\$148,513
Waukenabo Township	3	\$10,996
Workman Township	23	\$322,928
Total	237	\$4,351,177

*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.

SOURCE: (FEMA, 2021C)

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



SOURCE: (FEMA, 2021C)

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

Aitkin County Emergency Management identified existing program gaps and deficiencies that make its citizens more vulnerable to flooding. These gaps should be addressed with new mitigation efforts to reduce vulnerability, outlined as follows:

Surface Water Run-off Management: Controlling runoff from various sources continues to be a challenge and priority to control what runs downstream.

Increasing Culverts and Raising Roads: Some roads, bridges, and culverts within Aitkin 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.

Shoreline Stabilization: Continued efforts are needed to stabilize vulnerable shoreline that is eroding due to high rain events and wave action.

5.2 Wildfires

A wildfire is an uncontrolled fire spreading through vegetative fuels, posing danger and destruction to property. Minnesota experienced an average of 1,400 wildfires each year between 1985 and June 2021 (MN DNR, 2021d). Wildfires occur throughout the spring, summer and fall; however, most wildfires in Minnesota take place in March, April and May. During this period, much of the existing vegetation has been killed due to winter temperatures and is dead, brown and combustible. Also, there is little green vegetation to serve as a barrier for a moving wildfire.

Wildfires can occur in undeveloped areas and spread to urban areas where structures and other human developments are more concentrated. While some wildfires start by natural causes, humans cause over 80% of wildfires in the United States (Balch et al., 2017). In Minnesota, 98% of wildfires are caused by humans, with most fires starting from burning debris (38%), miscellaneous (25%), arson and incendiary devices (14%), and equipment (12%). A smaller number of wildfires start from campfires (5%), railroads (3%), and smoking (2%). As a natural hazard, a wildfire is often the direct result of a lightning strike; however, lightning strikes account for less than 2% of Minnesota's wildfires (MN DNR, 2021c). The dangers from wildfire include the destruction of timber, property, wildlife, and injury or loss of life to people in the affected area or using the area for recreational facilities.

The frequency and behavior of wildfires varies within the state. Vegetation (fuel), topography, and weather contribute significantly to these variations. Vegetative material is the main source of fuel for a

wildfire. Fuel is classified by its size, moisture content, and volume. Fuel with low moisture content ignites easier than wet fuel. Areas with a greater volume of fuel will produce more intense fires with larger flames that are difficult to extinguish. Topography affects the movement of air and fire over the ground surface. The slope and shape of terrain can change the rate of speed at which the fire travels. Weather variables such as temperature, humidity, wind, and lightning affects the probability, severity, and duration of wildfires. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildfire activity. In contrast, cooling and higher humidity often signals reduced wildfire occurrence and easier containment (ENR-ITI-Lands Resource Centre, 2021).

Fire severity refers to the effects of a fire on the environment, typically focusing on the loss of vegetation both above ground and below ground but also including soil impacts. A fire classified as “low severity” has limited effect on overstory trees (< 30% mortality), understory vegetation, and soils. A fire producing variable, moderate effects on trees and vegetation (<80% killed) and/or moderate soil exposure would be classified as “moderate severity.” High-severity fires have great losses to vegetation and result in extensive mineral soil exposure (Northwest Fire Science Consortium, 2018).

The most severe fires result in greatly reduced soil productivity, slow vegetative recovery (5-10 years) and great potential for soil erosion. Severe burning wildfires typically occur in areas with steep north or east slopes and dense timber.

Homes threatened by wildfire are primarily those located in the zone known as the wildland–urban interface (WUI). This is the zone where homes and subdivisions have been located in wildland areas where natural wildfires can have an impact. As people settled in the country and began clearing natural lands for development, new, artificially caused wildfires emerged, and their frequency and level of destruction increased. While wildfires are necessary for healthy ecosystems, they burn whatever fuel is in their path, whether vegetation or buildings.

The topographic features of the building site, defensible space around the structures, and fire resistant materials in the building envelope (siding and roofing) are the major factors that contribute to whether or not a home will survive a wildfire. One of the most common causes of a home being damaged or destroyed is due to radiant heat. In a wildfire, radiant heat is the heat given off by burning vegetation. The high temperatures of some wildfires can cause the deck, siding or roof of a home to ignite, because the fire was too near the home (FEMA, 2004a).

5.2.1 HISTORY OF WILDFIRES

The Minnesota DNR responded to 2,226 wildfires in Aitkin County between 1985 and June 2021. These include fires not only on state lands, but also rural private lands for which there is not another agency with primary responsibility. Wildfires that are not included in this data are those that occur on federal lands and those that are responded to by local fire departments. The overwhelming majority of these fires were started by humans and burned a total area of nearly 60,000 acres. The largest wildfire occurred just south of Minnewawa on April 2, 2015 due to a “miscellaneous” reason and scorched over 3,000 acres of

land. (MN DNR, 2021d). Wildfire damage to property and crops have cost the county more than \$42,000 since 1960 (CEMHS, 2019).

Aitkin County experienced 223 wildfires since its last Hazard Mitigation Plan in 2015. A map of these fires is shown in Figure 17. Although the wildfires occurred throughout the county, a higher concentration of wildfires occurred near the towns of Aitkin, Minnewawa, and Bennettville.

When examining wildfires, it is important to consider the locations of peatlands as peat fires can burn for days, weeks, months, or even years—smoldering underground and re-emerging in another location, making them very difficult to extinguish (MPR, 2012). Peat is partially decayed plant matter found in ancient bogs and swamps. Minnesota has approximately 6 million acres of peatland, the highest total acreage in the contiguous United States (MN DNR, 2007b). Peat fires can smolder during winter months beneath the snow, surfacing again in the spring to burn above ground. Peat ignites when its moisture content is low, and then it supports combustion rather than flame. Once started, combustion is persistent because peat contains oxygen and needs little or no outside oxygen to continue burning. Peat’s insulating qualities mean the fire loses little heat. As the peat dries it becomes water repellent. These factors result in long-lasting fires that require extensive operations to extinguish.

According to the MN DNR, about 28% of the county’s surface areas contains peat (367,376 acres) (2007b).

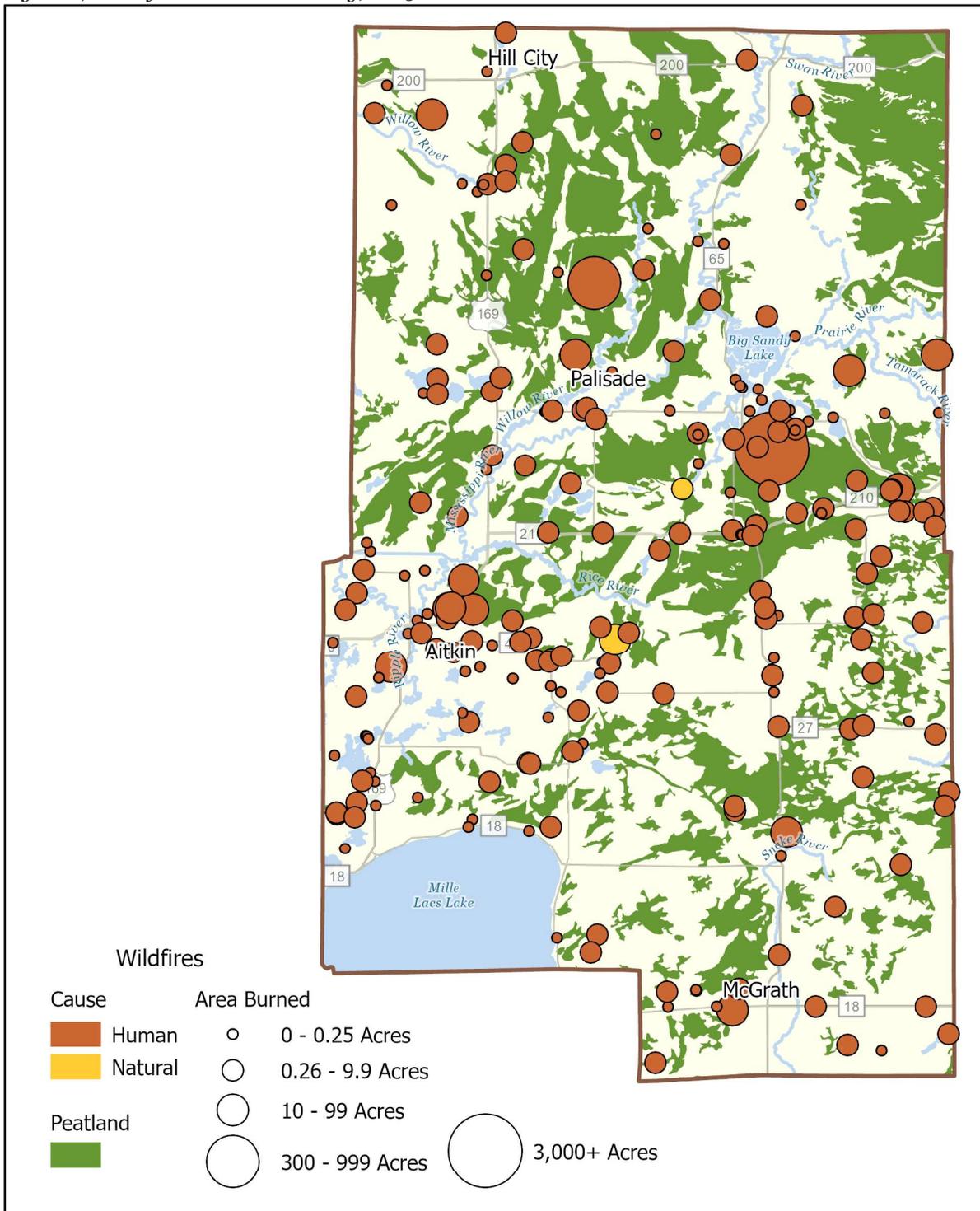
5.2.2 PROBABILITY OF OCCURRENCE

To determine the probability of future wildfires Aitkin County, records of previous wildfire events in were summed and divided by the dataset’s period of record, resulting in the annual relative frequency of wildfires during the period of record. Based on Minnesota DNR records, from January 1985 to June 10, 2021, the relative frequency of wildfire events in the county is 61 per year (MN DNR, 2021e). This relative frequency can be used to infer the probability of these events occurring in the future.

5.2.3 CLIMATE CHANGE PROJECTIONS

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

Figure 17. Wildfires in Aitkin County, 2015–June 2021



SOURCE: (MN DNR, 2021C)

5.2.4 VULNERABILITY

Wildfires jeopardize the built environment, health, and wellbeing of individuals living near its fuel source. Some residents are more vulnerable to air quality conditions of wildfire, including children, older adults, and those with respiratory issues (AirNow, 2021). The Household Composition & Disability SVI map is made up of these population groups and should be reviewed to better understand the vulnerability of each jurisdiction.

Structures located in areas near undeveloped wildland are vulnerable to wildfires. The SILVIS Lab at University of Wisconsin–Madison created a dataset documenting the changes of the Wildland–Urban Interface (WUI) in the United States from 1990 to 2010. Radeloff et al. (2018) define WUI as the area where structures and other human development meet or intermingle with wildland vegetation. With the increase of development in metropolitan fringes and rural areas, the WUI is growing. The expansion of the WUI in recent decades has significant implications for wildfire management and impact as it creates an environment in which fire can readily move between structural and vegetation fuels. Its expansion has increased the likelihood that wildfires will threaten structures and people (Radeloff et al., 2018).

There are two main types of WUI: intermix and interface. Intermix WUI are areas where housing and wildland vegetation intermingle; interface WUI are areas where housing are adjacent to wildland vegetation (Radeloff et al., 2018). Table 22 shows the change of total WUI (intermix and interface) in the county from 1990 to 2010, and the percent of the county’s land, housing, and population located in the WUI area. Figure 18 displays the WUI areas in Aitkin County.

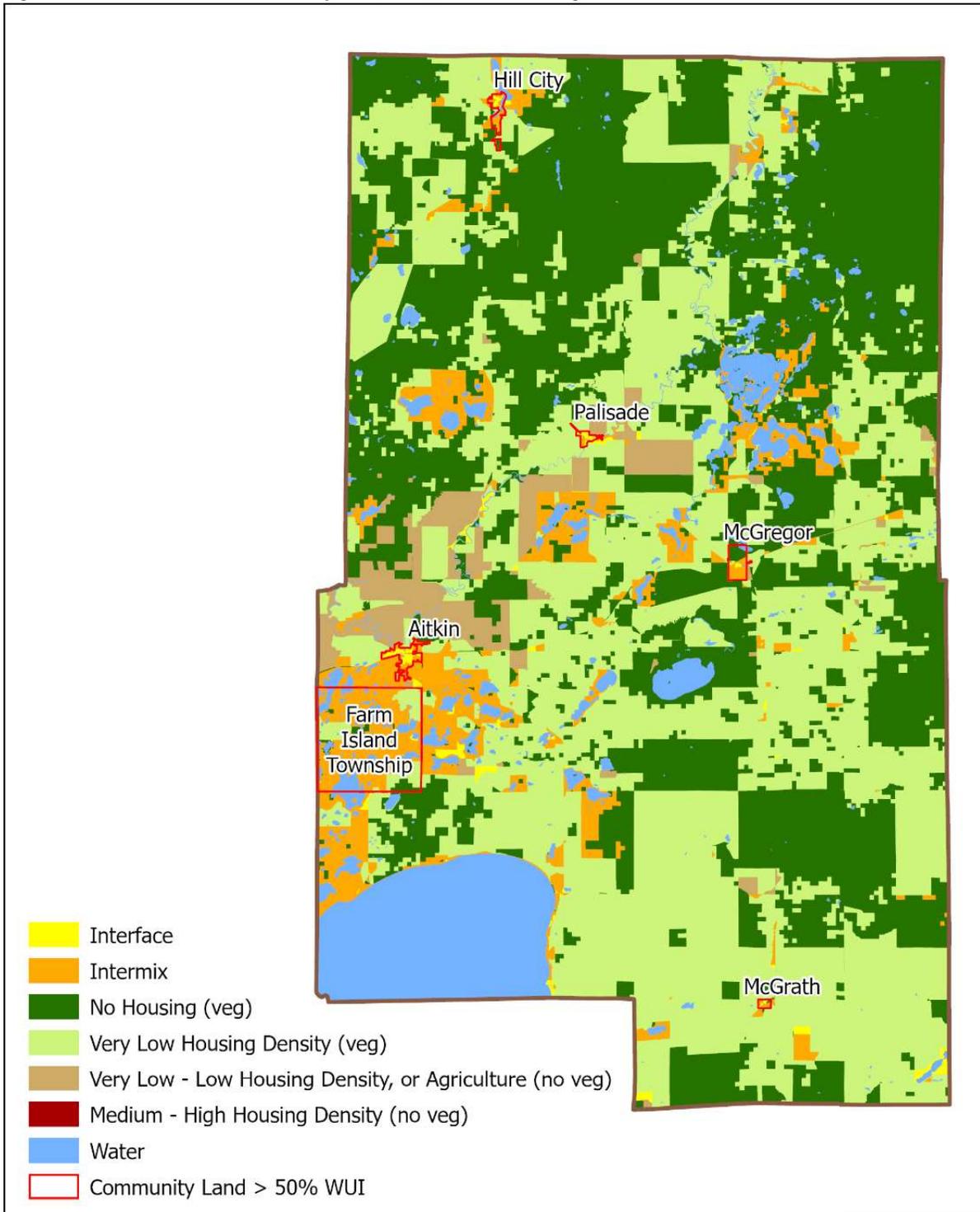
Communities within the county with more than 50% of land classified as WUI include, Aitkin City, Farm Island Township, Hill City, McGrath City, McGregor City, and Palisade City. These communities along with others in WUI areas are more vulnerable to wildfires.

Table 22. Wildland–Urban Interface (WUI), Aitkin County, 1990–2010

	Total WUI 1990	Total WUI 2000	Total WUI 2010	% Change (1990–2010)
Land Area	5.8%	6.1%	7.1%	+22.4%
Housing	74.9%	72.9%	74.1%	-1.1%
Population	61.1%	63.2%	67.6%	+10.6%

SOURCE: (RADELOFF ET AL., 2019)

Figure 18. Wildland–Urban Interface (WUI), Aitkin County, 2010



SOURCE: (RADELOFF ET AL., 2017)

5.2.5 PROGRAM GAPS AND DEFICIENCIES

Aitkin County Emergency Management identified existing program gaps and deficiencies that make its citizens more vulnerable to wildfire. These gaps should be addressed with new mitigation efforts to reduce vulnerability, outlined as follows:

Community Wildfire Protection Plan (CWPP): The MN DNR notes that Aitkin County has a past CWPP equivalent in place developed, although a copy cannot be located. Aitkin County should work with MN DNR Firewise to see how we need to address this either through an updated CWPP equivalent or a full CWPP plan.

Rural Water Access for Wildland Firefighting: There are areas within Aitkin County where improved water access may be needed for fighting wildfire. These areas are rural and not supported by a municipal water source. Local fire departments have the opportunity to work with the MN DNR to evaluate additional dry hydrant/well access projects.

Public Awareness: Raising public awareness of wildfire safety and dangerous conditions is an on-going effort of Aitkin County Emergency Management, local fire departments, and the MN DNR.

Firewise Assessments: Level-1 Firewise assessments should be encouraged for homeowners living in rural, woodland high-risk wildfire areas. MN DNR Firewise should be sought for local guidance or assistance in conducting assessments.

5.3 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 23 lists the expected effects of increasing wind speeds.

Table 23. 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.
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)

5.3.1 HISTORY

Aitkin County experienced 1 strong wind and 135 thunderstorm wind events between 1955 and February 2020, with wind speeds up to 78 knots (90 mph) (NCEI, 2021). The majority of these windstorms occurred in June (25%), July (36%), and August (25%). Wind damage to property and crops have cost the county more than \$3.1 million since 1960 (CEMHS, 2019). Table 24 lists the wind-related events that have occurred in the county since 2015. Thunderstorm Wind events, from 1955–2019, in Aitkin County, are shown in Figure 19.

Table 24. Wind Events in Aitkin County, January 2015–August 2021

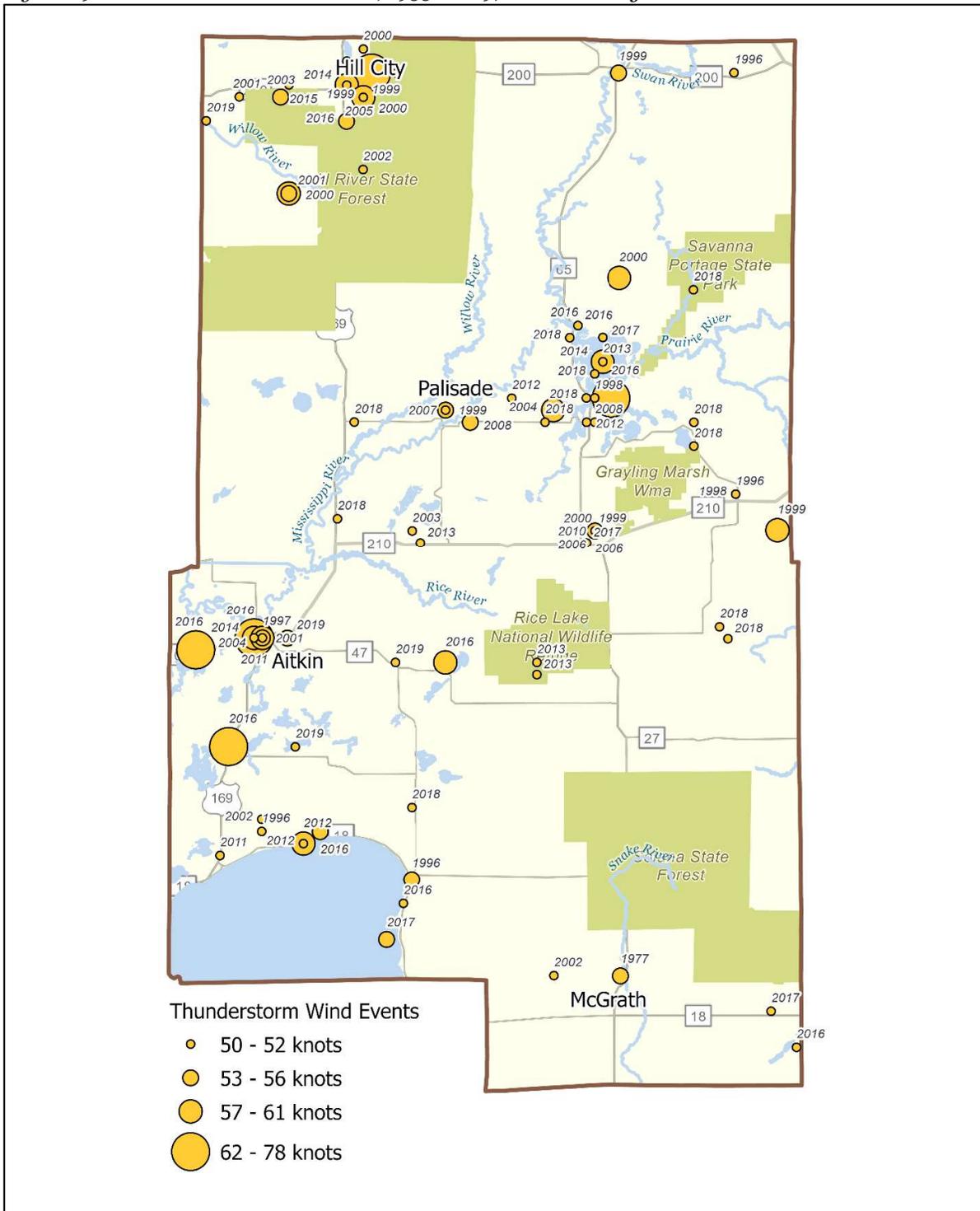
Date	Event Type	Description
8/14/2020 (3 events)	Thunderstorm wind	The bulk of the severe reports consisted of damaging wind gusts that brought down numerous trees, leading to damage at homes and other buildings. Multiple docks were flipped over near Giese by the strong winds.
8/7/2020	Thunderstorm wind	A complex of storms moved across north central and northeastern Minnesota during the afternoon and evening hours of the 7th. A few small trees were downed along the shoreline of Big Sandy Lake.
7/18/2020	Thunderstorm wind	The storms developed over north-central Minnesota during the afternoon and pushed eastward through northwest Wisconsin during the evening hours producing damaging winds and large hail as they pushed across the area. Several large trees were downed a few miles west of McGregor.
7/17/2020	Thunderstorm wind	Damaging winds from the storm complex led to downed trees and minor structural damage in parts of north-central and northeast Minnesota. A small portion of a barn roof was torn off during the storm.
7/16/2020	Thunderstorm wind	Storm cells produced large hail and damaging winds that damaged a few boat docks. Multiple docks were blown into Farm Island Lake. Trees 8-12 inches in diameter were also uprooted or snapped.
7/8/2020	Thunderstorm wind	A potent storm system brought multiple rounds of severe storms to the Northland starting during the early morning hours of the 8th. A tree was downed by the storm.
7/14/2019	Thunderstorm wind	A warm front lifted across central and northeastern Minnesota. Thunderstorms developed along the front with a few of the storms producing marginally severe hail and damaging wind gusts. Power lines and trees were downed within the city of Aitkin due to the storm.
6/30/2019 (4 events)	Thunderstorm wind	A complex of thunderstorms formed overnight in northern Minnesota then tracked southeast. Large hail and wind damage were observed with this system. Uprooted trees were blown over the road. One 12-inch diameter tree was uprooted.
9/14/2018	Thunderstorm wind	Storms developed along a stationary boundary. One supercell storm produced large hail before a line of storms formed and brought damaging winds and heavy rain. A tree was blown down across State Highway 47 at mile marker 110.

Date	Event Type	Description
9/2/2018 (2 events)	Thunderstorm wind	A line of storms moved east across Northern Minnesota ahead of a cold front. One part of the line took on bow echo characteristics and led to a concentrated area of wind and hail before weakening. A pickup truck was lifted by the wind and landed on top of another truck in Aitkin. Several trees fell in the winds, the largest being about 2 feet in diameter.
8/31/2018 (6 events)	Thunderstorm wind	Large hail and strong winds were seen with storms as they moved through the region. The winds knocked down a tree onto a trailer home, collapsing the roof and crushing and fracturing the leg of a 10-year-old girl trapped inside. A pontoon boat and a boat lift were flipped upside down on Big Sandy Lake.
7/8/2018	Thunderstorm wind	A cold front moved across the area. Rich, low-level moisture was in place ahead of the front and numerous strong to severe storms developed. A large tree was blown down within Aitkin County.
6/28/2018 (2 events)	Thunderstorm wind	Two supercells developed along a warm front and traveled to the east-southeast along the front. Large hail and numerous trees were reported down, including trees in Savanna Portage State Park and along County Road 13 east of Lawler.
6/17/2018 (2 events)	Thunderstorm wind	This was the final day of a three-day severe weather event across the Northland. Severe storms brought heavy rainfall over areas that had seen dramatic flash flooding the previous night, causing riverbanks to overflow. Winds downed trees along Highway 65 from Libby to McGregor. One hundred feet of a barn roof was ripped off by the wind.
5/29/2018	Thunderstorm wind	Storms during the afternoon and evening hours produced numerous reports of downed trees and power lines due to small hail and strong winds. Power outages from this event lasted for over a day in some areas following the storms.
9/22/2017	Thunderstorm wind	Severe thunderstorms developed across portions of northeast Minnesota. Several large trees were knocked down along with nearby powerlines. A cupola was blown off of a bar and hail as large as an inch fell.
9/20/2017	Thunderstorm wind	A series of severe thunderstorms moved across portions of northeast Minnesota. The storms caused very gusty winds that led to numerous reports of blown down trees blocking roads and bringing down nearby power lines. A few buildings were also damaged by downed trees.

Date	Event Type	Description
7/21/2017 (2 events)	Thunderstorm wind	Two storm systems, one to the north and the other to the south, moved across most of northeastern Minnesota. The northern storm caused hail and sporadic wind damage. The southern storm system evolved into a bow echo that produced damaging winds. Several trees were downed.
7/17/2017	Thunderstorm wind	Severe thunderstorms moved across portions of northeast Minnesota. The storms produced winds which downed many trees. A few trees were blown down on the north end of Big Sandy Lake.
7/6/2017	Thunderstorm wind	Severe thunderstorms that rolled across Minnesota produced damaging winds and hail across multiple counties. Several trees were blown down, damaging power lines and in one case, a home.
8/4/2016	Thunderstorm wind	Storms moved into northeast Minnesota overnight. Bow echoes within the cluster of storms caused damaging winds and many trees and power lines were blown down. The Aitkin County Sheriff Department reported some trees were blown down along Minnesota State Highway 18 on the north side of Mille Lacs Lake.
7/24/2016	Thunderstorm wind	Thunderstorms dropped hail and brought damaging winds to isolated parts of northeast Minnesota during the early morning. A few trees were blown down.
7/21/2016 (7 events)	Thunderstorm wind	A cluster of thunderstorms developed and merged into a couple of main bow echoes that quickly sped across northeast and central Minnesota. The multi-bow storm caused extensive damage across the region from widespread straight-line winds of 60 to 80 mph. Power was out to 75,000 customers and many homes were without power for as long as a week. Numerous trees were downed and structural damage occurred to a home.
6/26/2016	Thunderstorm wind	Thunderstorms ended after bringing strong winds to parts of northeast Minnesota on June 25th, first in the morning, and then again in the afternoon. Several large trees were blown down.
6/25/2016 (3 events)	Thunderstorm wind	Thunderstorms brought strong winds to parts of northeast Minnesota on June 25th, first in the morning and then again in the afternoon. Many large trees were blown down, including some trees 2–3 feet in diameter.
7/5/2015	Thunderstorm wind	Thunderstorms dropped large hail and caused damaging winds across parts of northeast Minnesota. A tree was downed on Highway 200.

SOURCE: (NCEI, 2021)

Figure 19. Thunderstorm wind wvents, 1955–2019, Aitkin County



SOURCE: (NCEI, 2021)

5.3.2 PROBABILITY OF OCCURRENCE

To determine the probability of future wind-related events in Aitkin 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 2.0 per year. The relative frequency of all wind-related events since January of 1996 is 5.4 per year. These relative frequencies can be used to infer the probability of these events occurring in the future.

5.3.3 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.

5.3.4 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.

5.3.5 PROGRAM GAPS AND DEFICIENCIES

Aitkin County Emergency Management identified existing program gaps and deficiencies that make its citizens more vulnerable to windstorms. These gaps should be addressed with new mitigation efforts to reduce vulnerability, outlined as follows:

Above-Ground Power Lines: A majority of the power 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.

Warning Sirens: Upgrades are needed for the warning siren at Big Sandy Lake. The cities of Palisade and McGrath do not have warning sirens, which should be installed.

Public Education: Continued public education needs to be conducted during tornado season to inform the public on what a tornado watch/warning is and what to do when warning sirens are activated. Aitkin 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 and summer storm events such as thunderstorms or straight-line winds.

County Parks & Campgrounds: There are many campground facilities throughout Aitkin County. The Savanna Portage State Park is the only park with a designated shelter. The other campground facilities are vulnerable to severe weather events such as high winds and damaging hail and thunderstorms. These campgrounds do not have an official storm shelter or tornado safe room.

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.

5.4 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 25). The EF Scale incorporates the use of 28 damage indicators to derive estimated wind speeds and assign an associated EF rating (NWS, 2020; 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 25. 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, 2020)

5.4.1 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 (Fo/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, 19 tornadoes have occurred in Aitkin County between 1950 and August 2021, resulting in one death, three injuries (NCEI, 2021), and an estimated 2.4–3.6 million U.S. dollars in property and crop damage (CEMHS, 2019; NCEI, 2021). The strength of these tornadoes ranged from Fo/EF0 to F4. The costliest of these tornadoes occurred on August 6, 1969, when an F4 tornado headed northeast across Aitkin County damaging property, utilities, and stumps, and costing over two million dollars. The deadliest tornado occurred later that same day, when an F3 tornado in Aitkin County killed one person in a cabin and injured three others (NCEI, 2021). Table 26 lists the tornadoes that have occurred in Aitkin County since 2015.

Table 26. Tornadoes in Aitkin County, January 2015–August 2021

Date	Start Location	End Location	Magnitude	Description
8/14/20	Lawler	Lawler	EF1	The tornado tracked north-northeast across 360th Street breaking and uprooting trees. The tornado then tracked over a homestead on Kestrel Avenue approximately 1 mile north of Lawler doing damage to trees, an electrical pole, and some outbuildings.

Date	Start Location	End Location	Magnitude	Description
8/26/2019	Bennettville	Bennettville	EF0	A waterspout developed over the northwestern arm of Farm Island Lake. It damaged docks, flipped boats, and caused tree damage. The waterspout then traveled through a grove of trees and dissipated before reaching US Highway 169.
6/19/2016	Jacobson	Jacobson	EF1	A tornado developed in far northern Aitkin County, tracked northeast and continued into Itasca County. The tornado destroyed several pole barns, lofted a roof from a house, and destroyed the house. It also caused surrounding tree damage.

SOURCE: (NCEI, 2021)

5.4.2 PROBABILITY OF OCCURRENCE

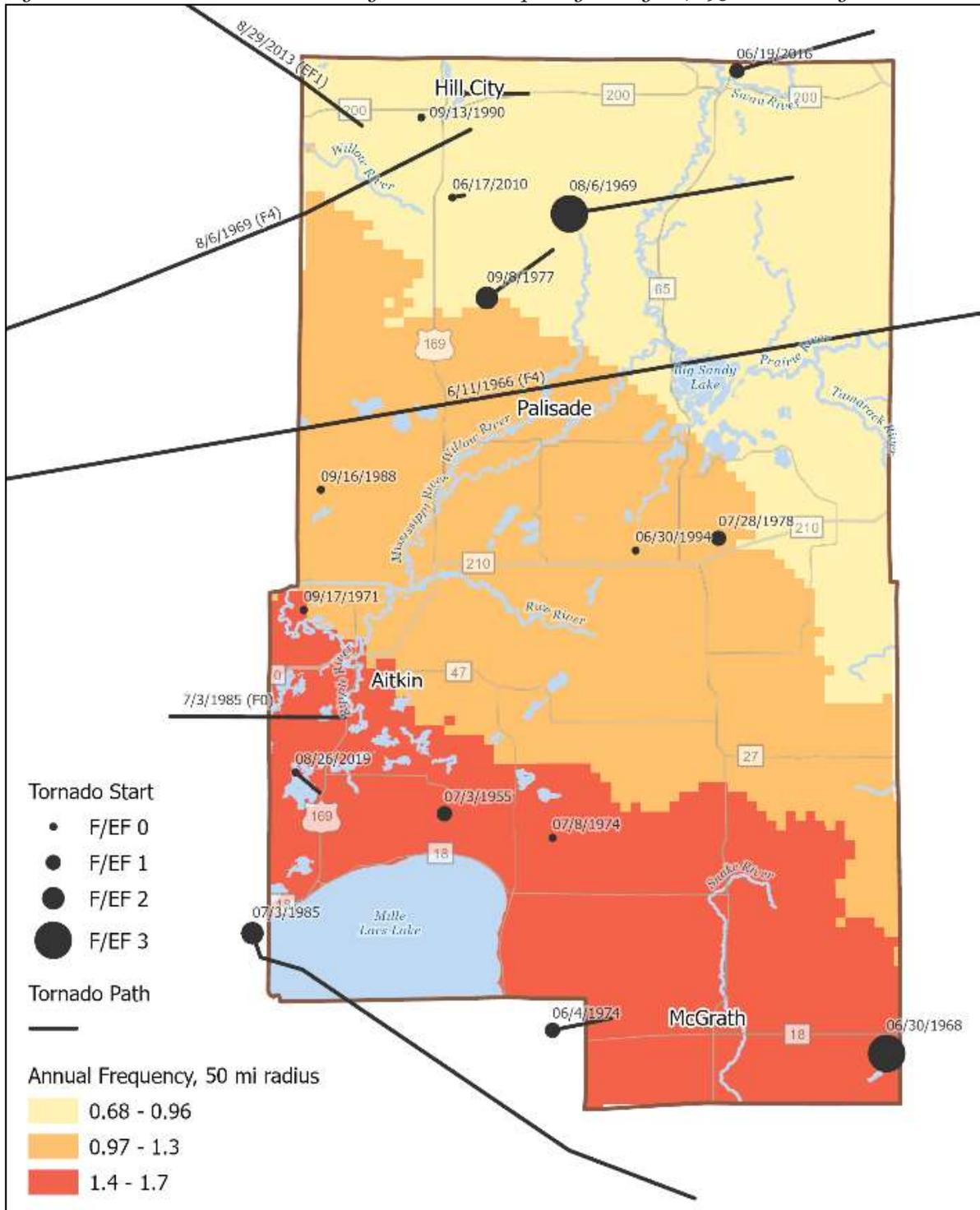
Estimating the probability of future tornadoes in Aitkin County was done using two methods. The first method summed the total number of tornadoes which either touched down in or traveled through the county. This sum was divided by the number of years tornado data was recorded, resulting in the annual 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 Aitkin County is 0.3 per year. (These 18 tornadic events occurred in 16 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 Aitkin County, there was an annual frequency of 0.7–1.7 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 20 shows the tornadoes that have occurred in Aitkin 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 20. Tornadoes in Aitkin County & Annual Frequency in Region, 1950–February 2020



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

5.4.3 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).

5.4.4 VULNERABILITY

The likelihood of a tornado does not vary significantly across geography within Aitkin 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 Aitkin 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.

5.4.5 PROGRAM GAPS AND DEFICIENCIES

Aitkin County Emergency Management identified existing program gaps and deficiencies that make its citizens more vulnerable to tornadoes. These gaps should be addressed with new mitigation efforts to reduce vulnerability, outlined as follows:

Above-Ground Power Lines: A majority of the power 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.

Warning Sirens: Upgrades are needed for the warning siren at Big Sandy Lake. The cities of Palisade and McGrath do not have warning sirens, which should be installed.

Public Education: Continued public education needs to be conducted during tornado season to inform the public on what a tornado watch/warning is and what to do when warning sirens are activated. Aitkin 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 and summer storm events such as thunderstorms or straight-line winds.

County Parks & Campgrounds: There are many campground facilities throughout Aitkin County. The Savanna Portage State Park is the only park with a designated shelter. The other campground facilities are vulnerable to severe weather events such as high winds and damaging hail and thunderstorms. These campgrounds do not have an official storm shelter or tornado safe room.

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.

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, lake-effect snow, sleet, 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).

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 1/4–1/2 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 hazardous 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

Aitkin County has an active history of winter-related weather events. Since 1996, the county experienced 87 events, including heavy snows, ice storms, winter storms, and winter weather (NCEI, 2021). Winter weather events in the county have cost over \$8.3 million dollars in property and crop damages since 1960 (CEMHS, 2019). Table 27 provides descriptions from the NCEI Storm Events Database of the events that have occurred since 2015, the year the county’s MHMP was last updated.

Table 27. Winter-related weather events in Aitkin County, Jan. 2015–August 2021

Date	Type	Description
3/10/2021	Heavy Snow	The combination of wet, heavy snow clumping to trees and the enhanced winds lead to several downed trees and power outages throughout the area. Snowfall totals were highest across the Arrowhead, ranging from 6 to 11 inches
12/23/2020 (2 events)	Heavy Snow	A strong area of low pressure brought heavy snowfall and very strong winds to much of the Northland starting on Wednesday the 23rd and lingering into Thursday the 24th. The eastern half of northeast Minnesota received 6 to 10 inches of snowfall with lesser amounts further west in addition to the widespread blizzard conditions.

Date	Type	Description
11/20/2020 (2 events)	Heavy Snow	Snowfall reports of 6 to 10 inches were recorded from the Brainerd Lakes area into the Twin Ports and Minnesota Arrowhead with a total of 11 inches recorded near Motley. Much of the snow fell in about 6 hours and started during the evening commute in many locations. Some of the Brainerd area received just over 6 inches of snow in as little as 3 hours during this event.
1/17/2020	Heavy Snow	Widespread snowfall totals of six to ten inches were seen across the region. Winds gusted to 30–40 mph on January 18, leading to areas of blowing and drifting snow and reduced visibility.
12/28/2019	Heavy Snow/Winter Storm	Snow was moderate to heavy before warmer air changed it to rain, freezing rain, and sleet. Snowfall totals of six to eight inches were seen around the region. Additionally, a layer of ice coated snow-covered roads leading to dangerous driving conditions.
12/8/2019	Heavy Snow	Snow began the evening of December 8, and snowfall totals of six to eight inches were common across much of northeastern Minnesota.
12/1/2019	Heavy Snow	Widespread snowfall totals ranged from six to twelve inches.
11/27/2019	Heavy Snow	Heavy snowfall spread across northeastern Minnesota, causing six to ten inches of snow to fall across the area. The highest amounts were seen downwind of Lake Superior due to lake enhancement.
4/11/2019	Heavy Snow	A long snowfall event mixed with occasional periods of freezing rain. Strong winds of over 40 mph led to numerous reports of downed trees and power lines with multiple vehicle crashes due to the snow and freezing rain. Snowfall amounts ranged from three to nine inches, with up to thirteen inches in some areas.
3/9/2019	Heavy Snow	Snowfall amounts were recorded of up to six to nine inches across the affected area.
2/6/2019	Heavy Snow	Multiple waves of heavy snowfall occurred along with areas of freezing drizzle in between waves. A snowfall report of nine inches was reported in the county from the township of McGregor.
1/21/2019	Heavy Snow	Snowfall totals over the county ended up ranging from eight to ten inches.
12/30/2018	Heavy Snow	A moderate to heavy snowfall laid down three to six inches of snow with isolated areas reaching up to seven inches.
12/26/2018	Heavy Snow	A prolonged three-day snowfall created snowfall amounts of eight to sixteen inches, with some areas reaching up to twenty-two inches.
3/30/2018	Heavy Snow	Snowfall amounts ranged from six to nearly thirteen inches.
3/26/2018	Heavy Snow	Snowfall in this area ranged from six to eight inches.

Date	Type	Description
3/5/2018	Heavy Snow	An extremely slow-moving storm system with multiple periods of snow affected portions of east-central Minnesota. Winds were also very strong with gusts well into the 40-mph range. The winds caused sporadic power outages. Snowfall ranged from seven to thirteen inches.
2/24/2018	Heavy Snow	Heavy snow fell overnight and was reported as reaching 7.2 inches north of the city of McGregor. Snowfall and strong winds made travel conditions difficult.
2/22/2018	Heavy Snow	Snowfall measured 6.1 inches seven miles north of McGregor and snow reached up to eleven inches in northern Aitkin County.
12/25/2016	Winter Storm	The storm caused a mixture of freezing rain, sleet, and snow, as well as strong winds. The Aitkin County Sheriff's office reported widespread tree damage across the county due to the storm; felled trees contributed to power outages.
11/17/2016	Heavy Snow	Heavy snow brought a wide variety of snowfall depths ranging from eight to twenty-five inches across the region.

SOURCE: (NCEI, 2021)

5.5.2 PROBABILITY OF OCCURRENCE

To determine the probability of future winter-related storm events in Aitkin County, records of previous events (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 Aitkin County is 3.4 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

Aitkin County Emergency Management identified existing program gaps and deficiencies that make its citizens more vulnerable to winter storms. These gaps should be addressed with new mitigation efforts to reduce vulnerability, outlined as follows:

Above-Ground Power Lines: A majority of the power lines in Aitkin 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.

Public Education: Aitkin County Emergency Management and local cities need to continue to encourage all residents to be ready for long-term power outages or to be snowed in during dangerous winter events such as ice storms and blizzards.

Backup Power: Not all of designated shelter facilities in the county 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.

5.6 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 valves); 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 Indian 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.

There are 29 dams and two levees in Aitkin. Table 28 provides the properties of each dam and Table 29 lists the properties of each levee in the county.

Table 28. Dams in Aitkin County

Dam Name	Owner	Waterway	Type	Height (ft)	Length (ft)	Purpose	Condition	Rating
Ecklund	MNDNR-Fisheries and Wildlife	Ripple River - OS	Earth	10'	600'	Fish and Wildlife Pond	Poor	No Data
Little Pine Lake	MNDNR-Waters	Ripple River	Gravity	3.8'	37'	Recreation	Fair	Class III
Ripple Lake	MNDNR	Ripple River	Gravity	6'	35'	Recreation	Poor	Class III
Hanging Kettle Lake	MNDNR	Ripple River	Gravity	5.7'	40'	Recreation	Poor	Class III
Hill Lake	MNDNR-Wildlife	Hill River	Gravity	6'	24'	Recreation	Satisfactory	Class III
Waukenabo Lake	MNDNR	Little Willow River - TR	Gravity	6.2'	41'	Recreation	Fair	Class III

Dam Name	Owner	Waterway	Type	Height (ft)	Length (ft)	Purpose	Condition	Rating
Moose-Willow 1	MNDNR-Wildlife	Moose River	Earth	12'	500'	Fish and Wildlife Pond	Satisfactory	Class III
Moose-Willow 2	MNDNR-Wildlife	Willow River	Earth	10'	1500'	Fish and Wildlife Pond	Poor	No Data
Washburn Lake	MNDNR-Wildlife	Willow River - TR	Gravity	6'	35'	Other	Poor	Class III
Digman Pond	Gerlach, Rodney	Pine River - OS	Earth	8'	10'	Fish and Wildlife Pond	No Data	No Data
Sandy Lake	USCOE	Sandy River	Earth	14'	109'	Flood Control	Not Rated	Class III
Rice River Pool	USF&W	Rice River	Gravity	9'	95'	Fish and Wildlife Pond	No Data	Class III
Rice Lake Pool	USF&W	Rice River - TR	Gravity, Earth	8'	24'	Fish and Wildlife Pond	No Data	Class III
Little Willow River	MNDNR-Wildlife	Little Willow River	Other	6'	56'	Fish and Wildlife Pond	Satisfactory	Class III
Little Willow River WMA	MNDNR-Wildlife	Little Willow River	Earth	10'	228'	Fish and Wildlife Pond	Satisfactory	Class III
Jewett WMA 2	MNDNR-Fisheries and Wildlife	Dam Brook	Earth	6'	400'	Fish and Wildlife Pond	No Data	No Data
Jewett WMA 1	MNDNR-Fisheries and Wildlife	Dam Brook	Rockfill, Other	9'	675'	Fish and Wildlife Pond	Satisfactory	Class III
Little Hill Pond	MNDNR-Fisheries and Wildlife	Little Hill River - TR	Earth	8'	420'	Fish and Wildlife Pond	Poor	Class III
Rabbit Lake	MNDNR	Rabbit Creek	No Data	No Data	No Data	Recreation	Satisfactory	No Data
Dam Lake	MNDNR	Dam Brook	No Data	No Data	No Data	Flood Control	Poor	No Data
Cornish Flowage	MNDNR-Wildlife	Savannah River - TR	Rockfill, Earth	8'	38'	Flood Control	Satisfactory	Class III
Cedar Lake	MNDNR	No Data	No Data	No Data	No Data	No Data	Satisfactory	No Data

Dam Name	Owner	Waterway	Type	Height (ft)	Length (ft)	Purpose	Condition	Rating
Esquagamah Lake	MNDNR-Trails	No Data	No Data	No Data	No Data	Recreation	Not Rated	No Data
Lake Minnewawa	MNDNR	Minnewawa Creek	No Data	No Data	No Data	Recreation	Satisfactory	Class III
Spirit Lake	MNDNR-Trails	Ripple River	No Data	No Data	No Data	Fish and Wildlife Pond	Satisfactory	Class III
Long-Tamefish Lake	MNDNR	No Data	No Data	No Data	No Data	Recreation	Satisfactory	No Data
French Lake WMA	MNDNR-Wildlife	Rice River - TR	No Data	No Data	No Data	Fish and Wildlife Pond	Satisfactory	Class III
Round Lake	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data
Grayling Marsh	MNDNR-Wildlife	No Data	No Data	No Data	8'	Fish and Wildlife Pond	Fair	Class III

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

Table 29. Levees in Aitkin County

Levee Name	Location	Waterway	Length (mi)	Leveed Area (sq mi)
Aitkin Unincorporated Levee	Aitkin Township, Aitkin City	Mississippi River	1.222	0.198
Mississippi River Diversion near Aitkin	Second Assessment Unorg Terr, Aitkin Township	Little Willow River	5.771	5.009

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

5.6.1 HISTORY

According to the State Dam Safety Engineer at the MN DNR, there are no records of a dam or levee failure in Aitkin County.

5.6.2 PROBABILITY OF OCCURRENCE

To determine the probability of future dam or levee failures in Aitkin County, records of previous failures and the period in which they occurred were examined. There MN DNR has zero 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.

5.6.3 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.

5.6.4 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 30 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, 2004b).

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).

Table 30. 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)

Nineteen of the dams in Aitkin County are a Class III (low hazard potential) and no hazard information is available for the other ten dams. None of the dams had Emergency Action Plans (EAP) available to us, but the USCOE does have an updated EAP for the low hazard Sandy Lake Dam. 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.

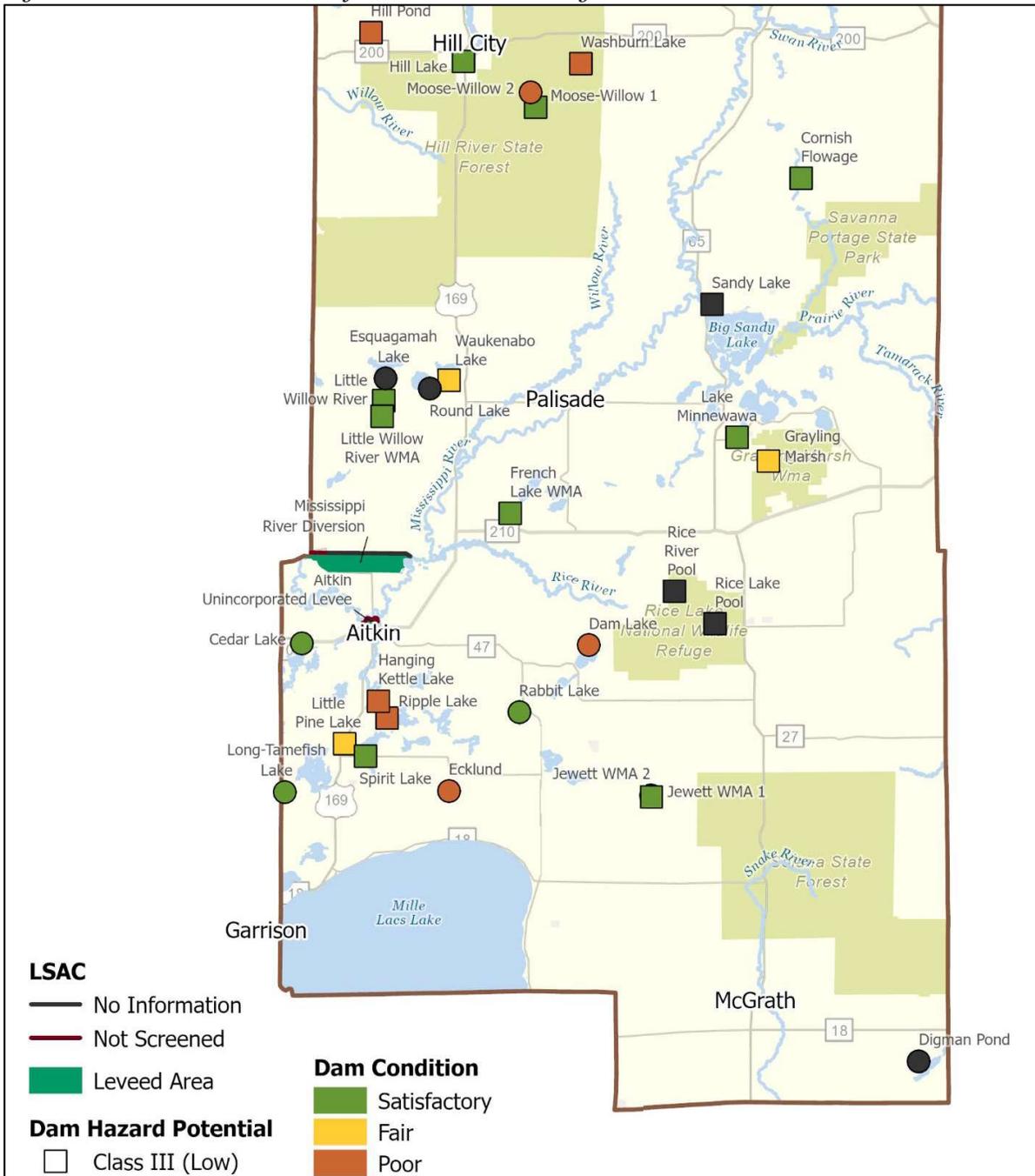
Not Rated: The dam has not been inspected, is not under state jurisdiction, or has been inspected but, for whatever reason, has not been rated. (USACE, 2008)

Dams in “Poor” or “Unsatisfactory” conditions may be more vulnerable to failure and pose a greater threat to the surrounding community and infrastructure. Seven of the dams that have received a rating in Aitkin County have been rated as “Poor.” The location of levees and location and condition of dams in Aitkin County are mapped in Figure 21.

Similar to dams, levees have a Levee Safety Action Classification (LSAC) “...designed to take into account the probability of the levees being loaded, existing condition of the levee, the current and future maintenance of the levee, and the consequences if a levee were to fail or be overwhelmed (USACE, 2020a). Table 31 shows the LSAC’s five levels of risk, as well as the actions that should be taken at each risk level.

The levees in Aitkin County are used to regulate water levels and protect communities from flooding. A breached levee can have serious consequences to the community relying on the levee to hold water back. Table 32 provides a summary of the county’s levees and community assets protected by the respective levee.

Figure 21. Levees and condition of dams in Aitkin County



SOURCE: (USACE, 2021)

Table 31. USACE's Levee Safety Action Classification (LSAC) Table

Risk	Actions for Levee Systems and Leveed Areas in this Class <i>(Adapt actions to specific levee system conditions.)</i>	Risk Characteristics of this Class
Very High (1)	Based on risk drivers, take immediate action to implement interim risk reduction measures. Increase frequency of levee monitoring, communicate risk characteristics to the community within an expedited timeframe; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning systems and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction actions as very high priority.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very high risk.
High (2)	Based on risk drivers, implement interim risk reduction measures. Increase frequency of levee monitoring, communicate risk characteristics to the community within an expedited timeframe; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning systems and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction actions as high priority.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in high risk.
Moderate (3)	Based on risk drivers, implement interim risk reduction measures as appropriate. Verify risk information is current and implement routine monitoring program; assure O&M is up to date; communicate risk characteristics to the community in a timely manner; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning systems and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction actions as a priority.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in moderate risk.
Low (4)	Verify risk information is current and implement routine monitoring program; assure O&M is up to date; communicate risk characteristics to the community as appropriate; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning systems and evacuation procedures; and, recommend purchase of flood insurance. Support risk reduction actions to further reduce risk to as low as practicable.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in low risk.
Very Low (5)	Continue to implement routine levee monitoring program, including operation and maintenance, inspections, and monitoring of risk. Communicate risk characteristics to the community as appropriate; verify emergency plans and flood inundation maps are current; ensure community is aware of flood warning and evacuation procedures; and recommend purchase of flood insurance.	Likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in very low risk.
No Verdict	Not enough information is available to assign an LSAC.	

*Levee risk is the risk that exists due to the presence of the levee system, and this is the risk used to inform the decision on the LSAC assignment. The information presented in this table does not reflect the overtopping without breach risk associated with the presence or operation of the levee system.

SOURCE: (USACE, 2020A)

Table 32. Assets in leveed areas

Levee Name	Location	LSAC Rating	Property Value	Structures at Risk	Population at Risk
Aitkin Unincorporated Levee	Aitkin Township, Aitkin City	Not Screened	\$17,348,953	70	135
Mississippi River Diversion near Aitkin	Second Assessment Unorg Terr, Aitkin Township	Not Screened	\$2,528,833	10	10

SOURCE: (USACE, 2020B)

5.6.5 PROGRAM GAPS AND DEFICIENCIES

Aitkin 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 Aitkin County as related to hazard mitigation.
- Appendix C: As part of the Aitkin 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 Aitkin 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 33 lists and describes jurisdictional participation in the National Flood Insurance Program (NFIP).

Table 33. NFIP participation in Aitkin County

Community Name	Participation in the NFIP	FEMA Map	Description of Participation
Aitkin County	Participating	FEMA-mapped high-risk areas	Aitkin County has adopted and enforces a Floodplain Ordinance (last amended June 6, 2001) to meet NFIP requirements, including regulating new construction in Special Flood Hazard Areas (SFHAs). The Aitkin County Planning & Zoning Department conducts floodplain identification and mapping, including any local requests for map updates and assists with community assistance and monitoring for localized flooding.
Aitkin	Participating	FEMA-mapped high-risk areas	The City of Aitkin has adopted and enforces Chapter 152: Zoning and Subdivisions; subsection 152.056 Floodplain Overlay District which establishes regulations designed to minimize flood losses.
Hill City	Participating	FEMA-mapped high risk areas (annexed county SFHA)	The City of Hill City adopted a Floodplain Management Ordinance on November 12, 2014. The ordinance includes maps.
McGrath	Not Participating	No FEMA-mapped high-risk areas	The city does not have a FEMA map and is not participating.
McGregor	Participating	FEMA-mapped high-risk areas (annexed county SFHA)	The City of McGregor has adopted and enforces a Floodplain Ordinance (Ordinance No. 173) which regulates development in the flood hazard areas of the City of McGregor.
Palisade	Participating	FEMA-mapped high-risk areas	The City of Palisade is mapped and is participating under an old ordinance. The city is reviewing it in order to update it.
Tamarack	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.

There are no RL properties in Aitkin County. For more on the areas that flood repeatedly in Aitkin County, see Section 5.1.

6.1.2 PLANS AND ORDINANCES

Aitkin 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

Aitkin 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 Aitkin County to support mitigation for the hazards addressed in this plan.

All Hazards

All Hazards Emergency Operations Plan: Aitkin County Emergency Management maintains an all hazards Emergency Operations Plan which details key emergency management functions (i.e., 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, Aitkin County utilizes the Everbridge emergency notification system which users must sign up for (“opt-in service”). Aitkin County also has IPAWS (Integrated Public Alert Warning System) which allows for both targeted and countywide emergency notifications to both residents and visitors (not an “opt-in” service). 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, Everbridge, cell phone apps and the outdoor warning siren system.

Preparedness Outreach: Aitkin County Emergency Management utilizes our Sheriff’s Office Facebook page and local news media to communicate with residents and visitors on emergency preparedness. A link for the Everbridge emergency notification system is located on the Aitkin County website.

Shelter Facilities: There are six designated shelter facilities within Aitkin 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. Aitkin County Emergency Management and the Aitkin Public Health Department maintain a list of shelters within the county and have trained staff for shelter operations. Aitkin County has sheltering and pet sheltering plans in place.

NOAA Weather Radios: Aitkin 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. We promote use of these radios in advance of and during our severe weather months using our Sheriff's Office social media and also during the NWS severe weather awareness weeks.

Backup Power: Generator back-up power is in place for the Aitkin County EOC, Courthouse, Public Works Building, Jail, Sheriff's Office and Dispatch.

School Closings: All school districts within Aitkin 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 Weather Warnings: Winter weather warnings are issued by the National Weather Service office in Duluth, MN. Aitkin County Sheriff's Office and local media help to relay NWS weather warnings.

Winter Hazard Awareness Week: Aitkin 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 Aitkin County Sheriff's Office Facebook page and local news media to share information with the public.

Snow Removal: The Aitkin 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 Aitkin 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 six outdoor warning sirens located in Aitkin County. Sirens are activated when the National Weather Service notifies Dispatch of high winds or tornado conditions that pose a risk to the public. Warning sirens are owned by the cities of Aitkin, Hill

City, Tamarack, and McGregor and Mille Lacs Band of Ojibwe and are located and maintained by those jurisdictions. All sirens are remotely activated by the Aitkin County Sheriff's Office.

SKYWARN Program: Aitkin County Emergency Management works with the National Weather Service to offer training on an 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: Aitkin 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 Aitkin Sheriff's Office Facebook page and local news media to share information with the public.

Tree Management: The Aitkin 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. Local road authorizes are encouraged to do the same.

MDH Requirements for Manufactured Home Parks: The Aitkin 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: Aitkin County's Environmental Services Office maintains the floodplain maps and floodplain management ordinance for the county.

National Flood Insurance Program (NFIP): Aitkin County and all cities with FEMA-mapped high-risk areas participate in the NFIP.

Aitkin County Floodplain Management: The Aitkin County Environmental Services Office is the repository for the National Flood Insurance Program's Flood Insurance Rate Maps (FIRM), as well as flood boundary and floodway maps for rural Aitkin County. The Environmental Services Office can assist county residents in determining whether their property is affected by an officially mapped flood area. Flood Insurance Rate Maps are available on the Environmental Services website for all Aitkin County townships.

Transportation Improvement Plan: Aitkin County Highway Department maintains an annual Transportation Improvement Plan (TIP) that identifies and schedules road improvement projects that include culvert and drainage improvements to reduce over-the-road repetitive flooding. The current Aitkin County TIP is in place for 2019-2023.

Aitkin County Floodplain & Shore Land Ordinances: The Aitkin County Environmental Services Department administers land use and zoning ordinances for rural and unincorporated portions of Aitkin County, including for floodplains and shore land. The department also provides information and support for environmental health issues that may affect water quality after flooding occurs. Aitkin County 'County-Wide' Zoning Ordinance addresses Shore Land Management Regulations including building regulations to mitigate against flooding during high-water elevation (for structures along lakes, ponds, flowages, rivers, and streams).

Stormwater Management Ordinance & Plans: Aitkin County Zoning Ordinance Section 5.5 of the Shore Land Management Ordinance addresses storm water management.

Enforcement of MPCA Storm Water Standards for New Development: New residential and commercial development is required to meet MPCA storm water standards and are required to obtain and National Pollutant Discharge Elimination System (NPDES) and the County requires a copy of this before approvals are granted. All the townships have drainage standards that meet or exceed the required rainfall events. Each project has to provide the County with a Storm water Pollution Prevention Plan (SWPPP) before the County grants approval through the platting process. The County keeps employees on staff that are qualified through training to review these plans.

Aitkin County Drainage Administration: Aitkin County has a Drainage Engineer that oversee management of 646 miles of open ditches and thousands of miles of underground tile in Aitkin County, consisting of 42 public drainage systems. Private landowners with property that adjoin county ditches are encouraged to help keep them free and clear of debris.

Aitkin County Land Use Management Plan: The Aitkin County Land Use Management Plan (2000) addresses goals for the management of drainage ditches: Initiate and implement a process and office within the County structure to administer the maintenance of a public drainage system, continually review the needs of the system, address drainage concerns and make reports to the Ditch Authority.

Aitkin County Soil & Water Conservation District: The Aitkin County SWCD helps to oversee and implement regional planning for projects that help to reduce the impacts of high rain events resulting in flooding and erosion that affects natural systems.

Wildfire

Local Fire Departments: There are six fire departments located in Aitkin County. Each department is responsible for wildfires within their department boundaries; however, they often work together on larger fires, including wildfires.

Burning Permits/Restrictions: The Minnesota Department of Natural Resources regulates when burning permits are available and requires permit holders to notify the county prior to burning.

Mutual Aid Agreements: All of the municipal fire departments in Aitkin County have mutual aid agreements with each contiguous department that borders their respective fire district. Written mutual aid agreements are on file with each city.

Fire Prevention Week: Fire prevention week is held annually each October with the main emphasis on educating the youth through visiting schools. Most fire departments participate and provide an opportunity for local residents to learn fire safety with open houses.

Dam Failure

Aitkin County Dam Emergency Action Plan: The Big Sandy Lake Dam, also known as the Libby Dam, is located on the north side of Big Sandy Lake where the Mississippi River enters. The dam is owned and operated by the US Corp of Engineers. The US Corp of Engineers maintains an Emergency Action Plan for the dam which addresses response measures such as emergency public notification and evacuation in the event of a dam breach. There are many small water control dams located throughout Aitkin County. Ownership of these structures varies. Some are owned by Aitkin County, some by Minnesota Department of Natural Resources, some have questionable/unknown ownership. The MN DNR generally has permitting authority and responsibility over all of these structure as they generally control water elevations in public waters

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 Aitkin County Plan. This framework, as outlined below, will allow for integration of the mitigation actions that are listed by Aitkin 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 34.

Table 34. 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.	<ul style="list-style-type: none"> • 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

Mitigation Strategy	Description	Example Mitigation Actions
Structure and Infrastructure Projects	<p>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.</p> <p>This type of action also involves projects to construct manmade structures to reduce the impact of hazards.</p> <p>Many of these types of actions are projects eligible for funding through the FEMA Hazard Mitigation Assistance program.</p>	<ul style="list-style-type: none"> • 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	<p>These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.</p>	<ul style="list-style-type: none"> • Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements • Wetland restoration and preservation
Education and Awareness Programs	<p>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.</p>	<ul style="list-style-type: none"> • 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	<p>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.</p>	<ul style="list-style-type: none"> • Emergency operations plan • Flood fight plans and preparedness • Dam emergency action plans • Warning • Backup power • Emergency capabilities

Local leaders work together with the Aitkin 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 Aitkin 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 Aitkin 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 Aitkin, Hill City, McGrath, McGregor, Palisade, and Tamarack.

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

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 Aitkin 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 35 provides criteria that were taken into consideration in the process.

Table 35. Criteria for Mitigation Action Priority Ranking

Ranking	Criteria
High Priority	<ul style="list-style-type: none"> • 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.
Moderate Priority	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 Aitkin County Mitigation Action Chart is provided in Table 36. Appendix J provides the mitigation action charts developed for each city participating in the MHMP update.

Table 36. Aitkin County 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 county residents to sign-up for the county's Everbridge emergency notification alert system.	Existing High Ongoing	Aitkin County Emergency Management (ACEM)	A link for the Everbridge emergency notification system is located on the Aitkin County website and reminders are put out on the Sheriff's Office Facebook page as well as during the NWS's Severe Weather Awareness Week.	County
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the Aitkin 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	ACEM	ACEM 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. ACEM and ACPH 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. ACEM will continue to work to ensure that all designated shelters are prepared with backup generators where needed.	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	ACEM, AC Public Health (ACPH)		County

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
4	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	ACEM in coord with Local Gov't	ACEM 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 Everbridge system and Sheriff's Office Facebook page to receive emergency notifications and other information. ACEM shares information with local governments and encourages them to use their communication platforms to keep residents informed.	County
5	Severe Winter & Summer Storms	Structure & Infrastructure Systems	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.	Existing High Ongoing	ACEM in coord with Local Gov't and Rural & Municipal Utility Coops	Mille Lacs Electric and Lake Country Power continue to address where power lines can be strengthened or buried underground. ACEM will assist as needed with future applications to FEMA for eligible projects to reduce risk of power outages by these coops. ACEM 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.	Electric Coops, FEMA HMA grant
6	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	ACEM in coord with Local Gov't	The Aitkin County Hwy. Dept and local utility providers address tree management near powerlines. Townships & cities are encouraged to do the same for roads under their authority.	County, Local Gov't
7	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	AC Highway Dept.		County

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
8	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	ACEM, in coord with Schools & Other Facilities	ACEM and ACPH continue to work with school districts and other long-term care facilities across the county and will encourage them to have plans in place for when the need arises.	County, Local Facilities
9	Severe Summer Storms	Education & Awareness Programs	Encourage campground operators to post information regarding storm shelters and safety during strong summer storms.	Existing Moderate Ongoing	ACEM in coord with AC Land Dept. & State/Local Parks	Campground operators will be encouraged to take action on this locally. Big Sandy Lake Campground, Savanna Portage State Park and the group camp at Savanna Lake have established storm shelters. Aitkin County manages camping reservations at 4 county parks (Aitkin Park, Berglund Park, Jacobson Park, and Snake River Park) and posts storm safety information for campers. The Aitkin County Public Health Department works with the owners of manufactured home parks and the municipalities where they are located to help to ensure that they are meeting Minnesota Department of Health requirements for storm shelters and evacuation plans.	County, State/Local
10	Severe Summer Storms	Local Planning & Regulations	Work with owners of mobile home parks (MHP's) to ensure they are in compliance with Minnesota Department of Health (MDH) requirements for evacuation plans and storm shelters.	Existing High Ongoing	ACPH in coord with Local Gov't and MHP's		ACPH, MHP Owners
11	Severe Summer Storms	Mitigation Preparedness & Response Support	Ensure there is a network of trained Storm Spotters throughout the county to support situational awareness of and public notification for dangerous storms such as severe thunderstorms and tornadoes.	Existing Moderate Ongoing	ACEM in coord with NWS & Local Gov't	ACEM works with the NWS to provide SKYWARN storm spotter training on an annual basis to local law enforcement, fire departments, and local residents who wish to participate.	County, NWS

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
12	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	ACEM in coord with Local Gov't	Warning siren upgrades or new installations are needed for the cities of Hill City, McGregor, and Palisade. ACEM will assist these communities 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
13	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 tornadoic events.	Existing Moderate Ongoing	ACEM in coord with Local Gov't & Savanna State Park (MN DNR)	The cities of Aitkin, Hill City, McGrath, McGregor, Tamarack and the MN DNR Savanna Portage State Park have all 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). ACEM will provide assistance as needed to help assess need, possible construction options, and assist in applying for grant funding as needed (i.e., FEMA HMA safe room grant). The MN DNR Firewise Program has noted that Aitkin County has a CWPPP equivalent on file (which is addressed in the county's EOP), but cannot locate a copy. ACEM will work with the MN DNR Firewise Coordinator for NE MN to evaluate if a CWPPP equivalent or full CWPPP is best for Aitkin County and proceed with that planning for wildfire mitigation.	County, FEMA HMA, Other (TBD)
14	Wildfire	Local Planning & Regulations	Work with the MN DNR Firewise Program to address update of the Aitkin County Community Wildfire Protection Plan (CWPPP).	New Moderate TBD	ACEM in coord with MN DNR Firewise		County, MN DNR Firewise Grant

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
15	Wildfire	Education & Awareness Programs	Work with the Aitkin County SWCD to promote wildfire awareness and local actions to reduce wildfire risk.	New Moderate TBD	ACEM in coord with Aitkin SWCD	Aitkin County SWCD is actively working with area homeowner groups on wildfire awareness and creation of defensible space. ACEM will work to help promote these efforts and raise public awareness & education on wildfire risk and opportunities to reduce wildfire risk for homeowners through Level-1 Firewise Assessments and creation of defensible space.	County, MN DNR
16	Wildfire	Local Planning & Regulations	Apply for FEMA HMA or MN DNR Firewise grant program funding to support the implementation of targeted wildfire mitigation activities such as wildland fuels reduction measures, “chipper days”, installation of dry hydrants, and public awareness campaigns.	New High Ongoing	Aitkin SWCD	The Aitkin County Soil and Water Conservation District (SWCD) is providing leadership on wildfire mitigation efforts within Aitkin County and is also working in partnership with Dovetail Partners and Carlton County SWCD. Aitkin SWCD wishes to maintain eligibility to apply for wildfire mitigation projects that may be fundable by FEMA for MN DNR in order to support implementation. Aitkin County participates in the NFIP and has adopted and enforces a Floodplain Ordinance, adopted June 21, 2016. Compliance with this ordinance is overseen by the Aitkin County Environmental Services Department, which maintains the floodplain maps for the county.	FEMA HMA, MN DNR, other TBD
17	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	AC Envir. Services Dept.		County

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
18	Flooding	Local Planning & Regulations / Structure & Infrastructure Projects	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	AC Highway Dept.	AC Highway Dept and local jurisdictions evaluate needed projects on an annual basis and following flood events. AC Hwy. Dept. maintains an annual Transportation Improvement Plan (TIP) that identifies and schedules road improvement projects that include culvert and drainage improvements to reduce over-the-road repetitive flooding. The current Aitkin County TIP is in place for 2019-2023.	County, State, Federal
19	Flooding	Local Planning & Regulations / Structure & Infrastructure Projects	Work in partnership with the Aitkin County Soil & Water Conservation District and local municipalities to address mitigation projects that address erosion and localized flooding.	Existing Moderate Ongoing	AC Highway Dept. in coord with SWCD and Local Gov'ts	AC Hwy. Dept. continues to partner together with the Aitkin SWCD and local governments to address flood and erosion projects (i.e., ditch drainage, culvert & rural road repair, bank stabilization projects).	County, Local Gov't, SWCD Cost Share Grant Funding
20	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 Low Ongoing	ACEM, AC Envir. Services in coord with Local Gov'ts	There are currently no projects for conducting property buyouts, however Aitkin County will continue to evaluate and assist with potential future property acquisition projects and application to FEMA or MN DNR for grant funding to conduct buyouts.	County, MN DNR, FEMA HMA, Local Gov't

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
21	Flooding	Local Planning & Regulations	Enforce county policies that regulate zoning for new development, setbacks in shoreline area, and stormwater management.	Existing Moderate Ongoing	AC Envir. Services	The Aitkin County Environmental Services Department administers land use and zoning ordinances for rural and unincorporated portions of Aitkin County, including for floodplains and shoreland. The Aitkin County 'County-Wide' 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). Aitkin County Zoning Ordinance Section 5.5 of the Shore Land Management Ordinance addresses stormwater management. Aitkin County has a Drainage Engineer that oversee management of 646 miles of open ditches and thousands of miles of underground tile in Aitkin County, consisting of 42 public drainage systems. Private landowners with property that adjoin county ditches are encouraged to help keep them free and clear of debris. The Aitkin County Land Use Management Plan (2000) addresses goals for the management of drainage ditches. Aitkin County Environmental Services continues to work with the Aitkin County SWCD, Big Sandy Area Lakes Watershed District and the Mille Lacs Watershed Management Group on projects that affect water quality, erosion control, and shoreland stabilization.	County
22	Flooding	Local Planning & Regulations	Manage the system of county ditches to reduce over-the-road flooding resulting from high rain events.	Existing Moderate Ongoing	AC Envir. Services		County
23	Flooding	Local Planning & Regulations	Work in partnership with the SWCD and area watershed districts to coordinate planning and project efforts that address flooding and erosion concerns.	Existing Moderate Ongoing	AC Envir. Services, AC SWCD, in coord with Watershed Districts		County, SWCD Cost Share Grant Program, & Watershed Districts

Section 7 – Plan Maintenance

7.1 Monitoring, Evaluation, and Updating the Plan

The Aitkin 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 Aitkin County MHMP.

The Aitkin 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 five-year planning cycle, the Aitkin County Emergency Management Director (EMD) will work with the Aitkin County Emergency Managers Group to serve as the group to help monitor, review, evaluate, and update the Multi-Hazard Mitigation Plan. The group includes designated city emergency managers and fire chiefs from the cities of Aitkin, Hill City, McGrath, McGregor, Palisade, and Tamarack and also includes city administrators, city clerks, and mayors as needed. The Aitkin County EMD conducts outreach to and communicates with the group on a quarterly basis on emergency management matters regarding severe weather awareness, local preparedness, mitigation, and response & recovery as needed. Additional stakeholders will be added based on need or in response to severe weather events. If necessary, the Aitkin County Emergency Management Director will convene the group 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 group will meet to update pertinent mitigation strategies. Depending on Aitkin 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 Aitkin 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, Aitkin 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

Aitkin 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 Aitkin County and its jurisdictions (see Section 6.3). The cities of Aitkin, Hill City, McGrath, McGregor, Palisade, and Tamarack 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 Aitkin 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 Aitkin 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 (MHMP). The Aitkin County Emergency Management Director and the Aitkin County Emergency Managers Group 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 5-year window of implementation for this plan, Aitkin County will take the following measures:

- The plan will be posted on the Aitkin County Emergency Management website for the public to read and provide feedback. Collected feedback will be reviewed during the five-year plan cycle and will be noted for future update of the plan or addressed as necessary.
- Following any major storms or natural disasters, Aitkin 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 (i.e., Sheriff's Office 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 Aitkin 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

Aitkin County

Local Mitigation Survey Report

Overview

As part of Aitkin 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

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AITKIN COUNTY

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

- 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	High	No Change
Windstorms	X	High	Increasing
Lightning	X	Low	No change
Hail	X	Low	No change
Flooding	X	High	Increasing
Extreme Cold	X	Low	No change
Extreme Heat	X	Low	No change
Drought	X	Low	No change
Wildfire	X	Moderate	No change
Landslides		Low	No change
Dam Failure		Low	No change

- 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 last 5 years, Aitkin County has had three weather related State and Federal Declarations:

- In summer of 2016 there were wind damages, power outages and extreme heat & humidity in the Hill City area, along with flooding, wind damages and power outages for the rest of the county from that same storm.
- In June/July, 2018 and August/ September of 2018 were two other declarations for wind damages, power outages, and flooding.

There have been other weather events in 2017 and 2020 that have caused damages due to wind, flooding, and power outages, but not enough to make a declaration.

Aitkin County has also had heavy wet snows and ice that have toppled power lines and trees causing power outages in the spring of 2020. In the summer of 2020, the county had a confirmed tornado that did not cause damages as it hit in a remote unpopulated area.

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 susceptible 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 susceptible to damage and loss from specific hazard events.
Windstorms/Tornadoes	Aitkin County is a tourist destination with several campgrounds, cabins, and seasonal trailers. Only Savanna Portage State Park has a designated shelter. The resorts, campgrounds, and trailer parks are vulnerable to falling trees, hail, and high winds.
Extreme Heat/Cold	Aitkin County has a higher percentage of elderly residents. In cases of extreme heat and cold, any power failures due to over loads or storm events could endanger that population.
Ice Storms/Blizzards	Aitkin County has power lines, transmission lines and high voltage lines running through several areas of our county. Ice storms or blizzards could cause damage to these. The trees and power lines are susceptible to ice and windstorms that break and blow them down. This may leave an inordinate amount of debris and cause disposal problems as well as hazardous conditions for anyone traveling our roadways.
Wildfire	Aitkin County is home to commercial peat farms. Once a peat fire is started it is difficult to extinguish and could burn for several months.
Flooding	Aitkin County is susceptible to flooding with its low lands, wetlands, lakes and rivers. Heavy rain events have created problems to our township, county, and state roads by undermining the roads, and washing out culverts. Many lakes now have "no wake" restrictions to lessen the possibility of lakeshore erosion and flooding to homes.

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.**

Aitkin County has encouraged local residents and businesses to sign up for the county's Everbridge emergency mass notification system and their Weather Warning to get emergency notifications. Public awareness for this program has been pushed through social media, newspapers, public events and radio broadcasts. In addition to Everbridge, Aitkin County has also implemented the IPAWS system, which can alert those that are not subscribers of Everbridge of impending danger.

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.**

In the last few years, there have been several high rain events that have caused flooding in several areas of the county. With the rise in lakes and river waters, there is an old diversion channel and levee on the edge of the city of Aitkin that the Army Corps of Engineers has stated will not function, as it should. The residents in that area are in danger of flooding.

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.

Aitkin 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.

Aitkin County has a comprehensive plan in place and capital improvements plan that plan for future development within the county.

Aitkin County participates in the National Flood Insurance Program (NFIP).

Aitkin County's Environmental Services Department maintains the floodplain maps and floodplain management ordinance for the county.

The Aitkin County Environmental Services Department administers land use and zoning ordinances for rural and unincorporated portions of Aitkin County, including for floodplains and shoreland.

Aitkin County Highway Department maintains an annual Transportation Improvement Plan (TIP) that identifies and schedules road improvement projects that include culvert and drainage improvements to reduce over-the-road repetitive flooding. The current Aitkin County TIP is in place for 2019-2023.

Aitkin County Zoning Ordinance Section 5.5 of the Shoreland Management Ordinance addresses stormwater management.

The Aitkin County Land Use Management Plan (2000) addresses goals for the management of drainage ditches.

The Aitkin County Highway Department has a snow removal policy.

The Aitkin 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.

Aitkin County Environmental Services Department has an ordinance in place for bluff setbacks to be at 30 feet regardless of erodibility. It includes any bluff regardless of whether it drains towards the water body or if it is over 300 feet from a river or 1000 feet from a lake.

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

Aitkin County staff related to mitigation efforts include the emergency management director (sheriff) and deputy emergency management directors (2), county administrator & county board, county engineer, environmental services director, health & human services director, GIS department director, and a land department director. Aitkin County works closely with the Aitkin County Soil & Water Conservation District (SWCD).

We partner with the American Red Cross (ARC) 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 have close working relationships with emergency managers in MN HSEM Region 2 and support each other in emergency mitigation and preparedness planning, exercises and emergency response, when needed.

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

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

Aitkin 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 an annual basis.

Aitkin County Emergency Management and Aitkin County Public Health promote public awareness of personal safety measure to take during periods of extreme heat, such as minimizing exposure and staying hydrated.

The Aitkin County SWCD manages a Volunteer Rainfall Monitoring Network program for the county. The program is part of the MnGAGE program administered by the Minnesota State Climatology Office.

The Aitkin County SWCD has numerous programs focusing on providing information and technical assistance to landowners, shoreland protection & buffers, and public education. In 2020 the SWCD also started a large county wide culvert inventory. The end result will be a map for each township that contains the locations, condition, size and type of all the culverts in the township road and county road right of ways. The aim of this project is to get an increased understanding of the watersheds and use the gathered information to quickly solve water flow problems.

Aitkin County Emergency Management participates in regional emergency management exercises for Region 2.

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

Projects that mitigate highway flooding are included in the Aitkin County Capital Infrastructure Program using local, state, and federal highway construction funding. In addition, state and federal grant programs for targeted flood mitigation projects are utilized on a case-by-case basis when funding is available.

The only funding the county's planning & zoning dept. has received for flood mitigation was from the State and FEMA for collection and disposal of flood damage materials from properties that were damaged during the flood of 2012.

Just after the 2012 flood event, the Aitkin County SWCD had access to some additional flood damage funds for cost-share assistance to landowners. The funds were used to help landowners complete multiple erosion control and revegetation projects in the county. Timeline for those funds was approximately 2013 through 2015.

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 plans at this time.

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

Mille Lacs Electric, Lake Country Power

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

A link for the Everbridge emergency notification system is located on the Aitkin County website and reminders are put out on the Sheriff's Office Facebook page as well as public events, radio and newspaper during the NWS's Severe Weather Awareness Week.

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

Generator back-up power is in place for the Aitkin County EOC, courthouse, public works building, jail, sheriff's office and dispatch. Additional generators may be needed for other county facilities as well as our designated shelter facilities.

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.

An upgrade is needed for the warning siren at Big Sandy Lake. The cities of Palisade and McGrath also do not have warning sirens and should be installed.

Continue to do outreach to promote residents to be prepared for emergencies, to have NOAA weather radios, and to sign up for the county's Everbridge 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.

Provide support to communities to identify where storm shelters or tornado safe rooms are needed and assist in applying for grant funding (i.e., USDA, FEMA HMA)

Encourage long-term care facilities that house senior citizens or other vulnerable populations to have emergency plans and generators in place to deal with severe weather, power outages and extreme temperatures.

Update the Aitkin County Community Wildfire Protection Plan (CWPP) "equivalent" with the MN DNR or develop a full CWPP. More can be done in Aitkin County with the Firewise Program such as public education and helping property owners improve defensive space.

Address road improvements, ditch maintenance and bank stabilization projects needed to mitigate against high rain events as identified by the Aitkin County highway engineer and feedback from townships.

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

Some roads, bridges, and culverts within Aitkin 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.

Continued culvert replacement to prevent road flooding is a strain on our smaller townships that have limited funding for road infrastructure.

Funding is always an issue when it comes to providing adequate shelters for campgrounds and resorts.

Power poles that have reached the end of their life are still in place and vulnerable to the high winds and ice storms that have become more frequent in our county.

Funding is needed for more sirens in the county, especially around highly populated lakes.

PART D: SURVEY PARTICIPANTS

Patrice Erickson, Dispatch Supervisor/Deputy EM

Karla White, Jail Administrator/Deputy EM

Jessica Seibert, County Administrator

Tom Fistere, Dispatcher

John Welle, Aitkin County Engineer

Terry Neff, Environment Services Director

Steve Hughes, SWCD District Manager

CITY OF AITKIN

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

- 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	Increased
Ice Storms	X	Moderate	Increased
Tornadoes			
Windstorms	X	Moderate	No Change
Lightning	X	High	Increased
Hail	X	Low	Increased
Flooding	X	High	No Change
Extreme Cold	X	Low	No Change
Extreme Heat	X	Low	No Change
Drought			
Wildfire	X	Low	No Change
Landslides			
Dam Failure			

- 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 mid-summer of 2017, we had a hail storm and two days later a windstorm that caused over 1-million dollars in damage to Brandl Motors, and caused extensive damage throughout the city to properties.

About 4 years ago (2016) a spring ice jam caused some flooding in the Ripple River on the South side of town. We reached flood stage but did not actually flood for the last two springs.

- 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 susceptible 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 susceptible to damage and loss from specific hazard events.
Flooding	Homes, sewer collection and treatment are vulnerable to flooding.
Ice Storms/Blizzards	We have power lines and power poles that have failed or may fail due to heavy snow and ice. Ice storms are dangerous for the safety of roads. For

	blizzards it is difficult for the ambulance and first responders to safely respond.
Windstorms and Tornadoes	Downed trees, power outages, and downed power poles can occur. Blocked roads during storms makes it difficult for First Responders to get through.
Extreme cold/heat	Seniors & children are vulnerable to extreme cold especially if the power goes down during storm events.
Lightning	Fire damage can occur to houses and buildings, as well as a loss of power.

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 planted trees this summer to create a wind block (living snow fence) on Bunker Hill Drive. This will help to reduce blowing and drifting snow in winter.

We have backup generators for the well house and wastewater treatment facility. We also have a permanent levy around the substation.

We have used bigger power poles with shorter spans between them.

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.**

As the city expands there will be an increase in the area that we are responsible for. Homes are being put into forested areas which makes them vulnerable to forest fires. The roundabout put in by MnDOT can also increase traffic accidents.

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 have a comprehensive plan, and we use our planning and zoning regulations.

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

Our department heads work together when an emergency happens. Our fire chief is our designated emergency manager. We work with Aitkin county when needed.

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

We recently upgraded our primary warning siren, and we added an additional siren. We participate in the county's comprehensive plan and hazard mitigation plan.

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

We primarily use our own money to fund mitigation projects. For example, in 2012 our public utilities used their money to build a levy around the substation. We used federal grant money to add and upgrade the sirens.

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?**

Aitkin Public Utilities and Mille Lacs Electric

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

The fire hall has an open house once per year, and they promote signing up.

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

We have one portable generator to service 11 stations, 1 portable generator to service the well house, and the treatment plant has a permanent generator.

We need generators for the fire hall, police department, and public utilities garage (cannot open garage doors without power). Every lift station should have its own 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.

We need a storm shelter plan in town.

We also need to increase the elevation and provide pump stations and a culvert on 4th Ave. NW in order to make sure we have access to the street shop, protect homes, protect the sewer collection system, and protect the substation.

We can also work to encourage residents to sign up for the County's emergency notification system using our city website and Facebook page.

We need generators for the fire hall, police department, and public utilities garage (cannot open garage doors without power). Every lift station should have its own generator.

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

Funding.

PART D: SURVEY PARTICIPANTS

Rose Beverly, City Administrator
Bob Nicko, Street Commissioner
Dave Cluff, Public Utility Manager
Paul Ryan, Interim Police Chief
Brian Pisarek, Fire Chief

CITY OF HILL CITY

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

- 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	Low	No Change
Ice Storms	X	Low	No Change
Tornadoes	X	Moderate	No Change
Windstorms	X	Moderate	No Change
Lightning			
Hail			
Flooding	X	Moderate	No Change
Extreme Cold	X	Moderate	No Change
Extreme Heat		Low	No Change
Drought			
Wildfire	X	Low	No Change
Landslides			
Dam Failure			

- 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 2016 we experienced heavy rain, wind damage to trees, street flooding and power outages for over a week in some areas. The city experienced major flooding in 2016 and 2018 that caused damage to the city campground, city roads and culverts as well as to private properties.

- 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 susceptible 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 susceptible to damage and loss from specific hazard events.
Flooding	Our city sewer lift stations are vulnerable to failure during flood events if the power goes down or the lift station is flooded. Heavy rain impacts out city streets and alleys.
Windstorms and Tornadoes	We have a municipal campground without proper storm shelter where visitors are vulnerable to high winds 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 public works dept. is working on culvert improvements and ditching to help with the heavy rains. We have encouraged businesses and residents to enroll in the county's Everbridge emergency notification system so they will be aware when heavy rain may cause flooding impacts. The city has recently increased use of our website and Facebook page to communicate with residents on emergency preparedness.

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.**

In general, we have noticed an increase in more frequent high-rain events in the last 5 years. We have an increased vulnerability in that our bathhouse/storm shelter is too small now. We have added six new RV sites to our campground. This increases the number of people in the park. Ditching improvements still need to be done.

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 (NFIP) and we have a floodplain ordinance in place. We are in the process of developing a capital improvement plan.

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

Our fire chief is the city's designated emergency manager. We have a city engineer and 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 the county's emergency alert system and we promote residents to sign up for it by having a link on our website to the registration site. Our local school practices tornado drills on an annual basis. Each fall & spring we do active outreach to clear leafy and woody debris from roadside gutters to prevent clogging and over the road flooding in these areas.

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, such as replacement of culverts. We have also worked closely with the county highway engineer on local flood mitigation projects for roads and the county zoning department when we updated our local floodplain ordinance. Short, Elliot and Hendrickson (SEH), the city's engineer, has helped with multiple city projects.

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?**

Lake Country Power

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

It has been in our city newsletters and is on our website and Facebook

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

Yes

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 upgrade the city's warning siren.

We need a storm shelter or tornado safe room constructed at the local campground & RV park (Hill City Park and Campground) within the city. We don't have a specific area for trailer homes/mobile homes, they are throughout the town.

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 can continue to use our website and Facebook page to communicate with residents on emergency preparedness and encourage them to sign up for Everbridge.

We need a portable generator for our City Hall and community center, which is our designated community mass care shelter.

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. There is a lack of education to the public on emergency preparedness.

PART D: SURVEY PARTICIPANTS

George Casper, Head of Maintenance
Lyn Benson, Council Member
Tami Meyer, Deputy Clerk

CITY OF MCGRATH

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

- 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			
Windstorms	X	Moderate	No Change
Lightning	X	Moderate	No Change
Hail	X	Moderate	No Change
Flooding			
Extreme Cold	X	Low	No Change
Extreme Heat			
Drought			
Wildfire			
Landslides			
Dam Failure			

- 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.

We had a lightning strike on a home that caused a fire and ruined the main panel to the city sewer system.

- 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 susceptible 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 susceptible to damage and loss from specific hazard events.
Lightning	Lightning can cause a fire if it strikes any structures or it can damage city infrastructure such as the power to our city sewer system.

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.

Every year the city is improving drainage with new culverts and ditches. We have not had any flood issues.

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.

We have nothing specific for mitigation.

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 population of 50. We have a mayor, city council and a city clerk. We work with Aitkin County as needed.

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

We participate in the county’s Everbridge emergency notification system.

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

We have a limited city budget and work with Aitkin 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?

East Central Energy

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

We currently do not do anything. The Aitkin County Sheriff's Office website has a link for residents to sign up for the emergency notification system.

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

We do not have a generator. It would be good to have one on hand.

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 do not have a generator or a tornado safe room. Both would be nice. We can also seek to encourage residents to more actively sign up for the county's emergency notification system by making announcements at meetings or posting flyers in public areas.

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

Dawn Clark, City Clerk

CITY OF MCGREGOR

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

- 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	Increasing
Ice Storms	X	High	Increasing
Tornadoes	X	High	No Change
Windstorms	X	High	Increasing
Lightning	X	Moderate	No Change
Hail	X	Moderate	No Change
Flooding	X	High	Increasing
Extreme Cold	X	Moderate	No Change
Extreme Heat	X	High	Increasing
Drought	X	Low	Increasing
Wildfire	X	High	Increasing
Landslides		Low	No Change
Dam Failure		Low	No Change

- 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.

Over the last five years the city has experienced power outages, minor storm damage and abnormally high-water levels as well as near drought conditions. The city proper has not seen any severe weather damage in this time period, but our emergency services response area is approximately 750-square miles surrounding the city of McGregor, which has had numerous storm events during this time period.

- 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 susceptible 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 susceptible 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. There are many residents of the city that lack the ability to evacuate on their own and subsequently require shelter during a flood. The ability to sustain emergency operations is critical to

	the management of flooding, so having backup power for our fire station will ensure operational success.
Ice Storms, Blizzards	We have power lines and power poles that may fail due to heavy snow and ice storms. Having a location with backup power to house displaced vulnerable residents during prolonged power outages is needed. Our ambulance service has medication and supplies that must be stored at constant temperatures and would be damaged if the fire hall was not heated during an extended power outage. Having a fire station that remains operational in the event of a long-term power outage is mission critical to any other emergency that would arise i.e., house fire.
Windstorms and Tornadoes	Both of the city’s mobile home parks are without storm shelters, which leaves the residents vulnerable to high wind events. Our current metal frame fire hall is without a shelter for emergency crews during storm events. Having back-up power for our fire station, water tower and sewer system is critical.
Extreme Cold	Our seniors & children are vulnerable to extreme cold especially if the power goes down during extreme cold events. To be able to use our fire station, city hall and/or community center as a shelter and remain operational.
Extreme Heat	We have a high number of elderly residents in our city, so having a place to shelter this vulnerable population during a heat emergency is critical.
Wildfire / Drought	The entire city is surrounded by grassy wetlands that interface directly with the majority of our residential and commercial structures. Wildland fire could disrupt every system in the city including our sewer system. Wildfire has the potential to damage power poles and our local power substation, having back-up power for our water tower to sustain firefighting operation would be critical.
Lightning	Our fire department’s VHF communications tower was struck by lightning and disabled our backup emergency communications system. The lightning also did damage to other electronics in the fire hall.

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 has been working for the last 10 years to replace Aitkin County Ditch 5. According to the county engineer this ditch is restricting enough flow to raise the water table by 3 to 4 feet around the east and south sides of McGregor. Replacing this ditch would help to reduce the chance of flooding from a high rain event by returning the area to historic water table levels.

We have identified several culvers on Highway 65 N of the Highway 210 intersection that are holding back water on the west side of McGregor.

The maintenance department has removed 16 beavers and are working with the MN DNR to remove two beaver dams on the Sandy River north of McGregor near highway 65. The city drainage is being restricted by beaver dams in surrounding waterways and culverts.

The city maintenance department has identified the need to replace the standby generator at the primary sewer lift station as it is not reliable. In a normal day, the lift station pumps operate

about 1 hour per day, but during the 2012 flood event the pumps ran 24-hour per day due to ground water entering the sewer system. Without reliable backup power this could cause a catastrophic failure of the system.

The maintenance department has also identified several homes that could potentially flood during a high rain event. This appears to be from loss of ditching to prior road construction.

The city's maintenance department has begun smoke testing the sewer lines to find areas that have ground water infiltrating. Increased ground water pressure during flooding could always water to enter and overwhelm the sewer system.

The city is planning to replace our current metal frame fire station with a precast concrete structure that will better withstand extreme weather conditions.

- 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 Riverwood Clinic is constructing a new larger facility, which is an area that was flooded in 2012.

Our community has an increasing percentage of elderly and other vulnerable populations.

McGregor High School is expanding its footprint and there is a plan to construct a 28-unit affordable housing apartment building in the city.

There has been an increase in high rain events in the area over the last 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.**

We currently participate in the NFIP, but were unable to find a Floodplain Ordinance.

We are working with county engineer and WSB Inc. to improve water flow through Ditch 5.

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

The city maintenance department identifies flooding issues. The McGregor Fire Department does prescribed burns around the city to mitigate heavy fuel loads surrounding the city. We also work with Aitkin County Emergency Management when needed.

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

The city participates in the county's Everbridge emergency alert system and our warning siren is activated via the Aitkin County Sheriff's Office Dispatch remotely.

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

The city uses its own budget to do routine culvert maintenance and beaver removal.

We are working closely with the Aitkin County engineer to move forward on the Ditch 5 project, but both parties currently lack funding to move forward with the project.

We receive a yearly \$2,500 matching grant from the MN DNR for wildfire equipment.

In 2020 we received a \$10,000 grant from the wellhead protection district for capping wells.

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, we do not at this time, but it would be a benefit to the continued vitality of our community.

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

Mille Lacs Energy Coop

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

We have not done anything to date, but this process has sparked our interest in doing so.

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

We have one permanent back-up generator for our main sewer lift station and one portable trailer mounted unit. Both are 30+ years old. We do not current have generators for our community center, fire station or City Hall.

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 has had many complaints about not having storm shelters for residents that live in mobile homes so we would like to find funding to construct shelters.

The city's emergency warning siren was designed to notify firefighters of fire calls 60 years ago and the sound is blocked to the east as the siren is lower than the fire station next to it. The city has received complaints about residents not being able to hear the warning siren inside their homes during the monthly tests. The current warning siren does not cover our manufacturing district or the assisted living facility. We would like to replace our current siren and add an additional siren to better cover the city. We can also work to encourage residents to sign up for the county's Everbridge emergency notification system to receive emergency alerts, which would include for dangerous high winds or tornadoes.

We would like to replace Ditch 5 to make sure we do not have continue to have artificially high-water table so we can better handle high rain events.

The city maintenance department has identified the need to add and replace generators that back up the city's water and sewer system. Having operable sewer and water system is critical not just for the city, but the surrounding townships may need to shelter in the city during a disaster.

The city also identified the need to add standby power generators to the fire hall, community center, and City Hall in order to maintain critical operations and provide emergency shelter locations for city and surrounding residents.

The city would benefit from educating the residents on the wildland-urban interface and how to reduce the risk to property from wildfire.

The city is planning to replace our current metal frame fire station with a precast concrete structure that will better withstand extreme weather conditions.

The city participates in the NFIP but needs to ensure we have a floodplain ordinance in place.

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

The trend of people migrating to mobile phones as their source of entertainment and information could leave residents unaware of storm alerts, so creating a campaign to get residents to use weather alert apps and signing up for the Aitkin counties Everbridge automated alert system would improve safety.

The city and county lack funding to complete the Ditch 5 project that would mitigate flooding in the city.

The city lacks funding to implement a wildland fire safety program and reduce fuel loads.

The city lacks funding to upgrade current generators for the sewer system and add generators to the Fire Hall, City Hall and Community Center.

The city lacks funding to construct appropriately sized storm shelters for the 2 mobile home parks and fire hall.

The city lacks funding to upgrade our outdoor warning siren which is needed so that all residents can be notified effectively.

PART D: SURVEY PARTICIPANTS

Dake Olson, Mayor
Larry Paukert, Head of City Maintenance
Deanna Casale, City Clerk
James Carr, Fire Chief
Penny Olson, Ambulance Service

CITY OF PALISADE

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

- 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	Increasing
Ice Storms	X	Moderate	Increasing
Tornadoes	X	High	No Change
Windstorms	X	High	Increasing
Lightning	X	Moderate	No Change
Hail	X	Moderate	No Change
Flooding	X	High	Increasing
Extreme Cold	X	High	No Change
Extreme Heat	X	High	No Change
Drought	X	Low	Increasing
Wildfire	X	Moderate	No Change
Landslides		Low	No Change
Dam Failure		Low	No Change

- 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.

Over the last 5 years the city has experienced numerous severe storms that have caused wind storms that downed trees, hail damage to city structures, and power outages that affected both water and wastewater systems.

- 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 susceptible 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 susceptible to damage and loss from specific hazard events.
Flooding	We have an aging population, and some would be unable to evacuate to a safe place on their own; they would require assistance to mobilize and a place to shelter during a flood. Having backup power systems to sustain emergency operations would be critical. The city has no generator.
Ice Storms, Blizzards	Power lines may go down and take-out power for prolonged periods. Having a shelter with back-up power would help those most vulnerable to cold and may require power for oxygen and medications that are temperature sensitive.

	Having equipment at the fire hall must also be maintained and ready to respond to any other emergencies in the city and our surrounding service area.
Windstorms, Tornadoes	Our outdoor warning siren was struck by lightning and has not been replaced, so we cannot alert our residents to a tornado by this siren. We also have very limited space for citizens to shelter safely that is accessible for the elderly and disabled. We also have more mobile homes that are going up and a county park with RV parking that is managed by the city; it is full from Fishing Opener to Hunting Season.
Extreme Cold/Heat	Should power go out, we need a place like our community center/fire hall where vulnerable seniors and children can go to be safe.
Wildfire	Having back-up power to our water tower is critical to our fire department fighting fires.

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 is working on a grant for a city street project to create a catch basin for flood water. We also have completed a comprehensive plan with the involvement of the community, city leadership and the Arrowhead Regional Development Commission (ARDC). We also recently completed a wellhead protection plan. We identified needs and where perhaps we can get grants. The 2020 pandemic has put severe delays in plans due to high costs of supplies and slower responses to requests for quotes.

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.**

Approximately 10 new permanent mobile homes are coming into the city due to Enbridge, as well as other workers temporarily sheltering in RVs. There is no established shelter from storms for these people in mobile homes and RV’s so they are at higher risk during severe storms.

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 have a comprehensive plan designed to address future needs and a wellhead protection plan. We also have joined MnWARN for emergency/disaster assistance that include both water and wastewater support.

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

Our fire chief is the city's designated emergency manager. Our city council, mayor, department heads and city clerk work together to find solutions to address emergent situations and look for longer term answers to challenges.

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

We participate in the county's Everbridge emergency notification system. In non-pandemic times our fire department hosts a safety awareness/fire prevention day for our city and the surrounding townships we serve. The Aitkin County Sheriff's Department and other community resources usually have information booths and experiences for the kids.

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

The city has received and has grants in the works with USDA, MDH, IRRRB, Blandin Foundation, FEMA to name a few in the last few years.

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?**

Mille Lacs Electric Cooperative

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

We have not done anything to date but we wish to start soon.

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

We do not currently have any generator for the city, but would need portable and/or permanent back-up generators for our water tower/pump, our wastewater system and fire hall (doors are difficult to open without 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.**

We need to repair and/or replace the city's outdoor warning siren. It was struck by lightning and does not work.

We would like a cell tower in the city as service is very spotty and citizens have not received alerts if they are signed up for notifications on their cell phones.

We would like to purchase at least two portable generators on wheels and perhaps a permanent one for the fire hall/community center.

Install a new monitoring panel for our wastewater system. The existing monitoring panel is obsolete and replacement parts cannot be obtained. A new monitoring panel would allow remote monitoring and allow for long-term savings.

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

Funding is an issue as with most things. A stronger social media presence by the city would be beneficial to encourage residents to sign up for the county's emergency notification system and to provide other emergency preparedness information. We do not have a city website or Facebook page.

PART D: SURVEY PARTICIPANTS

Maureen M. Mishler, City Clerk/Treasurer
Jan Hart, Maintenance Supervisor
Sharon DeWitt, City Councilor
Jere Gruhlke, Fire Chief

CITY OF TAMARACK

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

- 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	High	Increasing
Windstorms	X	High	Increasing
Lightning	X	Moderate	No Change
Hail	X	Moderate	No Change
Flooding			
Extreme Cold	X	High	Increasing
Extreme Heat	X	High	Increasing
Drought			
Wildfire	X	High	No Change
Landslides			
Dam Failure			

- 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.

We have had a few major hail storms in the last 5 years. We have also had some high wind storms and grass fires ignited by sparks from the railroad and cigarettes being thrown out by passing motorists.

- 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 susceptible 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 susceptible to damage and loss from specific hazard events.
Flooding	Although the city of Tamarack wasn't affected within city limits by past flood events, we did become an island because surrounding area highways (Hwy. 210) were flooded and we couldn't go anywhere.
Windstorms / Tornado	City residents do not have basements because of the high level of the water table, so they cannot take shelter during a severe storm event or tornado. We are in need of a storm shelter or tornado safe room in Tamarack.
Ice Storms	We have had power lines and power poles that have failed.

Extreme Cold	When the power goes out there is no back up heat.
Extreme Heat	When the power goes out there is no cooling system.
Wildfire	Wildland fire is a real threat as we have swamp and trees surrounding the town. The railroad on the north side of town has set off a number of fires. Highway 210 is on the south side of Tamarack, and people throwing cigarettes out of car windows has started fires.

- 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 of Tamarack is finishing an upgrade to the sewer system. The city is also looking for donations to construct a pavilion with a storm shelter.

- 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.**

No noted increases in vulnerability.

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 use the county and state for zoning policies. We participate in the county’s hazard mitigation plan update every 5 years.

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

The city of Tamarack has a small government in place (mayor, city council, and a city clerk). The city has great communication with the county sheriff. We also have a Tamarack Area Emergency Planners (TAEP) group.

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

The city of Tamarack has an outdoor warning siren in place. We participate in the Aitkin County SkyWarn trainings and have 40 storm spotters. Tamarack Area Emergency Planners (TAEP) organization is still up and running.

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, such as replacement of culverts. We are in communication with the county engineer 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?**

Lake Country Power

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

A link to the county's Everbridge emergency notification system is posted on our city Facebook page. We also make announcements at city council meetings and post information on local bulletin boards as well as in our city newsletter.

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

We do have a generator for our lift station. We would like a portable generator to use as needed when there is an outage. The generator would be used for a refrigerator (to take care of medications, food etc.) and to run water.

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.

Work with Aitkin County Emergency Management to improve our emergency planning for the city. We want to have a good understanding of who we need to be contact with in the event of a major storm or disaster, as well as how we would get emergency transportation in the event we need to evacuate residents.

We would like to construct a pavilion & storm shelter / tornado safe room in a central location for city residents.

We need a portable generator to use as needed in the event the power goes out. (i.e., the ability to refrigerate medications for residents.)

We would like to increase our emergency preparedness information that we put into our monthly newsletter that goes out with the sewer billing. Some extra funding to do this would be helpful.

We would like to ensure that individual mobile homes within the city are physically secured for high-wind or tornado events. We would like to put a policy in place for building specifications for any future mobile homes in the city.

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

Funding

PART D: SURVEY PARTICIPANTS

Bob Johnson, TAEP
Ellen Cyrus, TAEP
Kathy Haugse, City Clerk/Treasurer
John Cyrus, Mayor

Appendix D – Plans & Programs in Place

Aitkin County

MHMP Plans in Place Form

Planning & Regulatory

<i>Plans/Programs</i>	<i>Yes/No</i>	<i>Comments</i>
Comprehensive/Master Plan	Yes	Aitkin County Comprehensive Land Use Plan, Adopted April 2020
Capital Improvements Plan	Yes	
Economic Development Plan	Yes	
Emergency Operations Plan	Yes	Aitkin County Sheriff's Office – Emergency Management updates county EOP
Climate Adaptation Plan	No	
Continuity of Operations Plan	Yes	County, cities, schools
Transportation Plan	Yes	County Hwy. Dept.
Stormwater Management Plan	No	No county plan – these are city-level plans.
Community Wildfire Protection Plan	Yes/No	MN DNR Firewise Coordinator notes Aitkin County has a CWPP equivalent, but unable to locate a copy.
FireWise Program	No	
Water Conservation/Emergency Preparedness Plan	Yes	brochures
Wellhead Protection Plan	Yes	Aitkin County Environmental Services has a wellhead protection plan for campgrounds. Cities have their own plans.
Database of dry hydrants/well access	Yes	Layer on CAD map
Burning permits/restrictions	Yes	MN Dept of Nat Res.
Water Management Plan	Yes	This is a city plan
Zoning ordinance	Yes	
Subdivision ordinance	Yes	
Floodplain ordinance	Yes	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Yes	Aitkin County Buffer Ordinance, Sept. 12, 2017.
Flood insurance rate maps	Yes	

Acquisition of land for open space and public recreation uses	No	
School closing policy/communications plan in event of inclement weather/temperatures	Yes	School districts take care of this
Mass Care Sheltering Plan	Yes	This plan is developed by Aitkin County Public Health. The PH plan for Mass Care is mentioned in the Congregate Care Annex of our Aitkin County EOP.
Designated Mass Care Sheltering Facilities (list available)	Yes	Falls under Public Health in coordination with American Red Cross to establish formal facility MOUs.
Tornado Safe Rooms/Outdoor Storm Shelters (list available)	Yes	Big Sandy Campground and Savannah Portage, Hill City School, and Aitkin Fire Hall is a public storm shelter.
Warning sirens (list all locations)	Yes	Sirens are located in Aitkin, Hill City, Tamarack, and McGregor. McGrath and Palisade do not have sirens. The communities of Big Sandy Lake and East Lake Community also have sirens purchased & maintained by the Mille Lacs Band.
SKYWARN Program	Yes	Volunteer spotters only
Emergency Mass Notification System	Yes	Everbridge
Severe Weather Awareness Week	Yes	NWS program in April
Winter Weather Awareness Week	Yes	NWS program in November
NOAA Weather Radios	Yes	
THIRA	Yes/No	Did it years ago, not updated since
<i>Other *please describe</i>		

Administrative & Technical

<i>Administration</i>	<i>Yes/No</i>	<i>Comments</i>
Planning Commission	Yes	
Mitigation Planning Committee	Yes	2020-2021 MHMP Planning Team
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	County Hwy. Dept.
Mutual aid agreements	Yes	
<i>Staff</i>	<i>Yes/No</i>	<i>Comments</i>
Chief Building Official	Yes	Jim Bright
Floodplain Administrator	Yes	Terry Neff
Emergency Manager	Yes	Sheriff Guida
Community Planner	Yes	Elected officials
Civil Engineer	Yes	John Welle
GIS Coordinator	Yes	Dan Haasken
<i>Technical</i>	<i>Yes/No</i>	<i>Comments</i>
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	Everbridge, IPAWS, and system of outdoor warning sirens
Hazard data and information	Yes	Damage data from past disasters in the county on record.
Hazus analysis	No	

Education & Outreach

<i>Program/Organization</i>	<i>Yes/No</i>	<i>Comments</i>
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Public Health has volunteer groups, Search and rescue. Northern Chapter of the American Red Cross covers Aitkin County.
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	Brochures have been passed out at Fair and Commerce shows
Natural disaster or safety related school programs	Yes	Awareness weeks
StormReady certification	No	
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues	Yes	Schools, PH, elected officials coalition
<i>Other *please list & describe</i>		

Appendix E – Past Mitigation Action Review Status Report

Aitkin County

Past Mitigation Action Review Status Report

Following is a report on the status of mitigation actions related to natural hazards listed in *Section 5: Mitigation Strategy* of the Aitkin 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
1	Violent Storms	Work with campground operators to post information regarding storm shelters and safety during strong summer storms.	Aitkin County, Aitkin, Hill City, Palisade	Ongoing	Campground operators will be encouraged to take action on this locally. Big Sandy Lake Campground, Savanna Portage State Park and the group camp at Savanna Lake have established storm shelters.
2	Violent Storms	Work with the appropriate jurisdictions or agencies to place safety information at boat landings throughout Aitkin County regarding what to do in case of severe weather.	Aitkin County, Aitkin, McGregor, Hill City, Palisade	Deleted	Not a strong mitigation action. MN DNR may post information at some boat access points.
3	Violent Storms	Work with mobile home park owners to ensure they are meeting the standards set by the Minnesota Department of Health for approved storm shelters or evacuation plans for times of high winds or tornadoes.	Aitkin County, Aitkin	Ongoing	Aitkin County Public Health and the city of Aitkin continue to work with mobile home park operators to be in compliance.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
4	Violent Storms	Promote the National Weather Service's "Severe Weather Awareness Week" held in April of each year. The event seeks to educate residents on the dangers of severe summer storm events and highlights the importance of preparing for severe weather before it strikes.	Aitkin County, Aitkin, McGregor, Hill City, Palisade	Ongoing	This is a regular part of EM public outreach & education that take place each year. Cities will be encouraged to continue to participate.
5	Violent Storms	Promote the National Weather Service's "Winter Hazard Awareness Week" held in November of each year. The event seeks to educate residents on the dangers of winter weather and how to properly deal with it.	Aitkin County, Aitkin, Palisade	Ongoing	This is a regular part of EM public outreach & education that take place each year. Cities will be encouraged to continue to participate.
6	Violent Storms	Review current information and delivery systems in place for public awareness and education of preparedness for severe winter and summer storms and improve upon them as needed.	Aitkin County, Aitkin, Palisade,	Ongoing	Aitkin County EM continues to review the effectiveness of public outreach tools and improve upon them as needed.
7	Violent Storms	Participate in annual "Skywarn Training" from the National Weather Service to train new storm spotters in Aitkin County and ensure existing storm spotters maintain their storm-spotting skill.	Aitkin County, Aitkin, McGregor, Hill City, Palisade	Ongoing	This is done annually in coordination with the NWS.
8	Violent Storms	Continue to ensure that procedures are in place so that emergency management personnel, county sheriffs, and other emergency response teams are notified as soon as possible in the event of an approaching storm.	Aitkin County, Aitkin, McGregor, Hill City, Palisade	Deleted	Emergency communications are a standard part of Aitkin County Emergency Management – this does not need to be a mitigation action.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
9	Violent Storms	Ensure that communication procedures are in place to effectively provide warning to residents and visitors in advance of approaching severe weather.	Aitkin County, Aitkin, Tamarack, Hill City, Palisade	Ongoing	Use of Everbridge emergency notification system, outdoor warning sirens, Sheriff's Office FB page and local media are all in place.
10	Violent Storms	Provide information to Aitkin County visitors and residents regarding how they can obtain information on severe weather and how to respond to dangerous weather conditions. Increase strategically located signage along roadways informing people about emergency information radio frequencies.	Aitkin County, Aitkin, McGregor	Ongoing	This is an ongoing effort of Aitkin County EM. Aitkin County is currently in the process of implementing the IPAWS program to warn visitors to the area of severe weather. Use of roadside signage is no longer relevant.
11	Violent Storms	Promote and educate Aitkin County residents, agencies, and communities about the use of NOAA weather radios for relaying weather-related emergency information.	Aitkin County, Aitkin, Palisade	Ongoing	NOAA weather radios are promoted as part of personal emergency preparedness during the NWS severe weather week and throughout the year.
12	Violent Storms	Work with local utility companies that serve Aitkin County to locate power lines underground or strengthen where it is feasible and cost effective to reduce the risk of power outages from downed lines during a severe storm. This could be done as part of new construction or as retrofit in areas deemed as high-priority.	Aitkin County, Aitkin	Ongoing	Cities will be encouraged to continue to work with their municipal / rural electric companies to reduce vulnerable overhead powerlines as deemed necessary and feasible.
13	Violent Storms	Maintain an aggressive right-of- way clearing program in order to reduce risks of downed trees interrupting the power supply.	Aitkin County, Aitkin	Ongoing	Aitkin County Hwy. Dept, local utility providers and local jurisdictions address tree management near powerlines.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
14	Violent Storms	Maintain an aggressive brushing program in order to reduce the amount debris that could block a road after a severe windstorm or winter storm.	Aitkin County, Aitkin	Ongoing	Aitkin County Hwy. Dept and local jurisdictions address vegetation management as needed.
15	Violent Storms	Maintain an updated database of facilities in the county that have shelter agreements with the American Red Cross and the capabilities of each shelter to provide mass care in the event of violent storms.	Aitkin County, Aitkin, McGregor, Tamarack, Palisade	Ongoing	Aitkin County Public Health works with the American Red Cross and local jurisdictions on keeping our list of mass care shelter facilities updated.
16	Violent Storms	Ensure there are personnel trained in shelter management within the County and each of its jurisdictions, engaging those who would play a role in emergency response leadership in the event of needing to activate a shelter for mass care.	Aitkin County, Aitkin, Tamarack, Hill City, Palisade	Ongoing	Overseen by Aitkin County Public Health.
17	Violent Storms	Research possible storm shelter and safe room locations within the County and each of its government jurisdictions including schools, mobile home parks, campgrounds or other areas where there are populations (residents or visitors) vulnerable to high winds and tornado events.	Aitkin County, Aitkin, McGregor, Tamarack, Palisade	Ongoing	Aitkin County Emergency Management & local jurisdictions will continue to address the need for tornado safe rooms or storm shelters where they may still be needed.
18	Violent Storms	Retrofit or construct new storm shelter and safe room facilities in the identified vulnerable locations with specific information on location and building type to construct or retrofit.	Aitkin County, McGregor, Tamarack, Palisade	Ongoing	Safe Room or storm shelter projects will be implemented as needed and as funding allows.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
19	Violent Storms	Identify critical facilities within the County and each of its jurisdictions that do not have a generator to supply backup power in the event of a severe storm taking out primary power for its facilities and essential functions. Critical facilities may include: police and fire stations, hospitals, water and sewer treatment facilities, and other facilities that the county deems critical.	Aitkin County, McGregor, Tamarack, Hill City, Palisade	Ongoing	Identifying where backup generator power is needed is an ongoing effort by all jurisdictions.
20	Violent Storms	Purchase generators or related equipment (e.g., generator hook-ups) that will support the operation of essential functions in identified County- and jurisdiction-owned critical facilities in the event of severe storms. Critical facilities may include: police and fire stations, hospitals, water and sewer treatment facilities, and other facilities that the county deems critical	Aitkin County, McGregor, Tamarack, Hill City, Palisade	Ongoing	Obtaining backup generators will be done by the County and local jurisdictions as funding allows.
21	Violent Storms	Work with respective road authorities to plant "living snow fences" or tree lines along identified problem areas of identified roads that can reduce snow drifts on the roads.	Aitkin County, Aitkin, Tamarack, Palisade	Ongoing	This does not occur by the Aitkin Hwy. dept or local jurisdictions. However it may be a project that MnDOT may address for state highways.
22	Violent Storms	Raise public awareness on driving conditions and snow removal policies for certain routes during times of dangerous snow or ice conditions.	Aitkin County	Ongoing	This falls under general public outreach & education on winter weather conditions and safety precautions.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
23	Violent Storms	Assure the functionality of warning systems for the areas with warning sirens in place. Warning sirens should be able to be remotely activated by the Aitkin County Sheriff's Office.	Aitkin County, McGregor, Hill City	Ongoing	Warning sirens are tested monthly by the Aitkin County Sheriff's Dept.
24	Violent Storms	Identify jurisdictions that do not have warning siren systems in place and have an expressed need for acquiring one to alert people in high risk, vulnerable areas (such as: campgrounds, parks and rural residents out of reach of other existing warning siren systems) to approaching severe weather.	Aitkin County, Tamarack, Hill City, Palisade	Ongoing	The cities of McGrath and Palisade do not have sirens. Existing outdoor warning sirens are located in the cities of Aitkin, Hill City, Tamarack, and McGregor. The communities of Big Sandy Lake and East Lake Community also have sirens purchased & maintained by the Mille Lacs Band.
25	Violent Storms	Install new warning systems in identified vulnerable locations (jurisdictions that do not have warning siren systems in place and have an expressed need for acquiring one to alert people in high risk, vulnerable areas such as campgrounds, parks and rural residents out of reach of other existing warning siren systems) to approaching severe weather.	Aitkin County, Tamarack, Hill City, Palisade	Ongoing	See above - Cities of McGrath and Palisade.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
26	Violent Storms	Work with local jurisdictions, MN DNR and other key stakeholders to develop an Evacuation Plan for Aitkin County in the event of severe weather. The plan should make sure to address the evacuation of vulnerable populations, such as those in nursing homes or remote locations (such as Savanna Portage State Park or rural residential areas).	Aitkin County, Aitkin, McGregor, Tamarack, Hill City, Palisade	Deleted	The Aitkin County EOP addresses evacuation for all-hazards and the Sheriff's Office will coordinate with any communities in the event of a necessary evacuation.
27	Violent Storms	Work to install shatter-resistant glass and other identified retrofitting measures to protect against the impact of severe summer storms at Riverwood Healthcare Center.	Aitkin, Riverwood Healthcare Center	Deleted	Critical facilities are responsible to identify and implement any needed improvements to their buildings to be more storm-ready.
28	Violent Storms	Work to provide increased first responder training for those that work in remote areas and serve the public in the County	Aitkin County, Aitkin, Tamarack, Hill City, Palisade	Deleted	Not a relevant mitigation action.
29	Violent Storms	Investigate "Storm Ready" designation by the National Weather Service and submit an application if deemed appropriate.	Aitkin County, Aitkin, Tamarack, Palisade	Deleted	The county does not plan to pursue NWS StormReady designation.
30	Extreme Temperatures	Expand information on risks of heat-related illnesses. Key audiences are the elderly and the younger population engaging in physically strenuous activities.	Aitkin County	Ongoing	Aitkin County EM and PH work to do outreach to remind the public of safety precautions during periods of high heat.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
31	Extreme Temperatures	Continue the winter storm awareness program. Key audiences are the elderly and the younger populations who may be more susceptible to the effects of freezing temperatures when outside.	Aitkin County, Aitkin, Hill City, Palisade	Ongoing	Aitkin County Emergency Management helps put out weather warnings in winter from the NWS on severe storms or temperatures.
32	Extreme Temperatures	Promote and educate Aitkin County residents, agencies, and communities about the use of NOAA weather radios for relaying weather-related emergency information.	Aitkin County, Tamarack, Palisade	Ongoing	Aitkin County Emergency Management continues to promote the use of NOAA weather radios.
33	Extreme Temperatures	Maintain an updated database of facilities in the county that have shelter agreements with the American Red Cross and the capabilities of each shelter to provide mass care in the event of extreme temperatures.	Aitkin County, Aitkin, McGregor, Tamarack, Palisade	Ongoing	Aitkin County Public Health works with the American Red Cross and local jurisdictions on keeping our list of mass care shelter facilities updated.
34	Extreme Temperatures	Ensure there are personnel trained in shelter management within the County and each of its jurisdictions, engaging those who would play a role in emergency response leadership in the event of needing to activate a shelter for mass care.	Aitkin County, Aitkin, McGregor, Tamarack, Palisade	Ongoing	Overseen by Aitkin County Public Health.
35	Wildfire	Educate area residents through the Firewise program on what they can do to reduce the risk of wildfires doing damage to their property through vegetation management and the use of fire-resistant building materials.	Aitkin County, Aitkin	Ongoing	FW program will be looked at for how to promote wildfire education & local actions to reduce wildfire risk where most needed.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
36	Wildfire	Promote the use of financial assistance for fuel reduction efforts through the Firewise program by area property owners.	Aitkin County, McGregor	Deleted	MN DNR FW program does not have funding for individual homeowner projects.
37	Wildfire	Promote, through new building codes, the use of building materials that can reduce the chance of property damage related to structural fires.	Aitkin County, McGregor	Deleted	Building codes are in place. Metal roofs are an option that individual homeowners can pursue.
38	Wildfire	Pursue additional funding sources, if available, to supplement programs such as Firewise.	Aitkin County, Tamarack	Ongoing	If there are wildfire mitigation projects identified we will look at possible funding sources.
39	Wildfire	Maintain an ongoing effort to educate people how to respond in case of a large wildfire event so both residents and area visitors will know how to respond to warnings and are aware of evacuation routes.	Aitkin County, Aitkin, Hill City, Palisade	Ongoing	Ongoing as needed. Information on wildfire safety as well as warnings are pushed out to the public during times of high-risk for wildfire.
40	Wildfire	Work with fire departments to inventory areas where firefighting capacity is limited through availability of water and consider strategic installation of dry fire hydrants or water holding tanks.	Aitkin County, city fire depts.	Ongoing	Local FD's will be asked if this is an issue in areas not served by a municipal water source.
41	Wildfire	Planning staff on the city and county level, along with area fire chiefs, should coordinate to ensure new development will have adequate access and egress for emergency response vehicles.	Aitkin County, Aitkin	Ongoing / Delete	Keep as appropriate. This may be relevant for local jurisdictions that are experiencing new development.
42	Wildfire	Continue inter-agency and multi-jurisdictional efforts to identify, contain, and extinguish wildfires.	Aitkin County, Aitkin	Deleted	This is a standing effort through existing county and municipal mutual aid agreements for firefighting.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
43	Wildfire	Explore development of a Community Wildfire Protection Plan for Aitkin County with guidance from the MN DNR Firewise Community Specialist for Northeast Minnesota. Create plan as advised by MN DNR.	Aitkin County, Aitkin, Tamarack	Ongoing	MN DNR FW Program has noted that Aitkin County has a CWPP equivalent on file but cannot locate a copy. An equivalent is addressed in the county EOP rather than a full CWPP. We will review the EOP to see how it is addressed and how an update may be conducted.
44	Wildfire	Identify projects to mitigate at-risk structures and associated loss of life from the threat of wildfire through activities such as the creation of defensible space for wildfire, application of ignition-resistant construction, hazardous fuels reduction, and installation of external wildfire sprinkler systems and apply for appropriate funding for implementation.	Aitkin County, Aitkin, Tamarack, Palisade	Ongoing	Feedback will be sought from MN DNR and local jurisdictions to identify if any wildfire mitigation projects are needed.
45	Wildfire	In the event of a blow-down of trees from a severe storm, work with respective partners in natural resources to manage removal of trees to reduce wildland fire fuel.	Aitkin County, Aitkin, Tamarack, Palisade	Ongoing	Post-storm cleanup & removal of downed trees is a regular effort by the County and affected jurisdictions.
46	Flash Flood and Riverine Flood	Maintain bridge, road, and culvert infrastructure at a level that it is capable of sustaining a major storm event and will not be vulnerable to washouts.	Aitkin County, Aitkin, Palisade	Ongoing	This is an ongoing effort by the Aitkin County Highway Dept. and local jurisdictions.
47	Flash Flood and Riverine Flood	Steer development away from areas that may be difficult to serve with reliable road access.	Aitkin County, Aitkin, Palisade	Ongoing	County and cities have floodplain management ordinances enforced that detail where construction can and cannot take place in the floodplain.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
48	Flash Flood and Riverine Flood	Address ice dams that may impact the road system in a timely manner in order to prevent damage to infrastructure, in particular during spring thaw.	Aitkin County, Aitkin, Palisade	Ongoing	Aitkin County Hwy. Dept and local jurisdictions work to prevent spring over-the-road flooding from ice dams as needed.
49	Flash Flood and Riverine Flood	Within the County and its jurisdictions, identify public infrastructure in areas that are prone to flooding (such as culverts, roads and bridges, and government buildings) and pursue funding for making specific mitigation improvements to those identified pieces of infrastructure.	Aitkin County, Aitkin, McGregor, Tamarack, Palisade	Ongoing	County and local-level flood mitigation measures will continue.
50	Flash Flood and Riverine Flood	Maintain, and, where necessary, add storm water retention ponds to protect wastewater treatment facilities throughout Aitkin County.	Aitkin County, Aitkin, McGregor, Palisade	Ongoing / Delete	Keep as applicable. Input will be sought for any specific county or local needs.
51	Flash Flood and Riverine Flood	Work to increase communication between the Aitkin County Planning and Zoning department and the United States Army Corps of Engineers regarding flooding and flowage easements.	Aitkin County, Aitkin, Palisade	Ongoing	Revise as needed. The County works with the ACOE as needed on flooding related issues.
52	Flash Flood and Riverine Flood	Review stormwater management guidelines currently in place to ensure that they are adequate to limit post-development run-off and will not result in storm water run-off created flood damages.	Aitkin County, Aitkin, Palisade	Ongoing	Stormwater management efforts continue at the county and local level.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
53	Flash Flood and Riverine Flood	Communities without floodplain or shore land ordinances should develop such ordinances. The State Floodplain Management Act requires flood prone communities to adopt floodplain management regulations when adequate technical information is available to identify floodplain areas and enroll and maintain eligibility in the National Flood Insurance Program (NFIP).	Aitkin County, Aitkin, Tamarack	Deleted	Aitkin County and cities that participate in the NFIP and have floodplain ordinances. There are 2 cities that do not participate (McGrath & Tamarack) as they do not have FEMA mapped high-risk areas.
54	Flash Flood and Riverine Flood	Work to update the floodplain maps for Aitkin County. Current floodplain maps are over 20 years old.	Aitkin County, Aitkin, McGregor, Hill City	Ongoing	Aitkin County will work with MN DNR as per their timeline for updating our DFIRM maps.
55	Flash Flood and Riverine Flood	Continue to enforce city and county ordinances governing development and setbacks in shoreline area.	Aitkin County	Ongoing	Aitkin County Environmental Services/Zoning and local cities enforce existing floodplain & shoreline ordinances.
56	Flash Flood and Riverine Flood	Identify minor localized flood reduction projects identified to lessen the frequency or severity of flooding and decrease predicted flood damages, such as the installation or modification of culverts, stormwater management activities, such as creating retention and detention basins, protection of sanitary sewer lift stations in flood-prone areas.	Aitkin County, Tamarack, Palisade	Ongoing	Aitkin County Environmental Services/Zoning, Aitkin County Hwy. Dept and local jurisdictions evaluate needed projects on an annual basis and following flood events.
57	Flash Flood and Riverine Flood	Install flow-rate meters (stream gauges) on rivers and streams that are prone to flooding high-risk, vulnerable properties.	Aitkin County, Tamarack, Palisade	Ongoing	Areas of concern will be identified for potential stream gauge meters.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
58	Flash Flood and Riverine Flood	Acquire flood prone properties in the special flood hazard area and physically relocate existing structure(s) to outside of the special flood hazard area.	Aitkin County, Tamarack, Palisade	Ongoing	Property buyouts for flood prone properties will be considered for the MHMP update as needed.
59	Flash Flood and Riverine Flood	Acquire at-risk structures and the underlying land in special flood hazard areas and demolish flood prone structures for the conversion of the land to open space.	Aitkin County, Aitkin	Ongoing	Same as above.
60	Flash Flood and Riverine Flood	Reduce potential infrastructure flood damages on utilities such as wastewater treatment, pipelines, and power facilities by dry proofing or wet proofing facilities that are flood prone.	Aitkin County, Aitkin	Ongoing	County and localized flood risk reduction projects will continue as identified.
61	Drought	Continue to implement the monitoring of water table levels.	Aitkin County	Ongoing	Overseen by MN DNR & Aitkin County SWCD.
62	Drought	Educate the public on water conservation measures in times of approaching drought conditions and develop plans to limit water use for nonessential purposes, such as lawn watering, car washing, etc., during drought periods as necessary.	Aitkin County, McGregor, Tamarack, Hill City, Palisade	Ongoing	Education and outreach will occur on recommended water conservation measures and danger for wildfire during extended dry periods.
63	Drought	Strategically place livestock watering ponds on farms in the county to help offset the impact of drought on local farmers.	Aitkin County, Tamarack	Deleted	This falls under the responsibility of local farmers with livestock.

Appendix F – Planning Team Meetings

Aitkin County MHMP Update

Appendix F - Kickoff Meeting Documentation

Overview:

On May 5, 2020, U-Spatial@UMD hosted a kickoff meeting online that was attended by the Aitkin 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

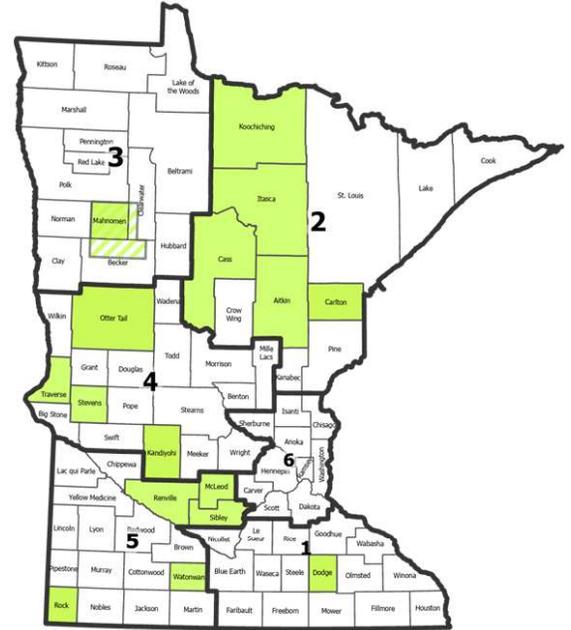
The U-Spatial@UMD team will coordinate with each Emergency Manager throughout the plan update process to engage participating jurisdictions and other stakeholders in the planning process. Following is an overview of key tasks that the U-Spatial@UMD team will facilitate to meet FEMA requirements in the 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



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



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, Mahanomen, 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 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 queue 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>

Aitkin County MHMP Update

JURISDICTIONAL CONTACT LIST

County Contacts

Name	Title	Phone	Email
Dan Guida	Sheriff/EM Director	218-927-7417	Dan.Guida@co.aitkin.mn.us
Jessica Siebert	County Administrator	218-927-7276	Jessica.siebert@co.aitkin.mn.us
Mark Wedel	County Board Chairman	218-838-9324	mark.wedel@co.aitkin.mn.us
Mike Dangers	Assessor	218-927-7340	mike.dangers@co.aitkin.mn.us
Andrew Carlstrom	Environmental Services	218-927-7352	andrew.carlstrom@co.aitkin.mn.us
Dan Haaskens	GIS	218-927-7391	dan.haaskens@co.aitkin.mn.us
John Welle	County Highway	218-927-7469	john.welle@co.aitkin.mn.us
Rich Courtemanche	Land Department	218-927-7333	rich.courtemanche@co.aitkin.mn.us
Courtney Dowell	Long Lake Conservation Center	218-768-4653	info@longlakecc.org
Cynthia Bennett	Health & Human Services Director	218-927-7200	cynthia.Bennett@co.aitkin.mn.us
Steve Hughes	SWCD District Manager	218-927-7284	Hughes.aitkinswcd@gmail.com
Erin Melz	Public Health Supervisor	218-927-7209	erin.melz@co.aitkin.mn.us
Stacey Durgin-Smith	Public Health EM	218-927-7224	stacey.durgin@co.aitkin.mn.us

City Contacts

CITY OF AITKIN

Name	Title	Phone	Email
Megan Workman	Mayor	218-546-3898	mworkman@ci.aitkin.mn.us
Rose Beverly	City Administrator	218-927-2527	cityadmin@ci.aitkin.mn.us
(Vacant)	Police Chief	218-838-9890	
Brian Pisarek	Fire Chief	218-838-0102	brian.pisarek@state.mn.us
Bob Nicko	City Street Commissioner	218-839-3145	streetdepartment@yahoo.com
Dave Cluff	Director of Public Utilities	218-839-1246	dcluff@aitkinutilities.com

CITY OF HILL CITY

Name	Title	Phone	Email
Dan Kingsley	Mayor	218-245-9427	kingsdan27@gmail.com
Tami Meyer	(Deputy) City Clerk	218-697-2301	cityhall@hillcity-mn.com
Paul Ryan	Police Chief	218-330-1481	pryan@aitkinpolice.com
Jeremy Nelson	Fire Chief	218-259-1481	jnelson@ci.grand-rapids.mn.us
George Casper	Maintenance	218-244-0440	maintenance@hillcity-mn.com

CITY OF MCGRATH

Name	Title	Phone	Email
Brian Clark	Mayor	218-393-6893	cityofmcgrathmn@yahoo.com
Dawn Clark	City Clerk	320-592-0155	cityofmcgrathmn@yahoo.com
Bob Dresser	Fire Chief	218-232-5136	Rcdresser2001@yahoo.com

CITY OF MCGREGOR

Name	Title	Phone	Email
Dake Olson	Mayor	218-391-4920	dakeolson@gmail.com
Deanna Casale	City Clerk	218-768-2717	mcgregor.city@gmail.com
James Carr	Fire Chief	218-820-1288	james.carr@ftr.com

CITY OF PALISADE

Name	Title	Phone	Email
Pamela Nordstrom	Mayor	218-845-0076	beaglenemo@yahoo.com
Maureen Mishler	City Clerk	218-845-2051	city@frontiernet.net
Jerry Gruhlke	Fire Chief	218-232-7750	Jg56469@gmail.com

CITY OF TAMARACK

Name	Title	Phone	Email
John Cyrus	Mayor	651-402-4455	j.ecyrus@gmail.com
Kathy Haugse	City Clerk	218-768-0975	cityoftamarack@frontiernet.net

Township Contacts

Name of Township	Name & Title	Phone	Email
Aitkin	Terry Betley, Chairperson	218-927-6359	terry.betley@gmail.com
Ball Bluff	Steven Saari, Chairperson	218-752-6635	s.saari54@yahoo.com
Balsam	Michael Kruse, Chairperson	612-810-2420	mkruse@mcgregorprinting.com
Beaver	Gilbert Eigsberg, Chairperson	218-768-2633	gilberteigsberg.319@msn.com
Clark	Frank DeMenge, Chairperson	218-380-6198	frankdemenge@gmail.com
Cornish	Randy Souter, Chairperson	218-409-2223	randpsout@yahoo.com
Farm Island	Tim Woodrow, Chairperson	218-831-6799	t_woodrow99@yahoo.com
Fleming	Robert Reich, Chairperson	218-845-2465	sdurose@frontiernet.net
Glen	Doug Coil, Chairperson	218-549-3301	dvcoil@yahoo.com
Haugen	Robert Nelson, Chairperson	218-392-0052	paparob52@yahoo.com
Hazelton	Daniel Bobseen, Chairperson	218-678-3920	bobseen@centurylink.net
Hill Lake	Duane Niesen, Chairperson	218-697-8104	dtniesen@yahoo.com
Idun	Laura Dunphy, Chairperson	320-592-3707	ljd56342@icloud.com
Jevne	Sandra DeMenge, Chairperson	218-839-8717	maybell8717@gmail.com
Kimberly	Donnie Miller, Chairperson	218-549-0615	donniemmiller@gmail.com
Lakeside	Stanly Miller, Chairperson	320-676-3301	smiller@isle.k12.mn.us
Lee	Michelle Brodhead, Chairperson	218-429-2652	mikkibeas.mb@gmail.com
Libby	Michael Hall, Chairperson	218-259-2670	lakeimagination@gmail.com
Logan	David Tevis, Chairperson	218-845-2682	farmert@frontiernet.net
Macville	Kenneth Janssen, Chairperson	218-820-7615	dotbiskey@hotmail.com
Malmo	Paul White, Chairperson	320-684-2488	malmotownclerk@outlook.com
McGregor	Brent Amundson, Chairperson	218-768-3651	amundfam@yahoo.com
Millward	Randy Anderson, Chairperson	218-658-4570	elee123@frontiernet.net
Nordland	Ruth Nelson, Chairperson	218-927-4044	randdnelson@gmail.com
Morrison	Heidi Roettger, Chairperson	218-839-7259	heidiroettger@gmail.com
Pliny	Marion Klous, Chairperson	320-592-3381	deadstock@citlink.net
Rice River	Larry Koehler, Chairperson	218-670-0512	ricerivertwp@gmail.com
Seavey	Harold Harms, Chairperson	218-232-2935	doubleh10q@gmail.com
Salo	Charlene Vincent, Chairperson	218-768-7022	canddvincent@aol.com
Spalding	Duane Swedberg, Chairperson	218-821-8961	dswedberg@isd4.org

Shamrock	Allen Eld, Chairperson	612-254-8021	aleld@shamrocktwp.org
Turner	Norman Wiese, Chairperson	218-426-4219	thewieses@frontier.com
Spencer	Kevin Stromberg, Chairperson	218-839-9717	kevin.m.stromberg@icloud.com
Wagner	Paul Peterson, Chairperson	320-233-6758	circlingwolf@gmail.com
Verdon	Kent Lorentzen, Chairperson	218-752-6678	kent@niftywares.com
Wealthwood	Tom Veenker, Chairperson	218-678-3792	tv4fish@centurylink.net
Waukenabo	Debra Goble, Chairperson	218-845-2997	dgoble33@hotmail.com
Williams	Richard Mensing, Chairperson	320-592-3830	rbmensing@citlink.net
White Pine	Diane Stulc, Chairperson	320-592-3319	ronaldgeo@aol.com
Workman	James Berg, Chairperson	218-426-3634	Supervisor1@workmantownship.org

Other Stakeholder Contacts

Name of Agency/Org.	Name & Title	Phone	Email
Riverwood Healthcare	Rhonda Vetter, EM	218-513-4544	rvedder@riverwoodhealthcare.org
Aitkin School District	Dan Stifter, Superintendent	218-927-2115 ex.3420	dstifter@isd1.org
Hill City School District	Patrick Rendle, Superintendent	218-697-2394 ext.100	prendle@isd002.org
McGregor School District	Brad Johnson, Superintendent	218-768-2111 ext.5126	bjohnson@isd4.org
Savanna Portage State Park	Courtney Dowell, Park Supervisor	218-838-7928	courtney.dowell@state.mn.us
Lake Country Power Cooperative	Derek Howe, Director of Operations	218-326-7178	dhowe@lakecountrypower.com
Mille Lacs Electric Cooperative	Cory Brix, Line Superintendent	218-851-9775	cbrix@mlecmn.com
East Central Electric Cooperative	Christy Flaspeter, HR Manager	763-689-8069	Christy.flaspeter@ecemn.com
U.S. Army Corps of Engineers	Jeff Steere, Northern Headwaters Section Supervisor	218-426-3482	jeffrey.l.steere@usace.army.mil
Jacobson Fire Department	Dale Thompson, Fire Chief	218-244-2238	dalethompson@frontiernet.net
South Aitkin First Responders	Scott VanHatten	218-549-0650	svanhatten@fontier.com
MN DNR Forestry	Glendon Nyberg, Forester	218-330-9370	glendon.nyberg@state.mn.us
MN DNR FireWise Program	Jeff Jackson, NE MN Firewise Coordinator	218-328-8909	Jeffrey.Jackson@state.mn.us
Minnesota Dept of Transportation	Todd Sangren, Area Supervisor	218-828-5734	Todd.Sangren@state.mn.us
USDA Rural Development Community Programs	Tyler Ray, Area Specialist	218-829-5965 x117	tyler.ray@usda.gov

Neighboring Jurisdiction Contacts

Name of Jurisdiction	Name & Title	Phone	Email
Carlton County	Marlyn Halverson, EMD	218-910-0546	marlyn.halverson@co.carlton.mn.us
Kanabec County	Jeff Anderson, EMD	320-679-8421	jeffrey.anderson@co.kanabec.mn.us
Mille Lacs County	Julie Peterson, EMD	320-983-8475	Julie.peterson@millelacs.mn.gov
Crow Wing County	John Bowen, EMD	218-825-3445	john.bowen@crowwing.us
Cass County	Chad Emery, EMD	218-547-7437	chad.emery@co.cass.mn.us
Itasca County	John Linder, Interim EMD	218-244-6952	john.linder@co.itasca.mn.us
St. Louis County	Dewey Johnson, EMC	218-726-2936	johnsond@stlouiscountymn.gov
Mille Lacs Band of Ojibwe	Monte Fronk, EMD	320-362-0435	Monte.Fronk@millelacsband.com

Aitkin County MHMP Planning Team Meeting #1

October 21, 2020 - Meeting Summary & Documentation

Summary: On Wednesday, October 21, 2020, Aitkin 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 Aitkin County Multi-Hazard Mitigation Plan (MHMP). The purpose of the meeting was to formally present information about the Aitkin 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: Aitkin 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 33 people attended the meeting. Representation included elected officials and departmental staff from Aitkin County and the cities of Aitkin, Hill City, McGregor, Palisade, and Tamarack. The City of McGrath was not in attendance. Other stakeholders, including neighboring jurisdictions, participated in the meeting. 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. **(10) 42%**
- No, but I am familiar with hazard mitigation planning. **(4) 17%**
- No, and this is all new to me. **(10) 42%**

Question 2: What natural hazards you are most concerned about in your community? (please note, this is not comprehensive)

- Winter Storms (6) 25%
- Tornado (6) 25%
- Wildfire (5) 21%
- Flood (4) 17%
- Windstorms (3) 13%
- Drought (0) 0%
- Extreme Heat (0) 0%
- Extreme Cold (0) 0%
- Hail (0) 0%
- Landslides (0) 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 2015 risk priorities for Aitkin 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	2015 Priority	2020 Current Priority
Tornadoes	High	High
Winter Storms	High	High
Flooding	Moderate	High
Windstorms	High	High
Wildfire	Moderate	Moderate
Hail	Low	Low
Lightning	Low	Low
Drought	Moderate	Low
Extreme Cold	Low	Low
Extreme Heat	Low	Low
Landslides	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
Maureen Mischler, City Clerk-Treasurer, City of Palisade	Will an electronic copy of this presentation be available following the meeting? Thanks for your reply.	Good Morning, yes, we will send out a PDF of the presentation following the meeting, as well as a full meeting summary.
Bill Pratt, Aitkin County Commissioner	When considering mobile homes, are areas where there are a concentration of mobile homes not in a mobile home park considered?	Yes, any community that has that sort of situation we can address them if we have data to include.
John Welle, Aitkin County Highway Engineer	On discussion of the prioritization of flooding: I don't remember how flooding was ranked in 2015, but to say that flooding is on the same level as drought seems not right. I think that flooding risks are right up there with flooding risks and tornadoes and should be prioritized as high.	Flooding was agreed to be noted as a high priority natural hazard for the plan update.
Steve Hughes, Aikin SWCD Manager	I agree with John on the flooding risks. Landslides are also a concern (roads washed out, lakeshore slopes sliding towards the water body and associated water quality).	We definitely want to include the issues of roads washing out and lakeshore erosion in the flood section of the plan. Also, yes, water quality concerns follow flooding, so we will say that. Landslides would be slope failure, that is not necessarily connected to flood events.
Maureen Mischler, City Clerk-Treasurer, City of Palisade	What about non-natural hazards such as pipeline incidents or eco-terrorism (i.e., setting wildfires) being addressed by the plan?	The plan does not address technological/human-caused incidents such as these, as they are not the federal requirement and are addressed by other county or agency planning efforts. This is not to minimize or dismiss them, but we do not conduct a risk assessment on these hazards and develop mitigation actions for them.
Dake Olson, Mayor, City of McGregor	McGregor has got a lot of comments about a storm shelter for our mobile home park.	Noted for follow up with the City of McGregor.
Stacey Durgin Smith, Aitkin County Health & Human Services, PHEP Coordinator	Is there any way to mitigate the flooding in the City of Aitkin around the greenhouse, Hardware Hank, etc.?	Noted for follow up with the City of Aitkin. / Aitkin County EM response: Brian Pisarek is the City of Aitkin EM and I believe they have had discussions in the past about this. Terry Bentley has been involved as well, but no easy fix.
Stacey Durgin Smith, Aitkin County Health & Human Services, PHEP Coordinator	The City of Tamarack has been concerned about where residents can go in case of emergency.	Noted for follow up with the City of Tamarack. Aitkin County EM response: The snow flyers building

	Apparently there are no open safe buildings and a lack of basements in that area.	has been identified as the best building to gather in the city limits. We could get together to discuss other options as well.
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Following the discussion, participants were encouraged to fill out and return the “Mitigation Ideas” worksheet that they were provided with to Aitkin 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?

- (13) Yes
- (1) Unsure

2. Please provide comments about any of the lower risk hazards if you think they should be addressed in the plan (lightning, hail, extreme cold, extreme heat, landslide)

- I would also put flooding at a higher risk level. I will also follow up with you on shelters in remote townships and emergency communications.
- Thought straight-line winds and tornado could be combined, as by definition straight-line winds are a tornado that has no lift to make a vertical vortex.
- Extreme heat and cold seem to be put lower on the list because we are used to them in Minnesota. However, if they happen in combination with a power outage, they are very concerning. Also, as our population ages, there may be an increase in the number of people who cannot tolerate the extreme heat and lack the funding to provide air conditioning.
- Nothing in the lower risk, but am wondering if flooding should not be higher too, as it seems we are having more and more large rain events, which does major damage to gravel roads in particular, but certainly other roads too, which are critical infrastructure.
- Storm shelters for our public safety buildings and mobile home park, Fire mitigation around the city, and reduction of potential flooding in the city of McGregor would be a High on my list. Upgrading a City building as a winter storm relocation shelter would be a moderate priority.
- I'm interested in the development of a county-wide detailed drainage study, that would analyze drainage patterns while taking into consideration man made obstacles to drainage (i.e., road, rail beds, etc.) and consider the effectiveness of bridges, culverts and overall county drainage ditches. This would result in recommendations for improvements and providing tools to cities and township to conduct better planning and more effective use of their local funds in conjunction with the county efforts. Perhaps something similar already exist or is in development.

3. Any other comments (about natural hazards, mitigation actions, or how we might improve this webinar)?

- I thought the Webinar was very informative.
- Like your presentation and its format.
- Nice job, very well put together! Thanks!
- Our city park is well attended, but we have a relatively small bathhouse. After one of our last storms it was recognized that even though it is our designated storm shelter for

the park, it would not accommodate all the campers if the park was full. Would expanding the bathhouse be considered a legitimate expense?

- I think the zoom platform was perfect and you did a great job presenting. Thank you very much.
- Excellent webinar. I think it would have been helpful for some discussion of how the County as a whole and neighboring counties/cities identify possible resources to assist one another during disasters/recovery. Perhaps that will come up during the mitigation planning process? Thanks so much for the information.

Attached are the following documentation items for the Aitkin County MHMP Meeting #1:

- 10-21-20 Mtg. #1 Email Invitation
- 10-21-20 Mtg. #1 List of Participants
- 10-21-20 Mtg. #1 Power Point Slides
- 10-21-20 Mtg. #1 Handouts

Meeting Summary Prepared By: Bonnie Hundrieser, U-Spatial@UMD Project Team

From: Bonnie K Hundrieser
To: Bonnie K Hundrieser
Subject: Aitkin County Multi-Hazard Mitigation Plan Team Meeting #1 Invitation
Date: Thursday, September 3, 2020 4:58:46 PM

From: Patrice Erickson <patrice.erickson@co.aitkin.mn.us>

Sent: Thursday, September 3, 2020 2:18 PM

To: Daniel Guida <dan.guida@co.aitkin.mn.us>; Jessica Seibert <jessica.seibert@co.aitkin.mn.us>; Bill Pratt <bill.pratt@co.aitkin.mn.us>; Mike D. Dangers <mike.dangers@co.aitkin.mn.us>; Terry B. Neff <terry.neff@co.aitkin.mn.us>; Dan Haasken <dan.haasken@co.aitkin.mn.us>; John Welle <john.welle@co.aitkin.mn.us>; Rich P. 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Williams TWSP - Richard Mensing <rbmensing@citlink.net>; Workman TWSP - James Berg <jimbetty@frontiernet.net>; Workman TWSP - Wanda Essen <clerk@workmantownshipmn.org>; Aitkin Mayor - Gary Tibbitts <garytibbitts@yahoo.com>; Hill City Clerk - Diana McManigle <cityhall@hillcity-mn.com>; Hill City Mayor - Dan Kingsley <kingsdan27@gmail.com>; McGrath Mayor/Clerk - Brian Clark, Dawn Clark <cityofmcgrathmn@yahoo.com>; McGregor City Clerk - Deanna Casale <mcgregor.city@gmail.com>; McGregor Mayor - Dake Olson <dakeolson@gmail.com>; Palisade City Clerk - Maureen Mishler <city@frontiernet.net>; Palisade Mayor - Charles Carlson <charlie2559@gmail.com>; Tamarack Clerk - Kathy Haugse <cityoftamarack@frontiernet.net>; Tamarack Mayor - John Cyrus <j.ecyrus@gmail.com>; Bob Dresser McGrath FD <rcdresser2001@yahoo.com>; Brian Pisarek Aitkin FD <bpisarek@ci.aitkin.mn.us>; Brian Pisarek Aitkin FD <brian.pisarek@state.mn.us>; Dale Thompson <dalthompson@frontiernet.net>; Greg Payment <greg.payment@co.aitkin.mn.us>; Jermy Nelson Hill City FD <jnelson@ci.grand-rapids.mn.us>; Jerry Gruhke Palisade FD <jg56469@gmail.com>; Jim Carr McGrator FD <james.carr@ftr.com>; Kent Olesen <kent.olesen@co.aitkin.mn.us>; Scott Turner McGrator FD <saturner82@gmail.com>

Cc: Bonnie K Hundrieser <hundrieserconsulting@outlook.com>

Subject: Aitkin County Multi-Hazard Mitigation Plan Team Meeting #1 Invitation

AITKIN COUNTY

MULTI-HAZARD MITIGATION PLAN UPDATE – MEETING INVITATION

Greetings,

Your presence is requested at a Planning Team Meeting for the update of the **Aitkin 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 that we may strengthen our shared mitigation efforts.

We will be holding the meeting using Zoom webinar:

Date: Wednesday, October 21, 2020

Time: 9:00 a.m. – 11:00 a.m.

Registration: https://umn-private.zoom.us/webinar/register/WN_CeJ8V1WTSZuqZdXjplElgw

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 Aitkin 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 Aitkin 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 Aitkin 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,

Patrice Erickson
Aitkin County Sheriffs Office
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Cc: Bonnie K Hundrieser
Subject: RE: Aitkin County Multi-Hazard Mitigation Plan Team Meeting #1 Invitation
Date: Tuesday, October 20, 2020 2:08:39 PM
Attachments: Mitigation Ideas Worksheet.docx
HSEM_HMA Grants Program Overview.pdf
Mitigation Strategies Action Types.pdf

Greetings,

We look forward to you joining us for the Aitkin County Multi-Hazard Mitigation Plan meeting tomorrow, Wednesday, October 21st from 9am – 11am.

Attached please find 3 handouts we will be referencing during the meeting.

If you have not registered yet, please do so by clicking on the following link: https://umn-private.zoom.us/webinar/register/WN_Cei8V1WTSzUqZdXjplElgw

Thank you,

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From: Patrice Erickson
Sent: Thursday, September 3, 2020 2:18 PM
To: Daniel Guida <daniel.guida@co.aitkin.mn.us>; Jessica Seibert <jessica.seibert@co.aitkin.mn.us>; Bill Pratt <bill.pratt@co.aitkin.mn.us>; Mike D. Dangers <mike.dangers@co.aitkin.mn.us>; Terry R. Neff <terry.neff@co.aitkin.mn.us>; Dan Haasken <dan.haasken@co.aitkin.mn.us>; John Welle <john.welle@co.aitkin.mn.us>; Rich P. 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Cc: Bonnie K Hundrieser <hundrieserconsulting@outlook.com>
Subject: Aitkin County Multi-Hazard Mitigation Plan Team Meeting #1 Invitation

AITKIN COUNTY

MULTI-HAZARD MITIGATION PLAN UPDATE – MEETING INVITATION

Greetings,

Your presence is requested at a Planning Team Meeting for the update of the **Aitkin 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 that we may strengthen our shared mitigation efforts.

We will be holding the meeting using Zoom webinar:

Date: Wednesday, October 21, 2020

Time: 9:00 a.m. – 11:00 a.m.

Registration: https://umn-private.zoom.us/webinar/register/WN_Cej8V1WTSZugZdXjplElgw

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

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AITKIN COUNTY Multi-Hazard Mitigation Plan Update 2020 Planning Team Meeting #1

October 21, 2020



Welcome & Introductions

U-Spatial@UMD Project Leads



Stacey Stark
Project Manager
U-Spatial@UMD



Bonnie Hundrieser
HM Planning Specialist
Hundrieser Consulting LLC

Aitkin County Project Lead

- Dan Guida, Aitkin County Sheriff / Emergency Management Director



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



July, 2016 CRA flood damage

The purpose of this meeting is to formally convene the **Aitkin 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?



- **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



2016 Hill City straight line wind 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.

Aitkin County MHMP Update 2020

- Last plan adopted in 2015.
- The updated plan will cover a 5-year window (2021-2026).
- County and local-level government participation is required.

PRESENTER : BONNIEHUNDRIESER

Who the Plan Covers



The Aitkin 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.

PRESENTER : BONNIEHUNDRIESER

MHMP Planning Team



Aitkin County Planning Team

- Aitkin 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.

PRESENTER : BONNIEHUNDRIESER

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.

PRESENTER : STACEY STARK

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)



Labor Day, 2018 hail & wind damage



July, 2012 McGregor flood damage

PRESENTER : STACEY STARK

Hazard Prioritization

Hazards Addressed in 2015 HMP	2015 priority	Comments
Ice Storm	High	With winter storms in 2020
Tornado	High	
Wildfire	Moderate	
Winter Storm	Moderate	
Drought	Moderate	
Straight-line Wind	Moderate	"Windstorms" in 2020
Flood	Moderate	
Extreme Heat	Low	
Extreme Cold	Low	
Hail		Discussed in Summer Storms in 2015
Lightning		Discussed in Summer Storms in 2015
Landslide		Not Addressed
Dam Failure	Low	Required by HSEM

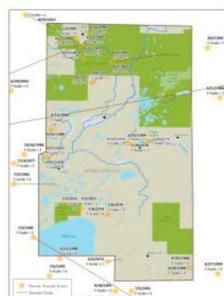
Tornadoes (high)



- Based on NCEI Storm Events Database through February 2020, the relative frequency of tornadoes is .26 per year (18 total)
- Tornadoes occurred in 2019 (EF0) and 2016 (EF1)
- Identify mobile home locations



August 29, 2013 Hill City-Remer tornado



PRESENTER : STACEY STARK

Winter Storms (high)



- 22 winter weather related events (blizzards, heavy snows, ice storms, winter storms, and winter weather) have occurred since January 2014 (3.1 year)
- Based on all records in the NCEI Storm Events Database, the relative frequency of winter-related storm events is 3.4 per year.



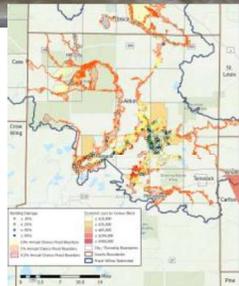
Winter 2019 heavy, wet snowstorm

PRESENTER : STACEY STARK

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



Distribution of Estimated Economic Loss: 1% annual chance flood.

PRESENTER : STACEY STARK

Windstorms (high), Lightning, Hail (low)



- Each addressed individually
- The relative frequency of all wind-related events since January of 1996 is 4.2 per year.
- There were ten hailstorms with hail greater or equal to 1-inch since 2014. The relative frequency of all hail events is 1.5 per year.
- Hazards deemed low risk and without significant mitigation actions, can be dropped from the plan.



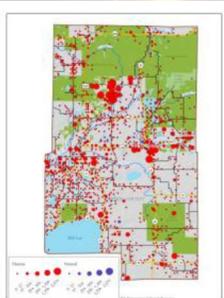
Labor Day, 2018 hail & wind storm damage to power poles and mobile home

PRESENTER : STACEY STARK

Wildfire – Wildland Fire (moderate)



- Minnesota DNR tracked 1,956 wildfires in Aitkin County between 1985 and 2013, burning a total of 54,734 acres (> 51/yr)



PRESENTER : STACEY STARK

Drought (moderate)



- From 2000 – 2018, Aitkin County was in at least Moderate (D1) Drought 22-25% of the time.



Data from U.S. drought monitor October 13, 2020

PRESENTER : STACEY STARK

Extreme Cold (low)



- From 2014 - 2020, daily low temperatures ≤ -18 °F were recorded 84 times at Sandy Lake Dam Libby station. Le Sueur County experiences an average of 11-14 extreme cold days each year.
- -41°F recorded by the Sandy Lake Dam Libby station on January 31, 2019
- The relative frequency of cold-related events (NWS Warning issued due to wind chill of -35 °F or colder) in Aitkin County is .9 per year

PRESENTER : STACEY STARK

Landslides (low)



- Hazards deemed low risk and without significant mitigation actions, can be dropped from the plan.

PRESENTER : STACEY STARK

Review of Mitigation Strategies & Example Actions



See Handout: Mitigation Strategies & Action Types

PRESENTER : BONNIE HUNDRIESER

#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.



PRESENTER : BONNIE HUNDRIESER

#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



PRESENTER : BONNIE HUNDRIESER

Community Safe Rooms

Wadena-Deer Creek School, June 17 2010



PRESENTER : BONNIE HUNDRIESER

August, 2012 – 1st school based tornado safe room (Wadena)



PRESENTER : BONNIEHUNDRIESER

Power Line retrofit/burial



PRESENTER : BONNIEHUNDRIESER

#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 : BONNIEHUNDRIESER

#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.

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 : BONNIEHUNDRIESER

#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 : BONNIEHUNDRIESER

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 : BONNIEHUNDRIESER

Historical Projects in Aitkin County Resulting from HMA Funding since 2010

DR / project #	subrecipient	project type	100% project cost	federal share (%75)	local match (%25)
1941.10.	Aitkin County	Plan	\$34,000.00	\$25,500.00	\$8,500.00

Mitigation Ideas

Do you have questions or ideas to share about local hazards & vulnerabilities and proposed mitigation actions?

See Handout: Mitigation Ideas Worksheet

PRESENTER : BONNIEHUNDRIESER

PRESENTER : BONNIEHUNDRIESER



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.

PRESENTER : BONNIEHUNDRIESER



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.

PRESENTER : BONNIEHUNDRIESER



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

PRESENTER : BONNIEHUNDRIESER



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.

PRESENTER : BONNIEHUNDRIESER



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

Questions?

What questions do you have for U-Spatial@UMD about the MHMP update process?

PRESENTER : BONNIEHUNDRIESER

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, Consultant

Hundrieser Consulting LLC

hundrieserconsulting@outlook.com

218-343-3468



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.	<ul style="list-style-type: none"> • 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	<p>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.</p> <p>This type of action also involves projects to construct manmade structures to reduce the impact of hazards.</p>	<ul style="list-style-type: none"> • 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 <p><i>Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.</i></p>

Mitigation Strategy	Description	Example Mitigation Actions
<p>Natural Systems Protection</p>	<p>These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.</p>	<ul style="list-style-type: none"> • 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 <p><i>Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.</i></p>
<p>Education and Awareness Programs</p>	<p>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.</p>	<ul style="list-style-type: none"> • 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 <p><i>Some of these types of actions may be projects eligible for funding through the FEMA HMA "5 Percent Initiative Program".</i></p>
<p>Mitigation Preparedness and Response Support</p>	<p>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.</p>	<ul style="list-style-type: none"> • 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

Aitkin County MHMP Planning Team Meeting #2 September 23, 2021 - Meeting Summary & Documentation

Summary: On Thursday, September 23, 2021, Aitkin County Emergency Management convened 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 Aitkin County Multi-Hazard Mitigation Plan (MHMP). The purpose of the meeting was to formally convene the Aitkin 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: Aitkin 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 23 people attended the meeting. Representation included elected officials and departmental staff from Aitkin County and the cities of Aitkin, Hill City, McGregor, Tamarack, and Palisade. The city of McGrath was not in attendance. 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
Steve Hughes, Aitkin County SWCD District Manager	In regards to the discussion on Wildfire: Aitkin SWCD and Carlton SWCD are creating a Firewise “before and after” video to show risk for a cabin or other structure. We could have a link to several websites when that is completed....Removing vegetation from directly around the structure reduces risk; we will show that with drone video.	This is excellent information that illustrates how the Aitkin SWCD can assist with public outreach & education for wildfire mitigation. We can include mention of this work in the Aitkin County mitigation action chart. We also encourage you to please review the wildfire section of the plan when we share the plan for public review.
Rhonda Vetter, Safety/Emergency Management Coordinator, Riverwood Healthcare Center	Post-Meeting Comment regarding Drought: In thinking about the 5-year mitigation plan, I feel that drought should be moved to a moderate hazard with current trending in climate change. Any long term drought scenario put the county at least at moderate possible high risk for wildfires and with the number of peat bogs in the county a concern for sustained response.	Follow up was conducted with Sheriff Guida on this matter. The drought was a very real issue in the summer of 2021, but there was also very little that we could do to reduce impacts. The fire hazard associated with a drought was discussed and the most likely hazard to mitigate. Drought will remain in the low priority category for the plan as mitigation activities are limited for drought and can more directly be addressed in the realm of wildfire mitigation.
Stacey Durgin-Smith, Aitkin County Public Health Emergency Preparedness Coordinator	Post-Meeting Comment regarding Drought: My only question after reading over the presentation slides was why drought was considered low when we are in a moderate drought and nearly half of the US is in a severe to exceptional drought and there are concerns about getting enough moisture to counteract drought for years to come. I am not sure how the ratings were performed. That result just seemed odd.	Same as above.

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. Thanks for attending today! Did this presentation meet your expectations?

Yes (3)

2. Do you have any comments about hazards or mitigation actions? Do you have any questions for the consultants?

Could I get a copy of the presentation, so I can review with my hospital emergency management team for consideration in development of our hazard vulnerability assessment.
(rvedder@rwhealth.org)

Attached are the following documentation items for the Aitkin County MHMP Meeting #2:

- 9-23-21 Mtg. #2 Email Invitation
- 9-23-21 Mtg. #2 List of Participants
- 9-23-21 Mtg. #2 Power Point Slides
- 9-23-21 Mtg. #2 Handouts

Meeting Summary Prepared By: Bonnie Hundrieser, U-Spatial@UMD Project Team

From: Daniel Guida
To: Mark Wieda; Mike D. Dangers; Andrew Carlstrom; John Welle; Rich P. Courtmanche; info@longlakecc.org; Cynthia Bennett; Steve Hughes; Erin Mel; Stacey Durgin Smith; mworkman@ci.aitkin.mn.us; cityadmin@ci.aitkin.mn.us; brian.pisarek@state.mn.us; streetdepartment@yahoo.com; dduff@aitkinutilities.com; knosdan27@gmail.com; cityhall@hillicity-mn.com; pryan@aitkinpolice.com; jnelson@d.grand-rapids.mn.us; maintenance@hillicity-mn.com; cityofmcgrathmn@yahoo.com; cityofmcgrathmn@yahoo.com; fcdresser2001@yahoo.com; dakeolson@gmail.com; mcgregor.city@gmail.com; james.carr@fr.com; beaalenemo@yahoo.com; city@frontier.net; ja56469@gmail.com; lecvrus@gmail.com; cityofmarack@frontier.net; terry.betlev@gmail.com; s.saari@yahoo.com; mkruise@microcorpprinting.com; gilbertelsberg.319@mn.com; franklemene@gmail.com; randpsout@yahoo.com; l.woodrow99@yahoo.com; sdarose@frontier.net; dpcoll@yahoo.com; eagarob52@yahoo.com; bolseni@centurylink.net; dmieser@yahoo.com; ljds532@icloud.com; maybell8711@gmail.com; donniemiller@gmail.com; smiller@isd112.mn.us; mikkibees.mn@gmail.com; lakemagnation@gmail.com; farmer@frontier.net; detbeske@hotmail.com; malmdtownlerk@outlook.com; amundfam@yahoo.com; glee123@frontier.net; sandelson@gmail.com; bedroetter@gmail.com; deakrock@citlink.net; ricervetwp@gmail.com; double10@gmail.com; candvincent@aol.com; dsaweborg@isd4.org; aled@shamrocktwp.org; thewises@frontier.com; kevin.m.stromberg@cloud.com; circlingwolf@gmail.com; kent@niftywares.com; tvfish@centurylink.net; ddouble33@hotmail.com; rbmensing@citlink.net; ronaldzoo@aol.com; Supervisor1@workmantownship.org; pyedder@riverwoodhealthcare.com; dstuifer@isd1.org; prentled@isd002.org; bjohanson@isd4.org; courtney.dowell@state.mn.us; sbowes@lakecountrypower.com; chrx@miesm.com; Christy.Taspet@ecomm.com; jeffrey.l.streit@usace.army.mil; dalstomson@frontier.net; vanhatten@ontario.com; glendon.myer@state.mn.us; jeffrey.hickson@state.mn.us; Todd.Saegren@state.mn.us; tyles.ray@sda.gov; marlyn.halverson@co.carbon.mn.us; leff.anderson@co.kanabec.mn.us; Julie.peterson@millelacs.mn.gov; john.bowen@crowwing.us; chad.emery@co.cass.mn.us; john.linder@co.itasca.mn.us; johnson@stlouiscountymn.gov; Monte.Fronk@millelacsband.com; Jessica.Seibert; Dan.Haasken
Cc: Bonnie K Hundrieser
Subject: Hazard Mitigation Planning
Date: Wednesday, September 8, 2021 1:32:08 PM
Attachments: Aitkin County MHMP Mtg #2 Invitation 9-23-21 (003).docx

All,

Please see the attached invitation and I hope you all can make it and provide valuable input for this process!

V/R

Daniel Guida
Aitkin County Sheriff
W-218-927-7417
dan.guida@co.aitkin.mn.us

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AITKIN COUNTY

MULTI-HAZARD MITIGATION PLAN UPDATE – MEETING INVITATION

Greetings,

Your presence is requested at the **2nd Planning Team Meeting** for the update of the **Aitkin 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, September 23, 2021

Time: 9:00 a.m. – 11:00 a.m.

Zoom Link: https://umn-private.zoom.us/webinar/register/WN_irZuGz_0TmiorbE8qxiZcg

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 Aitkin 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 Aitkin 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,

Dan Guida
Aitkin County Sheriff

Aitkin County

9-23-21 MHMP Planning Team Meeting #2

List of Participants (23)

	First Name	Last Name	Organization	Job Title
1	Dan	Guida	Aitkin County Sheriff's Office	Sheriff / EM Director
2	Jessica	Seibert	Aitkin County	Administrator
3	Patrice	Erickson	Aitkin County Sheriff's Office	Dispatch Sup/Deputy EM
4	Karla	White	Aitkin County Sheriff's Office	Jail Administrator/Deputy EM
5	Mike	Dangers	Aitkin County	County Assessor
6	Steve	Hughes	Aitkin County SWCD	District Manager
7	John	Welle	Aitkin County	County Engineer
8	Adam	Johnson	Hill City School District	Principal
9	Dan	Stifter	Aitkin Public Schools	Superintendent
10	Maureen	Mishler	City of Palisade	City Clerk-Treasurer
11	Jen	Thompson	City of Aitkin	City Clerk
12	David	Cluff	Aitkin Public Utilities	Manager
13	Kathy	Haugse	City of Tamarack	City Clerk/Treasurer
14	Tami	Meyer	City of Hill City	Clerk/Treasurer
15	Dake	Olson	City of McGregor	Mayor
16	Kevin	Stromberg	Spencer Township	Supervisor/Chairman
17	Rhonda	Vedder	Riverwood Healthcare Center	Safety/EM Coordinator
18	Cory	Brix	Mille Lacs Energy	Line Superintendent
19	Brad	Johnson	McGregor Schools	Superintendent/Principal
20	Julie	Peterson	Mille Lacs County	Emergency Management Director
21	John	Linder	Itasca County Sheriff's Office	Emergency Manager Coordinator
22	Chad	Emery	Cass County Sheriff's Office	Deputy Sheriff / EM Coordinator
23	Monte	Fronk	Mille Lacs Band of Ojibwe	Tribal EM

AITKIN COUNTY Multi-Hazard Mitigation Plan Update 2021 Planning Team Meeting #2

SEPTEMBER 23, 2021



Welcome & Introductions

U-Spatial@UMD Project Leads



Stacey Stark
Project Manager
U-Spatial@UMD



Bonnie Hundrieser
HM Planning Specialist
Hundrieser Consulting LLC

Aitkin County Project Lead

- Dan Guida, Aitkin County Sheriff / Emergency Management Director



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



July, 2016 CR4 flood damage

The purpose of this meeting is to formally convene the **Aitkin 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 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

Aitkin 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.

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Who the Plan Covers



This is a **multi-jurisdictional plan** that covers Aitkin County, including the cities of Aitkin, Hill City, McGrath, McGregor, Palisade, and Tamarack.



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.

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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

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Prioritization of Hazards for Aitkin County



Prioritization of hazards by the Aitkin 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
Tornadoes	High
Winter Storms	High
Flooding	High
Windstorms	High
Wildfire	Moderate
Drought	Low
Hail	Low
Lightning	Low
Extreme Cold	Low
Extreme Heat	Low
Landslides	Low

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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



Labor Day, 2018 hail & wind damage

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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)

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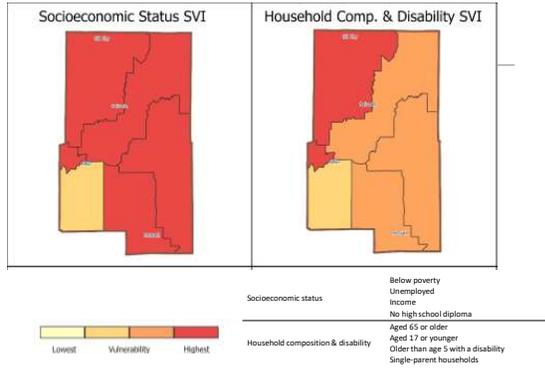
All Hazards – Critical Infrastructure

- Healthcare Facilities
- Emergency Services
- Schools and Shelters
- Transportation
- Utilities
- Dams and Levees
- Hazardous Materials Facilities
- Major Employers
- Government Buildings
- Cultural Resources



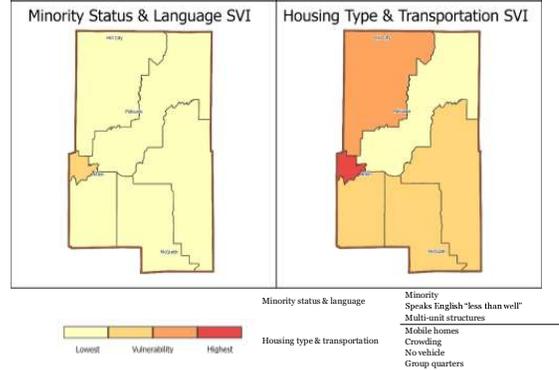
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All Hazards – Population Vulnerability



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All Hazards – Population Vulnerability



PRESENTER: STACEY STARK

AITKIN COUNTY: Tornadoes (high)

- Based NCEI Storm Events Database through February 2020, the relative frequency of tornadoes in Aitkin County is .26 per year (18 total)
- Tornadoes occurred in 2020 (EF1), 2019 (EF0) and 2016 (EF1).
- Current concerns about the availability of tornado safe rooms and upgrade of outdoor warning sirens.



August 29, 2013 Hill City-Remer tornado

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AITKIN COUNTY: Windstorms (high)

- The relative frequency of all wind-related events since January 1996 is 5.4 per year.



Labor Day, 2018 hail & wind storm damage to power poles and mobile home

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AITKIN COUNTY: Winter Storms (high)



Associated Press

3.4 winter-related storm events per year in Aitkin County

- Vulnerability - Program Gaps & Deficiencies:**
- Aboveground Powerlines
 - Backup Power for critical facilities
 - Public sign-up for emergency notifications



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AITKIN COUNTY: Flooding (high)



July, 2016 Long Lake overflowed shoreline and docks submerged



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AITKIN COUNTY: Flooding (high)

- 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

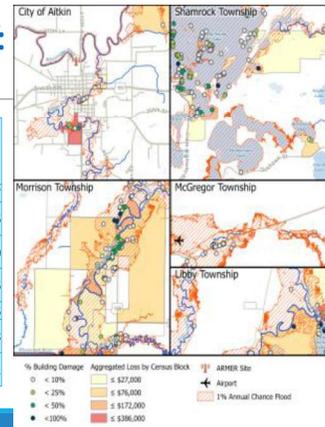


July, 2012 McGregor flood damage

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AITKIN COUNTY: Flooding (high)

Jurisdiction	Count of Buildings in Floodplain	Estimated Building and Contents Loss*
Aitkin County	237	\$4,351,177
Shamrock Township	47	\$1,281,186
Morrison Township	53	\$564,390
Libby Township	8	\$482,206
Aitkin City	7	\$479,156
Workman Township	23	\$322,928
Spencer Township	8	\$261,451



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AITKIN COUNTY: Wildfire (moderate)

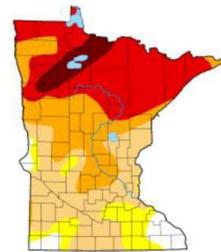
Minnesota DNR responded to 2,226 wildfires in Aitkin County between 1985 and June 2021, burning a total area of nearly 60,000 acres

Program Gaps/Deficiencies:

- Development of Aitkin County Community Wildfire Protection Plan (CWPP)
- Continued wildfire safety & awareness
- Rural water access for wildland fire fighting (dry hydrants, well access).



AITKIN COUNTY: Drought (low)



Map released: Thurs. September 16, 2021
Data valid: September 14, 2021 at 8 a.m. EDT

Intensity

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)
- No Data

Authors

United States and Puerto Rico Author(s):
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PRESENTER: STACEY STARK

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



Example Eligible Activities:

- 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.
- 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

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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.

AITKIN COUNTY		Mitigation Action Chart					
#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeline	Responsibility	Comments on Implementation & Interagency	Possible Funding
1	Wildfire	Education & Awareness Program	Encourage all county residents to sign-up for the county's Everbridge emergency notification alert system.	Existing Ongoing	Aitkin County Emergency Management (ACEM)	A link for the Everbridge emergency notification system is located on the Aitkin County website and residents are notified on the Sheriff's Office Facebook page as well as during the "Fire" Town Meeting Emergency T-Alert.	County
2	Wildfire	Mitigation Preparedness & Response Support	Examine the Aitkin County Emergency Operations Plan (EOP) is updated and address public information needed to support EOP functions prior to, during, and following a disaster.	Existing Ongoing	ACEM	ACEM has an EOP that is updated on a regular basis which helps the county be ready to respond to disasters across a range of EOP functions. This includes plans in place for sheltering of displaced residents and pet sheltering.	County
3	Wildfire	Mitigation Preparedness & Response Support	Examine designated facilities are in place and prepared for providing mass care sheltering and recovery and as needed in sheltering operations.	Existing Ongoing	ACEM, AC Public Works (ACPW)	ACEM and ACPW maintain a list of shelters within the county and have trained staff for shelter operations. We partner with the American Red Cross to establish shelters with facilities in the county to serve as critical shelter locations that meet ACEM shelter assessment for mass and accessibility. ACEM will continue to work to ensure that all designated shelters are prepared with backup generators where needed.	County

Local Planning & Regulations



AITKIN COUNTY EXAMPLES:

- Participating in the NFIP & policy enforcement for new development.
- Update of the County's CWPP for wildfire mitigation.
- Collaborating with SWCD and watershed districts to address flooding and erosion.
- Working with MHP operators to be in compliance with Minnesota State statutes for storm shelters & evacuation plans.
- Providing grant writing assistance to jurisdictions for mitigation activities.



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Structure & Infrastructure Projects

AITKIN 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, culvert upsizing).
- Flood protection for critical infrastructure (i.e., levees or berms to protect lift stations, electrical substations).
- Conducting property buyouts of homes at risk from repetitive flooding or erosion and convert to open space.



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Natural Systems Protection

AITKIN COUNTY EXAMPLES:

- Conduct vegetation management along county-owned and city roads to reduce the risk of downed trees and branches resulting from severe storms.
- Encourage homeowners to create defensible space around existing structures or include in design of new development to reduce risk to wildfire.



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Education & Awareness Programs

AITKIN COUNTY EXAMPLES:

- Promoting sign-up for the County's Everbridge 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



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Mitigation Preparedness & Response Support

AITKIN 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



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Fall 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.

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Fall-Winter 2021

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

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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.	<ul style="list-style-type: none"> • 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	<p>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.</p> <p>This type of action also involves projects to construct manmade structures to reduce the impact of hazards.</p>	<ul style="list-style-type: none"> • 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 <p><i>Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.</i></p>

Mitigation Strategy	Description	Example Mitigation Actions
<p>Natural Systems Protection</p>	<p>These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.</p>	<ul style="list-style-type: none"> • 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 <p><i>Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.</i></p>
<p>Education and Awareness Programs</p>	<p>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.</p>	<ul style="list-style-type: none"> • 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 <p><i>Some of these types of actions may be projects eligible for funding through the FEMA HMA "5 Percent Initiative Program".</i></p>
<p>Mitigation Preparedness and Response Support</p>	<p>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.</p>	<ul style="list-style-type: none"> • 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

Aitkin County MHMP News Release #1 Record of Public Input & Incorporation

Overview: On June 23, 2020, Aitkin 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. Aitkin 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 Aitkin 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 Aitkin County Sheriff’s Office Facebook page, Aitkin County Public Health Facebook page, and local newspapers and radio stations. 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.

1. In response to the posting on the Aitkin County Sheriff’s Office Facebook page, a resident posted the following comment: *“I think you should utilize the ham radio operators in the county. We are free line of communication and many communities make good use of these professionals. Would love to get together and discuss what we can do. I know others would join in on a meeting.”*

Incorporation: This public comment does not need to be considered for incorporation into the MHMP as it relates to emergency response communications, not natural hazards mitigation.

2. Another county resident emailed the Aitkin County Sheriff directly with the following comment: *"In my quest to get our county up to speed on preparing for an event that would last more than a few hours, should power not be available, I would recommend an emergency food kitchen mobile unit .the food unit can be self-contained with the ability to serve a population of 25 to 5000, with little as 3 people to 25 depending on the situation, when I was a mess sergeant for Cloquet National Guard I fed up to 150 people and privately have catered 500 plus for weddings when I ran a catering business, their were years when I helped design kitchens, for up-and-coming places like the black bear casino in cloquet. I am only sharing this so you can have a understanding I have the for knowledge of food distribution and ordering large quantities in a moment's notice. I would welcome the opportunity to sit down with you and share some ways we could overcome hurdles if and when events should arrive. Thank you."*

Incorporation: This public comment does not need to be considered for incorporation into the MHMP as it relates to emergency response mass care feeding, not natural hazards mitigation.

Following is documentation of the means of public outreach for News Release #1.

From: [Patrice Erickson](mailto:Patrice.Erickson@co.aitkin.mn.us)
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Idun TWSP; [Mary Vukelich](mailto:Mary.Vukelich@beaver.mn.us); Jeune TWSP; [Deborah McCordle](mailto:Deborah.McCordle@beaver.mn.us); Jeune TWSP; [Sam Demengo](mailto:Sam.Demengo@beaver.mn.us); Kimberly TWSP; [Donnie Miller](mailto:Donnie.Miller@beaver.mn.us); Kimberly TWSP; [Kim Miller](mailto:Kim.Miller@beaver.mn.us); Lakeside TWSP; [Stanly Miller](mailto:Stanly.Miller@beaver.mn.us); Lakeside TWSP; [Tarina Shade](mailto:Tarina.Shade@beaver.mn.us); Lee TWSP; [Jerry Weller](mailto:Jerry.Weller@beaver.mn.us); Lee TWSP; [Michelle Brodhead](mailto:Michelle.Brodhead@beaver.mn.us); Libby TWSP; [Jane Grimso](mailto:Jane.Grimso@beaver.mn.us); [Jewett](mailto:Jewett@beaver.mn.us); Libby TWSP; [Michael Hall](mailto:Michael.Hall@beaver.mn.us); Logan TWSP; [Craig Lefblanc](mailto:Craig.Lefblanc@beaver.mn.us); Logan TWSP; [Dave Tevis](mailto:Dave.Tevis@beaver.mn.us); MacVile TWSP; [Dorothy Biskey](mailto:Dorothy.Biskey@beaver.mn.us); Macville TWSP; [Kenneth Janssen](mailto:Kenneth.Janssen@beaver.mn.us); Maimo TWSP; [Leaza Morris](mailto:Leaza.Morris@beaver.mn.us); McGregor TWSP; [Susan Amundson](mailto:Susan.Amundson@beaver.mn.us); Millward TWSP; [Christopher Hedberg](mailto:Christopher.Hedberg@beaver.mn.us); Millward TWSP; [Randy Anderson](mailto:Randy.Anderson@beaver.mn.us); Morrison TWSP; [Adrienne Hurd](mailto:Adrienne.Hurd@beaver.mn.us); Morrison TWSP; [Heidi Roettger](mailto:Heidi.Roettger@beaver.mn.us); Nordland TWSP; [Mathew Nis](mailto:Mathew.Nis@beaver.mn.us); Nordland TWSP; [Ruith Nelson](mailto:Ruith.Nelson@beaver.mn.us); Pliny TWSP; [Mata Zimpel](mailto:Mata.Zimpel@beaver.mn.us); [Rice River TWSP](mailto:Rice.River TWSP); [Nancy Benson](mailto:Nancy.Benson@beaver.mn.us); Salo TWSP; [Charlene Vincent](mailto:Charlene.Vincent@beaver.mn.us); Salo TWSP; [Darlene Turnock](mailto:Darlene.Turnock@beaver.mn.us); Salo TWSP; [Robert Mercum](mailto:Robert.Mercum@beaver.mn.us); Seavey TWSP; [Harold Harms](mailto:Harold.Harms@beaver.mn.us); Seavey TWSP; [Kimberly Dubois](mailto:Kimberly.Dubois@beaver.mn.us); Shamrock TWSP; [Allen Ehr](mailto:Allen.Ehr@beaver.mn.us); Shamrock TWSP; [Cardace Kra](mailto:Cardace.Kra@beaver.mn.us); Spalding TWSP; [Duane Swedberg](mailto:Duane.Swedberg@beaver.mn.us); Spalding TWSP; [Marion Davis](mailto:Marion.Davis@beaver.mn.us); Spencer TWSP; [Bonnie Ganz](mailto:Bonnie.Ganz@beaver.mn.us); Spencer TWSP; [Kevin Stromberg](mailto:Kevin.Stromberg@beaver.mn.us); Turner TWSP; [Gavv Helstrom](mailto:Gavv.Helstrom@beaver.mn.us); Turner TWSP; [Gwen Wiese](mailto:Gwen.Wiese@beaver.mn.us); Verdon TWSP; [Brian Baldwin](mailto:Brian.Baldwin@beaver.mn.us); Verdon TWSP; [Kent Lorentzen](mailto:Kent.Lorentzen@beaver.mn.us); Wagner TWSP; [Paul Peterson](mailto:Paul.Peterson@beaver.mn.us); Wagner TWSP; [Sonia Fales](mailto:Sonia.Fales@beaver.mn.us); Waukenabo TWSP; [Debra Goble](mailto:Debra.Goble@beaver.mn.us); Waukenabo TWSP; [Heidi Olesen](mailto:Heidi.Olesen@beaver.mn.us); [Wealthwood TWSP](mailto>Wealthwood TWSP); [Linda Wendlandt](mailto:Linda.Wendlandt@beaver.mn.us); [Wealthwood TWSP](mailto>Wealthwood TWSP); [Tom Veenker](mailto:Tom.Veenker@beaver.mn.us); [White Pine TWSP](mailto:White.Pine TWSP); [Diane Stulz](mailto:Diane.Stulz@beaver.mn.us); [White Pine TWSP](mailto:White.Pine TWSP); [Ronald Thomsen](mailto:Ronald.Thomsen@beaver.mn.us); Williams TWSP; [Beverly Mensing](mailto:Beverly.Mensing@beaver.mn.us); Williams TWSP; [Richard Mensing](mailto:Richard.Mensing@beaver.mn.us); Workman TWSP; [James Berg](mailto:James.Berg@beaver.mn.us); Workman TWSP; [Wanda Essen](mailto:Wanda.Essen@beaver.mn.us)
Cc: [Daniel Guida](mailto:Daniel.Guida@co.aitkin.mn.us); [Bonnie K Huntress](mailto:Bonnie.K.Huntress@co.aitkin.mn.us); [Patrice Erickson](mailto:Patrice.Erickson@co.aitkin.mn.us); [Karia D. White](mailto:Karia.D.White@co.aitkin.mn.us)
Subject: FW: Multi-Hazard Mitigation Plan
Date: Tuesday, June 23, 2020 3:25:56 PM
Attachments: [2020 MHMP release.docx](#)

Greetings,

Aitkin County Emergency Management is commencing work on the update of the Aitkin 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 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 are encouraged to help share this news release locally to strengthen our public outreach. Please notify me if you have posted the news release and provide documentation of the posting (i.e. email a link to your website or social media, or email a picture of the posting on a community bulletin board).

I look forward to your participation in the Aitkin County MHMP update.

If you have any questions, please let me know.

Thank you,

V/R

Daniel G.Guida
Aitkin County Sheriff
C-218-839-2111
Dan.guida@co.aitkin.mn.us

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AITKIN COUNTY SHERIFF

DANIEL G. GUIDA

217 2nd St. N.W., Rm 185

Aitkin, MN 56431

218-927-7435 / 1-888-900-2138

Emergency 911

Sheriff Fax: 218-927-7359 / Dispatch Fax: 218-927-6887

Aitkin COUNTY NEWS RELEASE

23 June, 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 Aitkin 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 Aitkin 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 Aitkin County MHMP is a multi-jurisdictional plan that covers Aitkin County, including the cities of Aitkin, Hill City, McGrath, McGregor, Palisade, and Tamarack. The Aitkin 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 Dan Guida, Aitkin County Sheriff and 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, Aitkin 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 Aitkin 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

Sheriff Dan Guida

Aitkin County Sheriff/Emergency Management Director

Phone: 218-927-7417

Email: Dan.guida@co.aitkin.mn.us

Aitkin County MHMP News Release #1

Documentation of News Release Postings

COUNTY POSTINGS

Aitkin County
County Website, June 23, 2020

News & Notices

The yard waste composting site located near the Oak Ridge Landfill 5 miles south of Aitkin is temporarily closed. Notice will be given once the site is re-opened.

- [Multi-Hazard Mitigation Plan](#)
- [Aitkin County Household Hazardous Waste Collection](#)
- [Tax-Forfeited Lands List](#)
- [Notice Of Vacancy: Aitkin Airport Commission](#)
- [Aitkin County E-waste | June 6, 2020](#)
- [Minnesota Open Appointment Act: Application For Service On A City/County/State Agency](#)
- [Public Notice: Social Services Block Grant - Annual Report](#)

Aitkin County
Sheriff's Office Facebook Page, June 23, 2020



Aitkin County Sheriff's Office

June 23 at 11:50 AM · 🌐

Aitkin County Sheriff
Daniel G. Guida

Aitkin County News Release
23 June, 2020

Public Input Wanted as County Updates
Multi-Hazard Mitigation Plan

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**Aitkin County
Public Health Facebook Page, June 25, 2020**

Like Share ...

Aitkin County Public Health Education
1 hr · 🌐

Aitkin County Sheriff's Office
June 23 at 11:50 AM · 🌐

Aitkin County Sheriff
Daniel G. Guida

Aitkin County News Release
23 June, 2020

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Multi-Hazard Mitigation Plan

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LOCAL MEDIA POSTINGS

Aitkin Independent Age Newspaper, July 1, 2020

Aitkin Independent Age
www.aitkinage.com
Wednesday, July 1, 2020 | A7



Aitkin County seeks feedback on hazard mitigation

The Aitkin County Office of Emergency Management is currently working with U-Spatial at the University of Minnesota Duluth to update the county's multi-hazard mitigation plan (MHMP).

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 the event of tornadoes or severe wind events; burying power lines 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.

NEWS

Aitkin County seeks public input on mitigation plan

Written By: Brainerd Dispatch | Jun 24th 2020 - 12am.



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Caregivers
We are Caregivers in our Little Falls sites. "SIGN-ON BONUS".....

Aitkin County is taking steps to minimize the damage from natural disasters and is seeking the public's input in updating its Multi-Hazard Mitigation Plan.

The Aitkin 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 Aitkin County plan is a multi-jurisdictional plan that covers Aitkin County, including the cities of Aitkin, Hill City, McGrath, McGregor, Palisade and Tamarack. The plan 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 Aitkin County Sheriff and Emergency Management Director Dan Guida in a news release. "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 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 power lines that may fall 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. Some mitigation activities may be eligible for future FEMA Hazard Mitigation Assistance grant funding.



As part of the planning process, Aitkin County is seeking feedback from residents and businesses from across the county to incorporate into the plan on the following questions:

- What are the natural hazards posing the greatest risk to the community?
- What experiences can be shared from previous disaster events?
- What concerns exist, and what sorts of mitigation actions or projects would help to reduce the damages of potential future events for personal property, the community and/or the county as a whole?

The Federal Disaster Mitigation Act of 2000 requires counties to update their plan every five years to maintain eligibility for FEMA's Hazard Mitigation Assistance grant programs.

For more information contact the sheriff by calling 218-927-7417 or emailing him at dan.guida@co.aitkin.mn.us.

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Jun 20 2020 Jun 25 2020 View

Aitkin County seeks public input on Multi-Hazard Mitigation Plan

(Aitkin County, MN) --- 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 Aitkin 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.

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CITY POSTINGS

City of Aitkin Police Department Facebook Page, June 23, 2020

In this family one fights at

Aitkin Police Department @aitkinpd

Home Posts Photos About Community Create a Page

Aitkin County Sheriff's Office June 23 at 11:50 AM

Aitkin County Sheriff Daniel G. Guida

Aitkin County News Release 23 June, 2020

Public Input Wanted as County Updates Multi-Hazard Mitigation Plan

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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 tornadoes or severe wind events; burying powerlines that may fail due to heavy snow, ice or wind storms; ensuring timely emergency communication to

City of Aitkin
City Facebook Page, July 9, 2020

The screenshot shows the Facebook profile of the City of Aitkin. The profile picture is the City of Aitkin logo, which features a stylized green mountain range above the text "THE CITY OF AITKIN MINNESOTA". The page name is "City of Aitkin" with the handle "@CityofAitkin". A navigation menu on the left includes "Home", "Posts", "Reviews", "Photos", "About", "Community", and "Events", with a "Create a Page" button at the bottom.

The main post is from the "Aitkin County Sheriff's Office", dated "June 23 at 11:50 AM". The post text reads: "Aitkin County Sheriff Daniel G. Guida Aitkin County News Release 23 June, 2020 Public Input Wanted as County Updates Multi-Hazard Mitigation Plan". The post includes three paragraphs of text:

- Paragraph 1: "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 Aitkin 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."
- Paragraph 2: "The Aitkin 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."
- Paragraph 3: "The Aitkin County MHMP is a multi-jurisdictional plan that covers Aitkin County, including the cities of Aitkin, Hill City, McGrath, McGregor, Palisade, and Tamarack. The Aitkin County MHMP also incorporates the concerns and needs of townships, school districts, and other stakeholders participating in the plan."

 The post also includes a quote from Dan Guida, Aitkin County Sheriff and Emergency Management Director: "Hazard mitigation planning is a central part of our emergency management program," said Dan Guida, Aitkin County Sheriff and 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."

City of Hill City
City Website Posting, July 13, 2020

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Public Input Wanted as County Updates Multi-Hazard Mitigation Plan

07-14-2020

Aitkin COUNTY NEWS RELEASE

23 June, 2020

Public Input Wanted as County Updates

Multi-Hazard Mitigation Plan

City of Hill City City Facebook Posting, July 1, 2020

AITKIN COUNTY SHERIFF
DANIEL G. GUIDA
217 2nd St. N.W., Rm 185
Aitkin, MN 56431
218-927-7435 / 1-888-906-2138
Emergency 911

Sheriff Fax: 218-927-7339 / Dispatch Fax: 218-927-6887

Aitkin COUNTY NEWS RELEASE
23 June, 2020

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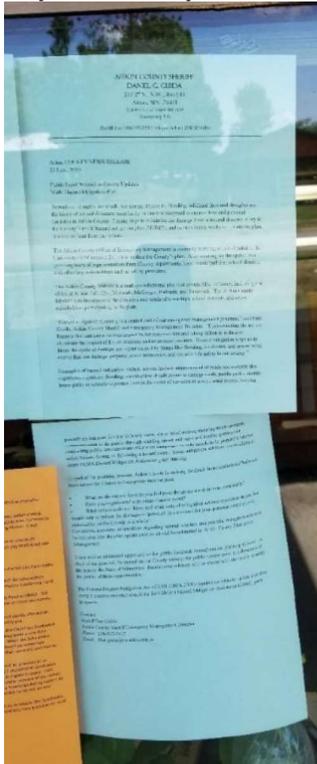
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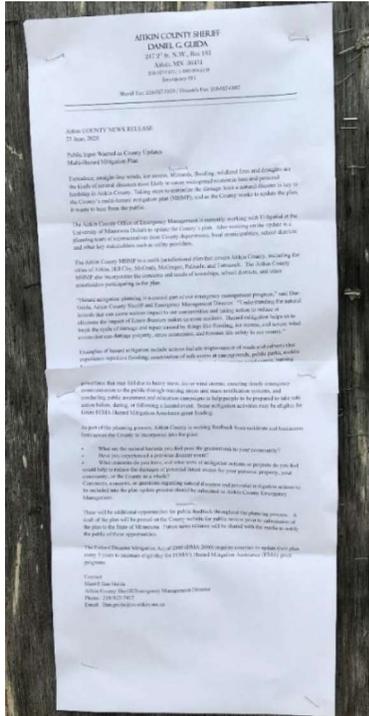
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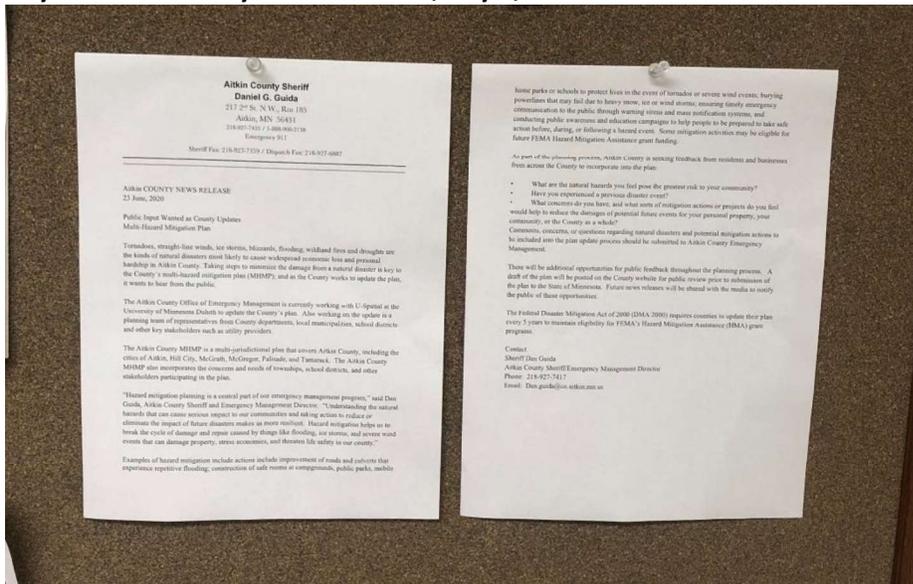
City of Hill City Community Bulletin Board, July 13, 2020



City of McGrath Community Bulletin Board, July 13, 2020



City of McGregor City Hall Community Bulletin Board, July 1, 2020



City of McGregor
Mayor of McGregor Facebook Page, July 5, 2020

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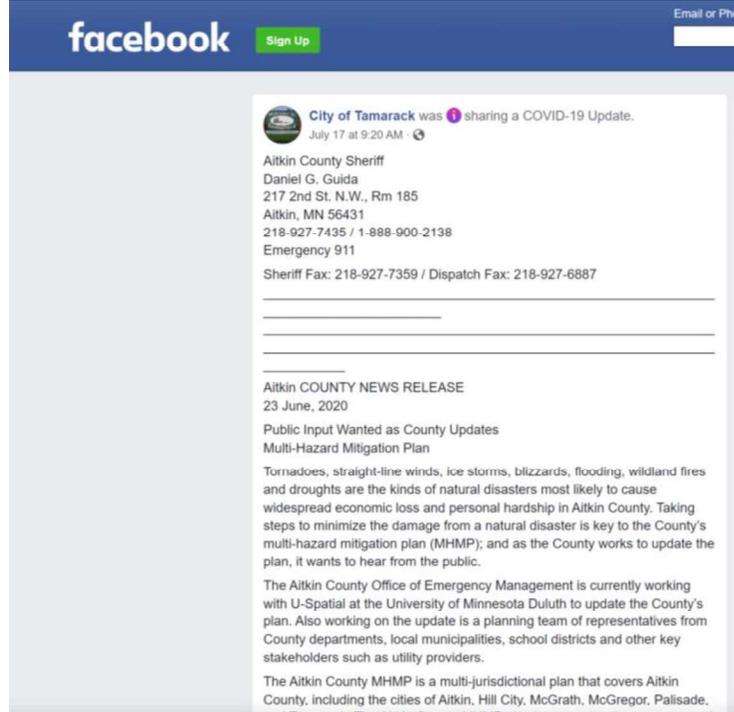
Dake Olson - Mayor of McGregor
July 5 at 5:00 AM · 🌐

Aitkin COUNTY NEWS RELEASE - 23 June, 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 Aitkin County. Taking steps to...
Continue Reading

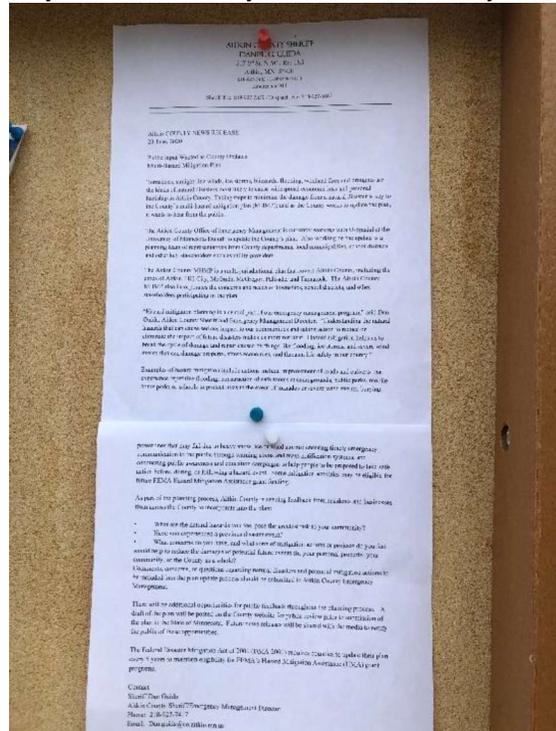
City of Palisade
Community Bulletin Board Posting, July 13, 2020



**City of Tamarack
City Facebook Page, July 17, 2020**



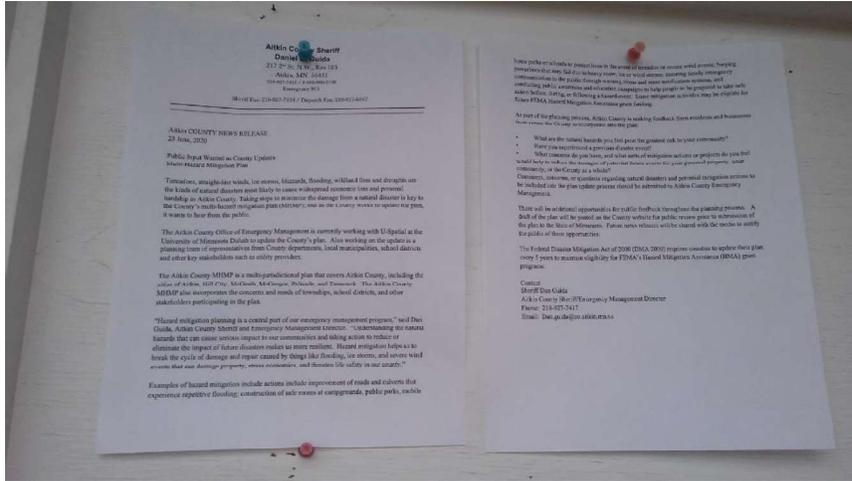
**City of Tamarack
City Hall Community Bulletin Board, July 17, 2020**



TOWNSHIP POSTINGS

Morrison Township

Town Hall front door posting, July 17, 2020



Aitkin County MHMP News Release #2 Record of Public Input & Incorporation

Overview: On October 25, 2021 Aitkin County Emergency Management put out a news release titled “Public Input Sought for County's Multi-Hazard Mitigation Plan” to announce the completion of the draft Aitkin 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 October 25 to November 7, 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 Aitkin 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 Aitkin County news release and how the input will be incorporated into the plan update, and if not relevant to be addressed, why.

Local Resident, City of Hill City

Comment submitted via online feedback form, 10/26/21

Survey Question: 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.

Comment: A lot of people have cell phones and are not able to get notified by Aitkin County of weather like land lines are and that would be nice if they could be because most places don’t have home phones anymore.

Incorporation: No incorporation needed. Aitkin County emergency notifications put out by the Sheriff’s Office go to all registered cell phones and land lines. The Aitkin County mitigation action chart addresses the activity of promoting resident sign up for emergency notifications: Mitigation Action #2: *Encourage all county residents to sign-up for the county’s Everbridge emergency notification alert system.*

Local Resident, City of McGregor

Comment submitted via online feedback form, 10/27/21

Survey Question: 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.

Comment: The city of McGregor needs to update its tornado siren. The one that's in town can barely be heard in town.

Incorporation: The City of McGregor identified this matter as an issue to address in their Local Mitigation Survey in Part C.1, Local Mitigation Projects: *"The city's emergency warning siren was designed to notify firefighters of fire calls 60 years ago and the sound is blocked to the east as the siren is lower than the fire station next to it. The city has received complaints about residents not being able to hear the warning siren inside their homes during the monthly tests. The current warning siren does not cover our manufacturing district or the assisted living facility. We would like to replace our current siren and add an additional siren to better cover the city."* As a result, the City of McGregor included a mitigation action in their jurisdictional mitigation action chart to address replacement of their tornado siren: Mitigation Action #5 - *"Replace our current outdoor warning siren and add an additional siren to better cover the city."*

From: Daniel Guida
To: dakeolson@gmail.com; Daniel Guida; Jessica Siebert@co.aitkin.mn.us; Bill Pratt; Mike D. Dangers; Terry Neff@co.aitkin.mn.us; dan.haaskens@co.aitkin.mn.us; John Welle; Rich P. Courtmanche; info@longlakecc.org; Cynthia Bennett; Steve Hughes; qbhbts@ci.aitkin.mn.us; cityadmin@ci.aitkin.mn.us; tcatlin@aitkinpolice.com; brian.pisarek@state.mn.us; streetdepartment@yahoo.com; dcluff@aitkinutilities.com; kingsdan27@gmail.com; cityhall@hilcity-mn.com; kimbball@hilcity-mn.com; jnelson@ci.grand-rapids.mn.us; maintenance@hilcity-mn.com; cityofmcgrathmn@yahoo.com; cityofmcgrathmn@yahoo.com; Bcdresser2001@yahoo.com; dakeolson@gmail.com; mcgregor.city@gmail.com; james.cam@fr.com; charlie259@gmail.com; city@frontiernet.net; Jo56469@gmail.com; jecvus@gmail.com; cityofamarack@frontiernet.net; jecvus@gmail.com; cityofamarack@frontiernet.net
Cc: Bonnie K Humdrieser
Subject: MHMP Feedback requested
Date: Tuesday, October 26, 2021 12:56:33 PM
Attachments: 10-25-21 Aitkin County 2020 MHMP Release #2.pdf

Aitkin County Sheriff
Daniel G. Guida
217 2nd St. N.W., Rm 185
Aitkin, MN 56431
218-927-7435 / 1-888-900-2138
Emergency 911

Sheriff Fax: 218-927-7359 / Dispatch Fax: 218-927-6887

Aitkin COUNTY NEWS RELEASE
25 October, 2021

Public Input Sought for as County's
Multi-Hazard Mitigation Plan

Aitkin 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 https://z.umn.edu/aitkin_hmp. The review and comment period is open through Sunday, November 7, 2021. After that, the county will submit the draft plan to the State of Minnesota and the Federal Emergency Management Agency (FEMA) for review.

The Aitkin County MHMP is a multi-jurisdictional plan that covers Aitkin County, including the cities of Aitkin, Hill City, McGrath, McGregor, Palisade, and Tamarack. The Aitkin County MHMP also incorporates the concerns and needs of townships, school districts, and other stakeholders participating in the plan.

Aitkin 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 Aitkin 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 Aitkin 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. Aitkin 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 Aitkin County Emergency Management.

As a courtesy to us, please post this news release using your township, city websites, or Facebook and to provide me with the link. Posting a hardcopy of the news release in a public area such as a community bulletin board or City Hall window is also acceptable. Please take a picture of the posting and share with me via email so I can track the progress.

Contact
Sheriff Dan Guida
Aitkin County Sheriff/Emergency Management Director
Phone: 218-927-7417
Email: Dan.guida@co.aitkin.mn.us

This transmission (the e-mail and all attachments) is confidential and intended solely for the use of the addressee(s). If you have received this transmission in error, please notify the sender by reply and delete this transmission immediately. Any unauthorized distribution, or copying of this transmission, or misuse or wrongful disclosure of information contained in it, is strictly prohibited. The information contained in this document is provided on an as-is basis and does not constitute a binding legal contract or receipt for services.

AITKIN COUNTY SHERIFF

DANIEL G. GUIDA

217 2nd St. N.W., Rm 185

Aitkin, MN 56431

218-927-7435 / 1-888-900-2138

Emergency 911

Sheriff Fax: 218-927-7359 / Dispatch Fax: 218-927-6887

Aitkin COUNTY NEWS RELEASE

25 October, 2021

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Contact

Sheriff Dan Guida

Aitkin County Sheriff/Emergency Management Director

Phone: 218-927-7417

Email: Dan.guida@co.aitkin.mn.us

Aitkin County MHMP News Release #2 Documentation of News Release Postings

COUNTY POSTINGS

Aitkin County Sheriff's Office Facebook Page, October 26, 2021

Aitkin County Sheriff's Office
The Aitkin County Sheriff's Office is committed to safeguarding the lives and property of the citizenry.

Posts About Photos Videos

Intro
6.7K Followers
Page · Law Enforcement Agency
218 1st St NW, Aitkin, MN, United States, Minnesota
(218) 927-7435
co.aitkin.mn.us/departments/public-safety/public-safety.html
Always Open

Aitkin County Sheriff's Office
October 26 at 1:38 PM · 🌐
Aitkin County Sheriff
Daniel G. Guida
Aitkin COUNTY NEWS RELEASE... See more

SITES.GOOGLE.COM
Aitkin County
Aitkin County is currently in the process of updating its Multi-Hazard Mitigation Plan. Before the plan is submitted to the State of Minnesota...

Aitkin County Public Health Facebook Page, November 2, 2021

Aitkin County Public Health Education
Published by Brea Hamdorf · Just now · 🌐

AITKIN COUNTY SHERIFF
DANIEL G. GUIDA
217 1st St. N.W., Box 155
Aitkin, MN 55411
218-927-7435 / 1-800-495-4198
Zoozoozoo 911
Sheriff Fax: 218-927-7359 / Dispatch Fax: 218-927-6887

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Emergency Management Director

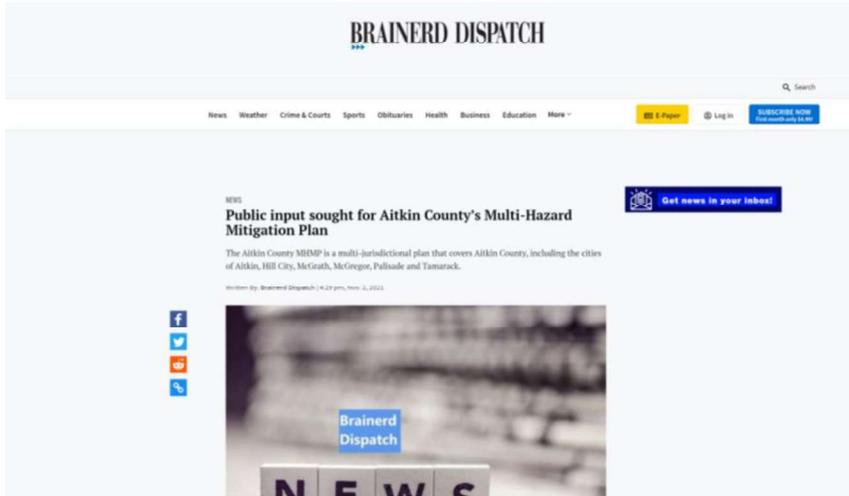
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snow, ice or wind storms, ensuring timely emergency communication to the pub
warning sirens and mass notification systems, and conducting public awareness

LOCAL MEDIA POSTINGS

Brainerd Dispatch

Online news, November 3, 2021



CITY POSTINGS

City of Aitkin

City of Hill City

Facebook Page, November 2, 2021



City of McGrath

City of McGregor

**City of Palisade
City Hall Posting, November 2, 2021**



**City of Palisade
Facebook posting, November 2, 2021**

A screenshot of a Facebook post from the City of Palisade, MN. The post text reads: "Aitkin 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 https://z.umn.edu/aitkin_hmp. The review and comment period is open through Sunday, November 7, 2021. After that, the county will submit the draft plan to the State of Minnesota and the Federal Emergency Management Agency (FEMA) for review. The complete press rele... See more". Below the text is a preview for "Aitkin County" with the text "Aitkin County is currently in the process of updating its Multi-Hazard Mitigation Plan. Before the plan is submitted to the State of Minnesota..." and interaction buttons for Like, Comment, and Share.

**City of Tamarack
City Hall Posting, November 2, 2021**



Aitkin County MHMP 2021

Online Public Review Website & Comment Form

Public Review Website

The Aitkin 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.

The screenshot shows a web page with a light blue header containing the text "Aitkin County" on the left and "MULTI-HAZARD MITIGATION PLAN 2021" in the center. Below the header, there is a paragraph of text explaining the update process and a red button labeled "SEND FEEDBACK". A list of links for various jurisdictions is provided, including Aitkin County, Hill Co., McGeary, McGregor, Pillsbury, and Tamarack. At the bottom, there is contact information for Stacy Stark and the U-Spatial logo with the University of Minnesota Duluth tagline "Driven to Discover".

Aitkin County

MULTI-HAZARD MITIGATION PLAN 2021

Aitkin County is currently in the process of updating its Multi-Hazard Mitigation Plan. Before the plan is submitted to the State of Minnesota and FEMA for approval, we need your feedback!

Please review the draft plan, in particular the mitigation actions for your jurisdiction. Click the red bar below to submit feedback about the Hazard Mitigation Plan and MACs.

SEND FEEDBACK

Select a link below to view the document online, or right-click and select "save link as" to download the pdf.

- [Aitkin County MHMP 2021 draft plan](#)
- [Aitkin County Mitigation Action Chart \(MAC\)](#)
- [Aitkin Mitigation Action Chart](#)
- [Hill Co. Mitigation Action Chart](#)
- [McGeary Mitigation Action Chart](#)
- [McGregor Mitigation Action Chart](#)
- [Pillsbury Mitigation Action Chart](#)
- [Tamarack Mitigation Action Chart](#)

For more information, please contact Stacy Stark at stark4@lumn.edu or visit <https://research.lumn.edu/units/spatial/services/hazard-mitigation-planning>

U-SPATIAL
UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover

Aitkin 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 Aitkin County, please answer the following questions to provide feedback and suggestions. Thank you!

Reviewer Information

- Name
- Email
- Job Title and Organization
- 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 Aitkin 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

The screenshot shows a web form titled "Aitkin County MHMP Feedback & Comments". At the top, it says "Upon reviewing the draft Multi-Hazard Mitigation Plan update for Aitkin County, please answer the following questions to provide feedback and suggestions. Thank you!". Below this is a user identification section showing "hundredsconsulting@outlook.com (not shared)" with a "Switch account" link and a "Required" indicator. The form consists of several input fields: "Name", "Email address", "Job Title and Organization", and "Jurisdiction you live in or are representing *". The jurisdiction section has radio button options for Aitkin, Hill City, McGrath, McGregor, Palisade, and Tamarack. Following these are four text input fields, each with a question: "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 Aitkin County to mitigate against future natural hazards? If not, please explain.", and "Do you have any other comments or suggestions on the plan before it is submitted to the State of Minnesota and FEMA for approval?". The final section is "How did you find out about this planning effort?" with radio button options for Colleague, Friend, Facebook Page, County Announcement/Flyer, County Email, Newspaper, and Other. At the bottom, there are "Submit" and "Clear form" buttons.

Appendix H – Minnesota Department of Health Climate & Health Report

Planning for Climate & Health Impacts in Northeast Minnesota

Emergency Management Considerations for HSEM Region 2

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.



Pagami Creek Fire (Greg Sietz, 2011)

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](http://www.health.state.mn.us/divs/climatechange/data.html)
(www.health.state.mn.us/divs/climatechange/data.html)

REGION 2 OVERVIEW

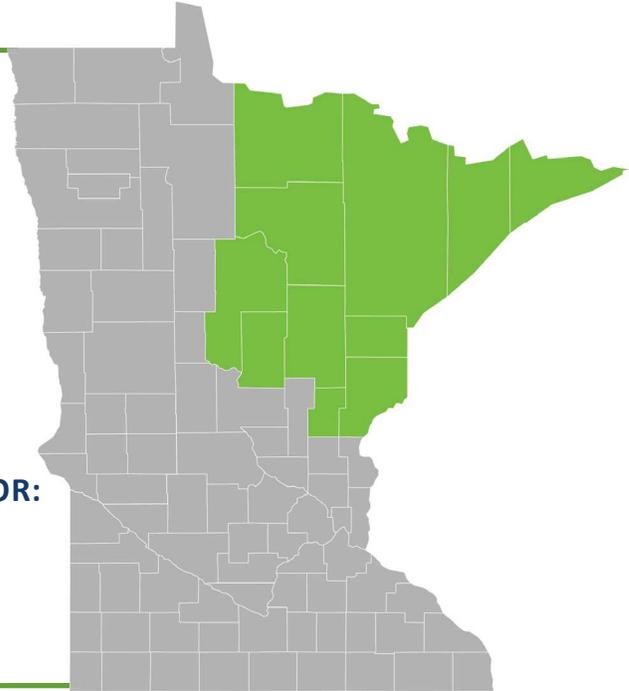
REGION 2: Northeast Minnesota

COUNTIES

- Atkin
- Carlton
- Cass
- Cook
- Crow Wing
- Itasca
- Kanabec
- Koochiching
- Lake
- Pine
- St. Louis

HSEM REGIONAL PROGRAM COORDINATOR:

Roy Holmes
218-327-4496
roy.holmes@state.mn.us



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 2 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 infrastructure, 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 2:



Average Summer Maximum Temperature for HSEM Region 2		
1981-2010	2050-2075	Change
77.2 °F	84.6 °F	+7.4 °F



Average Winter Minimum Temperature for HSEM Region 2		
1981-2010	2050-2075	Change
1.2 °F	11.3 °F	+10.1 °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 2 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 2		
1981-2010	2050-2075	Change
4.1"	4.7"	+0.6"



Average Early Fall Precipitation for HSEM Region 2		
1981-2010	2050-2075	Change
2.9"	2.9"	0.0"

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 2 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 2		
2015	2050	Change
76,714	66,044	-14%



Elder Population (65+) Projection Estimates for HSEM Region 2		
2015	2050	Change
93,639	121,876	+30%

REGION 2 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., wildfire) 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: WILDFIRE

DATE: 2011

The Pagami Creek Wildfire was first detected on August 18th, 2011 in Lake County, approximately 13 miles east of the town of Ely, inside the Boundary Waters Canoe Area Wilderness (BWCA). Likely caused by a lightning strike in a bog area, it grew to become the largest wildfire in Minnesota since 1918.

At first the fire kept to a small quarter acre within the bog, but on August 26th, a drop in relative humidity coupled with strong wind pushed flames up into tree tops spreading the fire to approximately 130 acres. Dry conditions and a lack of rain made fire suppression difficult. Then, on September 12th, extreme shifting winds caused the fire to expand dramatically in multiple directions to approximately 93,000 acres. Smoke from the Pagami Creek Wildfire drifted east and south to the Upper Peninsula of Michigan, Ontario, Chicago, even as far as Poland, Ukraine, and Russia. The extent of smoke drift demonstrates that while wildfires may occur locally, the air quality impacts are far-reaching.

REGION 2 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.

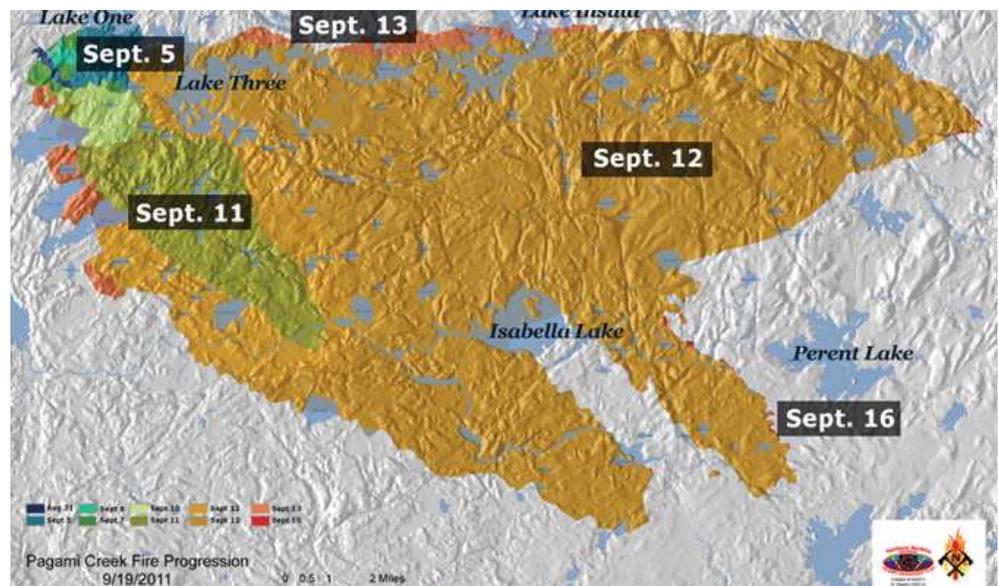
The extensive costs associated with the 2011 Pagami wildfire are difficult to capture in a single estimate. Besides evacuations and structural damage, there were substantial costs associated with mobilizing more than 960 firefighters and support personnel to suppress the fire and support affected communities. The Minnesota National Guard was called up to assist with response efforts. Some sources cite that the fire-fighting effort alone cost nearly 23 million dollars. Despite major investments in fighting the fire, essential resources were limited due to aircraft and personnel being dedicated to competing wildfires in the south and west regions of the U.S. In addition, months of battling the flames required a massive cleanup of more than 150 miles of fire hose, water pumps, watercraft, and other gear.

The following are just a few examples of the adverse impacts on HSEM Region 2 communities from the Pagami Creek Wildfire:

PUBLIC SAFETY: No fatalities occurred but there were major threats to firefighters and other emergency personnel during fire suppression response. In addition, the fires burned large portions of the BWCA wilderness, a very popular recreation destination, endangering visitors spread throughout a large area and beyond the reach of easy communication. Particulate matter from the fires posed a serious threat to respiratory health, particularly for individuals with asthma, lung disease, heart ailments, and other conditions. Air quality alerts were released across numerous Minnesota, Wisconsin, and Illinois counties.

DISPLACEMENT & DISRUPTED COMMUNITY NETWORKS: Fires threatened numerous homes, cabins, and businesses and required mandatory evacuation of at least 36 addresses and numerous campsites within the BWCA. Most of the eastern BWCA was closed during peak fire suppression response.

INFRASTRUCTURE FAILURES: Many county and Forest Service roads closed. Smoke and ash from the fire made land and air travel extremely dangerous. In some areas, visibility was reduced to one-and-a-half miles.





“

Smoke from the Pagami Creek Wildfire drifted east and south to the Upper Peninsula of Michigan, Ontario, Chicago, even as far as Poland, Ukraine, and Russia.

”

*Top: Firefighters in the BWCA (Steve Foss, 2011)
Bottom left: Aerial visual of smoke (NASA, 2011)
Bottom right: Smoke plume over water (Greg Seitz, 2011)*

CLIMATE PROJECTION DATA

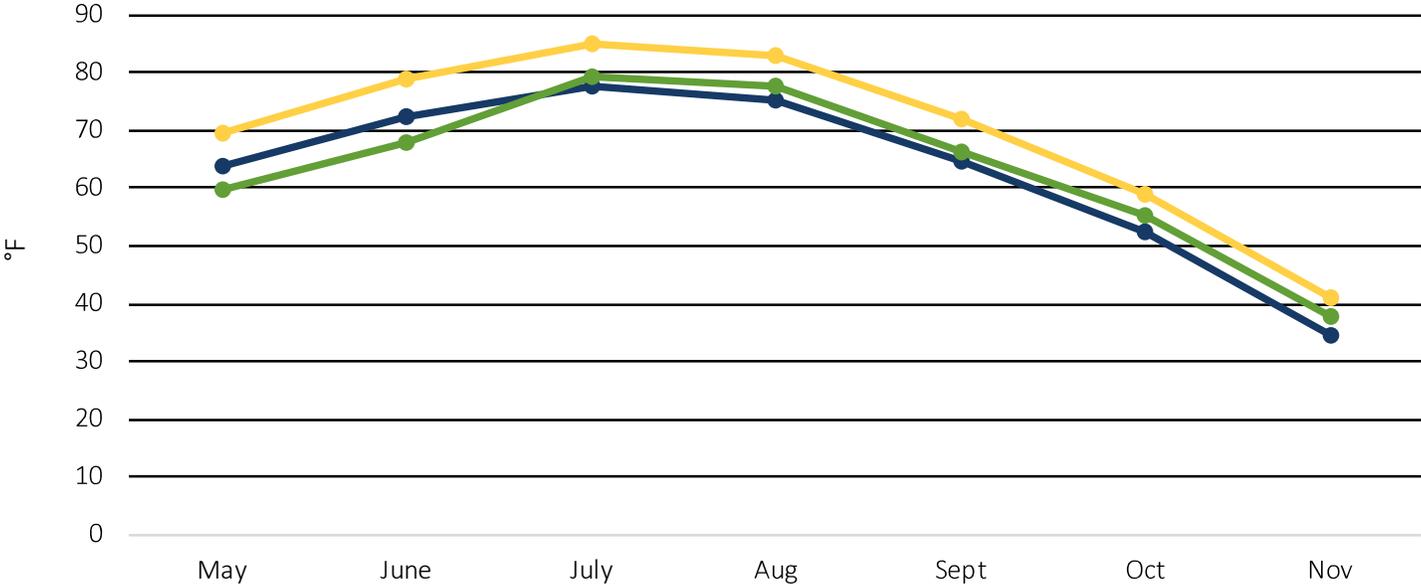
Following are visual representations of climate projection data for Region 2 Lake County, given that the Pagami Creek Wildfire burned mainly within this county. (Data for individual counties are available in the long-form report.) The graphs below compare future temperature and precipitation projection data (in yellow) with a historical climate baseline (in blue) and weather data associated with the Pagami wildfire (in green). Although wildfires seem to have an abrupt onset, they are often enabled by persistent weather conditions, like high temperatures and lack of rainfall. Thus, data are provided starting from the early part of summer to the end of fall to highlight conditions leading up to the event and those that persisted which exacerbated the spread of the fires and complicated management and risk reduction activities.

LEGEND

- **Historical:** 1981- 2010
- **Case Study:** 2011 wildfire
- **Projected:** 2050- 2074

Maximum Temperature

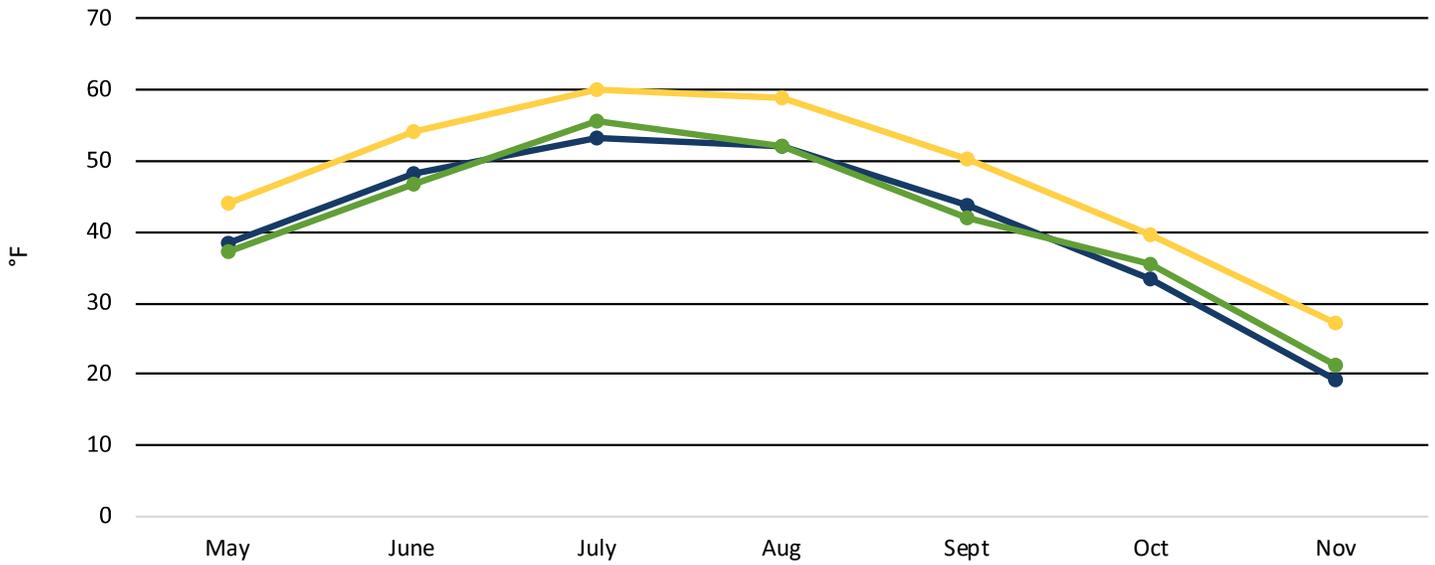
Trend comparison to 2011 wildfire data



	May	June	July	August	September	October	November
Historical	63.7	72.5	77.5	75.2	64.8	52.3	34.5
Case Study	59.9	68.0	79.5	77.6	66.3	55.2	37.7
Projected	69.4	78.8	85.1	82.9	72.1	59.0	41.2

Minimum Temperature

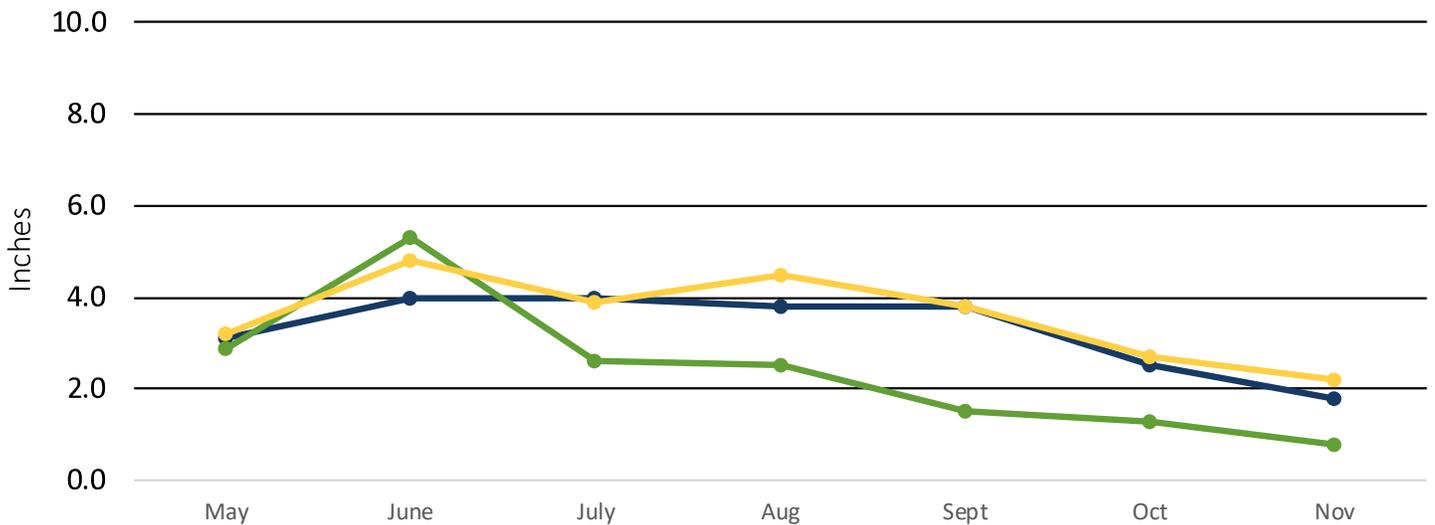
Trend comparison to 2011 wildfire data



	May	June	July	August	September	October	November
Historical	38.5	48.2	53.4	52.0	43.7	33.4	19.2
Case Study	37.2	46.6	55.5	52.0	42.0	35.6	21.3
Projected	44.2	54.1	60.1	59.0	50.4	39.7	27.1

Total Precipitation

Trend comparison to 2011 wildfire data



	May	June	July	August	September	October	November
Historical	3.1	4.0	4.0	3.8	3.8	2.5	1.8
Case Study	2.9	5.3	2.6	2.5	1.5	1.3	0.8
Projected	3.2	4.8	3.9	4.5	3.8	2.7	2.2

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 extended periods of low rainfall. Similar conditions in the past likely contributed to the 2011 Pagami wildfire disaster. Summer maximum and minimum temperatures were slightly above average leading up to the start of the wildfire. Midcentury climate estimates indicate that average summer maximum and minimum temperatures for Lake County will be approximately 6-8°F warmer than historical trends. These significantly warmer temperatures will likely increase the risk of wildfires, particularly in areas with existing vulnerabilities, such as dead or dying vegetation or expansion of residential development in wilderness areas.

Precipitation was well below average for the spring and summer season leading up to the start of the wildfire. This dry period continued into the fall season, making suppression efforts difficult. Midcentury climate estimates indicate minimal changes in average monthly precipitation for Lake County, with the exception of March, June, and August, which may receive well over a half inch additional rain compared to historical trends. The additional rain may help alleviate some of the fire pressures brought about by rising temperatures. However, climate experts predict that rainfall patterns will change across the Midwest, with rainfall occurring more often as heavy precipitation events separated in time by longer, more severe dry spells. Prolonged periods without rain can harden the ground so when rainfall does occur, it is less likely to be absorbed by the dry soil, and it will remain susceptible to fire.

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.

For example, in HSEM Region 2, population projections show a decrease in children but a substantial increase in seniors. Older people may be more at-risk for respiratory complications during dry, dusty periods, or have limited access to transportation if wildfires necessitate evacuation. 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](http://www.ncdc.noaa.gov/cag/), 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/
- [Incident Information System](https://inciweb.nwcg.gov/), InciWeb
National data source for incident related information, including wildfire.
<https://inciweb.nwcg.gov/>
- [Minnesota Climate and Health Profile Report \(PDF\)](http://www.health.state.mn.us/divs/climatechange/docs/mnprofile2015.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 \(PDF\)](http://www.health.state.mn.us/divs/climatechange/docs/mnclimvulnreport.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](https://mn.gov/admin/demography/data-by-topic/population-data/our-projections/), 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](http://www2.usgs.gov/climate_landuse/clu_rd/nccv/viewer.asp), United States Geological Survey
Source for all climate projection data presented in this profile.
www2.usgs.gov/climate_landuse/clu_rd/nccv/viewer.asp

RESOURCES & REFERENCES

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/>
- [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/>
- [Wildfire Information Center](#), Minnesota Department of Natural Resources
Information source for fire danger and updates, including fire weather forecasts for Minnesota.
https://www.dnr.state.mn.us/forestry/fire/wildfirereports_tools.html

REFERENCES

- United States Department of Agriculture Forest Service, 2012. [Pagami Creek Wildfire](#).
<https://www.fs.usda.gov/detail/superior/home/?cid=stelprdb5341928>



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Front cover photo: Pagami Creek Fire (Derek Montgomery, 2011)

Minnesota Department of Health

Climate & Health Program

health.climatechange@state.mn.us

651-201-4899

www.health.state.mn.us/divs/climatechange/



Appendix I – Critical Infrastructure

Appendix I

Aitkin County Critical Infrastructures

Healthcare Facilities

Name	Address	City	Zip	Type
Aicota Health Care Center	850 Second Street Northwest	Aitkin	56431	Nursing Homes
Aitkin Health Services	301 Minnesota Avenue South	Aitkin	56431	Nursing Homes
Aicota Health Care Center Inc	850 2nd Street NW	Aitkin	56431	Nursing Homes
Golden Horizons	518 7th Ave NE	Aitkin	56431	Nursing Homes
Northland Village McGregor	22027 420th Street	McGregor	55760	Nursing Homes
Rivers Edge Assisted Living In	11 Minnesota Avenue South	Aitkin	56431	Nursing Homes
Riverwood Healthcare Center	200 Bunker Hill Drive	Aitkin	56431	Hospitals

Emergency Services

Name	Address	City	Zip	Type
McGregor Volunteer Fire Department Station 2	49954 Lake Avenue	McGregor	55760	Emergency Medical Services (EMS)
McGregor Volunteer Fire Department Station 1 / McGregor Area Ambulance	101 East Center Avenue	McGregor	55760	Emergency Medical Services (EMS)
North Memorial Medical Transportation - Aitkin	500 Bunker Hill Drive	Aitkin	56431	Emergency Medical Services (EMS)
Palisade Volunteer Fire Department	48052 Nature Avenue	Palisade	56469	Emergency Medical Services (EMS)
Aitkin County Emergency Operations Center	217 2nd Street Northwest	Aitkin	56431	Emergency Operations Centers (EOC)
Aitkin County Sheriffs Department / Aitkin County Jail	217 2nd Street Northwest	Aitkin	56431	Law Enforcement Facilities
Hill City Police Department	111 West Henrietta Avenue	Hill City	55748	Law Enforcement Facilities
Aitkin Police Department	109 1st Avenue Northwest	Aitkin	56431	Law Enforcement Facilities

Emergency Services

Name	Address	City	Zip	Type
McGregor Police Department	101 East Center Avenue	McGregor	55760	Law Enforcement Facilities
Minnesota Department of Natural Resources Hill City Field Station	454 US Highway 169 North	Hill City		Fire Stations
Minnesota Department of Natural Resources McGrath Field Station	16082 State Highway 65	McGrath		Fire Stations
Minnesota Department of Natural Resources Sandy Lake Field Station	49928 Lake Avenue	McGregor		Fire Stations
Minnesota Department of Natural Resources Aitkin Area Office	1200 Minnesota Avenue South	Aitkin		Fire Stations
Hill City Fire Department	111 Henrietta Avenue Southwest	Hill City		Fire Stations
Jacobson Fire Department	68368 198th Avenue	Jacobson		Fire Stations
McGregor Volunteer Fire Department Station 1 And Ambulance Service	101 East Center Avenue	McGregor		Fire Stations
Aitkin Fire Department	109 1st Avenue Northwest	Aitkin		Fire Stations
McGrath Fire Department	West Main Street	McGrath		Fire Stations
McGregor Volunteer Fire Department Station 2	49954 Lake Avenue	McGregor		Fire Stations
Palisade Volunteer Fire Department	48052 Nature Avenue	Palisade		Fire Stations

Schools & Shelters

Name	Address	City	Zip	Type
McGregor Elementary	148 S 2nd St	McGregor	55760	School
McGregor Area Learning Program	148 S 2nd St	McGregor	55760	School
Aitkin Alternative Learning Program	12 7th St NW	Aitkin	56431	School
Minisinaakwaang Leadership Academy	20930 367th Ln	McGregor	55760	School
McGregor Secondary	148 S 2nd St	McGregor	55760	School
Hill City Middle School	500 Ione Ave	Hill City	55748	School
Aitkin Secondary School	306 2nd St NW	Aitkin	56431	School
Hill City Elementary	500 Ione Ave	Hill City	55748	School
Rippleside Elementary	225 2nd Ave SW	Aitkin	56431	School
Hill City Senior High	500 Ione Ave	Hill City	55748	School
Long Lake Conservation Center	28952 438th Lane	Palisade	56469	Shelter
McGregor Schools (ISD 4)	148 South 2nd Street	McGregor	55760	Shelter
Hill City School	500 Ione Avenue	Hill City	55748	Shelter
Aitkin Public Schools (ISD 1)	306 2nd St NW	Aitkin	56431	Shelter
Bethel Lutheran Church	112 1 Ave SW	Aitkin	56431	Shelter
Aitkin City Hall	109 1st Ave NW	Aitkin	56431	Shelter
Palisade Fire Department and Community Center	48052 Nature Ave	Palisade	56469	Shelter

Schools & Shelters

Name	Address	City	Zip	Type
Palisade City Hall	48052 Nature Avenue	Palisade	56469	Shelter
Aitkin Westside Church	810 2nd St NW	Aitkin	56431	Shelter
Macville Township	34375 605th Lane	Hill City	55748	Shelter
Glory Baptist Church	28053 360th Ave	Aitkin	56431	Shelter
St. James Church	299 Red Oak Drive	Aitkin	56431	Shelter
Rippleside Elementary School	225 2nd Ave SW	Aitkin	56431	Shelter
District II (East Lake) Community Center	36666 State Hwy 65	McGregor	55760	Shelter

Transportation

Name	Address	City	Zip	Type
Aitkin Muni-Steve Kurtz Field	109 1st Ave. NW	Aitkin	56431	Airport
Hill City-Quadna Mountain	125 Lake Ave, Box 160	Hill City	55748	Airport
Isedor Iverson	P.O. Box 100	Mc Gregor	55760	Airport

Utilities

Name	Address	City	Zip	Type
Glen	Great River Energy			Electrical Infrastructure
McGregor	Great River Energy			Electrical Infrastructure
Round Lake	Great River Energy			Electrical Infrastructure
Palisade	Great River Energy			Electrical Infrastructure
Spirit Lake	Great River Energy			Electrical Infrastructure
Aitkin	Great River Energy			Electrical Infrastructure
Kimberly	Great River Energy			Electrical Infrastructure
Hill City	Great River Energy			Electrical Infrastructure
Hill City Wastewater Treatment Plant	125 Lake Ave	Hill City	55748	Wastewater Treatment Plant
Aitkin Wastewater Treatment Plant	4th Ave NW	Aitkin	56431	Wastewater Treatment Plant
Palisade Wastewater Treatment Plant	30509 480th St	Palisade	56469	Wastewater Treatment Plant
Tamarack Wastewater Treatment Plant	165 Orvis Ave	Tamarack	55787	Wastewater Treatment Plant

Utilities

Name	Address	City	Zip	Type
McGregor Wastewater Treatment Plant	97 Pond Ln	McGregor	55760	Wastewater Treatment Plant

Hazardous Materials Facilities

Hazardous Materials Facilities have been omitted from this document due to security considerations.

Major Employers

Name	Address	City	Zip
Aitkin County Land Department	502 Minnesota Ave N	Aitkin	56431
Aitkin County Highway Department	1211 Air Park Dr	Aitkin	56431
Aitkin County Health & Human Services	204 1st St NW	Aitkin	56431
Aitkin County Judicial Center	209 2nd St NW	Aitkin	56431
Aitkin County Government Center	307 2nd St NW	Aitkin	56431
Floe International & Hoyt McGregor Payroll	48473 State Highway 65	McGregor	55760
Riverwood Health Care Center	200 Bunker Hill Dr	Aitkin	56431
Aitkin County	307 2nd St NW	Aitkin	56431
Aitkin Public Schools	306 2nd St NW	Aitkin	56431
McGregor Public Schools	148 S 2nd St	McGregor	55760
Aicota Health Care Center	850 2nd St NW	Aitkin	56431
Aitkin Iron Works	301 Bunker Hill Dr	Aitkin	56431
Woodland Container, Inc.			

Appendix J – Mitigation Actions by Jurisdiction

City of Aitkin Mitigation Action Chart

CITY OF AITKIN							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 Everbridge emergency notification alert system.	Existing High Ongoing	City Admin, City EM	The fire hall has an open house once per year, and they promote signing up. We can also begin to use our city website and Facebook page to encourage residents to sign up on the county website.	City	
2	Severe Winter & Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events and extended power outages.	Existing High Ongoing	City Admin, City EM	We will work to share information about severe weather and being prepared for it by using our city website and Facebook page. We can help post information we receive from Aitkin County Emergency Management (i.e., during Severe Weather Awareness Week).	City	
3	Severe Winter & Summer Storms	Education & Awareness Programs	Purchase generators for the fire hall, police dept, public utilities garage, and lift stations to provide emergency backup power.	New High TBD	City Admin, City EM, City Street Dept.	The city will purchase generators as our budget allows.	City	
4	Severe Summer Storms	Local Planning & Regulations	Designate a storm shelter facility in the city and develop a storm shelter plan.	New High TBD	City Admin, City EM, City Street Dept.	We need to identify a designated facility within the city to serve as a storm shelter for those that do not have a basement and address planning for how to notify people it is open in advance of a severe storm event.	City	
5	Flooding	Structure & Infrastructure Projects	Increase the elevation and provide pump stations and a culvert on 4th Ave. NW in order to make sure we have access to the street shop, protect homes, protect the sewer collection system, and protect the substation.	Existing High TBD	City Admin, City EM, City Street Dept.	This will be addressed with the upcoming waste water treatment plant design.	City	

CITY OF AITKIN**Mitigation Action Chart**

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
6	Wildfire	Local Planning & Regulations	Encourage creation of defensible space for new development that occurs in forested areas.	New Moderate TBD	City Admin, City EM	As new development occurs, we will encourage incorporation of defensible space to reduce wildfire risk.	City

City of Hill City Mitigation Action Chart

CITY OF HILL CITY

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 Everbridge emergency notification alert system.	Existing High Ongoing	City Admin, City EM	It has been in our city newsletters and is on our website and Facebook	City
2	Severe Winter & Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events and extended power outages.	Existing High Ongoing	City Admin, City EM	The city has recently increased use of our website and Facebook page to communicate with residents on emergency preparedness.	City
3	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Obtain a portable generator for our City Hall and community center, which is our designated mass care shelter.	New High TBD	City Admin, City EM, City PW	The city will purchase generators as funding allows.	City
4	Severe Summer Storms	Structure & Infrastructure Projects	Upgrade the city's outdoor warning siren.	New High TBD	City Admin, City EM, City PW	We will work to upgrade the warning siren and to have it connected to the county's testing and activation system. We will seek to apply for grant funding to purchase the siren.	City, USDA CF Grant Program
5	Severe Summer Storms	Structure & Infrastructure Projects	Construct a storm shelter or tornado safe room for the Hill City Park & Campground to protect campers from high wind or tornado events.	New High TBD	City Admin, City EM, City PW	We will work with Aitkin County Emergency Management to assess the need for a storm shelter at our municipal campground and identify the best course of action. Additional funding for construction of a facility will be needed (i.e., FEMA HMA).	City, County, FEMA HMA grant
6	Flooding	Structure & Infrastructure Projects	Conduct culvert improvements and ditching to help with water flow during heavy rains.	Existing High Ongoing	City PW	This is an ongoing effort of the city's Public Works department.	City
7	Flooding	Education & Awareness Programs	Encourage homeowners to clear leafy and woody debris from roadside gutters to avoid impacting the city's stormwater system during high rain events.	Existing High Ongoing	City Admin, City PW	This is an ongoing effort by the city each spring and fall. It helps to prevent clogging and over the road flooding in these areas.	City

City of McGrath Mitigation Action Chart

CITY OF MCGRATH

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 Everbridge emergency notification alert system.	New High Ongoing	City Admin, City EM	We can seek to encourage residents to more actively sign up for the county's emergency notification system by making announcements at meetings or posting flyers in public areas.	City
2	Severe Winter & Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events and extended power outages.	New High Ongoing	City Admin, City EM	We will work to share information we receive from Aitkin County Emergency Management about severe weather and how to be prepared for it by sharing information with residents via flyers or announcements.	City
3	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Obtain a portable generator for the city in the event of a power outage.	New High TBD	City Admin, City EM	We will work with Aitkin County Emergency Management on this.	City
4	Severe Summer Storms	Structure & Infrastructure Systems	Construct a storm shelter or tornado safe room for the community.	New High TBD	City Admin, City EM	We will work with Aitkin County Emergency Management to assess the potential for this project, what would be most suitable, and proceed with constructing a shelter as funding allows.	City, Other (TBD)

City of McGregor Mitigation Action Chart

CITY OF MCGREGOR 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 Everbridge emergency notification alert system.	New High Ongoing	City Admin, City EM	We have not done anything with this to date. We do not have a city website or Facebook page, but we can hang up community flyers and make announcements at city council meetings to direct residents to sign up on the Aitkin County website.	City
2	Severe Winter & Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events and extended power outages.	New High Ongoing	City Admin, City EM	Same as above. We can use our city meetings and flyers to share information that we receive from Aitkin County about severe weather and how to be prepared for it.	City
3	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Purchase generators to support critical infrastructure and essential services in the event of a power outage.	New High TBD	City Admin	Backup generators are needed for our water & sewer systems, fire hall, community center, and City Hall. We will purchase generators as funding allows.	City
4	Severe Winter & Summer Storms	Structure & Infrastructure Systems	Replace our current metal frame fire station with a precast concrete structure that will better withstand extreme weather conditions.	New Moderate TBD	City Admin	This is an infrastructure project that the city is budgeting for.	City
5	Severe Summer Storms	Structure & Infrastructure Systems	Replace our current outdoor warning siren and add an additional siren to better cover the city.	New High TBD	City Admin	We will work with Aitkin County Emergency Management on this effort and apply to the USDA Community Facilities grant program for funding to purchase sirens.	City, USDA CF Grant
6	Severe Summer Storms	Structure & Infrastructure Systems	Construct a storm shelter or tornado safe room for the community.	New High TBD	City Admin	The city has had many complaints about not having storm shelters for residents that live in mobile homes so we would like to find funding to construct shelters.	City, FEMA HMA
7	Flooding	Structure & Infrastructure Systems	Replace Ditch 5 in order to better handle high-rain events.	New Moderate TBD	City Admin	We will work with Aitkin County on this effort to reduce artificially high water levels.	City, County

CITY OF MCGREGOR**Mitigation Action Chart**

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
8	Flooding	Local Planning & Regulations	Ensure the city has a Floodplain Ordinance in place.	New Moderate 2021-2022	City Admin	We will work with MN DNR Floodplain Manager to create & adopt a FP ordinance as part of our participation in the NFIP.	City
9	Wildfire	Education & Awareness Programs	Educate residents on how to reduce the risk to property from wildfire.	New Moderate Ongoing	City Admin	We will do outreach to residents who live in the wildland-urban interface areas of the city that may be at higher risk to wildfire.	City

City of Palisade Mitigation Action Chart

CITY OF PALISADE

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 Everbridge emergency notification alert system.	New High Ongoing	City Admin, City EM	We have not done anything to date but we wish to start soon. We do not have a city website or Facebook page. We can hang up community flyers and make announcements at city council meetings.	City
2	Severe Winter & Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events and extended power outages.	New High Ongoing	City Admin, City EM	Same as above. We can see to share information we receive from Aitkin County Emergency Management about severe weather and how to be prepared for it.	City
3	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Purchase at least two portable generators on wheels and perhaps a permanent one for the fire hall/community center.	New High TBD	City Admin, City EM	The city will purchase generators as funding allows. Additional funding may be needed from a grant source to purchase generators.	City, Other (TBD)
4	Severe Summer Storms	Structure & Infrastructure Systems	Repair or replace the city's outdoor warning siren.	New High TBD	City Admin, City EM	We will work with Aitkin County Emergency Management on this effort and seek funding from the USDA Community Facilities Grant Program if purchasing a new siren.	City, USDA CF Grant
5	Extreme Cold/Heat	Mitigation Preparedness & Response Support	Designate a city facility to serve as a temporary shelter if the power goes out during a period of extreme cold or heat to serve our vulnerable residents.	New High 2021-2022	City Admin, City EM	We will determine what facility may be best (fire hall or community center) and create a plan for how we would provide outreach to residents during a power outage event that necessitated temporary sheltering.	City
6	Flooding	Structure & Infrastructure Systems	Complete city street project to create a catch basin for flood water.	In-Progress High 2021-2026	City Maintenance	Our city street project is in progress over the next several years.	City

City of Tamarack Mitigation Action Chart

CITY OF TAMARACK

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 Everbridge emergency notification alert system.	Existing High Ongoing	City Admin, TAEP	A link to the county's Everbridge emergency notification system is posted on our city Facebook page. We also make announcements at city council meetings and post information on local bulletin boards as well as in our city newsletter.	City
2	All-Hazards	Mitigation Preparedness & Response Support	Work with Aitkin County Emergency Management to improve our emergency planning for the city.	New High Ongoing	City Admin, TAEP	The Tamarack Area Emergency Planners (TAEP) group will work with Aitkin County Emergency Management on our local planning for things such as communication, evacuation, etc.	City
3	Severe Winter & Summer Storms	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events and extended power outages.	New High Ongoing	City Admin, TAEP	We have a monthly newsletter that goes out to residents and a city Facebook page that we can use to share information.	City
4	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Purchase one or more portable generators for emergency backup power for the city in the event of a power outage.	New High TBD	City Admin, TAEP	We will work with Aitkin County Emergency Management on obtaining portable generators and will purchase them as the city budget allows or additional funding is available.	City
5	Severe Summer Storms	Structure & Infrastructure Systems	Construct a storm shelter or tornado safe room in a central location for city residents.	New High TBD	City Admin, TAEP	We would like to construct a pavilion with a storm shelter/tornado safe room. This is a project we will seek guidance on from Aitkin County Emergency Management on. Outside grant funding would be needed.	City, FEMA HMA, Other (TBD)
6	Severe Summer Storms	Local Planning & Regulations	Put a policy in place for building specifications for any future mobile homes in the city to ensure they are physically secured for high wind events.	New High TBD	City Admin, TAEP	The city will confer with Aitkin County planning & Zoning on what kind of policy may be best to create.	City