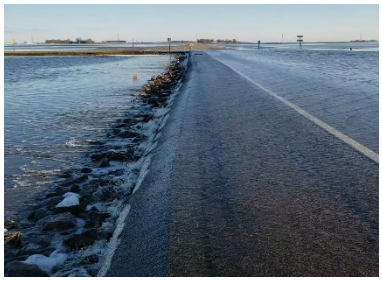
TRAVERSE COUNTY MINNESOTA


2021

Multi-Hazard Mitigation Plan

Approved April 15, 2022

Traverse County Minnesota

U-SPATIAL
University of Minnesota Duluth
Driven to Discover℠

TRAVERSE COUNTY MINNESOTA

MULTI-HAZARD MITIGATION PLAN

Lynn Siegel
Emergency Management Director
Traverse County Emergency Management
708 3rd Ave. N
Wheaton, MN 56296

320-563-0872

Prepared By:

U-Spatial
Research Computing | Office of the Vice President for Research
1208 Kirby Drive
University of Minnesota Duluth
Duluth, MN 55812

218-726-7438

Contents

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).

Traverse 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 Traverse 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 Traverse County Emergency Management to facilitate an update to the 2015 Traverse 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 Traverse 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 Traverse County, including the cities of Browns Valley, Dumont, Tintah, and Wheaton. The Traverse 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 Traverse County after final approval by FEMA (see Appendix D).

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

- Include more recent data documenting the critical infrastructure and hazards faced by Traverse 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 Traverse 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 Traverse County MHMP planning team is headed by the Traverse County emergency manager, who is the primary point of contact. Members of the Traverse 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
Lynn Siegel	Traverse County Emergency Management	Emergency Management Director
Trevor Wright	Traverse County Sheriff's Office	County Sheriff
Tom Monson	Traverse County Board of Commissioners	Commissioner
Chad Gillespie	Traverse County Highway Department	County Highway Engineer
Janelle Tritz	Traverse County Highway Department	Hwy. Dept. Accountant
Mike Doll	Traverse County Highway Department	Engineering Technician
Sara Gronfeld	Traverse County SWCD	District Manager
Ben Oleson	Traverse County Land Management Office	Zoning Administrator
Dustin Kindelberger	Traverse County Veteran Services	Veteran Service Office/Safety
Dianne Reinart	Traverse County Assessor's Office	County Assessor
Lisa Zahl	Traverse County Human Resources	HR Director/ County Coordinator
Jodi Hook	City of Browns Valley	City Administrator
Gail Thiel	City of Dumont	City Clerk
Amy Olson	City of Wheaton	City Administrator
Delane Anderson	Monson Township	Supervisor
Heather Muehler	Sanford Wheaton Medical Center	Manager of Ancillary Services
Chelsie Falk	Sanford Wheaton Medical Center	Senior Director
Daniel Posthumus	Wheaton Area Schools	Superintendent
Karen Lupkes	Traverse Electric Cooperative, Inc.	Office Manager
Joel Janorschke	Traverse Electric Cooperative, Inc.	General Manager
Troy Fridgen	Bois de Sioux Watershed District	Engineer Technician / Ditch Inspector

Name	Agency/Organization	Participant Title
Julie Anderson	Douglas County Emergency Management	Emergency Management / Public Information Officer
Dona Greiner	Stevens County Emergency Management & Big Stone County Emergency Management	Emergency Management Director for both counties

2.2 Review of Existing Plans, Capabilities & Vulnerabilities

Traverse County and its local communities utilized a variety of planning documents to direct plan development. These documents included a Comprehensive/Master Plan, Emergency Operations Plan, Transportation Plan, etc. (see Appendix D for a full listing of plans and programs in place in Traverse 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 Traverse 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 Traverse 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 Traverse 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 Traverse County to support mitigation.

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

2.3 Planning Process Timeline and Steps

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

2.3.1 TRAVERSE COUNTY STAKEHOLDER COORDINATION

On May 5, 2020, U-Spatial hosted an online kickoff meeting that was attended by the Traverse 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 July 24, 2020, Traverse County issued a news release inviting public feedback and participation for the Traverse County MHMP update (for complete documentation, see Appendix G).

A planning team meeting took place on October 14, 2020, via Zoom video conference hosted by U-Spatial. Meeting participants included representatives from Traverse 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 Traverse County MHMP update, as well as the roles and responsibilities of planning team members. During the meeting, participants discussed the prioritization of natural hazards facing the county and local jurisdictions, provided feedback on plans and programs in place, and identified mitigation actions that would reduce future risk. Information gathered during this meeting was used to inform the development of mitigation strategies in the updated plan. See Appendix F for a full meeting summary.

On November 3, 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 Traverse County. Draft mitigation strategies were developed for Traverse County and each city participating in the plan (see Appendix F).

In order to provide opportunity for public input, Traverse County issued a second news release January 14, 2022, inviting public review and feedback on the draft plan. The news release provided information on where to view the plan and submit comments. U-Spatial hosted a webpage to post the full draft of the Traverse County MHMP, including excerpts of the Traverse 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 Traverse County and jurisdictions. The public feedback period for the draft plan was open from 1/14/22 to 1/27/22, for a total of 14 days.

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

Event	Date	Appendix
Kickoff Webinar	5/5/20	Appendix F, Planning Team Meetings
News Release #1	7/24/20	Appendix G, Public Outreach & Engagement Documentation
Planning Team Meeting #1	10/14/20	Appendix F, Planning Team Meetings
Planning Team Meeting #2	11/3/21	Appendix F, Planning Team Meetings
News Release #2	1/14/22	Appendix G, Public Outreach & Engagement Documentation

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

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

2.3.2 OVERVIEW OF JURISDICTIONAL PARTICIPATION

Throughout the planning process, Traverse 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 Traverse 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 Traverse 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 Traverse 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 Traverse 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. Traverse 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 Traverse 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
Traverse County (3360)	X	X	X	X	X	X
City of Browns Valley (558)	X	X	X	X	X	X
City of Dumont (75)	X	X	X	X	X	
City of Tintah (67)	X		X	X		
City of Wheaton (1460)	X		X	X	X	
Neighboring Jurisdictions:						
Douglas County		X				
Big Stone County		X			X	
Stevens County		X			X	
Wilkins County						
Grant County						

Section 3 – Traverse County Profile

3.1 General County Description

Traverse County is located in west-central Minnesota, approximately 180 miles northwest of the Twin Cities. It is bounded on the north by Wilkin County, on the east by Otter Tail and Grant Counties, on the south by Big Stone County, and by the states of North and South Dakota to the west. The land area of the county is comprised of approximately 586 square miles and there are 23 protected lakes and 3 major watersheds.

There are two cities and fifteen townships in Traverse County. The City of Wheaton is the county seat and most populated city. Wheaton was home to a population of 1,424 in 2010. The county had an estimated total population of 3,259 in 2019.

Traverse County is largely agricultural. The majority of the county's land is cropland, producing primarily corn and soybeans. Traverse County is the least-populous county in Minnesota. There is one airport in the county, located southwest of the City of Wheaton.

3.2 Environmental and Geologic Characteristics

The Prairie Pothole Region covers 300,000 square miles in central North America, including west-central Minnesota and Traverse County. Minnesota's portion of the Prairie Pothole Region is tallgrass prairie, where grasses sometimes grow six or seven feet high. This region gets its name from the once extensive grassland that was dotted with millions of shallow wetlands called potholes, formed as a result of glacial activity.

The glaciers that retreated from this region more than 12,000 years ago left behind depressions in the prairie that filled with water. These pothole wetlands are most well known for their importance to waterfowl; it is estimated that more than half the waterfowl born in North America comes from this area. Prior to European settlement, the Prairie Pothole Region was a paradise for waterfowl, prairie chickens, bison, wolves, and other prairie wildlife.

The glaciers also left behind very fertile soil, which made this part of the country attractive for agricultural development. Agriculture changed the landscape by breaking up the prairie sod and draining potholes, which resulted in the loss of many of these natural habitats.

Traverse County's soil type is primarily clay loam to silty clay loam. Over three quarters of Traverse County lies in the agriculturally productive glacial lake plain of the Red River Valley. The land in Traverse County has been extensively drained for improved agricultural production in the last century. Increased volume and velocity of cropland drainage has led to more soil erosion by water, resulting in degradation of the clarity and quality of water throughout the county.

3.3 Hydrography

Traverse County lies primarily in the Red River of the North Basin, with a small portion in the southwest corner of the county located in the Minnesota River Basin. There are three major watersheds in Traverse County, including the Bois de Sioux River, Mustinka River, and Minnesota River–Headwaters watersheds. The Mustinka River watershed is the largest, spanning over 350 square miles within Traverse County, or 60% of the county.

Traverse County contains a number of Protected Waters (formerly called Public Waters), which are lakes, wetlands, and watercourses regulated by the Minnesota DNR. The inventory of the protected waters in the county includes 23 lakes, 38 watercourses (rivers and streams), and 32 wetlands (MN DNR, 2019a).

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

3.3.1 GROUNDWATER

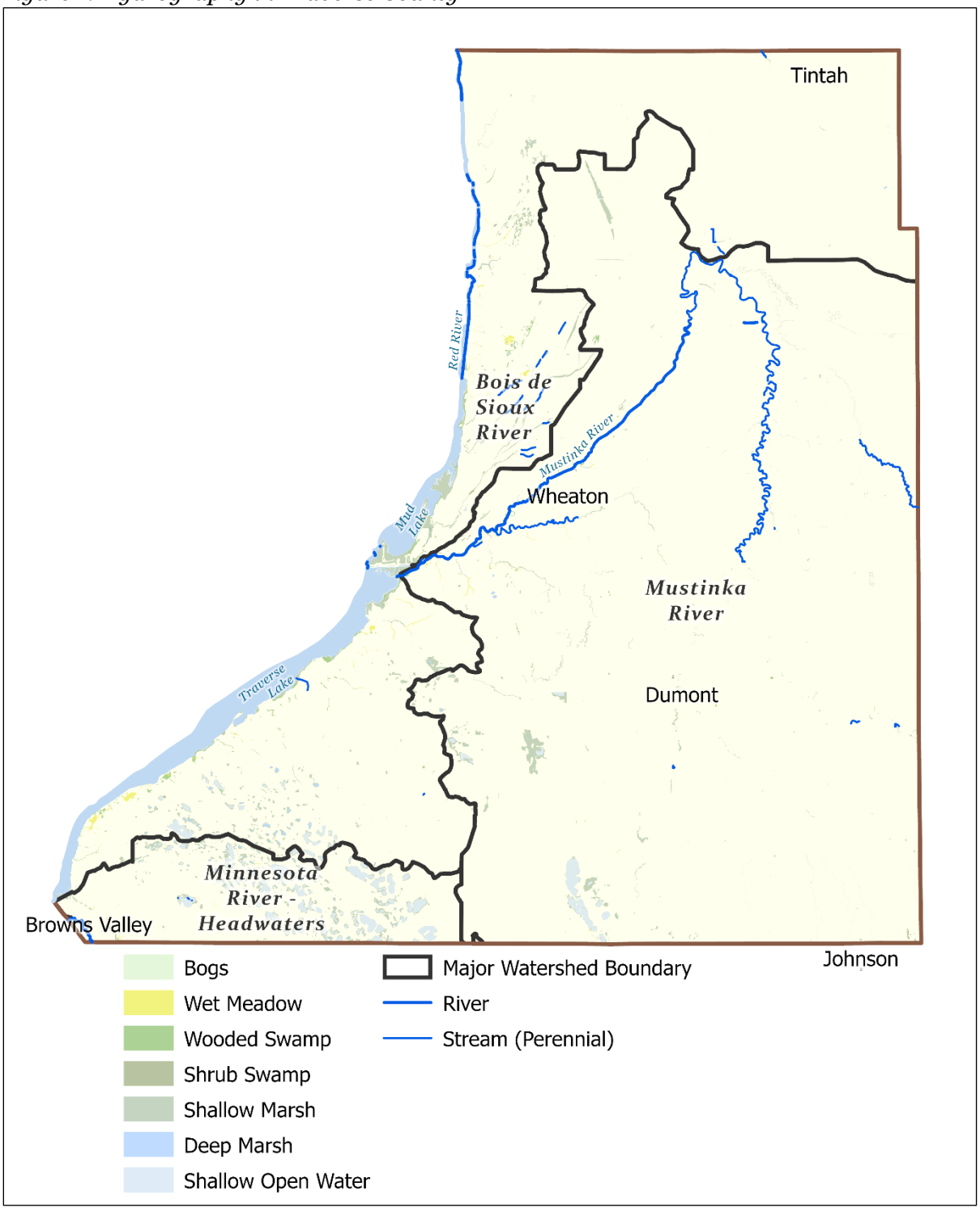
Groundwater serves a variety of vital functions in Traverse County and is an extremely important resource. All domestic water supplies, public and private, are drawn from groundwater sources. Groundwater has provided a reliable and relatively high-quality source of water for both domestic and livestock consumption. Unlike many other counties in Minnesota, irrigation uses a very small percentage of water.

Groundwater is found in both surficial and buried aquifers within the clayey glacial drift. It is also found in cretaceous sediments and, to a limited degree, within bedrock. Fractured bedrock is usually buried deeply beneath glacial sediments and is only locally used as an aquifer. Water from aquifers in the glacial drift is generally very hard and high in dissolved solids and iron. Surficial aquifers tend to have lower dissolved solids and iron content. However, they are far more easily contaminated by surface water pollutants.

Based on information provided by the MN DNR, there are four municipal water suppliers (Browns Valley, Dumont, Wheaton, and Tintah) within Traverse County which are permitted by the DNR to draw a total of 201 million gallons of water per year from various groundwater sources (MPCA, 2015).

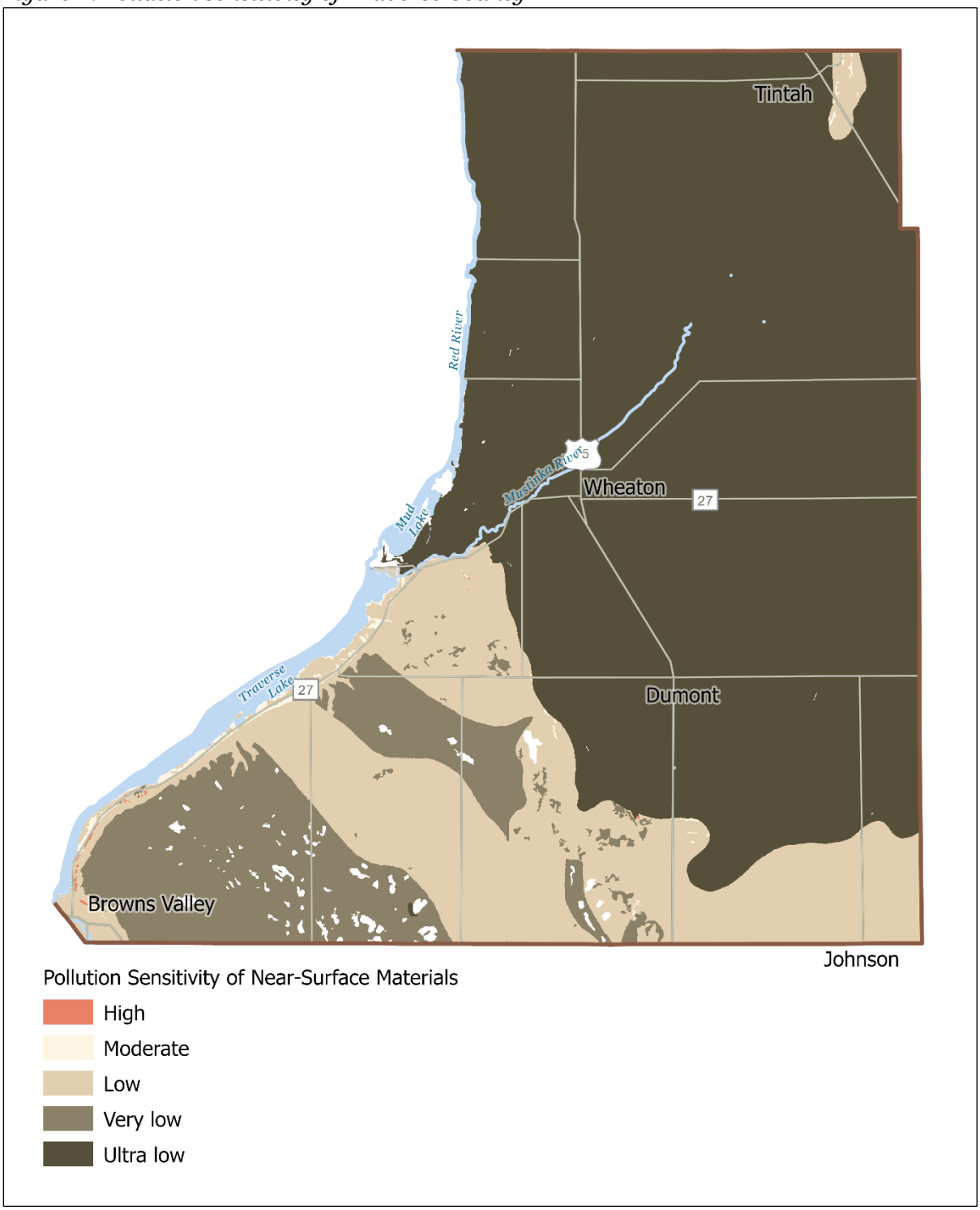
With such an abundance of groundwater available, it is important to examine how sensitive this natural resource is to pollution. Groundwater sensitivity to pollution is measured by flow rate and soil permeability. Figure 2 maps pollution sensitivity of near-surface materials based on the time it takes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

Figure 1. Hydrography in Traverse County



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

Figure 2. Pollution sensitivity of Traverse County



SOURCE: (MPCA, 2018A)

3.3.2 LAKES

There are 23 protected lakes in Traverse County. The largest lake in the county is Traverse Lake, which spans 5,637 acres within the county. It covers 10,849 acres total and forms part of the county's western border with South Dakota. Traverse Lake is man-made and was created for a U.S. Army Corps of Engineers water retention project. Approximately 2% of Traverse County is covered by open water.

The MPCA classifies the following lakes as impaired: Mud Lake and Traverse Lake (MPCA, 2020). Lakes in Traverse County have been identified as "impaired" due to pollutants or stressors found in these waters; examples include mercury in fish tissue, and eutrophication. Impaired waters do not meet the State's water quality standards and they affect growth and health of communities and economies. The Clean Water Act has a mandate requiring every state to address impairments (US EPA, 2015).

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

3.3.3 RIVERS

Three major rivers flow through Traverse County: the Bois de Sioux River, Mustinka River, and the Little Minnesota River. The Little Minnesota River flows briefly through the county in the southwestern corner, before joining the Minnesota River to the south. The 68-mile-long Mustinka River flows through the county from the east, before emptying into Lake Traverse. Lake Traverse is then drained by the Bois de Sioux River which is 30 miles long and a tributary of the Red River. The Bois de Sioux River forms part of the county's western border with North and South Dakota. There are no state water trails in the county (MN DNR, 2020d).

The MPCA classifies a number of rivers in Traverse County as "impaired," including the Bois de Sioux River and Mustinka River.

3.3.4 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.

Traverse County contains many wetlands mostly in the southwestern section of the county. These wetlands total 25,033 acres and cover 6.7% of the county (MN DNR, 2019c). These wetlands are mostly shallow open water (10,548 acres), seasonally flooded basin (7,014 acres) and shallow marsh (5,387 acres). The variety of wetland types are presented in the hydrography map (MN DNR, 2019d). The variety of wetland types are presented in the hydrography map in Figure 1.

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 Traverse County.

3.4 Climate

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

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

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

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

Month	MN Climate Division 4 1981–2010	MN Climate Division 4 1990–2020	MN Statewide 1981–2010	MN Statewide 1990–2020
January	10.9°F	11.0°F	9.9 °F	10.1 °F
February	16.3°F	15.4°F	15.4 °F	14.7 °F
March	28.8°F	28.7°F	27.9 °F	27.8 °F
April	44.3°F	43.2°F	42.9 °F	41.9 °F
May	56.9°F	56.5°F	55.1 °F	54.8 °F
June	66.1°F	66.6°F	64.4 °F	64.8 °F
July	70.7°F	70.6°F	69.0 °F	69.0 °F
August	68.5°F	68.3°F	66.8 °F	66.8 °F
September	59.1°F	60.2°F	57.7 °F	58.6 °F
October	45.9°F	46.2°F	44.8 °F	45.1 °F
November	29.9°F	30.6°F	29.2 °F	29.8 °F
December	15.2°F	17.2°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 4 profile. Appendix H provides the full MDH profile for Region 4, which includes Otter Tail 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).

Potential 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.

Table 5. Temperature trends for HSEM Region 4

Average Summer Maximum Temperature			Average Winter Minimum Temperature		
1981–2010	2050–2075	Change	1981–2010	2050–2075	Change
80.7 °F	88.3 °F	+7.6 °F	4.5 °F	14.3 °F	+9.8 °F

SOURCE: (MDH, 2018)

While a longer growing season may increase total crop production, other climate changes, such as increased crop losses and soil erosion from more frequent and intense storms and increases in pests and invasive species, could outweigh this benefit.

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

Precipitation

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

> There has been an increase in total average as well as heavy precipitation events, with longer periods of intervening dry spells. Our historical rainfall patterns have changed substantially, giving rise to larger, more frequent heavy downpours. Minnesota's high-density rain gauge network has captured a nearly four-fold increase in "mega-rain" events just since the year 2000, compared to the previous three decades. Extreme rainfall events increase the probability of disaster-level flooding. However, there is also an increased probability that by mid-century heavy downpours will be separated in time by longer dry spells, particularly during the late growing season. Over the past century, the Midwest has not experienced a significant change in drought duration. However, the average number of days without precipitation is projected to increase in the future, leading Minnesota climate experts to state with moderate-to-high confidence that drought severity, coverage, and duration are likely to increase in the state. Modeling future precipitation amounts and patterns is less straight-forward compared to temperature. Some climate models do a better job than others representing rainfall for the Midwest, and available data sources only provide average estimates on a monthly scale, masking the spikes in extremes that trigger flood and drought disasters. (MDH, 2018)

3.5 Demographics

Traverse County contains four cities and 15 townships. In 2020, Traverse County had a population of 3,360, averaging six people per square mile of land area (U.S. Census Bureau, 2020b). The county seat, Wheaton City, is the largest city in the county with a 2020 population of 1,460. Table 6 lists the communities in Traverse County along with their respective population numbers.

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

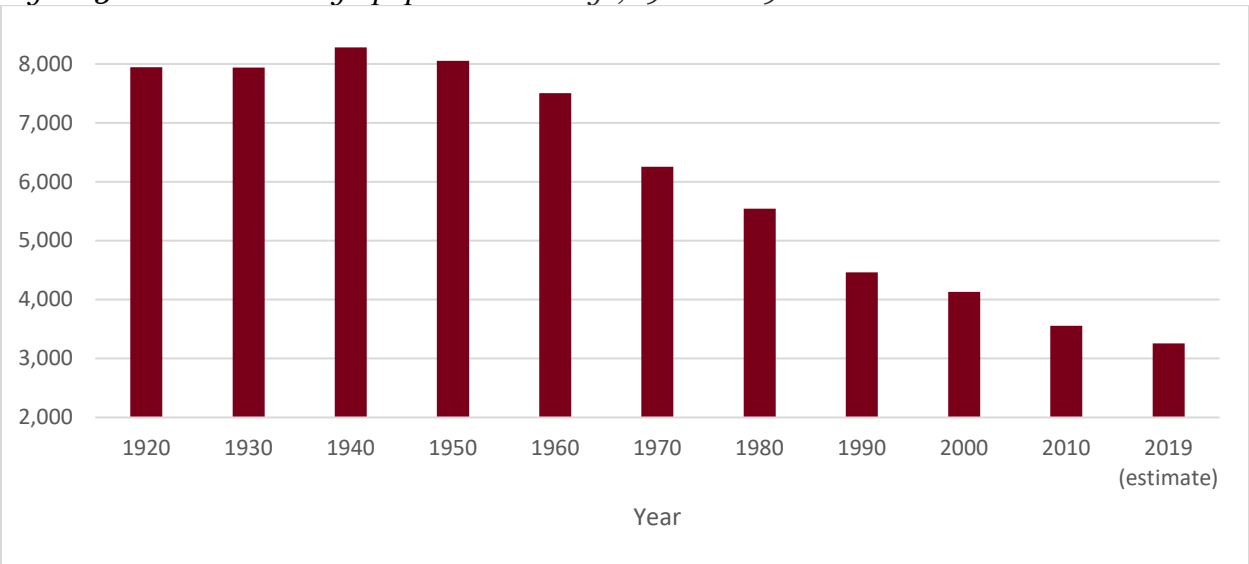
Community	2010 Population	2020 Population	% of County 2020
Arthur Township	81	59	1.76%
Browns Valley City	589	558	16.61%
Clifton Township	75	59	1.76%
Croke Township	75	73	2.17%
Dollymount Township	77	80	2.38%
Dumont City	100	75	2.23%
Folsom Township	128	111	3.30%
Lake Valley Township	237	198	5.89%
Leonardsville Township	107	111	3.30%
Monson Township	133	110	3.27%
Parnell Township	60	64	1.90%
Redpath Township	48	32	0.95%
Tara Township	92	72	2.14%
Taylor Township	105	84	2.50%
Tintah City	63	67	1.99%
Tintah Township	33	33	0.98%
Walls Township	65	42	1.25%
Wheaton City	1,424	1,460	43.45%
Windsor Township	66	72	2.14%
Total	3,558	3,360	100.00%

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

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.

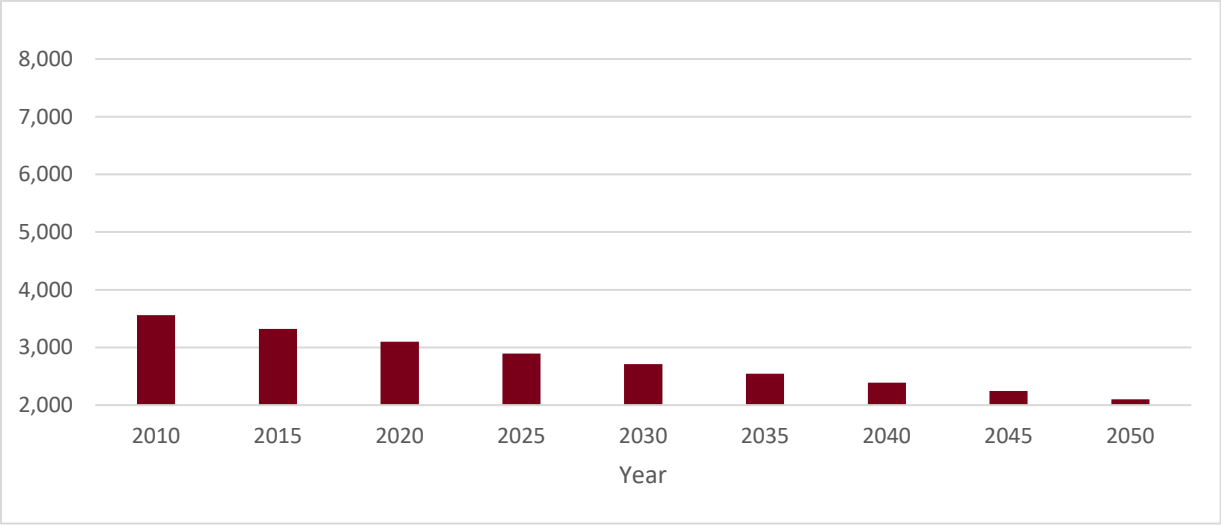
The county's population saw a growth of 4.3% during the 1930s and reached its record high population of 8,283 in 1940. However, the county's population has not increased since. From 1940 to 2019 Traverse County's population has been decreasing, shrinking by 57% during that time period (U.S. Census Bureau, 2020b). Population predictions show a continued downward trend, and the Minnesota State Demographic Center projects a 41% decline Traverse County's population through 2050 (Minnesota State Demographic Center, 2020). Figure 3 provides an overview of the county's historic population change, and projected population is detailed in Figure 4.

Figure 3. Traverse County's population change, 1920–2019



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

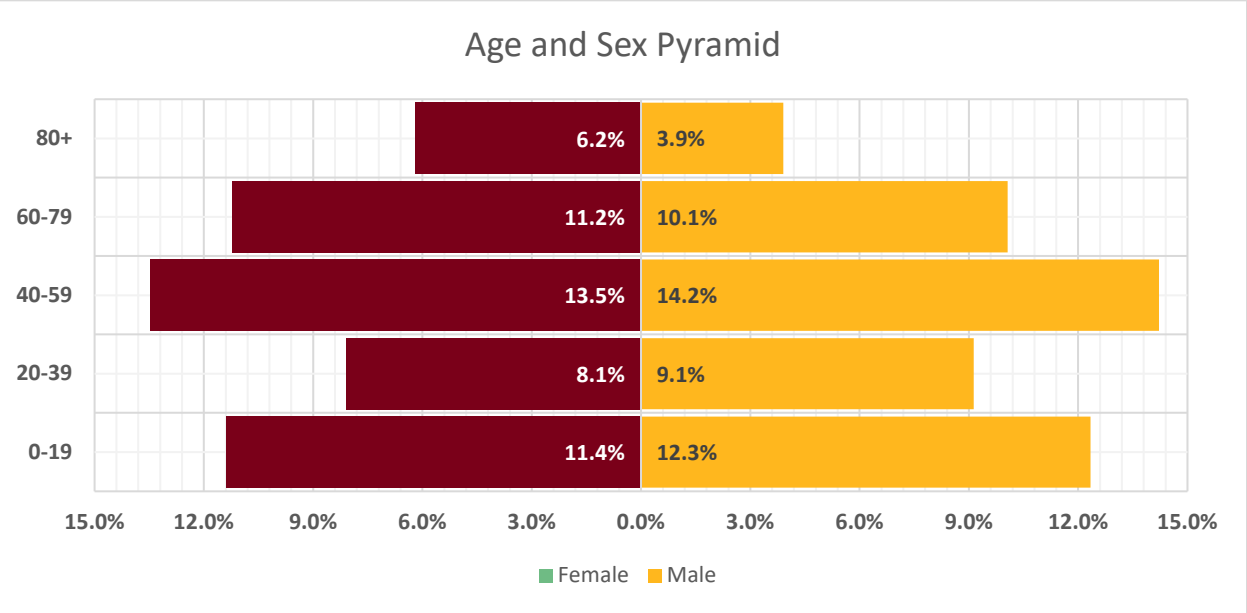
Figure 4. Traverse County's projected population change, 2010–2050



SOURCE: (MINNESOTA STATE DEMOGRAPHIC CENTER, 2020)

Traverse County's total population consists of 50.3% females and 49.7% males. 10.1% of the total population is aged 80 and older, and 23.7% of the total population is under 20 years old. 40–59-year-olds make up the largest age category in Traverse County, at 27.7% of the population. Figure 5 breaks down the percentage of the total population into categories of age and sex.

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



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

3.6 Economy

As of 2019, the Education and Health Services industry supersector employed (32%) of people in Traverse County, followed by Trade, Transportation and Utilities (30%), and Public Administration (12%). The total number of jobs in the county increased by over 3.9% between 2009 and 2019. The 10-year change in the average annual employment of each industry supersector in Traverse County is in Table 7.

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

Industry Supersector	Average # of Employees (2009)	Average # of Employees (2019)	% Change
Natural Resources and Mining	67	101	50.75%
Construction	36	38	5.56%
Manufacturing	37	36	−2.70%
Trade, Transportation and Utilities	325	355	9.23%
Financial Activities	38	35	−7.89%
Education and Health Services	398	379	−4.77%
Leisure and Hospitality	No Data	45	N/A
Other Services	33	23	−30.30%
Public Administration	143	139	−2.80%
Total, All Industries	**1,132**	**1,177**	**3.98%**

SOURCE: (MN DEED, 2020)

The 2018 median household income in Traverse County was $48,784 compared to a Minnesota average of $70,315. The median household income in Traverse County increased by 18% from 2010 to 2018. The percent of the county's population living below the poverty level in 2016 was 11%, compared to an 9.6% average for the state of Minnesota (U.S. Census Bureau, 2020c).

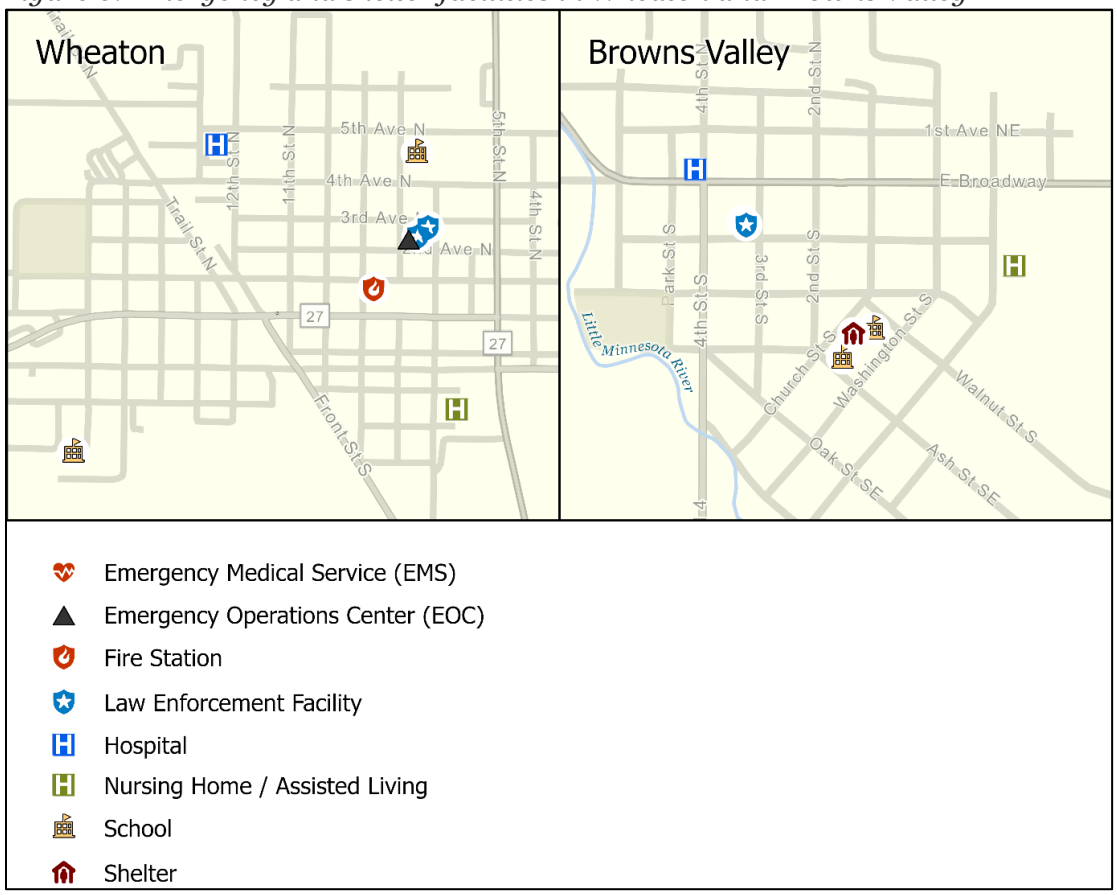
3.7 Critical Infrastructure

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 Traverse County. Critical infrastructure is identified based on FEMA guidelines (FEMA, 2013a) as well as input from Traverse 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 Traverse 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 Traverse 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.

Figure 6. Emergency and shelter facilities in Wheaton and Browns Valley



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

Healthcare Facilities

Traverse County is served by four healthcare facilities. The cities of Wheaton and Browns Valley have one hospital and one nursing home each.

Emergency Services

Law Enforcement: A full-time police department is in place for the cities of Wheaton and Browns Valley. The county sheriff's office is headquartered in the Wheaton Police Department. The one Emergency Operation Center in Traverse County is also located in Wheaton.

Fire & Rescue Services: The county is served by four fire departments: Browns Valley, Dumont, Wheaton, and Tintah. Browns Valley also includes EMS services.

Schools & Evacuation Centers/Shelters

There are four schools in Traverse County: an elementary and a middle school in Browns Valley, and an elementary and a secondary school in Wheaton.

FEMA and the American Red Cross have designated one facility within the county as a shelter to be used in the event of an issued evacuation. It is located in Browns Valley.

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

The infrastructure of transportation systems facilitates the movement of individuals, goods, and services.

U.S. Highway 75 runs north/south through the county, passing through Wheaton and Dumont. State Highway 27 lies parallel to Traverse Lake, continuing on through Wheaton and then heading due east. There are 1,117.5 miles of roads and 160 bridges and culverts in the county. The Traverse County Highway Department is in charge of construction and maintenance of county bridges.

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 Traverse County.

Table 8. Road miles by route system

Route System Defined	Miles
County Road	241
County State Aid Highway (CSAH)	243
MN Highway	46

Route System Defined	Miles
Municipal	30
National Wildlife Refuge Road	.2
Private Road-Public Access	1
Ramp or Connector	0.3
Township Road	525
US Highway	31
Total	**1,117.5**

SOURCE: (MNDOT, 2012)

Railways: Only a small section of railroad runs through Traverse County, in the northeastern corner adjacent to Minnesota Highway 9 and passing through the town of Tintah. This section is operated by Burlington Northern-Santa Fe (BNSF), a nationally operated railroad company that serves a variety of industrial and commercial customers.

Airports: Traverse County has one airport, located southwest of and owned by the city of Wheaton. There are two runways: one asphalt and one turf. The asphalt runway is 3,298-feet long and the turf runway is 1,953-feet long.

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 Traverse County is displayed in Figure 7.

Water & Sewer: Traverse County is home to three wastewater treatment plants. Two are located in Wheaton and one in Dumont. Six electrical substations are located within the county along with thirteen major electric transmission lines. Ten of these lines are operated by Otter Tail Power, which serves Wheaton and Dumont. East River Electric and Great River Energy operate the remaining lines.

Energy: A natural gas pipeline, operated by Alliance Pipeline, runs east-west across the northern part of the county. A hydrocarbon liquid gas (HGL) pipeline, operated by Kinder Morgan, also runs east-west across the northern part of the county.

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

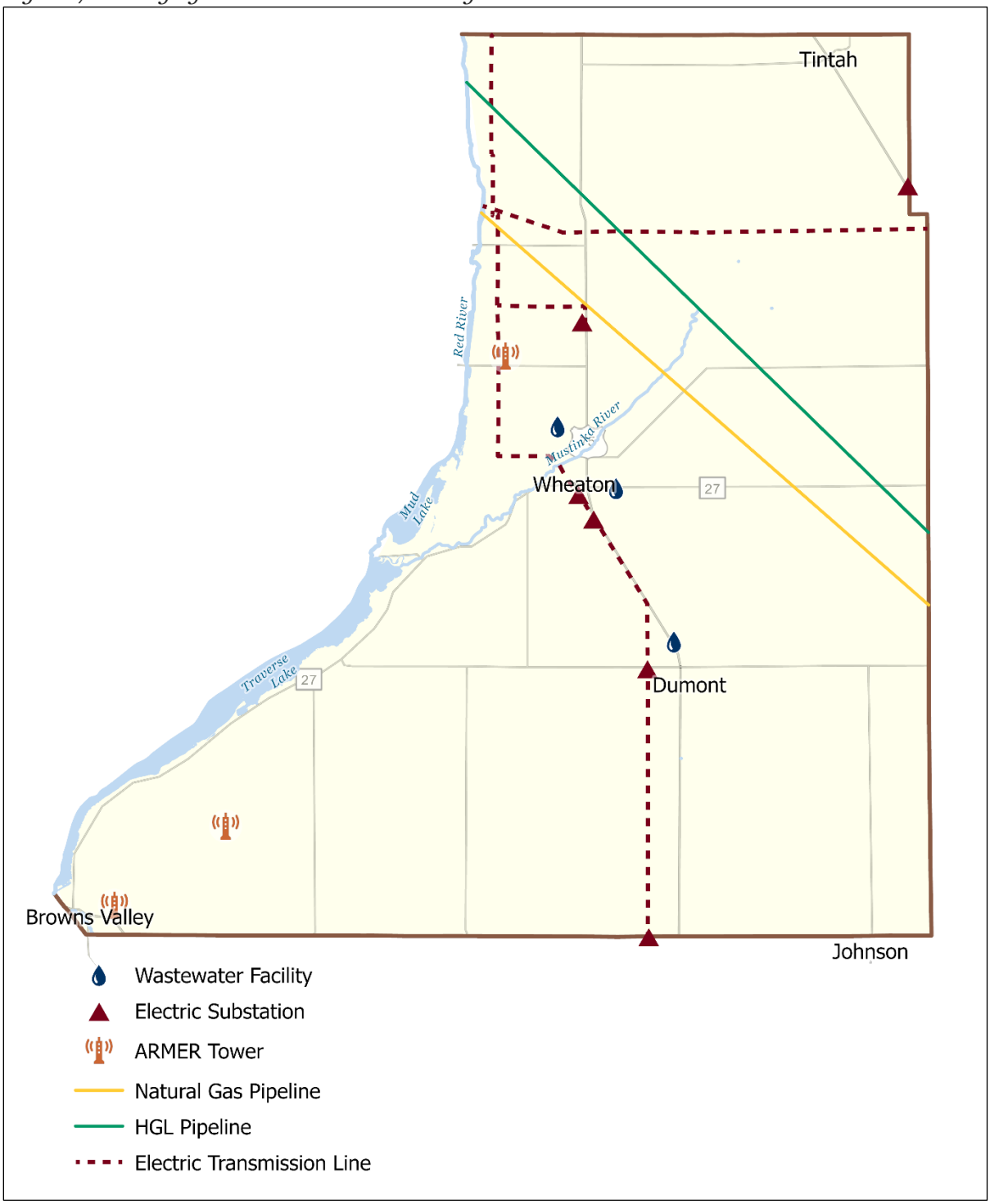
3.7.3 HIGH POTENTIAL LOSS STRUCTURES

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

A hazardous materials facility contains materials that would threaten the public if released. The inventory of these facilities in the county includes those required to register with the EPA due to the type and

quantity of hazardous materials being stored or produced at the facility. Three of these facilities have been identified in the county. Due to the sensitive nature of these data, the locations of these facilities have not been mapped in this plan.

Figure 7. Utility systems in Traverse 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. Fifteen employers fitting this profile were identified in Traverse County. These employers are in the electric, manufacturing, healthcare, food retail, and banking industries.

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

Cultural Resources: Cultural resources are cultural or historic assets that are unique, irreplaceable, or important to a community. Five such assets have been identified in the county. All are historic buildings.

3.8 Land Use and Ownership

Traverse County is a largely agricultural county. The county is 586 square miles, 87% of which is covered by cultivated crops, followed by emergent herbaceous wetlands (4%), and developed open space (3%) (USGS, 2016). A map of Traverse County's land cover is displayed in Figure 8.

Just over 88% of the land in Traverse County is cropland. The term "cropland" encompasses five components: harvested cropland, crop failure, cultivated summer fallow, cropland used only for pasture, and idle cropland (USDA ERS, 2019). Between 2012 and 2017 the area of total cropland in the county grew by nearly 5%, from 334,992 acres in 2012 to 350,906 acres in (USDA, 2012, 2017). "Harvested cropland" are the acres of cropland that are planted and successfully harvested. Table 9 shows a breakdown of Traverse County's harvested cropland in 2017.

In addition to growing crops, Traverse County is also home to numerous feedlots. A 2016 inventory counted 67 active feedlots in the county. Nearly 69% of the feedlots raise cattle as the primary stock and 19% raise pigs. An average of 1,300 animals are on each feedlot (MPCA, 2016).

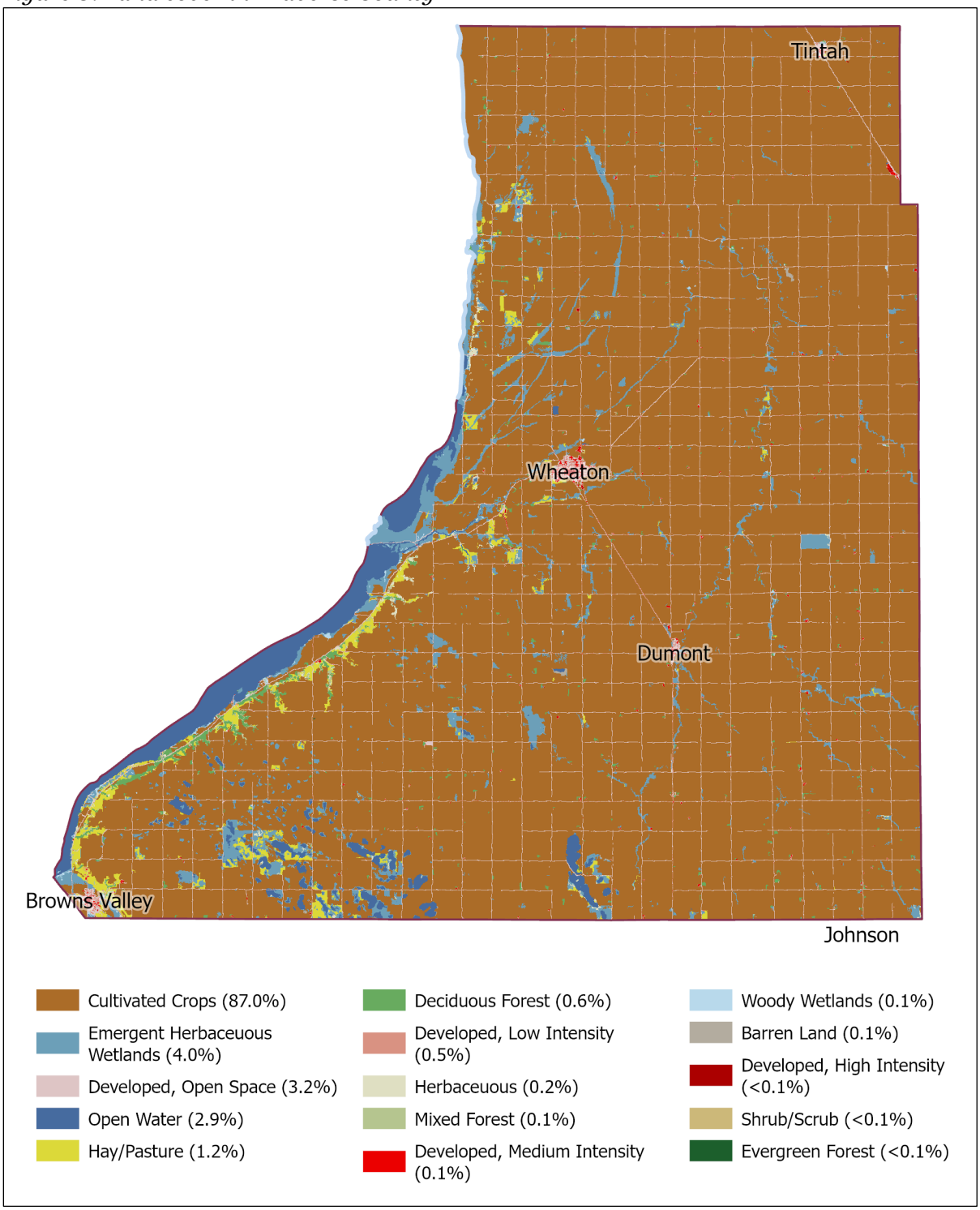
Ownership of the county is divided between six different agencies; the majority being privately owned (95%). Land ownership is displayed in Figure 9.

Table 9. Traverse County's harvested cropland, 2017

Crop	Acres	% of Harvested Cropland
Soybeans	167,575	50.42%
Corn (grain & silage)	143,632	43.22%
Wheat	10,414	3.13%
Sugar Beets	5,452	1.64%
Hay & Haylage	3,610	1.09%
Other	1,649	0.50%
Total	332,332	**100%**

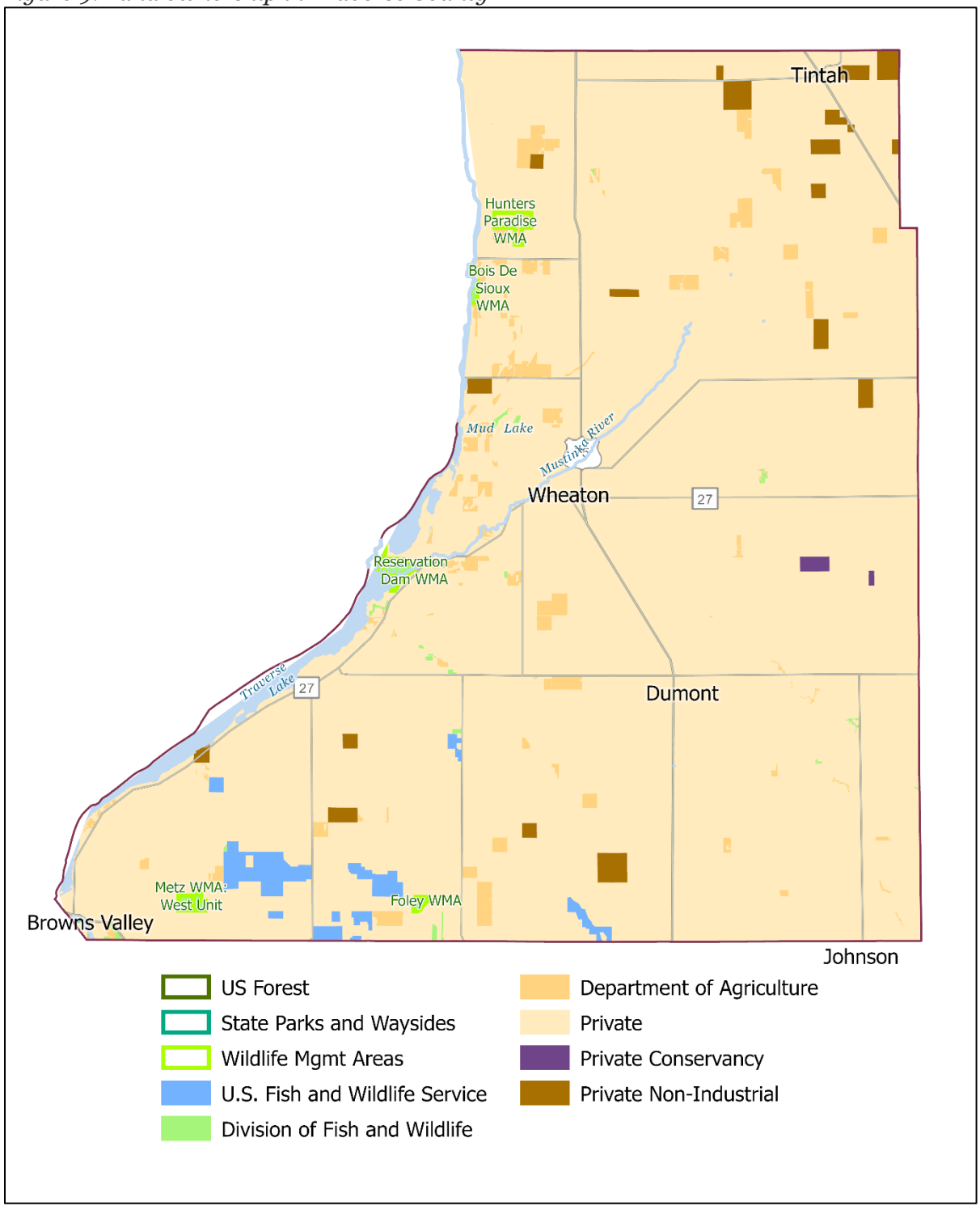
SOURCE: (USDA NASS, 2017)

Figure 8. Land cover in Traverse County



SOURCE:(USGS, 2016)

Figure 9. Land ownership in Traverse County



SOURCE: (MN DNR, 2008)

Section 4 – Risk Assessment and Vulnerability Analysis

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

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

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

4.1 Hazard Identification and Prioritization

The cornerstone of the risk assessment is identification of the hazards that affect jurisdictions. To facilitate the planning process, several sources were employed to ensure that the natural hazards are identified prior to assessment. Listed below are the natural hazards addressed in the 2019 Minnesota State Hazard Mitigation Plan:

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

4.1.1 HAZARD PRIORITIZATION

As part of the plan update process, the planning team reviewed, updated, and prioritized the hazards faced by residents of Traverse 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 Traverse County were discussed and adjusted to reflect the definitions of natural hazards used in the 2019 Minnesota State Hazard Mitigation Plan.

While the focus of this MHMP is on natural hazards, planning took place with the understanding that many non-natural hazards could occur as a result of natural disasters (e.g., disruption in electrical service due to downed powerlines from heavy snow, ice storms, or high wind events).

The prioritization of hazards for the Traverse County MHMP Update (Table 10) was based upon group review and discussion of the natural hazards that pose risk to the county during the MHMP Planning Team Meeting #1 on October 14, 2020. In the review of each hazard, the group was asked to consider if the risk to severe natural hazards had increased or decreased since the last plan, and if this affected their priority level to mitigate against that hazard. The group agreed that since the last plan the prioritization of lightning should decrease from moderate to low, as the occurrence of damage to structures or risk to life safety was low. All other hazards being addressed had remained unchanged since the last plan with no changes in perceived increase or decrease. The hazards of extreme heat and extreme cold were not addressed in the last plan but were felt to be of low priority for risk across the county. Appendix F provides the discussion notes from the October 14, 2020 meeting

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

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

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

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

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

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

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

Table 11. National Centers for Environmental Information event types

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

SOURCE (NCEI, 2021)

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

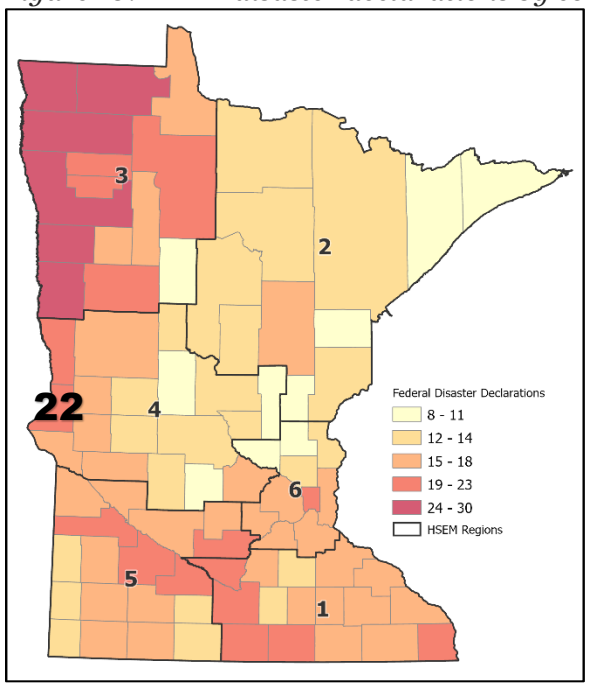
The Storm Events Database is updated regularly. NCEI receives data from the NWS approximately 75 days after the end of a data month; therefore, during the timeframe of compiling this plan, data more current than what is used in this report will become available (NCEI, 2021).

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

4.1.3 FEMA- AND MINNESOTA-DECLARED DISASTERS AND ASSISTANCE

Another historical perspective is derived from FEMA-declared disasters. Seventeen major disaster and five emergency declarations in Traverse County have been made between 1957 and January 2021 (Figure 10), for a total of 22. These are listed in Table 12.

Figure 10. FEMA disaster declarations by county



SOURCE: (FEMA, 2021A)

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

Declaration Number	Declaration Year	Incident	Incident Period
EM-3453-MN	2020	Covid-19	01/20/2020–current
DR-4531-MN	2020	Covid-19 Pandemic	01/20/2020–current
DR-4442-MN	2019	Severe Winter Storm, Straight-Line Winds, and Flooding	03/12/2019–04/28/2019
DR-4131-MN	2013	Severe Storms, Straight-Line Winds, and Flooding	06/20/2013–06/26/2013
DR-1982-MN	2011	Severe Storms and Flooding	03/16/2011–05/25/2011
DR-1900-MN	2010	Flooding	03/01/2010–04/26/2010
EM-3310-MN	2010	Flooding	03/01/2010–04/26/2010
DR-1830-MN	2009	Severe Storms and Flooding	03/16/2009–05/22/2009
EM-3304-MN	2009	Severe Storms and Flooding	03/16/2009–05/22/2009
DR-1622-MN	2006	Severe Winter Storm	11/27/2005–11/29/2005
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-1158-MN	1997	Severe Winter Storms	01/03/1997–02/03/1997
DR-1175-MN	1997	Severe Flooding, High Winds, Severe Storms	03/21/1997–05/24/1997
DR-1078-MN	1996	High Winds, Freezing Rain, Heavy Snowfall	10/23/1995–10/24/1995
DR-1116-MN	1996	Flooding and Severe Storms	03/14/1996–06/17/1996

Declaration Number	Declaration Year	Incident	Incident Period
DR-993-MN	1993	Severe Storms, Tornadoes & Flooding	05/06/1993–08/25/1993
DR-824-MN	1989	Flooding	03/29/1989–05/08/1989
DR-555-MN	1978	Storms, Ice Jams, Snowmelt & Flooding	04/22/1978–04/22/1978
EM-3013-MN	1976	Drought	06/17/1976–06/17/1976
DR-255-MN	1969	Flooding	04/18/1969–04/18/1969
DR-188-MN	1965	Flooding	04/11/1965–04/11/1965

SOURCE: (FEMA, 2021A)

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

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

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

DR	Date Declared	Incident Period	Incident Type	Eligible Counties & Tribes
SD-035	11/8/2019	9/10–9/15/2019	Severe thunderstorms with heavy rainfalls and flooding	Murray, Pipestone, Rock, Traverse
SD-008 (open)	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 Traverse County

DR/project #	Sub-Grantee	Project Type	Federal Share (%75)
1941.12	Traverse County	Safe Room	$105,269
1982.03	Traverse County	Mitigation Plan	$27,911

SOURCE: (MN HSEM, 2021)

4.2 Jurisdictional Change in Risk or Vulnerability Assessment

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

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

4.2.1 JURISDICTIONAL RESPONSES

As part of the Local Mitigation Survey form, Traverse 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.

City of Browns Valley

Flooding: Most of the city is within the floodplain until diversions are completed, which may take 10 years or more. Our city sewer lift stations struggle to keep up during flooding events which results in basement backups. Storm drains cannot keep up with flooding or heavy rain events which results in water reaching some buildings on Broadway. City wells and lift stations in flood zone on the north side of town are vulnerable to flooding.

Blizzards, Ice Storms: Loss of power to city can occur during blizzards or ice storms.

Windstorms: Loss of power can occur, downed trees, and unpassable streets can occur due to severe windstorms.

City of Dumont

Flooding: During high rain events our sewer system could be affected causing back-ups. We do have a generator for the lift station.

Windstorms, Tornadoes: We need to upgrade our warning siren. It is very old.

Extreme Cold: Our water tower is susceptible to freezing when the weather gets very cold.

Ice Storms: We have power lines and poles that could break during an ice storm.

City of Tintah

Flooding: When the state ditch fills up, the water comes back into town by drains.

Blizzard, Ice Storm: We have had power lines and poles that fail and may fail due to heavy snow and ice.

Windstorm, Tornadoes: The city does not have a local storm shelter for people to go to in case of an emergency. Our outdoor warning siren is also very dated and should be upgraded.

Extreme Cold: We have many children and seniors in town so with power outages they would be vulnerable if we lost power during a period of extreme cold.

City of Wheaton

Ice Storm, Blizzard: Our main lift station could be vulnerable to backups due to loss of our power to run our pumps to our sewer ponds. Also, severe winter storms may affect our ability to produce water to send to town in our collection system. Neither facility has a backup generator to run said structures.

Flooding: Lift stations struggle to keep up during high rain/flood events.

4.2.2 FUTURE DEVELOPMENT

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

No related responses

Traverse County and its cities did not report on any factors related to population growth, zoning, or development that would increase vulnerability to storm damage.

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 Traverse 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 Traverse 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).

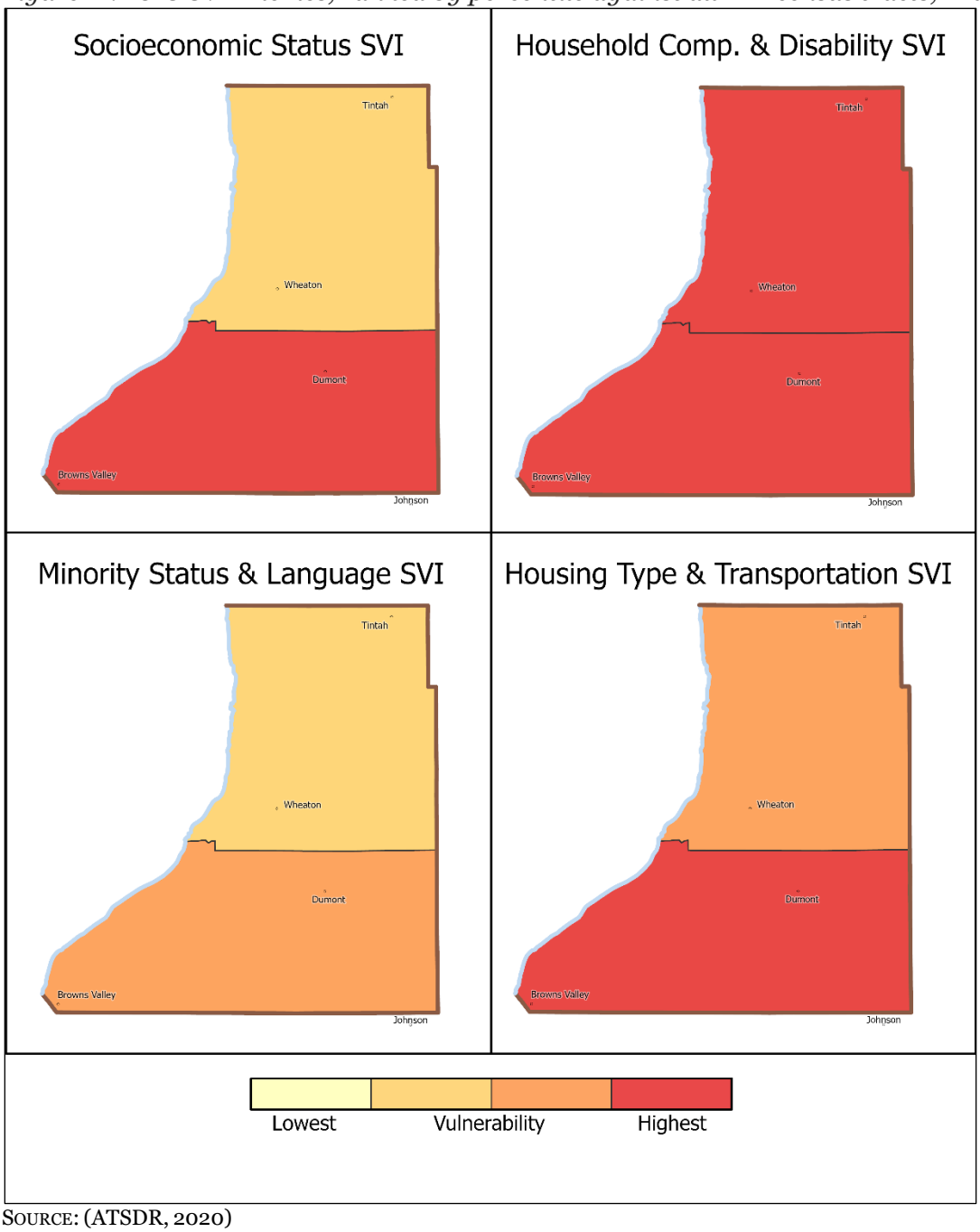
Table 15. Social Vulnerability Index (SVI) Variables

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

SOURCE: (ATSDR, 2020)

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

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



SOURCE: (ATSDR, 2020)

4.3.2 STRUCTURE VULNERABILITY

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

Table 16. Traverse County Total Building Exposure

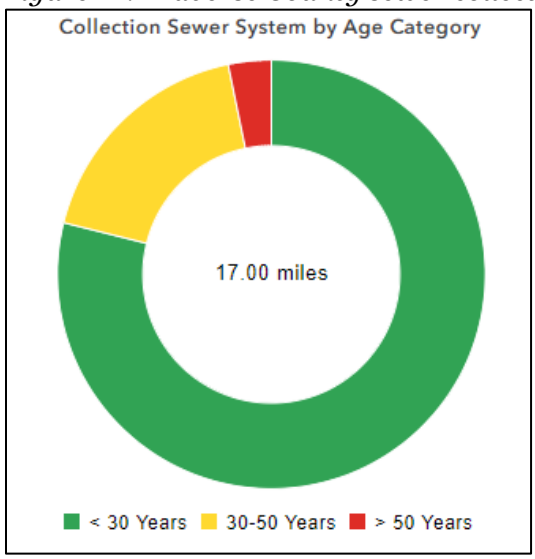
General Occupancy	County Total Buildings	County Building and Contents Value
Residential	2,798	$122,594,034
Commercial	220	$28,892,098
Other	2,445	$171,723,374
Totals	5,463	$323,209,506

SOURCE: TRAVERSE COUNTY

Traverse 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 three percent of the 17 miles of sewer collection system in the county are over 50 years old. 79% of the collection system is less than 30 years old (OSA, 2020). A chart of this age distribution is located in Figure 12.

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

Figure 12. Traverse County sewer collection system ages



SOURCE: (OSA, 2020)

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

4.3.3 ELECTRIC UTILITIES AND OUTAGES

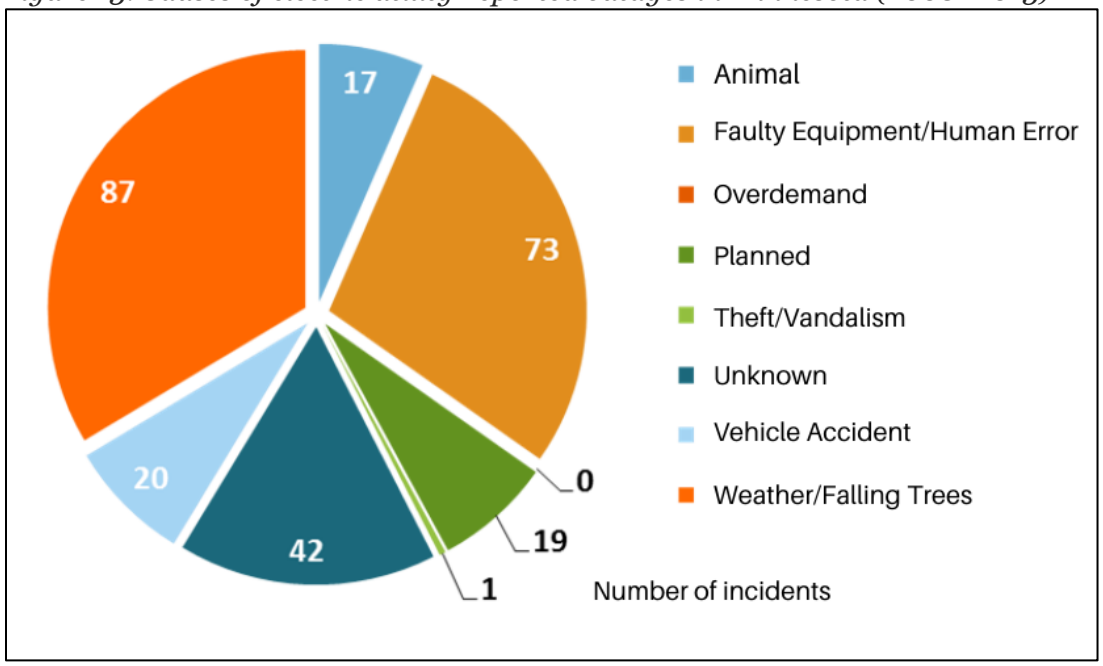
Loss of power is often the result of a natural hazard. According to the U.S. Department of Energy (2016), the leading cause of electric outages in Minnesota from 2008 through 2013 was severe weather/falling trees (see Figure 13), affecting nearly half a million Minnesotans annually. While the power grid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

Because of the significance of physical and economic disruption power outages can cause, HSEM prepared a Rural Electric Annex to the MN State All Hazard Mitigation Plan to make rural electric cooperatives eligible for FEMA's Hazard Mitigation Assistance (HMA) Program. Thirty-five percent of Minnesota's population, and 85% of Minnesota's territory, is covered by electrical distribution cooperatives. Flooding, windstorms, tornado, and winter storms are the greatest risks to electric utilities. The damage to rural electric cooperative infrastructure has often been how Minnesota reaches economic damage thresholds for federal disaster declaration (MN HSEM, 2014). Rural electric cooperatives are vulnerable and could very well be becoming more vulnerable without mitigation against future damages.

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.

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



SOURCE: (US DOE, 2016)

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 Traverse 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. Traverse County was included in DR-4442 for extensive flooding in April 2019 (FEMA, 2021a). In September 2019, over half the state received at least two times the normal amount of precipitation. The average precipitation for the year statewide was 35.51 inches, with many stations of over 50 years of observations breaking their own precipitation records (MN DNR, 2019e). Traverse County had 32.1 inches of rain in 2019. This total was second only to the record precipitation in the county, which was 32.29 inches in 1962 (MN DNR, 2020a).

Traverse County has experienced many floods and flash floods, though none have resulted in property damage or deaths (NCEI, 2019). Table 17 lists all Traverse County's historical flood events from 2015 to 2021 as recorded by the NCEI. Three deaths have been reported as a result of flooding, along with one injury. The cumulative property damage estimate is about $14 million dollars as of 2018 (CEMHS, 2019).

Table 17. Flood events in Traverse County, January 2015–August 2021

Date	Event Type	Description
10/22/2019	Flash Flood	Heavy rainfall brought a short minor flooding episode on 12-mile Creek near Dumont in late October.
09/11/2019	Flood	Heavy rainfall caused the West Branch of 12-Mile Creek near Dumont to flood for about a week in mid-September. The creek rose above the flood stage of 6 feet on the 11th to 8.7 feet on the 14th and then back below flood stage on the 18th.
08/17/2019	Flood	Above normal August rainfall brought more flooding on the west branch of 12-mile creek near Dumont from August 17th through August 23rd. The creek rose above the flood stage of 6 feet to 8.3 feet on August 20th.
07/05/2019	Flood	Heavy rainfall runoff caused the west branch of Twelve Mile Creek near Dumont to go above the flood stage of 6 feet on July 5th rising to 7.33 feet on July 6th. The creek then fell back below flood stage on July 13th.
04/18/2019	Flood	Snowmelt runoff brought flooding on Twelve Mile Creek above Wheaton for a short period of time from April 18th through the 20th. The creek went above the flood stage of 18 feet to 19.7 feet on April 19th.
04/05/2019	Flood	Snowmelt flooding caused the Bois De Sioux River to go above the flood stage of 80 feet on April 5th to 80.5 feet on April 7th, before falling back to below flood stage on April 9th. The river rose slightly above flood stage again from April 23rd to April 24th.

Date	Event Type	Description
04/01/2019	Flood	Late March snowmelt flooding on Twelve Mile Creek near Dumont continued off and on into April, going above flood stage several times through April 19th. The largest degree of flooding during this time was 1.8 feet above the flood stage of 10 feet on April 18th. Late March snowmelt flooding on the Mustinka River near Wheaton slowly fell to below flood stage by April 3rd. It reached 2.6 feet above the flood stage of 92 feet on March 30th. The river again went temporarily just above flood stage from April 19th through the 21st. A mid-April blizzard only added to the flooding problems, due to additional large amounts of snowmelt water. Many roads along with cropland remained or became flooded. This flooding and delayed planting continued into May.
03/27/2019	Flood	Snow melt water brought flooding to the Mustinka River and 12-Mile Creek in west central Minnesota in late March. The water rose to just above to nearly 2.6 feet above flood stage from Wheaton to above Wheaton on the creek and river.
03/26/2019	Flood	Above normal snow melt water brought some flooding to west central Minnesota. Many roads along with crop land were flooded.

SOURCE: (NCEI, 2021)

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

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

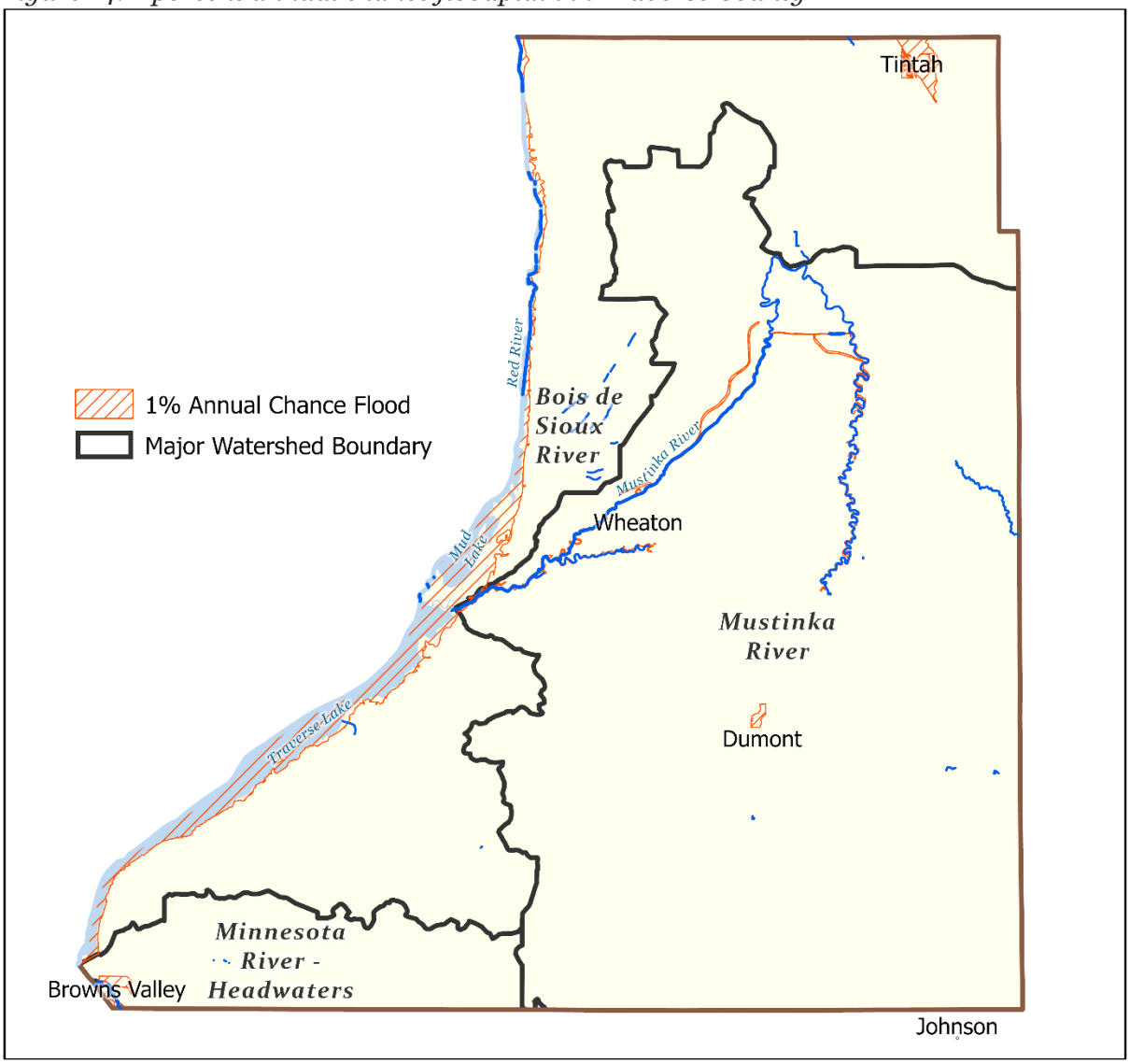
USGS 05047900 Twelvemile Creek at County Road 6 DUMONT, MN 1996-2019			USGS 05049000 Mustinka River Wheaton, MN 1916-2019		
(1)	April 6, 1997	13.63	(1)	April 6, 2011	94.61
(2)	April 13, 2001	12.35	(2)	Mar. 30, 2019	94.33
(3)	Mar. 29, 2019	11.71	(3)	Mar. 25, 2009	93.90
(4)	April 4, 2011	11.45	(4)	Mar. 19, 2010	93.85
(5)	July 22, 2018	11.42	(5)	April 1, 2006	91.47

SOURCE: (USGS, 2021)

5.1.2 PROBABILITY OF OCCURRENCE

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

Figure 14. 1-percent annual chance floodplain in Traverse 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, 2015). In 2007, 24 Minnesota counties received drought designation, while 7 counties were declared flood disasters. In 2012, 55 Minnesota counties received federal drought designation at the same time 11 counties declared flood emergencies. In addition, the yearly frequency of the largest storms—those with 3 inches or more of rainfall in a single day—has more than doubled in just over 50 years. In the past decade, such dramatic rains have increased by more than 7% (MN EQB, 2014).

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

Four of the ten wettest years in the county occurred in the last two decades (MN DNR, 2020a).

5.1.4 VULNERABILITY

Potential economic loss estimates were based on county-specific building data. Traverse County provided parcel tax and spatial databases that included building valuations, occupancy class, square footage, year built, and number of stories. The quality of the inventory is the limiting factor to a Hazus flood model loss estimation. Best practices were used to use local data and assumptions were made to populate missing (but required) values.

Hazus reports the percent damage of each building in the floodplain, defined by the centroid of each building footprint. After formatting the tax and spatial data, 5,463 points were input to Hazus to represent buildings with a total estimated building plus contents value of $300 million. Approximately 51% of the buildings (and 38% of the building value) are associated with residential housing.

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

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

General Occupancy	County Total Buildings	County Building and Contents Value	Floodplain Total Buildings	Floodplain Building + Contents Value	Buildings with damage	Building + Contents Loss
Residential	2,798	$122,594,034	425	$10,519,300	421	$4,355,410
Commercial	220	$28,892,098	16	$213,100	15	$67,079
Other	2,445	$171,723,374	74	$2,630,600	53	$885,852
Totals	5,463	$323,209,506	515	$13,363,000	489	$5,308,341

SOURCE: (FEMA, 2021C)

The distinction between building attributes within a parcel was not known, so the maximum percent damage to a building in that parcel was used to calculate loss estimates for the entire parcel. The sum of all the losses in each census block were aggregated for the purposes of visualizing the loss. An overview of these results with the percent damage of buildings is shown in Figure 15.

Please note: It is possible for a building location to report no loss even if it is in the flood boundary. For example, if the water depth is minimal relative to 1st-floor height, there may be 0% damage.

Hazus Critical Infrastructure Loss Analysis

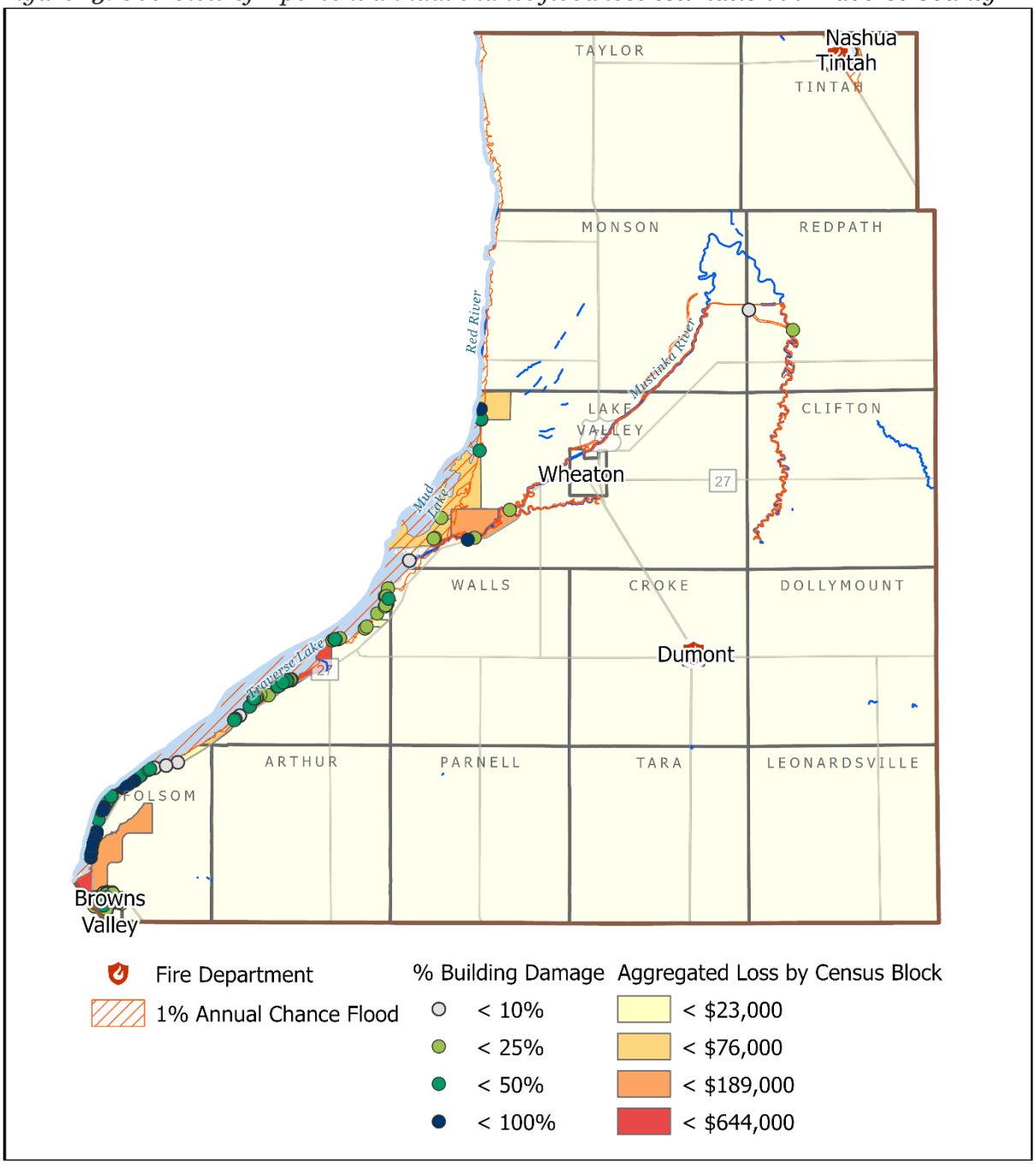
Critical facilities and infrastructure are vital to the public and their incapacitation or destruction would have a significant negative impact on the community. These facilities and infrastructure were identified in Section 3.7 and verified by Traverse County.

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.

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 if any critical infrastructure within the 1-percent annual chance floodplain, given the higher risk of the facility or infrastructure being incapacitated or destroyed during a flood. In Traverse County, three critical infrastructure locations were found to be at risk in the 1-percent annual chance flood. They are the Dumont Fire Department, the Tintah Fire Department, and one hazardous materials facility, which has not been mapped due to sensitive nature of these data. No other information is available about these facilities.

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



SOURCE: (FEMA, 2021c)

Community Vulnerability

Potential economic losses were estimated by Census Minor Civil Division. All jurisdictions with buildings identified in the 1-percent annual chance flood zone listed in Table 20.

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

Jurisdiction (county subdivision)	Count of Buildings in Floodplain	Estimated Building and Contents Loss*
Browns Valley City	213	$ 1,614,956
Dumont City	46	$ 270,638
Folsom Township	75	$ 2,106,518
Lake Valley Township	12	$ 304,680
Redpath Township	1	$ 13,251
Tintah City	56	$ 147,183
Windsor Township	86	$ 851,115
Total	489	$ 5,308,341

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

The cities of Tintah, Dumont, and Browns Valley, as well as the community of Folsom Township are shown in Figure 16. In addition to the aggregate economic loss by census block, the point locations used to represent flooded buildings are symbolized by percent damage to the building.

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

5.1.5 PROGRAM GAPS AND DEFICIENCIES

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

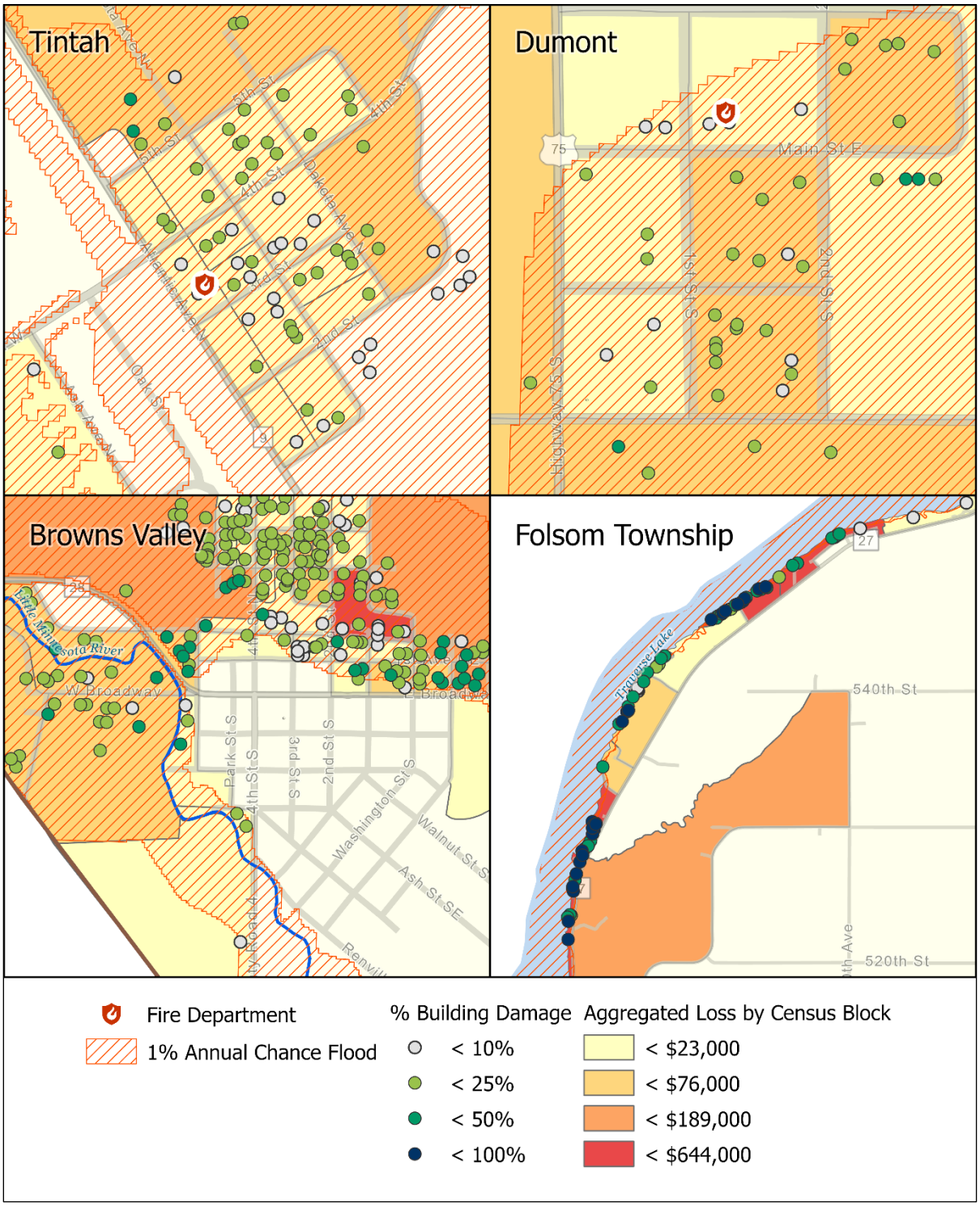
Surface Water Run-off Management: Controlling runoff from various sources continues to be a challenge and priority to control what runs downstream.

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

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



SOURCE: (FEMA, 2021C)

5.2 Windstorms

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

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

Tornadoes are categorized as separate hazards from windstorms.

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

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

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

Table 21. Effects of wind speed

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

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

SOURCE: (NWS, 2018)

5.2.1 HISTORY

Traverse County experienced 20 high wind and 54 thunderstorm wind events between 1955 and August 2021, with wind speeds up to 85 knots (98 mph) The majority of these windstorms occurred in June (24%), July (28%), and August (16%). Wind damage to property and crops have cost the county more than $2.8 million since 1960 (CEMHS, 2019). Table 22 lists the wind-related events that have occurred in the county since 2015. Thunderstorm wind events from 1955–2018 are mapped in Figure 17.

Table 22. Wind events in Traverse County, January 2014–January 2020

Date	Event Type	Description
7/26/2020 (2 events)	Thunderstorm wind	Winds of up to 60–75 mph caused some crop damage and damaged some of the siding on a house and an old barn.
7/17/2020 (3 events)	Thunderstorm wind	Up to 70 mph winds uprooted a large tree which then fell onto a cabin.
7/8/2020	Thunderstorm wind	Winds of up to 60 mph took some pieces of siding off a house and downed several tree limbs.
10/21/2019	High wind	High winds affected west central Minnesota from the evening of the 21st to the early morning hours of the 22nd. Northwest winds of 30–45 mph with gusts to 50–60 mph occurred. A tree was blown down by the high winds.
9/9/2019	Thunderstorm wind	A severe thunderstorm with winds estimated to be up to 70 mph downed several trees 6 miles northeast of Browns Valley.
9/2/2019	Thunderstorm wind	A thunderstorm brought a 64-mph severe wind gust west of Charlesville during the early evening.
7/21/2017	Thunderstorm wind	A thunderstorm brought winds of 60 mph or higher to Browns Valley. Some large tree branches were downed in the area.
6/13/2017 (3 events)	Thunderstorm wind	Severe thunderstorms in west central Minnesota brought damaging winds along with a few tornadoes to the region. Wind gusts reached 60–70 mph. Many large tree branches were downed.
3/7/2017	High wind	A surface low pressure area brought high winds to west central Minnesota. West to northwest winds of 35–45 mph with 60 mph gusts occurred.
8/10/2016	Thunderstorm wind	A line of thunderstorms moved into west central Minnesota bringing damaging winds near Tintah. 70 mph winds brought down several tree branches.

Date	Event Type	Description
7/10/2016	Thunderstorm wind	Severe thunderstorms brought damaging winds of up to 80 mph, downing trees and powerlines in Browns Valley and damaging some roofs.
6/12/2016	Thunderstorm wind	Thunderstorms brought damaging winds and large hail to parts of Traverse County. Two outbuildings were severely damaged by 80 mph winds.
11/18/2015	High wind	A clipper low pressure area merged with a northeasterly moving surface low pressure area. This brought high winds to west central Minnesota.

SOURCE: (NCEI, 2021)

5.2.2 PROBABILITY OF OCCURRENCE

To determine the probability of future wind-related events in Traverse 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 0.7 per year. The relative frequency of all wind-related events since January of 1996 is 2.4 per year. These relative frequencies can be used to infer the probability of these events occurring in the future.

5.2.3 CLIMATE CHANGE PROJECTIONS

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

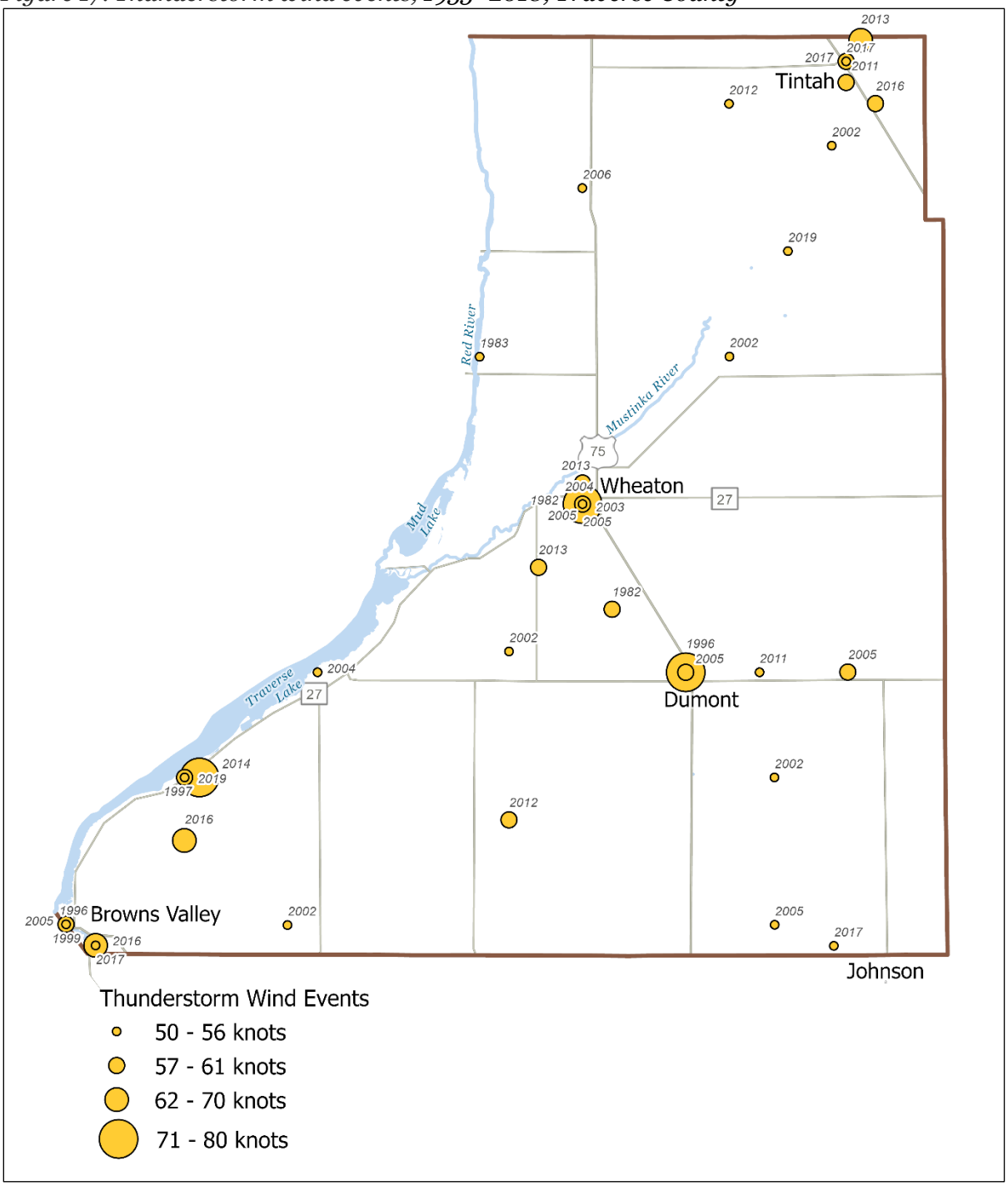
5.2.4 VULNERABILITY

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

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

2017). Building codes have also changed to improve the strength of new mobile home construction but there are still many older mobile homes in use that do not meet these new standards.

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



SOURCE: (NCEI, 2021)

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

5.2.5 PROGRAM GAPS AND DEFICIENCIES

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

Above-Ground Power Lines: 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 sirens in the cities of Browns Valley, Dumont, and Tintah. Monthly testing is completed by Traverse County dispatch to ensure each siren is in working condition. The warning sirens are functional but are very old and in need of replacement.

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

Traverse County Park: The Traverse County Park does not have a dual-use storm shelter facility (e.g., bathroom building) or a tornado safe room to protect campers or other park visitors in the event of a severe storm or high wind events.

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. None of the cities in Traverse County have a specially designated tornado shelter.

5.3 Tornadoes

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

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

Table 23. Enhanced Fujita Scale (EF Scale)

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

SOURCE: (NWS, 2020A)

5.3.1 HISTORY

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

The peak months of tornadic activity in Minnesota are June and July respectively (MN DNR, 2019b). According to the NCEI Storm Events Database, 13 tornadoes have occurred in Traverse County between 1950 and August 2021, resulting in no deaths or injuries (NCEI, 2021), (NWS, 2020b), but an estimated $1.3–5 million in property and crop damage (CEMHS, 2019; NCEI, 2021). The strength of these tornadoes ranged from F0/EF0 to F3. The most costly of these tornadoes occurred on May 10, 1982, when an F3 tornado moved west across northern Traverse County, causing $2.5 million of property damage (NCEI, 2021). Table 24 lists the tornadoes that have occurred in Traverse County since 2015.

Table 24. Tornadoes in Traverse County, January 2015–August 2021

Date	Start Location	End Location	Magnitude	Description
6/13/2017	Collis	Collis	EF1	A tornado touched down in an open field before moving over to a farmstead. Minor damage to a garage door and garage siding occurred along with multiple uprooted trees and snapped trunks. Tree limbs and branches were tossed in multiple directions.
6/14/2016	Collis	Collis	EF0	A tornado touched down briefly. No damage was reported.

SOURCE: (NCEI, 2021)

5.3.2 PROBABILITY OF OCCURRENCE

Estimating the probability of future tornadoes in Traverse 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 Traverse County is 0.2 per year. (These 13 tornadic events occurred in 12 of the 70 years on record.)

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

For any location in Traverse County, there was an annual frequency of 3.0–3.5 tornadoes within a 50-mile radius. The historical frequency was only slightly higher in the southeast than the northwest. These relative frequencies can be used to infer the probability of these events occurring in the future.

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

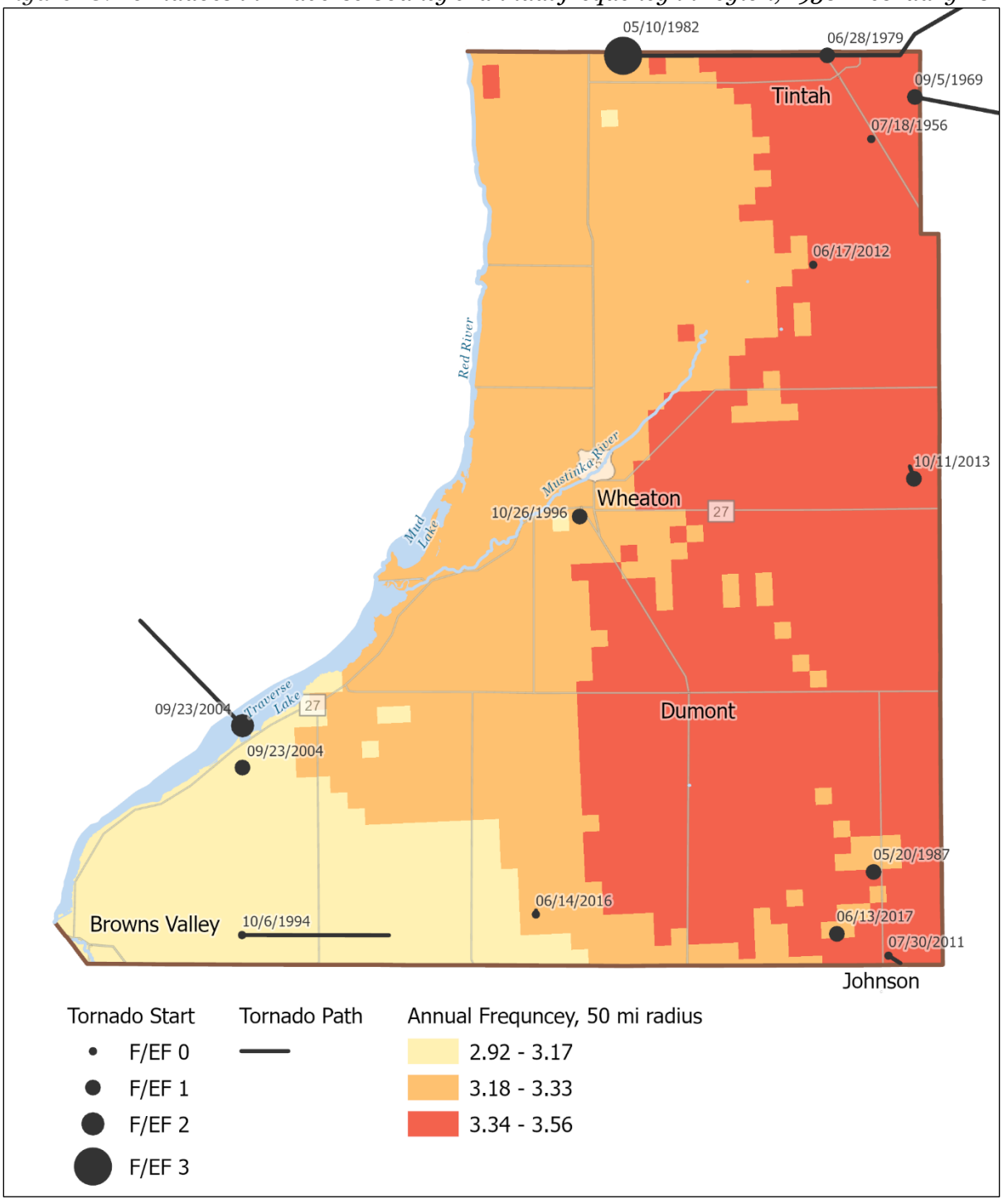
5.3.3 CLIMATE CHANGE PROJECTIONS

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

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

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

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



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

5.3.4 VULNERABILITY

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

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

5.3.5 PROGRAM GAPS AND DEFICIENCIES

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

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 sirens in the cities of Browns Valley, Dumont, and Tintah. Monthly testing is completed by Traverse County dispatch to ensure each siren is in working condition. The warning sirens are functional but are very old and in need of replacement.

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

Traverse County Park: The Traverse County Park does not have a dual-use storm shelter facility (e.g., bathroom building) or a tornado safe room to protect campers or other park visitors in the event of a severe storm or high wind events.

5.4 Hail

A hailstorm is a storm producing spherical balls of ice. Hailstones form in a thunderstorm's unstable air mass when warm moist air rises rapidly into the upper atmosphere and subsequently cools, leading to the formation of ice crystals. The ice crystals grow into hailstones through the storm's updraft and

downdraft cycle, each time being coated with a layer of ice until the hailstone becomes too heavy to be carried by the updraft and falls to the ground.

A number of factors determine the damage potential from hail including hailstone size, texture, numbers, fall speed, speed of storm translation, and strength of the accompanying wind (TORRO, 2021). The maximum hailstone size is the most important parameter relating to structural damage. Studies have determined that most property damage begins when hailstone diameters are ≥ .75 in., while crop damage can occur from hailstones as small as .25 in (Changnon et al., 2009) depending on the crop and growth stage. Table 26 shows the TORnado and storm Research Organization's (TORRO) Hailstorm Intensity Scale, which describes the typical damage from different sized hailstones.

Table 25. TORRO Hailstorm Intensity Scale

	Intensity Category	Typical Hail Diameter (in.)	Typical Damage Impacts
H0	Hard Hail	.2	No damage
H1	Potentially Damaging	.2–.6	Slight general damage to plants, crops
H2	Significant	.4–.8	Significant damage to fruit, crops, vegetation
H3	Severe	.8–1.2	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	1–1.6	Widespread glass damage, vehicle bodywork damage
H5	Destructive	1.2–2	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	1.6–2.4	Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	2–3	Severe roof damage, risk of serious injuries
H8	Destructive	2.4–3.5	Severe damage to aircraft bodywork
H9	Super Hailstorms	3–4	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	> 4	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

SOURCE: (TORRO, 2021)

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

5.4.1 HISTORY

Traverse County experienced 80 hail events from 1955 through August 2021; 61% of these hailstorms produced hailstones ≥ 1 in. diameter. The largest hailstone recorded in Traverse County was 3.5 in., which occurred in Tintah on July 2, 2003 (NWS, 2020b). Hail damage to property and crops have cost the county more than 36.5 million dollars since 1960, ranking the county 5th for hail damage incurred by Minnesota counties (CEMHS, 2019). Table 26 lists hail events in Traverse County that produced hailstones ≥ 1 in. diameter since January 2015, and Figure 19 shows the hail events in Traverse County from 1955 through February 2020 that produced hailstones ≥ 1 in. in diameter.

Table 26. Storms producing hail ≥ 1 in. diameter, Traverse County, January 2015–August 2021

Date	Location	Hailstone Diameter (in.)	Damage
7/8/2020	Rolsberg	1	Severe thunderstorms produced large hail across parts of west central Minnesota.
4/6/2020	Collis	1	Quarter-size hail occurred in Collis.
7/19/2019 (2 events)	Multiple	1–1.25	Severe thunderstorms brought hail up to the size of half dollars along with a couple funnel clouds to Traverse County. Hail was reported in Collis and Browns Valley.
8/31/2018	Rolsberg	1	A severe thunderstorm dropped quarter-size hail west of Tintah.
7/16/2016	Collis	1	A severe thunderstorm brought quarter-size hail to the northeast of Johnson. Quarter-size hail along with strong winds resulted in crop damage.
7/5/2016	Dumont	1	Severe thunderstorms developed along a west to east convergence zone and brought very large hail along with a funnel cloud to west central Minnesota.
6/12/2016 (2 events)	Browns Valley	1	Severe thunderstorms brought damaging winds and large hail to parts of Big Stone and Traverse counties.
7/17/2015	Browns Valley	1.75	Severe thunderstorms along a warm front brought large hail and damaging winds to parts of west central Minnesota.
6/27/2015 (6 events)	Multiple	1–2	Severe thunderstorms brought hail larger than golf balls to parts of west-central Minnesota. Hail caused some damage to bean and corn crops, as well as a deck. Hail in Traverse County was reported at Collis and the Wheaton Airport.
6/9/2015	Dumont	1	Quarter-size hail fell east of Dumont. No hail damage was reported.

SOURCE: (NWS, 2020B)

5.4.2 PROBABILITY OF OCCURRENCE

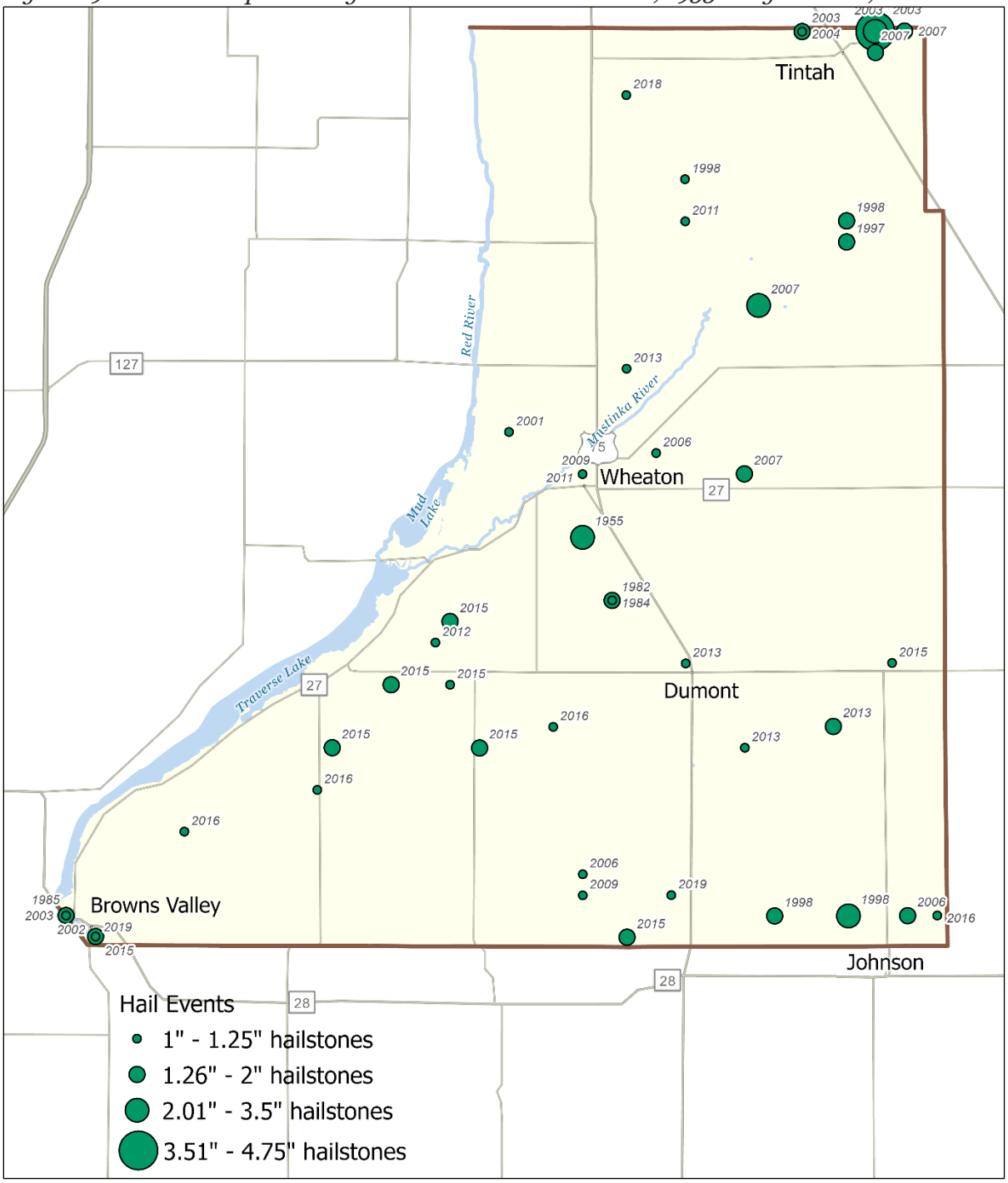
To determine the probability of future hailstorms in Traverse County, records of previous hail events in the county were examined for the period of record. From January 1955 through February 2020, the relative frequency of hail events was 1.2 per year. This relative frequency can be used to infer the probability of hail events occurring in the future.

5.4.3 CLIMATE CHANGE PROJECTIONS

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

events (USGCRP, 2018). Since the impact of more frequent or intense storms can be significant, climate scientists are actively researching the connections between climate change and severe weather.

Figure 19. Hail events producing hailstones ≥ 1 in. diameter, 1955–August 2021, Traverse County



SOURCE: (NWS, 2020B)

5.4.4 VULNERABILITY

Traverse County's agricultural lands and structures are vulnerable to hail damage and its citizens to injury and possibly death. Data from the Spatial Hazard Events and Losses Database for the United States (SHELDUS) was examined to identify the county's monetary losses due to hail damage to crops, property, injury, and death. From 1960 through 2018 Traverse County reported $36,512,269 in hail damages, ranking 5th among Minnesota counties in total hail damages. Traverse County losses are primarily due to crop damages reported at $35,023,202, followed by $1,489,068 in property damages. Crop indemnity payments due to hail totaled $13,413,386 for the period of record spanning 1989–2018 (CEMHS, 2019).

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

5.4.5 PROGRAM GAPS AND DEFICIENCIES

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

Above-Ground Power Lines: 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 sirens in the cities of Browns Valley, Dumont, and Tintah. Monthly testing is completed by Traverse County dispatch to ensure each siren is in working condition. The warning sirens are functional but are very old and in need of replacement.

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

Traverse County Park: The Traverse County Park does not have a dual-use storm shelter facility (e.g., bathroom building) or a tornado safe room to protect campers or other park visitors in the event of a severe storm or high wind events.

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. None of the cities in Traverse County have a specially designated tornado shelter.

5.5 Winter Storms

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

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

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

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

Figure 20. Thanksgiving Weekend Blizzard, 2019

ALEX KORMANN, ASSOCIATED PRESS

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

Heavy Snow: A heavy snow event is characterized as snow accumulation meeting or exceeding the local/regional defined 12 and/or 24-hour warning criteria. Depending on the area, this could mean 4–8

inches or more of snow in 12 hours or less, or 6–10 inches or more of snow in 24 hours or less. Heavy snow events may cause structural damage due to the weight of snow accumulation.

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

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

Winter Storm & Winter Weather: A winter storm is an event that has more than one winter hazard (e.g., 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

Traverse County has an active history of winter-related weather events. Since 1996, the county experienced 105 events, including blizzards, heavy snows, ice storms, winter storms, and winter weather (NCEI, 2021). Winter weather events in the county have cost over $11.4 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 Traverse County, Jan. 2014–Aug. 2021

Date	Type	Description
3/10/2021	Heavy Snow	An area of low pressure brought heavy snow across west central Minnesota. Snowfall amounts of three to seven inches accumulated.
1/14/2021	Blizzard	Snowfall of one to three inches combined with strong wind gusts of 50 to 65 mph and produced blizzard conditions. Travel was greatly affected or impossible. Schools were closed or had delayed starts both Thursday and Friday.
12/23/2020	Blizzard	Snowfall amounts of two to four inches occurred. Extremely strong northerly winds, gusting from 55 to 65 mph, combined with the snowfall to create widespread blizzard conditions and hazardous travel.
10/22/2020	Heavy Snow	Heavy snowfall amounts of six to ten inches occurred.
10/20/2020	Heavy Snow	The snowfall was very heavy at times enhanced by thunderstorms. Some snowfall amounts ranged from six to eight inches. These rare heavy snow producing systems set some monthly snowfall records. Wheaton had its snowiest October on record.

Date	Type	Description
2/12/2020	Blizzard	One to two inches of snowfall fell across the county and strong north winds of 30 to 40 mph gusted up to 50 mph. Widespread blizzard conditions occurred across west central Minnesota and travel was significantly disrupted.
1/17/2020	Blizzard	Moderate to heavy snowfall and winds of 30 to 40 mph, with gusts of over 50 mph, brought blizzard conditions. Some vehicles became stuck in ditches. Snowfall amounts were three to four inches.
12/28/2019	Winter Storm	Heavy snowfall was followed by a period of light snow, drizzle, and freezing drizzle, before the precipitation changed completely back to snow. Snowfall amounts ranged from six to eleven inches across west central Minnesota.
11/29/2019	Winter Storm	Heavy snow and areas of freezing drizzle brought some spotty icy conditions. Northwest winds gusting to 30 to 50 mph caused areas of blowing snow, reducing visibilities, and creating difficult travel. Snowfall was up to seven inches.
4/11/2019	Blizzard	Moderate to heavy snow fell during the morning, followed by heavy snow and strong north winds. The heavy snow in combination with winds gusting to over 40 mph brought blizzard conditions along with heavy drifting. Snowfall totals ranged from thirteen to eighteen inches.
3/9/2019	Heavy Snow	Snowfall amounts ranged from seven to twelve inches.
2/24/2019	Blizzard	Strong north winds gusting to 40 to 50 mph combined with new snowfall brought ground blizzard conditions to west central Minnesota. Travel was significantly disrupted or halted.
2/20/2019	Heavy Snow	Heavy snow of up to six inches fell across west central Minnesota.
2/7/2019	Blizzard	Two to four inches of snowfall fell across west central Minnesota. This was followed by strong north winds gusting 40 to 50 mph and brought blizzard conditions to the area.
12/31/2018	Blizzard	Three to six inches of snow fell across west central Minnesota. Strong north winds of 30 to 45 mph brought blizzard conditions to the region.
12/27/2018	Blizzard	Total snowfall amounts were from nine to fifteen inches. Northwest winds speeds were 25 to 45 mph and resulted in widespread blizzard conditions across the region. Reports of vehicles becoming stuck or ending up in the ditch occurred.
3/23/2018	Heavy Snow	Heavy snow of around six inches fell across the area.
3/5/2018	Heavy Snow	Scattered showers and thunderstorms moved across the region during the early morning hours before snow developed by mid-morning. Snowfall amounts ranged from six to eleven inches.
12/4/2017	Blizzard	Freezing drizzle brought slippery conditions before one to two inches of snowfall fell occurred. Winds gusted 50 to 60 mph, causing blizzard conditions.
12/25/2016	Ice Storm	Heavy rain occurred across the region. Significant icing formed across areas at or just below the freezing point. The combination of icing along with very strong winds produced power line and tree damage, and many power outages.

Date	Type	Description
11/18/2016	Blizzard	Snowfall from two to nine inches was seen across the area. Strong northwest 30 to 40 mph winds, with gusts of up to 60 mph, brought blizzard conditions
11/30/2015	Heavy Snow	Heavy snowfall of six to seven inches fell across west central Minnesota.
3/3/2015	Blizzard	Northwest winds of 25 to 35 mph with gusts of up to 50 mph combined with two to four inches of newly fallen snow and resulted in blizzard conditions. Visibilities were frequently below a quarter mile.
2/10/2015	Winter Weather	Freezing rain occurred in the morning. It resulted in ice accumulations of up to a tenth of an inch and caused slippery roads and sidewalks. This resulted in slow travel and some accidents.
1/8/2015	Blizzard	Strong northwest winds and scattered snow showers were seen across the area. Snowfall amounts were less than an inch. The winds were 30 to 45 mph with gusts up to 60 mph. They combined with the existing snow cover and snow showers to bring blizzard conditions across the area.

SOURCE: (NCEI, 2021)

5.5.2 PROBABILITY OF OCCURRENCE

To determine the probability of future winter-related storm events in Traverse County, records of previous events (blizzards, heavy snows, ice storms, winter storms, and winter weather) were summed and divided by the dataset's period of record, resulting in the annual relative frequency of winter-related storms. Based on records in the NCEI Storm Events Database through February 2020, the relative frequency of winter-related storm events in Traverse County is 4.2 per year. This relative frequency can be used to infer the probability of these events occurring in the future.

5.5.3 CLIMATE CHANGE PROJECTIONS

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

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

5.5.4 VULNERABILITY

Transportation systems, electrical distribution systems, and structures are vulnerable to winter storms throughout the county. These events do not vary geographically within the county; all jurisdictions are equally vulnerable. While it is highly likely these events will continue occurring annually, the amount of snow and ice and number of winter-related storm events to occur each year are unpredictable. Citizens

living in climates such as these must always be prepared for situations that put their lives or property at risk. It is important that extra consideration be given to the vulnerable populations and energy infrastructure discussed in Section 4.3.

5.5.5 PROGRAM GAPS AND DEFICIENCIES

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

Above-Ground Power Lines: A majority of the power lines in Traverse 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: Traverse 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 designated shelter facilities have generator back-up power to provide the ability to care for residents if displaced during a severe winter event coupled with an extended power outage.

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 values); 34% are from hydraulic failures (overtopping due to inadequate spillway design, debris blockage, or the settlement of the dam crest), and 30% are caused by structural failures (foundation defects from settlement and slope instability) (FEMA, 2013b).

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

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

The MN DNR Dam Safety Program has the mission of protecting the life and safety of people by ensuring that dams are safe. Minnesota's Dam Safety Program sets minimum standards for dams and regulates the design, construction, operation, repair, and removal of both privately and publicly (non-federal) owned dams (MN DNR, 2020b). The federal government is responsible for regulating and maintaining

dam safety of federally owned dams. No single agency regulates all federally owned dams. 42% of federal dams are owned and managed by the U.S. Army Corp of Engineers (USACE) and the Bureau of Reclamation. The remaining federal dams are owned and managed by other federal agencies, including the Fish and Wildlife Service, Forest Service, the Department of Defense, and the Bureau of Indiana Affairs, among others (Normand, 2019).The Federal Energy Regulatory Commission (FERC) Dam Safety Program is the largest dam safety program in the U.S. The Commission works with federal and state agencies to ensure and promote dam safety of over 3,000 dams across the U.S. The Commission inspects projects on an unscheduled basis to investigate potential dam safety problems; complaints about constructing and operating a project; safety concerns related to natural disasters; and issues concerning compliance with the term and conditions of a license (FERC, 2020).

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

Dam & Levee Inventory

There are five dams and three levees in Traverse County. Table 28 provides the properties of each dam, and Table 29 lists the properties of each levee in the county.

Table 28. Dams in Traverse County

Dam Name	Owner	Waterway	Type	Height (ft)	Length (ft)	Purpose	Condition	Rating
Browns Valley Dam	USCOE	Little Minnesota River-TR	Earth	14	3700	Flood Control	Not Rated	Class II
Reservation Highway	USCOE	Bois de Sioux River	Concrete, Earth	16	11295	Flood Control	Not Rated	Class II
White Rock	USCOE	Bois de Sioux River	Earth	20	14500	Flood Control	Not Rated	Class I
Redpath 21	WD of Bois de Sioux	No Data	No Data	No Data	No Data	Flood Control	Not Rated	No Data
Lake Valley 34	Gauger, Barbara Ltrust	Mustinka River-TR	Rockfill	15.4	230	Fire Protection, Stock, or Small Fish Pond	Fair	Class III

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

Table 29. Levees in Traverse County

Levee Name	Location	Waterway	Length	Leveed Area
East Side, Southeast of Whiter Rock	Monson Township	Bois de Sioux River	0.56 mile	0.176 sq mi
West Side, South End, Southeast of Whiter Rock	Monson Township	Bois de Sioux River	1.0 mile	0.085 sq mi
Dumont Levee	Dumont City	No Information	0.54 mile	0.106 sq mi

SOURCE: (USACE, 2020C)

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 Traverse County. The White Rock Dam, located on the Traverse County and South Dakota border on the north end of Mud Lake, nearly failed in the large flood of 1997. A dam located at Pine Ridge Park near Norcross in Grant County, Minnesota, nearly failed in 1997 as well. Water behind this dam could cause flooding in Traverse County should a breach occur (USACE, 2021).

5.6.2 PROBABILITY OF OCCURRENCE

To determine the probability of future dam or levee failures in Traverse 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 zero 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, 2004a).

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

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)

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).

One of the dams in Traverse County is a Class I, high hazard potential dam (White Rock Dam) and has an EAP. Two dams are Class II (significant hazard potential), one is Class III (low hazard potential), and no hazard information is available for one dam. The descriptions of the vulnerable structures and populations for the Class I (high hazard potential) White Rock Dam is described below.

White Rock Dam, which forms Mud Lake, controls water flowing north on the Bois de Sioux River, which creates the border between South Dakota and Minnesota. This 20-foot-high earthen dam normally stores 6,500 acre-feet of water but has a maximum storage volume of 95,500 acre-feet. There are day-use recreation facilities at the White Rock Dam (USACE, 2020a). The area directly downstream of this dam is agricultural. Four miles downstream is the small settlement of White Rock, South Dakota. According to the 2010 census, White Rock has a population of three people. If this dam would be compromised, the water would then flow towards Wilkin County, which is about 13 miles away from Fairmont, North Dakota. Fairmont has a population between 500 and 700. The flooding would eventually get to Wahpeton and Breckenridge, with populations of roughly 7,750 and 3,250, respectively (Lynn Siegel, Traverse County EM, personal communication, January 4, 2021).

The U.S. Army Corps of Engineers oversees all annual inspection and maintenance needs for the White Rock Dam. It is not under the county's jurisdiction to mitigate for potential issues that may lead to dam failure.

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

> *Satisfactory*: No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the applicable regulatory criteria or tolerable risk guidelines.
>
> *Fair*: No existing dam safety deficiencies are recognized for normal loading conditions. Rare or extreme hydrologic and/or seismic events may result in a dam safety deficiency. Risk may be in the range to take further action.

Poor: A dam safety deficiency is recognized for loading conditions which may realistically occur. Remedial action is necessary. "Poor" may also be used when uncertainties exist as to critical analysis parameters which identify a potential dam safety deficiency. Further investigations and studies are necessary.

Unsatisfactory: A dam safety deficiency is recognized that requires immediate or emergency remedial action for problem resolution.

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

Dams in "Poor" or "Unsatisfactory" conditions may be more vulnerable to failure and pose a greater threat to the surrounding community and infrastructure. Fortunately, none of the dams that have received a rating in Traverse County have been rated as "Poor." The location of levees and location and condition of dams in Traverse 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, 2020b).

The levees in Traverse 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 31 provides a summary of the county's levees and community assets protected by the respective levee. Table 32 shows the LSAC's five levels of risk, as well as the actions that should be taken at each risk level.

Table 31. Assets in leveed areas

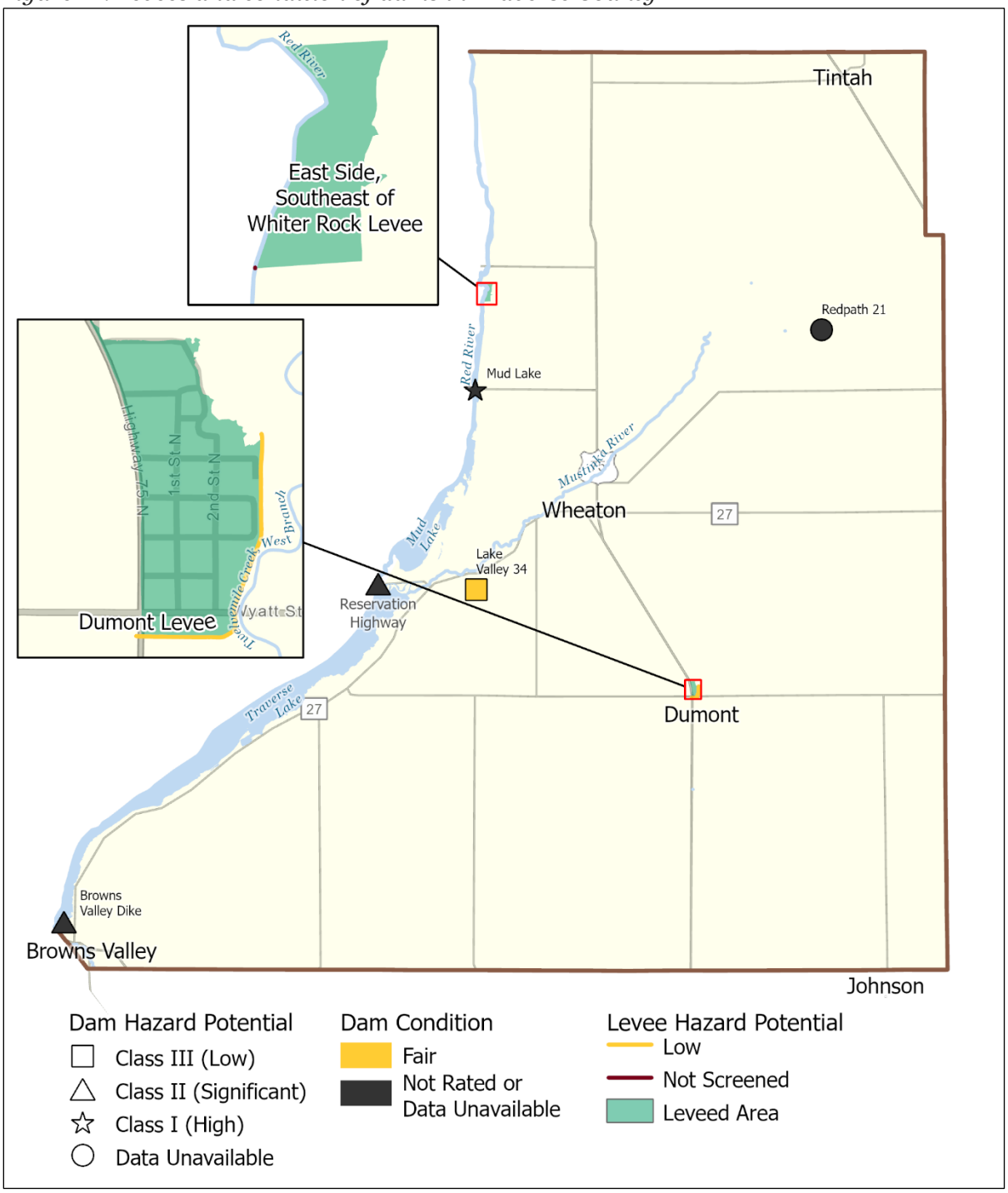
Levee Name	Location	LSAC Rating	Property Value	Structures at Risk	Population at Risk
East Side, Southeast of Whiter Rock	White Rock, Roberts County, South Dakota	Not Screened	$0	0	0
West Side, South End, Southeast of Whiter Rock	White Rock, Roberts County, South Dakota	Not Screened	$0	0	0
Dumont Levee	Dumont, Traverse County, Minnesota	Low	$7,750,090	59	101

SOURCE: (USACE, 2020c)

5.6.5 PROGRAM GAPS AND DEFICIENCIES

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

Figure 21. Levees and condition of dams in Traverse County



SOURCE: (USACE, 2021)

Table 32. USACE's Levee Safety Action Classification (LSAC) Table

Risk	Actions for Levee Systems and Leveed Areas in this Class *(Adapt actions to specific levee system conditions.)*	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, 2020B)

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 Traverse County as related to hazard mitigation.
- Appendix C: As part of the Traverse 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 Traverse 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 Traverse County

Community Name	Participation in the NFIP	FEMA Map	Description of Participation
Traverse County	Participating	FEMA-mapped high-risk areas	Traverse County enforces its Floodplain Management Ordinance (Section 21 of the Traverse County Land Use Ordinance) and regulates all building and zoning within the floodplain.
Browns Valley	Participating	FEMA-mapped high-risk areas	The City of Browns Valley has adopted and enforces Chapter VIII, Floodplain Management in the City Code.
Dumont	Participating	FEMA-mapped high-risk areas	The City of Dumont has a Floodplain Ordinance in place that it enforces to reduce risk of future development in any high-risk flood mapped areas.
Tintah	Participating	FEMA-mapped high-risk areas	The City of Tintah has adopted and enforces Chapter VIII, Floodplain Management in the City Code.
Wheaton	Participating	No FEMA-mapped high-risk areas	The City of Wheaton enforces Section 550.3.04 Non-Conforming Structures and Uses of the Wheaton, Minnesota Municipal Ordinances which addresses regulations for maintaining eligibility in the NFIP.

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.

Traverse County has 11 RL properties with a total of 27 losses. The properties are in Browns Valley (7), Wheaton (2), Norcross (1), and Traverse City (1). The properties are all single-family residences. Payments have totaled $142,223 as of February 2022. There are no severe repetitive loss properties (SRL) in Traverse County.

For more on the areas that flood repeatedly in Traverse County, see Section 5.1.

6.1.2 PLANS AND ORDINANCES

Traverse 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

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

All Hazards

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

Public Warning and Emergency Notification: In the event of emergencies or hazardous conditions that require timely and targeted communication to the public, Traverse County utilizes the CodeRED emergency notification system which users must sign up for ("opt-in service"). Traverse County also has IPAWS (Integrated Public Alert Warning System) which allows for both targeted and county-wide emergency notifications to both residents and visitors (not an "opt-in" service). Severe spring and summer storm warnings are initiated by the National Weather Service office in Chanhassen, MN 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, CodeRED, cell phone apps and the outdoor warning siren system.

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

Shelter Facilities- There are designated shelter facilities within Traverse County that are working with Emergency Management and the American Red Cross to create MOU's. A severe storm or a period of extreme heat/cold coupled with a major power outage may require emergency sheltering for those in need. Traverse County Emergency Management maintains

a list of s-helters within the county and have Horizon Public Health staff and other volunteers who will serve as shelter operations staff. Traverse County has sheltering and pet sheltering plans in place.

NOAA Weather Radios: Traverse 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 social media and also during the NWS severe weather awareness weeks.

Backup Power: Generator back-up power is in place for the Traverse County EOC, Social Services are connected to same hard-wired generator, Dispatch/Jail have their own generator hard-wired in, Sanford Wheaton Medical Center, Traverse Care Center, Browns Valley Health Center all have hard- wired generators, Browns Valley City Hall is wired to be connected to small generator as well as Traverse County Highway Department buildings located in Wheaton, Dumont, Tintah, and Browns Valley. Horizon Public Health is located in the social service building and is hard-wired in to maintain vaccine temperatures where they need to be in case of power outages.

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

Severe Winter Storms

Winter Hazard Awareness Week: Traverse 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 Emergency Management Facebook page and local news media to share information with the public.

Snow Removal: The Traverse 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 Traverse 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: Outdoor warning sirens are located in the cities of Browns Valley, Dumont, Tintah, Wheaton and also the Traverse County Park. 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 where they are located and maintained by

those jurisdictions. All sirens can be remotely activated by the Traverse County Sheriff's Office Dispatch. Cities can activate their own sirens if needed.

SKYWARN Program: Traverse County Emergency Management works with the National Weather Service (NWS) to offer training annually to local fire, law enforcement 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: Traverse 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 our Emergency Management Facebook page and local news media to share information with the public.

Tree Management: The Traverse County Highway Department trims or clears trees in 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 cities and townships are encouraged to do the same.

MDH Requirements for Manufactured Home Parks: The Horizon Public Health Department works with the owners of existing 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 the Minnesota Department of Health. No new residential home parks have been developed in Traverse County. Storm shelters for any new manufactured mobile home parks that are developed in unincorporated areas of the County should be considered per MDH requirements.

Flooding

Traverse County Floodplain Management: The Traverse County Hometown Planning & Land Management Office maintains the floodplain maps and Floodplain Management Ordinance for the county. The office is the repository for the National Flood Insurance Program's Flood Insurance Rate Maps for the county and can assist residents in determining whether their property is affected by an officially mapped flood area.

National Flood Insurance Program (NFIP): Traverse County and the cities of Browns Valley, Dumont, Tintah, and Wheaton participate in the NFIP.

Transportation Improvement Plan: The Traverse County Highway Department maintains a 5-year Road & Bridge Plan that identifies and schedules road improvement projects that include culvert and drainage improvements to reduce over-the-road repetitive flooding. The current

Traverse County TIP is in place for 2018-2023.

Shoreland Management Regulations: The Traverse County Hometown Planning & Land Management Office administers land use and zoning ordinances for rural and unincorporated portions of Traverse County, including for shoreland. Traverse County Ordinance, Section 5 addresses stormwater management and slope standards for the county.

Bois de Sioux Watershed District: Traverse County is part of the Bois de Sioux Watershed District and works closely as a partner to the BdSWD on planning and project mitigation efforts to reduce the impacts of future flood events. The BdSWD serves as the ditch authority for Traverse County, and also maps & monitors stream gages on waterways within the county. The BdSWD also leads the One Watershed, One Plan regional planning effort which includes Traverse County.

Traverse County Soil and Water Conservation District: The Traverse County SWCD oversees regional planning and project efforts related to projects within the watershed that reduce the impacts of high rain events and resulting localized flooding and erosion. The SWCD administers the State Cost Share program for Traverse County to assist landowners with conservation practices, and also enforces the State Buffer Initiative signed into law in 2015 by Governor Dayton. The purpose of the ordinance is to help 1) protect state water resources from erosion and runoff pollution, 2) stabilize soils, shores, and banks; and 3) protect or provide riparian corridors. Enforcement of the ordinance helps mitigation damages of erosion as a result of high rain events.

Dam Failure

White Rock Dam: The White Rock Dam is under the control of the Army Corp of Engineers, and they have the plans and programs in place in case of a dam breach.

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 Traverse County Plan. This framework, as outlined below, will allow for integration of the mitigation actions that are listed by Traverse 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.	• 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	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards. Many of these types of actions are projects eligible for funding through the FEMA Hazard Mitigation Assistance program.	• Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits • Floodwalls and retaining walls • Detention and retention structures • Culverts • Safe rooms
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	• Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements • Wetland restoration and preservation
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions.	• Radio or television spots • Websites with maps and information • Real estate disclosure • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas. • StormReady Certification • Firewise Communities
Mitigation Preparedness and Response	This is a State of Minnesota mitigation strategy with the intent of covering preparation and actions that protect life and property during a natural disaster.	• Emergency operations plan • Flood fight plans and preparedness • Dam emergency action plans • Warning • Backup power • Emergency capabilities

Local leaders work together with the Traverse 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 Traverse 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 Traverse 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 Browns Valley, Dumont, Tintah, and Wheaton.

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

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

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

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

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

See Table 34 for a description of each mitigation strategy and related types of actions.

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

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

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

Mitigation actions that have been completed or deleted from the 2015 Traverse 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	• 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	• Mitigation methods are established. • The County has limited experience with the kinds of measures that may be appropriate to mitigate the hazard. • Some mitigation measures are eligible for federal grants. • There is a limited range of effective mitigation measures for the hazard. • Mitigation measures are cost-effective only in limited circumstances. • Mitigation measures are effective for a reasonable period of time.
Low Priority	• Methods for reducing risk from the hazard are not well-established, are not proven reliable, or are experimental. • The State or Counties have little or no experience in implementing mitigation measures, and/or no technical knowledge of them. • Mitigation measures are ineligible under federal grant programs. • There is a very limited range of mitigation measures for the hazard, usually only one feasible alternative. • The mitigation measure(s) have not been proven cost effective and are likely to be very expensive compared to the magnitude of the hazard. • The long-term effectiveness of the measure is not known or is known to be relatively poor.

Time frame

Each mitigation action identifies the anticipated timeframe for implementation of the action within the next 5-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 Traverse 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. Traverse County Mitigation Action Chart (2021–2026)

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all county residents to sign-up for the county's CodeRED emergency notification alert system.	Existing High Ongoing	Traverse County Emergency Management (TCEM)	A link for the CodeRED emergency notification system is located on the Traverse County website and reminders are posted on the TCEM Facebook page. Local jurisdictions are encouraged to promote sign up for local residents by directing them to the county website.	County
2	All-Hazards	Mitigation Preparedness & Response Support	Ensure the Traverse 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	TCEM	TCEM 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 EM functions. This includes plans in place for Sheltering and Pet Sheltering in the event that people are displaced from their homes following a disaster.	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	TCEM, Horizon Public Health Dept (HPHD)	TCEM and HPHD 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. TCEM and HPHD work with the Red Cross on shelter management training. Traverse County will continue to work to ensure that all designated shelters are prepared with backup generators where needed.	County
4	Severe Winter & Summer Storms & Extreme Temps	Education & Awareness Programs	Provide education and outreach to residents on personal preparedness for severe weather events, extreme temperatures, and extended power outages.	Existing High Ongoing	TCEM in coord with HPHD and Local Gov't	Traverse County Emergency Management utilizes our Emergency Management Facebook page and local news media to communicate with residents and visitors on emergency preparedness. TCEM 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 CodeRED system and social media to receive emergency notifications and other information. TCEM and HPHD promote public awareness of personal safety measures to take during periods of extreme cold or extreme heat.	County

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
5	Severe Winter & Summer Storms	Structure & Infrastructure Systems	Work with municipal & rural electric coops to encourage them to address burying powerlines or strengthening power poles to avoid power outages from high wind events and storms.	Existing High Ongoing	TCEM in coord with Local Gov't and Rural & Municipal Utility Coops	Ottertail Power Company and Traverse Electric Coop continue to address where power lines can be strengthened or buried underground. TCEM will assist as needed with applications to FEMA for eligible project measures that help to eliminate or reduce risk of power outages by these coops.	Electric Coops, FEMA HMA grant
6	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Purchase & install permanent backup generators for Traverse County critical facilities where they are needed.	Existing High TBD	TCEM in coord with other county depts.	Traverse County is working to evaluate all critical buildings and services and determine where generators should be placed. Not all of our designated shelter facilities have generator back-up power to provide either heat or cooling if there is a loss of power. TCEM will work with other county departments to identify what county facilities do not have backup generator power. Generators will be purchased as funding allows.	County
7	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Work with local jurisdictions to acquire generator backup power to support critical infrastructure and delivery of essential services during an extended power outage due to storms.	Existing Moderate Ongoing	TCEM in coord with Local Gov't	Many of our cities and townships do not have adequate backup power to their key facilities, nor backup for sounding sirens. TCEM will continue to provide assistance to communities to acquire portable generators. In some cases, this may include helping to identify where used portable generators may be obtained or helping to prepare a funding application.	County, Local Gov't
8	Severe Winter & Summer Storms	Natural Systems Protection	Conduct vegetation management along county-owned roads to reduce the risk of downed trees and branches resulting from severe storms.	Existing Moderate Ongoing	TC Hwy. Dept, Utility Providers & Local Govt's	TC Highway Dept. and local utility providers actively maintain and clear their right of ways of trees, vegetation, and debris to prevent the creation of additional hazards or blocking road/site access. Townships & cities are encouraged to do the same for roads under their authority.	County, Utilities, Local Gov't

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
9	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Encourage schools and long-term facilities that house senior citizens or other vulnerable populations to have emergency plans and generators in place to deal with severe weather, extreme temperatures, and power outages.	Existing High Ongoing	TCEM & HPHD in coord with Schools & Other Facilities, and Local Govt's	TCEM & HPHD continue to work with schools and other long-term care facilities across the county and will encourage them to have plans in place for when the need arises. TCEM encourages local jurisdictions to work directly with facilities in their community to be prepared. Schools are encouraged to practice tornado drills each year.	County, Local Facilities
10	Severe Summer Storms	Mitigation Preparedness & Response Support	Ensure there is a network of trained Storm Spotters throughout the county.	Existing Moderate Ongoing	TCEM in coord with NWS & Local Gov't	TCEM 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. Storm Spotters help to support situational awareness of and public notification for dangerous storms such as severe thunderstorms and tornadoes.	County, NWS
11	Severe Summer Storms	Education & Awareness Programs	Conduct public outreach & education during tornado season to inform the public on what is a tornado watch/warning and what to do when warning sirens are activated.	Existing High Ongoing	TCEM	TCEM provides information on tornado awareness and safety on the TCEM Facebook page, and also posts information during tornado season and during the NWS Severe Weather Awareness Week in April each year.	County
12	Severe Summer Storms	Local Planning & Regulations	Work with owners of mobile home parks (MHP's) to ensure they are in compliance with the Minnesota Department of Health (MDH) requirements for evacuation plans and storm shelters.	Existing High Ongoing	HPHD in coord with Local Gov't and MHP's	HPHD works with the owners of manufactured home parks within the county and the municipalities where they are located to ensure that they are meeting MDH requirements for storm shelters and evacuation plans.	County, MHP Owners
13	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	TCEM in coord with Local Gov't	The cities of Browns Valley, Dumont, and Tintah have each identified a need to upgrade or install new warning sirens in their community. TCEM will assist 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 in the county will be connected to the county's remote activation system.	County, Local Gov't, USDA CF Grant Program

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
14	Severe Summer Storms	Structure & Infrastructure Projects	Address the need for the construction of storm shelters or tornado safe rooms in Traverse County parks and local community locations where people are vulnerable to high wind or tornadic events.	Existing High Ongoing	TCEM in coord with Local Gov't	The city of Tintah has 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). TCEM will provide assistance as requested to help assess need, possible construction options, and development of potential grant applications as needed (i.e., FEMA HMA safe room grant). Private RV parks/campgrounds around the county will also be encouraged to address necessary storm shelter projects to protect campers vulnerable to high wind events.	County, FEMA HMA, Other (TBD)
15	Flooding	Local Planning & Regulations	Participate in the National Flood Insurance Program and enforce policies that address development in high-risk flood areas.	Existing Moderate Ongoing	TC Zoning Administrator	The Traverse County Land Management Office maintains the floodplain maps and Floodplain Management Ordinance for the county. The office is the repository for the National Flood Insurance Program's Flood Insurance Rate Maps for the county and can assist residents in determining whether their property is affected by an officially mapped flood area. Traverse County enforces its Floodplain Management Ordinance (Section 21 of the Traverse County Land Use Ordinance) and regulates all building and zoning within the floodplain.	County
16	Flooding	Local Planning & Regulations / Structure & Infrastructure Projects	Address road improvements, ditch maintenance, and bank stabilization projects needed to mitigate against high rain events.	Existing High Ongoing	TC Hwy. Dept. in coord with Local Gov'ts	The Traverse County Highway Department maintains a 5-year Road & Bridge Plan that identifies and schedules road improvement projects that include culvert and drainage improvements to reduce over-the-road repetitive flooding. The current Traverse County TIP is in place for 2018-2023. The Hwy. Dept. works regularly with township governments to address mitigation measures for rural roads and culverts impacted by high rain and flooding events.	County, State, Federal

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
17	Flooding	Local Planning & Regulations	Enforce county policies that regulate zoning for new development, setbacks in shoreline areas, and stormwater management.	Existing Moderate Ongoing	TC Zoning Administrator in coord with SWCD	The Traverse County Land Management Office administers land use and zoning ordinances for rural and unincorporated portions of Traverse County, including for shoreland. Traverse County Ordinance, Section 5 addresses stormwater management and slope standards for the county. The TC SWCD also enforces Minnesota's Buffer Law, which requires perennial vegetative buffers of up to 50 feet along lakes, rivers, and streams and buffers of 16.5 feet along ditches.	County, SWCD
18	Flooding	Education & Awareness Programs	Provide planning support and technical assistance to cities and townships to update stormwater management plans and implement projects that protect critical infrastructure from future flood events and improve drainage.	Existing Moderate Ongoing	TC Zoning Administrator & TC Hwy. Dept. in coord with Local Govt's	The Traverse County Land Management Office and TC Highway Dept. continue to work with our city and townships to plan for and implement local stormwater management improvements in order to better handle future high rain events. We also assist with issues related to ditch maintenance and drainage.	County, Local Gov't
19	Flooding	Mitigation Preparedness & Response Support	Be prepared for future flood events with flood fight plans, evacuation & sheltering plans, and access to water pumps and sandbags.	Existing High Ongoing	TCEM in coord with TC Hwy. Dept. & Local Govt's	This is an ongoing effort of TCEM emergency response planning for flood disasters in coordination with our local jurisdictions and our neighboring jurisdictions in HSEM Region 4.	County
20	Flooding	Local Planning & Regulations	Work in partnership with the Traverse County SWCD and area watershed districts to coordinate planning and project efforts that address flooding and erosion concerns.	Existing Moderate Ongoing	TCEM & TC Zoning Administrator in coord with TC SWCD and Watershed Districts	Traverse County is part of the Bois de Sioux Watershed District and works closely as a partner to the BDSWD on planning and project mitigation efforts to reduce the impacts of future flood events. The BDSWD serves as the ditch authority for Traverse County, and also maps & monitors stream gages on waterways within the county. The BDSWD also leads the One Watershed, One Plan regional planning effort which includes Traverse County.	County, BDSWD, SWCD Cost Share Grant Program

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
21	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	TCEM & TC Zoning Administrator in coord with MN DNR	There are currently no projects slated for conducting property buyouts by the county or local jurisdictions; however, Traverse County will continue to evaluate and assist municipalities with any 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
22	Flooding	Structure & Infrastructure Projects	Work with the MN DNR to address structural improvements to the road along Lake Traverse in order to ensure they are accessible during a flood or other emergency.	New Moderate TBD	TCEM & TC Zoning Administrator in coord with MN DNR	Most of the roads along Lake Traverse that serve the many (mostly) seasonal homes and cabins are not publicly maintained by the Township, County or anyone. They are private roads. Many of them are likely not up to the elevations required by DNR Floodplain regulations and emergency service access to those roads would likely be difficult in the event of a flood or other emergency. Traverse County is open to discussion and potential future action to address improving those roads (elevating them, widening them, improving the base material on them or all of the above). Significant outside funding would be required for such measures to be implemented, such as from MN DNR flood mitigation grant funding, FEMA HMA grant funding or other sources.	County, Other Grant Sources (MN DNR, FEMA, Other)
23	Flooding	Local Planning & Regulations	Work with the MN DNR Floodplain Management Program to update the floodplain maps for Traverse County.	New High TBD	TCEM & TC Zoning Administrator in coord with MN DNR	Traverse County Emergency Management and the Land Management Office will communicate with the MN DNR to see when and how the county can have modernized floodplain maps developed. According to Hazus and the current flood maps, 9% of the total county structures are in the 1% annual chance flood zone. All 4 cities in Traverse County and Traverse County participate in the NFIP.	County, MN DNR

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
24	Flooding	Local Planning & Regulations	Drainage System Management: Manage the system of county ditches to reduce over-the-road flooding resulting from high rain events as allowed by MN Statute 103E.	Existing High Ongoing	Bois de Sioux Watershed District	The Bois de Sioux Watershed District is administrator to 53 Benefitted Property Owner-owned drainage ditch systems that consist of 340 miles of open channel and tile drainage infrastructure. Property owners are encouraged to help keep the systems functional. If not, they can work with county staff to arrange contractors to perform the work. The Bois de Sioux Watershed District implements improvements and maintenance of existing drainage systems.	Benefitted Property Owners, Bois de Sioux Watershed District
25	Flooding	Local Planning & Regulations / Structure & Infrastructure Projects	Work with township, county, watershed district, and city governments to plan for and implement measures to address minor localized flood and erosion reduction projects for roads, bridges, and culverts throughout the county.	Existing High Ongoing	Traverse County	Traverse County Hwy. Dept. work with townships and municipalities to assess damages following significant rain or flood events. Traverse County Hwy. Dept. works to help repair/replace or otherwise conduct mitigation measures for areas experiencing repetitive losses (resurfacing, culvert replacement, and bank stabilization). Traverse County maintains a long-range transportation plan that includes an ongoing assessment of existing conditions, establishment of long-term goals and performance measures, and future system planning analysis. Within the plan, the county also inventories the condition of county roads and bridges, and establishes an annual prioritized list of projects to ensure maintenance and repair targets are met.	Local, County, State, Federal
26	Flooding	Local Planning & Regulations / Structure & Infrastructure Projects	Work in partnership with watershed districts and Traverse SWCD to coordinate planning and project efforts that address flooding and erosion concerns.	Existing Moderate Ongoing	TC	Traverse County has one Soil and Water Conservation District, in addition to 2 watershed districts (Bois de Sioux River and Upper Minnesota River). Each of these bodies oversees regional planning and projects to reduce the impact of high rain events and resulting localized flooding and erosion. TC works in partnership with these groups on planning & project efforts as needed.	Local, County, State, Federal

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
27	Flooding	Local Planning & Regulations / Structure & Infrastructure Projects	Work with local communities, watershed districts and MN DNR to address the need for flood gauges or other water-level monitoring systems on streams and rivers where needed in order to provide early warning of high-water and flood events that may threaten adjacent shoreland properties or structures.	Existing Low Ongoing	Watershed Districts	Watershed Districts will work with local communities, watershed districts and MN DNR to help to determine a need for action on installing such devices on waterways of concern as needed.	Local & State
28	Flooding	Natural Systems Protection	Conduct soil stabilization and slope management projects in unstable areas for sediment and erosion control resulting from high rain events.	New High Ongoing	SWCD and Watershed Districts	The SWCD and Watershed Districts work to design, construct, and maintain erosion prevention projects that stabilize banks by proper sloping and grading techniques, planting vegetation, terracing hillsides, installing riprap boulders, geotextile fabric and/or concrete mats.	SWCD & Watershed Districts
29	Flooding	Natural Systems Protection	Conduct floodplain and stream corridor restoration in areas that are impacted by high rain events.	New High Ongoing	SWCD and Watershed Districts	The SWCD and Watershed Districts work to design, construct, and maintain floodplain and stream restoration projects mitigate erosion and flood risk by reestablishing the structure and function of ecosystems and floodplains to as close to possible natural conditions prior to development influences. The BDSWD 10-Year Bois de Sioux – Mustinka River Joint Comprehensive Watershed Management Plan (January 27, 2021) incorporates many projects related to this work.	SWCD & Watershed Districts
30	Flooding	Natural Systems Protection	Acquire and use conservation easements to prevent development in known flood hazard areas.	New Moderate Ongoing	SWCD and Watershed Districts	The SWCD and Watershed Districts play a role in helping to acquire conservation easements to protect areas sensitive to flooding.	SWCD & Watershed Districts

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Timeframe	Responsibility	Comments on Implementation & Integration	Possible Funding
31	Flooding	Natural Systems Protection	Construct flood diversion and storage projects where identified as needed to reduce the impacts of high rain events on streams, rivers, or drainage systems which may result in localized or downstream flooding.	New High Ongoing	SWCD and Watershed Districts	The SWCD and Watershed Districts work to design, construct, and maintain projects diverting floodwaters from a stream, river, or drainage system into a wetland, floodplain, canal, pipe, other conduit and storing them in reservoirs, floodplains, wetlands, impoundments, or other storage facilities. This allows for a controlled baseflow release and tempers peak flows, stages, and velocities to mitigate flooding.	SWCD & Watershed Districts

Section 7 – Plan Maintenance

7.1 Monitoring, Evaluation, and Updating the Plan

The Traverse 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 Traverse County MHMP.

The Traverse 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 Traverse County Emergency Management Director will work with the Traverse County Local Emergency Preparedness Committee (LEPC) to serve as the committee to help monitor, review, evaluate, and update the Multi-Hazard Mitigation Plan. The LEPC normally meets quarterly and consists of Traverse County Emergency Management and other county departments, as well as representatives from the cities of Browns Valley, Dumont, Tintah, and Wheaton. Additional stakeholders will be added based on need. If necessary, the Traverse County Emergency Management Director will convene the committee to meet on a more regular basis to monitor plan implementation progress and reassess needs and opportunities. This could be done in response to funding cycles of programs that provide resources for hazard mitigation activities. If there is a need for a special meeting due to new developments or a declared disaster occurring in the county, the committee will meet to update pertinent mitigation strategies. Depending on Traverse 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 Traverse 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, Traverse 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

Traverse 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 Traverse County and its jurisdictions (see Section 6.3). The cities of Browns Valley, Dumont, Tintah, and Wheaton 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 Traverse 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. 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 Traverse County. Regulation plays a particularly important role for land use, access to structures and the protection of water resources and public health.

7.3 Continued Public Involvement

Continued public involvement is critical to the successful implementation of the Multi-Hazard Mitigation Plan. The Traverse County Emergency Management Director and the MHMP planning team members will continue to engage new public stakeholders in planning discussions and project implementation during the five-year cycle of this plan.

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

- The plan will be posted on the Traverse County Emergency Management website for the public to read and provide feedback. Collected feedback will be reviewed during the 5-year plan cycle and will be noted for future update of the plan or addressed as necessary.
- Following any major storms or natural disasters, Traverse County Emergency Management will seek to gather concerns and new ideas for mitigation from local residents to include in the next update of the plan. This may be done through public meetings, outreach via social media (e.g., County Facebook Pages), 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 Traverse 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

References

Adams, R. (2016). *Pollution Sensitivity of Near-Surface Materials* (p. 16).

AMS. (2004, October 8). *Mobile Homes and Severe Windstorms*. American Meteorological Society. https://www.ametsoc.org/index.cfm/ams/about-ams/ams-statements/archive-statements-of-the-ams/mobile-homes-and-severe-windstorms/

Arnfield, A. J. (2020). Köppen climate classification. In *Encyclopedia Britannica*. https://www.britannica.com/science/Koppen-climate-classification

ATSDR. (2020, September 15). *CDC Social Vulnerability Index (SVI)*. ATSDR. https://www.atsdr.cdc.gov/placeandhealth/svi/at-a-glance_svi.html

Brimelow, J. C., Burrows, W. R., & Hanesiak, J. M. (2017). The changing hail threat over North America in response to anthropogenic climate change. *Nature Climate Change*, *7*(7), 516–522. https://doi.org/10.1038/nclimate3321

Brooks, H. E., Carbin, G. W., & Marsh, P. T. (2014). Increased variability of tornado occurrence in the United States. *Science*, *346*(6207), 349–352. https://doi.org/10.1126/science.1257460

Ceil Strauss, MN Floodplain Manager. (2020, April 6). *Community NFIP status* [Personal communication].

CEMHS. (2019). *Spatial Hazard Events and Losses Database for the United States*. Center for Emergency Management and Homeland Security, Arizona State University. https://cemhs.asu.edu/sheldus

Changnon, S., Changnon, D., & Hilberg, S. (2009). *Hailstorms Across the Nation: An Atlas about Hail and Its Damages* (p. 101). Illinois State Water Survey. https://www.isws.illinois.edu/pubdoc/CR/ISWSCR2009-12.pdf

Del Genio, A. D., Yao, M.-S., & Jonas, J. (2007). Will moist convection be stronger in a warmer climate?: CONVECTION STRENGTH IN A WARMER CLIMATE. *Geophysical Research Letters*, *34*(16). https://doi.org/10.1029/2007GL030525

FEMA. (2004a). *Federal Guidelines for Dam Safety: Hazard Potential Classification System for Dams*. https://www.ferc.gov/sites/default/files/2020-04/fema-333.pdf

FEMA. (2004b). *Using HAZUS-MH for Risk Assessment*. Federal Emergency Management Agency. https://www.fema.gov/pdf/plan/prevent/hazus/fema433.pdf

FEMA. (2006). *Introduction to Hazard Mitigation: IS-393.A*. Federal Emergency Management Agency. https://training.fema.gov/emiweb/is/is393a/is393.a-lesson3.pdf

FEMA. (2013a). *Local Mitigation Planning Handbook*. https://www.fema.gov/media-library-data/20130726-1910-25045-9160/fema_local_mitigation_handbook.pdf

FEMA. (2013b). *Living With Dams: Know Your Risks*. Federal Emergency Management Agency. https://www.fema.gov/media-library-data/20130726-1845-25045-7939/fema_p_956_living_with_dams.pdf

FEMA. (2015). *National Preparedness Goal*. https://www.fema.gov/media-library-data/1443799615171-2aae90be55041740f97e8532fc680d40/National_Preparedness_Goal_2nd_Edition.pdf

FEMA. (2021a). *Disaster Declarations for States and Counties | FEMA.gov*. https://www.fema.gov/data-visualization/disaster-declarations-states-and-counties

FEMA. (2021b). *Hazard Mitigation Assistance Grants*. https://www.fema.gov/grants/mitigation

FEMA. (2021c). *Hazus | FEMA.gov*. https://www.fema.gov/flood-maps/products-tools/hazus#2

FERC. (2020, July 21). *Dam Safety Program*. Hydropower. https://www.ferc.gov/industries-data/hydropower

Gunturi, P., & Tippett, M. (2017). *Impact of ENSO on U.S. Tornado and Hail frequencies* (p. 5). http://www.columbia.edu/~mkt14/files/WillisRe_Impact_of_ENSO_on_US_Tornado_and_Hail_frequencies_Final.pdf

Guttman, N. B., & Quayle, R. G. (1996). A Historical Perspective of U.S. Climate Divisions. *Bulletin of the American Meteorological Society*, *77*(2), 294–295.

Hales, D., Hohenstein, W., Bidwell, M. D., Landry, C., McGranahan, D., Molnar, J., & Jadin, J. (2014). *Climate Change Impacts in the United States: The Third National Climate Assessment*. U.S. Global Change Research Program.

HIFLD. (2021). *Homeland Infrastructure Foundataion-Level Data*. https://gii.dhs.gov/hifld/

Hogeback, J. (2020). *How Do Tornadoes Form?* Encyclopedia Britannica. https://www.britannica.com/story/how-do-tornadoes-form

Huttner, P. (2017, March 7). *Extreme Minnesota: Tornado and ice out records shattered*. MPR News. https://www.mprnews.org/story/2017/03/07/extreme-minnesota-tornado-and-ice-out-records-shattered

Kunkel, K. E., Stevens, L. E., Stevens, S. E., Sun, L., Janssen, E., Wuebbles, D., Hilberg, S. D., Timlin, M. S., Stoecker, L., Westcott, N. E., & Dobson, J. G. (2013). *Regional Climate Trends and Scenarios for the U.S. National Climate Assessment* (p. 102) [NOAA Technical Reports]. National Oceanic and Atmospheric Administration. https://scenarios.globalchange.gov/sites/default/files/NOAA_NESDIS_Tech_Report_142-3-Climate_of_the_Midwest_U.S_0.pdf

Lotha, G., Singh, S., & Tikkanen, A. (2019, February 22). *Levee*. Encyclopædia Britannica. https://www.britannica.com/technology/levee

Lynn Siegel, Traverse County EM. (2021, January 4). *Mud Lake Dam in Traverse County* [Personal communication].

MDH. (2018). *Planning for Climate & Health Impacts in West Central Minnesota*. Minnesota Climate & Health Program, Minnesota Department of Health. https://www.health.state.mn.us/communities/environment/climate/docs/hsem_region2.pdf

MDH. (2020, January 23). *Summary of General Requirements for Manufactured Home Parks: Manufactured Home Parks and Recreational Camping Areas:Environmental Health—Minnesota Dept. Of Health*. Minnesota Department of Health. https://www.health.state.mn.us/communities/environment/mhprca/mhpgenreq.html

MDH. (2021). *Health Care Facility and Provider Database*. Health Care Facility and Provider Database. https://www.health.state.mn.us/facilities/regulation/directory/index.html

Meador, R. (2013). *Climate change comes to Minnesota: Three experts outline the impacts*. http://www.minnpost.com/earth-journal/2013/02/climate-change-comes-minnesota-three-experts-outline-impacts

Midwestern Regional Climate Center. (2021). *Cli-MATE: MRCC Application Tools Environment*. https://mrcc.illinois.edu/CLIMATE/

Minnesota Climatology Working Group. (2010, October). *HydroClim Minnesota—October 2010*. https://climateapps.dnr.state.mn.us/doc/journal/hc1010.htm

Wetland Standards and Mitigation, Pub. L. No. 7050.0186 (2016). https://www.revisor.mn.gov/rules/7050.0186/

Minnesota State Demographic Center. (2020). *Population Data: Our Projections*. Minnesota State Demographic Center. https://mn.gov/admin/demography/data-by-topic/population-data/our-projections/

MN DEED. (2020). *Labor Market Information*. MN Employment and Economic Development, Labor Market Information. https://apps.deed.state.mn.us/lmi/qcew/AreaSel.aspx

MN DNR. (2004). *Heavy Rains Drench Southern Minnesota September 14-15, 2004*. http://www.dnr.state.mn.us/climate/journal/ff040914_15.html

MN DNR. (2007). *Heavy Rains Fall on Southeastern Minnesota: August 18-20, 2007*. http://www.dnr.state.mn.us/climate/journal/ff070820.html

MN DNR. (2008). *Minnesota GAP Stewardship, 2008*. [discontinued]

MN DNR. (2013). *Stream Routes with Kittle Numbers and Mile Measures—Minnesota Geospatial Commons*. https://gisdata.mn.gov/dataset/water-measured-kittle-routes

MN DNR. (2014). *Inventory of Dams in Minnesota*. Minnesota DNR - Division of Ecological and Water Resources, Dam Safety Unit. https://gisdata.mn.gov/dataset/loc-mn-dams-inventory-pub

MN DNR. (2019a). *Public Waters Inventory Lists*. https://www.dnr.state.mn.us/waters/watermgmt_section/pwi/download_lists.html

MN DNR. (2019b, March 28). *Minnesota Tornado History and Statistics*. Minnesota Department of Natural Resources. https://www.dnr.state.mn.us/climate/summaries_and_publications/tornadoes.html

MN DNR. (2019c). *National Wetland Inventory for Minnesota*. Minnesota Department of Natural Resources. https://gisdata.mn.gov/dataset/water-nat-wetlands-inv-2009-2014

MN DNR. (2019d). *Minnesota Wetland Inventory: User Guide and Summary Statistics*. Minnesota Department of Natural Resources. https://files.dnr.state.mn.us/eco/wetlands/nwi-user-guide.pdf

MN DNR. (2019e, December). *Another Very Wet Year in Minnesota*. Minnesota Department of Natural Resources. https://www.dnr.state.mn.us/climate/journal/another-very-wet-year-minnesota.html

MN DNR. (2020a). *Climate Trends*. Minnesota Department of Natural Resources.

MN DNR. (2020b). *Dams and Dam Safety*. MN Department of Natural Resources. https://www.dnr.state.mn.us/waters/surfacewater_section/damsafety/index.html

MN DNR. (2020c). *Groundwater Atlas*. Springs, Springsheds, and Karst. https://www.dnr.state.mn.us/waters/groundwater_section/mapping/springs.html

MN DNR. (2020d). *Minnesota River State Water Trail*. Minnesota Department of Natural Resources. https://www.dnr.state.mn.us/watertrails/minnesotariver/index.html

MN DNR. (2021a). *County Data and Map Viewers*. Minnesota Department of Natural Resources. https://www.dnr.state.mn.us/waters/watermgmt_section/floodplain/county-data-and-map-viewers.html

MN DNR. (2021b). *MNDNR Watershed Suite—Minnesota Geospatial Commons*. https://gisdata.mn.gov/dataset/geos-dnr-watersheds

MN DPS. (2021). *Emergency Communication Networks*. Minnesota Department of Pubic Safety, Emergency Communication Networks. https://dps.mn.gov/divisions/ecn/about/Pages/default.aspx

MN EQB. (2014). *Minnesota & Climate Change: Our Tomorrow Starts Today*. https://www.mcknight.org/wp-content/uploads/EQB_Climate_Change_Communications.pdf

MN GIO. (2016). *Electric Transmission Lines and Substations, 60 Kilovolt and Greater, Minnesota, 2016—Minnesota Geospatial Commons*. https://gisdata.mn.gov/dataset/util-elec-trans

MN HSEM. (2014). *Minnesota All Hazard Mitigation Plan Rural Electric Annex*. MN Homeland Security Emergency Management. https://dps.mn.gov/divisions/hsem/hazard-mitigation/

MN HSEM. (2019). *Minnesota State Hazard Mitigation Plan: Including Recommended Actions for Climate Change Adaptation*. https://dps.mn.gov/divisions/hsem/hazard-mitigation/

MN HSEM. (2021). *Minnesota grant proposals and approved funding for FEMA mitigation funds*. MN Homeland Security and Emergency Management. [by personal communication]

MnDOT. (2012). Minnesota Roads 2012. *Minnesota Roads*. https://gisdata.mn.gov/

MPCA. (2015). *Minnesota's Ground Water*. https://www.pca.state.mn.us/sites/default/files/pp-mngroundwater.pdf

MPCA. (2016). *County Feedlot Program Report—January 2016*. 33.

MPCA. (2018a). *Pollution Sensitivity of Near-Surface Materials*. https://gisdata.mn.gov/dataset/geos-hydrogeology-atlas-hg02

MPCA. (2018b). *Wastewater Facilities in Minnesota—Minnesota Geospatial Commons*. https://gisdata.mn.gov/dataset/util-wastewater-facilities

MPCA. (2018c, December 21). *Effects of climate change in Minnesota*. Minnesota Pollution Control Agency. https://www.pca.state.mn.us/air/effects-climate-change-minnesota

MPCA. (2020). *Minnesota's Draft 2020 Impaired Waters List*. Minnesota Pollution Control Agency.

Mukherjee, S., Nateghi, R., & Hastak, M. (2018). A multi-hazard approach to assess severe weather-induced major power outage risks in the U.S. *Reliability Engineering & System Safety*, *175*, 283–305. https://doi.org/10.1016/j.ress.2018.03.015

Multi-Hazard Mitigation Council. (2019). *Natural Hazard Mitigation Saves: 2019 Report* (p. 658). National Institute of Building Sciences. https://www.nibs.org/files/pdfs/NIBS_MMC_MitigationSaves_2019.pdf

National Climate Assessment Development Advisory Committee. (2013). National Climate Assessment.

Natural Resources Defence Council. (2015). *The Need for Flood Protection Standards*. http://www.nrdc.org/water/fema-assistance-grants.asp

NCEI. (2019). *Storm Events Database*. https://www.ncdc.noaa.gov/stormevents/details.jsp

NCEI. (2021). *Storm Events Database*. National Centers for Environmental Information, NOAA, Storm Events Database. https://www.ncdc.noaa.gov/stormevents/

NOAA. (2020). *U.S. Climate Divisions—NClimDiv Dataset*. NOAA National Centers for Environmental Information. https://www.ncdc.noaa.gov/monitoring-references/maps/us-climate-divisions.php

Normand, A. (2019). *Dam Safety Overview and the Federal Role* (p. 18). Congressional Research Service. https://crsreports.congress.gov/product/pdf/R/R45981

NSSL. (2020). *Severe Weather 101—Damaging Winds Types* [Text]. NOAA National Severe Storms Laboratory, Severe Weather 101 - Damaging Winds Types. https://www.nssl.noaa.gov/education/svrwx101/wind/types/

NWS. (2018). *National Weather Service Instruction 10-1605: Storm Data Preparation*. NOAA. https://www.nws.noaa.gov/directives/sym/pd01016005curr.pdf

NWS. (2020a). *Enhanced Fujita Scale*. NOAA's National Weather Service. https://www.weather.gov/tae/ef_scale

NWS. (2020b). *Storm Events Database*. NOAA National Centers For Environmental Information. https://www.ncdc.noaa.gov/stormevents/

OSA. (2020). *Infrastructure Stress Transparency Tool*. Office of the State Auditor, Infrastructure Stress Transparency Tool. https://www.auditor.state.mn.us/maps/

Pielke, R. (2012, February 2). *Windstorm*. Encyclopedia Britannica. https://www.britannica.com/science/windstorm

Pryor, S. C., Barthelmie, R. J., Young, D. T., Takle, E. S., Arritt, R. W., Flory, D., Gutowski, W. J., Nunes, A., & Roads, J. (2009). Wind speed trends over the contiguous United States. *Journal of Geophysical Research*, *114*(D14), D14105. https://doi.org/10.1029/2008JD011416

Rumbach, A., Sullivan, E., & Makarewicz, C. (2020). Mobile Home Parks and Disasters: Understanding Risk to the Third Housing Type in the United States. *Natural Hazards Review*, *21*(2), 05020001. https://doi.org/10.1061/(ASCE)NH.1527-6996.0000357

Samanta, A., & Wu, T. (2017). *Hail: The Hidden Risk. An analysis of property exposure to damaging hail in 2017* (p. 9). https://www.verisk.com/siteassets/media/campaigns/gated/underwriting/2017-hail-the-hidden-risk.pdf?__FormGuid=b105adc4-533b-41a0-8bc3-0eaa9c9d1e6d&__FormLanguage=en-US&__FormSubmissionId=e0a36676-fdfc-4904-b0f3-37284f4e41b3

Seeley, M. (2015). *Minnesota Weather Almanac*. Minnesota Historical Society Press.

Sepic, M. (2017). *In storm season, mobile home park tenants seek better shelter*. https://www.mprnews.org/story/2017/06/14/in-storm-season-mobile-home-park-tenants-seek-better-shelter

Smith, A. B. (2020). *U.S. Billion-dollar Weather and Climate Disasters, 1980—Present (NCEI Accession 0209268)* [Data set]. NOAA National Centers for Environmental Information. https://doi.org/10.25921/STKW-7W73

SPC. (2007). *Enhanced F Scale for Tornado Damage*. https://www.spc.noaa.gov/faq/tornado/ef-scale.html

Taylor, E., & Todey, E. (2021). *Thunderstorm Life Cycle*. Iowa State University. http://agron-www.agron.iastate.edu/courses/Agron541/classes/541/lesson12b/12b.4.html

The White House. (2015). *FACT SHEET: Taking Action to Protect Communities and Reduce the Cost of Future Flood Disasters*. https://www.whitehouse.gov/administration/eop/ceq/Press_Releases/January_30_2015

TORRO. (2021). *Hail Scale*. The Tornado and Storm Research Organisation, The TORRO Hailstorm Intensity Scale. https://www.torro.org.uk/research/hail/hscale

UCAR. (2021). *How Tornadoes Form | UCAR Center for Science Education*. https://scied.ucar.edu/learning-zone/storms/how-tornadoes-form

U.S. Census Bureau. (2020a). *Census U.S. Decennial County Population Data, 1900-1990*. National Bureau of Economic Research. https://www.nber.org/research/data/census-us-decennial-county-population-data-1900-1990

U.S. Census Bureau. (2020b). *Explore Census Data*. United States Census Bureau. https://data.census.gov/cedsci/

U.S. Census Bureau. (2020c). *Explore Census Data*. United States Census Bureau. https://data.census.gov/cedsci/

US DOE. (2016). *State of Minnesota Energy Sector Risk Profile*. US DOE Office of Cybersecurity, Energy Security, and Emergency Response. https://www.energy.gov/sites/prod/files/2016/09/f33/MN_Energy%20Sector%20Risk%20Profile.pdf

US EIA. (2020). *Layer Information for Interactive State Maps*. US Energy Information Administration, Layer Information for Interactive State Maps. https://www.eia.gov/maps/layer_info-m.php

US EPA. (2015, September 29). *Overview of Identifying and Restoring Impaired Waters under Section 303(d) of the CWA* [Overviews and Factsheets]. US EPA. https://www.epa.gov/tmdl/overview-identifying-and-restoring-impaired-waters-under-section-303d-cwa

USACE. (2008). *National Inventory of Dams Methodology: State and Federal Agency Manual*. U.S. Army Corps of Engineers. https://files.nc.gov/ncdeq/Public%20Records%202/DEMLR/NIDmanual2008.pdf

USACE. (2010). *So, You Live Behind a Levee!* American Society of Civil Engineers. https://www.lrh.usace.army.mil/Portals/38/docs/civil%20works/So%20You%20Live%20Behind%20a%20Levee.pdf

USACE. (2020a). *Lake Traverse*. Recreation. https://www.mvp.usace.army.mil/Missions/Recreation/Lake-Traverse/

USACE. (2020b). *Levee Safety Action Classification (LSAC) Table*. U.S. Army Corps of Engineers. https://www.mvn.usace.army.mil/Portals/56/docs/PAO/LSACs/LSAC%20Table.pdf

USACE. (2020c). *National Levee Database*. U.S. Army Corps of Engineers. https://levees.sec.usace.army.mil/#/

USACE. (2021). *National Inventory of Dams*. U.S. Army Corps of Engineers. https://nid.sec.usace.army.mil/ords/f?p=105:1::::::

USDA. (2012, 2017). *Harvested Cropland by Size of Farm and Acres Harvested: 2017 and 2012*. https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_2_County_Level/Minnesota/st27_2_0009_0009.pdf

USDA. (2017). *USDA/NASS Census of Agriculture*. https://www.nass.usda.gov/Quick_Stats/CDQT/chapter/2/table/1/state/MN

USDA ERS. (2019). *USDA ERS - Glossary*. https://www.ers.usda.gov/data-products/major-land-uses/glossary/

USGCRP. (2018). *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* (p. 1515). U.S. Global Change Research Program. https://doi.org/10.7930/NCA4.2018

USGS. (2016). *NLCD 2016 Land Cover, Minnesota—Minnesota Geospatial Commons*. https://gisdata.mn.gov/dataset/biota-landcover-nlcd-mn-2016

USGS. (2021). *USGS Surface Water for USA: Peak Streamflow*. https://nwis.waterdata.usgs.gov/usa/nwis/peak/

Appendix B – Adopting Resolutions

Appendix C – Local Mitigation Survey Report

Traverse County
Local Mitigation Survey Report

Overview
As part of Traverse 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

TRAVERSE COUNTY

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

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

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

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

   No recent hazard events were noted over the last 5 years.

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

Natural Hazard (please list)	Vulnerability Assessment **List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.**
	No local vulnerabilities listed for Traverse County.

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

No vulnerability reduction measures identified.

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 vulnerabilities identified.

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.**

   Traverse County has a Comprehensive Plan and Capital Improvements Plan in place that plan for future development within the county.

   Traverse 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 EM functions. This includes plans in place for Sheltering and Pet Sheltering in the event that people are displaced from their homes following a disaster.

   Traverse County participates in the National Flood Insurance Program (NFIP). The Traverse County Hometown Planning, Land Management Office maintains the flood rate insurance maps and floodplain ordinance for the county.

   The Traverse County Highway Department maintains a 5-year Road & Bridge Plan that identifies and schedules road improvement projects that include mitigation against flood related impacts to transportation infrastructure. The current plan is in place for 2018-2023.

   The Traverse County Highway Department has a Snow Removal Policy in place.

   Horizon Public Health works with the owners of existing 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.

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

   Traverse County staff related to mitigation efforts include the Emergency Management Director, County Sheriff/Deputy EM, County Highway Engineer, Hometown Planning/Land Management Office Director, County Administrator, County Board members, Public Health Director, and GIS Dept.

   Traverse County works closely with the Traverse County SWCD and the Bois de Sioux Watershed District on planning and project mitigation efforts to reduce the impacts of future flood events.

The Bois de Sioux Watershed District serves as the ditch authority for Traverse County, and also maps & monitors stream gages on waterways within the county. The BdSWD also leads the One Watershed, One Plan regional planning effort which includes Traverse County.

We partner with the American Red Cross to establish MOU's with facilities in the county to serve as official shelter locations that meet ARC shelter requirements for space and accessibility.

We have close working relationships with Emergency Managers in MN HSEM Region 4 and support each other in emergency mitigation and preparedness planning, exercises and emergency response, when needed.

We maintain an effective relationship with the National Weather Service for the relay and dissemination of emergency weather information.

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

Traverse County Emergency Management utilizes our Emergency Management Facebook page and local news media to communicate with residents and visitors on emergency preparedness. A link for the CodeRED emergency notification system is located on the Traverse County website.

Traverse 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 social media and also during the NWS severe weather awareness weeks.

Traverse 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. We use the Traverse County Emergency Management Facebook page to get information out to the public.

Each month Traverse County Sheriff's Office Dispatch conducts testing of outdoor warning sirens located in the cities of Browns Valley, Dumont, Tintah, Wheaton and also the Traverse County Park to ensure they are in working condition.

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

Traverse County primarily uses its own budget to address local mitigation measures, such as replacement of culverts. We have also applied for and received FEMA Hazard Mitigation Assistance grant funding in the past for a safe room project and update of our last hazard mitigation plan.

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?**

  Electric providers in the county include Otter Tail Power Company and Traverse Electric Cooperative (Wheaton)

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

  Traverse County Emergency Management Facebook Page, Traverse County website

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

  Generator back-up power is in place for the Traverse County EOC, Social Services are connected to same hard-wired generator, Dispatch/Jail have their own generator hard-wired in, Sanford Wheaton Medical Center, Traverse Care Center, Browns Valley Health Center all have hard- wired generators, Browns Valley City Hall is wired to be connected to small generator as well as Traverse County Highway Department buildings located in Wheaton, Dumont, Tintah, and Browns Valley. Horizon Public Health is located in the social service building and is hard-wired in to maintain vaccine temperatures where they need to be in case of power outages.

PART C: LOCAL MITIGATION PROJECTS

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

   Continue to promote residents to sign up for the Traverse County Emergency Management FB page and to enroll in the CodeRED emergency notification system.

   Evaluate where additional backup generators are needed for county facilities and provide assistance to local jurisdictions in the acquisition of generators as needed.

   Upgrades are needed for the warning sirens in the cities of Browns Valley, Dumont, and Tintah. The warning sirens are functional, but are very old and in need of replacement.

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

The Traverse County Park does not have a dual-use storm shelter facility (i.e., bathroom building) or a tornado safe room to protect campers or other park visitors in the event of a severe storm or high wind events. Assess potential for a construction project and application to FEMA for HMA grant funding for a tornado safe room.

Work with local jurisdictions on related storm shelter/safe room projects. Many will need technical assistance from the county to assess a potential project and will look to the county for assistance to apply for grant funding.

Traverse County Highway Department will continue to address mitigation related to protect/improve roads, culverts and bridges against future flood related damages. Some roads, bridges, and culverts within Traverse 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.

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

   No gaps or deficiencies were identified for Traverse County.

PART D: SURVEY PARTICIPANTS

Lynn Siegel, Emergency Management Director

CITY OF BROWNS VALLEY

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

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

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

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

   In 2017 the city experienced flooding that threated a lift station from ice damming. Because of ice jamming in the river and the ice not melting at the head of Big Stone Lake to allow flood waters in, we had overland flooding that reached the city main lift station.

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

Natural Hazard (please list)	Vulnerability Assessment **List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.**
Flooding	Most of the city is within the floodplain until diversions are completed, which may take 10 years or more. Our city sewer lift stations struggle to keep up during flooding events which results in basement backups. Storm drains cannot keep up with flooding or heavy rain events which results in water reaching some buildings on Broadway. City wells and lift stations in flood zone on the north side of town are vulnerable to flooding.
Blizzards	Loss of power to city can occur during blizzards.

Ice storms	Loss of power to city can occur during ice storms.
Windstorms	Loss of power can occur, downed trees, and unpassable streets can occur due to severe windstorms.

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 constructed a flood diversion to bypass the flooding from the river and has done a complete sewer rehab, but we are still in process of finishing all phases.

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.**

   More farmers upstream are diverting run off from thaws and heavy rains.

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 has a floodplain ordinance in place.

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

   We have a fire chief and city maintenance supervisor.

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

   We are waiting on more funding to finish the levee system to take the city out of the 100-year floodplain, which will take away the requirement to buy flood insurance.

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

   In the past the city has used FEMA funds to buy out flood properties and USDA funding for sewer rehab and to dig in the diversion ditch south of town.

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?**

     Otter Tail Power Company and Traverse Electric Coop

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

     We use our social media, local government channel, and we direct people to the Traverse County CodeRed system to sign up on the county website.

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

     Yes. We have backup generators in place for our lift stations and pump house. However they are old very old and should be replaced with new ones.

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 storm sewer upgrades. We also need generators. We have 4 generators which are 31 years old- 1 for each lift station so (2), 1 for the water tower, and 1 for the grinder station which I was told is a small lift station.

   We need upgrades to our 2 warning sirens. The timer is not working on them and they are aged. We could use more trained weather watchers (storm spotters).

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

   Funding and volunteers.

PART D: SURVEY PARTICIPANTS

Tony Serocki, Public Works Supervisor
Jodi Hook, City Administrator
Neil Madison City Councilor
Kenny Westbrock, City Councilor

CITY OF DUMONT

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

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

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

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

   We do not have any major storms with damages to report.

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

Natural Hazard (please list)	**Vulnerability Assessment** **List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.**
Flooding	During high rain events our sewer system could be affected causing back-ups. We do have a generator for the lift station.
Windstorms/Tornadoes	We need to upgrade our warning siren. It is very old.
Extreme cold	Our water tower is susceptible to freezing when the weather gets very cold.
Ice storms	We have power lines and poles that could break during an ice storm.

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

   In 1999 the city built a dike to contain the water during flood events to protect the city.

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

   None. We have not had anything increase our 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**,

   The city participates in the National Flood Insurance Program (NFIP) and we have a floodplain ordinance in place. We are covered by the county's hazard mitigation plan and the plan is updated every 5 years.

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 100. We have a mayor and city council, a city clerk/treasurer, and a director of maintenance/public works. We also work with Traverse County Emergency Management following a disaster.

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

   We participate in the Traverse County CodeRED Emergency Notification System. We also require citizens to drain their sump pumps outside and not to have them draining into the sewer system.

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

   We are a small town with very limited funds. When we built our dike in 1999, we received funding from the Department of Trade and Economic Development and the Minnesota Department of Natural Resources. We would look to Traverse County Emergency Management for assistance in mitigation and funding in the future for our outdoor warning siren.

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?**

     Ottertail Power Company

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

     Bulletin board, city of Dumont Facebook page, and we mail information with utility bills.

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

     We have generators for the sewer lift station and the water treatment facility. We also have a pump to direct water back into the creek during flooding.

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 upgrade our warning siren. It is very old.

   Continue to encourage residents to sign up for the county's CodeRed emergency notification system and to be aware of & prepared for severe weather.

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

   Not everyone is signed up for the county's CodeRED emergency notification system. Our ability to get accurate and up to the minute weather in formation coverage is poor due to our location.

PART D: SURVEY PARTICIPANTS

Gail Thiel, City Clerk
Don Montonye, Mayor
Eric Fischer, City Councilor & Firefighter
Mary Jo Young, City Councilor
Steve Grimes, City Councilor
Russ Breeggemann, Maintenance/Public Works

CITY OF TINTAH

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

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

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

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

   We have experienced a blizzard with loss of power.

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

Natural Hazard (please list)	Vulnerability Assessment **List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.**
Flooding	When the state ditch fills up, the water comes back into town by drains.
Blizzard, Ice Storm	We have had power lines and poles that fail and may fail due to heavy snow and ice
Windstorm, Tornadoes	The city does not have a local storm shelter for people to go to in case of an emergency. Our outdoor warning siren is also very dated and should be upgraded.
Extreme Cold	We have many children and seniors in town so with power outages they would be vulnerable if we lost power during a period of extreme cold.

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

   In 1998 the city raised the dike and put in storm gates.

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

   None. We have not had any increase 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.**

   The city participates in the National Flood Insurance Program (NFIP) and has a floodplain ordinance in place.

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 63. Our city councilmen and fire chief take care of city water hydrants. We have an emergency management coordinator.

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

   We participate in the county's CodeRed 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 we can use and work closely with Traverse County when 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?**

     Ottertail Power Company

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

  Nothing to date. Traverse County provides a link to sign up on the county website.

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

  We need a generator for the well house.

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 upgrade our warning siren. We have just been making necessary repairs, but it is probably from the 1980's and should be upgraded.

   We would like a sewer system to help when the water table is high so septic systems can keep up.

   We would also like a generator for the well house so when power goes out City would still have water.

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

Amanda Kinn, City Clerk
Hank Petermann, City Councilor

CITY OF WHEATON

PART A: HAZARD IDENTIFICATION, RISK ASSESSMENT & VULNERABILITY ANALYSIS

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

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

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

   None.

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

Natural Hazard (please list)	**Vulnerability Assessment** **List & describe what specific structures, systems, populations, or other community assets are suspectable to damage and loss from specific hazard events.**
Ice Storm/Blizzard	Our main lift station could be vulnerable to backups due to loss of our power to run our pumps to our sewer ponds. Also, severe winter storms may affect our ability to produce water to send to town in our collection system. Neither facility has a backup generator to run said structures.
Flooding	Lift stations struggle to keep up during high rain/flood 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.**

   Our five lift stations have generation capability in a power outages situation. We are in a MNWARN plan for mutual aid if we have a natural disaster whereas other towns will assist on an as-needed basis.

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 are working on our capital improvement plan to purchase generators in the future to power our facilities during power outages.

   We are contracted with Johnson Jetline to clean and televise our sewer system infrastructure to prevent household backups.

   We have an ordinance which requires all residents to drain their sump pumps to the outside and not into our sewer system.

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

   We have an emergency management plan and also work closely with Traverse County.

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

   We participate in the Traverse County CodeRed emergency notification system.

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

   The city of Wheaton currently uses its own budget to accomplish mitigation measures within the city. We are looking into grants to purchase generators for our water treatment and sewer plants.

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?**

     Ottertail Power Company and Traverse Electric Coop

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

     Social media, newspaper, website, flyers at City Hall and Library, notice on back of monthly bills.

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

     Currently we have none in place. We are in need of generators for our water treatment and sewer plants.

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 permanent generation power to both our water treatment plan and our main sewer plant large enough to run what we currently have.

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

   More residential participation in the county's CodeRed notification program.

PART D: SURVEY PARTICIPANTS

Dean Lampe, Public Works Supervisor
Amy Olson, City Administrator

Appendix D – Plans & Programs in Place

Traverse County

MHMP Plans in Place Form

Planning & Regulatory

Plans/Programs	*Yes/No*	*Comments*
Comprehensive/Master Plan	Yes	Comprehensive Plan under TC Hometown Planning, Land Management Office
Capital Improvements Plan	Yes	(Comp Plan)
Economic Development Plan	Yes	(Comp Plan)
Emergency Operations Plan	Yes	EOP updated by County EM
Climate Adaptation Plan	No	
Continuity of Operations Plan	Yes	
Transportation Plan	Yes	TC Highway Dept 5-year Road & Bridge Plan (2018-2023)
Stormwater Management Plan	No	Done by MPCA & Cities
Community Wildfire Protection Plan	No	
FireWise Program	No	
Water Conservation/Emergency Preparedness Plan	No	
Wellhead Protection Plan		Done by MDH & Cities
Database of dry hydrants/well access	No	
Burning permits/restrictions	Yes	Sheriff's Office/State
Water Management Plan	Yes	Update Underway – 1W1P
Zoning ordinance	Yes	TC Hometown Planning, Land Management Office
Subdivision ordinance		TC Hometown Planning, Land Management Office
Floodplain ordinance	Yes	TC Hometown Planning, Land Management Office
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Yes	TC Shoreland Ordinance, Section 5 addresses Stormwater

		Management and Slope Standards
Flood insurance rate maps	Yes	DNR & TC Hometown Planning, Land Management Office
Acquisition of homes (buyouts) due to repetitive flood damage or imminent risk of failure from erosion		DNR or Cities
School closing policy/communications plan in event of inclement weather/temperatures	Yes	School district responsibility
Mass Care Sheltering Plan	Yes	
Designated Mass Care Sheltering Facilities (list available)	Yes	Wheaton Area School
Tornado Safe Rooms/Outdoor Storm Shelters (list available)	Yes	Rosebud Resort
Warning sirens (list all locations)	Yes	Tintah, Wheaton, Browns Valley, Dumont, County Park
SKYWARN Program	Yes	Annual training with NWS
CodeRED (or other) Mass Notification System	Yes	CodeRED
Severe Weather Awareness Week	Yes	NWS Annual Event (April)
Winter Weather Awareness Week	Yes	NWS Annual Event (November)
NOAA Weather Radios	Yes	
THIRA	Yes	But hasn't been updated since requirements went away
*Other *please describe*		

Administrative & Technical

Administration	*Yes/No*	*Comments*
Planning Commission	Yes	TC Hometown Planning, Land Management Office
Mitigation Planning Committee	Yes	2020 MHMP Update planning team
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	TC Highway Dept.
Mutual aid agreements	Yes	
Staff	*Yes/No*	*Comments*
Chief Building Official	No	

Floodplain Administrator	Yes	TC Hometown Planning, Land Management Office
Emergency Manager	Yes	TC Emergency Management Office
Community Planner	No	
Civil Engineer	Yes	County Engineer
GIS Coordinator	Yes	Contract with Pro West & Associates for GIS
Technical	*Yes/No*	*Comments*
Warning systems/services (Reverse 911, outdoor warning signals)	Yes	CodeRED
Hazard data and information	Yes	Data & information from past storm events on file with County
Hazus analysis	No	Done by UMD for MHMP update

Education & Outreach

Program/Organization	*Yes/No*	*Comments*
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Yes	
Natural disaster or safety related school programs	Yes	
StormReady certification	No	
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues	No	
*Other *please list & describe*		

Appendix E – Past Mitigation Action Review Status Report

Traverse 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 Traverse 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	Flood	Identify, relocate, tear down or flood proof all repetitive loss structures and critical facilities.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	County and city flood mitigation projects continue as needed, including potential property buyouts.
2	Flood	Encourage continued compliance with the NFIP.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	The County and all cities participate in the NFIP.
3	Flood	Adopt new floodplain elevations and information once available and inform the public of these new boundaries.	Traverse County, Browns Valley, Dumont, and Tintah	Ongoing	This hasn't been worked on but when it is complete, we will adopt it.
4	Flood	Cities should adopt or update flood plain ordinances as needed.	Tintah, Dumont, and Browns Valley	Ongoing	Traverse County and all cities participate in the NFIP and continue to address local floodplain ordinances.
5	Flood	Identify and improve roads and streets that are repeatedly flooded and washed away by modifying and raising roads/streets, providing improved drainage and stormwater removal, rip- rapping where needed and creating buffers and vegetation strips.	Traverse County, Browns Valley, Dumont, and Tintah	Ongoing	Localized flood mitigation projects continue by the County Highway Dept., townships and local city Public Works.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
6	Flood	Develop a plan for preparing and distributing sandbags when needed.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	Ongoing by Traverse County Emergency Management (TCEM) for flood preparedness.
7	Flood	Establish a plan of action to address flood emergencies by identifying resources both locally and outside of the county that are needed and establish contracts or agreements for this assistance.	Traverse County, Browns Valley	Ongoing	Ongoing by TCEM for flood preparedness.
8	Flood	Educate the public on practices and programs that assist in diminishing the effects of flooding.	Traverse County, Browns Valley	Ongoing	TCEM promotes flood danger awareness and education for residents in advance of and during flood events. The TC Land Management Office also does some education when dealing with permits.
9	Flood	Conduct an equipment inventory for flood emergencies and determine what equipment is needed and how much it will cost.	Traverse County, Browns Valley	Deleted	Not relevant for MHMP update. This falls under Highway Dept / Public Works standard operations.
10	Flood	Periodically review and update the county's EOP to address strategies in this plan and other flood issues in the county.	Traverse County	Ongoing	The EOP is regularly reviewed and updated by TCEM.
11	Flood	Evacuation plans should be developed, reviewed, rehearsed and updated as needed in areas prone to flooding and flash flooding.	Traverse County, Browns Valley	Ongoing	Ongoing by TCEM for flood preparedness.
12	Flood	Study and identify water flow patterns and problems in the county in order to facilitate the development of further mitigation projects.	Traverse County	Ongoing	The SWCD does not study flow patterns per se, but we do try to help with erosion remediation / mitigation projects. The Bois de Sioux watershed does definitely do this.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
13	Flood	Analyze the ditch systems in the county and surrounding counties and make improvements where needed.	Traverse County	Ongoing	The Bois de Sioux Watershed District serves as a ditch authority for drainage systems in Grant, Wilkin, and Traverse Counties.
14	Flood	Address discrepancies between South Dakota and Minnesota permitting requirements for flood structures such as dikes and levees and try to develop similar permitting requirements and policies between the two states.	Traverse County	Deleted	The Bois de Sioux Watershed is not doing any work with SD or has any plans to.
15	Flood	Encourage the removal, relocation, improvement or alteration of structures, levies, dikes and dams in South Dakota that cause flooding in Traverse County.	Traverse County, Browns Valley	Deleted	The Bois de Sioux Watershed is not doing any work with SD or has any plans to.
16	Flood	Encourage and complete flood flow reduction projects both within the county and in surrounding counties and watersheds in both South Dakota and Minnesota.	Traverse County, Browns Valley	Deleted	The Bois de Sioux Watershed is not doing any work with SD or has any plans to.
17	Flood	Coordinate water flow and retention projects with neighboring counties and area watersheds.	Traverse County, Browns Valley	Ongoing	Watershed project efforts continue by the Bois de Sioux Watershed District
18	Flood	Reduce countywide flood damage to agricultural land, rural or urban development, and infrastructure by protecting against the ten year 24-hour runoff event for agricultural land in Traverse County (from county's water plan & BDSWD plan).	Traverse County	Ongoing	Watershed project efforts continue by the Bois de Sioux Watershed District

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
19	Flood	Participate in the "project team" process implemented by the Bois de Sioux Watershed District, including meetings and work groups to develop specific plans for priority sub-watersheds and projects to manage or reduce runoff in flood prone areas.	Traverse County	Ongoing	Traverse County will continue to work in partnership with the Bois de Sioux Watershed District on projects as needed.
20	Flood	Utilize land retirement programs such as CRP and RIM to convert cropland into grassland and trees/ shrubs to increase infiltration.	Traverse County	Ongoing	This falls under TC SWCD work with agricultural landowners.
21	Flood	Address stormwater and drainage management issues to effectively manage high volume runoff (from county's water plan).	Traverse County Wheaton Browns Valley Tintah?	Ongoing	Traverse County and local cities work to address stormwater management to reduce impacts of high rain events.
22	Flood	Encourage and explain the benefits of residue management and grassed waterways regarding reduced runoff.	Traverse County	Ongoing	This falls under TC SWCD work with agricultural landowners.
23	Flood	Assist communities and developments in developing sufficient stormwater management plans.	Traverse County	Ongoing	Falls under TC Planning & Zoning. The county Land Use Ordinance section on Shoreland Management includes requirements for Stormwater Management in new development & construction.
24	Flood	Work with local youth groups and the city planning and zoning department to develop urban stormwater runoff awareness.	Traverse County	Delete	Not a relevant mitigation action.
25	Flood	Identify and complete flood protection and prevention projects for cities.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	The county continues to work with our local cities to identify flood mitigation projects.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
26	Flood	Reduce flood flows within and downstream of the watershed (county) to reduce damages to public and private property, municipal services and agricultural land	Traverse County	Ongoing	Bois de Sioux Watershed District.
27	Flood	Maintain an inventory of potential flood impoundment and flood flow reduction sites.	Traverse County	Ongoing	This falls under Bois de Sioux Watershed District.
28	Flood	Provide/construct additional flood storage, impoundment or flood flow reduction sites throughout the entire watershed (county).	Traverse County	Ongoing	This falls under Bois de Sioux Watershed District.
29	Flood	Consider the implementation of a USACE Feasibility Study for a multi- purpose project that reduces flood damage.	Traverse County	Ongoing	This is being worked on.
30	Flood	Prevent damage from critical flood events while enhancing base flows.	Traverse County	Ongoing	This falls under Bois de Sioux Watershed District.
31	Flood	Define, restore and/or create hydrologic areas that are critical for contributing to or sustaining base flows.	Traverse County	Ongoing	This falls under Bois de Sioux Watershed District.
32	Flood	Restore wetlands in critical areas in ways that augment base flows.	Traverse County	Ongoing	SWCD and BdSWD
33	Flood	Restore drained lake basins to augment base flows.	Traverse County	Ongoing	SWCD and BdSWD
34	Flood	Encourage flood control projects that provide opportunities for both flood damage reduction and environmental enhancement.	Traverse County	Ongoing	This falls under Bois de Sioux Watershed District.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
35	Flood	Target flood prone areas with sandy soils and encourage minimum tillage, soil health farming practices and conservation programs such as CRP on those lands to help reduce runoff.	Traverse County	Ongoing	This falls under SWCD work with agricultural landowners.
36	Flood	Encourage the development of site-specific analytical tool for the permitting of ditches.	Traverse County	Deleted	This does not pertain to the TC SWCD.
37	Flood	Work cooperatively with the Bois de Sioux and Upper Minnesota River Watershed Districts' plans, policies and regulations and implement or encourage, as appropriate, projects identified by those watersheds.	Traverse County	Ongoing	We are just completing this and I am on the committee to get this done. (TCEM)
38	Flood	Study the possibility of creating flood diversion channels and determine the proper location for such channels.	Traverse County	Ongoing	This falls under Bois de Sioux Watershed District and Upper MN River WD.
39	Flood	Create flood diversion channels as appropriate.	Traverse County	Ongoing	This falls under Bois de Sioux Watershed District and Upper MN River WD.
40	Violent Storms/ Extreme Heat & Cold	Encourage homes and businesses without basements to designate a safe shelter where people may go in case of violent storms.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	TC Emergency Management does public outreach & education on tornado awareness every year.
41	Violent Storms/ Extreme Heat & Cold	Identify structures in the county that could be used as safe shelters and make arrangements to use those facilities should the need arise.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	Addressing the need for storm shelters and tornado safe rooms will be continued by the county and local cities.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
42	Violent Storms/ Extreme Heat & Cold	Identify locations where safe shelters should be constructed.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	Same as above.
43	Violent Storms/ Extreme Heat & Cold	Build safe structures as needed.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	Same as above.
44	Violent Storms/ Extreme Heat & Cold	Inform all residents and visitors of safe shelter locations through media campaigns, maps, websites, newsletters and other sources.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	If new storm shelters or safe rooms are constructed they will be promoted to the public.
45	Violent Storms/ Extreme Heat & Cold	Evacuation plans for all hazards should be developed or reviewed and updated as needed.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	Ongoing effort under TCEM for emergency preparedness all-hazards planning.
46	Violent Storms/ Extreme Heat & Cold	Encourage all schools, senior housing, multi-family housing units, care facilities and facilities with vulnerable or large populations to have a severe storm plan in place.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	Ongoing effort under TCEM for emergency preparedness all-hazards planning.
47	Violent Storms/ Extreme Heat & Cold	Identify and develop evacuation plans and safe shelters for public event areas such as fairgrounds, golf courses, athletic fields, parks or campgrounds.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	Ongoing effort under TCEM.
48	Violent Storms/ Extreme Heat & Cold	Consider adoption and enforcement of the universal building code.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Deleted	Not applicable to Traverse County or city jurisdictions.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
49	Violent Storms/ Extreme Heat & Cold	Identify new Emergency Operations Centers (EOCs) as needed. Notify the public of EOC locations and a back- up location to each center.	Traverse County	Deleted	This falls under response planning.
50	Violent Storms/ Extreme Heat & Cold	Replace malfunctioning or old warning sirens.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	Traverse County EM will continue to work with any communities that may need a siren upgrade or replacement.
51	Violent Storms/ Extreme Heat & Cold	Provide backup power sources to all sirens and warning systems.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	We are working towards this.
52	Violent Storms/ Extreme Heat & Cold	Consider portable warning sirens that can be moved to areas of the county without warning systems.	Traverse County	Deleted	Portable warning sirens are not used.
53	Violent Storms/ Extreme Heat & Cold	Consider adding permanent sirens in rural areas.	Traverse County	Ongoing	Rural areas may be assessed for potential warning sirens based on need and effectiveness.
54	Violent Storms/ Extreme Heat & Cold	Assess which cities need additional sirens and seek funding for their purchase.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	They all have sufficient sirens at this time but we are always looking for grants to update
55	Violent Storms/ Extreme Heat & Cold	Implement technologies that enable emergency warnings to be dispatched or called out to any location in the county to notify of severe weather or other emergencies (Reverse 911 or similar software/ technology). The inability to access phone numbers with this type of technology was identified as an issue.	Traverse County	Ongoing	Traverse County uses CodeRed as our emergency notification system and can implement IPAWS as needed.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
56	Violent Storms/ Extreme Heat & Cold	Promote the use of weather radios and look for funds to purchase additional radios.	Traverse County	Ongoing	NOAA weather radios are recommended as part of personal preparedness.
57	Violent Storms/ Extreme Heat & Cold	Purchase weather radios for storm spotters.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	Mainly our storm spotters are our fire departments and they already have them, but if there were others that wanted to be storm spotters we would support them in getting a weather radio.
58	Violent Storms/ Extreme Heat & Cold	Encourage improved cell phone service in order to better utilize siren systems to alert populations affected by severe weather.	Traverse County	Ongoing	New tower is going up in the southern part of Traverse
59	Violent Storms/ Extreme Heat & Cold	Improve access to real-time weather data such as temperature, wind speed, direction and storm conditions.	Traverse County	Deleted	Not relevant – current technology and apps are in use.
60	Violent Storms/ Extreme Heat & Cold	Encourage critical facilities including schools, hospitals and nursing homes in the county to secure modern weather monitoring technology, other than traditional radios and televisions that provides severe weather notification and observation.	Traverse County	Ongoing	This falls under public outreach & awareness for severe weather and preparedness.
61	Violent Storms/ Extreme Heat & Cold	Get additional funding for the Incident Command System (ICS) to purchase equipment such as a new warning system and new GPS equipment. Consider latest technology options.	Traverse County	Deleted	Not relevant for MHMP update - this falls under response planning.
62	Violent Storms/ Extreme Heat & Cold	Review and update the organizational structure for emergency response in order to have optimum efficiency.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Deleted	Not relevant for MHMP update. This falls under response planning.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
63	Violent Storms/ Extreme Heat & Cold	Review and update emergency operations plans regularly.	Traverse County	Ongoing	Plan is updated regularly by EM. Keep as part of mitigation support.
64	Violent Storms/ Extreme Heat & Cold	Seek opportunities for severe weather and storm spotter training.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	SkyWarn trainings are held annually with the NWS.
65	Violent Storms/ Extreme Heat & Cold	Expand severe weather awareness week education and training.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	TCEM participates in the NWS severe weather awareness weeks and encourages cities to also participate in sharing the information.
66	Violent Storms/ Extreme Heat & Cold	Assess and prioritize which power lines are most susceptible to damage and failure from severe weather and hazard conditions and seek funding to bury the lines underground.	Traverse County	Ongoing	Ongoing in coordination with local cities and rural & municipal coops.
67	Violent Storms/ Extreme Heat & Cold	Bury power lines identified as a priority by Traverse Electric Coop Power Company in Lake Valley and Clifton Townships.	Traverse County	Ongoing	Ongoing for powerline projects as identified.
68	Violent Storms/ Extreme Heat & Cold	Encourage tree trimming or no tree planting near power lines.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	Ongoing as necessary by local cities and rural & municipal electric coops.
69	Violent Storms/ Extreme Heat & Cold	Encourage the planting of windbreaks to serve as a “living snow fence” to help prevent blizzard conditions.	Traverse County	Ongoing	This would occur by the SWCD as they deem necessary.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
70	Violent Storms/ Extreme Heat & Cold	Assure adequate equipment is available to repair damaged utilities.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Delete	Not a relevant mitigation action.
71	Violent Storms/ Extreme Heat & Cold	Inventory where backup power sources are most needed and encourage the purchase of those power sources.	Traverse County	Ongoing	Ongoing by Traverse County and local municipalities for critical facilities.
72	Violent Storms/ Extreme Heat & Cold	Work with emergency responders to better coordinate emergency plans with utility providers.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Deleted	Not a relevant mitigation action.
87	Ground/ Surface Water Supply Contam. & Flooding	Flood proof, relocate or mitigate water and sewer infrastructure and facilities that are susceptible to flooding.	Traverse County, Browns Valley, Dumont, and Wheaton	Ongoing	Ongoing as needed by the county and cities for flood mitigation.
114	Drought	Establish methods of banking water for emergencies.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Deleted	Not a relevant mitigation action.
115	Drought	Drill monitoring wells into each of the county's major aquifers at appropriate locations and establish an ongoing program to monitor aquifer levels and water quality. Coordinate data with SWCD test wells.	Traverse County	Ongoing	The TC SWCD collects and records data from a well in Traverse County. The information that is gathered is sent on to the MN DNR. This is still applicable work by the SWCD.
116	Drought	Establish a comprehensive and ongoing water-monitoring program.	Traverse County	Completed	The TC SWCD continues to coordinate rainfall monitoring with the MN DNR.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
117	Drought	Include water conservation provisions and use restrictions in times of drought in county or city ordinances.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Ongoing	Revise for plan update – recommendations would be made but not likely ordinances established, unless the drought period is extended and severe.
118	Drought	Monitor semi-annual or annual water consumption by various major consumers for the potential impact to the aquifer.	Traverse County	Deleted	Traverse County does not do this monitoring. This falls under work by the MN DNR.
119	Drought	Estimate the annual recharge rates or the capacities of the various aquifers in the county.	Traverse County	Delete	This work falls soley under the MN DNR.
120	Drought	Educate the public on water saving tips during times of dry weather or drought conditions.	Traverse County	Ongoing	TCEM will conduct public outreach to raise awareness of drought conditions.
145	Wildfires	Train firefighters to fight wildfires.	Traverse County, Browns Valley, Dumont, Tintah, and Wheaton	Deleted	Not a relevant mitigation action.
146	Wildfires	Inventory wildfire equipment owned by the local fire departments, DNR and U.S. Fish and Wildlife Service to determine deficiencies and purchase additional equipment as needed.	Traverse County	Deleted	Not a relevant mitigation action.
147	Wildfires	Assess where existing dry hydrants are, where fire risks are greatest, and where water bodies suitable to support a dry hydrant are located.	Traverse County	Ongoing / Delete	TBD based on risk assessment for Traverse County.
148	Wildfires	Construct additional dry hydrants as needed.	Traverse County	Ongoing / Delete	TBD based on risk assessment for Traverse County.
152	All-Hazards	Ensure all cities and emergency personnel receive National Incident Management Systems (NIMS) training.	Traverse County	Ongoing	TCEM works to make sure local city elected officials & staff are trained in their role for emergency management.

#	Hazard	Mitigation Action	Jurisdiction	Status	Comments
153	All-Hazards	Update and expand the County's emergency management resource guide.	Traverse County	Deleted	This falls under emergency response planning.

Appendix F – Planning Team Meetings

Traverse 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 Traverse County Emergency Manager. The webinar included a project overview, U-Spatial@UMD's background, the roles and responsibilities of the Emergency Manager, the contents of the Multi-Hazard Mitigation Plan, the planning process, and the projected timeline of the project.

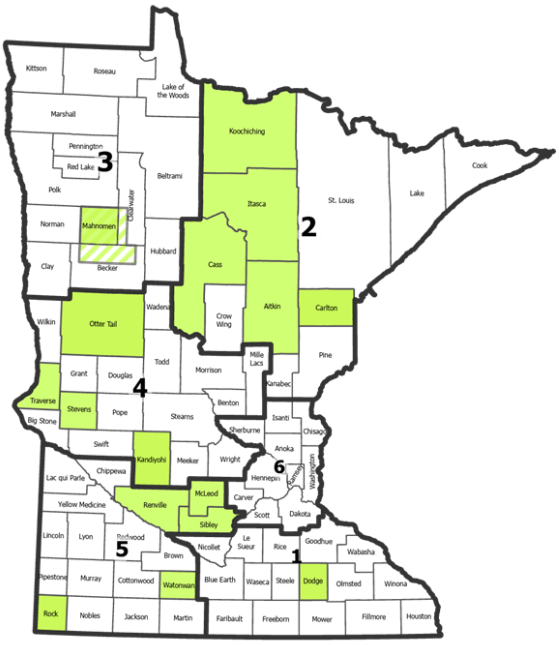
Attached Documentation:

- **Project Handout**: "Minnesota 2020-2021 Multi-Hazard Mitigation Plan Update Project Overview".

- **Webinar Slides**: "Minnesota 2020-2021 Multi-Hazard Mitigation Plan Update Project Kickoff Orientation Webinar"

Minnesota 2020-2021
Multi-Hazard Mitigation Plan Update Project Overview

During 2020-2021, U-Spatial from the University of Minnesota Duluth (U-Spatial@UMD) will be working to update Multi-Hazard Mitigation Plans (MHMPs) for 17 counties and 1 tribe. Our team consists of UMD staff who specialize in GIS applications and research and Hundrieser Consulting LLC, who specializes in stakeholder engagement and mitigation strategies.



Participating Jurisdictions

Aitkin, Carlton, Cass, Dodge, Itasca, Kandiyohi, Koochiching, LeSueur, Mahnomen, McLeod, Otter Tail, Renville, Rock, Sibley, Stevens, Traverse, Watonwan, White Earth Reservation.

Overview of Update Process

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

- Conduct 2 planning team meetings
- Conduct 2 periods of public outreach & engagement
- Assess Plans & Programs in Place to address natural hazards
- Conduct a Past Mitigation Action Review from past plan
- Update prioritization of natural hazards that pose risk
- Complete jurisdictional Local Mitigation Surveys (hazards, vulnerabilities & capabilities)
- Conduct hazard risk assessment for 1% annual chance floods using the Hazus GIS tool
- Inventory critical infrastructure
- Develop hazard profiles for each natural hazard (description, incident history, geographic variability, future probability, relationship to changing climate trends and local vulnerabilities)
- Develop 5-year jurisdictional Mitigation Action Charts

The planning process generally occurs over the course of 14-18 months from start to finish.

Contact

Stacey Stark, U-Spatial@UMD Director (MHMP Project Manager)
Phone: (218) 726-7438 / Email: slstark@d.umn.edu

HUNDRIESER CONSULTING LLC

U-SPATIAL
UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover℠

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

U-SPATIAL
UNIVERSITY OF MINNESOTA DULUTH
Driven to Discover℠

Webinar Purpose & Goals

The purpose of this webinar is to provide an orientation for Emergency Managers participating in 2020-2021 Multi-Hazard Mitigation Plan Updates.

- Introduce the U-Spatial@UMD Team and county contacts.
- Provide an overview of the project.
- Clarify roles and responsibilities.
- Outline the planning process, discuss key tasks and timelines.
- Discuss next steps and answer your questions.

Introductions

U-Spatial@UMD Project Team


Stacey Stark
Project Manager
U-Spatial@UMD


Bonnie Hundrieser
Emergency Management Planning Consultant
Hundrieser Consulting LLC


Zach Vavra
GIS Specialist and Researcher
U-Spatial@UMD


Steve Graham
Research Associate, Flood Modeling Specialist
U-Spatial@UMD

Emergency Managers:

- Name, Title, and Jurisdiction
- Past Experience with MHMP?

Minnesota HSEM:

Jennifer Davis, MN HSEM
State Hazard Mitigation Officer

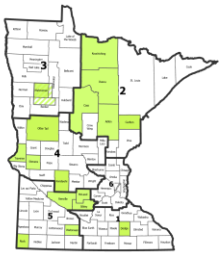
Project Overview

17 Counties:

Aitkin, Carlton, Cass, Dodge, Itasca, Kandiyohi, Koochiching, Le Sueur, Mahnomen, McLeod, Otter Tail, Renville, Rock, Sibley, Stevens, Traverse, Watonwan

1 Tribal Nation:

White Earth Band of Chippewa



Purpose

The Federal Disaster Mitigation Act of 2000 (DMA 2000) established programs and funding:

*"to reduce the loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from **natural disasters**"*

A local government plan is required in order to maintain eligibility for FEMA hazard mitigation grant programs.

MHMP's must be updated every 5 years

Flooding	Hail	Drought
Dam/Levee Failure	Lightning	Extreme Heat
Wildfire	Winter Storms	Extreme Cold
Windstorms	Landslides	Earthquakes
Tornadoes	Sinkholes & Karst	Coastal Erosion

Natural hazard categories for Minnesota MHMPs. Hazards may be omitted if low risk is demonstrated.

Why U-Spatial@UMD?

- **Proven experience**
  Our updates of 30+ MHMPs, as well as the State MHMP, have been quickly approved by FEMA and adopted by counties.
- **Advanced Capabilities**
  Expertise in the application of GIS, HAZUS, and research supports plan development and meeting all FEMA requirements.
- **Ability to Expedite**
  A consistent and proven approach for multiple counties supports State & FEMA review of draft plans.
- **Planning Team**
  Our project team includes advanced GIS students and Hundrieser Consulting.

Overview of MHMP Update Process

U-Spatial@UMD Team Roles & Responsibilities

- Keep you informed about the progress of your plan.
- Facilitate Planning Team meetings.
- Provide guidance to EM to conduct & document effective public outreach.
- Guide EM and planning team to complete key tasks for plan update.
- Keep up-to-date on FEMA requirements and Minnesota guidance.
- Produce a quality plan that FEMA will approve.
- Answer questions in a timely fashion.
- Provide quarterly reports to HSEM on your plan progress

EM Roles & Responsibilities

- Act as main Point of Contact.
- Track required local 25% match.
- Coordinate engagement of MHMP Planning Team.
- Conduct & document effective public outreach.
- Participate in completion of key assignments for plan update.
- Coordinate with other county/tribal staff to obtain information.
- Assist in timely review of draft document.
- Facilitate completion of local adoptions.

MHMP Planning Team

The MHMP planning team must include representation from local government, related stakeholders and neighboring jurisdictions.

- County/Tribal Government key officials and staff
- Cities – required; Townships – optional
- Other Related Stakeholders (i.e., Schools, Coops, MN DNR, etc.)
- Neighboring county/tribal jurisdictions

Key Tasks:

- Develop Jurisdictional Contact List.
- Hold & document Planning Team Meeting #1.
- Hold & document Planning Team Meeting #2.

Public Outreach

The plan update must document how the public was given the opportunity to be involved in the planning process and how their feedback was incorporated into the plan.

- Collect feedback on local-level concerns & mitigation actions.
- Use of local/social media, websites & community bulletin boards.
- Other outreach (i.e., attendance at City Council mtgs)

Key Tasks:

- Distribute & document News Release #1.
- Distribute & document News Release #2.
- Conduct other public outreach (optional).

Hazard Risk Assessment and Vulnerability Analysis

The U-Spatial@UMD Team will work closely with each EM and key departments to provide information as needed.

Key Tasks

- Review and contribute to critical infrastructure inventory.
- Identify specific, local-level impacts and vulnerabilities.
- Identify if and how risk priorities have changed since the last plan.
- Identify any factors (i.e., new development) that may increase the community's vulnerability to natural hazard events.
- Review social vulnerability factors.

Key Task Assignments

Hundrieser Consulting will coordinate with each EM and participating cities on key task assignments that will provide information required for the plan update.

Key Tasks

- Complete Plans in Place Checklist.
- Complete Capabilities Assessment for Mitigation.
- Conduct Past Mitigation Action Review.
- Coordinate Local Mitigation Survey (LMS) Forms.

Mitigation Action Charts

Hundrieser Consulting will coordinate development of draft 5-year jurisdictional Mitigation Action Charts (MACs) for the county/tribe and each participating city jurisdiction.

Key Tasks

- Complete Planning Team Mtg. #1 & Key Task Assignments.
- Conduct local-level development of MACs.
- Hold Planning Team Mtg. #2 for MAC review.
- Complete final MAC revisions.

Draft Plan Review

The U-Spatial@UMD Team will work with each EM to conduct a review of the draft MHMP and provide an opportunity for public review & comment on the plan.

Key Tasks

- EM review of initial draft plan > Revisions made as needed.
- Distribute News Release #2 - public review & comment period.
- EM coordination of review by key stakeholders.
- Posting of draft plan online with comment form.
- Documentation and incorporation of public feedback.

Plan Submission

The draft MHMP will be submitted to HSEM and FEMA for review & approval. Timing for review & approval is generally within 1-2 months.

Key Steps

- U-Spatial@UMD will submit the draft plan & Plan Review Tool (PRT) to HSEM.
- HSEM will submit the draft plan & PRT to FEMA reviewer.
- FEMA may respond with requests for revisions > U-Spatial@UMD to address revisions and resubmit plan.
- FEMA will send a letter of Approval Pending Adoption (APA status)

Plan Adoption

After FEMA has provided APA status, the county/tribe and all participating jurisdictions must formally adopt the plan.

Notes

- Good jurisdictional participation will facilitate local adoptions.
- Adoption of the plan is required for HMA grant program eligibility.
- Example adoption resolutions are provided for county/tribal adoption and local city adoption. Townships may elect to adopt (not required).
- Resolutions are incorporated into the final MHMP (PDF) by the Emergency Manager or included as hard copies.

Timeline Overview

- 22-Month total timeline (March 2020 – December 2021)
- Most plans take 14-18 months.
- Staggering of plans will be required to complete update of risk assessments, research of hazard histories, etc. for each jurisdiction.
- Many tasks occur concurrently, others must be done in succession.

Due to the COVID-19 Pandemic, we recognize that timing for completing the update of all 18 plans may be affected. If necessary, HSEM will work to extend our project contracts with FEMA to accommodate an extended timeline.

Possible timeline for your plan		Red includes county action items
Stage 1 Tasks (4-5 months)	April – August 2020	HMP kickoff meeting/webinar with U-Spatial@UMD Develop jurisdictional contact list for MHMP planning team Disseminate & document News Release #1 Hold & document Planning Team Meeting #1 Complete Plans & Programs in Place Checklist Complete Capabilities Assessment to address natural hazards Conduct a Past Mitigation Action Review from prior plan Complete Local Mitigation Surveys Revisit prioritization of natural hazards that pose risk Assist U-Spatial@UMD with provision of key data Complete inventory of Critical Infrastructure
Stage 2 Tasks (4-6 months)	August – November 2020	Develop 5-year Jurisdictional Mitigation Action Charts Hazus hazard risk assessment for flooding Develop hazard profiles for each natural hazard Complete county profile sections and maps Complete Draft Plan
Stage 3 Tasks (2-3 months)	December – February 2021	EM review of Draft Plan Hold & document Planning Team Meeting #2 Finalize Mitigation Action Charts Disseminate & document News Release #2 EM coordination of plan review by stakeholders
Stage 4 Tasks (2-3 months)	March – May 2021	Post-public review revisions made to plan (as necessary) Draft Plan sent to HSEM for review & approval Draft Plan sent to FEMA for review & approval

Local 25% Match

Each quarter EM's will be responsible to track and submit local match documentation to HSEM.

Notes:

- EM's are provided with a "Master Match Tracking" Excel Workbook to document match MHMP activities, participants, and amount accrued.
- Regular reminders & guidance will be provided on tracking match.

Next Steps

U-Spatial@UMD Team members will coordinate each EM to commence work on several tasks that will take place over the next several months.

Notes:

- We are sensitive to the workloads of EM's, particularly during COVID-19.
- All information requests or assignments are in prepared form.
- Please communicate your availability to complete/not complete work.
- Plans most expired are priority; however, EM's with completed tasks move up in the que for plan development.

Questions?

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

Contact Information

Stacey Stark, MS, GISP

U-Spatial@UMD

slstark@d.umn.edu

218-726-7438

Example Plans:

https://z.umn.edu/hazardmitigation

Traverse County MHMP Update
JURISDICTIONAL CONTACT LIST

County Contacts

Name	Title	Phone	Email
Lisa Zahl	County Coordinator	320-422-7778	Lisa.zahl@co.traverse.mn.us
Trevor Wright	Sheriff	320-422-7800	Trevor.wright@co.traverse.mn.us
Lynn Siegel	Emergency Management Director	320-563-0872	lynn.siegel@co.traverse.mn.us
Chad Gillespie	Engineer	320-563-4848	Chad.gillespie@co.traverse.mn.us
Sara Gronfeld	Soil & Water Conservation	320-563-8218	Sara.gronfeld@mn.nacdnet.net
Dianne Reinart	Assessor	320-422-7735	dianne.reinart@co.traverse.mn.us
Ben Oleson	Hometown Planning, Land Management Office	320-759-1560	oleson@hometownplanning.com
Shawn Shay	Building & Grounds	320-422-7725	shawn.shay@co.traverse.mn.us
Dustin Kindelberger	Safety	320-422-7727	Dustin.kindelberger@co.traverse.mn.us
Tom Monson	Commissioner	320-760-5440	Tom.monson@co.traverse.mn.us
Dave Salberg	Commissioner	320-563-4691	davesalberg@live.com
Kevin Leininger	Commissioner	320-563-8017	stormhtg@gmail.com
Mark Gail	Commissioner	320-760-7630	Mark.gail@co.traverse.mn.us
Todd Johnson	Commissioner	320-695-2540	Wingnfintraverse.gmail.com

City Contacts

CITY OF BROWNS VALLEY

Name	Title	Phone	Email
Jodi Hook	City Administrator	320-695-2110	Jodi.hook@prtel.com
Mike Heck	Mayor	605-237-0758	michealjjheck@gmail.com

CITY OF DUMONT

Name	Title	Phone	Email
Don Montonye	Mayor	320-563-4288	
Gail Theil	City Clerk	320-808-5790	gailbobt@hotmail.com cityofdumont@hotmail.com

CITY OF TINTAH

Name	Title	Phone	Email
Amanda Kinn	City Clerk	701-640-4349	cityoftintah@gmail.com
Randy Bullis	Mayor	502-741-8980	

CITY OF WHEATON

Name	Title	Phone	Email
Amy Olson	City Administrator	320-563-4110	cityadministrator@cityofwheaton.com
Lenard Zimmel	Mayor	320-563-4653	

Township Contacts

Name of Township	Name & Title	Phone	Email
Arthur Township	Ed Hiedeman, Supervisor	320-265-6242	Kma_dumont@hotmail.com
Clifton Township	Kevin Deal, Supervisor	320-563-8449	dealkevin@gmail.com
Croke Township	Philip Brink, Supervisor	320-760-1173	philipjbrink@gmail.com
Dollymount Township	Steven Fridgen, Supervisor	320-760-4247	sfridgen@gmail.com
Folsom Township	Jerry Metz, Supervisor	701-261-7378	5322 520th St Browns Valley MN 56219
Lake Valley Township	Steve Johnson, Supervisor	320-563-8160	maryandtompeyton@hotmail.com
Leonardsville Twp.	Randy Tritz, Supervisor	320-808-9278	rmtritzie@fedtel.net
Monson Township	Delane Anderson, Supervisor	320-760-9436	andersondelaned@hotmail.com
Parnell Township	Chad M. Arens, Supervisor	320-808-5973	5033 660th Ave Graceville MN 56240
Redpath Township	Chadd Berger, Supervisor	320-815-7084	chaddberger@yahoo.com
Tara Township	Dave Bauer, Supervisor	320-808-4843	dbauer@hurlyeandassociates.com
Taylor Township	Dean Holtz, Supervisor	320-563-4288	Ndholtz54@gmail.com
Tintah Township	Steve Keller, Supervisor	218-369-2695	steved@runestone.net
Walls Township	Bruce Conroy, Supervisor	320-760-2912	conroyjb@westtechwb.com
Windsor Township	Brandon Smith, Supervisor	320-760-3832	Brandon_s72@hotmail.com

Other Stakeholder Contacts

Name of Agency/Org.	Name & Title	Phone	Email
Sanford Wheaton Medical Center	Chelsie Falk, Senior Director	320-563-8226	Chlesie.falk@sanfordhealth.org
Sanford Wheaton Medical Center	Lee Rowland, Safety	320-563-8226	Lee.rowland@sanfordhealth.org
Bois De Sioux Watershed District	Jamie Beyer, Administrator	320-563-4185	bdswd@runestone.net
Wheaton Area Schools	Dan Posthumus, Superintendent	320-563-8282	dposthumus@wheaton.k12.mn.us
USDA Rural Development Community Programs	Jeff Scholten, Area Specialist	320-763-3191 x112	jeff.scholten@usda.gov
Otter Tail Power Company	Tom Hrdlicka, System Operations Mgr.	218-739-8200	thrdlicka@otpco.com
Traverse Electric Cooperative	Joel Janorschke, General Manger	320-563-8616	Jjanorschke@traverseelectric.com

Neighboring Jurisdiction Contacts

Name of Jurisdiction	Name & Title	Phone	Email
Wilkin County	Breanna Koval, EM Director	218-643-5815	bkoval@co.wilkin.mn.us
Grant County	Tina Lindquist, EM Director	218-685-8224	Tina.lindquist@co.grant.mn.us
Stevens County	Dona Greiner, EM Director	320-208-6507	donagreiner@co.stevens.mn.us
Big Stone County	Dona Greiner, EM Director	320-839-6379	Dona.greiner@bigstonecounty.org

Traverse County MHMP Planning Team Meeting #1
October 14, 2020 - Meeting Summary & Documentation

Summary: On Wednesday, October 14, 2020, Traverse 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 Traverse County Multi-Hazard Mitigation Plan (MHMP). The purpose of the meeting was to formally present information about the Traverse 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: Traverse County Emergency Management invited all stakeholders included on the county's MHMP Update Jurisdictional Contact List (JCL), which includes the key County Contacts, City Contacts, Township Contacts, Other Stakeholder Contacts, and Neighboring Jurisdiction Contacts identified to be invited to participate in the plan update process. Contacts were encouraged to engage additional staff or to send someone in their stead if they could not attend. A copy of the county's Jurisdictional Contact List is provided in *Appendix F Steering Committee Meetings*.

Meeting Participants: A total of 20 people attended the meeting. Representation included elected officials and departmental staff from Traverse County and the cities of Browns Valley and Dumont. The cities of Tintah and Wheaton were 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. **(4) 29%**
- No, but I am familiar with hazard mitigation planning. **(6) 43%**
- No, and this is all new to me. **(4) 29%**

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 Traverse 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
Flooding	High	High
Tornadoes	Moderate	Moderate
Winter Storms	Moderate	Moderate
Windstorms	Moderate	Moderate
Hail	Moderate	Moderate
Extreme Heat	Not specified	Low
Extreme Cold	Not specified	Low
Lightning	Moderate	Low
Drought	Low	Low
Landslides	Low	Low
Wildfire – Wildland fire	Low	Low

Comments, Questions or Mitigation Ideas – Following are the questions, comments or mitigation ideas that were shared by participants and how they will be addressed for the plan update.

Meeting Participant (by representation)	Comment, Question or Mitigation Idea Submitted	Facilitator Feedback / How to be Addressed in Plan Update
Ben Oleson, Traverse County Highway Engineer	Are private roads eligible for mitigation efforts (HMA grants), raising their elevation, for instance? Many of the lakeshore clusters of homes/subdivisions are served by private roads that the townships or county does not maintain. (On Lake Traverse anyway).	The private associations would not be eligible to apply for a FEMA HMA grant, the applicant would have to be Traverse County.
Troy Fridgen, Bois de Sioux Watershed District Engineer Tech./Ditch Inspector	The Bois de Sioux Watershed District has a permit process to size culverts and structures to our BTsac policy. This is a formula to size culverts to equally control the flow of certain drainage systems. During a flood and culverts need to be replaced we would like to be able to size the culverts before they are replaced. FEMA only allows replace with the same size pipe and	Thanks, Troy. This is a common complaint about FEMA allowances. I am not an expert in this and would recommend you contact Jen Nelson, the State Hazard MO. There is possibly some new FEMA guidance through the new BRIC program.

	sometimes they need to be larger or smaller according to our policy. How can we stream line this process so we can get the right size culverts replaced after a flood event?	

Following the discussion, participants were encouraged to fill out and return the "Mitigation Ideas" worksheet that they were provided with to Traverse 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?**
   (5) Yes

2. **Please provide comments about any of the lower risk hazards if you think they should be addressed in the plan (lightning, extreme heat, landslide, drought)**
   - I was surprised a bit that drought wasn't a larger threat historically. Is that something that is predicted to increase in the Upper Midwest generally?

3. **Any other comments (about natural hazards, mitigation actions, or how we might improve this webinar)?**
   - The COVID pandemic and its impacts have made me think more about our hazard mitigation planning – it's not a natural disaster in the traditional sense, but it's certainly not man-made either. Is that something that needs to be addressed? Also, the pandemic (because it was somewhat new in terms of creating the need for lockdowns) makes me wonder if we should be addressing hazards under headings of their impacts in addition to or instead of by types of hazards. For instance, if the main headings were based on the impacts that would be created by a hazard or disaster (whether natural or man-made). So one would be "Evacuation" (such as with flooding or some kind of chemical spill) and another would be "Shelter in place" like with a pandemic or for a snowstorm) and another might be "Temporary Mitigation" (for things like sandbagging during a flood). Then from there, we assess the responses that would be needed to assist people until the event is over (i.e. temporary group sheltering, providing temporary housing/food supply, doing wellness checks during an extended blizzard, restoring phone service or electricity, etc.). I'm just wondering if that helps address hazards or disasters even if they aren't what we've had to deal with in the past (i.e. - OK, we just had a disaster that is causing people to shelter in place for 2 days - what responses do we need to have?) What if the sheltering in place is for 3 weeks - what additional responses will we need to provide?). Perhaps I'm thinking more of emergency response than mitigation, but sometimes preparing to respond ahead of time can be a form of mitigation?

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

- 10-14-20 Mtg. #1 Email Invitation
- 10-14-20 Mtg. #1 List of Participants
- 10-14-20 Mtg. #1 Power Point Slides
- 10-14-20 Mtg. #1 Handouts

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

From:	Lynn Siegel
To:	Lisa Zahl; Trevor Wright; Chad Gillespie; Sara Gronfeld-NACD; Dianne Reinart; oleson; Shawn Shay; Dustin Kindelberger; Tom Monson; "Dave Salberg"; Kevin Leininger; Mark Gail; Todd Johnson (wingnfin@prtel.com); jodi.hook@prtel.com; michealjjheck@gmail.com; Gail thiel; cityoftintah@gmail.com; cityhall cityofwheaton.com; Kma_dumont@hotmail.com; dealkevin@gmail.com; philipjbrink@gmail.com; sfridgen@gmail.com; maryandtompeyton@hotmail.com; rmtritzie@fedtel.net; delane anderson; "chaddberger@yahoo.com"; "david bauer"; ndholtz54@gmail.com; steved@runestone.net; conroyjb@westtechwb.com; Brandon_s72@hotmail.com; Falk,Chelsie; Rowland,Lee; bdswd@runestone.net; Daniel Posthumus (dposthumus@wheaton.k12.mn.us); jeff.scholten@usda.gov; thrdlicka@ptpco.com; jjanorschke@traverseelectric.com; Dona Greiner (donagreiner@co.stevens.mn.us); Tina Lindquist; Breanna Koval; Dona Greiner
Cc:	Bonnie K Hundrieser
Subject:	Traverse County MHMP Planning Team Meeting #1 Invitation
Date:	Thursday, September 17, 2020 11:06:17 AM

TRAVERSE COUNTY

MULTI-HAZARD MITIGATION PLAN UPDATE – MEETING INVITATION

Greetings,

Your presence is requested at a Planning Team Meeting for the update of the **Traverse County Multi-Hazard Mitigation Plan**. You are requested to participate in this vital meeting because you have a position of administrative or departmental responsibility within either the County, a municipal government, or are a key stakeholder related to the planning process. Emergency Managers from neighboring jurisdictions are also encouraged to attend so we may strengthen our shared mitigation efforts.

We will be holding the meeting using Zoom webinar:

Date: Wednesday, October 14, 2020

Time: 2:00 p.m. – 4:00 p.m.

Registration: **https://umn-private.zoom.us/webinar/register/WN_Jf_p-IDtQkOJC4p3b_sf7A**

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 Traverse 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 Traverse 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 Traverse 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,

Lynn Siegel
Traverse County Emergency Manager
708 3rd Ave N
Wheaton Mn 56296
lynn.siegel@co.traverse.mn.us
320-563-0872

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

October 14, 2020

Traverse County Minnesota

U-SPATIAL
University of Minnesota Duluth
Driven to Discover

Welcome & Introductions

U-Spatial@UMD Project Leads

Stacey Stark
Project Manager
U-Spatial@UMD

Bonnie Hundrieser
HM Planning Specialist
Hundrieser Consulting LLC

Traverse County Project Lead

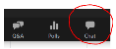
- Lynn Siegel, Traverse County Emergency Management Director

PRESENTER: STACEY STARK

Webinar Logistics

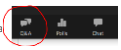
YOU ARE UNABLE TO UNMUTE YOURSELF OR TURN YOUR VIDEO ON

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

Spring, 2019 Flood Damage

The purpose of this meeting is to formally convene the Traverse County MHMP Planning Team for a presentation of the plan update and discussion of key items.

Agenda:

- Overview of Hazard Mitigation & the MHMP Update
- Who the Plan Covers & Role of the Planning Team
- Review of Hazards + Overview of Risk Assessment and Vulnerability Analysis
- Update of Risk Priorities
- Review of Mitigation Strategies & Example Actions
- Overview of FEMA HMA grant program
- Discuss local mitigation ideas & public engagement.
- Discuss next steps & answer your questions.

PRESENTER : STACEY STARK

Why U-Spatial?

U-SPATIAL
University of Minnesota Duluth
Driven to Discover

- **Proven experience**
  Our updates of 30+ MHMPs, as well as the State MHMP, have been quickly approved by FEMA and adopted by counties.
- **Advanced Capabilities**
  Expertise in the application of GIS, HAZUS, and research supports plan development and meeting all FEMA requirements.
- **Ability to Expedite**
  A consistent and proven approach for multiple counties supports State & FEMA review of draft plans.
- **Planning Team**
  Our project team includes advanced GIS students and Hundrieser Consulting.

PRESENTER : STACEY STARK

What is Hazard Mitigation?

Hazard Mitigation is any action taken to reduce or eliminate long term risk to people and property from natural disasters.

- HM planning **identifies** risks and vulnerabilities, **develops** a plan of action, and **builds** partnerships to implement efforts.
- HM breaks the **cycle** of disaster and reconstruction.
- HM builds stronger & more **resilient** communities.

PRESENTER : BONNIE HUNDRIESER

MHMP Overview & Timeline

Spring, 2019 flood damage

The Multi-Hazard Mitigation Plan (MHMP) is a requirement of the Federal Disaster Mitigation Act of 2000 (DMA 2000).

- ✓ **The development of a local government plan is required in order to maintain eligibility for FEMA hazard mitigation grant programs.**
- ✓ **Plans must be updated every 5 years.**
- ✓ **Must address all jurisdictions and engage key stakeholders.**
- ✓ **Planning process must give an opportunity to the public to provide feedback.**

Traverse 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.

Who the Plan Covers

Traverse County Minnesota

The Traverse County MHMP is a multi-jurisdictional plan that covers the county as well as all city & townships within the county.

- ✓ County and city governments are required to adopt the plan.
- ✓ Townships are covered under the umbrella of the county, but may elect to adopt.
- ✓ City-level participation in the plan update must be documented for local adoptions to be approved.

MHMP Planning Team

Traverse County Planning Team

- **Traverse County Emergency Management**
- **Key County Officials & Staff**
- **City and Township Officials & Staff**
- **Neighboring Jurisdictions**
- **Other Related Agency or Organizational Stakeholders**

- ➢ Assist with public outreach & documentation for news releases (use of websites, social media & community bulletin boards).
- ➢ Participate in 2 planning team meetings.
- ➢ Assist with provision of county/local information
- ➢ Help develop & review local mitigation action charts.
- ➢ Review of the draft plan.
- ➢ Facilitate local-level adoptions.

What Hazards are Addressed in the Plan?

HAZARD MITIGATION

- ➢ **Natural hazards** that pose risk to the county and its jurisdictions.
- ➢ Manmade hazards are not required to be addressed (per the DMA 2000).
- ➢ Hazards may be omitted from the plan if **low risk** is demonstrated.
- ➢ Hazard Risk may differ in cities and the county overall.

Flooding	Hail	Drought
Dam/Levee Failure	Lightning	Extreme Heat
Wildfire	Winter Storms	Extreme Cold
Windstorms	Landslides	Earthquakes
Tornadoes	Sinkholes & Karst	Coastal Erosion

Natural hazard categories for Minnesota MHMPs.

Hazard Risk Assessment and Vulnerability Analysis

The U-Spatial@UMD Team will work closely with the county and each city to provide information as needed.

- ➢ Inventory of critical infrastructure.
- ➢ Identify specific, local-level impacts and vulnerabilities.
- ➢ Identify any factors (i.e., new development) that may increase the community's vulnerability.
- ➢ Review social vulnerability factors.
- ➢ Identify if and how risk priorities have changed since the last plan. (Increased / Decreased)

October 11, 2013 funnel cloud development near Wheaton

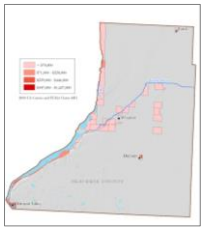
March, 2007 Browns Valley Flood event

Hazard Prioritization

Hazards Addressed in 2015 HMP	2015 priority	Comments
Flood	High	
Winter Storm	Moderate	
Wind Storm	Moderate	with summer storm
Wildfire	Moderate	
Tornado	Moderate	with summer storm
Extreme Cold	?	Not Rated
Extreme Heat	?	Not Rated
Drought	Low	Not Addressed
Dam/Levee Failure	Low	Not Addressed (required 2021)
Lightning	Moderate	with summer storm
Hail	Moderate	with summer storm
Landslide	?	Not Addressed
Land Subsidence	Low	Not Addressed

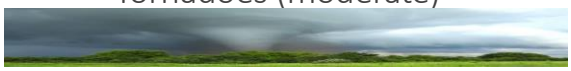
Flooding (high)

- 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, from 2015 HMP.

Tornadoes (moderate)



- Based NCEI Storm Events Database through February 2020, the relative frequency of tornados in Traverse County is .4 per year
- One mobile home park in Wheaton

August 14, 2020 NWS Tornado Watch Issued for Traverse County

Extreme Heat

- From 2015 - 2020, the Brown Valley weather station reported daily high temperatures ≥ 90 °F 77 times (5-15 days/year depending on station).
- Since January 1996, one heat events (heat index 100 °F) and two excessive heat events (heat index 105 °F) occurred. The relative frequency of heat-related events in the county is .1 per year.
- An excessive heat event occurred on July 20, 2016, when heat index in Wheaton rose to 111°F

August 13, 2020 NWS Heat Advisory Issued for Traverse County

Extreme Cold

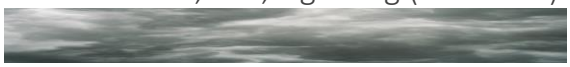
- From 2015 - 2020, daily low temperatures ≤ -18 °F were recorded 14 times at the Wheaton weather station. The county experiences an average of 2-5 extreme cold days each year.
- -35°F recorded by the Browns Valley station on January 31, 2019
- The relative frequency of cold-related events (NWS Warning issued due to wind chill of -35 °F or colder) in Traverse County is 1.2 per year

Winter Storms (moderate)

- 20 winter weather related events (blizzards, heavy snows, ice storms, winter storms, and winter weather) have occurred since January 2015 (3.3 year)
- Based on all records in the NCEI Storm Events Database, the relative frequency of winter-related storm events is 4.2 per year.

February 12, 2020 NWS Blizzard Warnings with whiteouts for western MN

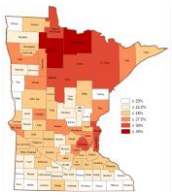
Windstorms, Hail, Lightning (moderate)



- Each addressed individually
- The relative frequency of all wind-related events since January of 1996 is 2.4 per year.
- There were eight hailstorms with hail greater or equal to 1-inch since 2015. The relative frequency of all hail events is 1.2 per year.
- Hazards deemed low risk and without significant mitigation actions, can be dropped from the plan.

Drought (low)

- From 2000 – 2018, Traverse County was in Moderate (D1) Drought 22-25% of the time.
- Hazards deemed low risk and without significant mitigation actions, can be dropped from the plan.



PRESENTER : STACEY STARK

Landslides

Wildfire – Wildland Fire

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.

NATIONAL FLOOD INSURANCE PROGRAM

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)

Power Line retrofit/burial

#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

#4 – Education & Awareness Programs

These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them.

CodeRED®

Ready

SKYWARN WEATHER.GOV

EXAMPLES:

- Promoting sign-up for emergency notifications
- Educate on use of outdoor warning sirens and response
- Participation in the NWS Severe Weather Awareness Weeks
- SKYWARN Storm Spotter Training
- Turn Around Don't Drown
- Promoting personal & family emergency preparedness (i.e. Ready.gov)

#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

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

Historical Projects in Traverse County Resulting from HMA Funding since 2010

DR / project #	subrecipient	project type	100% project cost	federal share (%75)	local match (%25)
1941.12	Traverse County	Safe Room	$141,763.00	$106,322.25	$35,440.75
1982.03	Traverse County	Mitigation Plan	$37,215	$27,911.25	$9,303.75

Mitigation Ideas

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

See Handout: Mitigation Ideas Worksheet

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.

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.

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

Spring-Summer 2021

Planning Team Meeting #2 and Public Review & Comment Period

- Hold Planning Team Mtg. #2 – presentation of draft plan and final review of Mitigation Action Charts.
- Disseminate & document news release by county and jurisdictions.
- Conduct draft plan review.
- Document local outreach and feedback.

Next Steps

Fall-Winter 2021

Draft Plan Submission to HSEM & FEMA for Approval

- Draft plan will be submitted first to HSEM and then to FEMA for approval for meeting all Federal requirements.
- Typically requires 1-2 months.
- APA letter
- EM coordination of adopting resolutions

PRESENTER : BONNIE HUNDRIESER

Questions?

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

PRESENTER : STACEY STARK

Contact Information

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

HUNDRIESER CONSULTING LLC

PRESENTER : STACEY STARK

Mitigation Strategies & Action Types

Following are the five types of mitigation strategies that will be used in the update of the Multi-Hazard Mitigation Plan with examples of related mitigation actions. Minnesota HSEM recommends the use of these mitigation strategies to be in alignment with the State plan and those recommended by FEMA. The first four strategies listed are taken from the FEMA publications *Local Mitigation Planning Handbook* (2013) and *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* (2013). The fifth strategy type was determined by Minnesota HSEM for use within the state.

These strategies will provide the framework for identification of new jurisdictional-level mitigation actions for implementation over the next 5-year planning cycle.

Mitigation Strategy	Description	Example Mitigation Actions
Local Planning and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	• Comprehensive plans • Land use ordinances • Planning and zoning • Building codes and enforcement • Floodplain ordinances • NFIP Community Rating System • Capital improvement programs • Open space preservation • Shoreline codes • Stormwater management regulations and master plans • Mobile home park compliance for storm shelters
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.	• Property Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits (i.e., metal roofs) • Floodwalls and retaining walls • Detention and retention structures • Culvert Installation/Modification • Roads & Bridge risk reduction • Safe Room (New construction or facility retrofit) • Green Infrastructure Methods *Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.*

Mitigation Strategy	Description	Example Mitigation Actions
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	• Soil stabilization for sediment and erosion control • Floodplain and Stream corridor restoration • Slope management • Forest management (defensible space, fuels reduction, sprinkler systems) • Conservation easements • Wetland restoration and preservation • Aquifer Storage & Recovery • Flood Diversion and Storage *Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.*
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions that support life safety and lessen property damage.	• Radio or television spots • Websites with maps and information • Social media outreach • Promotion of sign-up for emergency warnings • Real estate disclosure • Promotion of NFIP insurance to property owners • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas. • NWS StormReady Program • Firewise Communities *Some of these types of actions may be projects eligible for funding through the FEMA HMA "5 Percent Initiative Program".*
Mitigation Preparedness and Response Support	This is a State of Minnesota mitigation strategy with the intent of covering emergency preparedness actions that protect life and property prior to, during, and immediately after a disaster or hazard event. These activities are typically not considered mitigation, but support reduction of the effects of damaging events.	• Emergency Operations Plan • Flood fight plans and preparedness measures • Dam emergency action plans • Emergency Warning Systems (i.e., CodeRed, warning sirens) • Generator backup power • NWS Storm Spotter Training • Training and education for local elected officials and key partners.

State of Minnesota
Department of Public Safety
Division of Homeland Security and Emergency Management
445 Minnesota Street, Suite 223
St. Paul, MN 55101-6223

HAZARD MITIGATION ASSISTANCE

Hazard Mitigation Assistance (HMA) grant programs provide funding with the aim to reduce or eliminate risk to property and loss of life from future natural disasters. HMA programs are typically a 75%/25% cost share program. The federal share is 75% of total eligible project reimbursement costs. The local applicant is responsible for 25% of the project costs. The amount of HMGP funds availability is based on a percent of Public Assistance provided by Federal Emergency Management Agency (FEMA).

- Hazard Mitigation Grant Program (HMGP) funds assists in implementing long-term hazard mitigation measures following a Presidential major disaster declaration.
- Pre-Disaster Mitigation (PDM) provides funds for hazard mitigation planning and projects on an annual basis.
- Flood Mitigation Assistance (FMA) provides funds on an annual basis to reduce or eliminate risk of flood damage to buildings that are insured under the National Flood Insurance Program (NFIP).

Who is eligible for grant funding?
All applicants must have or be covered under an approved Hazard Mitigation Plan. Eligible applicants include: State and local governments; certain private non-profit organizations or institutions; and Tribal Communities

What types of projects can be funded?
All projects must be eligible, technically feasible, and cost-effective. All projects are subject to environmental and cultural resource review. Examples of projects include:

- **Advance Assistance** may be used to develop mitigation strategies and obtain data, including for environmental and historic preservation compliance considerations, and develop complete project applications in a timely manner.

- **Aquifer Storage and Recovery** (ASR) projects serve primarily as a drought management tool, but can also be used to reduce flood risk and restore aquifers that have been subject to overdraft. The concept is to capture water when there is an abundant supply, store the water in subsurface aquifers, and recover water from the storage aquifer when needed. Storing water underground can help protect it from pollutants, evaporation, and weather events.

- **Floodplain and stream restoration** (FSR) projects are used primarily to reduce flood risk and erosion by providing stable reaches, and may also mitigate drought impacts. FSR projects restore and enhance the floodplain, stream channel and riparian ecosystem's natural function. They provide base flow recharge, water supply augmentation, floodwater storage, terrestrial and aquatic wildlife habitat, and recreation opportunities by restoring the site's soil, hydrology and vegetation conditions that mimic pre-development channel flow and floodplain connectivity.

- **Flood Diversion and Storage** (FDS) projects often are used to reduce flood risk, but also can be used to mitigate drought and improve ecosystem services. These projects involve diverting floodwaters from a stream, river, or other body of water into a conduit such as a canal, pipe, or wetland and storing them in an above-ground storage facility. Water is then slowly released, reducing flood risk.

- **Green Infrastructure Methods** are a sustainable approach to natural landscape preservation and storm water management. Include in *eligible hazard mitigation activities* as well as provide additional ecosystem benefits**.** Ecosystem-based approach to replicate a site's pre-development, natural hydrologic function. Benefits include: Increase water supply, improved water quality, can be scaled to size and designed to fit site conditions.

- **Property Acquisition and Structure Demolition or Relocation –** The voluntary acquisition of an existing at-risk structure and the underlying land, and conversion of the land to open space through the demolition or relocation of the structure. The property must be deed-restricted in perpetuity to open space uses to restore and/or conserve the natural floodplain functions.

- **Retrofit Flood-Prone Residential Structures** are changes made to an existing structure to reduce or eliminate the possibility of damage to that structure from flooding, erosion, or other hazards. Examples of this mitigation are primarily elevation of structures above flood levels and floodwalls.

- **Safe Room Construction** - Safe room construction projects are designed to provide immediate life-safety protection for people in public and private structures from tornado and severe wind events. Includes retrofits of existing facilities or new safe room construction projects, and applies to both single and dual-use facilities

- **Minor Localized Flood Reduction Projects** - Projects to lessen the frequency or severity of flooding and decrease predicted flood damages, such as the installation or up-sizing of culverts, and stormwater management activities, such as creating retention and detention basins. These projects must not duplicate the flood prevention activities of other Federal agencies and may not constitute a section of a larger flood control system.

- **Infrastructure Retrofit** - Measures to reduce risk to existing utility systems, roads, and bridges.

- **Soil Stabilization -** Projects to reduce risk to structures or infrastructure from erosion and landslides, including installing geotextiles, stabilizing sod, installing vegetative buffer strips, preserving mature vegetation, decreasing slope angles, and stabilizing with rip rap and other means of slope anchoring. These projects must not duplicate the activities of other Federal agencies. *New tools for Bioengineered Shoreline Stabilization, Bioengineered Streambank Stabilization.*

- **Wildfire Mitigation** - Projects to mitigate at-risk structures and associated loss of life from the threat of future wildfire through: Defensible Space for Wildfire, Application of Ignition-resistant Construction and Hazardous Fuels Reduction. *New tool for Bioengineered Wildfire Mitigation.*

- **HMGP only - 5 Percent Initiative Projects** – These projects, which are only available pursuant to an HMGP disaster, provide an opportunity to fund mitigation actions that are consistent with the goals and objectives of approved mitigation plans and meet all HMGP program requirements, but for which it may be difficult to conduct a standard Benefit-Cost Analysis (BCA) to prove cost-effectiveness.

How do I apply?
Start by submitting a Notice of Interest, available on HSEMs website at:
https://dps.mn.gov/divisions/hsem

Where can I obtain further information?
For additional information about the HMA grant program, you can refer to the FEMA website:
http://www.fema.gov/hazard-mitigation-assistance

MITIGATION IDEAS WORKSHEET

Please use the following worksheet to list your ideas for mitigation actions that you feel will help reduce the impact of future natural hazard events to the county or to your jurisdiction. Following the MHMP planning team meeting, please return this form via email to your county Emergency Manager to submit your feedback.

NAME OF JURISDICTION:

CONTACT INFORMATION
Name:
Phone:
Email:

Hazard	Description of Concern or Proposed Mitigation Action

Traverse County MHMP Planning Team Meeting #2
November 3, 2021 - Meeting Summary & Documentation

Summary: On Wednesday, November 3, 2021, Traverse County Emergency Management convened key county, city, and township representatives, as well as neighboring jurisdictions and other stakeholders to participate in the 2nd and final Planning Team Meeting for the update of the Traverse County Multi-Hazard Mitigation Plan (MHMP). The purpose of the meeting was to formally convene the Traverse 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: Traverse 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 14 people attended the meeting. Representation included elected officials and departmental staff from Traverse County and the cities of Browns Valley, Dumont, and Wheaton. The city of Tintah was not able to attend. Other stakeholders, including neighboring jurisdictions, participated in the meeting. A participant list is included with this meeting summary.

Presentation Overview: The PowerPoint presentation covered the following items about the process and content of the plan update. A PDF of the presentation slides is included with this meeting summary.

- Meeting Purpose and Agenda
- About the Project Team
- Overview of Plan Update
- Who the Plan Covers
- Who Needs to Participate
- Prioritization of Hazards
- Hazards Risk Assessment (Critical Infrastructure, Population Vulnerability Factors, and Review of High/Moderate Priority Natural Hazards)
- Development of Mitigation Actions
- FEMA HMA Grant Funding
- Overview of Mitigation Action Charts and Discussion
- Discussion of Next Steps & answer your questions

The opening PowerPoint presentation covered a re-cap of key points about the plan update, a review of the Risk Assessment & Vulnerability Analysis, an overview of FEMA Hazard Mitigation Assistance (HMA) grant funding; an overview of how mitigation actions are developed and an overview of the jurisdictional Mitigation Action Charts (MACs). Following the presentation, participants were provided with an opportunity to review and discuss the county and local mitigation action charts. This discussion period offered a facilitated opportunity for participants to consider any changes or new additions to the MACs prior to completion of the draft plan for public review.

Discussion Notes: Following is an overview of key discussion points, questions, or mitigation ideas that were shared during the presentation and how they will be incorporated into the plan update.

Meeting Participant	Comment, Question or Mitigation Ideas	Facilitator Feedback / Plan Incorporation
Lynn Siegel, Traverse County Emergency Management Director	In regards to flooding: It was suggested to add into the county Mitigation Action Chart an action regarding working with the MN DNR on updating the county's floodplain maps since they are outdated. It was unknown by the county if there was any anticipated timeline for the updated FEMA floodplain maps to be developed.	Stacey Stark noted that she would contact Ceil Strauss, the MN DNR Floodplain Manager to inquire on the status of the maps update for Traverse County. Bonnie Hundrieser noted that she would add in a mitigation action to the flooding section of the Traverse County chart to address this effort.

Meeting Conclusion: The meeting concluded with an overview and timeline of the upcoming next steps of posting the plan for public review and input and submitting the draft plan to HSEM and FEMA for final review and approval.

Exit Survey: Following the Zoom meeting, participants were provided with a short survey they were invited to fill out before upon their departure in order to gather some final feedback.

1. **Thank you for attending! Did this webinar meet your expectations? Did you get the information you were hoping to receive?**

   Yes (5), No (0), Not sure (0)

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

   No questions. This plan seems accurate and thorough. Thank you for your hard work on this.

   Thank you for including me!

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

- 11-3-21 Mtg. #2 Email Invitation
- 11-3-21 Mtg. #2 List of Participants
- 11-3-21 Mtg. #2 Power Point Slides
- 11-3-21 Mtg. #2 Handouts

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

From:	Lynn Siegel
To:	Lisa Zahl; Trevor Wright; Chad Gillespie; Sara Gronfeld-NACD; Dianne Reinart; oleson; Shawn Shay; Dustin Kindelberger; Tom Monson; "Dave Salberg"; "Kevin Leininger"; Mark Gail; "Todd Johnson (wingnfin@prtel.com)"; "jodi.hook@prtel.com"; "michealjjheck@gmail.com"; "Gail thiel"; "cityoftintah@gmail.com"; "cityhall cityofwheaton.com"; "Kma_dumont@hotmail.com"; "dealkevin@gmail.com"; "philipjbrink@gmail.com"; "sfridgen@gmail.com"; "maryandtompeyton@hotmail.com"; "rmtritzie@fedtel.net"; "delane anderson"; "chaddberger@yahoo.com"; "david bauer"; "ndholtz54@gmail.com"; "steved@runestone.net"; "conroyjb@westtechwb.com"; "Brandon_s72@hotmail.com"; "Falk,Chelsie"; "Rowland,Lee"; "bdswd@runestone.net"; Daniel Posthumus (dposthumus@wheaton.k12.mn.us); "jeff.scholten@usda.gov"; "thrdlicka@ptpco.com"; "jjanorschke@traverseelectric.com"; Dona Greiner (donagreiner@co.stevens.mn.us); Tina Lindquist; Breanna Koval; "Dona Greiner"; "Karen Lupkes"; Janelle Tritz
Cc:	"Bonnie K Hundrieser"
Subject:	Save the Date: Traverse County MHMP Planning Team Meeting #2 Invitation
Date:	Thursday, September 9, 2021 10:55:43 AM

TRAVERSE COUNTY

MULTI-HAZARD MITIGATION PLAN UPDATE – MEETING INVITATION

Greetings,

Your presence is requested at the **2nd Planning Team Meeting** for the update of the **Traverse 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: Wednesday, November 3, 2021
Time: 9:00 a.m. – 11:00 a.m.
Zoom Link: **https://umn-private.zoom.us/webinar/register/WN_YGL0wPjlRv2B91R6evcl_Q**

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 Traverse 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 Traverse 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,

Lynn Siegel
Traverse County Emergency Manager
708 3rd Ave N
Wheaton MN 56296
Office: 320-563-0872
Lynn.siegel@co.traverse.mn.us

Traverse County
11-3-21 MHMP Planning Team Meeting #2
List of Participants (14)

	First Name	Last Name	Organization	Job Title
1	Lynn	Siegel	Traverse County Emergency Management	Emergency Management Director
2	Trevor	Wright	Traverse County Sheriff's Office	Sheriff
3	Ben	Oleson	Traverse County/Hometown Planning	Zoning Administrator
4	Chad	Gillespie	Traverse County Highway Dept	County Engineer
5	Lisa	Zahl	Traverse County Human Resources	HR Director/County Coordinator
6	Dianne	Reinart	Traverse County	County Assessor
7	Sara	Gronfeld	Traverse SWCD	Manager
8	Janelle	Tritz	Traverse County Highway Dept	Highway Accountant
9	JODI	HOOK	Browns Valley Ambulance	City Administrator
10	Gail	Thiel	City of Dumont	City Clerk and Treasurer
11	Amy	Olson	City of Wheaton	City Administrator
12	Dan	Posthumus	Wheaton Area Schools	Superintendent
13	Joel	Janorschke	Traverse Electric Cooperative, Inc.	General Manager
14	Dona	Greiner	Stevens County Sheriff's Office and Big Stone County Emergency Management	Emergency Management Director for Stevens and Big Stone County

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

NOVEMBER 3, 2021

Traverse County Minnesota

U-SPATIAL
University of Minnesota Duluth
Driven to Discover

Welcome & Introductions

U-Spatial@UMD Project Leads

Stacey Stark
Project Manager
U-Spatial@UMD

Bonnie Hundrieser
HM Planning Specialist
Hundrieser Consulting LLC

Traverse County Project Lead

- Lynn Siegel, Traverse County 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

Spring, 2019 Flood Damage

The purpose of this meeting is to formally convene the Traverse County MHMP Planning Team for a presentation on the draft plan and discussion of key items prior to public review and submission of the plan to HSEM and FEMA.

Hazard Mitigation Planning Meeting #2 Agenda

- Welcome & Introductions
- Recap of Key MHMP Points
- Review of Risk Assessment & Vulnerability Analysis
- Overview of FEMA HMA Funding and Mitigation Action Charts (MAC)
- MAC Review & Feedback
- Next Steps

PRESENTER: STACEY STARK

About your Project Team

U-SPATIAL
University of Minnesota Duluth
Driven to Discover

U-Spatial at the University of Minnesota Duluth was contracted by MN HSEM to facilitate the development of this plan and to conduct spatial analysis, mapping and research for the plan.

This Hazard Mitigation Plan is one of many we are working on this year.

Working with U-Spatial@UMD is **Bonnie Hundrieser**, who specializes in Emergency Management planning.

PRESENTER: STACEY STARK

Overview of Plan Update

Traverse County is updating its **Multi-Hazard Mitigation Plan (MHMP)** to fulfill a state & federal requirement. The plan must be updated every 5 years. The last plan was adopted in 2015.

The purpose of the plan is to identify & assess natural hazards that pose risk to the county and it's jurisdictions and **develop long-term strategies and mitigation actions** that will help to reduce or eliminate the impact of future hazard or disaster events.

Hazard Mitigation is any action taken to reduce or eliminate long term risk to people and property from natural disasters.

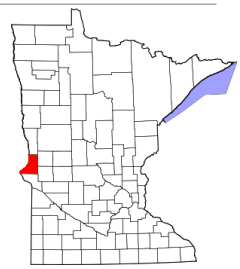
PRESENTER: BONNIE HUNDRIESER

Who the Plan Covers

Traverse County Minnesota

This is a **multi-jurisdictional plan** that covers Traverse County, including the cities of Browns Valley, Dumont, Tintah, and Wheaton.

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.



PRESENTER: BONNIE HUNDRIESER

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

PRESENTER: BONNIE HUNDRIESER

Prioritization of Hazards for Traverse County

NATURAL HAZARDS

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

PRESENTER: BONNIE HUNDRIESER

Questions / Comments?

Hazards Risk Assessment

- Validate prioritization
- Provide probability and severity of future events as possible
- Identify vulnerable populations and structures at risk as possible
- Consider variable jurisdictional vulnerability
- Inform Mitigation Actions in the HMP

October 11, 2013 funnel cloud development near Wheaton

PRESENTER: STACEY STARK

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)

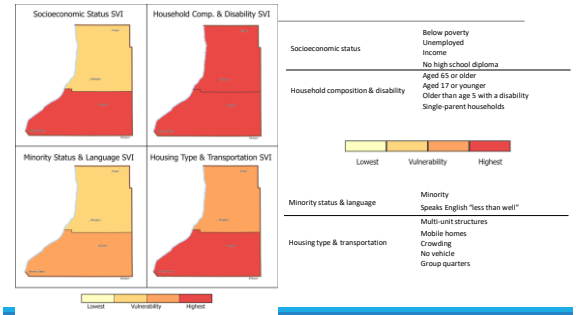
PRESENTER: STACEY STARK

All Hazards – Critical Infrastructure

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

PRESENTER: STACEY STARK

All Hazards – Population Vulnerability



PRESENTER: STACEY STARK

TRAVERSE COUNTY: Flooding (high)

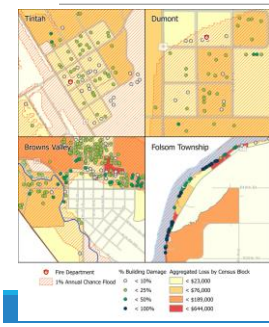
- Obtained building and parcel values from County
- Used statewide building footprint data
- Obtained FEMA Flood Insurance Rate Maps
- Ran flood model to estimate economic loss
- Identified Critical Infrastructure in flood zone

March, 2007 Browns Valley flood event

PRESENTER: STACEY STARK

TRAVERSE COUNTY: Flooding (high)

Spring, 2019 flood damage



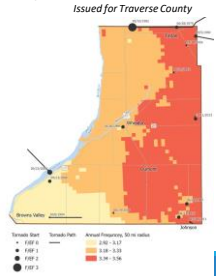
Jurisdiction (county subdivision)	Buildings in Floodplain	Est Building and Contents Loss
Tintah City	56	$ 147,183
Dumont City	46	$ 270,638
Browns Valley City	213	$ 1,614,956
Folsom Township	75	$ 2,106,518

PRESENTER: STACEY STARK

TRAVERSE COUNTY: Tornadoes (moderate)

August 14, 2020 NWS Tornado Watch Issued for Traverse County

- Based NCEI Storm Events Database through August 2021, the relative frequency of tornadoes in Traverse County is **.4** per year
- Current concerns about the availability of tornado safe rooms and upgrade of outdoor warning sirens.
- **Windstorms and Hail** were also deemed to be of moderate risk to Traverse County.
  - Wind events average **2.4** / year
  - Hail events average **1.2**/year



TRAVERSE COUNTY: Winter Storms (moderate)

Associated Press

4.2 winter-related storm events per year in Traverse County

Vulnerability - Program Gaps & Deficiencies:

- *Aboveground Powerlines*
- *Backup Power for critical facilities*
- *Public sign-up for emergency notifications*

PRESENTER: STACEY STARK

Questions / Comments?

Development of Mitigation Actions

- Must address hazards of high to moderate risk
- Must be jurisdictionally-specific
- Should address local vulnerabilities & reduce risk
- Should incorporate existing planning mechanisms and capabilities

Important

Eligible FEMA HMA project activities must be identified to support a future grant application.

FEMA HMA Grant Funding

- All applicants must be covered by an approved MHMP
- Cost share: Federal 75%, Applicant 25%
- Projects must address risk reduction.
- Eligible projects must be identified in the plan of action.

Example Eligible Activities:

- Property Acquisition (flooding/erosion)
- Tornado Safe Rooms (new/retrofit)
- Infrastructure Retrofits (utility systems, roads & bridges)
- Wildfire Mitigation
- Soil Stabilization
- Flood Risk Reduction
- Green Infrastructure
- Other projects difficult to conduct a standard BCA

PRESENTER: BONNIE HUNDRIESER

Mitigation Action Charts Overview

- County MAC (includes townships)
- City MACs
- 5-year window
- Please consider any additional mitigation actions you would like to add to your local MAC.


TRAVERSE COUNTY Mitigation Action Chart

Local Planning & Regulations

TRAVERSE COUNTY EXAMPLES:

- Participating in the NFIP
- Enforce county policies that regulate zoning for new development, setbacks in shoreline areas, and stormwater management.
- 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.

PRESENTER: BONNIE HUNDRIESER

Structure & Infrastructure Projects

TRAVERSE 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.

PRESENTER: BONNIE HUNDRIESER

Natural Systems Protection

TRAVERSE COUNTY EXAMPLES:

- Conduct vegetation management along roads to reduce downed limbs and trees from severe storms.

Other Examples

- Working with SWCD, MnDOT, and willing land owners to plant "living fences" for snow buffer on key travel corridors
- Planting windbreaks to protect buildings and other assets from straight line winds

Education & Awareness Programs

TRAVERSE COUNTY EXAMPLES:

- Promoting sign-up for the County's CodeRED 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

CodeRED®

Ready

Mitigation Preparedness & Response Support

TRAVERSE 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.
- Be prepared for future flood events with flood fight plans and equipment.

Questions / Comments?

Next Steps

Fall-Winter 2021

Planning Team Meeting #2 and Public Review & Comment Period

- Following Planning Team Mtg. #2, disseminate & document news release by county and jurisdictions.
- Conduct public review & comment period (stakeholder & public review of draft plan).
- Document and incorporate feedback into the plan as appropriate.

Next Steps

Winter 2021 - Spring 2022

Draft Plan Submission to HSEM & FEMA, Plan Approval, and Collection of Adopting Resolutions

- Draft plan will be submitted first to HSEM and then to FEMA for approval for meeting all Federal requirements.
- Typically requires 1-2 months.
- APA letter
- EM coordination of adopting resolutions

Questions?

What questions do you have for U-Spatial@UMD about the draft MHMP or next steps ?

Contact Information

Stacey Stark, MS, GISP
U-Spatial@UMD
slstark@d.umn.edu
218-726-7438

Bonnie Hundrieser, HM Planner
Hundrieser Consulting LLC
hundrieserconsulting@outlook.com
218-343-3468

U-SPATIAL
University of Minnesota Duluth
Driven to Discover

HUNDRIESER CONSULTING LLC

Mitigation Strategies & Action Types

Following are the five types of mitigation strategies that will be used in the update of the Multi-Hazard Mitigation Plan with examples of related mitigation actions. Minnesota HSEM recommends the use of these mitigation strategies to be in alignment with the State plan and those recommended by FEMA. The first four strategies listed are taken from the FEMA publications *Local Mitigation Planning Handbook* (2013) and *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* (2013). The fifth strategy type was determined by Minnesota HSEM for use within the state.

These strategies will provide the framework for identification of new jurisdictional-level mitigation actions for implementation over the next 5-year planning cycle.

Mitigation Strategy	Description	Example Mitigation Actions
Local Planning and Regulations	These actions include government authorities, policies, or codes that influence the way land and buildings are developed and built.	• Comprehensive plans • Land use ordinances • Planning and zoning • Building codes and enforcement • Floodplain ordinances • NFIP Community Rating System • Capital improvement programs • Open space preservation • Shoreline codes • Stormwater management regulations and master plans • Mobile home park compliance for storm shelters
Structure and Infrastructure Projects	These actions involve modifying existing structures and infrastructure to protect them from a hazard or remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves projects to construct manmade structures to reduce the impact of hazards.	• Property Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits (i.e., metal roofs) • Floodwalls and retaining walls • Detention and retention structures • Culvert Installation/Modification • Roads & Bridge risk reduction • Safe Room (New construction or facility retrofit) • Green Infrastructure Methods *Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.*

Mitigation Strategy	Description	Example Mitigation Actions
Natural Systems Protection	These are actions that minimize damage and losses and also preserve or restore the functions of natural systems.	• Soil stabilization for sediment and erosion control • Floodplain and Stream corridor restoration • Slope management • Forest management (defensible space, fuels reduction, sprinkler systems) • Conservation easements • Wetland restoration and preservation • Aquifer Storage & Recovery • Flood Diversion and Storage *Many of these types of actions are projects eligible for funding through FEMA HMA grant programs.*
Education and Awareness Programs	These are actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. These actions may also include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions that support life safety and lessen property damage.	• Radio or television spots • Websites with maps and information • Social media outreach • Promotion of sign-up for emergency warnings • Real estate disclosure • Promotion of NFIP insurance to property owners • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas. • NWS StormReady Program • Firewise Communities *Some of these types of actions may be projects eligible for funding through the FEMA HMA "5 Percent Initiative Program".*
Mitigation Preparedness and Response Support	This is a State of Minnesota mitigation strategy with the intent of covering emergency preparedness actions that protect life and property prior to, during, and immediately after a disaster or hazard event. These activities are typically not considered mitigation, but support reduction of the effects of damaging events.	• Emergency Operations Plan • Flood fight plans and preparedness measures • Dam emergency action plans • Emergency Warning Systems (i.e., CodeRed, warning sirens) • Generator backup power • NWS Storm Spotter Training • Training and education for local elected officials and key partners.

Appendix G – Public Outreach & Engagement Documentation

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

Overview: On July 24, 2020, Traverse 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. Traverse 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 Traverse 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 Traverse County website, Traverse County Emergency Management Facebook page, and local newspapers (Valley News and Wheaton Gazette). Cities and townships were encouraged to help share the news release locally by posting it on their websites, social media, or community bulletin boards.

Public Input & Incorporation:
Following is a record of public responses to the news release and how their input will be incorporated into the plan update, and if not relevant to be addressed, why.

> **No Public Input Received:** Traverse County Emergency Management did not receive any public input following News Release #1.

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

From:	Lynn Siegel
To:	Lisa Zahl; Trevor Wright; Chad Gillespie; Sara Gronfeld-NACD; Dianne Reinart; oleson; Shawn Shay; Dustin Kindelberger; Tom Monson; "Dave Salberg"; Kevin Leininger; Mark Gail; Todd Johnson (wingnfin@prtel.com); jodi.hook@prtel.com; michealjjheck@gmail.com; Gail thiel; cityoftintah@gmail.com; cityhall cityofwheaton.com; Kma_dumont@hotmail.com; dealkevin@gmail.com; philipjbrink@gmail.com; sfridgen@gmail.com; maryandtompeyton@hotmail.com; rmtritzie@fedtel.net; delane anderson; "chaddberger@yahoo.com"; "david bauer"; ndholtz54@gmail.com; steved@runestone.net; conroyjb@westtechwb.com; Brandon_s72@hotmail.com; Falk,Chelsie; Rowland,Lee; bdswd@runestone.net; Daniel Posthumus (dposthumus@wheaton.k12.mn.us); jeff.scholten@usda.gov; thrdlicka@ptpco.com; jjanorschke@traverseelectric.com
Cc:	Bonnie K Hundrieser
Subject:	Hazard Mitigation Plan
Date:	Friday, July 24, 2020 8:55:05 AM
Attachments:	HMP News Release.doc

Greetings,

Traverse County Emergency Management is commencing work on the update of the Traverse 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 Traverse County MHMP update.

If you have any questions, please let me know.

Thank you,

Lynn Siegel
Traverse County Emergency Manager
708 3rd Ave N
Wheaton Mn 56296
lynn.siegel@co.traverse.mn.us
320-563-0872

From:	Lynn Siegel
To:	Bonnie K Hundrieser
Subject:	FW: Hazard Mitigation Plan
Date:	Monday, July 27, 2020 11:13:09 AM
Attachments:	HMP News Release.doc

I forgot to cc you on this email

Lynn Siegel
Traverse County Emergency Manager
708 3rd Ave N
Wheaton Mn 56296
lynn.siegel@co.traverse.mn.us
320-563-0872

From: Lynn Siegel
Sent: Monday, July 27, 2020 11:13 AM
To: Tina Lindquist <tina.lindquist@co.grant.mn.us>; Breanna Koval <BKoval@co.wilkin.mn.us>; Dona Greiner (donagreiner@co.stevens.mn.us) <donagreiner@co.stevens.mn.us>; 'Dona Greiner' <Dona.Greiner@BigStoneCounty.org>
Subject: Hazard Mitigation Plan

Greetings,

Traverse County Emergency Management is commencing work on the update of the Traverse 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 Traverse County MHMP update.

If you have any questions, please let me know.

Thank you,

Lynn Siegel
Traverse County Emergency Manager
708 3rd Ave N
Wheaton Mn 56296
lynn.siegel@co.traverse.mn.us
320-563-0872

Traverse County Emergency Management

Lynn Siegel, EMD
PO Box 485
708 3rd Ave N
Wheaton, MN 56296
lynn.siegel@co.traverse.mn.us
Phone: 320-563-0872
Fax: 320-563-8734

TRAVERSE COUNTY NEWS RELEASE
July 24, 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 Traverse 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 Traverse 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 Traverse County MHMP is a multi-jurisdictional plan that covers Traverse County, including the cities of Browns Valley, Dumont, Tintah, and Wheaton. The Traverse 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 Lynn Siegel, Traverse County Emergency Management Director. "Understanding the natural hazards that can cause serious impact to our communities and taking action to reduce or eliminate the impact of future disasters makes us more resilient. Hazard mitigation helps us to break the cycle of damage and repair caused by things like flooding, ice storms, and severe wind events that can damage property, stress economies, and threaten life safety in our county."

Examples of hazard mitigation include actions include improvement of roads and culverts that experience repetitive flooding; construction of safe rooms at campgrounds, public parks, mobile home parks or schools to protect lives in the event of tornados or severe wind events; burying powerlines that may fail due to heavy snow, ice or wind storms; ensuring timely emergency communication to the public through warning sirens and mass notification systems, and conducting public awareness and education campaigns to help people to be prepared to take safe action before, during, or following a hazard event. Some mitigation activities may be eligible for future FEMA Hazard Mitigation Assistance grant funding.

As part of the planning process, Traverse 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 Traverse 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

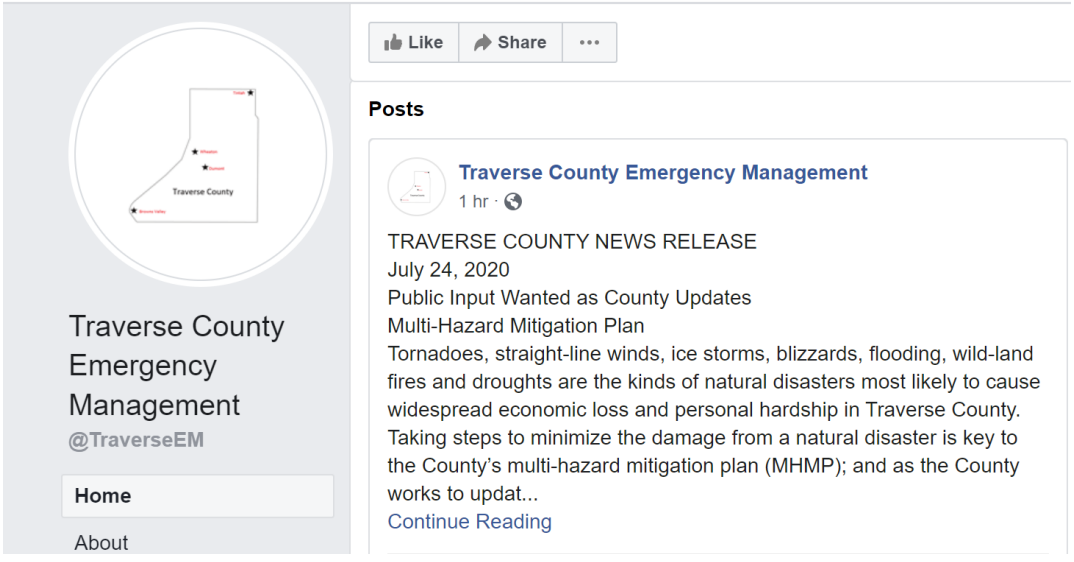
Lynn Siegel
Traverse County Emergency Management Director
Phone: 320-563-0872
Email: lynn.siegel@co.traverse.mn.us

Traverse County MHMP News Release #1
Documentation of News Release Postings

COUNTY POSTINGS

Traverse County
County Website, July 28, 2020

Traverse County
Emergency Management Facebook Page, July 24, 2020



LOCAL MEDIA POSTINGS

The Wheaton Gazette, July 28, 2020

THE WHEATON GAZETTE
Tuesday, July 28, 2020

Money out of lemons

Kiera Lundquist recently donated $58 to the Wheaton Food Shelf that she raised from a lemonade stand. Lundquist is pictured above (at left) making the donation with her younger brother Leo to Wheaton Food Shelf Coordinator Dawn Krumm.

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 Traverse 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 Traverse 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 Traverse County MHMP is a multi-jurisdictional plan that covers Traverse County, including the cities of Browns Valley, Dumont, Tintah, and Wheaton. The Traverse 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 Lynn Siegel, Traverse County Emergency Management Director. "Understanding the natural hazards that can cause serious impact to our communities and taking action to reduce or eliminate the impact of future disasters makes us more resilient. Hazard mitigation helps us to break the cycle of damage and repair caused by things like flooding, ice storms, and severe wind events that can damage property, stress economies, and threaten life safety in our county."

Examples of hazard mitigation include actions include improvement of roads and culverts that experience repetitive flooding; construction of safe rooms at campgrounds, public parks, mobile home parks or schools to protect lives in the event of tornados or severe wind events; burying powerlines that may fail due to heavy snow, ice or wind storms; ensuring timely emergency communication to the public through warning sirens and mass notification systems, and conducting public awareness and education campaigns to help people to be prepared to take safe action before, during, or following a hazard event. Some mitigation activities may be eligible for future FEMA Hazard Mitigation Assistance grant funding.

As part of the planning process, Traverse 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 Traverse 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.

Valley News, July 28, 2020

Valley News

Issue No. 50 — Tuesday, July 28, 2020 — 86¢

What is the story behind the "Bull"?

The Browns Valley Historical Society is asking for your help in trying to obtain information about the history of these bull figurines. If any one has such information, they are asked to contact Richard Johnson at 320-305-1031 or email johnsonr8203@arvig.com. The Historical Society would like to thank the Browns Valley community for your help.

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 Traverse 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 Traverse 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 Traverse County MHMP is a multi-jurisdictional plan that covers Traverse County, including the cities of Browns Valley, Dumont, Tintah, and Wheaton. The Traverse 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 Lynn Siegel, Traverse County Emergency Management Director. "Understanding the natural hazards that can cause serious impact to our communities and taking action to reduce or eliminate the impact of future disasters makes us more resilient. Hazard mitigation helps us to break the cycle of damage and repair caused by things like flooding, ice storms, and severe wind events that can damage property, stress economies, and threaten life safety in our county."

Examples of hazard mitigation include actions include improvement of roads and culverts that experience repetitive flooding; construction of safe rooms at campgrounds, public parks, mobile home parks or schools to protect lives in the event of tornados or severe wind events; burying powerlines that may fail due to heavy snow, ice or wind storms; ensuring timely emergency communication to the public through warning sirens and mass notification systems, and conducting public awareness and education campaigns to help people to be prepared to take safe action before, during, or following a hazard event. Some mitigation activities may be eligible for future FEMA Hazard Mitigation Assistance grant funding.

As part of the planning process, Traverse County is seeking feedback from residents and businesses from across the County to incorporate into the plan:

Continued on Page 4

Browns Valley farm family heard on national radio program

A Browns Valley-area family has given the world some insight into how farmers are coping with the COVID-19 pandemic.

Anne and Peter Schwagerl were featured on the National Public Radio program Marketplace. The 4-minute long segment, part of the "My Economy" series aired the first time the evening of July 9, and is now archived on the program's website.

"I've gotten a few e-mails from people all over the country," Anne said. "They are reaching out to show the gratitude for the work we do as farmers."

Marketplace is a program about business and the economy. It is actually produced and distributed by American Public Media, which has a base in Minnesota.

Anne said earlier this year she was working with the program for a segment about farming in a changing climate. The family operates Prairie Point Farm, an organic grain farm operation.

But just about the time that story was ready for production, COVID-19 emerged and dramatically changed focus of the news. While the climate change segment was shelved for the time being, Marketplace producers reached out again and found an area of interest to its listeners.

How does a farm family deal with having two small children at home during the pandemic when the schools are closed? The couple's two children are a 6-year-old and 4-year-old boy. The Schwagerls pulled their son out of daycare when the pandemic started as a precaution.

Fortunately, the planting season in April was favorable in Big Stone County (where their land is located), so Anne and Peter were able to switch off between planting and helping their daughter with distance learning.

The biggest question now is the status of schools this fall. Minnesota families should find out next week how the state Department of Education plans to handle the reopening of schools.

The situation for Browns Valley Schools is even more complicated because of its relationship with the Sisseton Schools in South Dakota, which will have a different schedule and rules than Minnesota.

"It feels like there is no good answer," Anne said. "I desperately want my kids to be safe. (But) I want to be at work again."

As for this year's crops, Anne said they planned to start combining rye last Friday. The harvest of oats and barley will follow in the coming weeks.

If Marketplace shows an interest, she'd report back. "If they'd contact me, I'd love to follow up and chat with them again," Anne said.

The program airs on Minnesota Public Radio stations at 6 p.m. on Monday through Fridays.

CITY POSTINGS

City of Browns Valley
City Facebook Page, July 28, 2020

City of Browns Valley
17 hrs

Traverse County Emergency Management

Lynn Siegel, EMD
PO Box 485
708 3rd Ave N
Wheaton, MN 56296
lynn.siegel@co.traverse.mn.us
Phone: 320-563-0872
Fax: 320-563-8734

TRAVERSE COUNTY NEWS RELEASE
July 24, 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 Traverse 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 Traverse 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 Traverse County MHMP is a multi-jurisdictional plan that covers Traverse County, including the cities of Browns Valley, Dumont, Tintah, and Wheaton. The Traverse 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 Lynn Siegel, Traverse County Emergency Management Director. "Understanding the natural hazards that can cause serious impact to our communities and taking action to reduce or eliminate the impact of future disasters makes us more resilient. Hazard mitigation helps us to break the cycle of damage and repair caused by things like flooding, ice storms, and severe wind events that can damage property, stress economies, and threaten life safety in our county."

Examples of hazard mitigation include actions include improvement of roads and culverts that experience repetitive flooding; construction of safe rooms at campgrounds, public parks, mobile home parks or schools to protect lives in the event of tornados or severe wind events; burying powerlines that may fail due to heavy snow, ice or wind storms; ensuring timely emergency communication to the public through warning sirens and mass notification systems, and conducting public awareness and education campaigns to help people to be prepared to take safe action before, during, or following a hazard event. Some mitigation activities may be eligible for future FEMA Hazard Mitigation Assistance grant funding.

As part of the planning process, Traverse 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?**

City of Dumont
City Facebook Page, July 24, 2020

City of Dumont
July 24 at 11:11 AM ·

Traverse County Emergency Management
Lynn Siegel, EMD
PO Box 485 lynn.siegel@co.traverse.mn.us
708 3rd Ave N Phone: 320-563-0872
Wheaton, MN 56296 Fax: 320-563-8734

TRAVERSE COUNTY NEWS RELEASE
July 24, 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 Traverse 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 Traverse 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 Traverse County MHMP is a multi-jurisdictional plan that covers Traverse County, including the cities of Browns Valley, Dumont, Tintah, and Wheaton. The Traverse 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 Lynn Siegel, Traverse County Emergency Management Director. "Understanding the natural hazards that can cause serious impact to our communities and taking action to reduce or eliminate the impact of future disasters makes us more resilient. Hazard mitigation helps us to break the cycle of damage and repair caused by things like flooding, ice storms, and severe wind events that can damage property, stress economies, and threaten life safety in our county."

Examples of hazard mitigation include actions include improvement of roads and culverts that experience repetitive flooding; construction of safe rooms

City of Tintah
City Hall Bulletin Board, July 28, 2020
(The city was not able to provide a photo.)

City of Wheaton
City Facebook Page, July 29, 2020

Cityof Wheaton
48m ·

Traverse County Emergency Management

Lynn Siegel, EMD

PO Box 485 lynn.siegel@co.traverse.mn.us

708 3rd Ave N Phone: 320-563-0872

Wheaton, MN 56296 Fax: 320-563-8734

TRAVERSE COUNTY NEWS RELEASE

July 24, 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 Traverse 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 Traverse 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

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

Overview: On January 14, 2022, 2021 Traverse County Emergency Management put out a news release titled **"Public Comment Sought for County's Multi-Hazard Mitigation Plan"** to announce the completion of the draft Traverse County Multi-Hazard Mitigation Plan and invitation for public review and comment. The news release informed jurisdictional stakeholders and the public that a copy of the draft plan and a form for public feedback was available online with a website link. The public review period for the draft plan was open from January 14 to January 27, 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 Traverse 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 Traverse County news release and how the input will be incorporated into the plan update, and if not relevant to be addressed, why.

- No public input was received by Traverse County Emergency Management, local jurisdictions, or via the online comment form.

From:	Lynn Siegel
To:	Lisa Zahl; Trevor Wright; Chad Gillespie; Sara Gronfeld-NACD; Dianne Reinart; oleson; Shawn Shay; Dustin Kindelberger; Tom Monson; "Dave Salberg"; "Kevin Leininger"; Mark Gail; "Todd Johnson (wingnfin@prtel.com)"; "jodi.hook@prtel.com"; "michealjjheck@gmail.com"; "Gail thiel"; "cityoftintah@gmail.com"; "cityhall cityofwheaton.com"; "Kma_dumont@hotmail.com"; "dealkevin@gmail.com"; "philipjbrink@gmail.com"; "sfridgen@gmail.com"; "maryandtompeyton@hotmail.com"; "rmtritzie@fedtel.net"; "delane anderson"; "chaddberger@yahoo.com"; "david bauer"; "ndholtz54@gmail.com"; "steved@runestone.net"; "conroyjb@westtechwb.com"; "Brandon_s72@hotmail.com"; "Falk,Chelsie"; "Rowland,Lee"; "bdswd@runestone.net"; "Daniel Posthumus (dposthumus@wheaton.k12.mn.us)"; "jeff.scholten@usda.gov"; "thrdlicka@ptpco.com"; "jjanorschke@traverseelectric.com"; "Dona Greiner (donagreiner@co.stevens.mn.us)"; "Tina Lindquist"; "Breanna Koval"; "Dona Greiner"; "Karen Lupkes"; Janelle Tritz
Cc:	"Bonnie K Hundrieser"
Subject:	Traverse County News Release – Multi-Hazard Mitigation Plan Update Public Review
Date:	Thursday, January 13, 2022 3:52:51 PM
Attachments:	Traverse County MHMP News Release Public Review 1-14-22.pdf Traverse County MHMP News Release Public Review 1-14-22.docx

Greetings,

The draft Traverse County Multi-Hazard Mitigation Plan is ready for public review and comment from **January 14 – January 27**. Please see the attached news release.

You are receiving this email because you are included on the Traverse County Multi-Hazard Mitigation Plan jurisdictional contact list. All recipients of this email are encouraged to review the plan and provide any comments. The link for the plan review website is https://z.umn.edu/traverse_hmp.

Traverse County Emergency Management requests that the cities of Browns Valley, Dumont, Tintah, and Wheaton post the news release and provide documentation of your posting. Your jurisdictional participation is something that will be looked for by FEMA. You can post the news release to your city website or Facebook page and provide a link to me and/or post the news release in a public location (i.e., community bulletin board, City Hall window, Post Office) and email me a photograph noting the location of the posting. Townships and other agency stakeholders are also encouraged to post the news release with the public.

There is only a 14-day open review period, so your timeliness to post is very important.

If you have any questions or comments, please let me know.

Lynn Siegel
Traverse County Emergency Manager
708 3rd Ave N
Wheaton MN 56296
Office: 320-563-0872
Lynn.siegel@co.traverse.mn.us

Traverse County Emergency Management

Lynn Siegel, EMD
PO Box 485
708 3rd Ave N
Wheaton, MN 56296

lynn.siegel@co.traverse.mn.us
Phone: 320-563-0872
Fax: 320-563-8734

TRAVERSE COUNTY NEWS RELEASE

January 14, 2022

Public Comment Sought for County's Multi-Hazard Mitigation Plan

Traverse 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/traverse_hmp. The review and comment period is open through Thursday, January 27, 2022. After that, the county will submit the draft plan to the State of Minnesota and the Federal Emergency Management Agency (FEMA) for review.

The Traverse County MHMP is a multi-jurisdictional plan that covers Traverse County, including the cities of Browns Valley, Dumont, Tintah, and Wheaton. The Traverse County MHMP also incorporates the concerns and needs of townships, school districts, and other stakeholders participating in the plan.

Traverse 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 Traverse 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 Traverse 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.

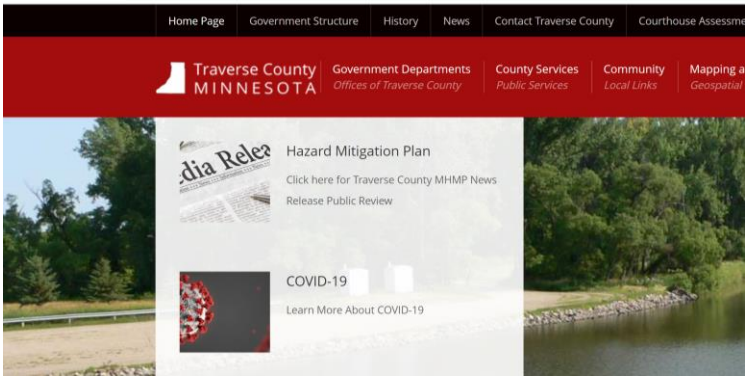
Community feedback is vital to the success of the plan. Traverse County invites public review and feedback of the draft plan prior to submitting it to the State of Minnesota and the Federal Emergency Management Agency (FEMA) for review. Feedback may be provided via the online comment form or directly to Traverse County Emergency Management.

Contact:
Lynn Siegel
Traverse County Emergency Management Director
Phone: 320-563-0872
Email: lynn.siegel@co.traverse.mn.us

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

COUNTY POSTINGS

Traverse County Website, 1/13/22



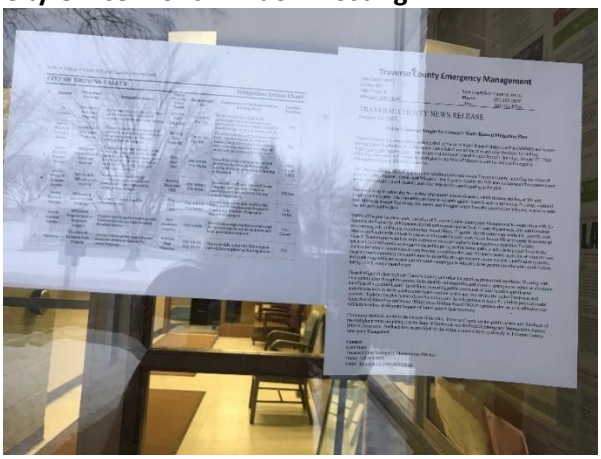
Traverse County Emergency Management Facebook Page, 1/13/22

LOCAL MEDIA POSTINGS

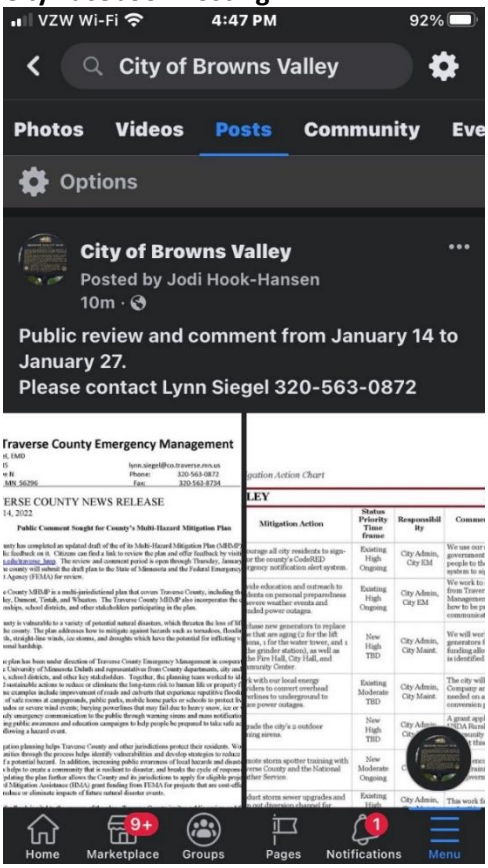
No local media postings.

CITY POSTINGS

City of Browns Valley, 1/13/22
City Office Front Window Posting



Browns Valley, 1/13/22
City Facebook Posting



City of Dumont
City of Tintah
City of Wheaton

Traverse County MHMP 2021
Online Public Review Website & Comment Form

Public Review Website

The Traverse 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.

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

Reviewer Information

- Name
- Email
- Job Title and Organization / Community Resident
- Jurisdiction you are representing

Questions

- After reviewing the mitigation actions for your jurisdiction, do you have any ideas for new ones to add? Please explain in as much detail as possible.

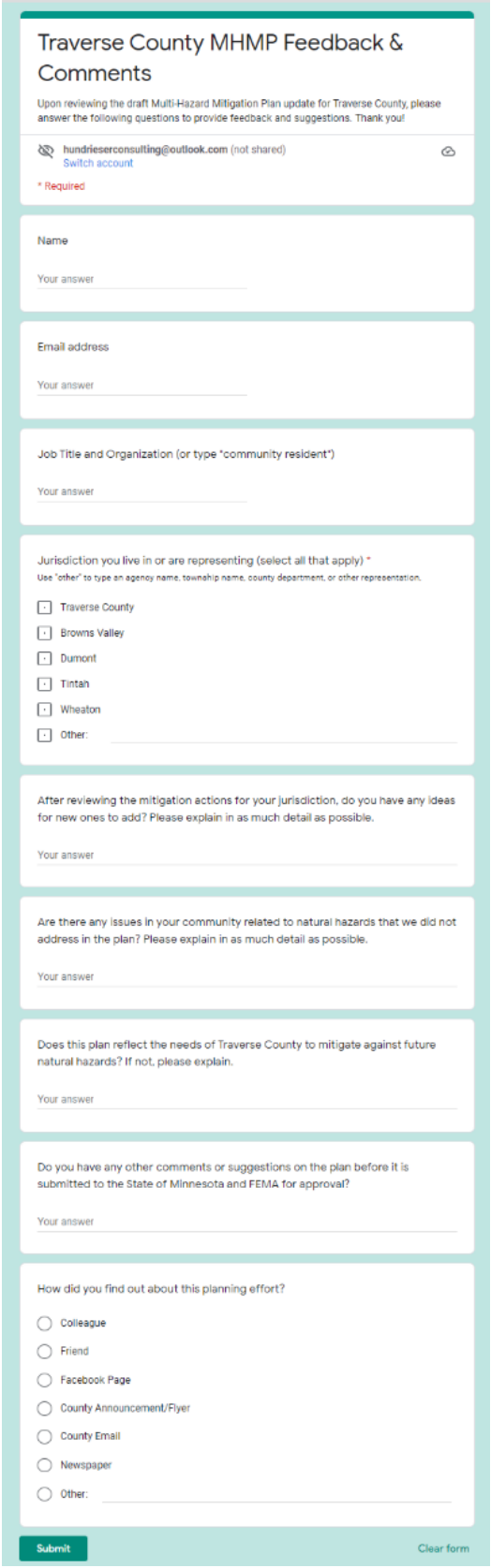
- Are there any issues in your community related to natural hazards that we did not address in the plan? Please explain in as much detail as possible.

- Does this plan reflect the needs of Traverse County to mitigate against future natural hazards? If not, please explain.

- Do you have any other comments or suggestions on the plan before it is submitted to the State of Minnesota and FEMA for approval?

- How did you find out about this planning effort?

    - Colleague
    - Friend
    - Facebook Page
    - County Announcement/Flyer
    - County Email
    - Newspaper
    - Other



Appendix H – Minnesota Department of Health Climate & Health Report

Planning for Climate & Health Impacts in West Central Minnesota

Emergency Management Considerations for HSEM Region 4

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.

Dust Bowl Drought (Library of Congress)

PUTTING CLIMATE CHANGE INTO CONTEXT

Sometimes, climate change and extreme weather events and the impact on our communities appear distant and abstract. That is why the Minnesota Department of Health's Minnesota Climate & Health Program teamed up with state and local emergency management and preparedness professionals as well as state climatologists to develop a custom climate profile for each of the six Homeland Security and Emergency Management (HSEM) regions across the state. Each regional profile includes a description of climate change trends along with a summary of climate projection data to illustrate these trends. Regional climate data are presented alongside population projection data, as it's important to consider both our climate future and population future as we plan to minimize risk and build resilience against climate impacts.

Additionally, each regional profile provides a local case study, a "focusing event," to illustrate the links between extreme weather and natural disasters and what climate projection data can (and cannot) signify for similar events in the future. Each case study features a recent natural disaster that impacted the HSEM region and provides a comparison between temperature and precipitation measures related to that event alongside historical baseline trends and future projection estimates. Taken together, the six HSEM regional profiles provide an extensive overview of climate change trends for Minnesota and describe the potential impact of these trends for emergency management and preparedness professionals and their partners.

FOR MORE INFORMATION

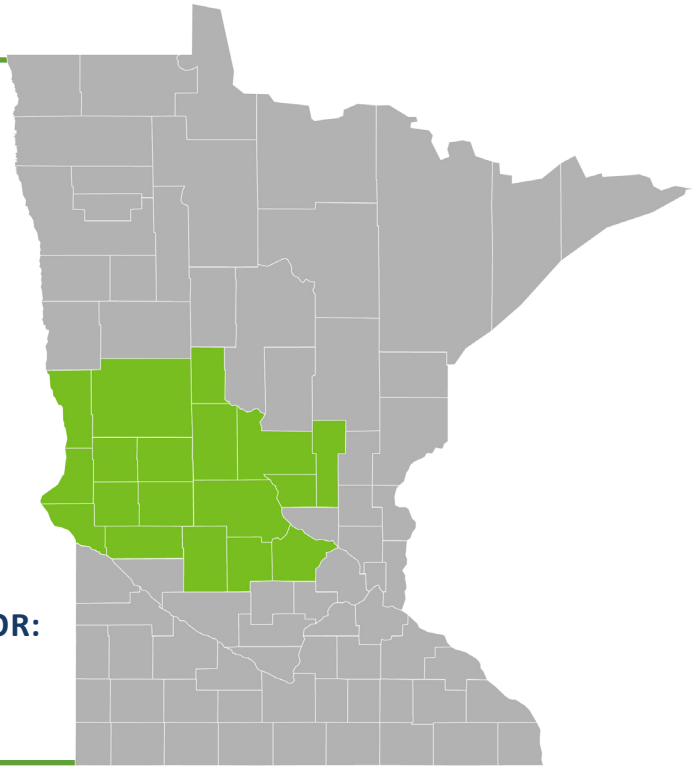
A long form report, including all six profiles, individual county data, and a more comprehensive description of climate change trends and supporting research will be available at:
Minnesota Climate & Health Planning Tools & Data
(www.health.state.mn.us/divs/climatechange/data.html)

REGION 4 OVERVIEW

REGION 4: West Central Minnesota

COUNTIES

- Benton
- Big Stone
- Douglas
- Grant
- Kandiyohi
- Meeker
- Mille Lacs
- Morrison
- Otter Tail
- Pope
- Stearns
- Stevens
- Swift
- Todd
- Traverse
- Wadena
- Wilkin
- Wright



HSEM REGIONAL PROGRAM COORDINATOR:

Jeanna Hayes
320-428-3184
jeanna.hayes@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 4 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 4:

Average Summer Maximum Temperature for HSEM Region 4		
1981-2010	2050-2075	Change
80.7 °F	88.3 °F	+7.6 °F

Average Winter Minimum Temperature for HSEM Region 4		
1981-2010	2050-2075	Change
4.5 °F	14.3 °F	+9.8 °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 4 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 4		
1981-2010	2050-2075	Change
3.9"	4.4"	+0.5"

Average Early Fall Precipitation for HSEM Region 4		
1981-2010	2050-2075	Change
2.5"	2.3"	-0.2"

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 4 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 4		
2015	2050	Change
124,242	111,006	-10.7%

Elder Population (65+) Projection Estimates for HSEM Region 4		
2015	2050	Change
105,835	164,173	+55.1%

REGION 4 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., drought and extreme heat) 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: DROUGHT & EXTREME HEAT **DATE: 1988**

The 1988 drought is considered one of the worst and most widespread droughts to hit the Midwest. Abnormally dry conditions started as early as late winter and conditions deteriorated through the spring. Dryness from April to June, compounded by soaring summer temperatures, placed significant stress on crops early in their growth cycle. By most measures, the summer of 1988 ranks as the hottest summer on record with 44 days of 90°F or above temperatures. As corn plants stop growing in temperatures above 90°F, crop loss was substantial. Maximum temperatures for May through July, when the drought peaked, were on average 8.0°F hotter than historical baseline values. June is normally the wettest month in Minnesota; however, precipitation levels for June in 1988 were (and still are) the lowest ever recorded for most of the state, as well as Region 4 counties. From April through July, the state as a whole averaged just 6.6 inches of precipitation.

REGION 4 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 damage associated with the 1988 drought and extreme heat is difficult to capture in a single cost estimate. Crop loss revenue alone was estimated at $1.2 billion.

The following are just a few examples of the adverse impacts on HSEM Region 4 communities and others from the 1988 drought and extreme heat:

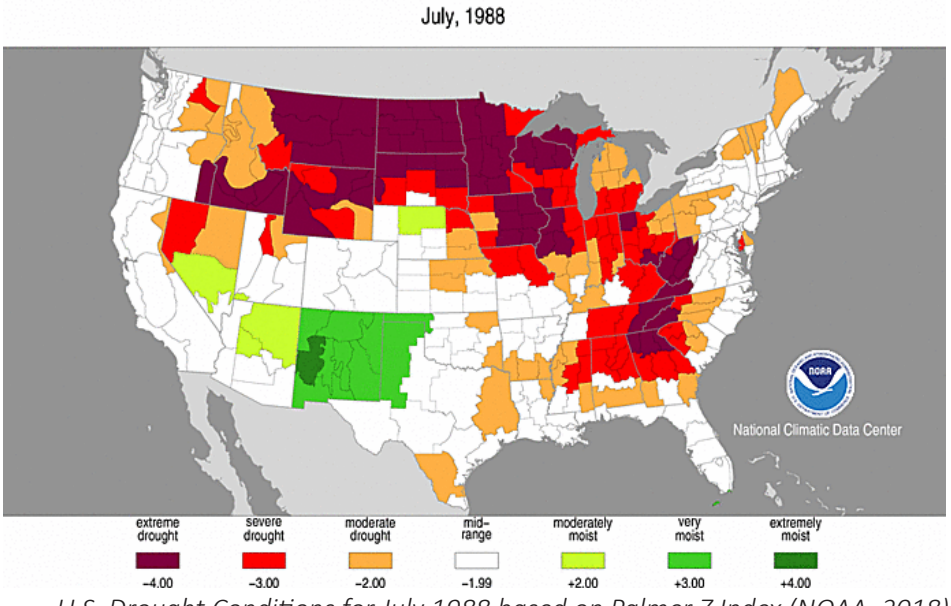
ECONOMIC LOSSES: The most devastating impacts of the drought were felt by the state's agriculture community with many farmers losing most, if not all, of their typical harvest. Other sectors, like the forest products industry, were also hit hard. Of 66,000 trees planted across the state from 1987-1988, 47% were adversely impacted. Eighty percent of the estimated 3.5 million Christmas trees planted in 1987-1988 were lost and many thousands of mature trees, costly to replace, in both forested and urban areas were lost due to lack of moisture.

POWER & TRANSPORTATION DISRUPTION: Due to issues of high water temperatures and reduced stream flow, cooling capacity was compromised at power plants. At least one power plant suffered periodic service disruptions, requiring external purchase of electrical power with the cost passed on to customers. Water levels dropped so low in areas along the Mississippi River that barge traffic was halted or reduced to one-way traffic.

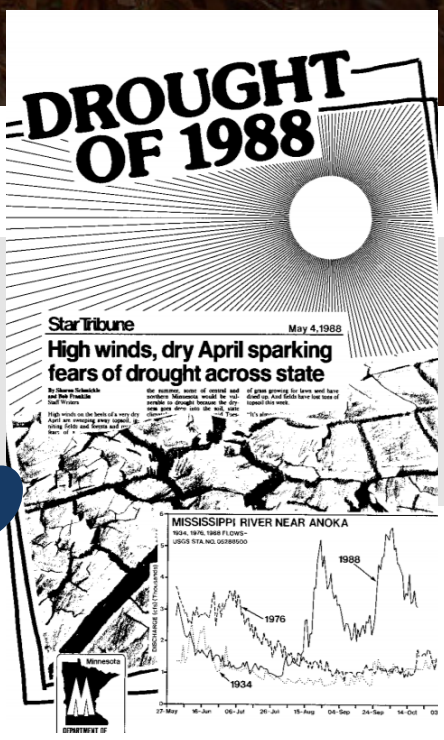
DIRECT HEALTH EFFECTS: Measures of solar radiation from April through July were 20% above average. Elevated levels of radiation can lead to acute and chronic effects on the skin, eyes, and immune system, including skin cancer and cataracts. Reports of stress and anxiety were widespread, particularly among farmers and others whose livelihoods are tied to agriculture.

STRICTER REGULATIONS: Surface water irrigation permits were suspended in 13 watersheds. Sprinkling bans went into effect for Minneapolis, St. Paul, and other communities across the state.

DEPLETED WELL WATER: Groundwater levels throughout the state reached new record lows. There were numerous reports of well interference when wells fail to produce adequate water. A community near St. Cloud had their wells go dry, and it was recommended that the community connect into the city's water supply system to ensure reliability of long-term source water.



U.S. Drought Conditions for July 1988 based on Palmer Z Index (NOAA, 2018)



The summer of 1988 ranks as the hottest summer on record with 44 days of 90°F or above temperatures.

Top: Corn plants in a drought-stricken farm field (Scott Olson, 2012)
Bottom left: Dry corn (MN Book Awards, 1988)
Bottom right: Drought of 1988 (Minnesota Department of Natural Resources, 1989)

CLIMATE PROJECTION DATA

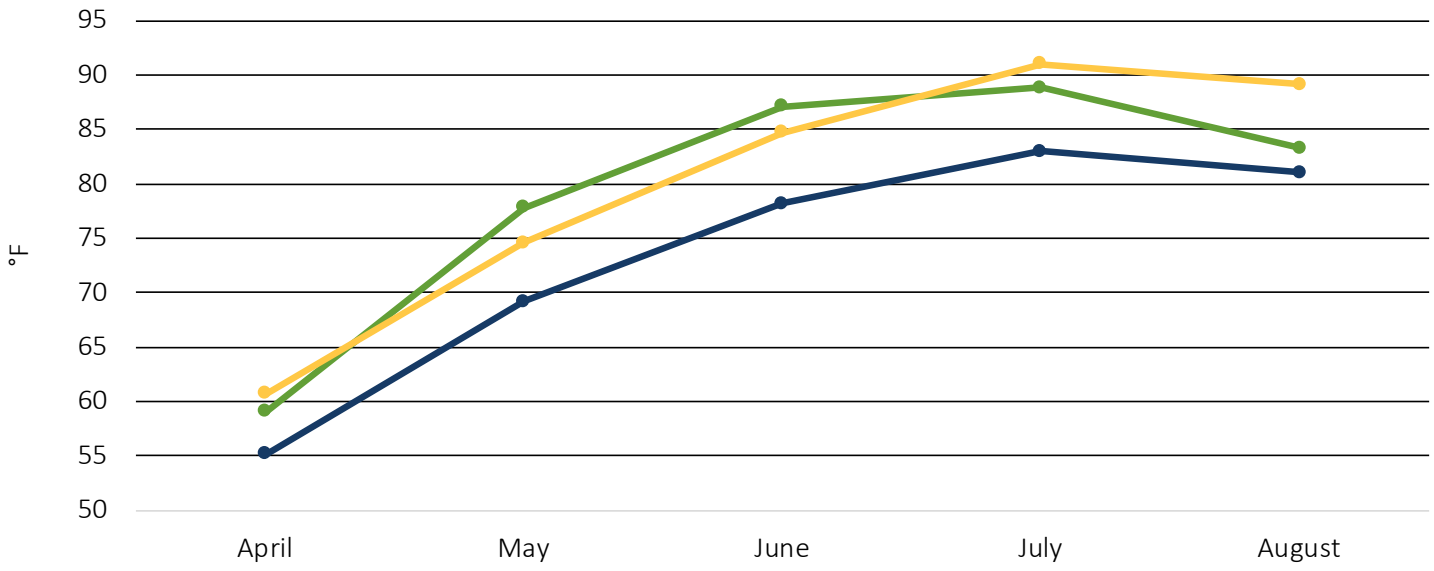
Following are visual representations of climate projection data for Region 4. Data for all counties included in Region 4 were averaged to derive regional estimates. (Data for individual counties are available in the long-form report.) The graphs below compare future temperature and precipitation projection data (in yellow) with a historical climate baseline (in blue) and climate measures from the regional case study event (in green). Because preceding conditions can influence a disaster event, data from April through July are provided to underscore the cumulative growth of peak drought.

LEGEND

- **Historical:** 1981- 2010
- **Case Study:** 1988 drought
- **Projected:** 2050- 2074

Maximum Temperature

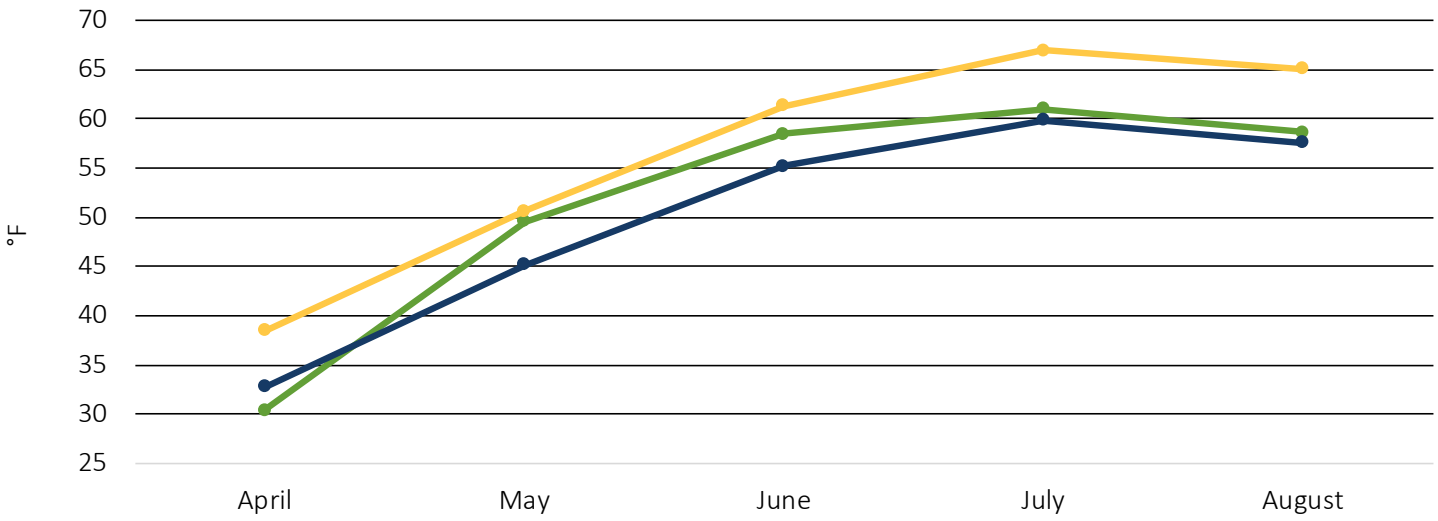
Trend comparison to 1988 drought and extreme heat data



	April	May	June	July	August
Historical	55.2	69.2	78.2	83.0	81.0
Case Study	59.1	77.8	87.1	88.8	83.3
Projected	60.7	74.6	84.7	91.0	89.1

Minimum Temperature

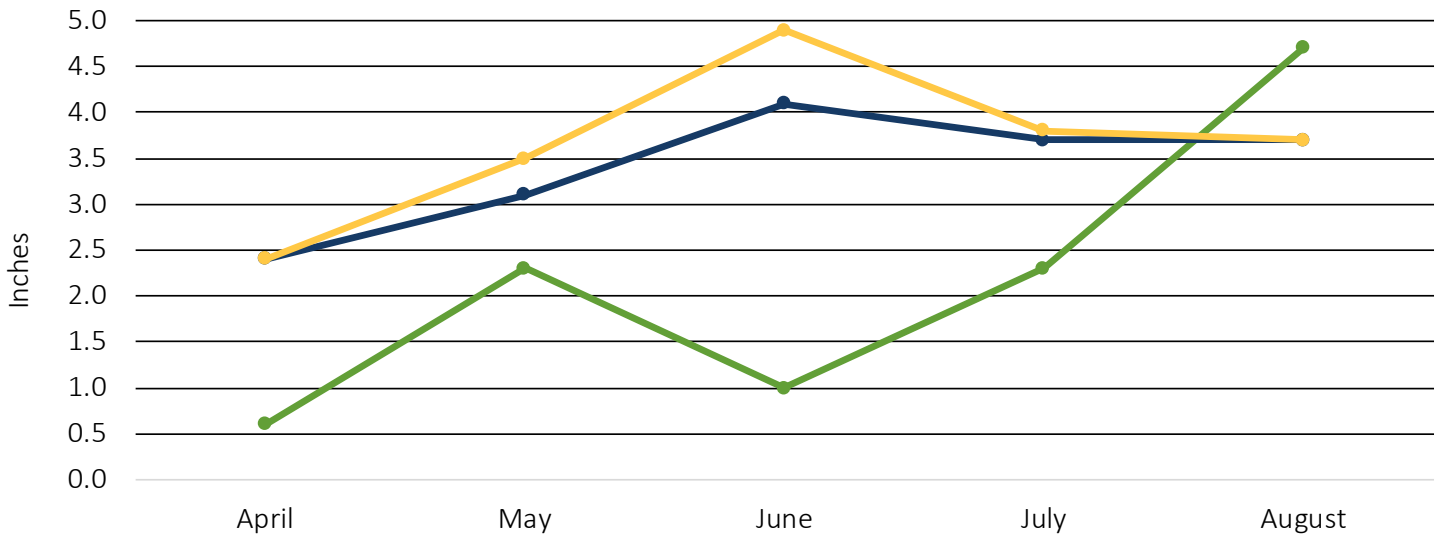
Trend comparison to 1988 drought and extreme heat data



	April	May	June	July	August
Historical	32.8	45.2	55.2	59.9	57.6
Case Study	30.4	49.6	58.5	61.0	58.6
Projected	38.5	50.6	61.3	67.0	65.1

Total Precipitation

Trend comparison to 1988 drought and extreme heat data



	April	May	June	July	August
Historical	2.4	3.1	4.1	3.7	3.7
Case Study	0.6	2.3	1.0	2.3	4.7
Projected	2.4	3.5	4.9	3.8	3.7

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 1988 drought/extreme heat disaster. While climate experts expect hotter, longer dry spells in the future, they also anticipate that these conditions will be punctuated with more frequent episodes of heavy rainfall. These combined too-wet and too-dry conditions were observed during the summer of 2012, when flood and drought disasters co-existed in Minnesota with diverse and dire consequences for impacted communities. Current climate projection data are available as monthly averages, which obscure potential extremes. Thus, it is important to track climate research and expert consensus on future climate trends in order to critically assess and apply projection data.

CLIMATE DATA IS A CRITICAL TOOL in planning for resilient communities into the future. Assessing threats from climate change and planning effective mitigation and response strategies is a key element for emergency managers and other planners to reduce future risk. It is crucial to understand the potential impacts of climate change and the associated priorities and vulnerabilities of communities, including population, the environment, critical infrastructure, and more. However, vulnerability is a nuanced concept and most effective as an indicator of risk when planners seek to understand and address vulnerability as close to the individual level as possible and in association with a specific hazard.

For example, in HSEM Region 4, population projections show a slight 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 evacuation is necessary. Considering the impacts of climate change to vulnerable populations is just one example of how to prioritize mitigation and response planning.

> *"Climate data is a critical tool in planning for resilient communities into the future."*

CLIMATE PROJECTION DATA continues to improve and should be considered as a priority to advance for Minnesota. Currently, global climate models that produce climate projection data for the Midwest are more accurate at simulating future temperature changes than they are for precipitation. However, the accuracy and resolution of these models are advancing rapidly as are their ability to model the future prevalence in short-duration, high-intensity localized heavy rainfall events.

Minnesota would benefit from a statewide high-quality climate projection dataset that is derived using the climate and environment features unique to our state, similar to datasets developed for other states. Meanwhile, data from national resources, like the U.S. Geological Survey (USGS) and National Oceanic and Atmospheric Administration (NOAA), can still provide a powerful input to regional scenario-planning efforts by allowing planners, managers, and analysts a means of "unpacking" general climate change predictions for the Midwest by looking at potential monthly fluctuations in coarse precipitation and temperature measures for Minnesota and its counties.

NEXT STEPS: MINIMIZE RISK & BUILD RESILIENCE

Prepare today for tomorrow's climate hazards. Emergency managers, planners, elected officials, and the public play a critical role in creating safe and healthy communities, especially in the face of extreme weather events. There are steps you can take to minimize local risk and build more resilient communities:

BRING EVERYONE TO THE TABLE: Build an inclusive yet nimble team to collectively identify climate hazards and potential impacts. Be sure to include members of the community; local department professionals responsible for built, natural, and health resources; planning commissioners; faith-based and cultural organizations; research centers; and commercial organizations. Including diverse perspectives throughout your process will help support more equitable planning efforts that best leverage cross-functional resources.

INCORPORATE CLIMATE INTO PLANNING: Incorporate climate projection data into planning efforts, such as exercise scenarios and long-range planning, to comprehensively identify future climate hazards and potential cascading effects. Explore how these interact with non-climate hazards in the community, such as aging infrastructure, to understand potential exposure to multiple threats and prioritize actions that build the community's capacity to respond.

CHAMPION CLIMATE & HEALTH: Be a champion for climate and health data. Seek opportunities to learn about these data and incorporate it in your work on an iterative basis. Support its application in professional networks and articulate the need to fund dynamically downscaled climate projection datasets for Minnesota. Climate data is a critical multi-discipline tool in proactively planning for resilient communities.

RESOURCES & REFERENCES

TOOLS & DATA

- Climate at a Glance: National Climatic Data Center, National Oceanic and Atmospheric Administration
  Source for all historical and much of the case study data presented in this profile.
  https://www.ncdc.noaa.gov/cag/
- Midwest Drought Monitor, United States Drought Monitor
  Source for historical and current drought conditions for the Midwest and other regions.
  http://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?Midwest
- Minnesota Climate and Health Profile Report (PDF), Minnesota Department of Health
  Profiles historic climate trends, future projections, and likely climate change impacts on the health of Minnesotans.
  http://www.health.state.mn.us/divs/climatechange/docs/mnprofile2015.pdf
- Minnesota Climate Change Vulnerability Assessment (PDF), Minnesota Department of Health
  Assesses five climate hazards and the populations that are most vulnerable to the hazards in Minnesota.
  http://www.health.state.mn.us/divs/climatechange/docs/mnclimvulnreport.pdf
- Minnesota Population Projection Data, Minnesota State Demographic Center
  Source for all population projection data presented in this profile.
  https://mn.gov/admin/demography/data-by-topic/population-data/our-projections/
- National Climate Change Viewer, United States Geological Survey
  Source for all climate projection data presented in this profile.
  https://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
- Drought in Minnesota, Minnesota Department of Natural Resources
  Comprehensive catalog of drought information.
  https://www.dnr.state.mn.us/climate/drought/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/
- Preparing for the Health Effects of Drought (PDF), Centers for Disease Control and Prevention
  A resource guide for including public health in drought preparedness and response.
  https://www.cdc.gov/nceh/hsb/cwh/docs/CDC_Drought_Resource_Guide-508.pdf
- 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/
- U.S. Drought Portal, National Integrated Drought Information System
  Source of data, research, and guidance related to understanding, preparing for, and responding to drought.
  https://www.drought.gov/drought/

REFERENCES

- Minnesota Department of Natural Resources, 1989. Drought of 1988 (PDF)
  https://files.dnr.state.mn.us/natural_resources/climate/summaries_and_publications/drought1988.pdf
- National Oceanic and Atmospheric Administration, 1988. The Drought of 1988 and Beyond (PDF)
  ftp://ftp.library.noaa.gov/noaa_documents.lib/OAR/CPO/drought_1988.pdf

Like our Facebook page
Minnesota Department of Health

Follow us on Twitter
@mnhealth

Follow us on Instagram
@mnhealth

Front cover photo: Effects of Drought on Corn (Bob Nichols, USDA)

Minnesota Department of Health
Climate & Health Program
health.climatechange@state.mn.us
651-201-4899
www.health.state.mn.us/divs/climatechange/

DEPARTMENT OF HEALTH

Appendix I – Critical Infrastructure

Appendix I
Traverse County Critical Infrastructures

Healthcare Facilities

Name	Address	City	Zip	Type
Browns Valley Health Center	114 Jefferson Street South	Browns Valley	56219	Nursing Home / Assisted Living
Traverse Care Center	303 Seventh Street	Wheaton	56296	Nursing Home / Assisted Living
Sanford Medical Center Wheaton	401 12th Street North	Wheaton	56296	Hospital
Browns Valley Clinic	404 West Broadway	Browns Valley	56219	Hospital

Emergency Services

Name	Address	City	Zip	Type
Browns Valley Ambulance Service	19 3rd Street South	Browns Valley	56219	Emergency Medical Service (Ems)
Traverse County Sheriffs Office - Browns Valley	19 3rd Street South	Browns Valley	56219	Law Enforcement Facility
Wheaton Police Department	203 7th Street North, Traverse County Law Enforcement Center	Wheaton	56296	Law Enforcement Facility
Dumont Fire Department	Main Street East	Dumont	56236	Fire Station
Browns Valley Fire Department	19 3rd Street South	Browns Valley	56219	Fire Station
Wheaton Fire Department	104 9th Street North	Wheaton	56296	Fire Station
Tintah Fire Department	207 Ash Ave	Tintah	56583	Fire Station
Traverse County Emergency Operations Center	702 2nd Avenue North	Wheaton	56296	Emergency Operations Center (EOC)
Traverse County Sheriffs Office / Traverse County Jail	203 7th Street North, Traverse County Law Enforcement Center	Wheaton	56296	Law Enforcement Facility

Schools & Shelters

Name	Address	City	Zip	Type
Wheaton Secondary	1700 3rd Ave S	Wheaton	56296	School
Browns Valley Elementary	118 Church St	Browns Valley	56219	School

Schools & Shelters

Name	Address	City	Zip	Type
Browns Valley Middle	118 Church St S	Browns Valley	56219	School
Browns Valley School	118 Church Street	Browns Valley	56219	Shelter
Pearson Elementary	710 4th Ave N	Wheaton	56296	School

Transportation

Name	Address	City	Zip	Type
Wheaton Muni	Box 868	Wheaton	56296	Airport

Utilities

Name	Address	City	Zip	Type
Wheaton Wastewater Treatment Plant	6706 660th Ave	Wheaton	56296	Wastewater
Wheaton Water Treatment Plant	6799 Highway 27 E	Wheaton	56296	Wastewater
Dumont Wastewater Treatment Plant		Dumont	56236	Wastewater
Dome Sub	East River Electric Power Cooperative			Electric
Wendell Sub	East River Electric Power Cooperative			Electric
Dumont Sub.	Otter Tail Power Company			Electric
Traverse Co. R.E.C. Subs	Otter Tail Power Company			Electric
Traverse REO Wheaton Sub	Otter Tail Power Company			Electric
Wheaton	Otter Tail Power Company			Electric

Hazardous Materials Facilities

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

Major Employers

Name
Willy’s Super Valu
Sanford Wheaton Medical Center
Traverse County
Wheaton Dumont Elevator
Traverse Electric
Traverse Care Center
Browns Valley Health Center
Kibble Equipment

State Bank of Wheaton
Star Bank Wheaton
Union State Bank Browns Valley
Bank of the West Wheaton
Tri County Coop Wheaton
Cenex Browns Valley
Whaley Excavating Wheaton

Appendix J – Mitigation Actions by Jurisdiction

CITY OF BROWNS VALLEY Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Time frame	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all city residents to sign-up for the county's CodeRED emergency notification alert system.	Existing High Ongoing	City Admin, City EM	We use our social media, local government channel, and we direct people to the Traverse County CodeRED system 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 work to share information we receive from Traverse County Emergency Management about severe weather and how to be prepared for it by using our communication means listed above.	City
3	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Purchase new generators to replace those that are aging (2 for the lift stations, 1 for the water tower, and 1 for the grinder station), as well as for the Fire Hall, City Hall, and Community Center.	New High TBD	City Admin, City Maint.	We will work on replacing our current generators for these facilities as city funding allows or other outside funding is identified.	City, Other (TBD)
4	Severe Winter & Summer Storms	Structure & Infrastructure Projects	Work with our local energy providers to convert overhead powerlines to underground to reduce power outages.	Existing Moderate TBD	City Admin, City Maint.	The city will work with Ottertail Power Company and Traverse Electric as needed on any future OH to UG line conversion projects.	Utilities
5	Severe Summer Storms	Structure & Infrastructure Projects	Upgrade the city's 2 outdoor warning sirens.	New High TBD	City Admin, City Maint.	A grant application may made to the USDA Rural Development Program's Community Facilities Program to support this project.	City, USDA
6	Severe Summer Storms	Mitigation Preparedness & Response Support	Promote storm spotter training with Traverse County and the National Weather Service.	New Moderate Ongoing	City Admin	We will encourage residents to take part in this training via our social media and local government channel.	City, County
7	Flooding	Structure & Infrastructure Projects	Conduct storm sewer upgrades and clean out diversion channel for better drainage.	Existing High Ongoing	City Admin, City Maint.	This work falls under City Maintenance and will be completed as funding allows.	City

CITY OF DUMONT Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Time frame	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all city residents to sign-up for the county's CodeRED emergency notification alert system.	Existing High Ongoing	City Admin, City EM	We use the city bulletin board, city of Dumont Facebook page, and we mail information out to residents with utility bills.	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 can work to share information we receive from Traverse County Emergency Management about severe weather awareness and how to be prepared. We can use our city bulletin board and Facebook page to post information.	City
3	Severe Summer Storms	Structure & Infrastructure Projects	Upgrade the city's outdoor warning siren.	New High TBD	City Admin	The city will work with Traverse County Emergency Management to determine what kind of upgrade is needed. A grant application may made to the USDA Rural Development Program's Community Facilities Program to support this project.	City, USDA

CITY OF TINTAH — Mitigation Action Chart

#	Hazard	Mitigation Strategy	Mitigation Action	Status Priority Time frame	Responsibility	Comments on Implementation & Integration	Possible Funding
1	All-Hazards	Education & Awareness Programs	Encourage all city residents to sign-up for the county's CodeRED emergency notification alert system.	New High Ongoing	City Admin, City EM	The city has not done anything with this to date. In the future we could post a flyer or make announcements at city council meetings to direct residents to go to the Traverse County website to sign up.	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	The city does not have a website or social media. We can share information we receive from Traverse County Emergency Management about severe weather and preparedness using city bulletin boards or announcements.	City
3	Severe Summer Storms	Structure & Infrastructure Projects	Upgrade the city's outdoor warning siren.	New High TBD	City EM	The city will work with Traverse County Emergency Management to determine what kind of upgrade is needed. A grant application may made to the USDA Rural Development Program's Community Facilities Program to support this project.	City, USDA
4	Severe Summer Storms	Structure & Infrastructure Projects	Address the need for construction of a storm shelter in the community.	New Moderate TBD	City EM	The city will work with Traverse County Emergency Management to evaluate the potential to construct some sort of storm shelter for those in the community that do not have a basement.	City, County
5	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Purchase a new generator for the city's well house.	New High TBD	City Admin	We will work with Traverse County Emergency Management for assistance in purchasing a generator for the well house so when the power goes out the city will still have water.	City
6	Flooding	Structure & Infrastructure Projects	Construct a sewer system to help when the water table is high so septic systems can keep up.	New Low TBD	City Admin	This is a major infrastructure project that the city has identified would be helpful, but implementing it is dependent upon significant funding.	City

CITY OF WHEATON 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 CodeRED emergency notification alert system.	Existing High Ongoing	City Admin, City EM	We encourage residents to sign up through our social media, newspaper, website, flyers at City Hall and Library, notice on back of monthly bills.	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 continues to share information we receive from Stevens County Emergency Management about severe weather awareness, training opportunities, and being prepared. We use our city website and city Facebook page.	City
3	Severe Winter & Summer Storms	Mitigation Preparedness & Response Support	Acquire permanent generators to power both our water treatment plant and our main sewer plant.	New High TBD	City Admin, City PW	We are working on our capital improvement plan to purchase generators in the future to power our facilities during power outages.	City