

# **Chippewa County**

Multi-Jurisdictional

## **All-Hazard Mitigation Plan**

**Adopted**  
**September 2015**



Upper Minnesota Valley  
**REGIONAL  
DEVELOPMENT  
COMMISSION**

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# Table of Contents

## ***Chapter One: Overview***

---

Definitions .....	1-1
Related Documents .....	1-3
The Planning Process .....	1-4
Overall Hazard Priority Levels (Summary) .....	1-9
Prioritized Strategies Overview (Natural).....	1-10
Prioritized Strategies Overview (Manmade/Technological).....	1-11

## ***Chapter Two: Community Profile***

---

Related Documents .....	2-1
General County Profile.....	2-1
Physical Characteristics .....	2-2
Climate and Precipitation .....	2-2
Geology and Topography .....	2-4
Soils .....	2-4
Land Use and Land Cover .....	2-4
Hydrology .....	2-8
Climate Change .....	2-13
Socioeconomic.....	2-15
Population Trends .....	2-15
Age and Sex Characteristics .....	2-19
Economic Synopsis .....	2-20
Community Infrastructure .....	2-24
Schools .....	2-24
Important Public Facilities .....	2-24
Transportation .....	2-25
Telecommunication and Power Facilities .....	2-28
Radio .....	2-28
Sewer and Water Systems .....	2-28
Emergency Response.....	2-29
Medical Facilities .....	2-29
Fire Services .....	2-30
Public Safety .....	2-31
Heavy Equipment Inventory.....	2-32
Property .....	2-32
Land Uses .....	2-32
Manufactured Homes Park .....	2-32
Current Codes .....	2-32

## ***Chapter Three: Hazard Inventory***

---

Natural Hazards – Presented by the Physical World .....	3-2
Violent Storms.....	3-2
Winter Storms.....	3-2
Summer Storms .....	3-5
Extreme Temperatures .....	3-11
Flooding .....	3-14
Erosion .....	3-21



Drought .....	3-22
Wildfire .....	3-24
Dam Failure .....	3-27
Technological Hazards – Presented by Man .....	3-31
Infectious Diseases .....	3-31
Fire .....	3-37
Hazardous Materials .....	3-39
Water Supply Contamination .....	3-44
Wastewater Treatment Facility Failure .....	3-46
Civil Disturbance / Terrorism .....	3-46
Public Assistance and Individual Assistance Grant Program in YMC .....	3-48

#### ***Chapter Four: Risk Assessment***

---

Overview .....	4-1
Prioritized Risk Assessment.....	4-1
Violent Storms and Extreme Temperatures .....	4-2
Floods .....	4-3
Drought .....	4-4
Wildfire .....	4-5
Dam Failure .....	4-6
Infectious Diseases .....	4-7
Fire .....	4-8
Hazardous Materials .....	4-9
Water Supply Contamination .....	4-10
Wastewater Treatment Facility Failure.....	4-11
Civil Disturbance / Terrorism.....	4-12
Overall Hazard Priority Level.....	4-13
Vulnerable Areas of Yellow Medicine County .....	4-14
Tornados.....	4-14
Floods .....	4-17
Hazus Flood Analysis .....	4-20
Wildfire.....	4-34
Dam Failures.....	4-36
Community-Based Risk Assessments.....	4-38
Clara City .....	4-40
Maynard .....	4-44
Milan .....	4-48
Montevideo .....	4-52
Watson.....	4-56

#### ***Chapter Five: Goals, Objectives, Strategies – Natural Hazards***

---

Overview .....	5-1
Definitions .....	5-1
General Mitigation Vision .....	5-1
Development of Strategies .....	5-2
HMGP-Funded Strategies .....	5-4
Completed Strategies – Natural and Manmade/Technological .....	5-5
Goals, Objectives and Mitigation Strategies .....	5-6
Violent Storms and Extreme Temperatures .....	5-6
Floods .....	5-9
Erosion .....	5-12
Drought .....	5-13

Wildfire .....	5-14
Dam Failure .....	5-16
National Flood Insurance Program Compliance .....	5-17
Repetitive Loss Structures .....	5-21
Prioritizing Strategies .....	5-22

## ***Chapter Six: Goals, Objectives, Strategies – Manmade / Technological Hazards***

---

Overview .....	6-1
Definitions .....	6-1
General Mitigation Vision .....	6-1
Development of Strategies .....	6-2
Completed Strategies – Manmade / Technological Strategies .....	6-3
Manmade / Technological Strategies – No Longer Relevant .....	6-4
Goals, Objectives and Mitigation Strategies .....	6-5
Infectious Diseases .....	6-5
Fire.....	6-6
Hazardous Materials .....	6-7
Water Supply Contamination .....	6-10
Wastewater Treatment Facility Failure.....	6-11
Civil Disturbance / Terrorism.....	6-12
Prioritizing Strategies .....	6-14

## ***Chapter Seven: Plan Maintenance & Implementation***

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Implementation & Maintenance .....	7-1
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## Appendices

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### Appendix 1: Additional Maps

Map A1.1:	State Overview
Map A1.2:	Chippewa County Civil Divisions
Map A1.3:	Chippewa County Land Cover
Map A1.4:	Chippewa County Hydrology & Drainage
Map A1.5:	Chippewa County Natural Features
Map A1.6:	Chippewa County Population by Census Block
Map A1.7:	Chippewa County Transportation System
Map A1.8:	Chippewa County Feedlot Locations

### Appendix 2: City Specific Objective and Strategies

Clara City .....	A2-1
Maynard .....	A2-3
Milan .....	A2-4
Montevideo .....	A2-5
Watson .....	A2-6

### Appendix 3: Solved Gaps and Deficiencies

### Appendix 4: Additional Hazard Information

### Appendix 5: Climatic Conditions for the 1997 Flood Event

### Appendix 6: Climatic Conditions for the 2001 Flood Event

### Appendix 7: Additional Information on 1997 and 2001 Flood Events

### Appendix 8: NOAA Weather Radio Broadcasts

### Appendix 9: Normal Annual Precipitation

### Appendix 10: Inventory of Hazardous Material Spills

### Appendix 11: City Surveys

### Appendix 12: Public Participation

### Appendix 13: County and City Plan Adoption

### Appendix 14: Resilience Report

### Appendix 15: Community Capability Checklist

## CHAPTER 1: OVERVIEW

### *DEFINITIONS*

#### **Hazard Mitigation**

Hazard mitigation is defined as any action taken to eliminate or reduce the long-term risk to human life and property from natural and technological hazards. Potential types of hazard mitigation measures include the following:

- Structural hazard control or protection projects
- Retrofitting of facilities
- Acquisition and relocation of structures
- Development of mitigation standards, regulations, policies, and programs
- Public awareness and education programs
- Development or improvement of warning systems

#### **Hazard Mitigation Plan**

Hazard mitigation planning can break the cycle of disaster-repair-disaster within a community and prepare it for a more sustainable future. The Development and application of long-term strategies that reduce or alleviate loss of life, injuries and property damage or destruction resulting from natural or human caused hazards accomplish the goals of hazard mitigation planning. These long-term strategies must incorporate a range of community resources including planning, policies, programs and other activities that can make a community more resistant to disaster. Mitigation planning efforts should both protect people and structures and minimize costs of disaster response and recovery. Mitigation is the cornerstone for emergency management and is a method for decreasing demand on scarce and valuable disaster response resources.

#### **Disaster Mitigation Act of 2000**

As a result of the Disaster Mitigation Act of 2000, the Federal Emergency Management Agency (FEMA) requires jurisdictions to first have in place a multi-hazard mitigation plan, in order to be eligible for Hazard Mitigation Grant Program (HMGP) funds. Effective November 1, 2004, jurisdictions must update their plan within five years. FEMA has provided states with funding to assist local governments in funding these plans.

The Disaster Mitigation Act of 2000 amended the Stafford Act (42 U.S.C. 5121 et seq.), which established a national program for pre-disaster mitigation. The program is meant to control Federal costs of disaster assistance and streamline the administration of disaster relief.

#### **Hazard**

A hazard is something that is potentially dangerous or harmful and is often the root cause of an unwanted outcome.

## *HAZARD MITIGATION*

### **Goal**

The goal of hazard mitigation is to eliminate and reduce vulnerability to significant<sup>1</sup> damage and/or repetitive damage from one or more hazards.

### **Benefits**

The benefits of hazard mitigation include the following:

- Saving lives, protecting public health, reducing injuries
- Preventing or reducing property damage
- Lessen economic losses
- Minimizing social dislocation and stress
- Decreasing agricultural losses
- Maintaining critical facilities in functioning order
- Protecting infrastructure from damage
- Protecting mental health
- Reducing legal liability of government and public officials

### **Process**

The process of hazard mitigation involves numerous steps, including:

- Identification and screening of major hazards
- Analysis of the risks posed by those hazards
- Review of existing capabilities and resources
- Development, implementation, and maintenance of specific hazard mitigation measures

Although most mitigation measures are implemented on a continual basis, the post-disaster period often presents special hazard mitigation opportunities. Mitigation opportunities are often more apparent immediately following a disaster making both public officials and the general public more willing to consider taking mitigation actions and proactive in seeking special funding to assist implementation efforts.

Several post-disaster mitigation activities are "automatically" implemented in the event of a Presidential Disaster Declaration. One of the state's most notable activities involves the activation of the Minnesota Recovers Disaster Task Force. The task force is comprised of both state and federal agencies<sup>2</sup>, and is chaired by the Department of Homeland Security and Emergency Management. In the event of a Presidential Disaster Declaration, all or part of the task force is activated and normally meets on a weekly or monthly basis. The meetings facilitate a coordinated and timely distribution of state/federal post-disaster recovery/mitigation funds by

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<sup>1</sup> Defined as damage greater than 50% from one event.

<sup>2</sup>The state and federal agencies requested to provide a representative for the Minnesota Recovers Disaster Task Force will generally include those that typically provide personnel to serve on an Interagency Hazard Mitigation Team/Hazard Mitigation Survey Team and/or a damage survey team. These members include Minnesota Department of Public Safety's Division of Emergency Management, FEMA, Department of Natural Resources, Department of Trade and Economic Development, Housing Finance Agency, Pollution Control Agency, and the state Historic Preservation Office. In addition, other agencies that have applicable programs, regulations, and/or funding may be asked to provide a representative. The specific agencies selected will be determined by the nature of the disaster.

establishing mutually agreed upon (project) priorities, identifying eligible projects, and mixing and maximizing available funds in order to implement projects.

Another post-disaster mitigation activity involves the implementation of state and federal disaster recovery assistance and hazard mitigation programs, including the FEMA Programs and other Federal and State programs. More information on FEMA can be found at <http://www.fema.gov/>.

### *RELATED DOCUMENTS*

The following documents have been used in compiling information for this All-Hazard Mitigation Plan:

**Table 1.1 Documents Applicable to Hazard Mitigation in Chippewa County**

<b>Name of Plan</b>	<b>Date Completed or Updated</b>	<b>Available</b>	<b>Relevant Information</b>
Minnesota State Hazard Mitigation Plan	2014	MN Department of Public Safety	Risk assessment, hazard profiles, county plan must conform to State Hazard Mitigation Plan
Chippewa County Comprehensive Plan	2003	Planning and Zoning	Population profile, population projections, vision statement
Chippewa County Zoning Ordinance	1996	Planning and Zoning	Land use, sewage and water supply, public roads, and recreational parks
Montevideo and Township Fire Rescue Agreement	2003	Emergency Manager	Montevideo fire district
Chippewa County Emergency Operations Plan	2014	Emergency Management	Emergency operation plans, responsibility, critical facilities
Montevideo Comprehensive Plan	2013	City of Montevideo	Population profile, city land statistics, and maps
Granite Falls Comprehensive Plan	2003	City of Granite Falls	Population profile, city land statistics, and maps
Clara City Comprehensive Plan	2012	City of Clara City	Population profile, city land statistics, and maps
Milan Comprehensive Plan	2013	City of Milan	Population profile, city land statistics, and maps
Chippewa County Water Plan	2013-2018	Planning and Zoning	Water and wastewater supply information.
All Cities in Chippewa County Wellhead Protection Plan	In Process	Cities	
Minnesota River Basin Plan	2001	MN Pollution Control Agency	Pollution, ground water, and clarity

In August 2012, FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) program published a Resilience Report for Chippewa County. This report is intended to provide the county a reference e fore management and mitigation of floods and other risks. A copy of the report can be found in Appendix 14.

## THE PLANNING PROCESS

Chippewa County chose to engage in a comprehensive planning process to update their All-Hazard Mitigation Plan for several reasons: first, as a process, it helps the county determine its current state – social, economic and environmental trends in addition to the hazards that affect the county; second, it lays out a process that will guide the county on how it deals with both current and potential hazards; and third, it gives the public an opportunity to decide what projects they want the county and cities to complete in the future.

After passage of the Disaster Mitigation Act of 2000, the county board contracted with the Upper Minnesota Valley Regional Development Commission (UMVRDC) to write the original grant and County Hazard Mitigation plan. The Chippewa County Emergency Manager, Marvin Garbe, was in charge of project coordination between the county and cities. All cities within the county participated in the original plan through adopted participation resolutions and task force delegates. Chippewa County completed and adopted its initial All-Hazard Mitigation Plan, with FEMA approval in May 2005.

An additional requirement of the Disaster Mitigation Act of 2000 requires a full All-Hazard Mitigation Plan update within five-years of adoption. To meet this requirement, Chippewa County again contracted with the UMVRDC to write the plan update grant in 2008 and complete an All-Hazard Mitigation Plan update for the county by September 2010. In 2013, Chippewa County and the UMVRDC collaborated to complete a plan update for 2015. Chippewa County requested the continued participation from all cities within the county in updating the All-Hazard Mitigation Plan. The chart below provides information specifying county and city and participation in the 2015 plan update process.

**Table 1.2 Chippewa County & Cities Participation in All-Hazard Mitigation Plan Update**

Jurisdiction	Adopted Current Plan (2010)	Documented Participation in Planning Process	Task Force Mtg. 1 (5/8/2014)	Task Force Mtg. 2 (9/11/2014)	Task Force Mtg. 3 (11/20/2014)	Task Force Mtg. 4 (5/26/2015)
CC	x	x	x	x	x	x
Clara City	x	x	x	x	x	x
Maynard	x	x				
Milan	x	x	x			
Montevideo	x	x	x	x	x	x
Watson	x	x	x			x
Townships	x	x	x	x	x	x

In the spring of 2014, staff from the UMRDC met with Tim Bergeland, the Chippewa County Emergency Manager to begin discussions on how to accomplish the county All-Hazard Mitigation Plan update. At this meeting, Chippewa County decided to complete a comprehensive update to the Chippewa County All-Hazard Mitigation Plan to improve every chapter of the plan, with a large emphasis on adding a Hazus Flood Analysis to the plan. Chapter 3: Hazard Inventory was updated with hazardous event occurrences from 2010 to 2014, will be updated when data was available. The Local Task Force provided information on new hazards not included in the initial plan. The Risk Assessment Chapter was updated using a ranking activity completed by Local Task Force members and includes an updated historical account of frequency, severity, and economic/human impacts. The Goals, Objectives, and Mitigation Strategies Chapters were updated by addressing each strategy of the previous plan and determining its current status. Following existing strategies, new goals, objectives and strategies were discussed. This section is divided between natural and technological hazards. The city-specific mitigation strategy lists were also updated and can be found in Appendix 2. Finally, the Plan Maintenance/Implementation Chapter (Chapter 7) was reviewed by the Local Task Force and Emergency Manager to determine necessary updates.

To accomplish this plan update, Chippewa County created a Local Hazard Mitigation Task Force to foster coordination, provide direction to the planning process, and ultimately develop the county's All-Hazard Mitigation Plan. Members appointed to the Local Task Force by Tim Bergeland, Chippewa County Emergency Management Director, included the County staff, County Commissioners, the County Administrator, representatives from participating cities and townships, as well as school superintendents, hospital administrators, utility company representatives, and more. In order to solicit other potential task force members and special interested parties, press releases were sent to newspapers (see Appendix 12) in the county discussing the upcoming All-Hazard Mitigation plan update process and contact information for anyone interested in the joining the task force or providing additional input.

### **Chippewa County Hazard Mitigation Task Force**

**Tim Bergeland**, Chippewa County Emergency Director  
**Matt Gilbertson**, Chippewa County Commissioner  
**David Lieser**, Chippewa County Commissioner  
**Jeffrey Lopez**, Chippewa County Commissioner  
**Jim Dahlvang**, Chippewa County Commissioner  
**David Nordaune**, Chippewa County Commissioner  
**Scott Williams**, Chippewa County Planning and Zoning Administrator  
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**David Lauritsen**, Head Librarian, Montevideo  
**Teresa Shelstad**, Chippewa County-Montevideo Hospital Safety Director  
**John Williamson**, MN Valley Co-op Light-Power  
**Ted Nelson**, Prairie Five Rides Program Manager  
**Tom Warner**, Soil and Water Conservation District  
**Ethan Jenzen**, DNR Waters Area Hydrologist

While required by the Disaster Mitigation Act of 2000, the county emphasizes public participation in the plan update as it is a key way to ensure ongoing support for the plan. The general public was invited to two meetings and was notified through press releases sent to the newspaper prior to these meetings. At these meetings, the public was invited to review and provide comments on the draft plan chapters.

The planning process occurred over a twelve-month period. During that time, the Local Task Force met four times. Individuals involved in the public meetings had two primary responsibilities: 1) to comment on draft stages of the plan and 2) provide input on the next stages of the plan. It was important to include long-time residents of the county in the process for a historical perspective. As noted, press releases were sent out for all of our public meetings to local and neighboring newspapers and local radio stations. The UMVRDC's telephone number was offered as a point of contact for the public if they had questions on how or why to get involved in the mitigation process, or could not attend the meetings in person but still had input for the plan.

The first Local Task Force meeting was held on May 8, 2014 in Montevideo, MN to identify potential hazards and perform a hazard inventory. To publicize the meeting and introduce the Hazard Mitigation Plan update process, a press release was sent to local newspapers prior to the meeting. Fifteen people attended the first Local Task Force meeting and provided information on recent hazardous events and new hazards previously left unconsidered. Gaps and deficiencies were also brought up to date for each hazard type. Cities with representatives in attendance at this task force meeting were provided with a city survey in order to document any changes over the last five years. A second meeting was announced at the end of this meeting.

The second Local Task Force Meeting was held on September 11, 2014 in Montevideo, MN. All Local Task Force members were notified of this meeting in advance. Prior to the meeting, the task force was provided with hazard inventory ranking information that provided a historical perspective on past hazardous events. During the meeting, the eight task force members present performed a ranked hazard inventory, included in Chapter 4. The Local Task Force team members were informed that the following meeting would occur after cities completed individual risk assessments and reviews of the previous plan's mitigation strategies.

From May 2014 through May 2015, all cities in Chippewa County participated in the update of the All-Hazard Mitigation Plan by providing updated information for land use surveys, city-specific risk assessments, and mitigation strategy surveys. The information was gathered through individual city meetings with mayors, city staff, city council members, and emergency response workers. The land use surveys provided city-specific information regarding land use changes and development trends, while the risk assessment surveys identified specific risks that may affect a city and determined city vulnerability to hazardous events. The mitigation strategy survey identified which mitigation strategies a city had completed, actively participated in, or wished to remove from its list. Finally, each city was asked to create a ranked mitigation strategy list for their municipality.

The third Local Task Force meeting was held on November 20, 2014 in Montevideo, MN to discuss the final hazard prioritization and review mitigation strategies from the previous All-Hazard Mitigation Plan. The Local Task Force was presented with their hazard prioritization (derived from the hazard inventories completed at the second meeting) and held a discussion about the final result. The public and task force were presented with the previous plan's hazard prioritization for comparison. A group participation activity was then completed where Local Task Force members were asked to comment on the previous plan's mitigation strategies and determine (to the best of their knowledge) whether each strategy was completed, considered an recurring strategy (no end of strategy), not yet completed, the feasibility of the strategy, or if a strategy was no longer relevant. The final chapter on plan maintenance and implementation was also reviewed at this meeting.

Following the third meeting, electronic copies of the plan chapters were sent to Local Task Force members for comment. This comment period was offered to the general public through a newspaper press release by visiting the UMVRDC website to review the plan online. Contact information for questions or comments was provided in the press release. During this time, the plan was also reviewed by county staff including the highway department and planning and zoning.

The fourth Local Task Force meeting took place on May 26<sup>th</sup>, 2015 in Montevideo. This meeting was open to the public for questions and comments on the draft plan. The public meeting was advertised through a press release in the local newspaper. The Chippewa County Emergency Manager was present throughout the meeting to offer information and incorporate the public's comments into the All-Hazard Mitigation Plan. The Local Task Force will be informed that the final draft version of Chippewa County's All-Hazard Mitigation Plan will be sent to the Federal Emergency Management Agency (FEMA) for review. The Task Force will be informed when the comments are received.

Prior to Chippewa County adoption, a public hearing will be held during a Chippewa County Planning Commission meeting to discuss the plan and send a recommendation to the Chippewa County Board of Commissioners for approval. Once the All-Hazard Mitigation Plan is approved by the County Board, all corresponding participating cities shall adopt the plan within one year of the County adoption. Each city will be sent an electronic copy of the plan and staff will be available at a city council meeting to answer questions and facilitate the local adoption of the county's plan. A copy of the Chippewa County resolution adopting the All-Hazard Mitigation Plan and a list of the resolutions passed by the county's cities will be included in Appendix 13.

The following tables summarize Chippewa County's prioritized hazards and strategies. The processes that defined these priorities are detailed in Chapters 4-6.

**Table 4.12 Overall Hazard Priority Levels in Chippewa County**

<b>Hazard</b>	<b>Chippewa County</b>	<b>Special Areas of Concern</b>
<b>1. Winter Weather</b> Blizzard, Ice Storms, Heavy Snow, Extreme Cold	2.99 – Moderate	County
<b>2. Tornado</b>	3.21 – Moderate	County
<b>3. Hazardous Materials</b>	2.87 – Moderate	County, All Cities
<b>4. Summer Weather</b> Thunderstorm, Lightening, Hail, Wind (excluding tornado) Extreme Heat	2.79 – Moderate	County
<b>5. Civil Disturbance/ Terrorism</b>	3.13 – Moderate	County
<b>6. Other/Flash Flooding</b>	2.29 – Low	County
<b>7. 100-year Floods</b>	2.08 - Low	Montevideo, Maynard
<b>8. Structure Fire</b>	2.71 – Moderate	All Cities
<b>9. Drought</b>	2.52 – Moderate	County
<b>10. Infectious Disease</b>	2.42 – Low	County
<b>11. Water Supply Contamination</b>	2.34 – Low	County
<b>12. Dam Failure</b>	2.33 – Low	Montevideo
<b>13. Wildfire</b>	2.31 – Low	Homes/Structures located near to grasslands; cities within the river valley
<b>14. Wastewater Treatment System Failure</b>	2.04 – Low	County, All Cities

**Table 5.3 CC Prioritized Strategies (Natural Hazards)**

<b>Ranked</b>	<b>Hazard</b>	<b>Strategy</b>	<b>Affected Participating Jurisdiction</b>
1	Severe Storms & Extreme Temperatures	Each city and the County Emergency Manager should continue to do periodic visits and review plan annually.	County EM, All Cities
1	Severe Storms & Extreme Temperatures	Identify funding to purchase portable generators and transfer switches to community emergency operation centers.	County, All Cities
1	Severe Storms & Extreme Temperatures	Assist with finding funding sources for and build safe shelters in all manufactured home parks, cities, city parks, county, and state parks and public golf courses. Identify a safe room for the campgrounds in cities and the greater county.	County EM, All Cities
2	Flooding	Work with state agencies, local government and emergency managers to address flooding issues as a region. Create a network of print, radio, social media that reaches all citizens with maps of risk areas, shelters, contact information and what to do in the event of a flood.	County EM, All Cities
2	Flooding	Prioritize bridges and culverts with annual flood concerns. Determine strategies to mitigate repeatedly flooded infrastructure (Ex. Replacing bridges, with clear-span bridges, replacing culverts).	County Engineer, County EM, All Cities
2	Flooding	Identify and prioritize repeat flood-impacted township roads to be improved.	County Engineer, County EM, Townships
2	Flooding	Identify structures prone to flood hazards for future buyouts.	County EM
3	Wildfire	Identify the location of all dry hydrants on a map.	County EM
3	Wildfire	Work with all units of government, fire departments, and schools to provide educational fire safety materials to the public.	County EM, All Cities, All Fire Departments, Schools

**Table 6.3 CC Prioritized Strategies (Manmade/Technological Hazards)**

<b>Ranked</b>	<b>Hazard</b>	<b>Strategy</b>	<b>Affected Participating Jurisdiction</b>
1	Hazardous Materials	Ensure that all Emergency Responders participate in Rail Car Incident Response Training.	All City Fire Departments, County
1	Hazardous Materials	Continue to participate in regional exercise that test local plans and interaction between local agencies.	County EM, All Cities, All Fire Departments
2	Civil Disturbance/ Terrorism	Schedule discussions with school leaders, hospital administrators, emergency managers, law enforcement and local units of government to address performance in response to terrorism, focusing on schools and hospitals.	County EM
3	Structure Fire	Provide public education to residents, focusing on carbon monoxide poisoning, evacuation, and smoke alarms.	County EM, All Cities, All Fire Departments
3	Structure Fire	Complete an annual inventory assessment of fire equipment, personnel, and training needs.	County EM, All fire departments

## CHAPTER 2: COMMUNITY PROFILE

### *RELATED DOCUMENTS*

The Community Profile is an important piece of the updated Chippewa County All-Hazard Mitigation Plan. This profile is used as a factual data point and includes the most recent available data.

To create this Community Profile, other Chippewa County documents were referenced including:

- Comprehensive Plan
- Water Plan
- Zoning Map
- Zoning Ordinance
- Land Use Map
- FEMA Regulations

The coordinated use and implementation of these combined documents create a sound foundation for all hazard mitigation projects, plans, and activities to ensure they are tied to the county's land use and environmental regulations.

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### *GENERAL COUNTY PROFILE*

#### **Location**

Chippewa County is 582.8 square miles located in southwestern Minnesota approximately 120 miles west of Minneapolis-St. Paul Metropolitan Area and 70 miles southwest of the city of St. Cloud. Chippewa County is bordered by Swift County to the north, Kandiyohi County to the east, Renville County to the southeast, Yellow Medicine County to the southwest, and Lac qui Parle County to the west. The Minnesota River forms the angled southwest border. Trees, rolling hills and vast agricultural land characterize the rest of the county. Chippewa County has six cities and 16 townships.

#### **History**

Chippewa County runs through the much larger Glacial River Warren Valley in western Minnesota. All early Minnesota explorers followed the Minnesota River which had a system of major trails on both sides of the river. The first wave of inhabitants came as French-Canadian voyageurs and missionaries from settlements in the eastern portion of the United States. Following the Civil War, Americans from New York and New England were able to travel by railroad, boat and ox cart to the newly opened land where they established most of the governmental structure for the county, townships and towns.

Many towns in Minnesota were settled in areas that had access to water, especially areas where water could serve as energy, transportation and a way to dispose of unwanted waste. Montevideo was settled in an area where the Chippewa River met the Minnesota River while Granite Falls settled next to the Minnesota Rivers near the waterfalls. The other towns in Chippewa County settled in locations because of the presence (or anticipation) of the railroad.

A final factor in the placement of towns at this time was the short distance (horse and buggy ride) between the communities.

For nearly 150 years, agriculture has remained the number one industry in Chippewa County. Crops grown are extremely diverse and include wheat, oats, corn, soybeans, and sugar beets. The total market value of local agricultural products sold in the county exceeds more than \$100 million annually. Currently, some farmers are exploring new markets for their organically grown feed grains, produce, and free-range organic meats such as poultry, beef, lamb, and pork. Industry in the county continues to expand and numerous manufacturing jobs are created along with an evolving the retail sector to keep pace with growing demands. Tourism has also started to grow, particularly in the past two decades. Chippewa County has and continues to learn and develop its many resources and set new goals for county residents.

In 2013, Chippewa County had an estimated population of 12,272 people (U.S. Census 2008-2013 American Community Survey). During the 1700s Europeans established a fur-trading post near the rivers and traded with area Native Americans. Montevideo was settled in the 1870s and is located overlooking the valleys of the Chippewa and Minnesota River. After the city was platted, Montevideo became an agricultural center. Clara City, Maynard, Watson, and Milan were all platted in 1879-1888 as a result of the railroad. Three Norwegian families first settled the land that is now Wegdahl in May 1867. The railroad came through Wegdahl after its settlement. East Granite Falls, located in Chippewa County on the east side of the Minnesota River, is actually part of the municipality of Granite Falls in Yellow Medicine County. East Granite Falls is located in Chippewa County but the Minnesota River which runs through Granite Falls places the rest of the municipality in Yellow Medicine County.

Two cities were platted along a railroad line that never reached fruition: Gluek in 1927 and Big Bend in 1914. Big Bend is located on the Chippewa River. These small communities are not incorporated.

## **Physical Characteristics**

### *Climate and Precipitation*

A wide range of seasonal temperatures characterizes Chippewa County (CC). The hottest day that Chippewa County has recorded was 110 degrees F in July 1988; the coldest day was -37 degrees F in January 1970 (Midwest Regional Climate Center) shown in Table 2.1. The sun shines 65 percent of the time in summer and 45 percent in winter. Prevailing winds are from the south.

Total annual precipitation is about 24 inches, 75 percent of which usually falls in the growing season between May and September, shown in Table 2.2 below.



**Table 2.1 CC Average Monthly Temperature and  
Record Highs & Lows from 1971 - 2013**

Month	Average High	Average Low	Mean	Record High	Record Low
January	22° F	1° F	11° F	69° F (1981)	<b>-35° F (1977)</b>
February	28° F	7° F	18° F	64° F (1981)	-34° F (1996)
March	40° F	20° F	30° F	83° F (2012)	-20° F (1984)
April	58° F	34° F	45° F	100° F (1980)	2° F (1975)
May	71° F	46° F	58° F	99° F (1987)	22° F (2005)
June	80° F	56° F	68° F	105° F (1979)	37° F (1998)
July	84° F	60° F	72° F	<b>110° F (1988)</b>	35° F (1971)
August	82° F	58° F	69° F	106° F (1988)	35° F (1971)
September	74° F	48° F	61° F	103° F (1978)	21° F (1974)
October	60° F	36° F	48° F	92° F (1993)	12° F (1993)
November	42° F	22° F	32° F	80° F (1999)	-19° F (1977)
December	27° F	8° F	17° F	63° F (1998)	-32° F (1983)

Source: Midwestern Regional Climate Center Monthly Data Summary. Data pertains to station at Montevideo.

**Table 2.2 CC Average Monthly Precipitation & Snowfall  
from 1971 - 2013**

Month	Precipitation in Inches	Snowfall in Inches
January	0.82	8.70
February	0.90	7.40
March	1.61	8.10
April	2.32	2.10
May	3.38	0.00
June	4.44	0.00
July	3.22	0.00
August	3.35	0.00
September	2.76	0.00
October	2.21	0.40
November	1.54	5.90
December	0.81	8.70
<b>Annual</b>	<b>27.36</b>	<b>41.30</b>

Source: Midwestern Regional Climate Center Monthly Data Summary. Data pertains to station at Montevideo.

### *Geology and Topography*

Chippewa County contains 374,400 acres of land and water, all influenced by glaciation. Most of Chippewa County is covered by nearly level to rolling ground moraine deposits of clay, sand and rocks deposited by the melting glacial sheet. Relatively flat, glacial lake deposits are found in the east and central part of the county. A large sandy outwash delta covers the northeast corner of the county.

The Minnesota River flows in a deep valley forming the western border of the county. The valley was cut by water draining from Glacial Lake Agassiz, which covered most of the Red River Valley.

Outside the Minnesota River Valley, the county's average elevation is 1,050 feet above sea level. Topography gradually rises to the east; with the highest point in the County 1,142 feet above sea level in the southeastern corner. Rugged valley walls and a flat floor characterize the Minnesota River Valley, while row crops and grassland characterize the remaining region. The topography of Chippewa County's watersheds includes gently twisting glacial till plains, nearly level to undulating ground moraines, and nearly level to gently sloping lands with a complex mixture of well and poorly drained soils.

### *Soil*

Chippewa County soils are produced by natural processes acting through time on material deposited or accumulated by geologic processes. Soil characteristics are determined by the parent material, climate, vegetation and topography in the area of soil formation. Soil parent material in Chippewa County ranges from clay in the east to sandy loam in the Minnesota River Valley. Soil associations, described in Chippewa County general soil maps, are a distinct pattern of soil series in defined proportions. Most associations contain one or more major soil series and at least one minor series. Associations are named from the major soil series name. Chippewa County contains 11 general soil associations. Soils data indicate general patterns of soil suitability and limitations for land uses and can be used to determine flooding potential, load bearing capacities, permeability, surface drainage, and percolation rates.

Soil erosion affects cropland, urban areas, roadsides, lakeshores, stream banks and drainage systems. Water erosion in Chippewa County generally occurs the most between the months of April and June when fields have been tilled and planted, but a crop canopy has not yet developed to protect the surface.

The potential for wind erosion occurs when wind velocities increase above 12 miles per hour. Wind speeds above this mark overcome the force of gravity and dislodge soil particles. Soil is most vulnerable when unprotected by vegetative cover. Soils with fine granulated structure are most susceptible to erosion, including sandy loam, loamy sand, and sand. November through June is the worst time for wind erosion, when field surfaces are normally dry and strong northwest winds are prevalent.

### *Land Use and Cover*

The pre-settlement vegetation of Chippewa County has undergone significant change since settlement began in the 1870s. Before it was settled, Chippewa County was predominately covered with prairie, wet prairie and river bottom forest vegetation along the Chippewa and

Minnesota Rivers. Fire played a main role in limiting the woody vegetation of Chippewa County. The forests were restricted to areas where natural firebreaks (such as rivers, lakes and rough topography) prevented the spread of fire from the adjacent prairie lands.

Today, land use in Chippewa County can be divided into four general categories: agricultural, woodland, water and wetlands, and other which includes urban uses. Agriculture is the most prevalent use, composing approximately 88 percent of the county land, woodland makes up two percent, and water and wetlands make up one percent of the land in Chippewa County. Other uses are nine percent. A more detailed breakdown of land uses is found in Table 2.3 below.

**Table 2.3 Chippewa County Land Use & Cover**

Land Use	Acreage	Percentage of Total
Urban and Rural Development	8,069	2%
Cultivated Land	327,003	87%
Hay/Pasture/Grassland	21,933	5%
Brush Land	931	2%
Forested	11,714	3%
Water	4,114	1%
Bog/Marsh/Fen	2,481	0%
Mining	143	0%
<b>Total</b>	<b>338,170</b>	<b>100%</b>

Source: Minnesota Land Management Information Center "Minnesota Land Use and Cover: 1990's Census of the Land (8 category statewide)".

**Agriculture.** Agricultural land is the dominant use in every township. Farms in Chippewa County have steadily increased in size from 256 acres in 1970 to 400 acres in 1987 (Minnesota Department of Agriculture 1989). As the size of farms increased, the overall number of farms decreased. In 1964 there were 1,551 farms in Chippewa County. Thirty-three years later (1997) only 618 farms remained found in Table 2.4 (U.S. Department of Agriculture).

**Table 2.4 CC Farm Comparisons from 1987-2012**

Farms	1987	1992	1997	2002	2007	2012
Farms (number)	820	689	618	694	720	674
Land in farms (acres)	327,916	326,804	318,472	339,652	367,926	335,109
Land in farms, average size of farm (acres)	400	474	515	489	511	497

Source: USDA, National Agricultural Statistics Service, 2014

Chippewa County developed rapidly due to rich agricultural resources and opportunities. The climate, soil, topography and vegetation all create a productive agricultural environment.

Seventy-three percent of the land in Chippewa County is considered to be prime farmland. Nearly all prime farmland is used for crops with corn, soybeans and sugar beets most commonly produced. Organic farming includes smaller crops such as vegetables, beef, and dairy and other niche markets and has grown significantly in the past 20 years. Table 2.5 outlines the changes that have taken place in the last 100 years in Chippewa County:

**Table 2.5 CC Crops by Type**

	<b>Corn- 1889</b>	<b>Corn - 2012</b>	<b>Wheat- 1889</b>	<b>Wheat- 2012</b>	<b>Oats- 1889</b>	<b>Oats- 2012</b>
Acres	19,000	151,997	138,000	2,958	27,000	198
Bushels/acre	26	176.4	13	55.6	37	80.5

Source: USDA National Agriculture Statistics Services: Census of Agriculture, 1889 & 2012

A recent trend in land use in some parts of the county has resulted in the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are less productive because they are more erodible, subject to drought or difficult to cultivate. Government programs such as CPR and CREP have been established to keep marginal land out of production and helped to prevent erosion and has improved water quality in the region.

CREP, CRP and other Government Programs. The Conservation Reserve Program (CRP) is the federal government's single largest environmental improvement program and one of its most productive and cost-efficient.

Established in 1985, the CRP encourages farmers to voluntarily plant areas of grass and trees on land that needs protection from erosion. The purpose of planting is meant to act as windbreaks or in places where vegetation can improve water quality or provide food and habitat for wildlife. Farmers must enter into contracts with the Commodity Credit Corporation (CCC) for periods of ten to fifteen years. In return, they receive annual rental payments, incentive payments for certain activities, and cost-share assistance to establish the protective vegetation. Land eligible for enrollment includes cropland that is physically and legally capable of being cropped in a normal manner and that has been planted or considered planted to an agricultural commodity in any two years from 1992 to 1996. The acreage must also be determined eligible and suitable for any of the following practices: filter strips, riparian buffers, shelter belts, field windbreaks, living snow fences, grass waterways, shallow water areas for wildlife, salt-tolerant vegetation and wellhead protection areas.

There are 8,198 acres in Chippewa County currently enrolled in CRP (Minnesota Board of Water and Soil Resources 2013).

The Reinvest in Minnesota (RIM) Program protects water quality, reduces soil erosion, and enhances fish and wildlife habitat through retiring marginal lands from agricultural production and restoring previously drained wetlands. The program pays landowners a percentage of the value of their land to enroll it in a conservation easement. Types of land eligible for the program include drained wetlands (for restoration), highly erodible cropland, riparian agricultural land, pastured hillsides and sensitive ground water areas. The state legislature created the RIM

Program in 1986 as a response to the concern of a coalition of environmental, conservation, and agricultural groups. As of August 2013, Chippewa County has 1,567 acres enrolled in the RIM program (Minnesota Board of Water and Soil Resources).

One way the county has been able to address pollution issues have been with the Minnesota River Conservation Reserve Easement Program (CREP). CREP gives landowners an opportunity to voluntarily enroll marginal cropland in a conservation easement program with 15 annual payments and a one-time bonus payment. Chippewa County has 8,401 acres enrolled in the program (Minnesota Board of Water and Soil Resources 2013). With this program, landowners in the Minnesota River Basin receive money to take cropland out of production as a way to improve water quality and wildlife habitat.

CREP combines the federal Conservation Reserve Program (CRP) with the state RIM Program. The program's goal is to protect and enhance up to 100,000 acres of environmentally sensitive land in the 37-county Minnesota River Basin; as of June 2014, the State of Minnesota has 107,167 acres involved in the program. The Minnesota River CREP ended in September 2002.

The Wetlands Reserve Program (WRP) is the federal government's wetlands restoration program. It is a voluntary program that offers landowners the means and the opportunity to protect, restore, and enhance wetlands on their property. The USDA Natural Resources Conservation Service (NRCS) manages the program as well as provides technical and financial support to help landowners who participate in WRP. In all cases, the landowner retains ownership and responsibility for the land, including any property taxes based on its reassessed value as wetland or nonagricultural land. The landowner controls access to the land; has the right to hunt, fish, trap, and pursue other appropriate recreational uses; and may sell or lease land enrolled in WRP. Chippewa County has 133 acres in permanent easement through the Wetland Reserve Program.

Wildlife Management Areas. Wildlife Management Areas are state-owned lands preserved for wildlife habitat. Chippewa County has 21 State Wildlife Management Areas that occupy approximately 12,000 acres. The Lac qui Parle Wildlife Management Area is located in the Minnesota River Valley in Big Stone, Chippewa, Lac qui Parle and Swift Counties. The area is approximately 25 miles in length and varies from one to three miles in width. It was established in 1936 as a state-sponsored flood control project under the Federal Works Progress Administration (WPA). The unit was authorized as a federal flood control project later in 1936, and operational authority was transferred to the U.S. Army Corps of Engineers.

The primary goal of the Lac qui Parle Wildlife Management Area is to develop and maintain diverse habitats, which are highly productive and attractive to wildlife. This serves to perpetuate wildlife and natural plant communities for public utilization, enjoyment and education in a region where some wildlife species are disappearing.

Consistent with the primary goal is a responsibility to provide public use of the area. The area is to be developed to accommodate activities directly oriented towards wildlife and fishing. Public hunting, trapping and fishing receive priority as sportsmen's tax monies were used to finance nearly all the development and management and much of the land acquisitions on the area.

Public use will be limited to levels that prevent excessive interference among users and do not endanger wildlife and fish populations.

State Wildlife Management Areas serve multiple uses in the county. In addition to their value as wildlife habitat and nesting areas, they serve to increase nutrient, sediment and chemical retention, floodwater storage and ground water recharge. In addition, the county also possesses one Scientific and Natural Area in the southern tip of the County.

## *HYDROLOGY*

Chippewa County's lakes, streams and ground water are some of its most significant resources, however vulnerable to pollution from a wide variety of human activities and/or disasters. Water quality has become one of the most important environmental issues facing the county and state. Water is used for domestic and residential purposes, industry, agriculture and recreation. The health, safety and welfare of the public are directly linked to the county's water supply.

Through the evolvement of Geographic Information Systems and tracking capabilities of past practices, the county has a better understanding of what is occurring on county lands. Another big change has been the addition of the Chippewa River and Hawk Creek Watershed Projects.

The Clean Water Partnerships have completed Phase II Implementation grants, and both have been awarded several other grants over the past decade. They are currently working on Total Maximum Daily Load (TDML) projects along with several other grants. They continue to monitor as a method to track accomplishments and to better understand the county's surface water quality and quantity. The Water Plan Committee continues to use these results to address future issues. A few past grants, such as the Conservation Credit Initiative (CCI) program and the Spring Creek Watershed Grant targeted a watershed to cover a variety of existing water quality issues using monitoring tools. In addition, many best management practices were cost-shared through the Water Plan such as fencing for rotational grazing practices, tree planting incentives, manure management plans, buffers, reduced tillage incentives, construction crop loss, pipe structures into county ditches, septic system upgrades, water testing and abandoned well sealing (for more information refer to the Chippewa County Water Plan 2013-2023).

Groundwater. Groundwater generally travels southwestward in Chippewa County. Cretaceous sandstone aquifers are present over most of the area, but yields in many places are not satisfactory, as aquifers are generally less than ten feet thick. Groundwater is found in three principal aquifers: near surface sand and gravel aquifers, buried sand and gravel aquifers and aquifers within Cretaceous deposits. Usable groundwater is mainly found in areas of gravel deposits and glacial drift. The depth of water varies from shallow enough to be withdrawn by a centrifugal pump to over 100 feet below the surface.

Surficial aquifers in Chippewa County are related to outwash deposits in water channels crossing between the glacial Pomme de Terre and Chippewa Rivers (U.S. Geological Survey 1984). The upper limit of the aquifer is the water table and the lower limit is the top of the glacial till. Water levels in the surficial aquifers are within ten feet of the land surface throughout most of

the outwash area in the county. The saturated thickness of the surficial aquifers ranges from less than ten feet along the Swift County border to over 50 feet elsewhere in the county.

Most irrigation and municipal ground water withdrawals in Chippewa County are from surficial aquifers in direct contact with the ground surface. These aquifers are rapidly recharged and susceptible to contamination. The surficial aquifers are generally confined to narrow valleys in the county fed by the broad outwash plains in southwestern Swift County near Appleton and Holloway.

Confined aquifers provide ground water for farms and small municipalities throughout the county. These aquifers recharge slowly and are less susceptible to contamination because of their greater depths. The limits and extent of the confined aquifers are not well known in Chippewa County. Some wells are developed in the Cretaceous Limestone and Sandstones underlying the glacial drift in the county. The yields of these wells are relatively low and the water quality is generally poor.

Recharge of the major aquifers in Chippewa County occurs through precipitation, primarily in sand and gravel where infiltration rates are high and topography is rolling. Recharge of confined aquifers is greatest where unconfined aquifers are present. Recharge areas include gravel pits, wetlands and ponds, lakes and rivers and road ditches. Recharge can also occur, although more slowly, through confining layers into confined aquifers throughout the county. Most recharge occurs in spring from snowmelt and rainfall when ground water demands by growing vegetation are minimal and precipitation can soak through to the water table. There is generally little recharge during the active growing season. Chippewa County aquifers are recharged in Swift County. Parts of Chippewa County may also serve as recharge areas for ground water resources of neighboring counties.

*Wellhead Protection.* Wellhead protection is a means of protecting public water supply wells by preventing contaminants from entering an area that contributes water to the well or well field over a period of time. The wellhead protection area is determined by using geologic and hydrologic criteria, such as physical characteristics of aquifers and the effects that pumping has on the rate and direction of groundwater movement. A management plan will be developed for the wellhead protection area that includes inventorying potential sources of groundwater contamination, monitoring for the presence of specific contaminants, managing existing and future lands, and water uses that pose a threat to ground water quality. The goals of wellhead protection are to reduce use of costly treatment facilities, avoid having to drill new wells, and to avoid the need treat contaminated ground water.

Maynard, Milan, Watson, Montevideo, Clara City and Granite Falls are currently in the wellhead protection program. Public water suppliers to be brought into the wellhead protection program within the next five years and current phase number are Tebben Enterprises (594) and Kibble Equipment (744). The lower phasing number has the higher priority. According to the Water Plan no other public water suppliers need to develop a wellhead protection plan at this time.

*Surface Water.* For additional information on Chippewa County surface water, refer to the Chippewa County Water Plan 2013 and the Comprehensive Plan 2003.

***Watersheds.*** Chippewa County lies within the Minnesota River Basin and is drained by three watersheds: the Minnesota River Headwaters, Minnesota River Granite Falls and the Chippewa River. As the entire county was covered with glacial sheets of ice until approximately 9,500 years ago, surficial drainage is very young.

The county receives approximately 24 inches of precipitation each year, 75 percent of which usually falls in the growing season between May and September. The surface water bodies receive runoff and act as temporary reservoirs.

***Wetlands.*** The term "wetlands" refers to low depressions in the landscape covered with shallow and sometimes intermittent water. Wetlands are also commonly referred to as marshes, swamps, potholes, sloughs, shallow lakes, and ponds. Wetlands differ in size, shape, and types of wet environment and derive their unique characteristics from climate, vegetation, soils and hydrologic conditions. Some have surface water only in the springtime during thaws or after rainstorms, while others may form shallow lakes that rarely dry up. They are classified according to their depth of water, total area, and seasonal life span.

Originally, wetlands were located throughout the entire county. With the advent of intensive agriculture practices and the application of land drainage techniques, many of the wetlands located on lands that were flat and suited to agricultural use have been drained, leaving relatively few wetlands in the flat till plain areas of the county. Most of the remaining wetlands are found in the moraine areas of the northern half of the county where the wetlands have either been preserved or where drainage is not economically feasible.

***Rivers.*** All of Chippewa County drains into the Minnesota River, which then drains to the Mississippi River. Hawk Creek, as Judicial Ditch 7, drains the eastern part of the county and runs into the Minnesota River. Shakopee Creek drains the northeastern part of the county and Dry Weather Creek drains the central part. Both of these creeks flow into the Chippewa River. The Chippewa River and a number of small creeks drain the final western third of the county. Other small creeks flow directly into the Minnesota River. An extensive system of county ditches and tile lines has modified the water flow since the county was settled. Many marshy areas that existed before the area was settled have been drained for agricultural purposes.

***Lakes.*** Lac qui Parle is the most prominent lake in the county. It was created by the Lac qui Parle Flood Control Project and completed in 1951. The reservoir behind the Lac qui Parle Dam has a capacity of 122,800 acre-feet and was designed for flood control, recreation, fish and wildlife conservation. Chippewa County has 79 lakes of 10 acres or more. These lakes cover an area of 9,158 acres which represents approximately 2.4 percent of the total area of the county.

***Recreational Use of Water Resources.*** Lac qui Parle Lake, the only lake in Chippewa County regularly monitored by the Minnesota Environmental Pollution Agency, has a Trophic Index exceeding the limits of supporting swimmable use. Because of the limited surface water resources in the county, recreational use of county lakes is important. Lac qui Parle Lake beaches receive significant use in spite of water quality perceptions. Many additional recreational activities of surface water in the County are available including hunting, canoeing, boating and bird watching along Lac qui Parle Lake and Marsh Lake. Horseback riding, hiking



and camping are also popular in Lac qui Parle State Park. The river above Lac qui Parle Lake is a state canoe and boating route, and the Minnesota River below the dam is a scenic river.

The rivers within Chippewa County, such as the Chippewa River and Hawk Creek, offer recreation opportunities such as canoeing, fishing and bird watching. Cottonwood Creek is the only designated trout stream in Chippewa County (near Big Bend-Milan).

**Pollution.** It is very important to preserve and protect the limited surface waters in Chippewa County. The need to establish lake water quality criteria or standards have been recognized at the state, provincial and federal levels of government. The Minnesota Pollution Control Agency (MPCA) is the primary agency charged with pollution monitoring, control and abatement. The MPCA develops water quality standards for all water bodies in the state and sets effluent limits for each discharger that will maintain the appropriate standards.

Over 16 miles of Lac qui Parle Lake is considered to have significant non-point water quality violations because of pH and ammonia. Approximately 11 miles of Chippewa River in Chippewa County also has significant water quality violations due to ammonia and conductivity. The goose concentrations on the north end of Lac qui Parle Lake are of local concern, as some locals estimate the goose population could contribute 21 tons of waste material to the lake annually.

Non-permitted waste disposal is a problem in some unincorporated areas. Sewage dumped directly into ditches contributes to the pollution problems of surface waters.

The Surface Water Toxic Control Program has identified for Section 304(1) of the Clean Water Act Minnesota waters affected by pollutants. Both the north and south portion of Lac qui Parle Lake are impacted by point or non-point source discharges of toxic, conventional and non-conventional pollutants due to nutrient pollution. A segment of the Chippewa River and a segment of the Minnesota River are impacted by toxic pollutants from any source because of a variety of municipal pollution effects.

Minnesota Pollution Control Agency (MPCA) lists the lakes and streams that are polluted with mercury, phosphorus, animal wastes and other contaminants. Chippewa County lists the following:

Minnesota River (Chippewa River to Stoney Run Creek)

- Unsafe to swim due to high fecal coliform

Chippewa River (Dry Weather Creek to Minnesota River)

- Aquatic life endangered due to high ammonia

- Unsafe to swim due to high fecal coliform

**Drainage and Flooding.** Large amounts of public and private capital have been invested in draining water from the landscape. This infrastructure radically improves the drainage efficiency of the landscape that benefits agricultural production. Drainage has also changed hydrology in recent years. As water storage on the landscape is reduced, peak stream flows come faster and higher in response to rain events and run off. Another issue is the recent explosion of pattern tiling that has accelerated these conditions. Older drainage infrastructure and receiving waters

are often not adequate to meet the new peak flows generated with pattern tiling. Water flowing into these tiles, ditches, streams and rivers exceed the capacity of receiving waters; water backs up on and floods other lands within the drainage system causing great economic damage.

Chippewa County has an elaborate system of public ditches as well as many private ditches that drain into the legal drain system. The county estimates that 88 percent of the agricultural land in the county is along a drainage ditch. The 1920 farm census reported that over half of the farms reported a need for drainage. As of 2003, Chippewa County has 460 miles of county open public ditches. There are also numerous miles of private open ditches, thousands of feet of county tile and millions of feet of private tile. Nine thousands acres of buffers are present along county open ditches (estimated from CP21 data in FSA office). The current CRP and CREP enrollees have restored approximately 2,500 acres of wetlands for diversity and ground water recharge.

As the landscape hydrology has been altered, higher peak flows are carving out larger channels. Unfortunately, this often results in riverbanks being destabilized.

Debris can also add to flooding issues. Downed trees caused problems at various bridges over the Minnesota River in the last round of major flooding. The trees float into bridges and then get caught in the bridges forming logjams. Contractors are hired to lift fallen trees over bridges and return them to the river downstream of the bridge. Usually, the result of such actions causes trees to flow into succeeding bridges, again needing services for removal. Large flood events can and do kill trees within the floodplain, including large cottonwood and maples. In subsequent flood events these standing dead trees may be knocked down and washed away.

In 1991, Minnesota legislation approved the Wetland Conservation Act (WCA). The Act moves toward its no-net-loss goal by requiring persons proposing to drain or fill a wetland to: try to avoid disturbing the wetland, try to minimize any impact to the wetland, or to replace any lost wetland functions and values. The basic requirement is that wetlands must not be drained or filled, wholly or partially, unless replaced by restoring or creating wetlands areas of at least equal public value under an approved replacement plan. The law mandates that counties and cities administer the Wetland Conservation Act. All cities in Chippewa County have by resolution requested the county to administer the Wetland Conservation Act within its incorporated boundaries. Chippewa County in turn has appointed the Chippewa Soil and Water Conservation District (SWCD) to administer this Act.

## *Climate Change*

The United States Environmental Protection Agency (EPA) defines climate change as any significant change in the measures of climate lasting for an extended period of time. It includes major changes in temperature, precipitation, wind patterns, or other effects, that occur over several decades or longer.

According to the EPA, the Earth's average temperature has risen by 1.4°F over the past century, and is projected to rise another 2 to 11.5°F over the next hundred years. Rising global temperatures are accompanied by changes in weather and climate. Several places have seen changes in rainfall, resulting in more floods, droughts, intense rain, and more frequent and severe heat waves. As these changes in weather and climate changes become more pronounced in the coming decades, they will likely present challenges to our society and our environment.

## **History of Climate Change in Chippewa County**

According to the Minnesota State Hazard Mitigation Plan 2014, climate change in Minnesota is already occurring in ways that will affect the environment, the economy and everyday life. Historical weather data show changing trends in some weather phenomenon over the past few decades, and future changes are likely. Intense study of these topics will continue into the future.

In addition, the state hazard mitigation plan provides historical climate trends for the Midwest and notes that

*“The NOAA Technical Report NESDIS 142-3, Regional Climate Trends and Scenarios for the U.S. National Climate Assessment, provides physical climate information for use by the authors of the Third National Climate Assessment (NCA) report, in draft form as of late 2013. One section summarizes historical conditions in the U.S. Midwest and trends in temperature and precipitation metrics that are important in the region. The historical climate conditions are meant to provide a perspective on what has been happening in each region and what types of extreme events have historically been noteworthy, to provide a context for assessment of future impacts. Some key characteristics of the Midwest historical climate identified in this report that relate to the All-Hazard Mitigation Plan include:*

- Climatic and hydroclimatic phenomena that have major impacts on the Midwest include floods, severe thunderstorms, summer drought, heat, excess rain, heat waves and winter storms.*
  - Historical, annual temperatures increased during the early 20th century to a peak in the 1930s, decreased into the 1960s/1970s, and increased thereafter. Annual temperatures have generally been well above the 1901-1960 average since the late 1990s and the decade of the 2000s is the warmest on record.*
- Section 3: State Profile 30*
- Precipitation has been near or above the 1901-1960 average for most years during the last 4 decades, and there have been no years with major precipitation deficiencies during the last 2 decades. The overall trend in annual precipitation is upward and statistically significant.*
  - The frequency and intensity of extreme precipitation has increased, as indicated by multiple metrics of extremes, including the number of 5-year storms and total accumulated precipitation during the top 10 wettest days of the year.*
  - Frequency of intense cold waves has been very low prior to the mid-1990s. Freeze-free season length averaged about 155-160 days before the 1930s; increased to about 160 days from the 1930s to 1980s; and since the 1980s has*

*increased gradually and now averages about one week longer than during the 1930s to 1980s.*

- *Frequencies of summertime minimum temperatures of 70°F or greater have increased in many of the larger urban areas in the region, equaling very high nighttime humidity. Statistically significant positive trends were found for five cities from 1950 to 2009.*

- *Recent heat waves, such as the 1995 event in Chicago which led to 700 fatalities, have been accompanied by very high humidity levels and high nighttime temperatures, but not quite as extreme daytime high temperatures (Kunkel et al. 1996; Rogers et al. 2007)". (Department of Public Safety and Division of Homeland Security and Emergency Management 2014)*

Chippewa County is no exception to this phenomena and its location in the Midwest makes it subject to these historical climate trends that will continue in the future.

### **Climate Change Risks for Chippewa County**

Every four years, the United States Global Change Research Program publishes a National Climate Assessment Report (<http://nca2014.globalchange.gov/highlights/regions/midwest>) The 2014 report identified the following climate change impacts to the Midwest:

"Extreme heat, heavy downpours, and flooding will affect infrastructure, health, agriculture, forestry, transportation, air and water quality, and more. Climate change will also exacerbate a range of risks to the Great Lakes."

According to the Minnesota State Hazard Mitigation Plan 2014, temperatures are rising and weather patterns are changing, with increases in severe weather events and extreme precipitation. As a result, more flooding, ice storms, drought, and higher night time temperature lows create the risks of flood damage, dangerous driving conditions and power outages due to downed power lines (Seeley presentation 2013), wild fire and health risks, and unsafe ice cover on lakes.

The state hazard mitigation plan also notes that climate change will likely have different effects on different geographical regions of the country as well as within the state of Minnesota. These effects may include relative temperature increases and precipitation trends. In the absence of smaller scale modeling, specific predictions for smaller geographical areas are not available. Therefore, the climate change risks associated with Chippewa County are not mutually exclusive, but rather the effects in the county may differ from those of the Midwest region.

### **Climate Change Adaptation for Chippewa County**

The climate change associated with Chippewa County leads to increased risks from natural disasters of various types and requires that an increase in emergency preparedness will be needed to mitigate the risks that are most likely. Reducing greenhouse gas emissions are still a valuable mitigation strategy that is still being addressed by many levels of government, however the purpose of this plan is to prepare and adapt to the changes that are likely to come.

Chippewa County can contact and/or utilize the state Interagency Climate Adaptation Team (ICAT) report, the Minnesota Health Department Extreme Heat Toolkit, the Climate Adaptation Partnership (CAP), and the Insurance Federation of Minnesota (IFM) to access data or information on how adaptation to climate change can be better planned for and carried out.

## Socioeconomic Profile

### *Population Trends*

Chippewa County has lost residents over every decade since 1940, declining to its estimated 2012 population 12,327. The estimated 2012 population consisted of 49% males (6,061) and 51% females (6,266). According to the 2010 census, 93.5% of Chippewa County residents identified as white. One percent of residents identified with two or more races. Of those, “White and American Indian or Alaska Native” made up nearly half of this group. Table 2.6 identifies population projections for Chippewa County.

**Table 2.6 Chippewa County Population Projections**

	2010 Population	2020 Projection	2025 Projection	2030 Projection	2035 Projection	2040 Projection	2045 Projection
<b>Chippewa County</b>	<b>12,441</b>	<b>12,704</b>	<b>12,868</b>	<b>13,031</b>	<b>13,154</b>	<b>13,157</b>	<b>13,132</b>

Source: Minnesota State Demographic Center 2014

Chippewa County is home to six cities and sixteen townships. The following is a brief city-specific discussion of population and number of households. Table 2.7 provides a breakdown between township and city populations in the county and Table 2.8 provides detailed data of the county’s population. A population distribution map can be found in Appendix 1.

**Montevideo.** The city of Montevideo is situated in the Minnesota River Valley. The city is located along the southern edge of Chippewa County, surrounded by Sparta Township. U.S. Highways 59 and 212 run through the city, as do State Highways 7 and 29. Montevideo is the largest center of employment and, as the county seat, provides most of Chippewa County’s services. Montevideo is estimated to have a population of 5,330 residents (2,331 households), today (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates).

It is important to note the floodplain area along the western edge of the city. Flooding has been an issue in Montevideo in recent years as well as in the past; the city took step to prevent development along the river by designating portions of land as 100-year floodplains. Through such mitigation efforts, the city saves money by avoiding costs of extensive flood damage and cleanup needed when the area was developed.

**Granite Falls.** The city of Granite Falls is Chippewa County’s southernmost city, located along the Minnesota River. The Minnesota River has risen within the city, causing dramatic flooding in recent years. Many flood mitigation projects have been implemented within the city which has eliminated most of the flooding in the city. Granite Falls is situated along State Highway 23 and U.S. Highway 212. The city’s estimated 2,761 people and 1,216 households make it the county’s second largest city. Granite Falls shares borders with Granite Falls Township and part of the city is located in Yellow Medicine County. The City of Granite Falls is addressed in the Yellow Medicine County All Hazard Mitigation Plan (2015). More information can be found in the Granite Falls Comprehensive Plan (2003).

**Clara City.** Clara City is the county’s third largest city with an estimated 1,256 residents and 518 households (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year

Estimates). In addition to State Highway 23, State Highway 7 runs east/west along the southern edge of the city, County Road 2 runs north/south through the city, and the Burlington Northern Railroad runs parallel to Highway 23. Hawk Creek runs near Clara City and has flooded in past destroying homes in recent years.

Maynard. The city of Maynard is located in the southern part of Chippewa County between Clara City and Granite Falls on State Highway 23. County Road 4 dissects the city cutting from the north to the southeastern part of the city. In addition, the Burlington Northern Railroad runs parallel to Highway 23. Maynard is the county's third smallest city with an estimated 401 people and 144 households (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates). Hawk Creek runs near Maynard and has caused some minor flooding issues in the city.

Milan. The city of Milan is located approximately 15 miles northwest of Montevideo. Milan is Chippewa County's second smallest city with an estimated 418 people and 154 households (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates). U.S. Highway 59 and State Highway 7 are joined at this point and run through the city from the northwest to the southeast. State Highway 40 runs along the southern edge of the city. Milan is located approximately two miles north of Lac qui Parle Lake.

Watson. The city of Watson is located approximately five miles northwest of Montevideo along the joined U.S. Highway 59 and State Highway 7. The city is located approximately two miles northeast of the Minnesota River. Watson is the county's smallest city with an estimated population of 250 residents and 104 households (U.S. Census Bureau, 2008-2012 American Community Survey, 5-Year Estimates).

As shown in Table 2.7 below, the distribution of population within Chippewa County has not significantly changed from 1970 to 2012. Notably, the main trend shows an increase of people living in cities versus rural townships. The greatest change from 1970 to 2007 is the overall decrease in population from 9,428 to 5,473, a loss of 3,955 residents. Table 2.8 identifies population, household units, households, persons per household, and person in group quarter comparisons from 1970 to 2012 for the county as a whole.

**Table 2.7 CC Distribution of Population between Cities & Rural Areas from 1960 -2012**

	1960		1970		1980		1990		2000		2010		2012 (Est.)	
Townships	7,120	39%	5,872	34%	5,328	31%	4,435	29%	2,356	27%	3,946	32%	3,929	32%
Cities	10,957	61%	11,487	66%	11,953	69%	10,872	71%	10,732	73%	8,480	68%	8,480	68%
<b>Total</b>	<b>18,077</b>	<b>100%</b>	<b>17,359</b>	<b>100%</b>	<b>17,281</b>	<b>100%</b>	<b>15,307</b>	<b>100%</b>	<b>13,088</b>	<b>100%</b>	<b>12,426</b>	<b>100%</b>	<b>12,327</b>	<b>100%</b>

Source: U.S. Census Bureau, 2008-2012 American Community Survey, Minnesota State Demographic Center and Metropolitan Council

**Table 2.8 Chippewa County Population Profiles**

	1970	1980	1990	2000	2010	2012 (Estimate)	2000-2010 Change		2010-2012 Change	
							Actual	Percent	Actual	Percent
Population	15,109	14,941	13,228	13,088	12,441	12,327	-648	-5%	-114	0%
Housing Units	5,308	6,120	5,755	5,855	5,721	5,730	-134	-2%	9	0%
Households	--	5,583	5,245	5,361	5,241	5,188	-120	-2%	-53	-1%
Persons per Household	--	2.68	2.52	2.39	2.33	2.33	0	-2.5%	0	0%
Persons in Group Quarters	--	238	236	297	209	263	-88	-30%	54	26%

Source: U.S. Census Bureau, 2008-2012 American Community Survey, Minnesota State Demographic Center and Metropolitan Council

Household characteristics have a direct impact on land use, housing needs, social services, and educational expenses. Changes in household size have a direct and proportional effect on demand exerted and types of housing necessary for communities. As household size decreases, the demand for housing units will increase. Chippewa County had an estimated 5,730 in 2012. Table 2.9 identifies the status of vacant houses in 2012. The conditions, type and variety of housing offered by communities directly influence the sustainability and vitality of the entire county. General county-wide housing characteristics are shown in Table 2.10.

**Table 2.9 CC Vacancy Status in 2012**

<b>Vacancy Status</b>	<b>Number of Units</b>
For rent	52
For sale only	190
Rented or sold, not occupied	18
For seasonal, recreational, or occasional use	29
For migrant workers	9
Other vacant	244
<b>Total</b>	<b>542</b>

Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.10 CC Housing Characteristics in 2012**

<b>Total Housing Units</b>	<b>Total Structures Built</b>	<b>Owner Occupied</b>	<b>Renter Occupied</b>	<b>Total Occupied</b>	<b>Vacant</b>
2010 or later	0	0	0	0	0
2000 to 2009	212	162	35	197	15
1990 to 1999	518	266	189	455	63
1980 to 1989	327	208	102	310	17
1970 to 1979	925	582	268	850	75
1960 to 1969	523	269	236	505	18
1940 to 1959	1,341	967	257	1,224	117
1939 or earlier	1,884	1,308	339	1,647	237
<b>Total</b>	<b>5,730</b>	<b>3,762</b>	<b>1,426</b>	<b>5,188</b>	<b>542</b>

Source: U.S. Census Bureau, 2008-2012 American Community Survey



### *Age and Sex Characteristics*

Since 1970, the county's population has "aged." Minnesota Planning predicts that the percent increase in elderly population will grow at a faster rate than the total population over the next 30 years. It is during this time frame that "baby boomers" will reach retirement age. This is a strong indicator of the need for many senior-related services, including senior housing and transit services.

Tables 2.11 and 2.12 show the age and sex characteristics in Chippewa County. When evaluating data, each of the cities within the county had very similar distribution to the county as a whole. The entire county has a greater percentage of people ages 65 and over compared to that of the state.

**Table 2.11 CC Age Characteristics in 2012**

	Under 18	18 and Older	Under 40	40 and Older	Under 65	65 and Over
<b>Minnesota</b>	24%	76%	53%	47%	87%	13%
Chippewa County	24%	76%	53%	47%	81%	19%
Montevideo	25%	75%	49%	51%	79%	21%
Granite Falls	24%	76%	50%	50%	78%	22%
Clara City	26%	74%	48%	52%	74%	26%
Maynard	24%	76%	52%	48%	86%	14%
Milan	25%	75%	55%	45%	86%	14%
Watson	26%	74%	36%	64%	82%	18%

Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.12 CC Sex Characteristics in 2012**

	Male	Female
Minnesota	49%	51%
Chippewa	49%	51%

Source: U.S. Census Bureau, 2012 American Community Survey.

### *Economic Synopsis*

Chippewa County's economic atmosphere supports an agricultural base, recreation, tourism, services, retail, trade and government. With strong and mature manufacturing and service-related industries, Chippewa County provides an ideal location for expansion of established businesses, as well as additional ventures. With excellent access to transportation systems, close proximity to the major urban centers; Chippewa County is positioned to have a vibrant economy for many years to come.

Sixty-eight percent of Chippewa County residents 16 years old and over are in the labor force and three percent are unemployed, according to the 2012 American Community Survey. Tables 2.13 and 2.14 provide an in-depth breakdown of labor statistics and occupations by business and industry types in Chippewa County from 2012. In short, over 50 percent of the civilian labor force population was employed and likely in the Educational/Health/Social Services, Agriculture, Forestry, Fishing and Hunting, and Mining industries, or in retail trade. Table 2.15 lists the employers with over 50 employees at their locations in Chippewa County.

**Table 2.13 CC Labor Statistics in 2012**

<b>Employment Status</b>	<b>Number</b>	<b>Percent</b>
<b>Population 16 years and older</b>	9,823	100%
In labor force	6,708	68%
Civilian labor force	6,704	68%
Employed	6,374	65%
Unemployed	330	3.4%
Percent of civilian labor force	4.9%	x
Armed Forces	4	0%
Not in labor force	3,115	32%
<b>Commuting to Work</b>		
Car, truck, or van – drove alone	4,863	78%
Car, truck, or van -- carpooled	568	9%
Public transportation (including taxicab)	141	6%
Walked	20	0%
Other means	96	2%
Worked at home	443	7%
Mean travel time to work (minutes)	17.4	x

Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.14 CC Industries for the Employed Civilian Population in 2012**

Agriculture, Forestry, Fishing and Hunting, and Mining	561
Construction	488
Manufacturing	1,011
Wholesale Trade	137
Retail Trade	706
Transportation and Warehousing, and Utilities	313
Information	74
Finance, Insurance, Real Estate and Rental and Leasing	280
Professional, Scientific, Management, Administrative, and Waste Management Services	356
<b>Educational, Health and Social Services</b>	<b>1,617</b>
Arts, Entertainment, Recreation, Accommodation and Food Services	393
Other Services (except public administration)	240
Public Administration	198
<b>Total</b>	<b>6,374</b>

Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.15 CC Major Employers**

<b>Employers</b>	<b>Location Employee Size Range</b>
Chippewa County Montevideo Hospital	250 to 499
Friendship Homes Of Minnesota	250 to 499
Jennie-O Turkey Store	250 to 499
Walmart Supercenter	250 to 499
Avenues For Care	100 to 249
Chippewa County Commissioner	100 to 249
Clara City Care Center	100 to 249
Logic PD Inc.	100 to 249
Luther Haven Nursing Home	100 to 249
SL Montevideo Technology Inc.	100 to 249
Western Co-Op Transport Assn.	100 to 249
Western Cooperative Transport	100 to 249
Central Middle School	50 to 99
Chandler Industries Inc.	50 to 99
Coborn's Superstore	50 to 99
Impact Innovations Inc.	50 to 99
Kibble Equipment	50 to 99
Kruse Motors Auto Group	50 to 99
MACCRAY High School	50 to 99
Montevideo High School	50 to 99
Montevideo School District	50 to 99
Ramsey Elementary School	50 to 99
Specsys Inc.	50 to 99

Source: Department of Employment & Economic Development, 2015

As shown in Table 2.16 below, the highest percentages of households (20 percent) and families (25 percent) fall into the income range of \$50,000 to \$74,999 in Chippewa County. The estimated median household income for Chippewa County in 2012 was \$46,579. Table 2.17 shows the change in household median income in Chippewa County compared to the other counties in the region and the state since 2000.

**Table 2.16 CC Income Statistics in 2012**

	Households		Families	
	Number	Percentage	Number	Percentage
Less than \$10,000	364	7%	65	2%
\$10,000 to \$14,999	365	7%	104	3%
\$15,000 to \$24,999	471	9%	181	6%
\$25,000 to \$34,999	679	13%	292	9%
\$35,000 to \$49,999	872	17%	471	15%
\$50,000 to \$74,999	1,012	20%	808	25%
\$75,000 to \$99,999	714	14%	616	19%
\$100,000 to \$149,999	484	9%	455	14%
\$150,000 to \$199,999	150	3%	147	5%
\$200,000 or more	77	1%	69	2%
<b>Total</b>	<b>5,188</b>	<b>100%</b>	<b>1,596</b>	<b>100%</b>
<i>Median household or family income</i>	<i>\$46,579</i>	<i>-</i>	<i>\$62,435</i>	<i>-</i>

Note: Household count contains both families and persons living alone.

Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.17 Median Household Income within Region and Statewide**

Region	2000	2010	2012	% Change: 2000-2012
Minnesota	\$ 47,111	\$ 57,243	\$ 59,126	20.3%
<b>Chippewa</b>	<b>\$ 35,582</b>	<b>\$ 43,956</b>	<b>\$ 46,579</b>	<b>23.6%</b>
Big Stone	\$ 30,721	\$ 42,870	\$ 45,545	32.5%
Swift	\$ 34,820	\$ 41,486	\$ 45,984	24.3%
Yellow Medicine	\$ 34,393	\$ 50,288	\$ 52,134	34.0%
Lac qui Parle	\$ 32,626	\$ 45,550	\$ 50,203	35.0%

Source: U.S. Census Bureau American Community Survey 5-Year Estimates, 2008-2012

Tables 2.18 and 2.19 compare monthly housing expenses for renter-occupied units and owner-occupied units. In 2012, approximately one third of renters had rent lower than \$499 dollars per month, nearly 40% of mortgage holding owner-occupied units spent between \$700 and \$999 dollars per month.

**Table 2.18 CC Gross Rent in 2012**

Monthly Rent	Number	Percent
Less than \$200	53	4.3%
\$200 to \$299	63	5.1%
\$300 to \$499	289	23.2%
\$500 to \$749	360	28.9%
\$750 to \$999	270	21.7%
\$1,000 to \$1,499	96	7.7%
\$1,500 or more	113	9.1%
No cash rent	182	x
<b>Total</b>	<b>1,244</b>	<b>100%</b>
<i>Median of rented units</i>	\$692	

Source: U.S. Census Bureau, 2008-2012 American Community Survey

**Table 2.19 CC Owner-Occupied Selected Monthly Owner Costs in 2012**

Monthly Payments	Number	Percent
<i>With a mortgage</i>	2,156	57%
Less than \$300	0	0%
\$300 to \$499	54	2.5%
\$500 to \$699	271	12.6%
\$700 to \$999	541	25.1%
\$1,000 to \$1,499	852	39.5%
\$1,500 to \$1,999	275	12.8%
\$2,000 or more	163	7.6%
<i>Median of mortgaged units</i>	\$931	X
<b>Not mortgaged</b>	<b>1,606</b>	<b>43%</b>
<i>Median of not mortgaged units</i>	\$393	X
<b>Total</b>	<b>3,762</b>	<b>100</b>

Source: U.S. Census Bureau, 2008-2012 American Community Survey

## Community Infrastructure

This section identifies Chippewa County's schools, public facilities, parks and natural resources, and available modes of transportation offering transit, airport facilities, roads, and a multitude of trail opportunities. A complete listing of telecommunication and power facilities has been provided along with city-specific water and sewer systems currently in place throughout the county.

### *Schools*

Chippewa County consists of four School Districts: Lac Qui Parle Valley, Yellow Medicine East, Montevideo, and MACCRAY (Table 2.20). Lac qui Parle Valley District covers the northwest corner of the county and includes Milan and Watson. Yellow Medicine East School District covers Granite Falls and the rest of the southern portion of Chippewa County. Montevideo School District includes the west central part of the county, which includes the city of Montevideo. MACCRAY School District covers the eastern part of the county, which includes Clara City and Maynard.

**Table 2.20 CC Schools & Locations**

<b>Chippewa County Schools</b>	<b>Addresses</b>
Montevideo Senior High School	1501 Williams Ave., Montevideo, MN 56265
Montevideo Middle School	2001 Williams Ave., Montevideo, MN 56265
Ramsey Elementary Schools	501 Hamilton Ave., Montevideo, MN 56265
Sanford Education Center	412 S 13th St., Montevideo, MN 56265
Minnesota Valley Learning Center	313 Black Oak Ave., Montevideo, MN 56265
Saint Paul Lutheran	321 N 5 <sup>th</sup> St., Montevideo MN 56265
West Elementary School	700 Agnes Ave., Maynard, MN 56260
Senior High School	711 Wolverine Drive, Clara City, MN 56222
MACCRAY Area Learning Program	430 North Main St., Clara City, MN 56222

### *Public Facilities*

Public Facilities have been mapped in Chapter 4. Important public facilities include city and town halls, county courthouse, libraries, parks, churches and historic resources. These places provide both public services and create an important sense of community character. Most public facilities are located in the cities. There are parks and wildlife management areas located in the county.

**Table 2.21 CC City Facilities**

<b>Clara City</b>	
City Hall /Community Center/Fire Department	215 1 <sup>st</sup> Street NW
Public Library	42 W Center Avenue
Swimming Pool	136 NW 3 <sup>rd</sup> Avenue
Community Hall	30 NW 2 <sup>nd</sup> Avenue
Nursing Home	1012 N Division St
Disposal Plant	515 1 <sup>st</sup> Street SW
Clara City Water Treatment Plant	400 S. Division Street
Wastewater Plant	110 <sup>th</sup> Ave SE
<b>Maynard</b>	
Maynard City Hall/Library/ Community Center	321 Mabel Street
Maynard Event Center	341 Cynthia Street
<b>Milan</b>	
Fire Hall/City Hall	224 2 <sup>nd</sup> Street North
Public Library	235 2 <sup>nd</sup> Street North
<b>Montevideo</b>	
City Hall/Police Department	103 Canton Avenue
Fire Department	911 North 11 <sup>th</sup> Street
Chippewa County Courthouse	629 North 11 <sup>th</sup> Street
Armory	711 S 17 <sup>th</sup> Street
Community Center	550 SW 1 <sup>st</sup> Street
Plaza 3 Theaters	560 SW 1 <sup>st</sup> Street
Public Library	224 S. 1 <sup>st</sup> Street
Outdoor Swimming Pool	901 N 3 <sup>rd</sup> Street
Water Treatment Plant	1001 Ridgeview Drive
Wastewater Treatment Plant	501 Highway 7 West
Landfill	1050 Highway 7 SW
<b>Watson</b>	
Watson Community Center	503 County Road 9
Watson Town Hall	Central Ave

## *Transportation*

### **Roads**

Chippewa County is well served by an extensive roadway network that connects the county with the rest of the region and Minnesota. State, county, township, and city roads are all included in the roadway network. It is the primary means of transportation for both goods and people within and out of the county. A map of the Chippewa County Transportation system can be found in Appendix 1.

### *Trunk Highway System*

Chippewa County has five Minnesota State Trunk Highways: 7, 23, 277, 40 and 29, and two U.S. Trunk Highways: 212 and 59/7. Highway 59 is considered a U.S. Trunk Highway but where

Highway 7 joins 59 in Montevideo, 59 is considered a State Highway. These roads are constructed and maintained by the Minnesota Department of Transportation (MnDOT). Chippewa County has 6.8 miles of US Highways and 126 miles of State Highways.

### ***County Roads***

These roads are established, constructed and improved by the County Boards. They are under the sole authority of the County Board and stretch to 53.7 miles. There are currently 244 miles of County State-Aid Highways under the jurisdiction of the County.

### ***Township Roads***

A road established by and under the authority of the township board, or reverted to township jurisdiction by the County Board. These roads are constructed and maintained by township boundaries and Chippewa County contains 706.9 miles of township roads.

### ***City Streets***

These roads serve as direct access from residential properties and/or commercial establishments and are classified as any street under the jurisdiction of a municipality not otherwise designated as a trunk Highway, County State Aid Street, Highway or County Highway. Municipal streets total 62.2 miles.

### **Transit**

Mass transit is an essential public service to provide for increased capacity on heavily traveled roads, transportation access to disabled persons or those otherwise unable to drive, supports dense land use development, decreases dependence on car use, and helps prevent the creation of additional air pollution from diminished individual car use.

Chippewa County has one large mass transit provider, Prairie Five Rides, and two smaller municipal systems. Prairie Five Community Action Council, Inc. serves the entire five county region. It began serving the public with buses in July of 1995, and merged with Ortonville Area Transit July 1, 1999. Prairie Five started with five buses in 1995. The buses run from approximately 7 a.m. until 5:00 p.m., Monday through Friday and Prairie Five RIDES now operates 10 vehicles (small buses). In 2007, Prairie Five RIDES gave 76,851 rides driving 407,018 miles, compared to 2008 where they provided 83,405 rides and drove 399,071 miles.

Currently, the only city that has its own transit system is Granite Falls. Granite Falls operates one vehicle (small bus), which carried 20,893 riders and drove 27,890 miles in 2008.

### **Airports**

The Chippewa County airport is located in Montevideo. Montevideo airport has a paved runway, 4,000 feet in length and 75 feet wide; and on average, six planes land a day. Montevideo also has a turf runway, 2,400 feet in length and 150 feet wide.

### **Railroads**

Two rail lines operate in Chippewa County, the Burlington Northern Santa Fe (BNSF) line and the Twin Cities and Western Railroad Company (TC&W), mainly for agricultural purposes. The BNSF line operates a class four rail line in the southeastern portion of the county, running on the northern side of State Highway 23 east of Clara City. West of Clara City it continues along through Maynard and passes just northwest of Granite Falls. The BNSF rail line owns



approximately 1,626 miles of line (35 percent) of the total rail mileage in the state. TC&W line is a class three line running along the western edge of the county, parallel to the combined State Highway 7 and U.S. Highway 59 in the northern half of the county until Montevideo, where the rail line continues parallel to the Minnesota River on the north. BNSF runs 16 trains a day at 49 miles per hour and the Twin Cities Western runs two trains a day at 40 miles per hour.

### Trails

Chippewa County has a variety of trails available for use for county and visiting residents. Table 2.22 identifies trails and uses totaling over 260 miles (not including river canoe routes).

**Table 2.22 BSC Trails**

Trail Name	County	Location/ Descriptions	Length (miles)	Surface	Use
Ridgerunners Snowmobile Trail	Big Stone, Chippewa, Swift	Routes throughout counties	140	Snow	Snowmobile
Snowdrifters Snowmobile Trail	Chippewa, Lac qui Parle, Yellow Medicine	Routes throughout counties	103	Snow	Snowmobile
Milan Beach Trail	Chippewa	State Hwy. 40	5	Paved	Walk, Bike, Inline Skate
Granite Falls Trail	Chippewa	Within Granite Falls City	2	Paved	Walk, Bike, Inline Skate
Historic MN River	Chippewa	Chippewa CSAH 15, Montevideo to Wegdahl	5	Paved	Walk, Bike, Inline Skate
Montevideo Trails	Chippewa	Inner City Trails	5	Paved	Walk, Bike, Inline Skate
Chippewa River Canoe Route	Swift, Chippewa	Chippewa River	Unknown	Water	Canoeing
Minnesota River Canoe Route	All Counties	Minnesota River	Unknown	Water	Canoeing

Source: UMRDC Trail Planning Guide (2002)

## *Telecommunication and Power Facilities*

### **Internet, Electric, Gas and Phone**

Table 2.23 below identifies the telecommunication and power facilities within Chippewa County.

**Table 2.23 CC Telecommunication and Power Facilities**

<b>City</b>	<b>Telecommunication Internet, Cellular, Cable</b>		<b>Electric</b>	<b>Gas</b>	<b>Phone</b>
Clara City	Clara City Telephone Co. Midwest	Wireless Media Com– Prior Lake Verizon Wireless	Xcel	Dooleys	Clara City Telephone Co.
Maynard	MVTV Wireless Frontier Communications	Wireless Media Com– Prior Lake	Xcel MN Valley Coop	Dooleys	Clara City Telephone Co. Centurylink Telephone Co.
Milan	Federated Telephone Co.	MVTV Wireless	Ottertail Power Company	--	Federated Telephone Co.
Montevideo	Numerous Cellular	Numerous Internet Charter Quest	Xcel MN Valley Coop	Great Plains Natural Gas	Charter Communications
Watson	MVTV Wireless, Direct TV, Dish Network,		Xcel	Dooleys	Century Link

Rural areas of Chippewa County are served by MN Valley Electric Coop.

### **Radio**

Chippewa County has two FM and two AM radio stations. Granite Falls has KKRC (FM) and KOLV (AM) that provides up to date weather readings. Montevideo has KMGM (FM) and KDMA (AM) that provides up-to-date weather readings.

### *Sewer and Water Systems*

All cities in Chippewa County have a municipal water and sewer system. The City of Watson recently completed the construction of a new sewer and water system in the city. The sewage coming from the city of Watson is now pumped to Montevideo for treatment. Residents outside these areas are served by individual wells and septic systems.

### *Emergency Response*

A county's ability to respond to an emergency situation or event is based on service areas, facilities, and equipment. An understanding of response times and abilities is critical in protecting the citizens of Chippewa County. The existing facilities and equipment in the county are intended to address local needs and support regional needs. Chippewa County is considered a mutual aid county and provides and receives support from adjacent counties. The following summary and description serves as an inventory of the response facilities for Chippewa County.

### **Medical Facilities**

Chippewa County is served by three clinics and one hospital. All Chippewa County medical facilities are identified in Tables 2.24 and 2.25. Chippewa County is served by one hospital and three clinics. The clinics are all served by the doctors of the Montevideo Clinic. Montevideo has two ambulances and Clara City has one ambulance. Granite Falls has three ambulances. The Montevideo ambulances are backed up by the ambulance service in Clarkfield. Both Montevideo and Appleton provide ambulance service for Milan.

**Table 2.24 CC Ambulance Services**

<b>Ambulance Services</b>	<b>Number of Ambulances</b>
Clara City	1 ambulance
Granite Falls	3 ambulances, 1 with Advanced Life Support
Maynard	Served by Montevideo and Clara City
Milan	Served by Montevideo and Appleton
Montevideo	3 ambulances, 1 with Advanced Life Support
Watson	Served by Montevideo

**Table 2.25 CC Hospitals & Clinics**

<b>Clinic Name</b>	<b>Location</b>
Montevideo Clinic	824 North 11th Street, Montevideo, MN 56265
Clara City Clinic	Under Construction, Clara City, MN 56222
Milan Clinic	237 Main Street, Milan, MN 56262
Chippewa County-Montevideo Hospital	824 North 11th Street, Montevideo, MN 56265
Luther Haven Nursing Home	1109 MN Highway 7, Montevideo, MN 56265

## Fire Services

There are no full-time fire departments in Chippewa County. All fire departments are volunteer-based with responsibilities divided into four response zones. The Department of Natural Resources (DNR) is responsible for fire protection on state forest and parkland and the U.S. The DNR and USFWS work closely with local fire units for protection of these lands through contracting agreements. Additionally, all fire departments have mutual aid agreements.

**Table 2.26 CC Fire Capabilities**

City	Pumpers	Tankers	100' Aerial	Grass Rigs	Air Packs	Number of Firemen
Clara City	2	3		2	8	21
Maynard	1	2		2	10	27
Milan	2	2		2	20	18
Montevideo	3	2	1	2	20	28
Watson (private)_	2	1		1	15	12

Source: Chippewa County, City Surveys 2015

Other equipment available throughout Chippewa County includes the purchase of personal protection equipment and turnout gear/wetland gear for firefighters, thermal imaging cameras, compressors, containment fill station, and defibrillators.

## *Public Safety*

### **Emergency Operations Center**

Located in Chippewa County Assembly Room in Montevideo, the center provides a point for strategic command for all events in Chippewa County.

The Farm Service Agency has the capacity to serve as an emergency operations center for any city in Chippewa County. Services available include multiple phone lines, access to internet and fax, and desk space. Food can be brought in if necessary.

### **Emergency Warning Systems**

The Chippewa County Public Service Answering Point (PSAP) is the Chippewa County warning point. The Chippewa County Sheriff has overall responsibility to ensure all notifications received by the warning point are handled properly. The Chippewa County warning points are responsible for proper receipt and dissemination of all emergency notifications. The National Weather Service tower in Appleton and the Marshall NAWAS Warning Point are responsible for disseminating all watches and warnings to the Chippewa County warning point, except warnings for conditions generated within the county itself.

The Chippewa County Warning Point is at the Law Enforcement Center in Montevideo, which has 24-hour warning capability. All cities in Chippewa County have emergency sirens in working condition. All city sirens have battery backup power, except Montevideo and Watson.

### **Police Departments**

Stations are located in Clara City and Montevideo. Law enforcement capabilities are listed in Table 2.27 for Chippewa County.

**Table 2.27 CC Law Enforcement Capabilities**

<b>Location</b>	<b>Officers</b>	<b>Squad cars</b>
Chippewa County	8 Full-Time, 7 Part-Time	9
Clara City	2 Full-Time, 3 Part-Time	2
Montevideo	10 Full-Time, 6 Part-Time	5
Granite Falls	5 Full-Time, 6 Part-Time	2

Source: Chippewa County Emergency Manager

### **Countryside Public Health**

Countryside Public Health Services is the County Department of Health for Chippewa, Swift, Lac qui Parle, Big Stone and Yellow Medicine counties. Part of their mission is designed to protect the health of the general population by emphasizing the prevention of disease, injury, disability and death through effective coordination, use of community resources, and provide education, training, WIC program, disease prevention and control and environmental programs.

Countryside Public Health has the ability to respond to health emergencies and is currently developing a Medical Reserve Corp (MRC) for volunteers.

### **Heavy Equipment Inventory**

The County Highway Department has equipment that can be used in case of an emergency from tornados to floods.

**Table 2.28 County Highway Department Equipment List**

<b>Location</b>	<b>Equipment Available</b>
<b>Montevideo</b>	8 Pick Ups, 3 Dump Trucks, 3 Loaders, 1 Grader
<b>Clara City</b>	4 Pick Ups, 1 Loader, 1 Bucket Truck (55 ft), 2 Dump Trucks, 1 Boom Truck, 2 Generators (125 KW and carry by hand)
<b>Maynard</b>	
<b>Milan</b>	1 Pick Up, 1 Tandem Truck, 1 Backhoe/Loader,
<b>Watson</b>	
<b>County</b>	14 Pick Ups, 7 Tandem Trucks, 1 Backhoe/Loader, 6 Dump Trucks, 5 Tractors, 2 Loaders, 2 Graders, 1 Generator (5000 Watt), 1 Portable Light Generator, 1 Water Pump (3")

### **Property**

#### **Land Uses**

Land uses are regulated in Chippewa County through county ordinances. Cities in Chippewa County have zoning ordinances that regulate the building construction and location of manufactured home parks.

#### **Manufactured Home Parks**

There is one manufactured home park in Chippewa County located near Montevideo. Manufactured home parks are allowed as a conditional use and must follow guidelines as set forth in the Chippewa County Ordinance Code.

#### **Current Codes**

Chippewa County has a floodplain ordinance adopted in 1993 and amended in 1997. The floodplain ordinance regulates permitted uses and development in the 100-year floodplain. Montevideo, Granite Falls, and Milan have adopted floodplain ordinances.

Montevideo and Granite Falls have adopted the universal building code. Construction of new buildings in Montevideo and Granite Falls require the use of tie-downs in the foundation in order to withstand high wind conditions. Montevideo also requires roof tie-downs. Other cities and the county do not regulate the use of tie-downs.

## CHAPTER 3: HAZARD INVENTORY

The hazard inventory chapter is divided into two parts: Natural Hazards and Manmade/Technological Hazards, defined by the Minnesota State Hazard Mitigation Plan.

### Definition – Natural Hazard

*Natural hazards are those presented by the physical world, rather than those presented by humans. In a natural hazard, there is an interaction between the physical world, the constructed environment, and the people that occupy them. Natural Hazards are primarily atmospheric or geologic.*

### Definition – Technological Hazard

*Technological hazards are those presented by humans, rather than those presented by nature. They are comprised of substances and processes that are flammable, combustible, explosive, toxic, noxious, corrosive, oxidizers, irritants, or radioactive.*

During the first Chippewa County All-Hazard Mitigation Task Force Meeting, the hazards included in the previous plan were reviewed. The task force felt it was important to include erosion as a hazard in this plan update as soil and wind erosion have been increasing issues in Yellow Medicine County over the last decade as more and more land has been converted into cropland. The task force also decided that adding a section on climate change to all applicable hazards would be a good way to introduce the hazard into the plan. As climate change becomes more prevalent in the region, subsequent plans can further explore this topic in terms of mitigation strategies. Table 3.1 lists each of the hazards previously included in the plan, as well as the new hazards included in this plan update.

**Table 3.1 Hazards in CC**

Hazard	In Previous Plans	Addition to 2015 Plan
Violent Storms	X	
Extreme Temperatures	X	
Floods	X	
Erosion		X
Drought	X	
Wildfires	X	
Dam Failures	X	
Climate Change		X
Infectious Disease	X	
Fire	X	
Hazardous Material	X	
Water Supply Contamination	X	
Civil Disturbance/Terrorism	X	

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## NATURAL HAZARDS – PRESENTED BY THE PHYSICAL WORLD

### Introduction

Source: Minnesota State Hazard Mitigation Plan

Guarding against the unpredictable forces of nature has always been a goal of society. Ways to accomplish this goal include informing society of known hazards and constructing building environments to prevent serious damage from occurring. As the forces of nature can strike with unpredictable fury, there is always an element of risk associated with natural hazards. To inventory hazards that have occurred in Chippewa County the Local Task Force committee identified hazards, established relationships between hazards, recognized current plans and programs in place to mitigate hazards, and highlighted gaps and overall deficiencies in current plans and programs.

For the purposes of this plan, natural hazards identified are organized into these groups:

#### 1. Violent Storms

##### a. Winter Storms

*Blizzards, Ice Storms, Sleet Storms, Heavy Snow or Snow Storm*

##### b. Summer Storms

*Thunderstorms, Lightning, Tornadoes, Hailstorms, Windstorms*

#### 2. Extreme Temperatures

**Summer Heat, Winter Cold**

#### 3. Floods

#### 4. Drought

#### 5. Wildfires

#### 6. Dam Failures

### Violent Storms

Violent storms can occur throughout the year in Chippewa County. For practical purposes violent storms are categorized as summer or winter storms although there is no sharp end or beginning to when they might occur.

#### *Winter Storms*

Chippewa County experiences three basic types of winter storms: blizzards, heavy snow events and ice storms. Ice storms include freezing rain, freezing drizzle and sleet.

**Blizzards** Blizzards, the most violent of winter storms, are characterized by low temperatures usually below 20° F, strong winds in excess of 35 miles per hour, and blowing snow that creates visibility issues at one-quarter mile or less for at least three hours. Blowing snow can result in whiteouts and drifting on the roadways, leading to stranded motorists and the difficulty or inability of emergency vehicles to respond to incidents. While blizzards can occur in Chippewa County from October through April, they most commonly occur from November through the end of March.



**Ice Storms** Freezing rain, the most serious of ice storms, occurs during a precipitation event when warm air aloft exceeds 32° F while the surface remains below the freezing point. When precipitation originating as rain or drizzle contacts physical structures on the surface, ice forms on all surfaces creating problems for traffic, utility lines, and tree limbs.

**Sleet Storms** Sleet forms when precipitation originating as rain falls through a rather large layer of the atmosphere with below freezing temperatures, allowing raindrops to freeze before reaching the ground. Sleet is also commonly referred to as ice pellets. Sleet storms are usually of shorter duration than freezing rain and generally create fewer problems.

**Heavy Snow or Snowstorm** In Minnesota, six or more inches of snow in a 12-hour period or eight or more inches of snow in a 24-hour period defines a heavy snow event. Snow is considered heavy when visibility drops below one-quarter mile regardless of wind speed.

**Table 3.2 CC Winter Events from 1993 - 2013**

Winter	1993-1994	1994-1995	1995-1996	1996-1997	1997-1998	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003
Number of Events	5	4	10	9	1	4	2	6	4	2
Winter	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Number of Events	5	2	3	1	3	7	7	7	2	6
Events include: blizzards, winter storm, heavy snow, blowing snow, ice storm, glaze, low and extreme wind chills										

Source: National Climatic Data Center – Event Query 2014

### ***History of Winter Storms in Chippewa County***

Between November 1993 and March 2013, the National Climatic Data Center reported 20 blizzards. The winters of 1995–1996 and 1996–1997 were exceptionally extreme. Four blizzards were reported during the season of 1995-1996 and three blizzards were reported during 1996-1997. In addition, heavy snow, high wind and winter storms made these two winters difficult for Chippewa County. The winter of 1996-1997 was declared a Presidential disaster because of the snow emergency. There were many school closings during this winter. Snow removal was extremely expensive and large snow load both damaged and destroyed buildings. The roof on the wastewater treatment plant in Clara City was destroyed during the winter of 1996-97 because of the snow load. More recently, there was record setting snowfall in December of 2010 and April of 2013.

There are two weather stations in Chippewa County located in Milan and Montevideo. Tables 3.3 and 3.4 show the snowfall records for these two weather stations. Milan had a record snowfall of 92 inches during the 1996-1997 winter season. In 1996, the blizzard of mid-January dropped record amounts of snow on both Milan and Montevideo.

**Table 3.3 CC Snowfall Extremes by Month from 1951 - 2013**

Month	Milan		Montevideo	
	High (in)	Year	High (in)	Year
January	29.5	1975	33	1982
February	25.5	1952	28	1962
March	33.5	1951	44	1951
April	29	2013	23.5	2013
May	1	1954	1	1954
June	0	-	0	-
July	0	-	0	-
August	0	-	0	-
September	0	-	0	-
October	8.2	2009	6	1991
November	20	2001	25	1985
December	25.3	2010	32.5	2010
<b>Season (Jul-Jun)</b>	92	1996-1997	82.2	1983-1984

Source: Midwest Regional Climate Center 2014

**Table 3.4 Chippewa County Largest One-day Snowfall  
in Milan and Montevideo from 1951 - 2013**

Month	Milan		Montevideo	
	1-Day Max (in)	Date	1-Day Max (in)	Date
January	11	1/18/1996	12	1/18/1996
February	12	2/20/2011	12	2/21/2011
March	15	3/21/2008	14	3/3/1989
April	15	4/11/2008	8	4/11/2013
May	1	5/11/1966	1	5/2/1954
June	-	-	-	-
July	-	-	-	-
August	-	-	-	-
September	-	-	-	-
October	4	10/22/1951	6	10/31/1991
November	9	11/27/2001	12	11/28/1983
December	10	12/9/2012	12	12/9/2012
<b>Season (Jul-Jun)</b>	15	3/21/2008 & 4/11/2008	14	3/3/1989

Source: Midwest Regional Climate Center 2014

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

Because most of Chippewa County is relatively flat, dangerous winter conditions are created when the wind blows including drifting, white outs and wind chills. Drifting and blizzard conditions can occur even if there are no new snow accumulations. During the winter of 1996-1997, drifts were higher than most street vehicles.

The winter of 1996-1997 also contributed to record spring flooding. This event is discussed in the flooding section.

## *Summer Storms*

**Thunderstorms** Thunderstorms are the most common summer storm in Chippewa County, occurring primarily during the months of May through August with the most severe storms most likely to occur from mid-May through mid-July. Thunderstorms are usually localized and produced by cumulonimbus clouds, always accompanied by lightening, and often have strong wind gusts, heavy rain, and sometimes hail or tornadoes.

**Lightning** While windstorms and tornadoes are significant hazards associated with severe thunderstorms, lightning is the most frequent hazard associated with thunderstorms and the hazard that results in the greatest loss of life. Lightning occurs to balance the difference between positive and negative discharges within a cloud, between two clouds and between the cloud and the ground. For example, a negative charge at the base of the cloud is attracted to a positive charge on the ground. When the difference between the two charges becomes great enough a lightning bolt strikes. The charge is usually strongest on tall buildings, trees and other objects protruding from the surface. Consequently, such objects are more likely to be struck than lower objects.

While cloud-to-ground lightning poses the greatest threat to people and objects on the ground it actually accounts for only 20 percent of all lightning strikes. The remaining lightning occurs within the cloud, from cloud to cloud, or from the ground to the cloud. Within-cloud lightning is the most common type.

**Tornadoes** Tornadoes are the most violent of all storms. A tornado is a rapidly rotating column of air, spawned by a cumulonimbus cloud. When it drops to the ground it can create significant damage and loss of life. Tornadoes always occur in association with thunderstorms. While somewhat more common in southern Minnesota, they have occurred in all counties in the state.

Tornadoes are most likely to occur during warm, humid spells during the months of May, June, July, and August but have occurred as early as March and as late as November in Minnesota. On occasion tornadoes called cold air funnels occur after the passage of a cold front when air is much less humid but the air aloft is very cold creating enough instability to make funnel clouds. Most tornadoes occur during the warm part of the day – late afternoon or early evening; over 80 percent of tornadoes occur between noon and midnight.

The tornado's path typically ranges from 250 feet to a quarter of a mile in width. The speed of a tornado varies but commonly is between 20 and 30 mph. However, larger and faster tornadoes have occurred in Minnesota. Most tornadoes stay on the ground for less than five minutes. Tornadoes frequently move from the southwest to the northeast but can vary in direction during some instances.

**Hailstorms** Hail is considered ice and is a result of severe thunderstorms. Hail is formed when strong updrafts within the cumulonimbus cloud carry water droplets above the freezing level or when ice pellets in the cloud collide with water droplets. The water droplets freeze or attach themselves to the ice pellets and begin to freeze as strong updraft winds toss the pellets and droplets back up into colder regions of the cloud. Both gravity and downdrafts in the cloud pull the pellets down, where they encounter more droplets that attach and freeze as the pellets are

tossed once again to higher levels in the cloud. This process continues until the hailstones become too heavy to be supported by the updrafts and fall to the ground as hail.

Most hail in Minnesota ranges in size from pea-size to golf-ball sized hail. Larger hailstones have been reported but are much less common. Strong updrafts are usually associated with severe thunderstorms. The area covered by individual hailstorms is highly variable because of the changing nature of the cumulonimbus cloud. While almost all areas of southern Minnesota can expect some hail during the summer months, most hail is not large enough to cause significant crop or property damage.

Windstorms Windstorms can and do occur in all months of the year but the most severe windstorms usually occur during severe thunderstorms in the warm months. These include tornadoes and downburst or straight line winds. Winds of greater than 60 mph are also associated with intense winter, spring, and fall low-pressure systems. These inflict damage to buildings and in some cases overturn high profile vehicles.

Straight-line Winds A downburst is a severe, localized downdraft from a thunderstorm or a rain shower. This outflow of cool or colder air can create damaging winds. Winds up to 130 mph have been reported in the strongest thunderstorms. Downburst winds can cause as much damage as a small tornado and are frequently confused with tornadoes because of the extensive damage they cause. As these downburst winds spread out they are often referred to as straight-line winds. They can cause major structural and tree damage over a relatively large area.

Strong winds combined with saturated soils can lead to wide spread loss of trees. This becomes a problem in communities when downed trees injure people, damage property, knock down power lines, or impede traffic. Downed power lines present a risk of electrocution or fire. Risks associated with downed trees can be managed through proper tree selection and proper maintenance programs. Some communities desire the look and feel of tree-shaded roads. This desire may lead a community to encourage the planting of trees that are too large for the boulevards, resulting in a greater risk of property damage.

### ***History of Summer Storms in Chippewa County***

Chippewa County has experienced all of the summer storms described above. Thunderstorms, hail storms, and windstorms are relatively common and can topple trees, cause destruction to homes, and destroy agriculture crops. Table 3.5 lists the number of summer storm events between 1955 and 2013 reported by the National Climatic Data Center. The average number of each type of events per year in Chippewa County is also calculated.

**Table 3.5 Chippewa County Summer Storms from 1955 - 2013**

	<b>Thunderstorm Wind 1955-2013</b>	<b>High Wind 1955-2013</b>	<b>Hailstorms 1955-2013</b>	<b>Tornados 1955-2013</b>
Events	46	13	56	11
Years	58	58	58	58
Average per year	0.79	0.22	0.97	0.19

Source: National Climatic Data Center – Event Query 2014

According to the Storm Database, the county has experienced eleven tornados since 1955, with the most recent three tornados receiving values of F0 and F1. In general, Chippewa County has been spared from significant tornado damage.

**Granite Falls Tornado.** An F4 tornado occurred on the Yellow Medicine side of Granite Falls on July 25, 2000. Chippewa County had two homes damaged by the strong winds of the storm. One person was killed, over a dozen injured, and millions of dollars of damage was done to residences, businesses, and public facilities in and around Granite Falls.

The tornado first touched down in rural Yellow Medicine County, eight miles west and three miles north of Granite Falls. The tornado lifted before exiting Granite Falls, leaving a concentrated damage path two miles long and 500 feet wide, through a primarily residential area of Granite Falls. Most of the damage in Granite Falls was caused by F2 to F3 wind speeds. However, this tornado has been classified as a minimal F4 tornado, based on the twisted wreckage of an overturned railroad car near the intersection of 9th Avenue and 14th Street in Granite Falls.

### **Violent Storms and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

**Winter Storms and Climate Change** Winter storms have had a large impact on public safety in Minnesota historically. Snowstorm frequency and annual total snowfall have the potential to increase in the future. These events increase energy demand and pressure on the systems that provide energy that can result in power outages. As these events increase in the future there is a risk of reduced reliability in services, increased number of outages, and rising energy costs that can affect public health.

Climate change will likely have different effects on different geographical regions of the country as well as within the state of Minnesota. In the absence of downscaled modeling, more specific predictions for smaller geographical areas are not available at this time. Therefore, the climate

change risks associated with Chippewa County are not mutually exclusive, but rather the effects in the county may differ from those of the state and Midwest region.

### Summer Storms and Climate Change

#### *Lightning and Climate Change*

According to the Draft National Climate Assessment (NCA), projections for the intensity and frequency of tornadoes, hail, and the damaging thunderstorm winds and the conditions associated with lightning are not certain (NCA, 2013, p. 26). The plan also stated that severe rain events are becoming more common and may include an additional risk of lightning.

#### *Tornadoes and Climate Change*

Tornadoes and other severe thunderstorm phenomena in the U.S. cause more deaths and similar amounts of annual property damage as hurricanes. Recent research has provided connections between global warming and the factors that cause tornadoes and severe thunderstorms. However, there is still a lot of research that has gone unexplored due to the challenges of observing these events and creating the computer models to simulate them (NCA, page 60).

#### *Hail and Climate Change*

The NCA reports uncertainty in predicting storm events associated with summer storms. However, during recent decades, the occurrence of very heavy precipitation has increased in Minnesota and it is predicted that this trend will continue into the future.

#### *Windstorms and Climate Change*

The NCA reported a slight increase of the frequency and intensity of winter storms and that the tracks of winter storms have shifted northward over the U.S. However, the lack of quality data sets makes assessment of these patterns difficult. Trends of storms remain uncertain and research will continue to investigate the connections between climate change and severe storms” (NCA, page 59).

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

Flooding. Thunderstorms and heavy rain can cause flooding and property damage as well as disrupt emergency response, transportation, and communication.

Transportation, Emergency Services, and Utility Disruption. Violent storms of all types can cause property damage, loss of life, personal injury, disrupt transportation, communication, and emergency services, and threaten public health and safety. Summer storms can present significant threats to essential public infrastructure and services such as power, water supply systems, and sanitary systems. Utility disruptions, in particular, are most likely to occur if a violent storm were to destroy an “electrical center” located in cities. It could take up to a full day to restore communication power, pending the service provider.

Fire. The storms listed above could knock down power lines, which could lead to fires.

### **Plans and Programs for all Severe Storms**

*Severe Storm Spotters Network.* This program, sponsored by the National Weather Service (NWS), enlists the help of trained volunteers to spot severe storm conditions and report this information to the NWS. No tornado warning is given unless the storm has been spotted by someone or is confirmed by NWS radar reports. Chippewa County has 80 emergency responders that have been trained as severe weather spotters and always has enough volunteers to make this an effective program.

*Severe Weather Awareness Week.* Each spring Chippewa County Emergency Management personnel conduct a severe weather-training workshop for schools, hospitals and nursing home personnel.

*Severe Weather Shelters.* Mobile home parks in and near Montevideo currently use the Chippewa County Courthouse as a severe weather shelter. Residents are notified when they move to the mobile home park of the location of the storm shelter. Residents are responsible to determine when to evacuate to the storm shelter.

*Windbreaks.* MnDOT and the Chippewa County Soil and Water Conservation District have been promoting a living snow fence program. Strategically planted strips of trees, shrubs and/or native grasses can use natural snow fences to protect highways and dramatically reduce blowing and drifting snow. MnDOT has worked with the USDA to access CRP resources to help implement this program.

*Live Weather Conditions.* The Montevideo school system has purchased a real-time weather monitoring station that provides current temperature, dew point, wind speed, wind direction and barometric pressure.

*Severe Weather Warning System.* All the county's cities have emergency sirens to warn residents in the event of severe summer weather.

*Weather Radios.* All of Chippewa County is within the broadcast range of the weather radio and some rural residents are within the range of the severe weather warning system sirens (\$50 at Radio Shack). The weather tower is in Appleton.

*Publication "The Right Tree"*. Minnesota Power has published *The Right Tree*. This handbook can be useful in selecting proper trees - especially around power lines. Proper maintenance of trees can also prevent problems. DNR forestry staff, as well as private consultants, is available to work with communities to develop community forestry programs.

*Hourly Data.* Hourly weather data is available online from various websites, including the MnDOT Website.

### **Gaps and Deficiencies**

- As much as 10 percent (approximately 500 homes) in the county lack basements that would provide shelter in the event of a tornado or damaging winds from a severe thunderstorm.
- Manufactured home parks in and around Montevideo are quite old and do not provide on-site safety shelters for residents. Emergency management personnel notify residents

of the location of the safety shelters when they move to the area. Residents are told to go directly to the Montevideo Hospital. Progress is being made on a safe room for 120 people near North Dale Mobile Home Park in Montevideo.

- Most power lines in the county are above ground and subject to damage from ice storms, wind and falling tree limbs. There are few community requirements that discourage the planting of large trees near power lines.
- Watson, population 205, could benefit from a safe room in the community to serve residents that do not have safe places to go during severe weather.



## Extreme Temperatures

Located in the center of the continent, Minnesota and Chippewa County experience the extremes of summer heat and winter cold. Summer temperatures in Chippewa County have exceeded 110° F on several occasions while winter temperatures have been as cold as 42°F below zero. Both heat and cold pose risks for people, animals, equipment, and infrastructure.

### History of Summer Heat in Chippewa County

In July, the warmest month of the year, the average high temperature is 84° F in most of Chippewa County. On average the county experiences 19 - 20 days of 90° F or higher during a summer. The all-time recorded high is 113° F in Milan, which occurred in 1934.

**Table 3.6 Chippewa County Temperature Extremes**

	Highest Temp	Date	Lowest Temp	Date
Milan	113° F	July 21, 1934	-42° F	February 16, 1936
Montevideo	110° F	July 31, 1988	-39° F	February 16, 1936

Source: Midwest Regional Climate Center 2014

While summers are typically warm but pleasant in Chippewa County, it is not uncommon to experience high dew points and temperatures in the 90s for several days in a row. Extended periods of warm, humid weather can create significant risks for people, particularly the very young, those that are ill, and seniors who may lack air conditioning and proper insulation or ventilation in their homes. Animals are also at risk during extended periods of heat and humidity.

Heat Index has been developed as a measure that combines humidity and temperature to better reflect the risk of warm weather to people and animals. The index measures the apparent temperature in the shade. People exposed to the sun would experience an even higher apparent temperature. A heat index of 105° F is considered dangerous. With prolonged exposure, it could result in heat stroke, heat exhaustion, and heat cramps. People are reminded to use extreme caution when the heat index is between 90° F and 105° F. A heat index of 90° F occurs when the temperature is 90° F and the relative humidity is 50 percent. This is more of a problem when these conditions are present for several days in a row, allowing buildings to become hotter and hotter as the conditions persist.

According to the State Climatologist, there is some evidence that current dew points are not only higher but are occurring with greater frequency than was true in the past. If that is true, Chippewa County residents can expect an increasing number of hours with heat indexes in the danger category.

### History of Winter Cold in Chippewa County

On average, January is the coldest month, with daytime highs of averaging 22° F and nighttime lows of 0° F. These averages, however, do not tell the entire story. Maximum temperatures in January have been as high as 69° F and minimums as low as 42° F below zero in Chippewa County. The winter months, on average, produce about 37-42 days of 0° F or lower.

Cold weather is often accompanied by winds creating a dangerous wind chill effect, putting both people and livestock at risk. Most of the county is at risk of this kind of weather because of its relatively flat, open character. More wooded, hilly areas of the county are less severely affected by wind chill. Wind chills of -35° F and lower can present significant risk, particularly if people are not properly clothed or protected. A -15° F air temperature with wind speeds of 10 miles per hour creates a wind chill of 35 degrees below zero. Under these conditions, frostbite can occur in just minutes on exposed skin.

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

*Violent Storms.* Temperature extremes are often associated with weather extremes such as snowstorms and blizzards.

*Drought.* Extended high temperature extremes can phase into drought.

*Wildfire.* Dry, hot conditions can increase the risk of wildfires.

*Collapsed Structures.* Structural weakness results from building material failure, settling, and other factors. Tornadoes, floods, high winds, snow, heavy rainfall, may cause major damage to structures.

*Utility Failure.* Heavy utility use to heat or cool buildings can cause utility damage or failure.

### **Extreme Temperatures and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

The average temperature in Minnesota has increased more than 1.5° F since recordkeeping began in 1895 and that increased warming has been occurring in recent decades (Interagency Climate Adaptation Team, p. 4). Midwest annual temperatures have generally been well above the 1901-1960 average since the late 1990s. The warmest decade on record occurred during the 2000s (Kunkel, K.E. et al, 2013). In addition, the Midwest has experienced major heat waves and their frequency has increased over the last six decades (Perera et al. 2012). In the U.S., mortality rates increase 4% on days with heat waves in comparison with non-heat wave days (Anderson and Bell 2011). It's been projected that heat stress will increase as summer temperatures and humidity continue to increase (Schoof, 2012).

In regards to extreme cold temperatures, the Minnesota State Hazard Mitigation Plan 2014 states that there is not yet any observable trend related to extreme cold events and climate change in Minnesota. Historically, cold temperatures have always been a part of Minnesota's climate and extreme cold events will continue. However, an increase in extreme precipitation or ice storms due to climate changes could lead to a higher risk of exposure to cold temperatures during power outages or other storm-related hazards during extreme cold.

The state hazard mitigation plan also notes that climate change will likely have different effects on different geographical regions of the country as well as within the state of Minnesota. In the absence of downscaled modeling, more specific predictions for smaller geographical areas are not available at this time. Therefore, the climate change risks associated with Chippewa County

are not mutually exclusive, but rather the effects in the county may differ from those of the state and Midwest region.

### **Plans and Programs for Extreme Temperatures**

The following programs and projects are in addition to the ones already mentioned for violent storms:

*School Closings.* The county's school districts each have their own school closing policy. The superintendents decide when to send students home based on current weather forecasts. Local radio stations partner with the districts to make sure school closure announcements are out by 6:00 a.m. or earlier.

*Heat Advisories.* The local radio and TV media in concert with the National Weather Service issues a heat advisory when the combination of temperature and humidity create risks for people and animals. A heat index of 105 to 114° F warrants a heat advisory. This occurs when air temperature reaches 95°F and the relative humidity is 50 percent. An excessive heat warning is issued when the heat index reaches 115°F. This occurs with an air temperature of 95°F and relative humidity of 60 percent. An index of 115° F or higher creates severe risk for both humans and animals.

*Wind Chill Warnings.* The local radio and TV media collaborate with the National Weather Service and issue wind chill warnings when temperatures are 30° F or below. Severe wind chill warnings are provided when conditions warrant and when severe risk and safety is a factor. Wind chills of -40°F or lower frequently prompt the closing of schools to protect children, particularly those that might have to wait outside for extended periods of time.

*Hourly Data.* Hourly weather data is available from the Automatic Weather Observation Station (AWOS) at the Chippewa County airport, located north of Montevideo, just off Highway 29. Information from this station is given to local radio stations to distribute to the public. The public can also call the airport to get weather reports.

### **Program Gaps or Deficiencies for Extreme Temperatures**

- None Listed

## **Flooding**

A flood is defined as an overflowing of water onto an area of land that is normally dry. For floodplain management purposes, the Federal Emergency Management Agency (FEMA) uses the following definition of “100-year or 1 percent flood.” Other water hazards considered in this section include flash floods and washouts.

The term “100-year flood” is the annual one percent chance that water levels will reach or exceed a defined flood elevation threshold. Thus, a 100-year flood could occur more than once in a relatively short period of time. The 100-year flood, which is the standard used by most federal and state agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance. A structure located within a special flood hazard area shown on a map has a 26 percent chance of suffering flood damage during the term of a 30-year mortgage. One-hundred year floodplains have been identified, mapped and used for further analysis using the county’s Geographic Information Systems (GIS).

Floods generally occur from natural causes, usually weather-related, such as a sudden snowmelt, often in conjunction with a wet or rainy spring or with sudden and very heavy rain falls. Floods can also result from human causes such as a dam impoundment bursting. Additional water hazards considered in this section include flash floods, washouts, and ice freezes that have potential to affect dams and culverts. In the spring of 2009 and 2010, a great amount of water overflowed roads causing a major washout and road closures throughout the county.

### **History of Flooding in Chippewa County**

The most severe flooding in Chippewa County occurs along the Chippewa and Minnesota Rivers when there is excessive rainfall, ice blockage of the channel, and/or rapid spring snow melt. Ice jams in eastern Granite Falls contribute to significant spring flooding. Flood damage may also result from improperly maintained or undersized ditches, excess drainage in the upper reaches of the watershed, or lack of upland retention structures. Hawk Creek and Shakopee Creek experience flooding problems whenever rain falls in excess of 4.5 inches. Major effects of excessive rainfall are flooding of agricultural lands and road washouts.

In 1997 and 2001, the Minnesota River floodwater was high enough to affect many business districts and homes within Chippewa County, including Montevideo and Granite Falls. Both flood events were considered 100-year floods. Communities are working together regionally, towards mitigation strategies to prevent such events from having detrimental safety and economic consequences. The main flooding problems are from the Chippewa and Minnesota Rivers and affect three areas: the 1969 Levee Area, Smith Addition, and U.S. Highway 212 area. The Reconnaissance Study identified the Highway 212 Area as the area most likely for a flood barrier to be cost effective. A feasibility study recommended a flood barrier protecting the 1969 Levee and Highway 212 areas. The U.S. Army Corps of Engineers felt that protecting the Smith Addition is not economically justified (US Army Corps of Engineers, St. Paul District).

### ***Granite Falls Flood History***

(Source: Granite Falls Flood Mitigation Plan 2001)

Floods on the Minnesota River at Granite Falls occur most often in the spring from snowmelt runoff. Low level flooding (events with an estimated frequency between 10 and 25 years) impacts areas directly adjacent to the main river channel. Flood fighting efforts for low level events is based more on individual efforts than community-wide efforts. At flood stage (approximately a 25-year frequency event), river flows are split between the main river channel and a secondary river channel along the west and south edge of the city that conveys water only at higher flows.

The record flood on the Minnesota River at Granite Falls took place in April 1997. This flood had a peak discharge of approximately 53,000 cubic feet per second (cu ft/s) at Granite Falls. This rate was measured at the Minnesota Falls Dam, located on the Minnesota River approximately 2.7 miles below the confluence of the secondary channel and the main river channel. The distribution of flows was estimated at 40,000 cu ft/s in the main channel and 13,000 cu ft/s in the secondary channel. A similar event occurred in the spring of 2001. While this event did not reach the same levels as in 1997, the magnitude of flows and impact to the community were similar. For more information, see Figures 3.1 and 3.2 provide more detail on these flood events.

Flood fighting efforts in the Granite Falls area during the last two floods consisted of hundreds of volunteers filling hundreds of thousands of sandbags and building sandbag levees around homes and businesses. Many agencies were involved in the previous two flood fighting efforts including the U.S. Army Corps of Engineers, Minnesota National Guard, National Weather Service, U.S. Geological Service (USGS), Minnesota Department of Transportation (MnDOT), as well as state, county, and local officials. Flood fighting itself carries significant risks for volunteers. Levee heights reach as high as ten feet. Volunteers worked day and night adjacent to the flooded Minnesota River, which was flowing at dangerous levels with velocities of 8 to 10 feet per second (12 to 15 mph), and with a water temperature just above freezing. In 2001, a total of 620,000 sandbags were filled and placed with volunteer labor and 550,000 of those were used to construct levees. Other large floods occurred in April 1952 (25,300 cu ft/s), April 1969 (43,000 cu ft/s), and April 2001 (cu ft/s is uncertain but likely between 34,600 and 43,000). Other smaller, but still significant flood events occurred in June 1919, April 1951, April 1965 and March 1994. It should be noted that ice flow or frazzle ice has exacerbated flooding impacts in the city on some occasions during spring flows.

Flood fighting efforts over the recent years has cost hundreds of thousands of dollars, extensive property damages, and economic hardship and has carried a significant risk for the volunteers involved in the flood fighting efforts.

### ***Hawk Creek Flooding***

In the 1950s, parts of Hawk Creek were channelized as a part of a USDA Flood Reduction project to help speed the flow of water and reduce flooding. This worked at a local level to control flooding but the faster flows may have increased flooding downstream. Currently, flooding is caused by ice jams that occur along Hawk Creek at bridges in both Maynard and

Clara City. Maynard has three bridges that hold back ice that causes flooding. Out of the five bridges in Clara City, one bridge has the potential to have ice jams, as a result of which flooding can occur.

The City of Willmar in neighboring Kandiyohi County discharges three million gallons of effluent daily from its new wastewater treatment plant into Hawk Creek. During rain events, it has reached as high as seven million gallons per day. During flood events, there is an EQ basin which can hold one million gallons.

### ***Montevideo Flood History***

Montevideo sits at the confluence of the Chippewa and Minnesota Rivers. During the major flood events, such as those in 1997 and 2001, the Chippewa River actually started to flow backwards because of the high waters of the Minnesota River. Businesses and residences in the Smith Addition have been flooded during these major events. Ninety-seven homes have been relocated and 18 remain. One commercial business was moved after the 1997 floods. The remaining 25 businesses in jeopardy of being flooded want relocation or better protection.

In 2009, Montevideo began to raise its existing levee system. The U.S. Army Corps of Engineers had studied the effects of this change in terms of how this may change where floodwaters threaten homes or businesses. The wastewater system will be better protected when the levee project is complete. Flood events happen periodically in the city, but these smaller floods do not cause damage. City crews usually have to respond by making sure pumps and all flood proofing is working properly. Other large flood events that caused damage happened in 1952 and 1969. In 1993, Montevideo was able to avoid damage through constant pumping at a cost of \$118,482.

### ***Milan Flood Event, 2009***

On March 23, 2009, approximately one mile southwest of Milan, a township road was washed out. Local rainfall totals varied from two to three inches before the storm moved north. Along with heavy rainfall and thick ice remaining on streams, creeks, and rivers, ice jams developed and caused flooding of roads and local communities. Several major rivers rose during this time period and caused additional road closures and some minor property damage.

Figure 3.1

**Flooding Reports from the National Climatic Data Center (NCDC) Storm Event Database**

<http://www4.ncdc.noaa.gov/cgi-win/wwwcgi.dll?wwevent~storms>

***Flash Flood, Montevideo  
May 7, 1993.***

Nearly six inches of rain fell in less than three hours flooding several thousand acres of cropland and flooding some basements in the vicinity of Montevideo.

***Flash Flood, Milan  
July 3, 1995***

Extreme rainfall between five and 15 inches resulted in severe property and crop damage. Numerous fields and roads were washed out. Hay bales were floating in fields. Thirty-two head of sheep drowned near the town of Milan. A Milan observer reported 9.78 inches of rain in a 24 hour period. Crop damage in Chippewa County affected 180,000 acres. Fifty-five thousand acres were a total loss. Damage was reported to 38 of the 42 township roads in Big Bend Township of northern Chippewa County. The Chippewa River at Milan rose nine feet on July 3<sup>rd</sup> and 4<sup>th</sup> and crested at 13.48 feet at 0100 on July 6<sup>th</sup>. This was the second highest crest ever of the Chippewa River at Milan. The river flooding subsided by July 10<sup>th</sup>.

***Flash Flood  
August 20, 2002***

Six to eight inches of rain fell within five hours, due to thunderstorms continually developing along an east-west boundary from Montevideo to the Clara City area. Streets were flooded with two to three feet of water in the lower sections of Montevideo. Numerous basements were also flooded.

***100-Year Floodplain***

The Federal Emergency Management Agency (FEMA) is an independent agency of the federal government whose mission is as follows:

*To reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards, through a comprehensive, risk-based emergency management program of mitigation, preparedness, response and recovery.*

FEMA identifies floodplains based on the risk of flooding in a given year. On FEMA floodplain maps, the area identified as a floodplain indicates that there is a one percent chance of a flood occurring in that area in a given year. A flood occurring in an area with a one percent chance of flooding is known as a 100-year flood.

***DNR Waters Summary***

***Factors that contributed to the 1997 flooding***

- Heavy autumn precipitation
- Extraordinary winter snowfall
- Less than ideal snowmelt scenario
- Heavy early spring precipitation

***Factors that contributed to the 2001 flooding***

- Significant autumn precipitation
- Heavy winter snowfall
- Less than ideal snowmelt scenario
- Record-breaking April precipitation

**Figure 3.2**

**Flooding Reports from the National Climatic Data Center (NCDC)  
Storm Event Database 2009**

<http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent-storms>

**April 1, 1997, 100-year flood**

Above normal temperatures during the last week of March began melting a deep snow cover across much of west central into parts of central Minnesota. Snow depth rank was in the 80 to 90th percentile over the area as measured on 3/20/97. The snow cover had high moisture content. In addition, several storms deposited additional rain and snow over the area on 3/24/97 and 4/5/97. The flooding resulted in severe losses to both public and private property. Damage was extensive to roads, bridges, culverts, agricultural drainage areas, homes and businesses. Scattered road closures were a result of the spring thaw as well.

Flood stage of the river in Montevideo was 14 feet which was reached on 4/2/97. The river crested at 23.9 feet on 4/7/97 establishing a new record crest in Montevideo. Other monitoring points along the Minnesota River reached crests that were at 3rd or 4th all-time record levels, including Mankato, Henderson, Jordan, Shakopee and Savage. Minnesota River flooding resulted in severe losses to public and private property. An early spring storm brought heavy rain, snow and high winds to the area on 4/5-6/97 at the peak of the flooding, severely aggravating the situation. Many roads were closed in the Montevideo and Granite Falls areas. Sanitary sewer lift station failed in Montevideo causing sewage to backup into homes. Four hundred residents were evacuated. Up to 150 homes in Montevideo reported flooding to some degree. Sewer backups were also reported in Watson and Clarkfield.

Hawk Creek, a tributary of the Minnesota River, caused a basement to collapse in Clara City. Dairy farmers were forced to dump milk due to inability to get trucks to farms. At one point, only one bridge (Highway 4 in Fairfax) spanning the Minnesota River was still open between Mankato and the South Dakota border.

The Minnesota River remained in flood stage through mid-May. The river first went above flood stage in late March. Peak crests of the river were reached during the first two weeks of April. The crest at Montevideo reached 23.9 feet on 4/7/97 which set a new record crest. Minnesota River flooding resulted in severe losses to public and private property.

**April 1, 2001, 100-year flood**

Heavy snowfall during winter remained on the ground through the end of March and then rapidly melted, resulting in river stages close to record levels. Water began to gush through drainage ditches and streams and into the mainstream rivers during mid-day April 1.

Heavy rain April 7-8 over much of central Minnesota prolonged the high water and also added one or two feet to many crests during mid-April. The same intense low pressure system that brought high wind to southern Minnesota also dumped a large area of 3 to 4 inches of rain across west central and central Minnesota, on top of melting snow and saturated ground. Drainage ditches, still clogged with snow, were unable to accept most of this rainwater. Several homes were flooded along Hawk Creek near Clara City (Chippewa County). Dozens of people were evacuated, though no injuries were reported. Hundreds of roads were submerged and some bridges flooded.

Many rivers remained well above flood stage into mid-May. The last of the river levels finally went below warning criteria on May 8. The crest at Montevideo on the Minnesota River was only 1.3 feet lower than the record set in 1997. Part of the Marsh Lake Dam southwest of Appleton (Swift and Lac qui Parle Counties) eroded on April 7, but officials shored it up with 9,000 tons of rock and gravel.



## **Relationship with Other Hazards – Cascading Effects**

**Hazardous Materials.** Structures that house hazardous materials may be flooded causing leaks or transportation routes may be washed out, causing overturned vehicles.

**Infectious Disease.** Water issues often translate into issues around infectious diseases. Water contamination and wastewater removal many times go along with flooding issues. Diseases such as hepatitis A, giardia, cryptosporidium, and West Nile virus are potential hazards that have direct links to water.

**Transportation, Emergency Services, and Utility Disruption.** Violent storms of all types can cause property damage, loss of life, personal injury, disrupt transportation and communication and emergency services. Further, public health and safety, and essential public infrastructure and services such as power, water supply systems and sanitary systems, could be threatened. Utility disruptions in particular, are most likely to occur if a flood were to destroy an “electrical center” located in cities and may take up to a day to restore communication power, pending the service provider.

**Landslide and Debris Flow.** Destabilized stream banks are related to flooding. As rivers evolve they carve out a channel adequate to handle typical peak flows (1-2 year flood events). As landscape hydrology alters, higher peak flows carve out larger channels. Unfortunately, this often results in riverbanks being destabilized. Across the region these unstable banks have threatened farmlands, roads and homes. Bank stabilization projects are expensive and often only shift the problem to a different place along the stream. Long term mitigation for riverbank stabilization is 1) holding water on the landscape and 2) proper setback of infrastructure and building from rivers.

Debris flow includes downed trees being carried by floodwaters. These trees caused problems at various bridges over the Minnesota River in the last round of major flooding. The trees ran into bridges and got caught forming logjams. Contractors lifted the trees over bridges and returned them to the river downstream of the bridge, with the end result of trees floating to succeeding bridges to be lifted over again. Large flood events can and do kill trees within the flood plain, including large cottonwood and maples. In subsequent flood events these standing dead trees can be knocked down and washed away, causing havoc to communities and counties.

**The Chippewa River and Big Bend Cemetery.** The bank of the Chippewa River has eroded away during flood events; thus as the river rises higher and faster, banks erode further and further. Some landowners lost many acres of land to the Chippewa River. The Big Bend Cemetery lost land to the river and was in a crisis state as the river moved closer to the Big Bend Lutheran Church Cemetery. The bank was only 15 feet from the nearest known gravesite and the Chippewa River has eroded over 75 feet of its bank in the last 50 years with approximately 25 feet of erosion occurring in the last ten years alone. Preliminary cost estimated of moving the cemetery out and developing a new cemetery was \$1,627,122.75. Seven hundred and forty-one gravesites are within the 100 year-flood level, which is similar to

the water levels recorded during the floods of 1997 and 2001. Of those gravesites, 70 percent, or 519, would require special care, as they were dug prior to 1965 and do not have vaults.

The Army Corp of Engineers collaborated with Chippewa County to protect approximately 900 linear feet of stream bank with riprap protection. Topsoil and seeding was placed over the riprap to establish vegetative protection on the eroded slope. Nearly 8,600 tons of riprap and 1,700 tons of topsoil were placed along the streambank by Northwest Constructors of Mahanomen, Minnesota. Chippewa County and the Army Corp of Engineers executed a project agreement on September 29, 2005, and the construction contract was awarded on July 31, 2006. The project ended in November 2006 and with a project cost of \$560,000 dollars.

**Salvage Yard.** A salvage yard in Chippewa County (near Montevideo) is located in the floodplain. While the building is out of flood danger; the yard has had severe flooding during past events. Debris flow and hazardous material spills during major flood events is a realistic problem. Currently no programs to move and clean up the site exist, although it is a priority for Chippewa County. Estimates to relocate and clean up the site range from \$350,000 and higher.

## **Floods and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

The change in the amounts of precipitation has led to increased magnitude of flooding. In conjunction with increased precipitation, seasonal changes have occurred with trends of wetter springs and drier summers and falls.

## **Plans and Programs for Floods**

**County Flood Area Map and Controls.** The current county official land use map identifies 100-year flood areas. The county zoning ordinance controls permitted land uses in these areas which describes what can be built and how.

**Montevideo and Granite Falls Flood Map and Controls.** Montevideo and Granite Falls have identified 100-year flood areas on its official land use map and adopted in its zoning ordinance a floodplain ordinance, which identifies appropriate zoning and land use controls governing these areas.

**Mobile Emergency Operations Center.** The emergency operations center can be moved in the case of an emergency occurring in the county courthouse or the city hall in Montevideo.

**Relocation of the City of Montevideo Water Treatment Plant.** After flooding in 1997, the water treatment plant was relocated out of the floodplain.

**Cemetery in Big Bend.** The church caring for the cemetery in Big Bend has addressed erosion concerns.

**Response Plan.** A response plan to a flood emergency has been developed and local resources and personnel have been committed to it.

Wetland Restorations. Wetland restorations are being done in Chippewa County. Surveys and construction are completed to ensure water is not a hazard to roads and adjoining landowners.

### **Program Gaps or Deficiencies for Floods**

- The salvage yard near Montevideo needs to be moved out of the floodplain. Currently the project is not financially feasible.
- A few businesses remain in identified 100-year floodplains, including nonconforming structures and uses currently “grandfathered in” in both the county and Montevideo land use plans and ordinances.
- Clara City and Maynard have homes at risk during 100-year flood events and have not fully addressed the 100-year flood risks in its planning and zoning.
- Montevideo and Granite Falls have homes and business at risk during 100-year flood events.
- Local resources are not adequate for a severe and prolonged flood and there is a need for assistance from outside the community during an emergency.
- After the 2003 planned buyouts in Montevideo, 18 homes still remain in the 100-year floodplain.
- The discharge from the Willmar wastewater treatment plant is released into Hawk Creek. Because of the warm water, more ice builds up on Hawk Creek, creating a larger issue.
- DNR forestry staff suggest that the costs and hazards associated with downed trees as debris flow might be mitigated through improved “sanitation cutting” in the floodplain. There are provisions within the Reinvest in Minnesota (RIM) set aside program that allows limited timber cutting on lands enrolled in the program. However, the cutting must be allowed in a timber management plan prepared by a DNR forester. Not all SWCDs and landowners have been utilizing this aspect of the RIM program.

### **Erosion**

Erosion is the gradual wearing-away of land surface materials, especially rocks, sediments, and soils, by the action of water, wind, or a glacier. Usually erosion also involves the transfer or eroded material from one place to another (The American Heritage Dictionary of Student Science). Erosion can occur on farmland, stream banks, bluffs, and coastlines and can be the result of both natural and man-made activities.

### **History of Erosion in Chippewa County**

According to the Chippewa County Water Plan (2013), Chippewa County soils are subject to both water and wind erosion. Water erosion results from soil removed from its original location by the force of water to lower slopes and plots. The potential for wind erosion occurs when wind velocities exceed 12 mph. The Chippewa County Water Plan states that approximately 55% of the land is classified as having potential for moderate water erosion. The Chippewa County Comprehensive Local Water Plan Update (2013) lists erosion and sediment control as a priority issue for the county.

## **Erosion and Climate Change**

The Minnesota State Hazard Mitigation Plan 2014 states that flash flooding can contribute to erosion of stream banks. Impervious surfaces from human development as well as the predicted increases in heavy rain events in the future may contribute to flash flooding leading to erosion for stream and river banks in Chippewa County.

### **Plans and Programs for Erosion**

Chippewa County Comprehensive Local Water Plan (2013) The Chippewa County Comprehensive Local Water Plan Update (2013) lists erosion and sedimentation as a priority issue for the county. The plan provides action steps for best management practices to address soil and stream bank erosion in Chippewa County.

### **Program Gaps or Deficiencies for Erosion**

- More education is needed on the devastating impacts erosion could have on the county, as well as prevention techniques.

## **Drought**

Drought is defined as a prolonged period of dry weather or a lack of rainfall.

### **History of Drought in Chippewa County**

Record low summer precipitation in Milan was 3.12 inches in 1921 and 3.46 inches in 1976 in Montevideo. Record low precipitation occurred in July of 1936 for Milan and Montevideo, 0.08 inches and 0.12 inches respectively.

As shown in Appendix 7, normal precipitation for Minnesota is wetter in the southeast and is drier in the northwest. Chippewa County is somewhat drier, which is similar to the central part of the state and the Dakotas.

Granite Falls currently receives its drinking water supply from the Minnesota River. In 1988, Granite Falls requested to hold back more water in order to prevent a shortage; however, this request was denied. Individual shallow wells have occasionally failed, requiring the affected parties to re-drill to reliable aquifers.

Drought of 1920's & 1930's. Perhaps the most devastating weather-driven events in American history were the droughts of the 1920's and 1930's, which significantly impacted Minnesota's economic, social, and natural landscapes. Abnormally dry and hot weather during the growing season throughout the better part of two decades turned Minnesota farm fields to dust and small lakes into muddy ponds. The parched soil was easily taken up by strong winds, often turning day into night. The drought peaked with the heat of the summer of 1936, setting many high temperature records that still stand today.

Drought of 1974-77. Drought-like conditions began in the winter of 1974 and extended through the summer of 1977. The dry conditions of these years lowered water levels in wells and caused record low stream flows throughout the state. Late summer forest fires broke out, and conflicts arose between domestic well owners and neighboring high capacity well owners. The DNR Division of Waters formulated new policies to resolve these resource management problems

and user conflicts. Many of these new policies formed the basis of subsequent amendments to agency rules and state statutes.

*Drought of 1987-89.* The warm, dry winter of 1986-87 was the beginning of this period of little rainfall and extreme dryness. Drought conditions became very serious in mid-June 1988 when Mississippi River flow levels threatened to drop below the Minneapolis Water Works intake pipes at the city of Fridley. Below normal precipitation coupled with declining lake levels, ground water levels, and stream flow to create statewide concern. To facilitate coordination of drought response actions, a State Drought Task Force was convened by the director of the Division of Waters. The State Drought Task Force brought together local, state, and federal officials to share information and coordinate drought response strategies. Several actions were taken following the summer of 1988 to better prepare the state for the next drought. Minnesota Governor Rudy Perpich appointed a "Twin Cities Water Supply Task Force" specifically to make recommendations on how to meet future water demands in the event of low flow conditions on the Mississippi River. The Corps of Engineers initiated review of its operating plans for the Mississippi River headwaters reservoirs, and the 1989 legislature charged the Metropolitan Council with preparing water use and supply plans for the metropolitan area. In the summer of 1988, rains finally came in August, but not soon enough to save agriculture crops.

*Drought of 2003.* For a three-month period from mid-July through mid-October, a stubbornly persistent weather pattern resulted in extremely dry weather across the state of Minnesota. Few widespread rain events moved through the state during this time period and precipitation totals were less than six inches across much of Minnesota. Total rainfall for the mid-July through mid-October period fell short of historical averages by four or more inches in many areas. Rainfall deficits exceeded seven inches in parts of southeastern Minnesota. When compared with other July 15 through October 20 time periods in the historical database, mid-July through mid-October 2003 rainfall totals rank among the lowest on record for many areas of south central and southeastern Minnesota, as well as a small portion of west central Minnesota.

### **Relationship with Other Hazards – Cascading Effects**

*Wildfires.* Woods, brush land, and non-cultivated fields stressed by drought, significantly increases the risks of wildfire.

### **Drought and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

Drought events have occurred throughout Minnesota's history. However, the Minnesota State Hazard Mitigation Plan 2014 reports that the impact of climate change on droughts is uncertain. During the past century there was no change that occurred for the duration of droughts in the Midwest, but the average number of days without precipitation is anticipated to increase in the future. In addition, the projection of higher air temperatures can cause increases in surface evaporation and water loss from plants. This could lead to drier soils where the sun heats the soil and the adjacent air instead of moisture with the result of hotter summers and drier climatic conditions.

### **Plans and Programs of Drought**

Water Plan. The current Chippewa County Comprehensive Water Plan identifies major and minor watersheds serving the county.

Shoreline Zoning. Chippewa County has adopted the state's statutory shoreline and riparian zoning classifications and minimum standards.

Water Consumption Use. Documentation occurs through the use of water meters in Montevideo for semiannual or annual water consumption by various major consumers, urban residential, industrial/commercial, or agricultural businesses.

Water Conservation. Water conservation provisions and use restrictions in times of drought are included in city ordinances.

### **Program Gaps and Deficiencies for Droughts**

- County has no estimates of annual recharge rates or the capacities of the various aquifers.
- Water conservation provisions and use restrictions in times of drought are not included in county ordinances.
- The current county water plan recommends wellhead protection standards for adoption via ordinance by Chippewa County but has yet to be implemented.

## **Wildfire**

A wildfire is an uncontrolled fire spread through vegetative fuels, posing danger and destruction to property. Wildfires can occur in undeveloped areas and spread to urban areas where structures and other human development are more concentrated. While some wildfires are started by natural causes such as lightning, humans cause four out of every five wildfires. Burning debris, arson, and carelessness are the leading causes of wildfires. As a natural hazard, a wildfire is often the direct result of a lightning strike that may destroy personal property and public land areas, especially on state and national forest lands. The greatest risks of wildfires are the destruction of timber, property, wildlife, and injury or loss of life to people living in or using the area for recreational activities

Wildfire risks are not limited to public lands. There are extensive tracts of privately owned grasslands as well. These include both conservation program lands (CRP, RIM, CREP, etc.) and "rough ground" that has been hayed, pastured, or left wild. These private lands particularly in combination with public lands (such as WMA, SNA, State Parks, WPA, etc.) can combine to create substantial blocks of grasslands.

To date, there has been very little injury or loss of property resulting from wildfire in the Upper Minnesota Valley Region. However, there are some risks that should be managed to mitigate potential disasters.

### **History of Wildfires in Chippewa County**

Wildfires occur throughout the state of Minnesota. According to the Minnesota State Fire Marshal, there are more than 2,000 annual wildfires with an estimated loss of more than \$13 million dollars.

Milan Area Wildfire, April 2003. On April 12, 2003, a wildfire started on a vacant farm near Chippewa County Road 30. Fifteen fire departments responded to the call over the weekend. Many of these fire departments do not have equipment to fight prairie fires and ended up with damaged and lost equipment. Many clutches on the fire trucks went out from driving on the bumpy prairie and at least one injured firefighter was reported.

The demands of this and other fires over the weekend stretched the resources of local, volunteer fire departments and the DNR crews that joined to battle the blazes. They obtained critical assistance from a DNR forestry tanker plane based in Brainerd and later National Guard helicopters with 500-gallon buckets.

Wildfires that raced through grasslands south of Appleton over that weekend scorched an estimated 3,300 acres; approximately 1,700 of these acres were part of the Lac qui Parle Wildlife Management Area. The fire could have spread further if it was not for back burning efforts that kept the blaze south of Highway 119 and away from Milan Beach. On Sunday, the wind speed increased and rekindled the fire. Conditions of powerful winds and bone-dry tinder set the stage for the Sunday fire.

Wildfire behavior is based on three primary factors: fuel, topography, and weather. When dry weather mixes with windy conditions, areas with fuel have the potential for a wildfire to spread out of control as it did in the 2003 fire near Milan. Chippewa County currently has 18,263.1 acres enrolled in CREP, RIM, CRP and the Wetland Reserve Program. These areas are left for wildlife habitat and are not burned on a regular basis. As a result, years of dead grasses accumulate on these lands and are a good fuel for any fire that may start. The Minnesota River Valley and the Wildlife Management Areas also provides an abundance of fuel for wildfires. Wildlife Management Areas occupy approximately 12,000 acres in Chippewa County.

Topography is an important factor in determining wildfire potential because it affects the movement of air and fire over the ground surface. The slope and shape of terrain can change the rate at which the fire travels. The majority of Chippewa County is relatively flat, which allows for fire to spread quickly. The Chippewa River Valley has some defined slope while the Minnesota River Valley is wide around Lac qui Parle Lake and has a more defined slope below the Lac qui Parle dam.

Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity, and wind affect the severity and duration of wildfires. These conditions are similar throughout the county. Although higher wind speeds are possible in the northern portion of the county due to the lack of vegetation and slope, the area is dominated by agricultural uses and lacks major stands of forests.

### **Relationship with Other Hazards – Cascading Effects**

Flooding and Erosion. Major wildfires can completely destroy ground cover which can cause heavy erosion and loss of all vegetation. If heavy rains follow a major fire, flash floods, landslides and mudflows can occur since vegetation is essential in deterring flooding during heavy rainfalls or spring runoff.

**Hazardous Materials.** Anhydrous ammonia tanks that sit in the countryside or on farms are at risk if a wildfire occurred. While most tanks can be moved quickly, fire departments and response teams may not be aware of their presence.

### **Plans and Programs for Wildfires**

**Fire Districts and Departments.** Fire departments (FD) respond to any structure fires that are in their fire district and help when needed in other districts (West Central Firefighters Association) to work together on large fires. All the FDs in the county are on the city level and are a part of the West Central Firefighters Association (also includes fire departments in surrounding counties).

**West Central Firefighters Association.** Fire departments in the county agree to make their fire-fighting equipment and personnel available to each other in the case of emergencies, and each has the legal authority to send its fire-fighting equipment and personnel into other communities.

**Zoning.** The Chippewa County Zoning department regulates the development of new housing and is in charge of enforcing safety restrictions including setbacks, lot coverage, depth, and structure height. In addition, the Unified Building Code sets standards for roofing and the county building inspector is responsible for inspecting residential structures, while the fire marshal inspects commercial structures for potential fire hazards.

**DNR Training.** Firefighters participate in annual wildfire training classes offered by the Minnesota Department of Natural Resources, Forestry Department.

**State Land Management.** The DNR operates and regulates all state lands within the county, including management of Lac qui Parle State Park and Lac qui Parle Wildlife Management Area. The park currently is primarily managed for recreational activities. Wildfires are minimized by thinning brush and vegetation around the park, particularly around the campground areas.

**FireWise.** The DNR participates in a national wildfire education program called FireWise. This program provides tools for risk assessment and risk reduction and is available to communities who would like to do a detailed risk assessment. Small grants are available for 50 percent of projects.

**Soil and Water Conservation District (SWCD) Plan.** The SWCD performs wildfire education and outreach and incorporates fire breaks. A 200 foot fire break is discussed with all landowners.

**Evacuation Plan.** The county's cities have evacuation plans delineating routes residents should take in the event of large fires.

**Dry Hydrants.** Currently, there are three dry hydrants in Chippewa County. Dry hydrants have been demonstrated as an effective tool in assuring a steady and close by source of water for responding to both major wild land and structural fires in rural areas. Dry Hydrants use a non-pressurized pipe system and are hooked directly into a natural water source such as a pond or stream. Assessments should be made to determine where existing dry hydrants are, where fire risks are greatest, and where water bodies suitable to support a dry hydrant are located.



Suitable placement of additional dry hydrants may be difficult as the area to fight wildfires is extremely large.

### **Wildfires and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

On a global scale, fire risk will increase by 10-30% because of higher summer temperatures. The Minnesota Forest Ecosystem Vulnerability Assessment and Synthesis by the U.S.D.A. Forest Service and Northern Institute of Applied Climate Science report that national and global studies agree wildfire risk will increase in the region, however there are a lack of studies that specifically address wildfire potential in assessment areas.

Droughts and drought fires have occurred throughout the history of Minnesota. No change has been found in the duration of Midwest droughts during the past century, but the average number of days without rain is predicted to increase along with temperatures. As a result, extreme heat events and associated wildfire risks are predicted to become more prevalent.

In addition, the increase of the fluctuations between drought, extreme rain events, and the increase in temperature will lead to changes in forest composition and distribution. These changes also will contribute to drier conditions that may cause increased fire risk as well.

### **Program Gaps or Deficiencies for Wildfires**

- Currently, county zoning lacks regulations regarding vegetation on property. One of the problems with past fires is the undergrowth and overhanging trees near residential structures. Although aesthetically appealing, vegetation around homes has destroyed numerous dwellings in past fires.
- There is currently no program to ensure that fire is considered when planning conservation plantings that include woody cover. Firebreaks should be included to protect homes and woody cover as well as allowing the use of fire as a management tool. (If a tree and shrub planting is placed in the middle of a prairie planting, it may be difficult to accomplish a prescribed management burn of that property without damaging or destroying the woody component. It may also be impossible to protect that planting in the event of a wildfire.)
- Communications between DNR and local fire departments could be improved.
- Because of the rough terrain and location of wildfires many of the fire departments do not have adequate equipment to fight wildfires. Fire vehicles are not able to access these areas. More grass rigs and off road vehicles are needed to address the problem of wild land and grass fires.

### **Dam Failure**

Dam failure is defined as the collapse or failure of an impoundment resulting in downstream flooding. Dam failures can cause loss of life and extensive property damages; and could result from an array of situations, including flood events, poor operation, lack of maintenance and repair, and terrorism.

The main purpose of dams is to hold water, which is important during high water or floods, especially during spring runoff and immediately after heavy rains. Although dams act to prevent

harm from flooding, they do pose potential threats in the event of failure. Dam failure can push a wall of water down to the valley below, causing serious destruction in its path.

Dams that could affect Chippewa County include dams along the Minnesota River and Lac qui Parle Lake. The Lac qui Parle Flood Control and Water Conservation Projects were authorized by Congress in 1936 and partially constructed as a Work Progress Administration (W.P.A.) project. The U.S. Army Corps of Engineers completed construction of their portion of the project between 1941 and 1951. Operation of the project was transferred from the state of Minnesota to the U.S. Army Corps of Engineers in 1950.

This project is located on the Upper Minnesota River in western Minnesota near the South Dakota border. It consists of the Highway 75 Dam, Marsh Lake Dam, Lac qui Parle Dam, the Watson Sag Weir, and the diversion channel on the Chippewa River. Although the Highway 75 Dam and Marsh Lake Dams are not located in Chippewa County, if they failed, they have potential to affect cities within Chippewa County.

The *Highway 75 Dam* impounds water for the Big Stone National Wildlife Refuge.

The Marsh Lake Dam is part of the Lac qui Parle Flood Control Project on the Minnesota River near Appleton, Minnesota. This dam is for water conservation purposes and does not affect the flooding of the Minnesota River. It is possible that in the event that it would fail during a flood event, it could cause another crest downstream. The Minnesota Department of Natural Resources operates the Lac qui Parle Wildlife Management Area, including the land around Marsh Lake. Marsh Lake Dam was constructed by the Works Progress Administration in 1939 and improved by the U.S. Corps of Engineers between 1941 and 1951. The dam has a fixed crest overflow spillway section 112 feet wide with a crest elevation of 937.6 feet. Unlike the Lac qui Parle Dam downstream, the Marsh Lake Dam cannot be operated to manage the lake's water level. Changes to this dam include rerouting the Pomme de Terre River to its original stream bed and allowing the level of Marsh Lake to drop periodically.

The *Watson Sag Weir* is used to reduce downstream flows at Montevideo by diverting a portion of the Chippewa River floodwaters into the Lac qui Parle reservoir.

The Granite Falls Dam is a "High Hazard Dam" which indicates potential for loss of human life if dam failure occurred. A dam break analysis was performed and was filed with state and federal regulatory agencies. Maximum "Sunny Day Failure" was 5.2 feet with a stage increase of one foot or more between Granite Falls Dam and Minnesota Falls Dam. For a dam break at a 15-year event, stage increases were 2.0 feet or less.

The Lac qui Parle Dam is the highest dam and regulates water flow from the Lac qui Parle Lake. This is a "Low Head Dam" which means that if it failed, it is not life threatening to Montevideo. A dam failure was modeled for the "Probable Maximum Flood", which illustrated travel time from the dam to Montevideo at approximately six to seven hours. The water level would only raise stages in Montevideo by less than half a foot. For a "Normal High Pool" failure, the impact at Montevideo would be approximately five feet. The impact at Granite Falls is very similar.

The U.S. Corps of Engineers operates and maintains day use recreation areas below Lac qui Parle and Marsh Lake dams. Facilities consist of picnic areas, playground, privies, bank fishing, and drinking water.

Lac Qui Parle Dam

Length -- 4,100 feet

Height -- 32 feet

Outlet -- 12' to 17' bays -- 4 gated

Highway 75 Dam

Length -- 16,250 feet

Height -- 23 feet

Outlet -- 65' bascule leaf gate

Marsh Lake Dam

Length -- 11,800 feet

Height -- 19.5 feet

Outlet -- 112' fix crest weir with 2' x 2' gated conduit

Chippewa Diversion

Outlet 1 - 8' tainter gate and 4 - 27' fixed crest bays, low flow 4' x 4' gated conduit.

### **History of Dam Failure for Chippewa County**

The worst recorded dam failure in U.S. history occurred in Johnstown, Pennsylvania, in 1889. More than 2,200 people were killed when a dam failed, sending a huge wall of water downstream, completely destroying the town below. Although risks are minimal, dam failure can occur in Minnesota. Several dam failures have occurred in Minnesota in the past, but none have been reported in Chippewa County.

### **Relations with Other Hazards – Cascading Effects**

Flood. Dam failure, although the risk is minimal, has the potential to be devastating to the areas within the floodplain and around the stream directly below the dam in Montevideo and Granite Falls. If the Lac qui Parle Dam were to fail, Montevideo and Granite Falls would be impacted. Dam failure would cause immediate flash flooding, destruction of property, erosion of crops, and the potential destruction of infrastructure.

### **Dam Failure and Climate Change**

Source: Minnesota State Hazard Mitigation Plan 2014

Dams are designed based on assumptions about a river's annual flow behavior. These assumptions will determine the volume of water behind the dam and the amount of water flowing through the dam at any one time. Changes in weather patterns due to climate change may change the hydrograph, or expected flow pattern.

Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events are a mechanism that also results in increased discharges downstream. It is conceivable that bigger rainfalls at earlier times in the year could threaten a dam's designed margin of safety, causing dam operators to release greater volumes of water earlier in a storm cycle in order to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream.

While climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures. Climate change is adding a new level of uncertainty that needs to be considered with respect to assumptions made during the dam construction.

### **Plans and Programs for Dam Failure**

*Floodplain Ordinance.* The county floodplain ordinance prohibits further development on the properties in the floodplain, including property directly below the dam.

*Dam Inspection.* The Minnesota Department of Natural Resources regulates nearly 900 of the numerous dams in the state. The DNR and U.S. Army Corps of Engineers regularly inspect the dam and reservoir capabilities for flooding and dam failure. Their report indicates that dam sizes are adequate for any major floods or spring runoff.

*Monitoring.* The county does some monitoring of tributaries emptying into the reservoir to help identify large volumes of water in times of flooding. This is completed by watershed projects.

*Evacuation Plan.* The county has an identified evacuation plan for all cities in Chippewa County.

*Contingency Plan.* There is a contingency plan in place in case of dam failure for all of the dams in Chippewa County.

### **Program Gaps or Deficiencies for Dam Failure**

- None Listed.

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## *TECHNOLOGICAL HAZARDS – PRESENTED BY MAN*

### **Introduction**

Source: Minnesota State Hazard Mitigation Plan

Technological hazards are a part of everyday life, a result the modern world in which we live. The challenge is to benefit from the use of technology while limiting potential harm to the community. In order to fully realize the benefits of technology, it is necessary to plan an effective response to unwanted technological emergencies before they occur.

From a hazard mitigation perspective, the existence of technological hazards in the community poses a risk to life, health, or property, just as natural hazards do. The use of hazardous materials in manufacturing and transportation can be extremely harmful if an unwanted release occurs and the use of nuclear materials in the presence of a community creates risks that must be managed. While dam failure can result from natural hazards, dams will still have a catastrophic impact on those downstream, if poor engineering or construction causes it to fail. Further, the furnishings in our homes make a pleasant living environment, but are often flammable and produce toxic gases if ignited.

For the purposes of this plan, technological hazards identified are organized into these groups:

- 1. Infectious Diseases**
- 2. Fire**
- 3. Hazardous Material**
- 4. Water Supply Contamination**
- 5. Wastewater Treatment System Failure**
- 6. Civil Disturbance/Terrorism**

### **Infectious Diseases**

An infectious disease is defined as an organism or virus that has the potential to spread or affect a population in adverse ways. Infectious diseases have the potential to affect any form of life at any time based on local conditions, living standards, basic hygiene, pasteurization, and water treatment. Despite breakthroughs in both medicine and technology, infectious diseases continue to pose a major public health risk. Today, the issue of emerging and re-emerging infectious diseases is at the forefront of public health concern. The very young, older adults, immunocompromised individuals, and hospitalized or institutionalized patients are at an increased risk for many infectious diseases. Changes in demographics, lifestyle, technology, land use practices, food production and distribution methods, child care practices, immunization, as well as increasing poverty, have roles in emerging infections.

Many infectious diseases are preventable and controllable. Prevention and control of infectious diseases involve collection of accurate condition assessment data. Outbreak detection and investigation and the development of appropriate control strategies (both short and long term) are based on specific epidemiological data. These activities require close collaboration among clinical providers (especially infection-control practitioners within hospitals), clinical laboratories, state and local health departments, and federal agencies. Furthermore, a need exists for continued education of food industry professionals, health-care students and providers, as well as research to improve immunizations, diagnostic methods, and therapeutic modalities. The

prevention of infectious diseases requires multidisciplinary interventions involving public health professionals, medical practitioners, researchers, community-based organizations, private and volunteer groups, industrial representatives, and educational systems.

### **History of Infectious Diseases in Chippewa County**

In contrast to typical natural disasters in which critical components of the physical infrastructure may be threatened or destroyed, an infectious disease outbreak may also pose significant threats to the people responsible for critical community services due to wide spread absenteeism in the workforce. In the non-health sector, this might include highly specialized workers in the public safety, utility, transportation, or food service industries, and will likely vary from jurisdiction to jurisdiction. State and local officials should carefully consider which services and key personnel within relevant firms or organizations are essential. It is important to identify where absenteeism would pose a serious threat to public safety or would significantly interfere with the ongoing response to the outbreak. To offset this issue, Countryside Public Health has collaborated with Chippewa County to create a Continuity of Operations Plan that determines priority activities that will help to ensure an office will be able to remain open during times of high absenteeism.

In general, infectious diseases would have no effect on physical property but there could be a negative impact on the economy if a widespread outbreak were to occur. As a result of an outbreak, businesses may be forced to shut down for an extended period. Chippewa County's entire population is susceptible to exposure from an infectious disease because of the random nature of diseases. Infection rates and exposure risk will vary based on the disease, individual sanitation habits and personal behaviors. Large population concentrations and sites with large numbers of people are especially at risk in the event of an outbreak. The following infectious diseases, divided by type, could be considered a health risk and disaster if a large outbreak occurred.

### ***Human Health***

***Pandemic*** A pandemic occurs when a disease is prevalent throughout an entire country, continent, or world, greatly affecting the human population. Many pandemics have occurred throughout history including small pox, cholera, measles, tuberculosis, and more recently HIV/AIDS and influenza. In November 2005, the U.S. Department of Health and Human Services (HHS) released a comprehensive plan for responding to a possible pandemic (Minnesota Department of Health 2009). Numerous state, local, and private entities have defined responsibilities to fulfill in the event of pandemic. For instance, the Department of Public Safety is responsible for organizing and coordinating a statewide response to a pandemic and the Minnesota Department of Health along with the Countryside Public Health and other local healthcare providers will work to minimize the impact of a pandemic on human health.

## Vaccine Preventable Diseases

While most medicines treat diseases, vaccines prevent diseases by stimulating the immune system with the same germs that can cause the disease. Vaccines contain germs that have either been killed or weakened, which cause the immune system to produce antibodies as if a person was exposed to the disease. This process gives people immunity to a particular disease without actually having the disease. There exist a number of vaccine preventable diseases that could adversely affect residents of Chippewa County. More information on vaccine preventable diseases can be found on the Center for Disease Control and Prevention website:

<http://www.cdc.gov/vaccines/vpd-vac/>.

It is important that all people in good health have completed recommended vaccination schedules to prevent a disease outbreak. Certain vaccinations are required for children to attend school (DTap, Polio, MMR, HepB, Varicella, TD). Data collected for the 2013-14 school year show that over 90% of children who attend school are vaccinated against diphtheria, tetanus, pertussis, polio, measles, mumps, rubella, hepatitis B and varicella. Some individuals such as the very young, those in poor health, and the elderly should not get particular vaccinations. This is when 'Herd Immunity' helps to prevent the spread of these diseases. Legal exemptions in Minnesota for kindergarten and seventh grade remain low. Less than 3 percent of students have a conscientious objection from all vaccines, and less than 0.05% have a medical exemption from all vaccines.

Seasonal Influenza According to the CDC, influenza (flu) is a contagious respiratory illness caused by influenza viruses that infect the nose, throat, and lungs. Flu viruses are believed to spread via droplets made when people with flu cough or sneeze. Possible symptoms of the seasonal flu include fever, cough, sore throat, runny or stuffy nose, muscle or body aches, headaches, fatigue, and possible vomiting and diarrhea. The best way to prevent seasonal influenza is to get vaccinated. Each year, a new vaccination is created that works to protect against new strains of Influenza Type A and Influenza Type B. One of the most severe strains in recent years was H1N1, also known as Swine Flu, which was first detected in 2009. More information can be at <http://www.cdc.gov/flu/>.

Hepatitis A Hepatitis A is an enterically transmitted viral disease that causes fever, malaise, anorexia, nausea, and abdominal discomfort, followed within a few days by jaundice. The disease ranges in clinical severity from no symptoms to a mild illness lasting from one and two weeks to a severely disabling disease lasting several months. In developing countries, hepatitis A virus is usually acquired during childhood, most frequently as a symptomatic or mild infection. Transmission can occur by direct person-to-person contact; exposure to contaminated water, ice or shellfish harvested from sewage-contaminated water; or from fruits, vegetables, or foods eaten uncooked, which can become contaminated during harvesting or subsequent handling. Minnesota saw 145 cases of Hepatitis A in 1998 and just 19 cases in 2014 (Minnesota Department of Health 2015). It has however, become more prevalent again as people eat outside of the home more frequently.

Other vaccine preventable diseases include and are not limited to small pox, measles, mumps, rubella, pertussis (Whooping Cough). More detailed information can be found at [www.cdc.gov/vaccines/vpd-vac/](http://www.cdc.gov/vaccines/vpd-vac/).

### **Vector Borne Diseases**

Vector borne diseases are bacterial and viral diseases transmitted by mosquitoes, and ticks. According to the Center for Disease Control and Prevention (CDC), vector borne diseases include some of the world's most destructive diseases. They have become an increasing threat to human health as globalization increases and changes in the environment and climate become prevalent. Many vector borne diseases can infect animals as well as humans. Common vector borne diseases in Minnesota include West Nile Virus, La Crosse Encephalitis, and Lyme Disease. Although rare in Minnesota isolated cases of Rocky Mountain Spotted Fever have been reported from various parts of the state. Chikungunya is a mosquito transmitted disease that has been found in parts of Africa, Southern Europe, Southeast Asia, and islands in the Indian and Pacific Oceans. In 2013, chikungunya was found for the first time in the Americas. Since then it has spread to the Caribbean, South and Central America and in North America. In 2014, there were 11 locally transmitted cases reported in Florida. In Minnesota, 24 travel-associated cases were reported. More information on vector borne diseases can be found at <http://www.cdc.gov/ncezid/dvbd/>.

West Nile Virus (WNV) The virus made its first appearance in Minnesota in July 2002. In the fall of 2003, the first West Nile death in Minnesota was reported. As of July 2009, Minnesota has reported 2,559 human cases of West Nile and a total of seven deaths. Chippewa County has experienced 6 cases since 2010 (Countryside Public Health).

Most people with West Nile virus will experience only mild symptoms – or no symptoms at all. Twenty percent of those bitten by an infected mosquito will develop the symptoms of West Nile fever. One out of every 150 people who become infected will become severely ill and develop West Nile encephalitis, inflammation of the brain. Approximately 10 percent of these encephalitis cases are fatal. Symptoms of the illness usually show up 2 to 6 days after being bitten, although the incubation period can be as long as 15 days. Symptoms of West Nile fever can include headache, high fever, nausea, vomiting, sore throat, backache, joint pain, prominent muscle aches and weakness, prolonged fatigue, rash and swollen lymph nodes. West Nile encephalitis symptoms can include mental status changes, vomiting, sensitivity to light, altered reflexes, seizures, coma and acute flaccid paralysis. People who suspect that they may have West Nile are recommended to see a physician.

### **Respiratory Illnesses**

Respiratory Illnesses such as Pertussis (Whooping Cough), SARS (Severe Acute Respiratory Syndrome), MERS (Middle East Respiratory Syndrome), Enterovirus 68, and other flu viruses are common in the United States and around the world. Many of these illnesses could be prevented with vaccination. However, viruses and bacteria are constantly changing and mutating making vaccines and antibiotics outdated quickly. This is the reason new flu vaccines come out each year. More information on respiratory illnesses can be found at <http://www.cdc.gov/ncird/>.



## **Gastrointestinal Illnesses**

Many gastrointestinal illnesses in humans are a result of germs passed on by animals or other humans through water, food, and direct contact. Common illnesses include Salmonella, E.Coli, Norovirus (Norwalk Virus), and Cryptosporidium (Crypto). Hand washing is the first step to prevent the transfer of these illnesses. More information can be found at <http://www.cdc.gov/zoonotic/qi/>.

**Ebola Virus** The 2014 Ebola epidemic is the largest in history, killing over 10,000 people in West Africa. Since it was discovered in 1976, there have been sporadic outbreaks in humans in Africa. Although the Ebola virus was reported in the United States on a few occasions in 2014, no cases have been reported in Minnesota. Symptoms of Ebola include fever, headache, muscle pain, weakness, fatigue, diarrhea, vomiting, abdominal pain, and unexplained hemorrhaging. Further information on the Ebola virus can be found at <http://www.cdc.gov/vhf/ebola/>.

## **Animal Health**

Wildlife diseases are a major area of concern in colonial water birds or major concentrations of waterfowl. Diseases, such as Newcastle disease or avian influenza, exist in the wild and outbreaks will occur. However, the extent to which animals die or disease is spread can be minimized through early identification.

Animal diseases of concern, particularly in cattle and flocks in Chippewa County and nearby areas include Mad Cow Disease (Bovine Spongiform Encephalopathy), Foot-and Mouth disease, Chronic Wasting Disease, Rabies, and Brucellosis. Most recently, in early 2015, H5N2 Avian Influenza was found in commercial turkey flocks in Chippewa County as well as many other surrounding counties. Precautions are being taken to prevent the spread of this virus and efforts are being made to identify the source. The United States Department of Agriculture is the lead investigator in this outbreak. Minnesota Department of Health is monitoring workers for illness. More information on these and other animal health issues can be found at <http://www.aphis.usda.gov/wps/portal/aphis/home/>.

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

**Associated with Other Disasters** Infectious disease outbreaks can occur as primary events themselves, or they may be secondary events to another disaster or emergency such as a terrorist attack, biological accident or natural hazard event.

**Riots/Civil Disturbance.** If an epidemic event were to occur, deaths, fear and misinformation could trigger large-scale riots, panic and lawlessness. Infectious diseases have the potential to be local, regional, statewide or national in scope and magnitude.

## **Plans and Programs for Infectious Diseases**

**Emergency Operations Plan** Chippewa County currently has an emergency operations plan known as the Chippewa County Emergency Operations Plan. This plan outlines procedures for county and local governments for contacting appropriate state and federal agencies, guidelines

and strategies for dealing with infectious diseases, and command structures with the County Health Department and the Emergency Manager for Chippewa County. Public education lies with public health as well. Much of the information is coordinated with the Center for Disease Control and Prevention and the Minnesota Department of Health.

*Emergency Response Plan* Response plans are incorporated into the Emergency Operations Plan and are added as needed. Countryside Public Health maintains emergency response plans and the state provides a framework as new plans are necessary. (As an example, the Foot and Mouth Disease Emergency Response Plan was written March 2002 and adopted into Chippewa County's Emergency Operations Plan.)

*Cooperation with State Health Department* Countryside Public Health works with the Minnesota Department of Health to address infectious diseases that are listed in Chapter 4605.7040 Disease and Reports (such as Encephalitis, Hepatitis, Influenza, Lyme Disease, Tuberculosis and Syphilis). If any of these or other listed diseases should appear in Chippewa County, the county works in cooperation with both the state health department and the Centers for Disease Control and Prevention.

*Notification* Communication between Countryside Public Health, the Minnesota Department of Health and the Center for Disease Control operates 24 hours, seven days a week depending on where an outbreak first occurs. Countryside Public Health, Chippewa County Answering Point and the County Emergency Manager receive health alerts via email and fax with instruction with how to proceed. Hospitals, clinics, city administrators, emergency managers and county commissioners are notified by both Countryside Public Health and the Minnesota Department of Health.

*Health Alert Network* The Health Alert Network has been developed as part of Center for Disease Control's (CDC) Public Health Emergency Preparedness & Response Program. This network is tested twice yearly. The Health Alert Network coordinates and maintains CDC's Public Health Emergency Preparedness & Response Website (<http://www.bt.cdc.gov/>). The Health Alert Network (HAN) is a nationwide, integrated information and communications system serving as a platform for distribution of health alerts, dissemination of prevention guidelines and other information, distance learning, national disease surveillance and electronic laboratory reporting, as well as for CDC's bioterrorism and related initiatives to strengthen preparedness at the local and state levels. The Health Alert Network ensures:

- High-speed, secure Internet connections for local health officials, providing access to CDC's prevention recommendations, practice guidelines, and disease data.
- Capacity for rapid and secure communications with first responder agencies and other health officials.
- Capacity to securely transmit surveillance, laboratory, and other sensitive data.
- On-line, Internet- and satellite-based distance learning systems.
- Early warning broadcast alert systems.
- Public health agencies achieve high levels of organizational capacity.

**Vaccination Program** Minnesota Vaccine for Children (MVFC) is a program that offers affordable vaccines for all children at local clinics and is designed to assist families of need in protecting their children from infectious diseases. Children (0-18 years) who fall within any of the following categories are eligible for this program:

- Uninsured
- American Indian/Alaskan Native
- Covered by a Minnesota Health Care Program (MHCP) including:
  - Fee-for-service Medical Assistance (MA)
  - MinnesotaCare (MnCare)
  - Prepaid Medical Assistance Plan (PMAP)
  - Underinsured (patients with private insurance that does not cover the vaccine itself or has a cap).

**Quarantine/Isolation Plan** The state is ultimately responsible to handle quarantine/isolation issues. Countryside Public Health has developed a Quarantine/Isolation Plan that would provide follow-up to those in isolation/quarantine and ensure their basic needs are met.

#### **Program Gaps or Deficiencies for Infectious Diseases**

- Countryside Public Health has a plan in place with multiple ways to reach the public. This plan requires and receives continuous review, constant monitoring, and updates as necessary.

## Fire

Urban fires are blazes that spread through structures, posing danger and destruction to property. These fires include any instance of uncontrolled burning which results in structural damage to residential, commercial, industrial, institutional or other properties in developed areas. Fires can occur in any community, and pose threats year round.

### *History of Fires in Chippewa County*

According to the State Fire Marshal Division, two people in Chippewa County have passed in the last 24 years due to fire. In 2012, Chippewa County had a total of 72 fire runs, 58 “other” runs, and had a total dollar loss of \$401,300. Fires are more common in cities because of the density and number of both residential and commercial structures. In Chippewa County, most residential fires are a result of kitchen fires, electrical failure, and chimney fires,

**Table 3.7 CC and Community Breakdowns of Fire-related Information in 2012**

Community	Total Fire Runs	Total Other Runs	Total Dollar Loss
Chippewa County	72	58	\$401,300
Clara City	10	16	\$18,000
Granite Falls	28	19	\$115,650
Maynard	13	14	\$217,000
Milan	5	1	\$0
Montevideo	37	22	\$166,300
Watson	7	2	\$0

Source: MN Dept of Public Safety's "Fire in Minnesota: Annual Report 2012"

Two major fires in the county include the Wegdahl Grain Elevator on December 10, 1998 and Friendship Homes in 2003. The Wegdahl fire occurred in an old wooden grain elevator and destroyed the building. The Friendship Homes fire destroyed the building and stopped operations of the home building plant for a few days.

### *Relationship with Other Hazards – Cascading Effects*

Service Disruptions. Major fires can completely destroy structures, including essential public facilities. Utilities such as electric and gas lines can be damaged and even destroyed.

**Health Risks.** Destruction or damage to essential infrastructure such as water and wastewater facilities can cause public health risk. Firefighting is a high risk job and can put a person in danger of harm at any time.

**Hazardous Materials.** Many times hazardous materials are highly flammable, causing fires to spread rapidly and increasing danger to human lives in the event of explosion.

### ***Plans and Programs for Fires***

**Fire Districts and Departments.** Structure fires are served by local fire districts and fire departments and each district is responsible for fires within their jurisdiction but they often work together on larger fires. All fire departments in the county are on the city level and are also a part of the West Central Firefighters Association (which includes fire departments in the surrounding counties).

**West Central Firefighters Association.** Fire departments that are members of the West Central Firefighters Association agree to make their fire-fighting equipment and personnel available to each other in the case of emergencies. Each department has the legal authority to send its fire-fighting equipment and personnel into other communities.

**Zoning.** Both the county and the cities in Chippewa County control development of new construction, including the enforcement of safety restrictions like setbacks, coverage, depth and structure height requirements. In addition, the Unified Building Code sets standards for roofing and all cities are responsible for new construction. The city of Montevideo controls all building inspections within a two-mile radius around city limits.

**State Training.** County firefighters participate in mandatory firefighting training classes offered by the state.

**Evacuation Plans.** Evacuation plans exist in the all cities.

### ***Program Gaps or Deficiencies for Fires***

- Although not in use very often, homes with chimneys pose a large threat of fires. Specialized training classes, such as chimney cleaning, safe cooking in the kitchen, and holiday hazards, could be offered to residents.
- Residents living in higher density areas should be more educated on fire prevention.
- In the back of the main street in Montevideo there are large power lines behind the tall buildings that limit accessibility in the event of a major structure fire.

## **Hazardous Materials**

Hazardous materials are chemical substances, which if released or misused can threaten the environment and/or health of a community. These chemicals are used in industry, agriculture, medicine, research, and consumer goods throughout Chippewa County. Hazardous materials are found in the county in the forms of explosives, flammable and combustible substances, corrosives, poisons, and radioactive materials.

A hazardous material spill or release poses risks to life, health, and property. An incident can force the evacuation of a few people, a section of a facility, or an entire neighborhood or community, resulting in significant economic impact and possible property damage. Spilled material is costly to clean up and may render the area of the spill unusable for an extended period of time. Hazardous materials incidences are generally associated with transportation accidents or accidents at fixed facilities.

### ***History of Hazardous Materials in Chippewa County***

Hazardous materials exist as part of everyday life in Chippewa County. These materials make life easier and more comfortable for residents throughout the county. The challenge is to use, store, and transport hazardous materials in a safe way that does not harm communities and prepare an effective response to unwanted releases of hazardous materials when they occur. A hazardous materials accident can occur anywhere at any time.

Meth labs are most often located in rural or semi-rural areas. Chippewa County is a rural area and could be a potential area for meth lab hazards, although to date there have not been any Meth Labs discovered in Chippewa County.

The major concern for hazardous materials events for fixed facilities is primarily in the city of Montevideo. Montevideo contains the majority of the county's population and employers. The transport of hazardous materials in Chippewa County is highly unpredictable. People and property on or immediately adjacent to transportation corridors throughout the county are at higher risk than those located one mile or more from a major county corridor. Chippewa County assumes that the highest risk of an incident would be to areas in close proximity to both rail lines and major roads and from large quantities of hazardous materials moving into and out of Chippewa County. The airport facility also provides further concern based on the possibility of an aircraft or site incident involving some sort of hazardous material.

The specific hazards created by a release are dependent on the hazardous characteristics of the material, the amount released, the location of the release, and the weather and topographic conditions in the area. Identifying specific materials and those involved in transportation can provide a more specific assessment of the vulnerability.

Minor incidents have occurred but these have had little or no impact on the community at large. The likelihood of a major event is considered to be marginal, but an isolated minor accident is of constant concern. According to the Minnesota Pollution Control Agency, 68 spills have occurred in Chippewa County from July 2002 to September 2014. See Appendix 10 for more specific information.

**Table 3.8 CC Hazardous Spills from 2002 – 2014**

City	Number of Spills	Product Type
Clara City	21	Acid/Base Chemical, Agriculture Pesticide/Fertilizer, Fertilizer, Light Fuel Oil & Diesel, Manure, Mineral Oil, Pesticide, Sewage/wastewater, Other
Maynard	6	Gasoline, Light Fuel Oil & Diesel, Mineral Oil, Pesticide
Milan	4	Light fuel oil & diesel, transformer oil, dry fertilizer
Montevideo	22	Acid/Base Chemical, Pressurized Container of Gas, Gasoline, Hydraulic Fluid, Light Fuel Oil & Diesel, Mineral Oil, Natural Gas
Watson	2	Agriculture Pesticide/Fertilizer, Anti-freeze, Glycols, Deicers
Granite Falls	13	Gasoline, Heavy Fuel Oil, Light Fuel Oil & Diesel, Mineral Oil, Pesticide, Other
Total	68	

Source: Minnesota Pollution Control Agency, 2014

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

**Water Supply Contamination.** If a spill occurred and polluted potable groundwater.

**Wastewater Treatment System Failure.** System failure would have direct impact on the health of humans and animals.

#### ***Transportation***

Road, rail, aircraft, and pipeline all move hazardous materials presenting differing levels of risk. Transported products include hazardous materials passing from producers to users, between storage and use facilities as well as hazardous waste from generators going to treatment and disposal facilities.

The road system in Chippewa County provides a network to transport both hazardous and non-hazardous material throughout the region and between local communities. Risks of a hazardous material events vary based on the classification of the road and its proximity to people and property. The risk of a major event is most severe in more populated western portions of the county and along state highways. According to the most recent findings at the Minnesota Department of Transportation (MnDOT), more than half of all accidents involving hazardous materials have occurred on the state roadways. Roads are a major concern in Chippewa County due to the lack of information available regarding what is traveling on the road system on a daily basis.

Approximately 11% of all statewide transportation incidents involving hazardous material in 2002 were from rail transport, according to MnDOT statistics. Valve leakage and safety valve releases are sources of material spills on pressurized and general service tank cars or other

hazardous materials containers such as covered hoppers, inter-modal trailers/containers or portable tanks. Leaks manifest themselves as odors or vaporous clouds from tanker top valves; spraying or splashing from tanker top valves; wetness on the side of the car; or drainage from the bottom outlet valve. Depending on the type of rail car involved, a leak or spill could result in hundreds to thousands of gallons/pounds of a substance being released.

Hazardous materials on both the roads and rail lines pose a risk to Chippewa County residents. Recently, there has been an increase in rail traffic through Western Minnesota as a result of oil being shipped east from North Dakota. While a spill could greatly affect residents anywhere in the county, a hazardous material spill would have the most impact on a city. Chapter 4 includes maps of each city in Chippewa County with ½ mile buffers around rail lines and Minnesota State Highways. The United States Department of Transportation (US DOT) considers the area within ½ mile of rail lines the *Evacuation Zone* for Oil Train Derailments. Areas within one mile of rail lines are considered to be *Potential Impact Zones* in case of an oil train fire.

Chippewa County has one small municipally-run airport that operates a general use facility for small businesses and pleasure uses only. The only hazardous material found at the airport is used for agricultural spraying. Planes are not allowed to wash out any hazardous materials and this use is seasonal only.

Chippewa County's pipeline supplies pressurized flammable liquids transmission. A liquid release in the Magallen Pipeline would put the City of Maynard at risk. The rest of the rural area is at slight risk and in the event of a leak in either the alliance or dome pipeline, will require additional personnel to inform each farm place to evacuate.

### ***Fixed Facilities***

A variety of hazardous materials exist in fixed facilities throughout Chippewa County, ranging from stored flammable liquids to radioactive materials and chemical agents. Some materials are particularly lethal even in small amounts, while others require strong concentrations with prolonged exposure periods to cause harm. Businesses housing hazardous materials are listed in the Emergency Operations Plan.

Facilities storing or using hazardous materials above minimum amounts have developed and filed a Risk Management Plan with the Local Emergency Planning Committee, State Emergency Response Commission and the Environmental Protection Agency. Each plan identifies significant hazards for the facility, likely release scenario for the hazards, estimated population impacted by the release, and specific steps to take in the event of a release to protect a population from harm.

### ***Pipelines***

Currently, over 78,000 miles of pipelines are located within the state of Minnesota. Six pipelines run throughout Chippewa County carrying liquid gasoline and natural gas are owned by CenterPoint Energy, Great Plains, Alliance Pipeline LTD, Dooley's, Magellan Pipeline Company LP, and Kinder Morgan Cochin LLP. Table 3.9 below identifies the type of commodity carried and length of pipelines by their respective owners.



**Table 3.9 Chippewa County Pipelines**

Operator Name	Commodity Carried	Mileage
CenterPoint Energy	Natural Gas	Unknown
Great Plains	Natural Gas	Unknown
Alliance Pipeline LTD	Natural Gas	8.2 Miles
Dooley's	Natural Gas	13.0 Miles
Magellan Pipeline Company	Gasoline Product	14.9 Miles
Kinder Morgan Cochin LLP	Gasoline Product	8.3 Miles

Source: Chippewa County, 2014

### **History of Pipeline Breaks in Chippewa County**

From 2000 to 2009, six pipeline breaks have occurred in Chippewa County. Three of the six breaks took place in 2001. Two of the breaks took place in Montevideo as a result of excavation. The other break occurred in Rhinelander Township, when a third-party excavated with a backhoe and hit a 2-inch natural gas pipe. In 2002, another 2-inch natural gas pipeline was hit during an excavation and caused a natural gas leak in Montevideo, requiring natural gas to be turned off for the area. During 2004, a homeowner in Montevideo was digging and broke a 1.5-inch natural gas pipeline that serviced the home. The most recent pipeline damage occurred on November 15, 2006 in Rhinelander Township, located near 50<sup>th</sup> St SE and County Road 1. The break transpired due to a construction company installing drain tile and excavation caused damage to a 8-inch pipeline owned by Magellan Pipeline Company LP carrying gasoline. In this case, the pipeline did not leak as it was shut down for maintenance.

### ***Methamphetamine and Clandestine Drug Labs***

A clandestine drug lab (or “clan lab”) is a collection of materials and ingredients used to manufacture illegal drugs. Methamphetamine (meth) is the drug most commonly made in Minnesota labs. The Minnesota Department of Health (MDH) received information from 75 counties when they surveyed all 87 counties twice in 2005 from January to June and July to December to tract the number of meth lab discoveries. A total of 128 labs were found throughout all counties, 95 from January to June and 33 from July to December. In 2006, the total number of meth lab discoveries declined with only 73 discoveries in total (Minnesota Department of Health 2006, 2007). The majority of these labs were located away from the largest population centers, in rural or semi-rural areas. There have been no meth labs found in Chippewa County.

Each drug lab is a potential hazardous waste site requiring evaluation and cleanup by hazardous waste professionals, West Central Chemical - Morris. Health effects occur in people exposed to lab chemicals before, during and after the drug-making process. While many of the ingredients used to make illicit drugs are common household products, both the production process and the mixtures produced can be extremely dangerous. In Minnesota, numerous law enforcement officers and staff from health, social service and other agencies have collapsed or become ill at clan lab sites. Jail and hospital staff members have become ill from exposure to meth lab chemicals on the clothing of people living or working at lab sites. MDH has received

reports of people who have moved into former lab sites and have suffered chest and respiratory symptoms months after lab chemicals were removed.

The impact of illegal drug-making labs is also felt by neighbors and occupants when labs catch fire, explode, and cause the release of chemicals and chemical waste into the surrounding environment. Finally, clan labs have been associated with increased crime in the surrounding community, including domestic abuse, theft and child endangerment.

Roughly 50 percent of Minnesota residences where drug labs have been discovered have also housed children. Recognizing the special risks to children living in lab environments, the Minnesota legislature has recently expanded child neglect and endangerment law to include endangerment through exposure to illegal drug manufacture and sales. In 2005, the Minnesota Legislature passed a law intended to reduce the number of meth labs and increase penalties for illegal meth usage.

In many Minnesota communities, there are no laws requiring cleanup of a hazardous waste site (particularly one contaminated by non-standard use of common household products) in a private residence. The Minnesota Bureau of Criminal Apprehension is usually involved in the case and the cleanup to make sure it is thoroughly investigated and cleaned.

### ***Plans and Programs for Hazardous Materials***

State Agency Cooperation. Chippewa County works directly with the appropriate state agencies to address needs for responding to and mitigating the impacts of a hazardous event.

Emergency Operations Plan. Chippewa County currently has an emergency operations plan, known as the Chippewa County Emergency Operations Plan, which outlines procedures for dealing with hazardous material accidents, spills or releases.

Hazardous Chemicals Collection. The Chippewa County Emergency Manager works with the Department of Public Safety and Emergency Response Commission to assist in the statewide collection of hazardous chemicals existing at facilities throughout Chippewa County so local emergency officials can prepare for incidents.

Water Plan. Chippewa County's Local Comprehensive Water Plan recognizes that the county's ground water is impacted by both agricultural and residential fertilizer and pesticide applications. It further recognizes the number of hazardous waste generators by minor civil division from the Minnesota Pollution Control Agency.

Environmental Health Regulations. Chippewa County and the cities of Montevideo and Granite Falls have worked to develop environmental health regulations and a County Safety Procedures and Policy Guide. These documents are cross-departmental plans that deal with hazardous material and act as guidelines to protect the county citizens.

GIS System. Chippewa County developed a county geographic information system with support from Minnesota Planning and the Departments of Natural Resources and Transportation. The county implemented GIS technology through the Planning and Zoning office as well as regional GIS support.

*Training of Emergency Personnel.* All emergency personnel are trained to at least the minimum Hazardous Materials Awareness level and all first responder groups conduct the required Occupational Health and Safety Administration training on a yearly basis.

*Warning System.* In early 2004, the 911 System received an upgrade to include hazardous materials spill. In the event of a hazardous materials spill, emergency personnel can enter name of chemical, etc. estimated amount, wind direction and speed. The system will indicate possible residents affected by name and location who would be evacuated by individual notification. Although this would be an effective warning system, emergency personnel will still need to go door-to-door to make sure everyone has left the impacted area.

*Southwest Emergency Preparedness Team (SWEPT).* SWEPT maintains a CHEMPACK cache in the southwest region for EMS and hospital staff to use for treatment of chemical spills or terrorism event.

#### ***Program Gaps or Deficiencies for Hazardous Materials***

- There is no warning system currently in place for warning residents in the rural area of a hazardous materials spill, although plans are to upgrade. Although this would be an effective warning system, emergency personnel will still need to go door-to-door to make sure everyone is out.
- Plans, policies and/or procedures are not in place to deal with a meth lab incident in the county. Law enforcement and emergency services are able to deal with meth labs, but the general public should be more educated on the risks. Lack of information and awareness has left the county susceptible to an accident that could impact a large area.

### **Water Supply Contamination**

Water supply contamination is the introduction of point and non-point source pollutants into public ground water and/or surface water supplies. Although minimal, water supply contamination does pose a threat in Chippewa County.

Microbiological and chemical contaminants can enter water supplies. Chemicals can leach through soils from leaking underground storage tanks, feedlots, and waste disposal sites. Human wastes and pesticides can also be carried to lakes and streams during heavy rains or snow melt.

#### ***History of Water Supply Contamination in Chippewa County***

Drinking water in Chippewa County comes from ground water and all cities have municipal water systems. All water plants are in good working condition and undergo annual inspections by municipal employees. Individual wells provide drinking water for rural residences within Chippewa County.

### ***Relationships with Other Hazards – Cascading Effects***

***Infectious Diseases.*** Polluted human water sources can produce illness and epidemics in both humans and animals.

### ***Plans and Programs for Water Supply Contamination***

***Drinking Water Standards, Requirements.*** The U.S. Environmental Protection Agency (EPA), as required by the Safe Drinking Water Act of 1974, sets uniform nationwide minimum standards for drinking water. State public health and environmental agencies have the primary responsibility for ensuring that each public water supplier meets these federal drinking water standards or more stringent ones established by the state.

***Public Water Supply Monitoring.*** The EPA requires an ongoing water quality-monitoring program to ensure public water systems are working properly. Local officials work together with the Minnesota Department of Health and the EPA to ensure that all public water supplies are safe. The EPA also requires all local suppliers to promptly inform the public if their supply becomes contaminated. Countryside Public Health Service inspects inspections of drinking water in restaurants, bars and other private businesses at least annually.

***Wellhead Protection Program.*** Chippewa County is in the process of setting up a wellhead protection plan that is required by the state of Minnesota. Four out of the six cities in the county have completed wellhead protection plans that comply with state and federal guidelines set up for wellheads.

***Well Construction and Testing.*** Since 1974, all water wells (public and private) constructed in Minnesota must meet the location and construction requirements of the Minnesota Well Code. Countryside Public Health has a certified lab to test for well contamination.

***Feedlot Pollution Prevention.*** Several steps are being taken to protect ground water sources from feedlot runoff. County ordinances require all feedlots within the county to participate in the state's feedlot programs. County extension services promote best management practices to minimize runoff from feedlots into rivers and feedlot locations are limited by county zoning ordinances. Expansion of existing feedlots is allowed with specific limitations.

***Sealed Wells.*** Soil and Water Conservation District has received grant money to help home owners seal their unused wells

### ***Program Gaps and Deficiencies for Water Supply Contamination***

- The emergency response plan does not identify alternate sources of drinking water, including locates for acquiring adequate amounts of bottled water, in the event of contamination.

## **Wastewater Treatment System Failure**

Wastewater treatment and disposal is an important part of our need to protect and preserve Minnesota's water resources. Although minimal, failure of wastewater treatment systems poses a potential risk in Chippewa County. Numerous hazards can impact water treatment plants, including severe flooding.

### ***History of Wastewater Treatment System Failure in Chippewa County***

Wastewater systems typically pose higher risks of failure during the spring when melting snow and runoff can cause flooding. To date, no wastewater treatment systems have failed in Chippewa County.

### ***Relationships with Other Hazards – Cascading Effects***

Infectious Diseases. The failure of septic treatment facilities and systems can have immediate adverse impacts on human health through communicable diseases and epidemics.

Water Supply Contamination. The failure of septic treatment facilities and systems can have immediate adverse impacts on potable water supplies.

### ***Plans and Programs for Wastewater Treatment System Failure***

Certified Operators and Inspections. The Minnesota Pollution Control Agency (MPCA) requires routine inspections of all public wastewater systems. These operators are required to take state training to maintain their certified operator status.

State Permit Enforcement. The Minnesota Pollution Control Agency (MPCA) regulates wastewater systems. State staff in the water-quality point-source program issue permits, monitors compliance through data review and inspections, and enforce permit conditions.

Individual Septic Tank Inspections. Chippewa County inspects individual septic tanks at the point of sale. There is also a fund to help owners upgrade their septic tanks to MPCA standards.

### ***Program Gaps or Deficiencies for Wastewater Treatment System Failure***

- Human-induced events, like terrorism, are not addressed in all emergency plans.

## **Civil Disturbance**

Human-caused hazards can be intentional, criminal, malicious uses of force and violence to perpetrate disasters against people or property. They can be the result of terrorism – actions intended to intimidate or coerce a government or the civilian population to further political or social objectives – which can be either domestic or international, depending on the origin, base and objectives of the terrorist organization

Hazards can result from the use of weapons of mass destruction, including biological, chemical, nuclear and radiological weapons; arson, incendiary, explosive and armed attacks; industrial sabotage and intentional hazardous materials releases; and cyber terrorism.

### ***History of Terrorism/Civil Disturbances in Chippewa County***

Chippewa County has no history of terrorist or individual acts designed to cause disasters against people or property. Vandalism, assaults and other criminal acts do occur, but these isolated incidents fall within the purview of local law enforcement.

**School Violence.** Violence in schools has become an increasingly important topic among teachers, students, and police. There is a focusing on preventing bullying, school shootings, vandalism, and overall safety. Regardless of the availability of drugs, alcohol, and weapons to youth, it appears as though school violence incidences are decreasing. This fact is demonstrated in the Minnesota Student Surveys completed in 2001 and 2007 in Chippewa County. The majority of students “strongly agree or agree” to feeling safe walking to and from school and at school.

From 2001 to 2007, the data remained generally consistent in terms of the number of days students brought a gun onto school property. Ninety-eight percent of all students and 91% of males in 12<sup>th</sup> grade reported never bringing guns to school. Over 90% of all students reported never bringing non-gun weapons to school. However, 12<sup>th</sup> grade males reported bringing a non-gun weapon to school at a slightly higher rate.

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

Cascading effects of an intentional human-caused disaster are highly dependent on the specific mode used and asset targeted. Many of these have been detailed in the technological hazards portion of the plan covering dam failure and hazardous materials incidents. Fires and secondary explosions are possible with explosive attacks, and fires from arson attacks can extend beyond the intended target.

### ***Plans and Programs for Terrorism/Civil Disturbances***

**Cooperation with State, Federal Officials.** Chippewa County officials are working with state and federal officials on domestic preparedness efforts, including with the Department of Health to ensure that health care facilities are prepared for bio-terrorism events.

**School Multi-Hazard Emergency Plans.** Since 2003, every school district in Minnesota has been mandated by state statute to institute multi-hazard emergency planning including quarterly drills and exercises. Each plan and practice is required to include prevention and response strategies – in particular to school violence. Each school implements their plans differently, while holding to the same basic tenets and working with their respective law enforcement agency.

**Emergency Plans.** The hospital plan, EMS Plan, Countryside Public Health Plan, and Chippewa County’s Emergency Operations Plan identify the CHEMPACK cache that can be requested for treatment if chemical exposure is identified.

### ***Program Gaps and Deficiencies for Civil Disturbance/Terrorism***

- Design and operations of facilities in the county were not developed with terrorism prevention in mind.

- Chippewa County government buildings, including the county courthouse and city hall, have unrestricted pedestrian access.
- The Montevideo City Hall and the Chippewa County Courthouse do not have fire suppression systems and are not blast resistant. Montevideo had a fire detection system installed in 2000.

*PUBLIC ASSISTANCE AND INDIVIDUAL ASSISTANCE GRANT PROGRAM*

Table 3.10 summarizes the Public Assistance Grant Program funds dispersed in Chippewa County. Chippewa County has not received any Individual Assistance Grant Program funds.

**Table 3.10 Public Assistance Grant Program in Chippewa County**

Disaster Declaration	Disaster Type	Project Amount
1370	Severe Winter Storms, Flooding, and Tornadoes	\$916,231.43
1830	Severe Storms and Flooding	\$190,100.64
1900	Flooding	\$232,346.73
1982	Severe Storms and Flooding	\$686,257.55
4182	Severe Storms, Straight-line Winds, Flooding, Landsides, and Mudslides	\$368,985.68

## CHAPTER 4: RISK ASSESSMENT

### OVERVIEW

The following risk assessment is divided into three parts. The first part consists of Hazard Prioritizations for each hazard, which are based on the information provided in Chapter Three. The second part discusses county vulnerability to natural hazards (Vulnerable Areas within Chippewa County) and the third part consists of maps of each city's land use and critical facilities.

### PRIORITIZED RISK ASSESSMENT

The following pages summarize important information about each hazard in the form of the subsequent risk assessment. This risk assessment was completed by the Chippewa County All-Hazard Mitigation Task Force, who considered each of the following hazards in terms of four criteria. The four criteria included frequency of occurrence, warning time, potential severity, and risk level. The values for the prioritized risk assessment were determined by a variety of resources including meetings and discussions with the Local Task Force, Technical Task Force team, city representatives, and the County Emergency Manager to determine a ranking for each hazard based on the risk assessment criteria. The raking method quantified each hazard's risk level by assigning numeric values to the criteria. From the number value assigned, an overall ranking for each hazard was determined, which allowed the hazards to be compared in order to assess which hazards pose the greatest risk in Chippewa County. Information from the community profile, analysis of historic disasters, and information provided by the task force and public to identify past, present and future disasters were also taken into consideration.

**Frequency of Occurrence:** This projects how often it may happen and the likelihood that the hazard will occur. The number values are determined by:

- 1 Unlikely
- 2 Occasional
- 3 Likely
- 4 Highly Likely

**Warning Time:** This projects how much warning time is available prior to the event.

- 1 More than 12 Hours
- 2 6-12 Hours
- 3 3-6 Hours
- 4 None-Minimal

**Potential Severity:** This projects how severe the impact will be in a general sense.

- 1 Limited
- 2 Minor
- 3 Major
- 4 Substantial

**Risk Level:** The risk level looks at the amount of risk there will be overall as a result of the event.

- 1 Minimal
- 2 Limited
- 3 High
- 4 Very High



**Table 4.1 Hazard: Violent Storms and Extreme Temperatures**

<b>Hazard:</b>	<b>Winter Weather</b> Blizzard, Ice Storms, Heavy Snow, Extreme Cold	<b>Summer Weather</b> Thunderstorm, Lightning, Hail, Straight Line Winds, Extreme Heat	<b>Tornado</b>
<b>Location</b>	County	County	County
<b>Historic events</b>	3-6 storms per year 1-3 blizzards per year Often below freezing Extreme cold 1-2 days per year	0-2 storms per year 1-3 days of extreme heat per year	11 small tornado occurrences in past 58 years
<b>Likely to happen now?</b>	Yes	Yes	No
<b>How often?</b>	3-6 storms per year 0-2 blizzards per year Extreme cold 1-3 days per year	1-2 storms per year 1-3 days of extreme heat per year	0 per year
<b>Where would it strike?</b>	County	County	County
<b>How bad could hazard get?</b>	2-3 days per storm, multiple storms in one season, limited visibility, record snow is 15 in. of snow in one day and 92 in. of snow in one season, record cold is -42°F, wind chill is factor	Lightning, strong wind and hail. Record temp. is 113°F Humidity is factor	F4 reported in neighboring county
<b>When would hazard likely occur?</b>	November – March	Spring - Fall	Spring - Fall
<b>What other hazards could occur simultaneously?</b>	Wind, transportation accidents, extreme temp, spring flooding	Flooding, lightning, hail, wind, transportation accidents, fires, wildfire	Hazardous materials, utility failure, fire
<b>Economic impacts</b>	Cost of snow removal, loss of livestock, school closing, store closing	Loss of livestock, fire potential, agriculture and property damage	Structure loss and community shut down
<b>Loss of life impacts</b>	Dangerous for Emergency Transportation, heat shut-off issues, transportation accidents	Lightning strike, heat stroke, rare	Extremely dangerous
<b>Risk Level</b> 1 Minimal 2 Limited 3 High 4 Very High	Citizens/People: <b>3</b> Animals/Livestock: <b>2</b> Housing: <b>2</b> Critical Structures: <b>2</b> Infrastructure: <b>2</b> <b>Total: 2</b>	Citizens/People: <b>2</b> Animals/Livestock: <b>2</b> Housing: <b>2</b> Critical Structures: <b>2</b> Infrastructure: <b>2</b> <b>Total: 2</b>	Citizens/People: <b>3</b> Animals/Livestock: <b>3</b> Housing: <b>3</b> Critical Structures: <b>3</b> Infrastructure: <b>2</b> <b>Total: 3</b>
<b>Risk Assessment</b>			
1 Unlikely 2 Occasional 3 Likely 4 Highly Likely	<u>Frequency of Occurrence</u>  3.5	<u>Frequency of Occurrence</u>  3.17	<u>Frequency of Occurrence</u>  2.33
1 More than 12 Hours 2 6-12 Hours 3 3-6 Hours 4 Non-Minimal	<u>Warning Time</u>  1.83	<u>Warning Time</u>  2.0	<u>Warning Time</u>  4.0
1 Limited 2 Minor 3 Major 4 Substantial	<u>Potential Severity*</u>  3.42	<u>Potential Severity*</u>  3.0	<u>Potential Severity*</u>  3.33
1 Minimal 2 Limited 3 High 4 Very High	<u>Risk Level**</u>  3.17	<u>Risk Level**</u>  3.0	<u>Risk Level**</u>  3.17
(Total divided by 4) 1 Very low 2 Low 3 Moderate 4 High	<u>Overall Priority</u>  <b>2.99</b>	<u>Overall Priority</u>  <b>2.79</b>	<u>Overall Priority</u>  <b>3.21</b>

\* This asks how severe the impact will be in a general sense.

\*\* The risk level looks at the amount of risk there will be overall as a result of the event.

**Table 4.2 Hazard: Floods**

<b>Hazard:</b>	<b>100-year Floods</b>	<b>Other Flooding/Flash Floods</b>
<b>Location</b>	Montevideo, Clara City, Maynard, Granite Falls, along Chippewa and Minnesota Rivers and Hawk Creek	County
<b>Historic events</b>	1997, 2001	1993, 1995, 2002
<b>Likely to happen now?</b>	Yes	Yes
<b>How often?</b>	Possible 2 times every 10 years	2 times every 3 years
<b>Where would it strike?</b>	Along rivers	Along rivers, drainage ditches, wetlands, basements, etc.
<b>How bad could hazard get?</b>	1997 was record year, improvements made since, some homes are still in the floodplain in Montevideo, one house could be affected in Clara City	Large amount of water, moving fast, ice jams cause spring flooding in Clara City and Maynard
<b>When would hazard likely occur?</b>	Spring	Spring/Summer
<b>What other hazards could occur simultaneously?</b>	Utility failure, landslide, debris flow, interrupt transportation routes (emergencies)	Utility failure, landslide, debris flow, interrupt transportation routes (emergencies)
<b>Economic impacts</b>	Sandbagging and road repair expenses, agricultural loss	Road Repair expenses, agriculture loss
<b>Loss of life impacts</b>	Danger if sandbagging	Danger if sandbagging
<b>Risk Level</b> 1 Minimal 2 Limited 3 High 4 Very High	Citizens/People: <b>2</b> Animals/Livestock: <b>2</b> Housing: <b>2</b> Critical Structures: <b>2</b> Infrastructure: <b>3</b> <b>Total: 2</b>	Citizens/People: <b>2</b> Animals/Livestock: <b>1</b> Housing: <b>2</b> Critical Structures: <b>2</b> Infrastructure: <b>2</b> <b>Total: 2</b>
<b>Risk Assessment</b>		
1 Unlikely 2 Occasional 3 Likely 4 Highly Likely	<u>Frequency of Occurrence</u>  2.5	<u>Frequency of Occurrence</u>  2.83
1 More than 12 Hours 2 6-12 Hours 3 3-6 Hours 4 Non-Minimal	<u>Warning Time</u>  1.0	<u>Warning Time</u>  2.17
1 Limited 2 Minor 3 Major 4 Substantial	<u>Potential Severity*</u>  2.5	<u>Potential Severity*</u>  2.33
1 Minimal 2 Limited 3 High 4 Very High	<u>Risk Level**</u>  2.33	<u>Risk Level**</u>  1.83
(Total divided by 4) 1 Very low 2 Low 3 Moderate 4 High	<u>Overall Priority</u>  2.08	<u>Overall Priority</u>  2.29

\* This asks how severe the impact will be in a general sense.

\*\* The risk level looks at the amount of risk there will be overall as a result of the event.

**Table 4.3 Hazard: Drought**

<b>Hazard:</b>	<b>Drought</b>
<b>Location</b>	County
<b>Historic events</b>	1976, 1988, 2003
<b>Likely to happen now?</b>	Unlikely
<b>How often?</b>	1 time per 20 years
<b>Where would it strike?</b>	County
<b>How bad could hazard get?</b>	Could kill a large number of crops
<b>When would hazard likely occur?</b>	Summer
<b>What other hazards could occur simultaneously?</b>	Utility failure (water, wastewater)
<b>Economic impacts</b>	Crops/agriculture/food supply
<b>Loss of life impacts</b>	Unlikely
<b>Risk Level</b> 1 Minimal 2 Limited 3 High 4 Very High	Citizens/People: <b>3</b> Animals/Livestock: <b>4</b> Housing: <b>2</b> Critical Structures: <b>2</b> Infrastructure: <b>1</b> <b>Total: 3</b>
<b>Risk Assessment</b>	
1 Unlikely 2 Occasional 3 Likely 4 Highly Likely	<u>Frequency of Occurrence</u>  3.0
1 More than 12 Hours 2 6-12 Hours 3 3-6 Hours 4 Non-Minimal	<u>Warning Time</u>  1.0
1 Limited 2 Minor 3 Major 4 Substantial	<u>Potential Severity*</u>  3.42
1 Minimal 2 Limited 3 High 4 Very High	<u>Risk Level**</u>  2.67
(Total divided by 4) 1 <b>Very low</b> 2 <b>Low</b> 3 <b>Moderate</b> 4 <b>High</b>	<u>Overall Priority</u>  <b>2.52</b>

\* This asks how severe the impact will be in a general sense.

\*\* The risk level looks at the amount of risk there will be overall as a result of the event.

**Table 4.4 Hazard: Wildfire**

<b>Hazard:</b>	<b>Wildfire</b>
<b>Location</b>	County – especially along the MN River Valley and CRP/CREP land
<b>Historic events</b>	2003
<b>Likely to happen now?</b>	Yes
<b>How often?</b>	Each year the potential increases as natural areas increase and managed burns do not take fuel away
<b>Where would it strike?</b>	County – especially along the MN River Valley and CRP/CREP land
<b>How bad could hazard get?</b>	Potential for hundreds of acres to burn
<b>When would hazard likely occur?</b>	Summer
<b>What other hazards could occur simultaneously?</b>	Erosion/landslide, severe wind, scrap tire fires, structure fires, hazardous materials, utility failure
<b>Economic impacts</b>	Extremely expensive for local fire departments
<b>Loss of life impacts</b>	Extremely dangerous for firefighters
<b>Risk Level</b> 1 Minimal 2 Limited 3 High 4 Very High	Citizens/People: <b>2</b> Animals/Livestock: <b>3</b> Housing: <b>3</b> Critical Structures: <b>2</b> Infrastructure: <b>2</b> <b>Total: 2</b>
<b>Risk Assessment</b>	
1 Unlikely 2 Occasional 3 Likely 4 Highly Likely	<u>Frequency of Occurrence</u>  1.83
1 More than 12 Hours 2 6-12 Hours 3 3-6 Hours 4 Non-Minimal	<u>Warning Time</u>  4.0
1 Limited 2 Minor 3 Major 4 Substantial	<u>Potential Severity*</u>  1.75
1 Minimal 2 Limited 3 High 4 Very High	<u>Risk Level**</u>  1.67
(Total divided by 4) 1 <b>Very low</b> 2 <b>Low</b> 3 <b>Moderate</b> 4 <b>High</b>	<u>Overall Priority</u>  <b>2.31</b>

\* This asks how severe the impact will be in a general sense.

\*\* The risk level looks at the amount of risk there will be overall as a result of the event.

**Table 4.5 Hazard: Dam Failure**

<b>Hazard:</b>	<b>Dam Failure</b>
<b>Location</b>	Along Minnesota River
<b>Historic events</b>	None
<b>Likely to happen now?</b>	No
<b>How often?</b>	Unlikely
<b>Where would it strike?</b>	Lac qui Parle Lake Dam, Granite Falls Dam
<b>How bad could hazard get?</b>	Dam could break and flood Montevideo and Granite Falls
<b>When would hazard likely occur?</b>	Year-round
<b>What other hazards could occur simultaneously?</b>	Flooding
<b>Economic impacts</b>	Devastating to Granite Falls, could affect Montevideo
<b>Loss of life impacts</b>	Could harm residents in Granite Falls, possibly in Montevideo
<b>Risk Level</b> 1 Minimal 2 Limited 3 High 4 Very High	Citizens/People: <b>2</b> Animals/Livestock: <b>1</b> Housing: <b>2</b> Critical Structures: <b>2</b> Infrastructure: <b>2</b> <b>Total: 2</b>
<b>Risk Assessment</b>	
1 Unlikely 2 Occasional 3 Likely 4 Highly Likely	<u>Frequency of Occurrence</u>  1.0
1 More than 12 Hours 2 6-12 Hours 3 3-6 Hours 4 Non-Minimal	<u>Warning Time</u>  3.5
1 Limited 2 Minor 3 Major 4 Substantial	<u>Potential Severity*</u>  3.0
1 Minimal 2 Limited 3 High 4 Very High	<u>Risk Level**</u>  1.83
(Total divided by 4) 1 <b>Very low</b> 2 <b>Low</b> 3 <b>Moderate</b> 4 <b>High</b>	<u>Overall Priority</u>  2.33

\* This asks how severe the impact will be in a general sense.

\*\* The risk level looks at the amount of risk there will be overall as a result of the event.

**Table 4.6 Hazard: Infectious Diseases**

<b>Hazard:</b>	<b>All Infectious Disease</b>
<b>Location</b>	County
<b>Historic events</b>	No major events
<b>Likely to happen now?</b>	Unlikely
<b>How often?</b>	Infrequent
<b>Where would it strike?</b>	Small population within county
<b>How bad could hazard get?</b>	Major outbreak of life-threatening disease
<b>When would hazard likely occur?</b>	Year-round
<b>What other hazards could occur simultaneously?</b>	Riots, terrorist attack, natural hazard event
<b>Economic impacts</b>	Tourism industry, local businesses
<b>Loss of life impacts</b>	Major if life-threatening outbreak
<b>Risk Level</b> 1 Minimal 2 Limited 3 High 4 Very High	Citizens/People: <b>3</b> Animals/Livestock: <b>3</b> Housing: <b>1</b> Critical Structures: <b>2</b> Infrastructure: <b>1</b> <b>Total: 3</b>
<b>Risk Assessment</b>	
1 Unlikely 2 Occasional 3 Likely 4 Highly Likely	<u>Frequency of Occurrence</u>  1.83
1 More than 12 Hours 2 6-12 Hours 3 3-6 Hours 4 Non-Minimal	<u>Warning Time</u>  1.67
1 Limited 2 Minor 3 Major 4 Substantial	<u>Potential Severity*</u>  3.33
1 Minimal 2 Limited 3 High 4 Very High	<u>Risk Level**</u>  2.83
(Total divided by 4) <b>1 Very low</b> <b>2 Low</b> <b>3 Moderate</b> <b>4 High</b>	<u>Overall Priority</u>  <b>2.42</b>

\* This asks how severe the impact will be in a general sense.

\*\* The risk level looks at the amount of risk there will be overall as a result of the event.

**Table 4.7 Hazard: Fire**

<b>Hazard:</b>	<b>Structure Fire</b>
<b>Location</b>	Buildings/county
<b>Historic events</b>	Friendship Homes 2003, Grain Elevator 1998
<b>Likely to happen now?</b>	Yes
<b>How often?</b>	Potential is always there
<b>Where would it strike?</b>	Structures throughout county
<b>How bad could hazard get?</b>	Entire structure could burn
<b>When would hazard likely occur?</b>	Year-round
<b>What other hazards could occur simultaneously?</b>	Wildfire, hazardous materials
<b>Economic impacts</b>	Could close business if fire is bad enough
<b>Loss of life impacts</b>	Potential if hazardous materials are present Elderly and very young at risk
<b>Risk Level</b> 1 Minimal 2 Limited 3 High 4 Very High	Citizens/People: <b>3</b> Animals/Livestock: <b>1</b> Housing: <b>3</b> Critical Structures: <b>3</b> Infrastructure: <b>2</b> <b>Total: 3</b>
<b>Risk Assessment</b>	
1 Unlikely 2 Occasional 3 Likely 4 Highly Likely	<u>Frequency of Occurrence</u>  2.0
1 More than 12 Hours 2 6-12 Hours 3 3-6 Hours 4 Non-Minimal	<u>Warning Time</u>  4.0
1 Limited 2 Minor 3 Major 4 Substantial	<u>Potential Severity*</u>  3.0
1 Minimal 2 Limited 3 High 4 Very High	<u>Risk Level**</u>  2.6
(Total divided by 4) 1 <b>Very low</b> 2 <b>Low</b> 3 <b>Moderate</b> 4 <b>High</b>	<u>Overall Priority</u>  <b>2.71</b>

\* This asks how severe the impact will be in a general sense.

\*\* The risk level looks at the amount of risk there will be overall as a result of the event.

**Table 4.8 Hazard: Water Supply Contamination**

<b>Hazard:</b>	<b>Hazardous Materials</b>
<b>Location</b>	Specific locations throughout county
<b>Historic events</b>	None
<b>Likely to happen now?</b>	Unlikely
<b>How often?</b>	Infrequent
<b>Where would it strike?</b>	Specific locations throughout county, along roads and railroads
<b>How bad could hazard get?</b>	Major spill could be devastating to human and animal life
<b>When would hazard likely occur?</b>	Year-round
<b>What other hazards could occur simultaneously?</b>	Wildfire, storm
<b>Economic impacts</b>	Could shut down area of spill
<b>Loss of life impacts</b>	Potential depending on material
<b>Risk Level</b> 1 Minimal 2 Limited 3 High 4 Very High	Citizens/People: <b>3</b> Animals/Livestock: <b>3</b> Housing: <b>2</b> Critical Structures: <b>3</b> Infrastructure: <b>2</b> <b>Total: 3</b>
<b>Risk Assessment</b>	
1 Unlikely 2 Occasional 3 Likely 4 Highly Likely	<u>Frequency of Occurrence</u>  1.83
1 More than 12 Hours 2 6-12 Hours 3 3-6 Hours 4 Non-Minimal	<u>Warning Time</u>  3.5
1 Limited 2 Minor 3 Major 4 Substantial	<u>Potential Severity*</u>  3.33
1 Minimal 2 Limited 3 High 4 Very High	<u>Risk Level**</u>  2.83
(Total divided by 4) <b>1 Very low</b> <b>2 Low</b> <b>3 Moderate</b> <b>4 High</b>	<u>Overall Priority</u>  <b>2.87</b>

\* This asks how severe the impact will be in a general sense.

\*\* The risk level looks at the amount of risk there will be overall as a result of the event.



**Table 4.9 Hazard: Hazardous Materials**

<b>Hazard:</b>	<b>Hazardous Materials</b>
<b>Location</b>	Specific locations throughout county
<b>Historic events</b>	None
<b>Likely to happen now?</b>	Unlikely
<b>How often?</b>	Infrequent
<b>Where would it strike?</b>	Specific locations throughout county, along roads and railroads
<b>How bad could hazard get?</b>	Major spill could be devastating to human and animal life
<b>When would hazard likely occur?</b>	Year-round
<b>What other hazards could occur simultaneously?</b>	Wildfire, storm
<b>Economic impacts</b>	Could shut down area of spill
<b>Loss of life impacts</b>	Potential depending on material
<b>Risk Level</b> 1 Minimal 2 Limited 3 High 4 Very High	Citizens/People: <b>3</b> Animals/Livestock: <b>3</b> Housing: <b>2</b> Critical Structures: <b>3</b> Infrastructure: <b>2</b> <b>Total: 3</b>
<b>Risk Assessment</b>	
1 Unlikely 2 Occasional 3 Likely 4 Highly Likely	<u>Frequency of Occurrence</u>  1.83
1 More than 12 Hours 2 6-12 Hours 3 3-6 Hours 4 Non-Minimal	<u>Warning Time</u>  3.5
1 Limited 2 Minor 3 Major 4 Substantial	<u>Potential Severity*</u>  3.33
1 Minimal 2 Limited 3 High 4 Very High	<u>Risk Level**</u>  2.83
(Total divided by 4) 1 <b>Very low</b> 2 <b>Low</b> 3 <b>Moderate</b> 4 <b>High</b>	<u>Overall Priority</u>  <b>2.87</b>

\* This asks how severe the impact will be in a general sense.

\*\* The risk level looks at the amount of risk there will be overall as a result of the event.

**Table 4.10 Hazard: Wastewater Treatment Facility Failure**

<b>Hazard:</b>	<b>Wastewater Treatment System Failure</b>
<b>Location</b>	County
<b>Historic events</b>	Individual systems and municipal systems have either gotten old or flooding has prevented from working
<b>Likely to happen now?</b>	Occasionally
<b>How often?</b>	Spring, during floods, or as systems age
<b>Where would it strike?</b>	County
<b>How bad could hazard get?</b>	Water source could be contaminated
<b>When would hazard likely occur?</b>	Year-round
<b>What other hazards could occur simultaneously?</b>	Infectious diseases, flood, water supply contamination
<b>Economic impacts</b>	During flood, losing wastewater system is expensive and inconvenient
<b>Loss of life impacts</b>	Could affect lives if contaminate water
<b>Risk Level</b> 1 Minimal 2 Limited 3 High 4 Very High	Citizens/People: <b>3</b> Animals/Livestock: <b>2</b> Housing: <b>2</b> Critical Structures: <b>2</b> Infrastructure: <b>2</b> <b>Total: 2</b>
<b>Risk Assessment</b>	
1 Unlikely 2 Occasional 3 Likely 4 Highly Likely	<u>Frequency of Occurrence</u>  1.27
1 More than 12 Hours 2 6-12 Hours 3 3-6 Hours 4 Non-Minimal	<u>Warning Time</u>  3.08
1 Limited 2 Minor 3 Major 4 Substantial	<u>Potential Severity*</u>  2.09
1 Minimal 2 Limited 3 High 4 Very High	<u>Risk Level**</u>  1.91
(Total divided by 4) <b>1 Very low</b> <b>2 Low</b> <b>3 Moderate</b> <b>4 High</b>	<u>Overall Priority</u>  <b>2.09</b>

\* This asks how severe the impact will be in a general sense.

\*\* The risk level looks at the amount of risk there will be overall as a result of the event.

**Table 4.11 Hazard: Civil Disturbance/Terrorism**

<b>Hazard:</b>	<b>Civil Disturbance / Terrorism</b>
<b>Location</b>	County, cities, dam, airports, water systems
<b>Historic events</b>	None
<b>Likely to happen now?</b>	Unlikely
<b>How often?</b>	School violence is increasing annually No actual "terrorism" events in County
<b>Where would it strike?</b>	County
<b>How bad could hazard get?</b>	Threaten way of life in county
<b>When would hazard likely occur?</b>	Year-round
<b>What other hazards could occur simultaneously?</b>	Infectious diseases, flood, dam failure, water supply contaminations, hazardous materials
<b>Economic impacts</b>	Potential to be devastating
<b>Loss of life impacts</b>	Potential to affect lives
<b>Risk Level</b> 1 Minimal 2 Limited 3 High 4 Very High	Citizens/People: <b>2</b> Animals/Livestock: <b>2</b> Housing: <b>2</b> Critical Structures: <b>2</b> Infrastructure: <b>2</b> <b>Total: 2</b>
<b>Risk Assessment</b>	
1 Unlikely 2 Occasional 3 Likely 4 Highly Likely	<u>Frequency of Occurrence</u>  1.36
1 More than 12 Hours 2 6-12 Hours 3 3-6 Hours 4 Non-Minimal	<u>Warning Time</u>  3.85
1 Limited 2 Minor 3 Major 4 Substantial	<u>Potential Severity*</u>  3.0
1 Minimal 2 Limited 3 High 4 Very High	<u>Risk Level**</u>  2.38
(Total divided by 4) <b>1 Very low</b> <b>2 Low</b> <b>3 Moderate</b> <b>4 High</b>	<u>Overall Priority</u>  <b>2.65</b>

\* This asks how severe the impact will be in a general sense.

\*\* The risk level looks at the amount of risk there will be overall as a result of the event.

The Overall Hazard Priority Levels were determined by calculating the average risk level for each hazard. The hazard was determined to be “Very Low” if the average risk number was between 1 and 1.49, “Low” if it was between 1.5 and 2.49, “Moderate” if between 2.5 and 3.49 and “High” if it was 3.5 or above. No hazards were determined to be of very low or high risk at the time of this document. The hazards were listed in numerical order for the Chippewa County Local Task Force to review and comment on at the third Local Task Force meeting in Montevideo, MN on November 20, 2014. The team was presented with the Overall Hazard Priority Level determined by their risk assessments and the initial Overall Hazard Priority Level from the previous All-Hazard Mitigation Plan. Staff facilitators discussed differences between the two lists and opened up conversation on changes to be made. During this meeting, Flash Flood/Other Flooding and 100-year floods were moved up from 12 and 13 on the list to 6 and 7. Summer weather was also moved up on the list from 5 to 4 and civil disturbance/terrorism was moved down from number 2 to number 5 on the list. Table 4.12 shows the final hazard prioritization.

**Table 4.12 Overall Hazard Priority Levels in Chippewa County**

<b>Hazard</b>	<b>Chippewa County</b>	<b>Special Areas of Concern</b>
<b>1. Winter Weather</b> Blizzard, Ice Storms, Heavy Snow, Extreme Cold	2.99 – Moderate	County
<b>2. Tornado</b>	3.21 – Moderate	County
<b>3. Hazardous Materials</b>	2.87 – Moderate	County, All Cities
<b>4. Summer Weather</b> Thunderstorm, Lightning, Hail, Wind (excluding tornado) Extreme Heat	2.79 – Moderate	County
<b>5. Civil Disturbance/ Terrorism</b>	3.13 – Moderate	County
<b>6. Other/Flash Flooding</b>	2.29 – Low	County
<b>7. 100-year Floods</b>	2.08 - Low	Montevideo, Maynard
<b>8. Structure Fire</b>	2.71 – Moderate	All Cities
<b>9. Drought</b>	2.52 – Moderate	County
<b>10. Infectious Disease</b>	2.42 – Low	County
<b>11. Water Supply Contamination</b>	2.34 – Low	County
<b>12. Dam Failure</b>	2.33 – Low	Montevideo
<b>13. Wildfire</b>	2.31 – Low	Homes/Structures located near to grasslands; cities within the river valley
<b>14. Wastewater Treatment System Failure</b>	2.04 – Low	County, All Cities

## *VULNERABLE AREAS OF CHIPPEWA COUNTY*

The purpose of this section is to identify vulnerable areas in relation to Chapter 3, Hazard Inventory, which provides detailed information on the potential hazards that may impact Chippewa County and/or cities within Chippewa County. This section identifies vulnerable areas and highlights specific events that have occurred throughout the county, as they pertain to four types of natural hazardous events: tornadoes, flooding, wildfires, and dam failure. The risk assessment maps for Chippewa County identify areas that may be more prone to these hazardous events.

### **Tornados**

According to the National Climatic Data Center, Chippewa County has experienced 14 tornados and six funnel clouds between 1965 and 2014. Of the 14 tornados, nine were classified as F0 and five were classified as F1<sup>1</sup>. An F4 tornado occurred on the Yellow Medicine side of Granite Falls on July 25, 2000. Chippewa County had two homes damaged by the strong winds of the storm. See Figure 4.1 for a visual representation of tornado paths in Chippewa County.

Traditionally, tornados are seen as a countywide hazard. In order to predict estimated damage caused by an F4/F5 tornado, Chippewa County based fiscal analysis on the recommendation of the National Weather Service (NWS) Data Management Department. According to the NWS, an acceptable method to create a damage cost estimate model from a F4/F5 tornado in a small community could be performed by using cost data from a previous tornado event that occurred in Greensburg, Kansas with a population of approximately 1,500 people. The devastation totaled around \$250 million dollars and damaged approximately 95% of the city. To model an F4/F5 tornado, the NWS suggested approximating that 90% of each land use category be considered demolished. Using 2009 market values, Table 4.13 depicts this information, providing the number of parcels damaged and estimated damage value by city. Final damage amount is estimated at \$348,244,290 dollars impacting 3,811 parcels of residences, commercial/industrial buildings, schools, churches, and government-owned properties (summation of all city parcels and assessed parcel values).

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<sup>1</sup> In 2007, the Fujita Scale (F-Scales) used to measure damage from tornadoes was updated in 2007 to the Enhanced Fujita Scale (EF-Scale). For more information on this update, please visit <http://www.spc.noaa.gov/faq/tornado/ef-scale.html>.

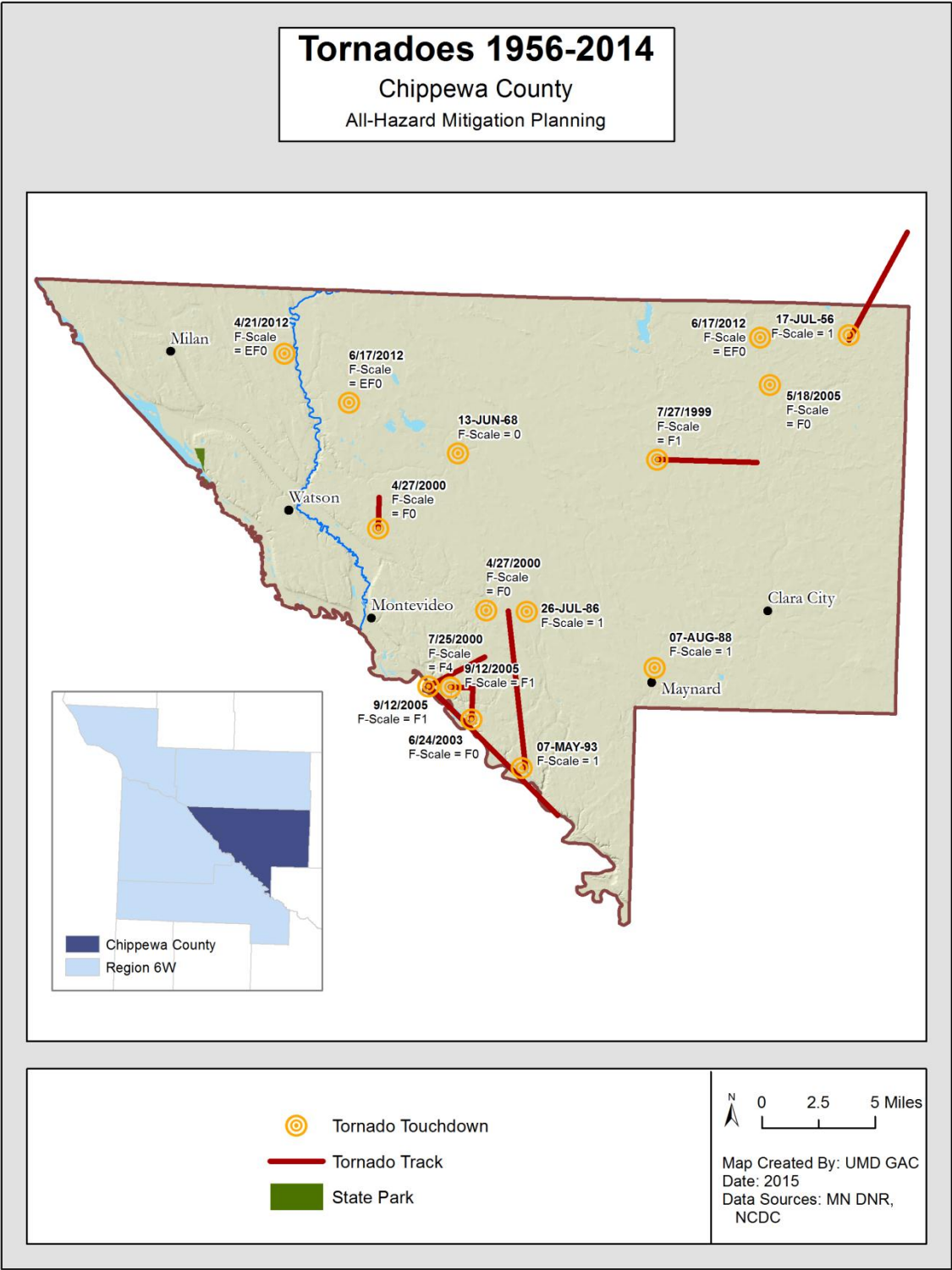
**Table 4.13 CC Estimated potential damage by an F4/F5 Tornado (2009 Market Value)**

<b>Geographic Area</b>	<b>Total Number of Parcels</b>	<b>Total Value of Parcels</b>	<b>90% of Total Parcels</b>	<b>Estimated Damage Value</b>
Clara City	759	\$74,511,785	683	\$67,060,607
Maynard	259	\$15,268,200	233	\$13,735,980
Milan	258	\$10,290,900	232	\$9,261,810
Montevideo	2,610	\$67,636,477	2,349	\$60,872,830
Watson	157	\$4,242,800	141	\$3,818,520
<b>Total (Chippewa County)</b>	4,043	\$171,944,163	<b>3,638</b>	<b>\$154,749,747</b>

Source: Chippewa County Assessor, 2009

On July 25, 2000 a tornado struck the city of Granite Falls on the Yellow Medicine County side. One person was killed, over a dozen injured, and an estimated \$20 million dollars of damage was done to residences, businesses, and public facilities. The tornado lifted before exiting Granite Falls, leaving the most concentrated damage path two miles long, and 500 feet wide, through a primarily residential area of the city. Most of the damage in Granite Falls was caused by F2 to F3 wind speeds. This tornado was classified as a minimal F4 tornado, based on the twisted wreckage of an overturned railroad car near the intersection of 9th Ave. and 14th St. in Granite Falls. (Source: City of Granite Falls)

Figure 4.1 Tornado Paths from 1956 to 2014 in Chippewa County



## Floods

The most severe flooding in Chippewa County occurs along the Chippewa and Minnesota Rivers when there is excessive rainfall, ice blockage of the channel, and/or rapid spring snow melt. Ice jams in eastern Granite Falls contribute to significant spring flooding. Flood damage may also result from improperly maintained or undersized ditches, excess drainage in the upper reaches of the watered, or lack of upland retention structures. Hawk Creek and Shakopee Creek experience flooding problems whenever rain falls in excess of 4.5 inches. Major effects of excessive rainfall are flooding of agricultural lands and road washouts. According to estimates by the US Army Corp of Engineers, Soil Conservation Service, and FEMA, there are approximately 9,391 acres in the 100-year floodplain and 70.57 acres in the 500-year floodplain in Chippewa County.

In 1997 and 2001, the Minnesota River floodwater was high enough to affect many businesses districts and homes within Chippewa County, including Montevideo and Granite Falls. Both flood events were considered 100-year floods. Communities are working together regionally, towards mitigation to prevent such events from having detrimental safety and economic consequences. The main problem consists of flooding from the Chippewa and Minnesota Rivers affecting three areas: the 1969 Levee Area, Smith Addition and U.S. Highway 212 Area. The Reconnaissance Study identified the Highway 212 area as the area most likely for a flood barrier to be cost effective. The feasibility study recommended a flood barrier protecting the 1969 Levee and Highway 212 Areas. Protection of the Smith Addition area was not economically justified (US Army Corps of Engineers, St. Paul District).

**Table 4.14 Summary of Expenses to Fight Flooding**

<b>Geographic Area</b>	<b>1997 Flood</b>	<b>2001 Flood</b>	<b>Total</b>
Chippewa County	\$72,979	\$80,345	\$153,324
Clara City	\$24,008	\$14,479	\$38,487
Granite Falls	\$852,086	\$437,115	\$1,291,201
Maynard	\$12,686	\$16,639	\$29,325
Montevideo	\$1,000,000	\$1,000,000	\$2,000,000
<b>Total</b>	<b>\$1,961,759</b>	<b>\$1,548,578</b>	<b>\$3,512,337</b>

Source: Chippewa County Assessor, 2002



### *Montevideo Flood History*

Montevideo sits at the confluence of the Chippewa River and Minnesota River. During the major flood events such as in 1997 and 2001, the Chippewa River actually started to flow backwards because of the high waters of the Minnesota River. Smith Addition businesses and residents have been flooded during these major events. Eighty homes have been relocated and 35 remain. One commercial business was moved after the 1997 floods. The remaining 25 businesses in jeopardy of being flooded want relocation or better protection.

In 2009, Montevideo began to raise the existing levee system, as the U.S. Army Corps of Engineers had studied the effects of this change to understand how this may change where floodwaters threaten homes or businesses. The wastewater system will be better protected when the levee project is complete. Flood events happen periodically in the city, but these smaller floods do not cause damage. City crews usually have to respond by making sure pumps are working and all flood proofing is working properly. Other large flood events that caused damage happened in 1952 and 1969. In 1993, damage would have occurred if it wasn't for the constant pumping at a cost of \$118,482. In 1997, the city spent one million for flood fighting efforts and cleanup. FEMA reimbursed the city \$729,000. In 2001, the city spent about one million for flood fighting efforts and cleanup. FEMA reimbursed the City \$712,000.

### *Hawk Creek Flooding*

In the 1950s, parts of Hawk Creek were channelized as a part of a USDA Flood Reduction project to help speed the flow of water and reduce flooding. This worked at a local level to control flooding; however, the faster flows may have increased flooding downstream. Currently, flooding is caused by ice jams that occur along Hawk Creek at bridges in both Maynard and Clara City. Maynard has three bridges which hold back ice that causes flooding. In 1997, the city was reimbursed \$12,686 from FEMA for flood fighting efforts, cleanup and repair. In 2001, the city was reimbursed \$16,639 from FEMA. Out of the five bridges in Clara City, one bridge has the potential to have ice jams which then cause flooding. In 1997, Clara City was reimbursed \$24,008 from FEMA for flood fighting efforts, cleanup and repair. In 2001, the city was reimbursed \$14,479.

### *Milan Flood Event 2009*

On March 23, 2009 approximately one mile southwest of Milan and township road was washed out. Local rainfall totals varied from two-three inches before the storm moved north. Along with heavy rainfall and thick ice remaining on streams, creeks and rivers; ice jams developed and caused flooding of roads and local communities. Several major rivers rose during this time period and caused additional road closures and some minor property damage.

### *Granite Falls Flooding*

In 1997, the city spent \$852,086 for flood fighting efforts and cleanup (cost figures provided by city staff). An estimated \$3.1 million was prevented from damage from the 1997 flood due to flood fighting activities. In 2001, the city spent \$437,115 for flood fighting efforts and cleanup (cost figures provided by city staff). The Corps of Engineers awarded temporary levee construction contracts in 2001 totaling \$112, 250 for Granite Falls.

The following section is a Flood Hazard Analysis for Chippewa County that was completed by the University of Minnesota Duluth Geospatial Analysis Center. This analysis focuses on the potential impacts of a 100-year (1%) flood event, detailing the distribution of potential economic loss in Chippewa County.

## Flood Hazard Analysis for Chippewa County

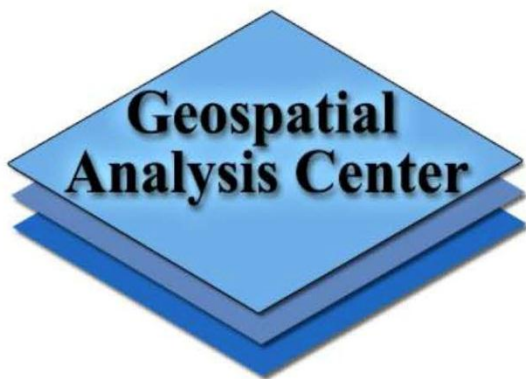
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*For Upper Minnesota Valley Regional Development Commission  
Level II Flood Hazard Analysis performed using FEMA Hazus-MH*

### Contact Information:

**Project Coordination:**

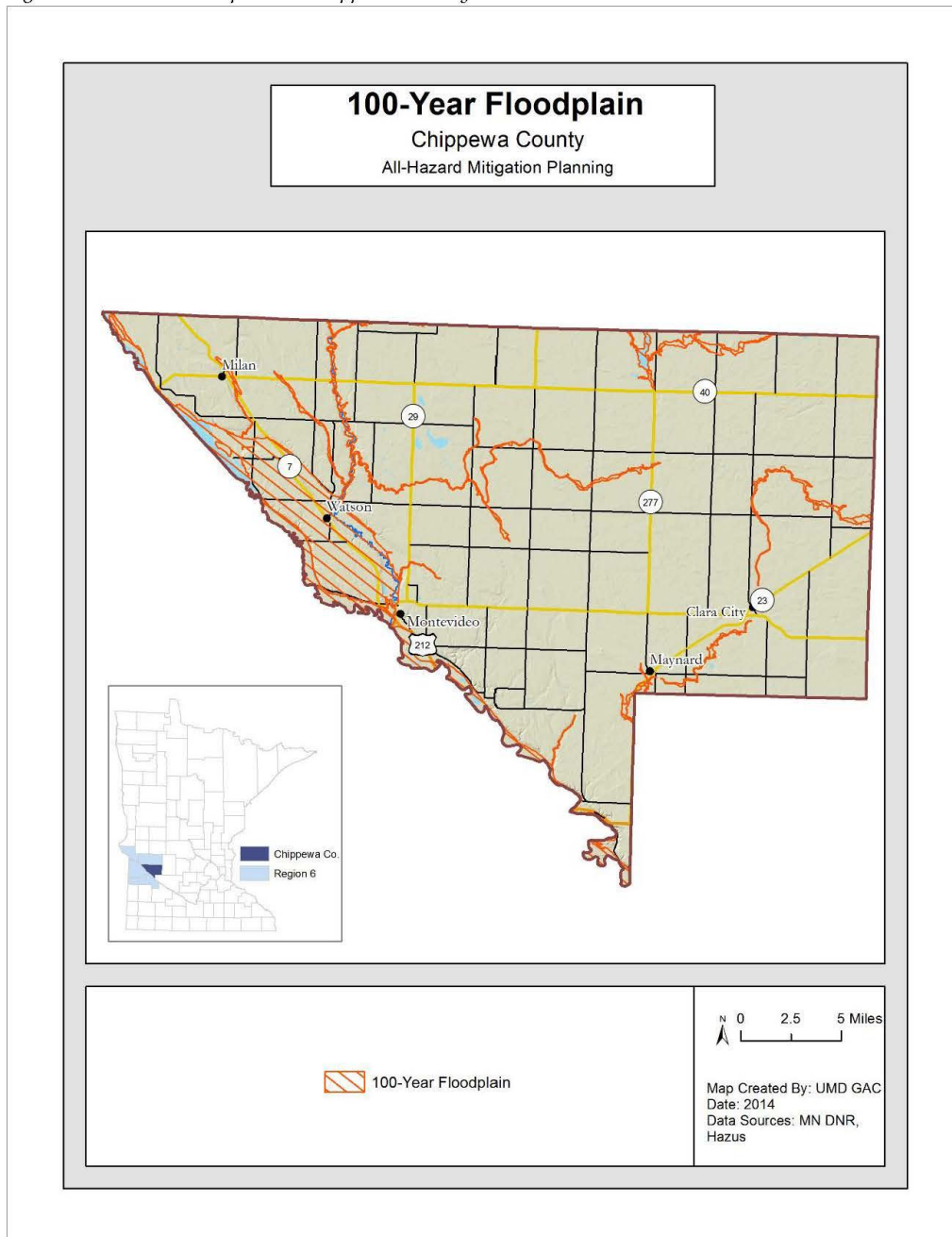
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## Chippewa County Hazus-MH Hazard Analysis

Hazus-MH was used to estimate the damages incurred for a 100-year flood event in Chippewa County using a Q3 and a 10-meter DEM (digital elevation model) to create a flood depth grid (no digital DFIRM was available). The resulting depth grid is shown in Figure 1.

Figure 1. 100-Year Floodplain in Chippewa County



Chippewa County specific building data was sourced from the parcel tax and spatial databases to include building valuations, occupancy class, square footage, year built, and number of stories. Chippewa County had 5815 parcels with buildings and a populated occupancy class field. In cases where building value, square footage, year built, or number of stories were missing, values were assigned based on best practices from values in the other 4 fields. The data were then assigned to one parcel centroid, which served as a surrogate for the each parcels buildings to aggregate to the associated census block for use in the Hazus-MH model.

According to the Chippewa County general building stock [updated with these parcel data], the Hazus-MH model estimates there are 5,815 buildings in the county with a total replacement value (excluding contents) of \$660 million (2006 dollars). Approximately 73% of the buildings (and 49% of the building value) are associated with residential housing. The Hazus model estimated 102 buildings will be at least moderately damaged. There are an estimated 31 buildings that would be completely destroyed.

The total economic loss estimated for the flood is \$43 million dollars, which represents 38% of the total replacement value of the scenario buildings. Building losses are broken into 2 categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are associated with inability to operate a business because of the damage sustained during the flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood. The total building-related losses were \$42 million dollars. 3% of the estimated losses were related to the business interruption of the region. Residential occupancies made up 26% of the total loss.

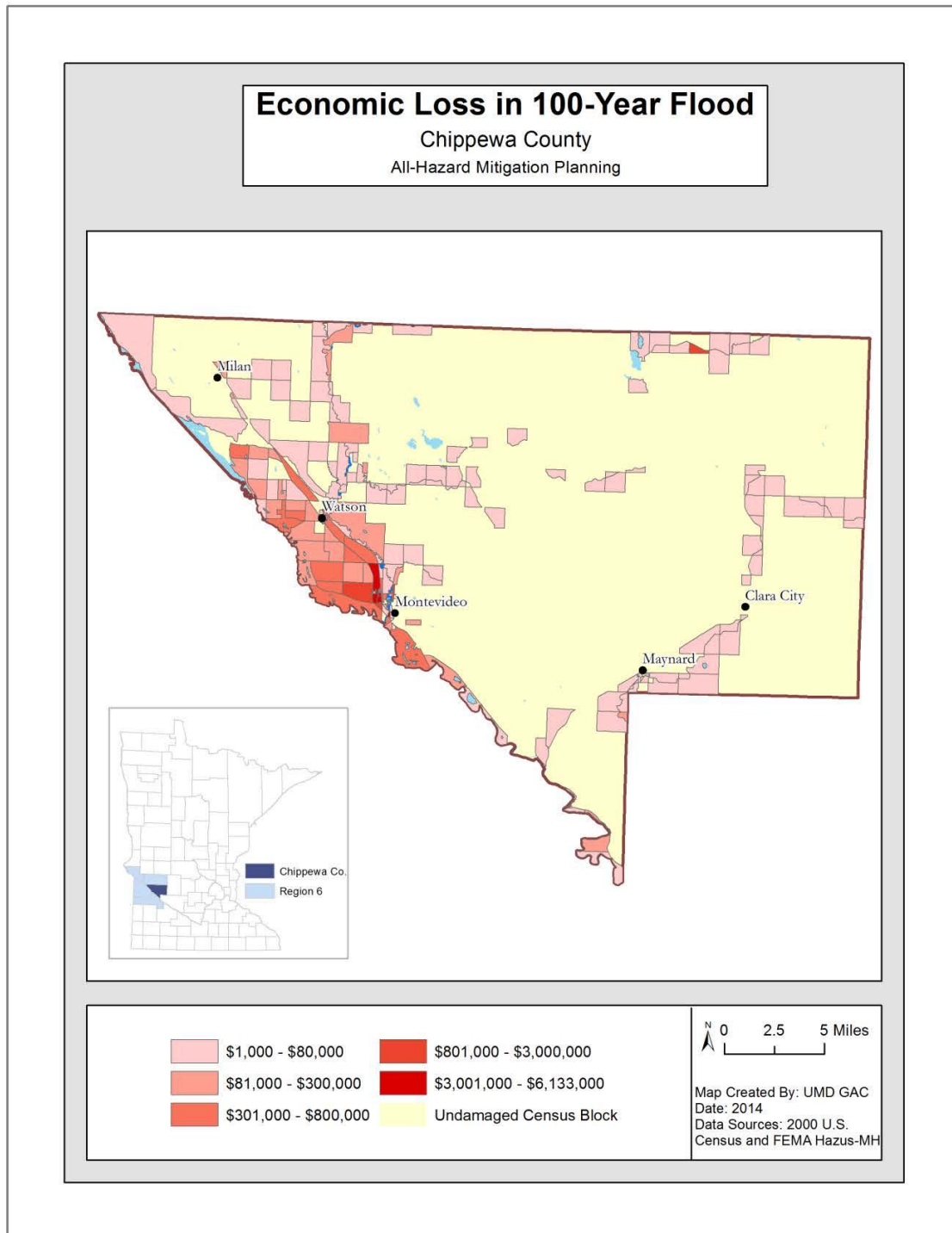
The reported building counts should be interpreted as degrees of loss rather than an exact number of buildings exposed to flooding. These numbers were derived from the aggregate building inventories which are assumed to be dispersed evenly across census blocks. Hazus-MH requires that a predetermined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

The total estimated number of damaged buildings, total building losses, and estimated total economic losses for the countywide 100-yr flood are shown in Table 1. The distribution of economic losses for Chippewa County is depicted in Figure 2.

*Table 1. Chippewa County Total Economic Loss from 100-Year Flood*

<b>General Occupancy</b>	<b>Estimated Total Buildings</b>	<b>Total Damaged Buildings</b>	<b>Total Building Exposure (In \$1000s)</b>	<b>Total Economic Loss (In \$1000s)</b>	<b>Building Loss (In \$1000s)</b>
Agricultural	937	6	\$114,471	\$10,051	\$1,927
Commercial	426	25	\$92,429	\$5,860	\$700
Education	13	0	\$35,832	\$0	\$0
Government	107	2	\$35,336	\$9,050	\$3,059
Industrial	51	0	\$35,684	\$6,071	\$1,283
Religious/Non-Profit	55	1	\$25,066	\$723	\$107
Residential	4,226	74	\$321,581	\$11,147	\$7,513
<b>Total</b>	<b>5,815</b>	<b>108</b>	<b>\$660,399</b>	<b>\$42,902</b>	<b>\$14,589</b>

Figure 2. Distribution of Estimated Economic Loss for Chippewa County in 100-Year Flood by Census Block





Census blocks of concern should be reviewed in more detail to determine the actual percentage of facilities that fall within the flood hazard areas.

Figure 3 shows the census block estimate clipped to the actual 100-yr flood boundary for Watson, and Figure 4 shows this same information for Montevideo.

Figure 3. 100-Year Flood Loss Estimates in Watson

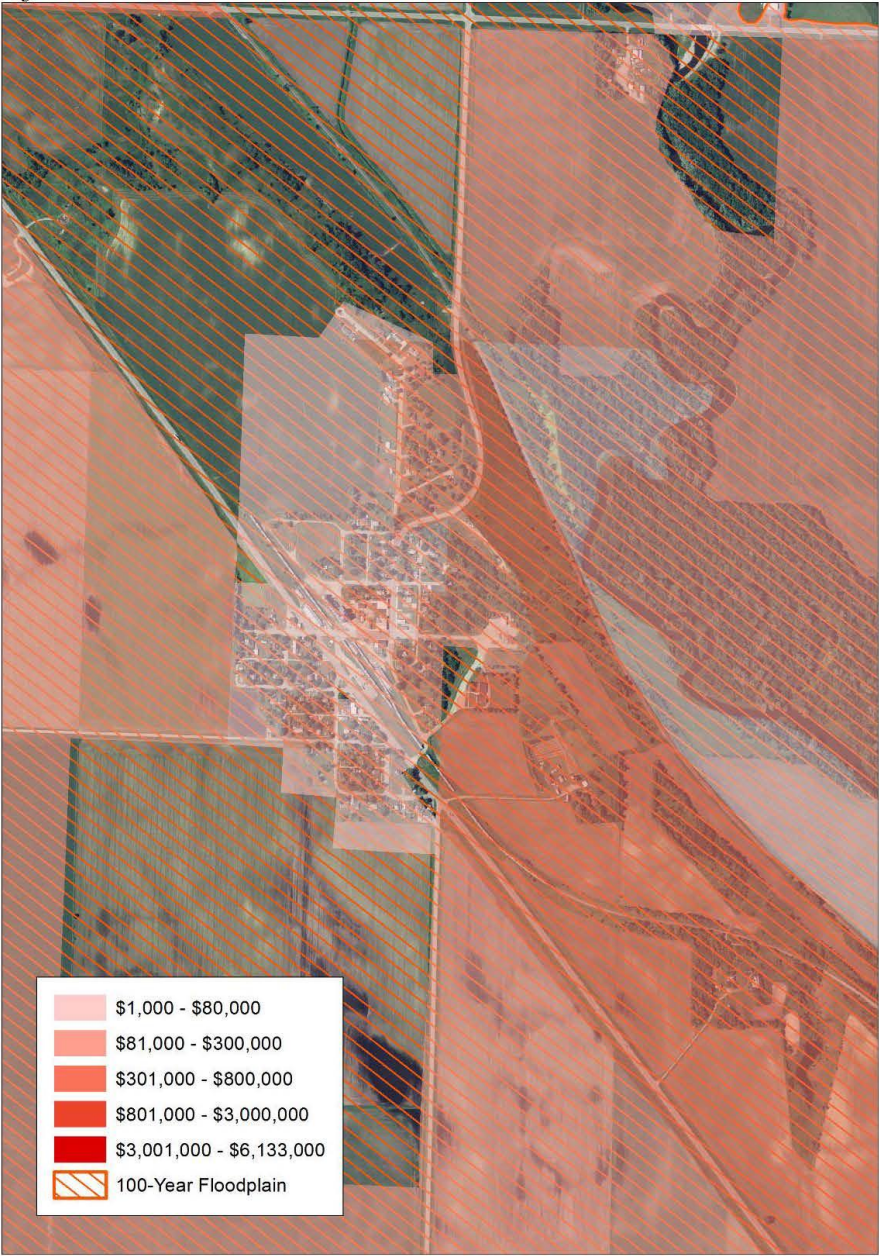
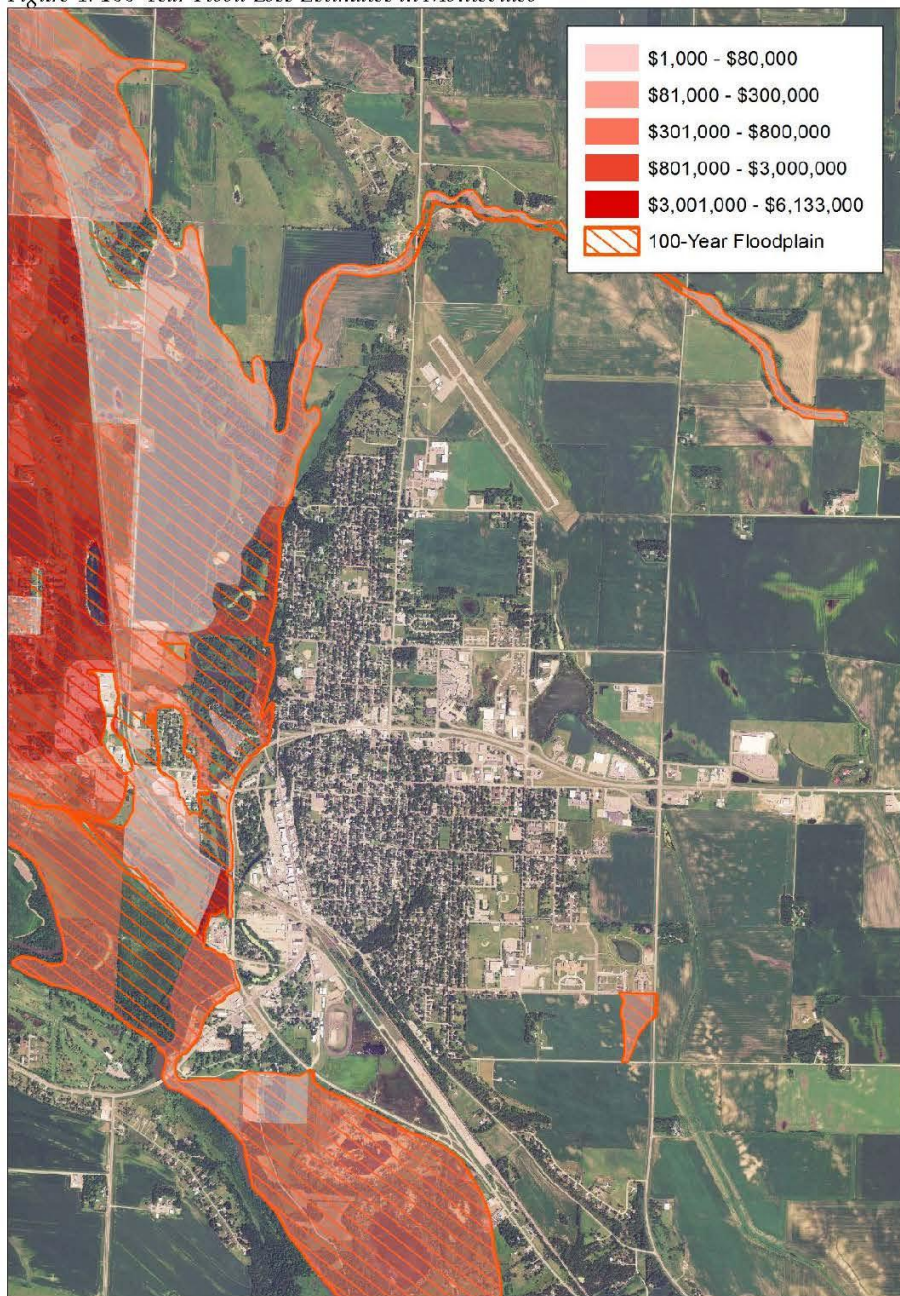




Figure 4. 100-Year Flood Loss Estimates in Montevideo



The aggregate losses reported in this study may be overstated because values are distributed evenly in a census block. The 5 census blocks showing the highest estimated loss values are shown in Table 2, with their spatial extents shown in Figure 5, Figure 6, Figure 7, Figure 8, and Figure 9. All 5 census blocks are located in Montevideo.



Table 2. Chippewa County Census Blocks with the Greatest Estimated Losses in the 100-Year Floodplain

Census Block Number	Total Estimated Loss	Location
270239502001013	\$6,133,000	Montevideo
270239501003036	\$5,319,000	Montevideo
270239502001002	\$3,906,000	Montevideo
270239501003042	\$2,967,000	Montevideo
270239502001007	\$2,419,000	Montevideo

Figure 5. Census Block #270239502001013 and 100-Year Floodplain, Montevideo

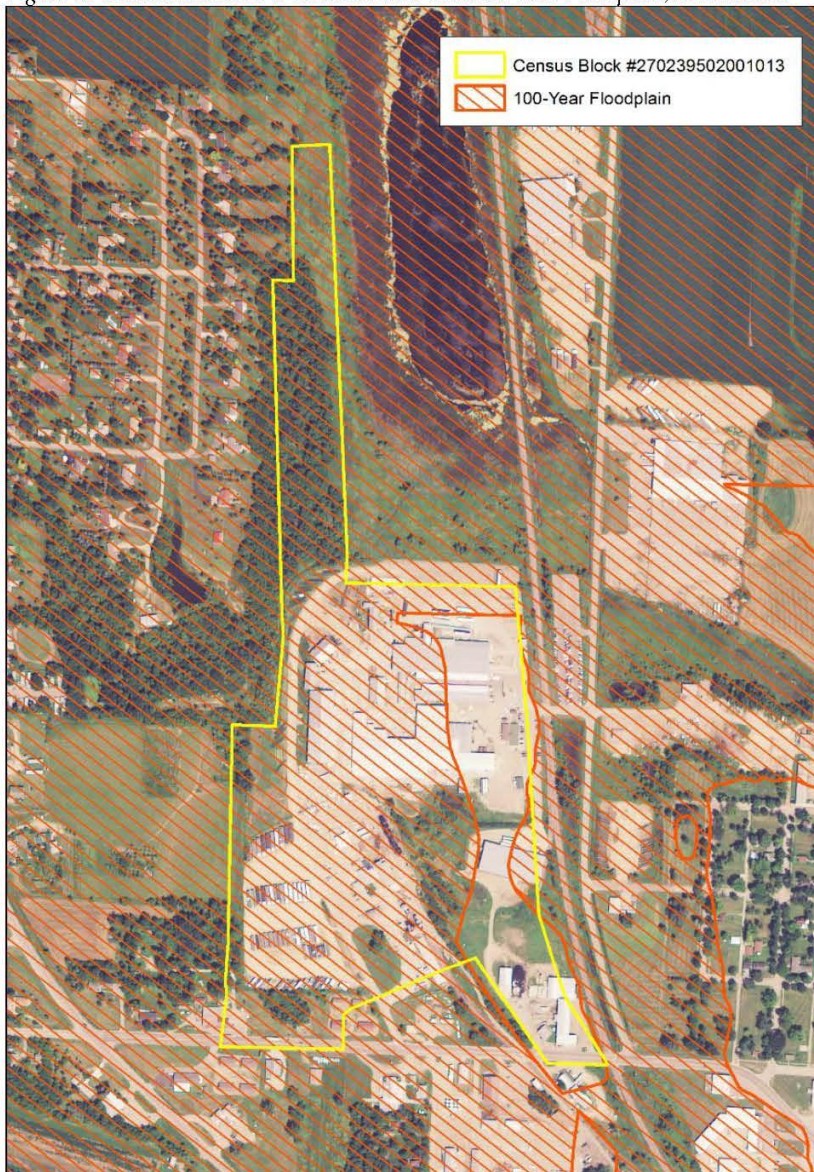




Figure 6. Census Block #270239501003036 and 100-Year Floodplain, Montevideo

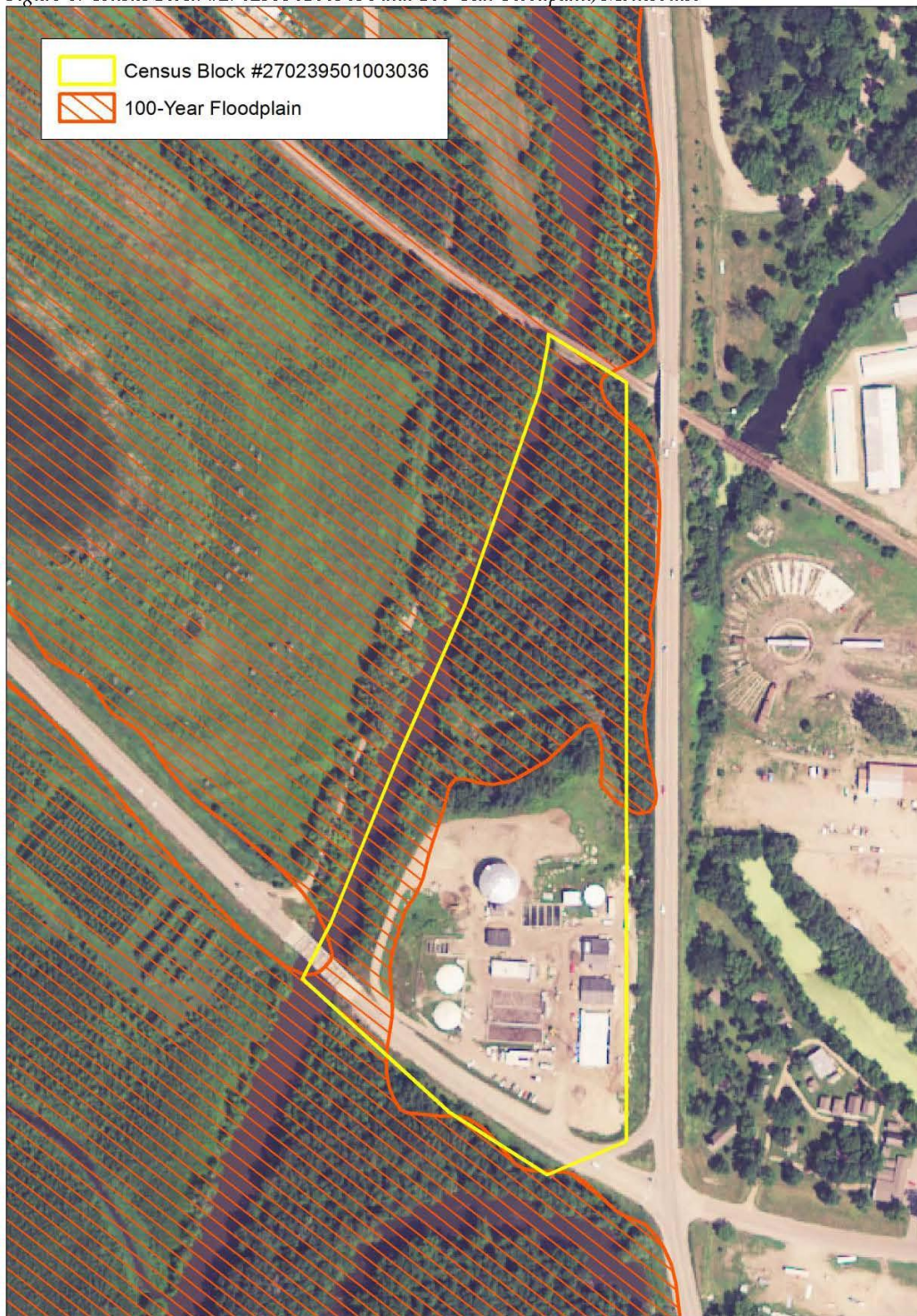




Figure 7. Census Block #270239502001002 and 100-Year Floodplain, Montevideo

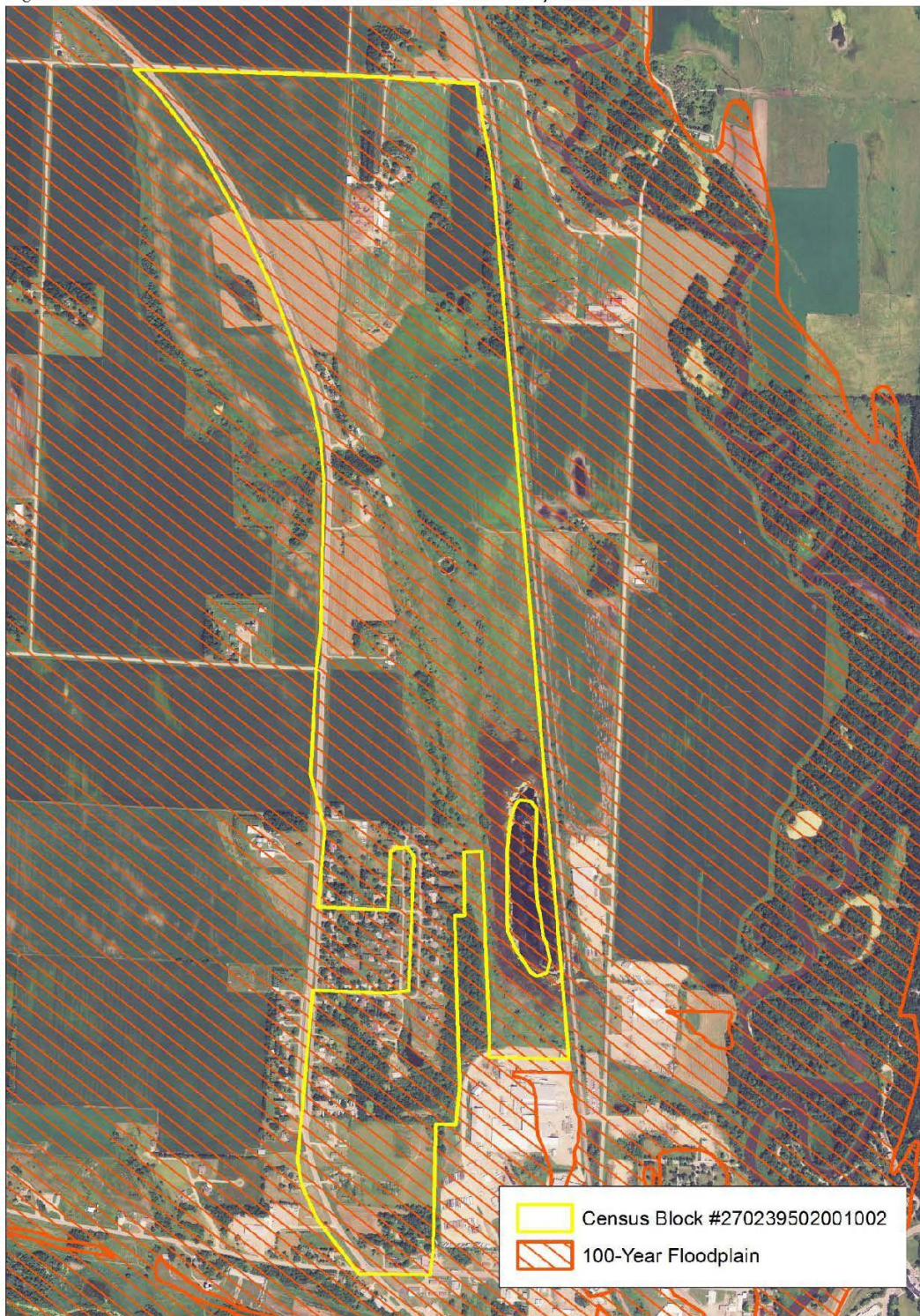




Figure 8. Census Block #270239501003042 and 100-Year Floodplain, Montevideo

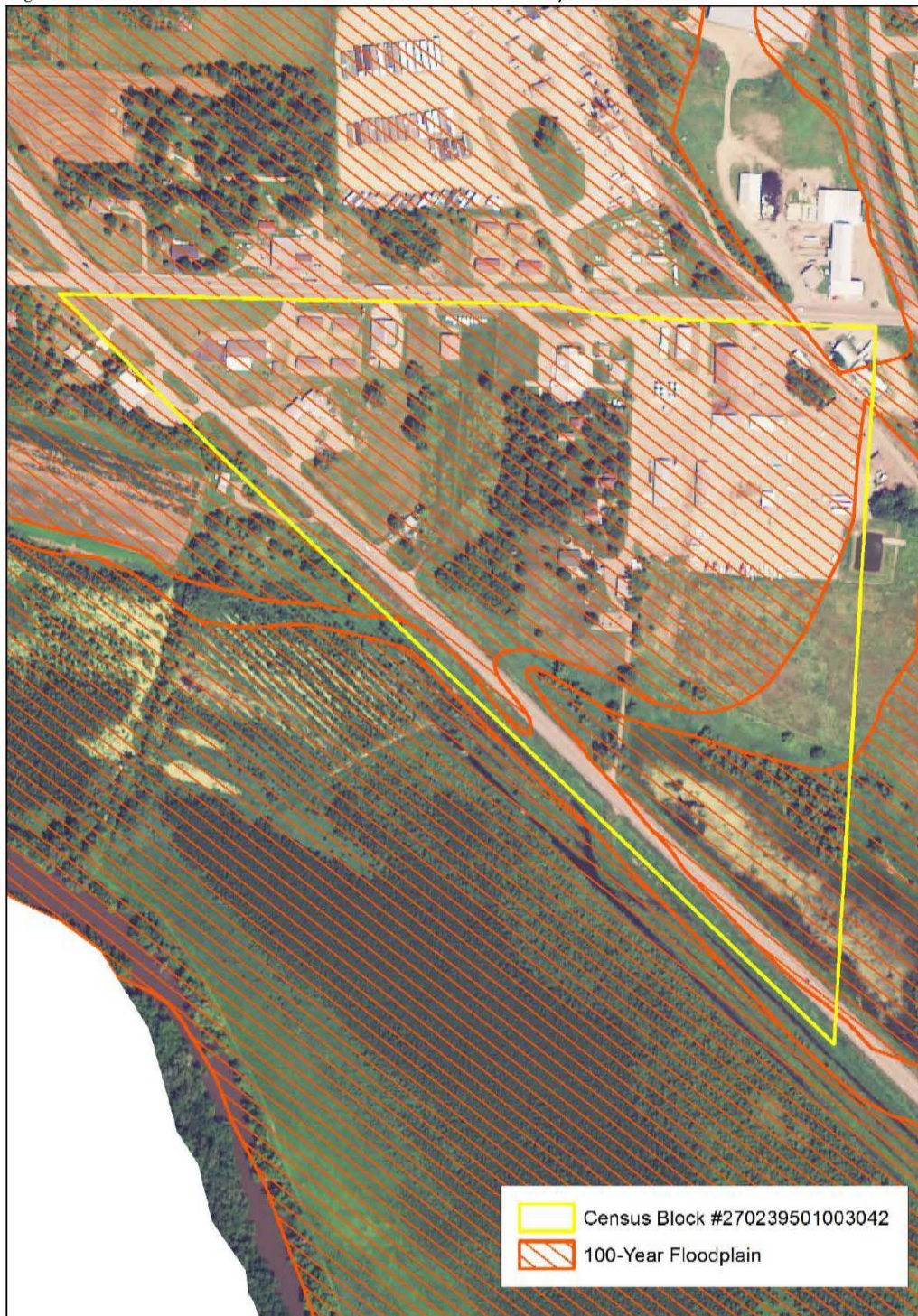
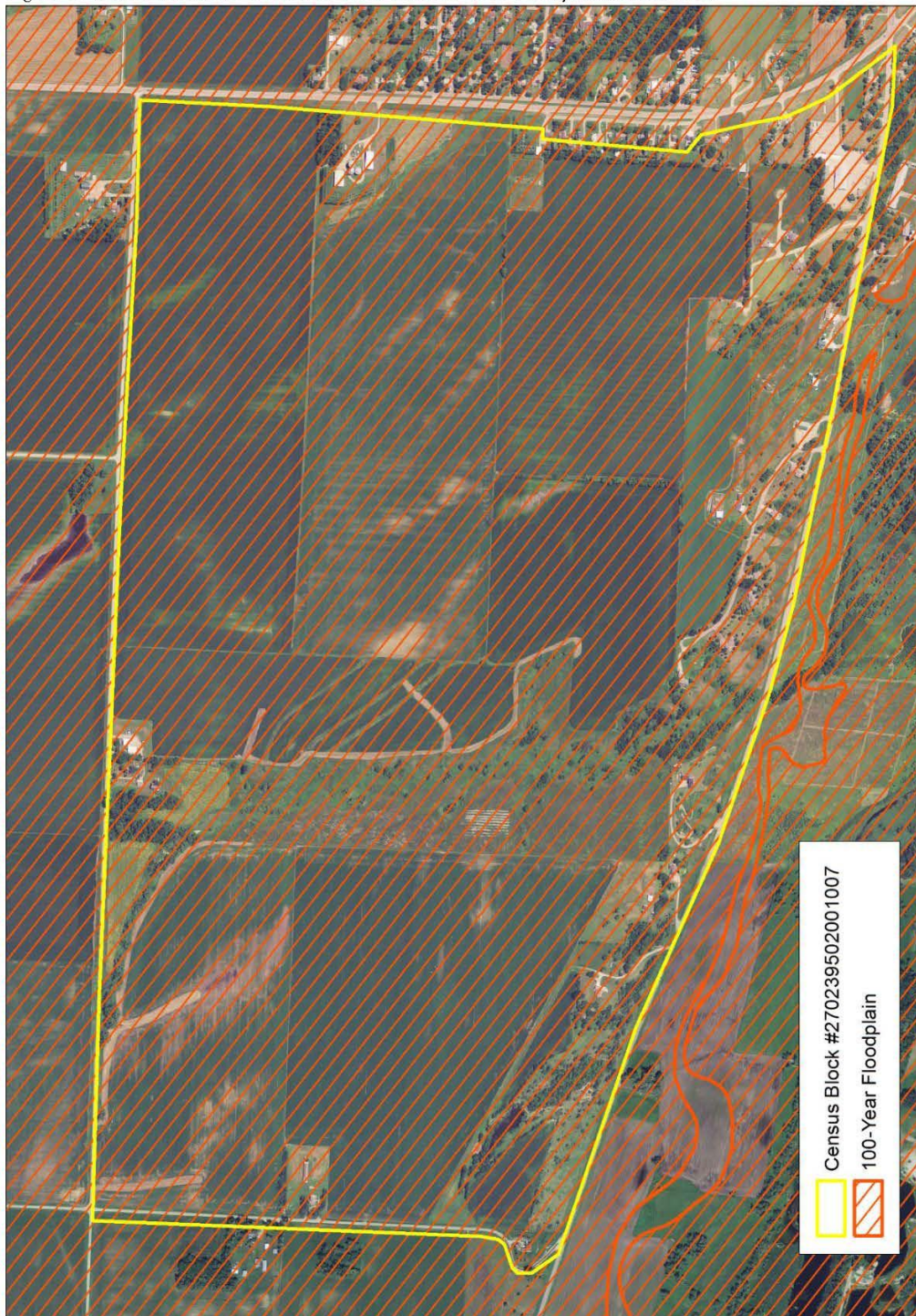




Figure 9. Census Block #270239502001007 and 100-Year Floodplain, Montevideo



Another analysis was performed by selecting the parcels with the highest values (building plus contents) that fell within the 100-year floodplain. The results of this analysis (and total building values) are shown in Table 3.

*Table 3. Chippewa County Properties with Highest Building/Contents Value Intersecting 100-Year Floodplain*

<b>Edited Parcel ID Number</b>	<b>Parcel Building + Contents Total Value</b>	<b>Class Description</b>	<b>Building Area (ft<sup>2</sup>)</b>
70-306-0162	\$99,190,440	Hospital	125,335
40-803-1100	\$29,930,750	Light Industry	674,692
70-293-0350	\$26,265,340	Grade School	131,046
70-040-0210	\$18,342,880	Grade School	98,122
70-818-3306	\$13,815,238	General Services	41,757
70-464-0105	\$11,838,112	Retail Trade	152,553
70-306-0110	\$11,184,304	Churches/Non-Profit	87,843
30-912-4401	\$9,349,500	Light Industry	210,754
30-912-1203	\$9,133,696	Grade School	79,840
70-040-0211	\$8,099,288	General Services	39,979
<b>Total</b>	<b>\$237,149,548</b>		

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

Essential facilities encounter the same impacts as other buildings within the flood boundary: structural failure, extensive water damage to the facility, and loss of facility functionality (i.e. a damaged police station will no longer be able to serve the community). One of the essential facilities (care facilities, fire stations, police stations, and schools) included in the Hazus-MH analysis falls within the 100-yr flood boundary: the fire department in Watson, with loss of use expected (Figure 10).



Figure 10. Essential Facility in 100-Year Floodplain in Watson



#### *Hazus-MH Shelter Requirement Analysis*

Hazus-MH estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus-MH also estimates those displaced people that may require accommodations in temporary public shelters. The countywide 100-year flood model estimates 326 households may be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, the model estimates 503 people (out of a 2000 census population of 13,088) may seek temporary shelter in public shelters.

#### *Hazus-MH Debris Generation Analysis*

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

The model estimates that a total of 25,404 tons of debris may be generated. Of the total amount, Finishes composes 19% of the total and Structural composes 47% of the total. If the debris tonnage is converted into an estimated number of truckloads, it will require 1,016 truckloads (@25 tons/truck) to remove the debris generated by the flood.

## Flood Hazard Analysis for Chippewa County

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*For Upper Minnesota Valley Regional Development Commission  
Level II Flood Hazard Analysis performed using FEMA Hazus-MH*

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## Wildfires

According to the Minnesota State Fire Marshal, there are more than 2,000 annual wildfires with an estimated loss of more than \$13 million dollars statewide. Every year, wildfires are started along the railroads and farmland. Three other potential wildfire hazards are power lines, utility structures, and timber bridges. Hot exhaust from farm equipment could also start fields on fire.

### Milan Area Wildfire, April 2003.

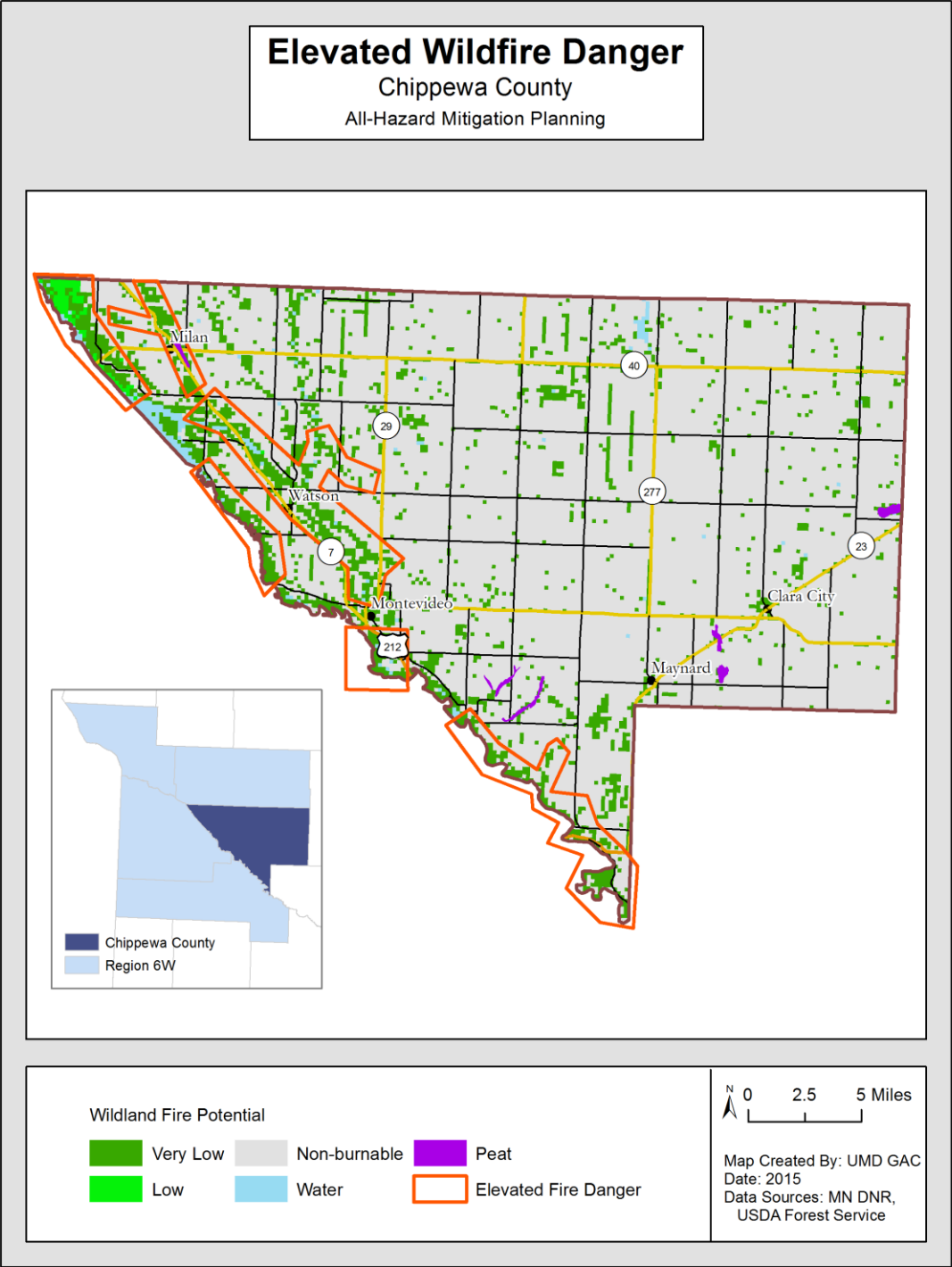
On April 12, 2003, a wildfire started on a vacant farm near Chippewa County Road 30. Fifteen fire departments responded to the call over the weekend. Many of these fire departments do not have equipment to fight prairie fires and ended with damaged and lost equipment. Many clutches on the fire trucks went out from driving on the bumpy prairie and at least one reported injured firefighter. The fire departments obtained critical assistance from a DNR forestry tanker plane based in Brainerd and later National Guard helicopters with 500-gallon buckets. Wildfires raced through grasslands south of Appleton over that weekend scorched an estimated 3,300 acres; approximately 1,700 of these acres were part of the Lac qui Parle Wildlife Management Area. The fire could have spread further if it was not for back burning efforts that kept the blaze south of Highway 119 and away from Milan Beach. On Sunday, the wind speed increased and rekindled the fire. Conditions of powerful winds and bone-dry tinder set the stage for the Sunday fire. An estimated \$57,000 was spent on fighting the wildfire and repairing equipment. (Source – Cities assisting with the fire and DNR)

Chippewa County currently has 17,380 acres enrolled in CREP, RIM, CRP and the Wetland Reserve Program. These areas are left for wildlife habitat and are not burned on a regular basis. As a result, years of dead grasses accumulate on these lands and are a good fuel for any fire that may start. The Minnesota River Valley and the Wildlife Management Areas also provides an abundance of fuel for wildfires. Wildlife Management Areas occupy over 12,000 acres in Chippewa County. Chippewa County currently has 1,234 acres of grasslands and 2,839 acres of forests (see Table 4.15). Figure 4.2 identifies six areas across the county that contain large patches of grasslands (406 acres) and forests (526 acres). Also, located within the six areas are 144 farmsteads and an additional 105 farmsteads found within a ½ mile of the areas. The general locations of the large patch areas are found along the western border of Chippewa County.

**Table 4.15 CC General Wildfire Information**

<b>Acreages</b>	<b>Grasslands</b>	<b>Forests</b>
Acres in "Six Large Patch Areas"	406	526
Total Acres in County	1,234	2,839
<b>Farmsteads located within:</b>	<b>Large Patch Areas</b>	<b>½ Mile of Large Patch Areas</b>
Number of Farmsteads	144	105

Figure 4.2 Elevated Wildfire Danger in Chippewa County

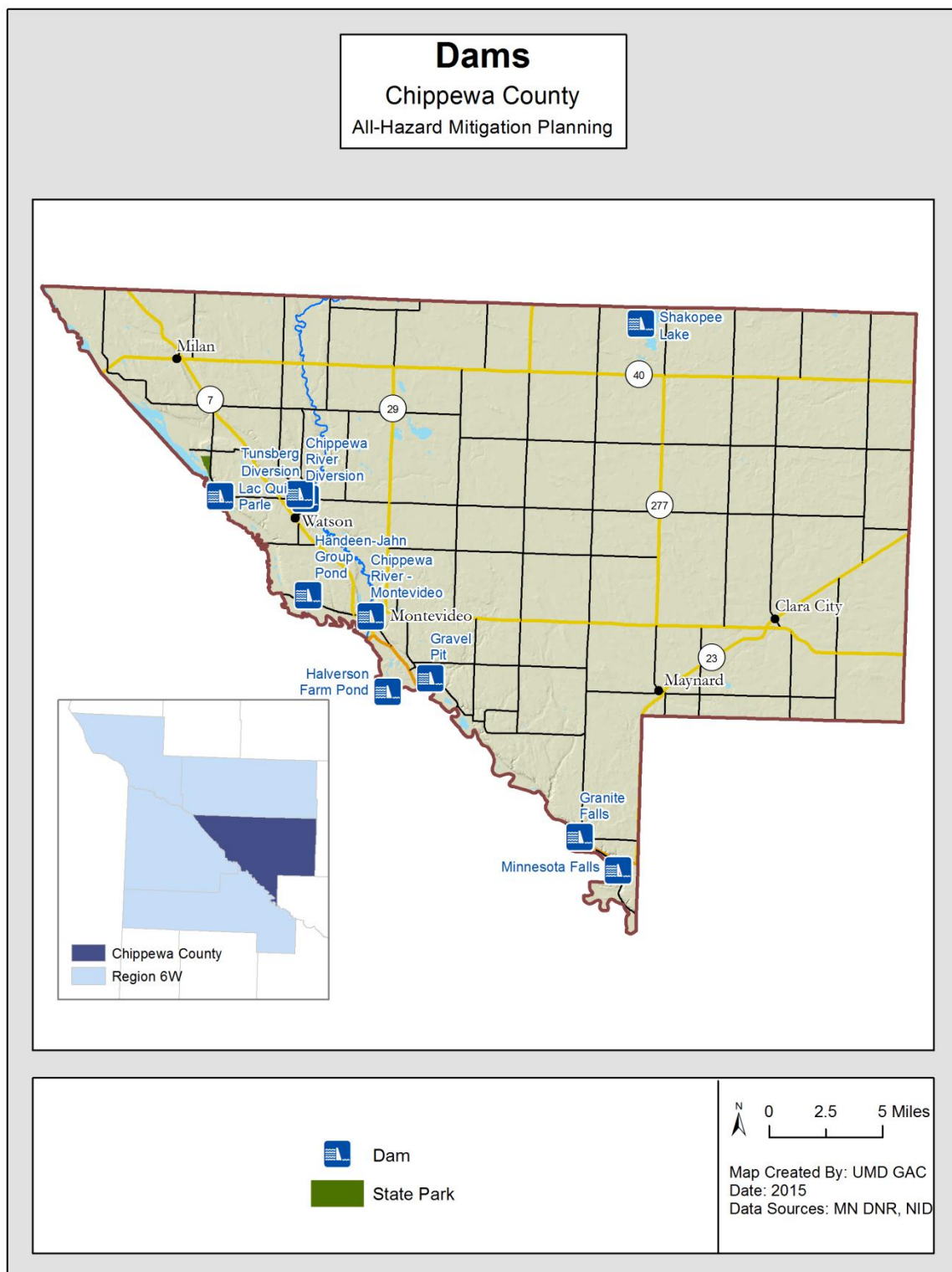


## Dam Failure

Dam failure is defined as the collapse or failure of an impoundment resulting in downstream flooding. Dam failures can result in loss of life and extensive property damages. They may result from an array of situations, including flood events, poor operation, lack of maintenance and repair and terrorism. Three major dams located in Chippewa County include the Lac qui Parle Dam, the Watson Sag Weir, and diversion channel on the Chippewa River.

The *Lac qui Parle Dam* is a "Low Head Dam" which means that if it failed, it is not life threatening to Montevideo. A dam failure was modeled for the "Probable Maximum Flood" illustrated travel time from the dam to Montevideo from approximately six to seven hours; although it would only raise stages in Montevideo by less than half a foot. For a "Normal High Pool" failure, the impact at Montevideo would be approximately five feet and would cause no fiscal damage to the City outside of the cost of dam repair. The estimated worth of the dam is unknown. The Watson Sag Weir is used to reduce downstream flows at Montevideo by diverting a portion of the Chippewa River floodwaters into the Lac qui Parle reservoir. Figure 4.3 illustrates the location of dams in Chippewa County.

**Figure 4.3 Dams in Chippewa County**



## *COMMUNITY BASED RISK ASSESSMENTS*

In previous Chippewa County All-Hazard Mitigation Plan updates, all cities underwent a broad risk assessment. Each community within Chippewa County received a survey and two inventories to gather information to complete the project with the Emergency Manager. The risk assessment survey requested identification of likely hazards that may affect the community as well as current land use development trends and the potential of future development. The risk assessment inventories were geared toward identifying vulnerable structures that may be affected by different hazard area boundaries and an inventory of community assets. Sample surveys and inventories, as well as information included in the previous plan update are found in Appendix 11<sup>2</sup>. Each community-based risk assessment was divided into four sections: existing development trends, potential of future growth and development vulnerability assessment of structures by hazard, and an inventory of community assets.

The task force had many discussions about the transportation of hazardous materials through the county during the 2015 Hazard Mitigation Plan update. Since the 2010 update, there has been an increase in crude oil transportation throughout western Minnesota coming from the Bakken Oil Fields in North Dakota. This is discussed in further detail in Hazardous Materials section of Chapter 3. It was determined that cities need to be aware of the areas of potential impact from a hazardous material spill. This section contains a map of each city in Chippewa County with a ½ mile buffer around rail lines and U.S. and state highways. It is becoming increasingly important for cities to be cognizant of which of its critical facilities and major employers are located within this hazard zone. In addition to evacuation plans, cities should consider these zones when locating new schools, hospitals, emergency operations centers, etc.

An updated summary of existing development trends as well as potential for future growth and development for each city within Chippewa County is provided below. The second portion of the city specific risk assessments includes land use information and an inventory of community assets for each city in Chippewa County. Each city's asset locations were identified and placed on a map of the city as well as its respective transportation of hazardous material maps. This is to show the connection between hazard boundaries and the location of assets. Assets vary from community to community; so all assets were categorized into one of seven categories:

- Major Employers (as defined by community)
- Police Department
- Fire Department
- Hospitals
- Schools
- Historical Structures (as defined by community and State Historic Preservation Office)
- Institutional Buildings (government-owned structure, not related to Emergency Services)
- Multi-Family Housing

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<sup>2</sup> Chippewa County did not have access to data more recent than 2009. Therefore, outlined is the total number of parcels within each land use category and a 2009 market rate value for the parcel for all non-exempt entities. All exempt parcels including hospitals, churches, government-owned facilities, and schools, have market values from 2004 as those properties are only assessed once every six years. It is important to note that Chippewa County's survey underestimates the actual number of structure within each community. Further, the market value utilized for the community-based risk assessment is for both the structure and the land, which causes an over-estimation of structure value.

- Public Facilities (Park, Pool, General Public Asset )
- Schools (Educational-related structure)

For the next update of the All-Hazard Mitigation Plan, the market value for exempt properties should be updated with more recent assessment values and will include updated square footage numbers. Some properties selected as Community Assets did not have accurate square footage measurements.

## City of Clara City, Minnesota

### *Existing Development Trends*

According to the 2008-2012 American Community Survey, Clara City has an estimated population of 1,256 and 518 households, making it the third largest city in Chippewa County. Since 2000, Clara City has seen approximately a 5 percent decrease in population. In the past 10 years Clara City's economic situation has remained stable. In May 2006, agricultural and open space land was converted to residential for "Hawk Creek Acres". In August 2009, agricultural and open space land was developed as "General Business." Clara City's general land use categories are broken down as in Table 4.16.

**Table 4.16 City of Clara City – Land Use Category Allotments**

<b>Land Use Type</b>	<b>Parcel Count</b>	<b>Percent of Area</b>
Residential	612	75.18%
Commercial	97	11.92%
Agricultural	15	1.84%
Government	14	1.72%
Religious	11	1.35%
Industrial	4	0.49%
Education	2	0.25%
<b>Total</b>	<b>814</b>	<b>100.00%</b>

Source: Chippewa County Assessor, 2009

### *Potential for Future Growth and Development*

Clara City's future growth area for development was identified north, south, and far south of the city. North of the city lies Hawk Creek Acres, with 20 lots available for residential development, with currently two lots sold and one new house built. South of the city is the Hanson Addition, with ten lots open for residential development, with four homes sold and built. Lastly, far south of Clara City, agricultural land is available for future development behind Donner's Crossroads.

Figure 4.4 Clara City Land Use

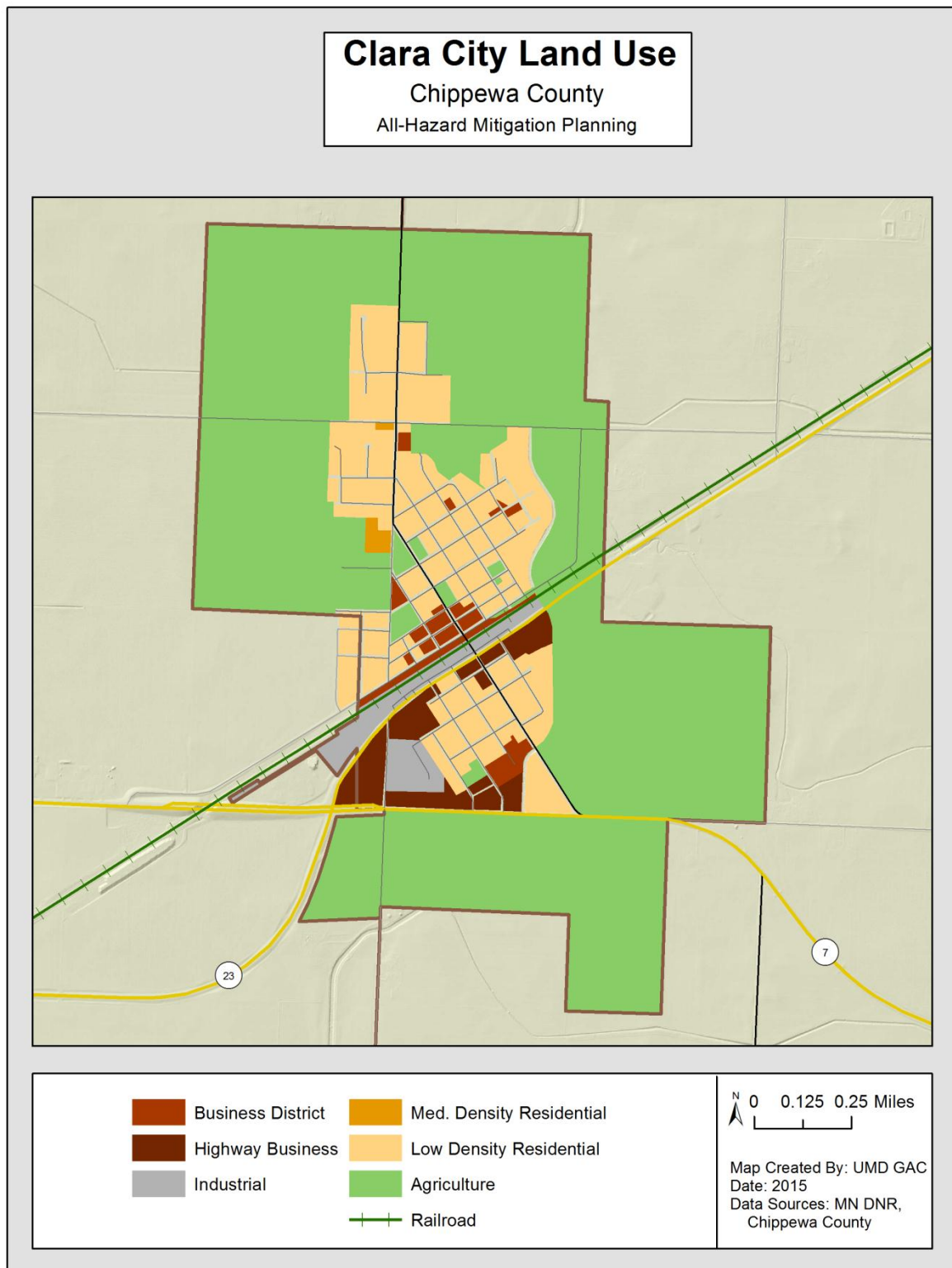




Figure 4.5 Clara City Community Assets/Critical Facilities

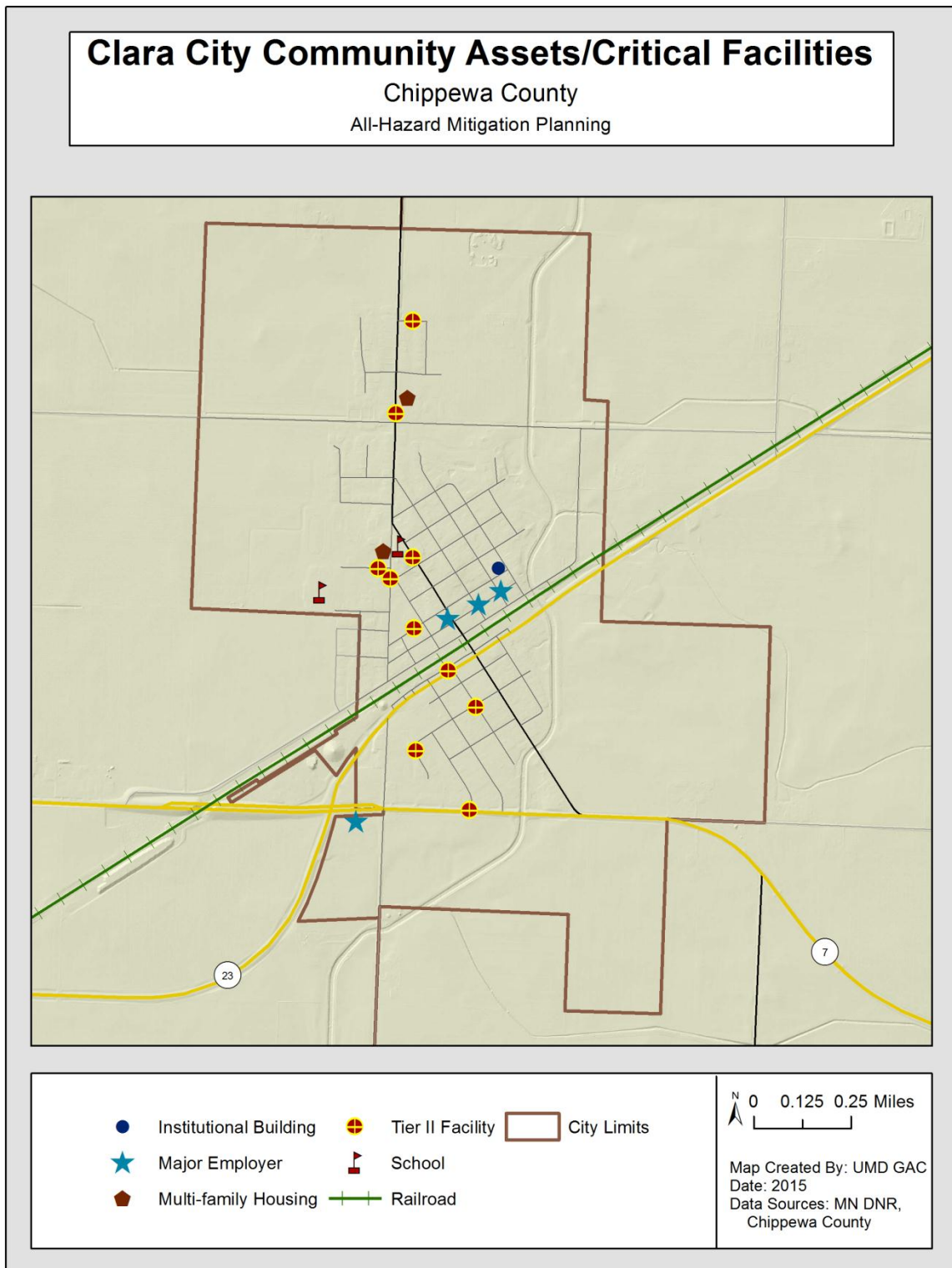
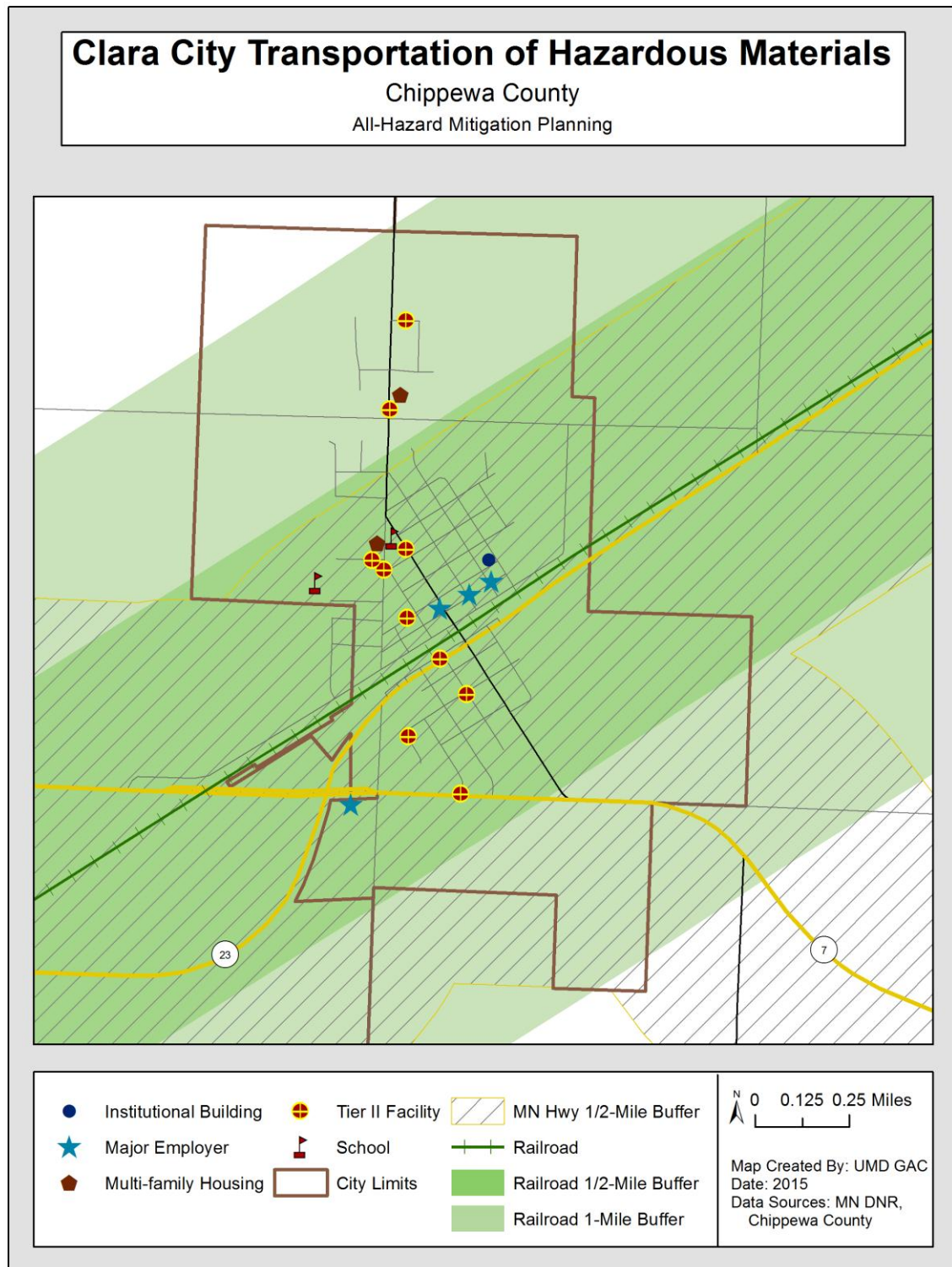


Figure 4.6 Clara City Transportation of Hazardous Materials



## City of Maynard, Minnesota

### *Existing Development Trends*

According to the 2008-2012 American Community Survey, the City of Maynard's had an estimated population of 401 and 144 households in 2013, making it the second smallest city in Chippewa County. The historic projections found in Chippewa County's Comprehensive Plan, for Maynard indicate a decrease in population by 5% from 2000 to 2020. Regardless of the population decrease, Maynard's economic situation has remained stable in the past ten years. Within the past ten years, two redevelopment projects have taken place within the City of Maynard. The first was a variance request by a Maynard residence to allow a business, Truwe Machining Business, in a residential district. The second was the Maynard Event Center, built in 2009 that doubles as an Emergency Operations Center for the surrounding area. Previously in the Event Center's location, were two dilapidated commercial units acquired and removed by the City. Aside from two mentioned redevelopment projects, no other land use changes or redevelopments occurred in Maynard in the last 10 years. The City of Maynard's general land use categories are broken down as shown in Table 4.17.

**Table 4.17 City of Maynard – Land Use Category Allotments**

Land Use Type	Parcel Count	Percent of Area
Residential	193	66.55%
Commercial	71	10.69%
Agricultural	18	3.79%
Government	25	2.76%
Religious	3	1.03%
Industrial	9	3.10%
<b>Total</b>	<b>290</b>	<b>100.00%</b>

Source: Chippewa County Assessor, 2009

### *Potential for Future Growth and Development*

Maynard's future growth area for development was identified in three general areas. The first is located along the Railroad to convert agricultural lands to industrial and residential. The second area is south of Highway 23, that is primed for industrial expansion. The final area is within the municipal boundary of Maynard and encouraging residential infill throughout the city.

Figure 4.7 Maynard Land Use

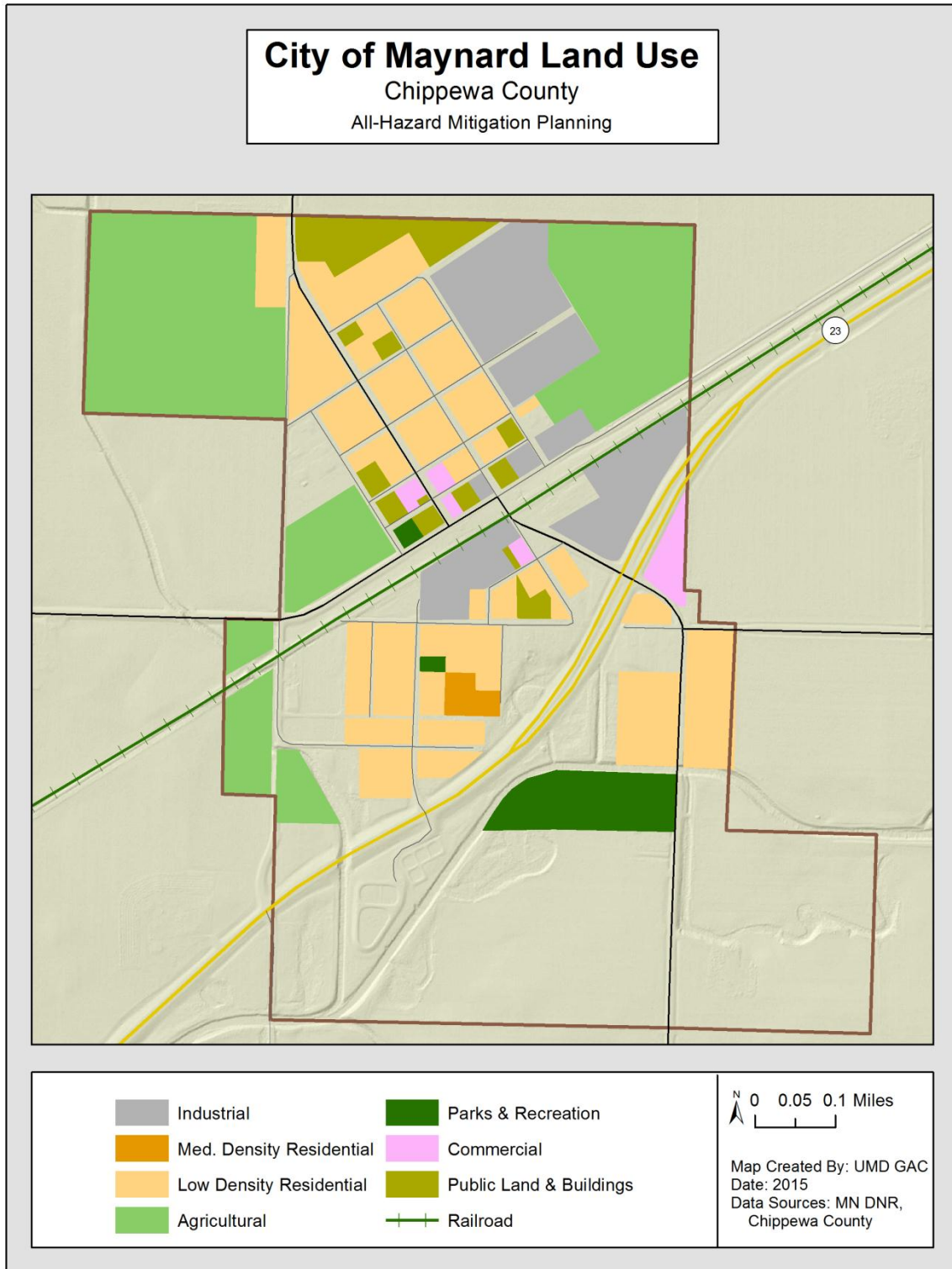
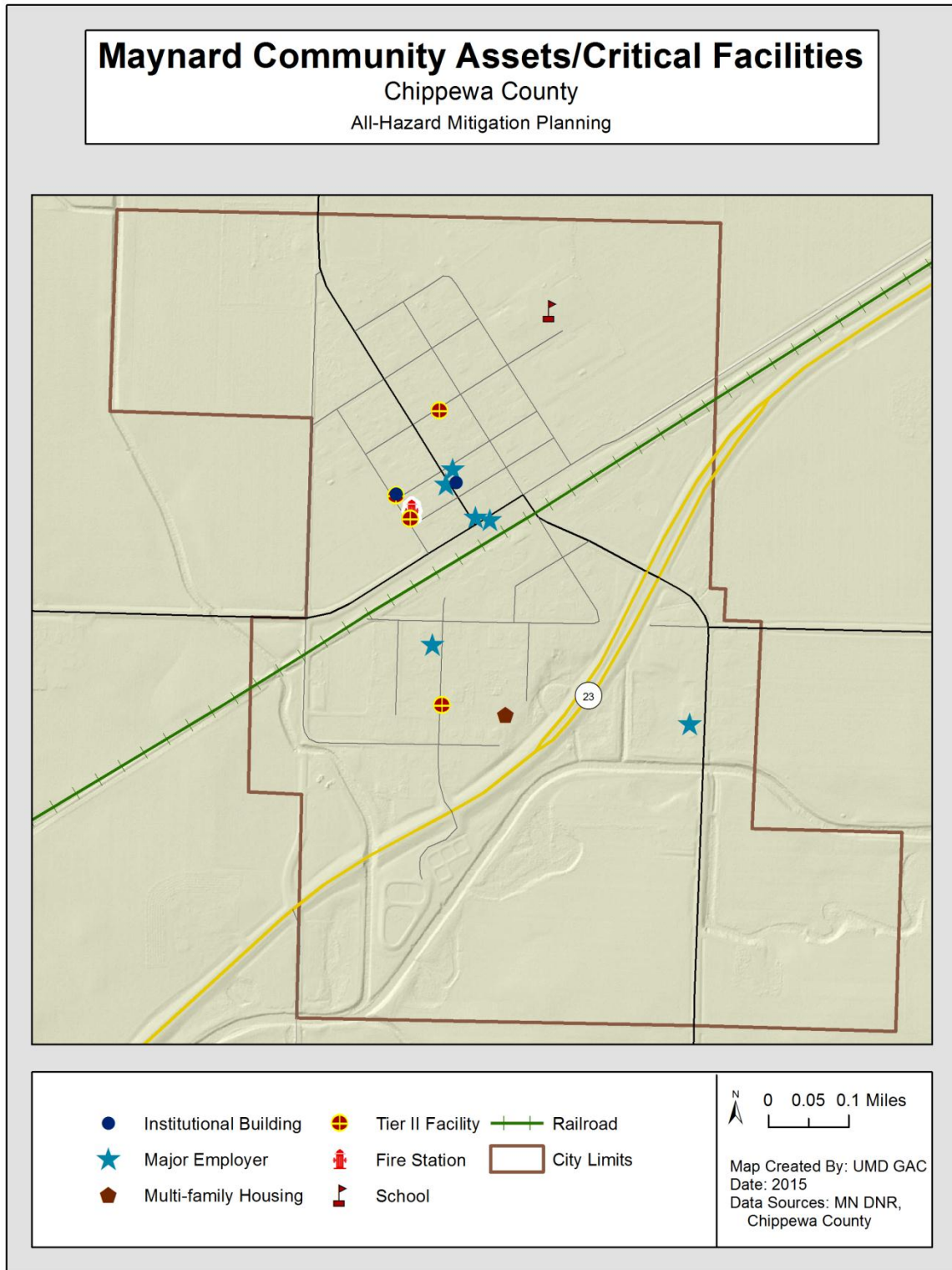
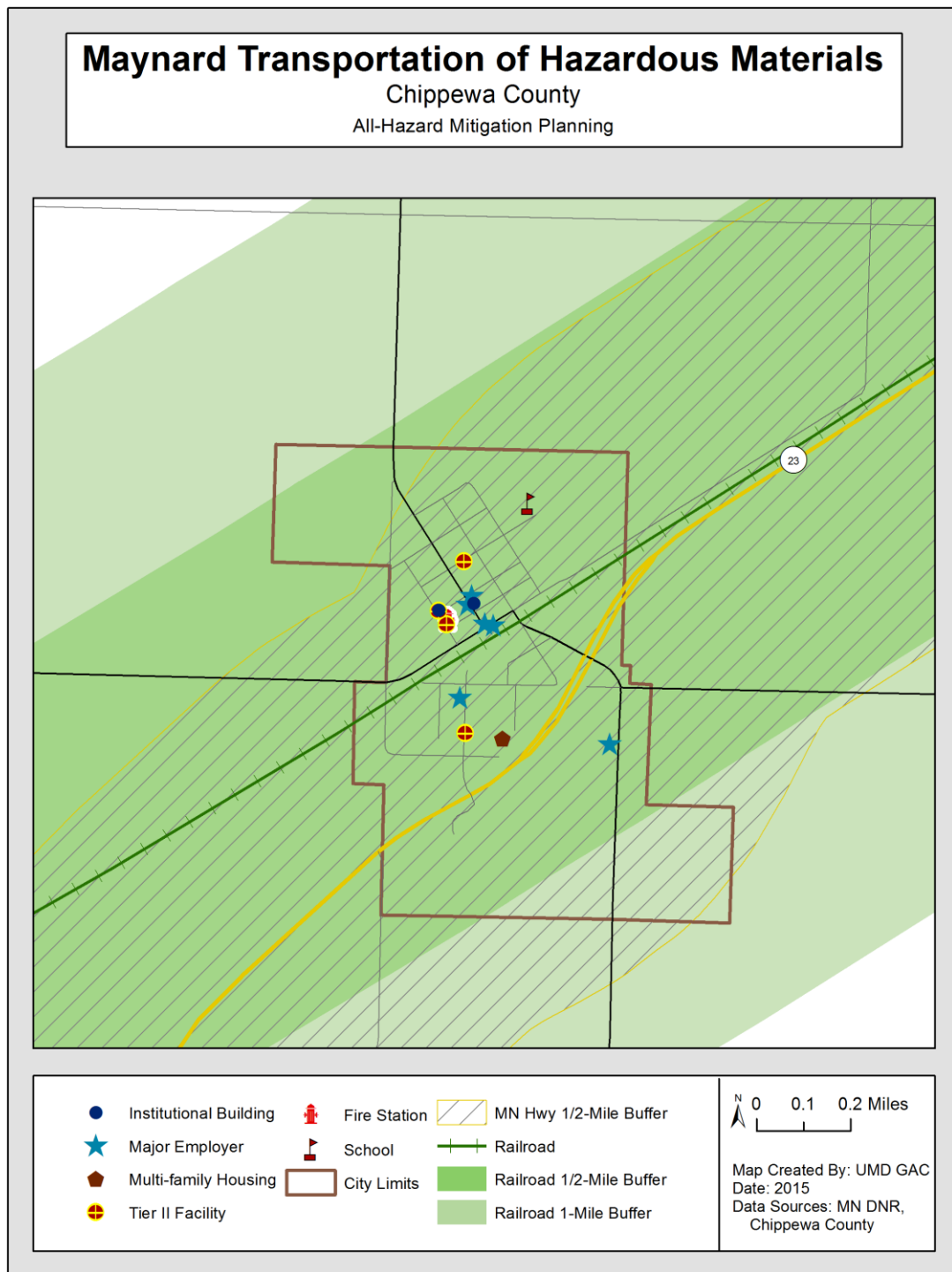




Figure 4.8 Maynard Community Assets/Critical Facilities



**Figure 4.9 Maynard Transportation of Hazardous Materials**



## City of Milan, Minnesota

### *Existing Development Trends*

According to the 2008-2012 American Community Survey, the City of Milan's population has an estimated population of 418 and 154 households, making it the third smallest city in Chippewa County. The historic projections found in Chippewa County's Comprehensive Plan, for Milan indicate a decrease in population by 23% from 2000 to 2020. As of 2008, Milan has seen a decrease of 10 percent in population and 16 percent in households. Regardless of the population decrease, Milan's economic situation has remained stable in the past ten years. Within the past four years, one major redevelopment project took place in Milan. The Milan Elementary School was refurbished by the Greater Milan Initiative project, renovating the facility for a thrift store, fitness area, and provides community education classes for surrounding communities. Aside from the mentioned redevelopment project, no other land use changes or redevelopments occurred in Milan in the last 10 years. The City of Milan's general land use categories are broken down in Table 66 below and see Appendix 8-12 for visual representation.

**Table 4.18 City of Milan – Land Use Category Allotments**

<b>Land Use Type</b>	<b>Parcel Count</b>	<b>Percent of Area</b>
Residential	195	73.31%
Commercial	38	14.29%
Agricultural	8	3.01%
Government	10	3.76%
Religious	2	0.75%
Industrial	2	0.75%
<b>Total</b>	<b>266</b>	<b>100.00%</b>

Source: Chippewa County Assessor, 2009

### *Potential for Future Growth and Development*

Milan's future growth area for development was identified by Milan staff as south of the existing city infrastructure. This would most likely be residential development on open agricultural land.

Figure 4.10 Milan Land Use

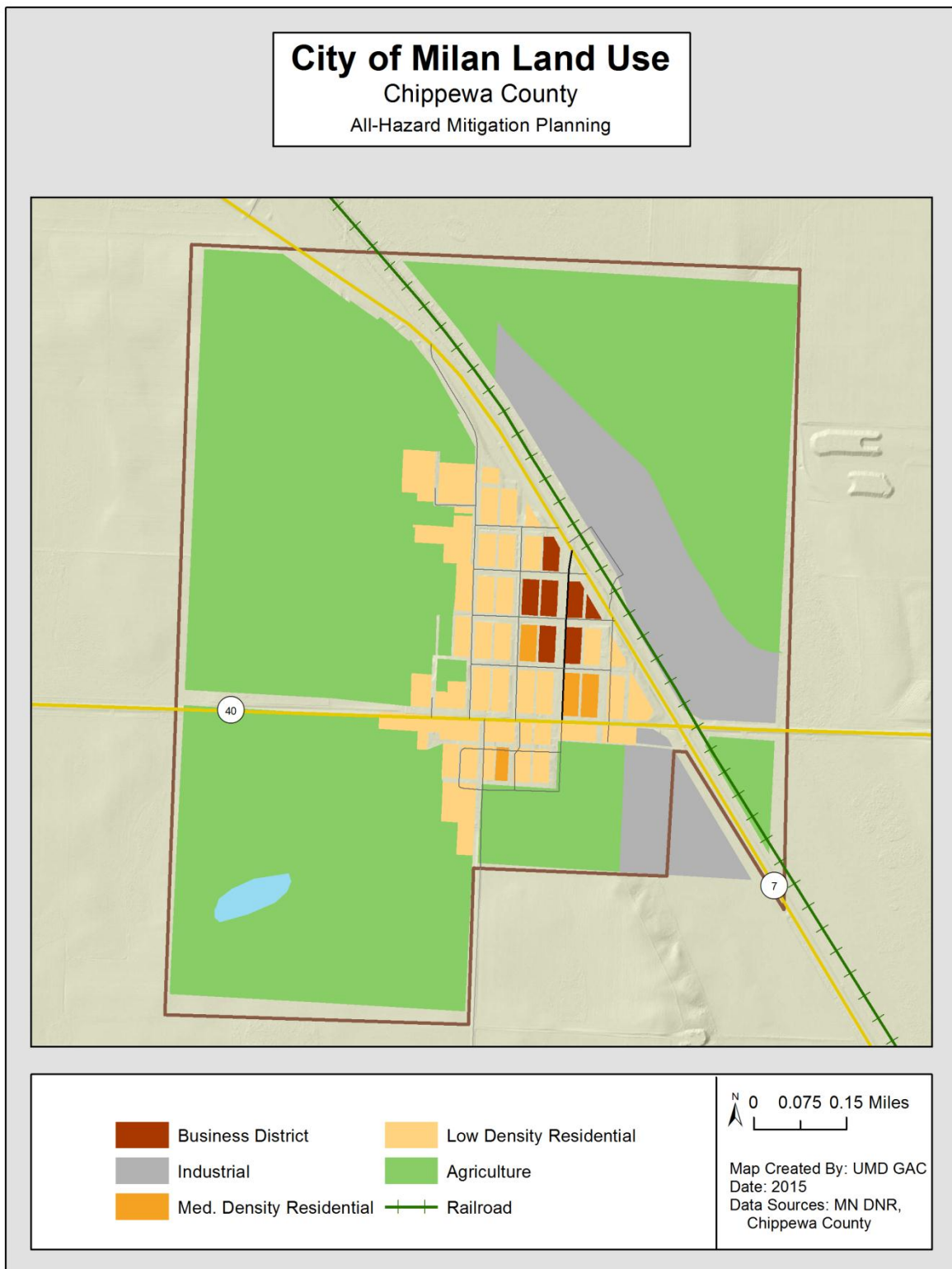




Figure 4.11 Milan Community Assets/Critical Facilities

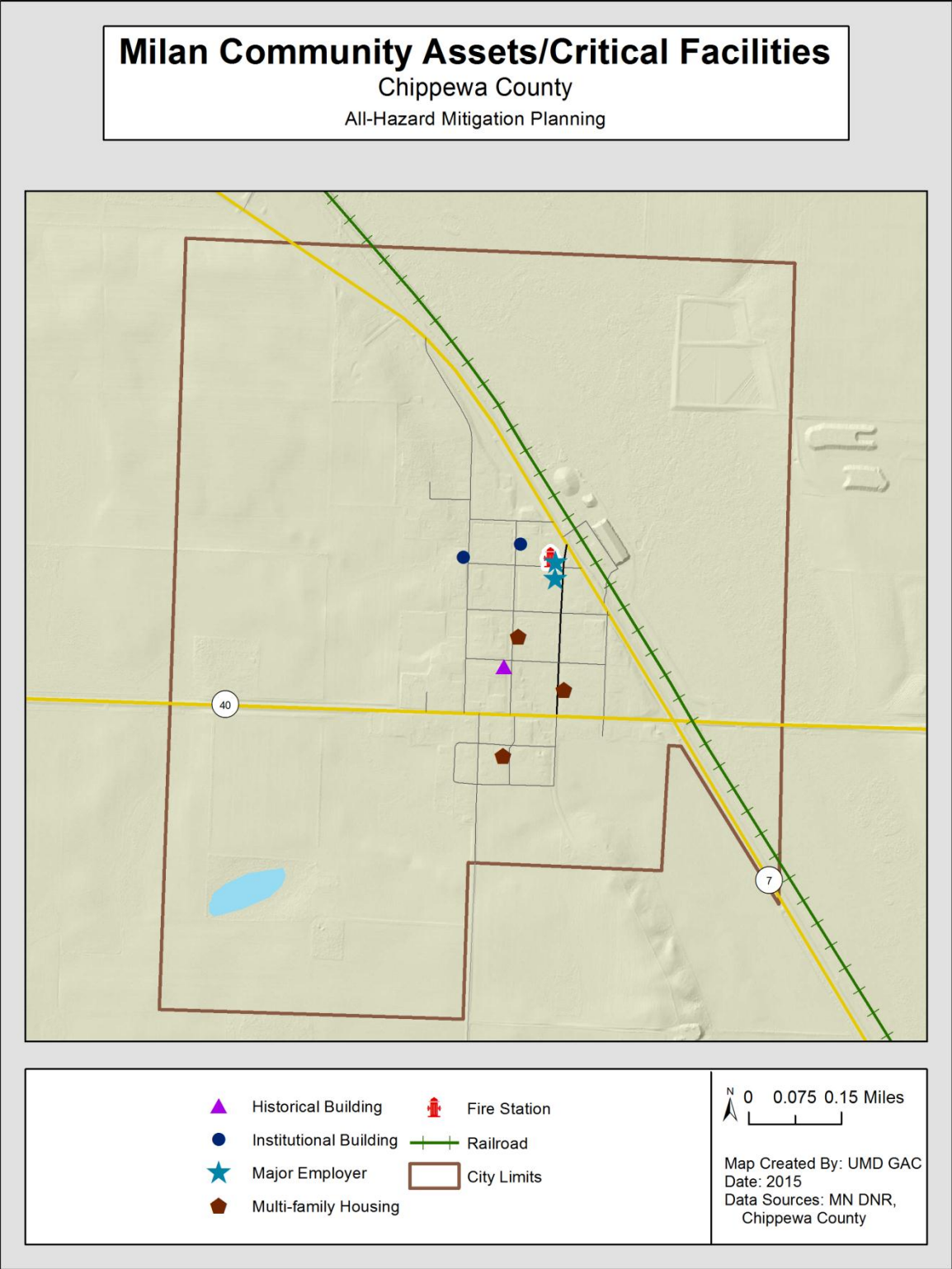
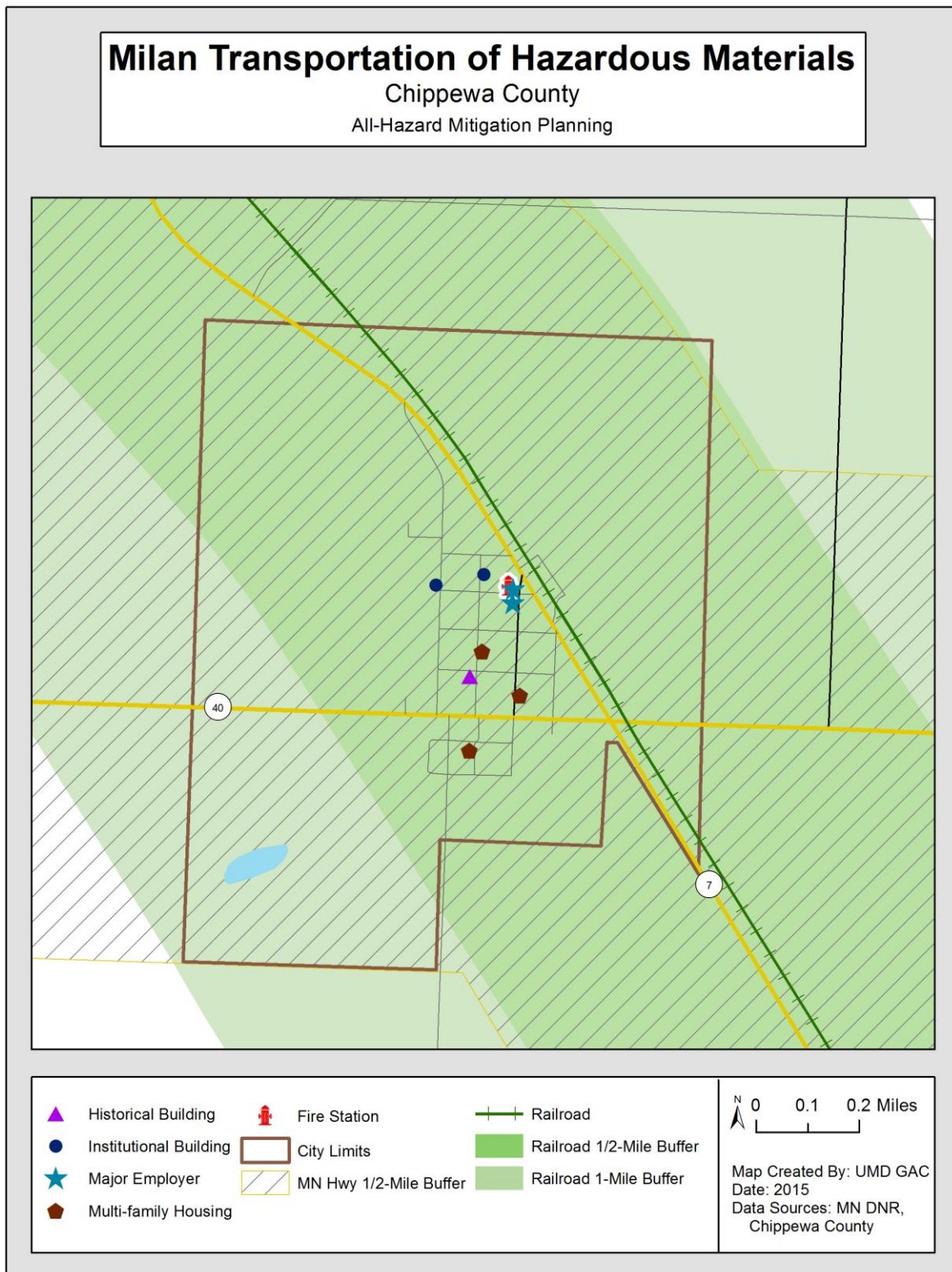


Figure 4.12 Milan Transportation of Hazardous Materials



## City of Montevideo, Minnesota

### *Existing Development Trends*

According to the 2008-2012 American Community Survey, the City of Montevideo's population has an estimated population of 5,330 and 2,331 households, making it the largest city in Chippewa County and the county seat. The historic projections found in Chippewa County's Comprehensive Plan, for Montevideo indicate a decrease in population by 3% from 2000 to 2020. Actual 2007 numbers reflect increases of 2 percent in population and 3 percent in households and have maintained a stable economic situation in the past ten years. While Montevideo has not completed extensive redevelopment projects in the city, numerous annexations have occurred since 1999 incorporating agricultural lands into the municipality for residential and commercial purposes. In 1999, the City annexed .65 acres of agricultural land and re-designated the land as residential, and again in 2003 with 6.09 acres, and in 2005 with three sites of 35 acres, 8.78 acres, and 23.76 acres. The other major annexations took place in 2002, converting 59.52 acres of agricultural land to commercial, 2006 with 55.02 feet, and 2008 with 44.66 acres. The City of Montevideo's general land use categories are outlined in Table 4.19 below.

**Table 4.19 City of Montevideo – Land Use Category Allotments**

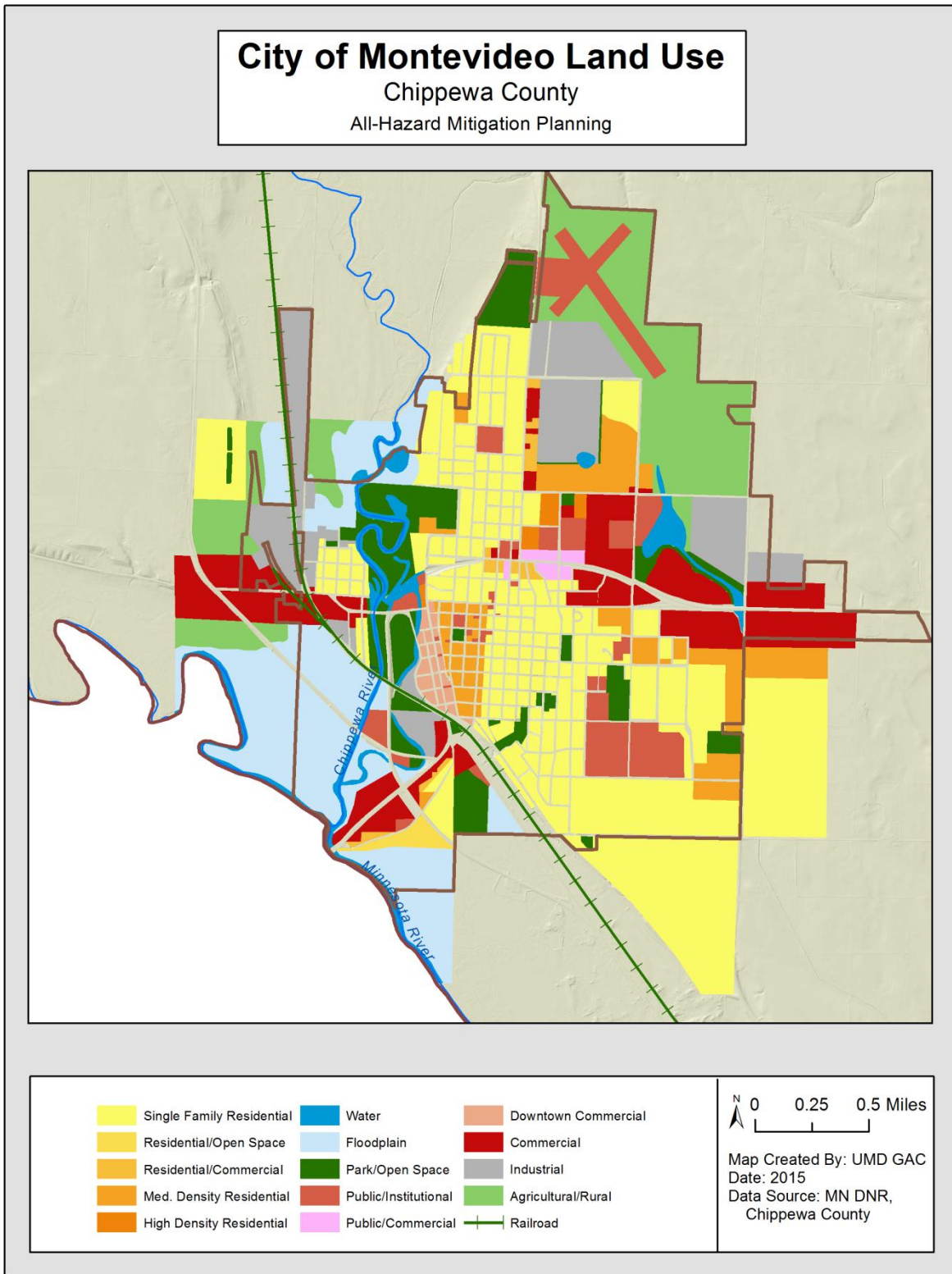
Land Use Type	Parcel Count	Percent of Area
Agricultural	357	14.78%
Residential	615	24.48%
Commercial	268	11.10%
Industrial	173	7.16%
Public Institutions	230	9.52%
Parks	138	5.72%
General Open Space	347	14.37%
Floodplain	286	11.85%
<b>Total</b>	<b>2,414</b>	<b>100%</b>

Source: Chippewa County Assessor, 2009

### *Potential for Future Growth and Development*

Montevideo's future growth area for development as identified by Montevideo staff are located in the northeast quadrant of the City, lots adjacent to Highway 7, land along 24<sup>th</sup> Street and Ashmore Avenue, and Williams Avenue in the southeast. The lots in the northeast should see growth in commercial and industrial areas, with residential and light industrial areas in the southeast section along Williams Avenue and 24<sup>th</sup> Street and Ashmore Avenue.

Figure 4.13 Montevideo Land Use





**Figure 4.14 Montevideo Community Assets/Critical Facilities**

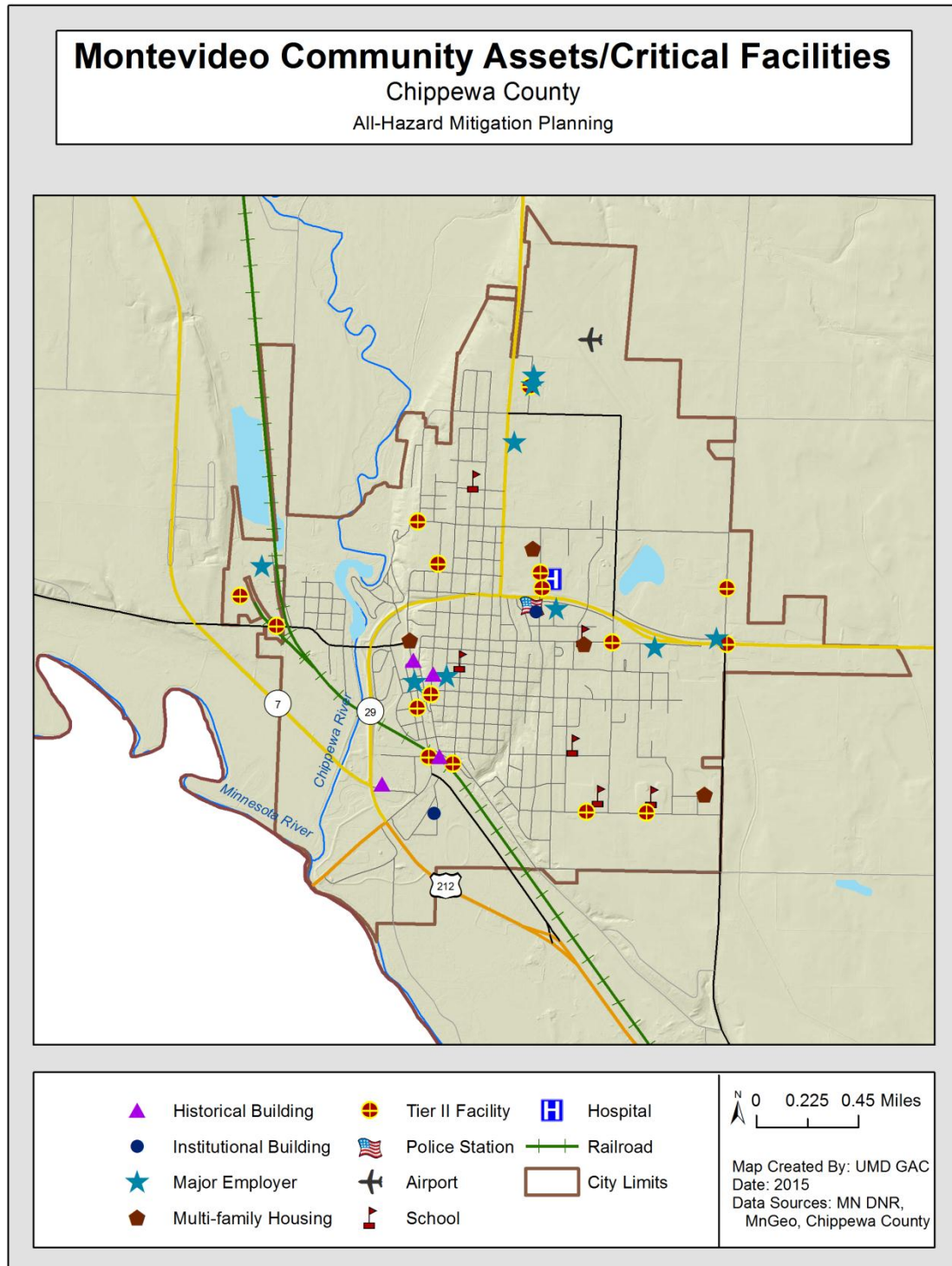
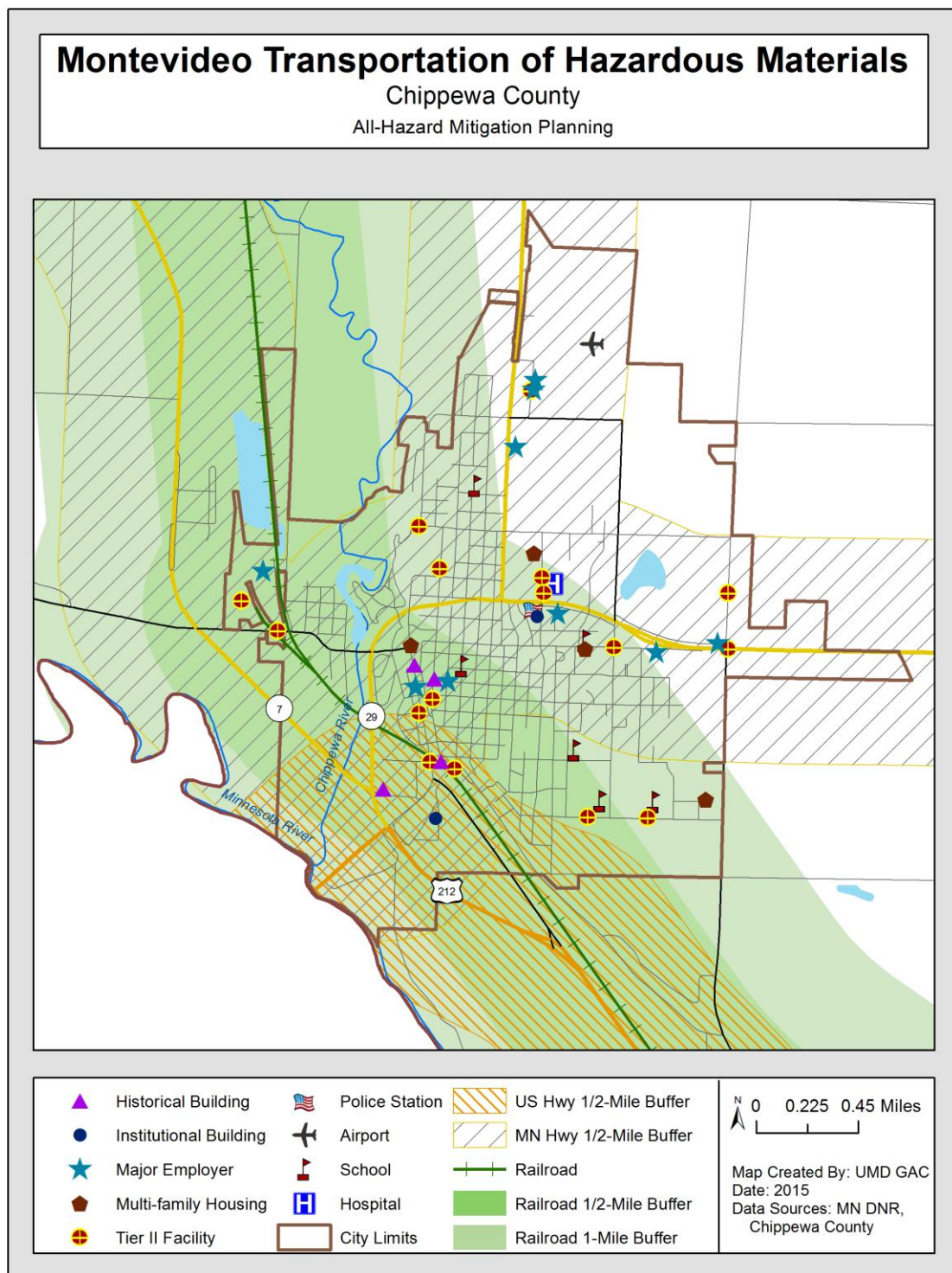


Figure 4.15 Montevideo Transportation of Hazardous Materials



## City of Watson, Minnesota

### *Existing Development Trends*

According to the 2010 United States Census, the City of Watson's population has a population of 205 and 90 households, making it the smallest city in Chippewa County. The historic projections found in Chippewa County's Comprehensive Plan, for Watson indicate a decrease in population by 13% from 2000 to 2020. In actuality as of 2007, Watson has seen an increase of 5 percent in population and 2 percent in households and has maintained a stable economic situation in the past ten years. The City of Watson has not completed any redevelopment projects in the last 10 years, aside from a new Water Treatment Plant in 2008. Rather, the City has focused on business and residential retention throughout the municipality. The City of Watson's general land use categories are broken down in Table 4.20.

**Table 4.20 City of Watson – Land Use Category Allotments**

<b>Land Use Type</b>	<b>Parcel Count</b>	<b>Percent of Area</b>
Residential	125	63.13%
Commercial	16	8.08%
Agricultural	5	2.53%
Industrial	3	1.52%
Government	6	3.03%
Religious/Non-Profit	1	0.51%
<b>Total</b>	<b>198</b>	<b>100.00%</b>

Source: Chippewa County Assessor, 2009

### *Potential for Future Growth and Development*

Watson's future growth areas for development (as identified by Watson staff) are located in the northeast, southeast, and southwest corners of the municipal boundary. The City has no land available within city limits and the development areas would be slated for residential homes.

Figure 4.16 Watson Land Use

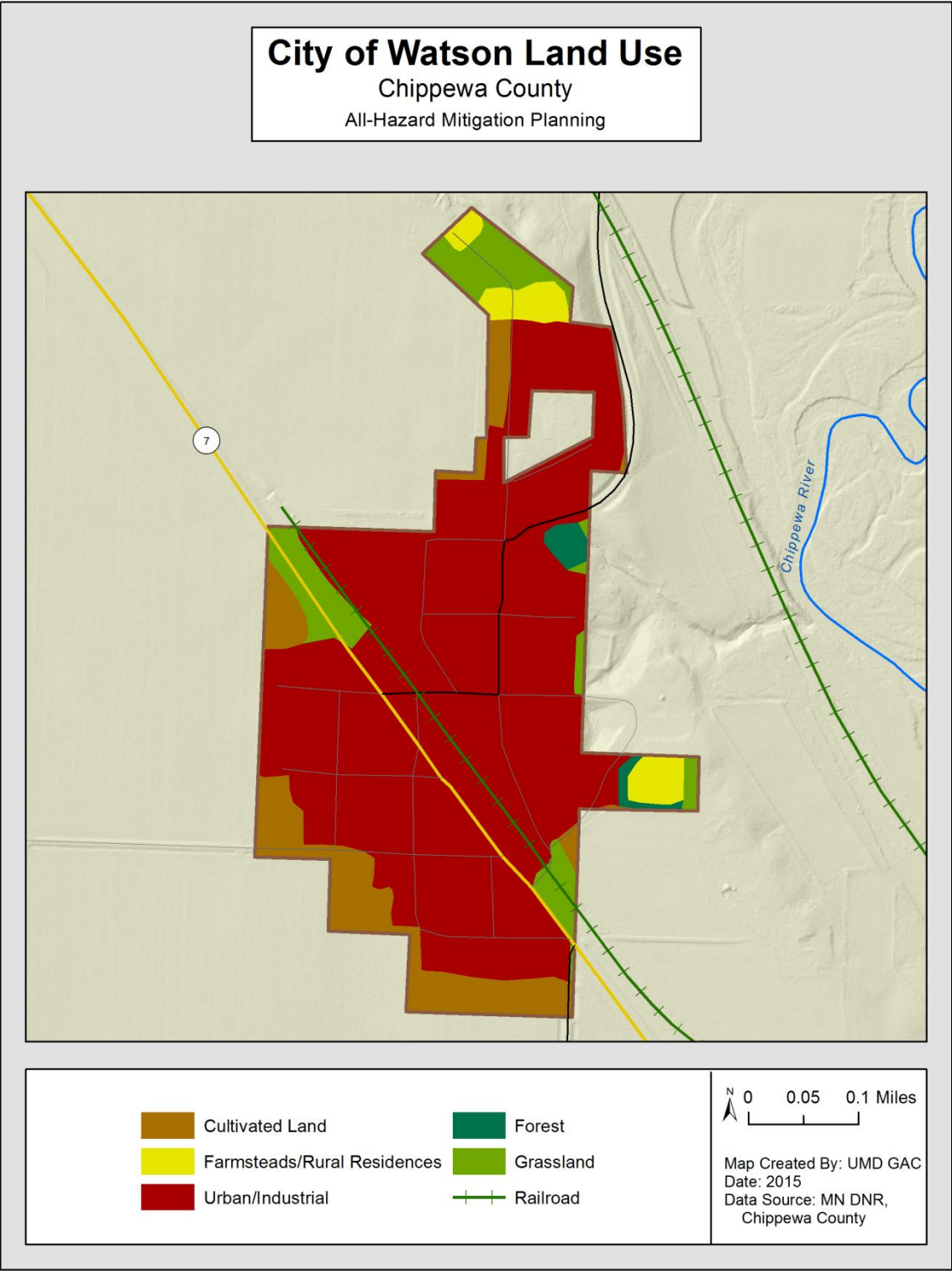
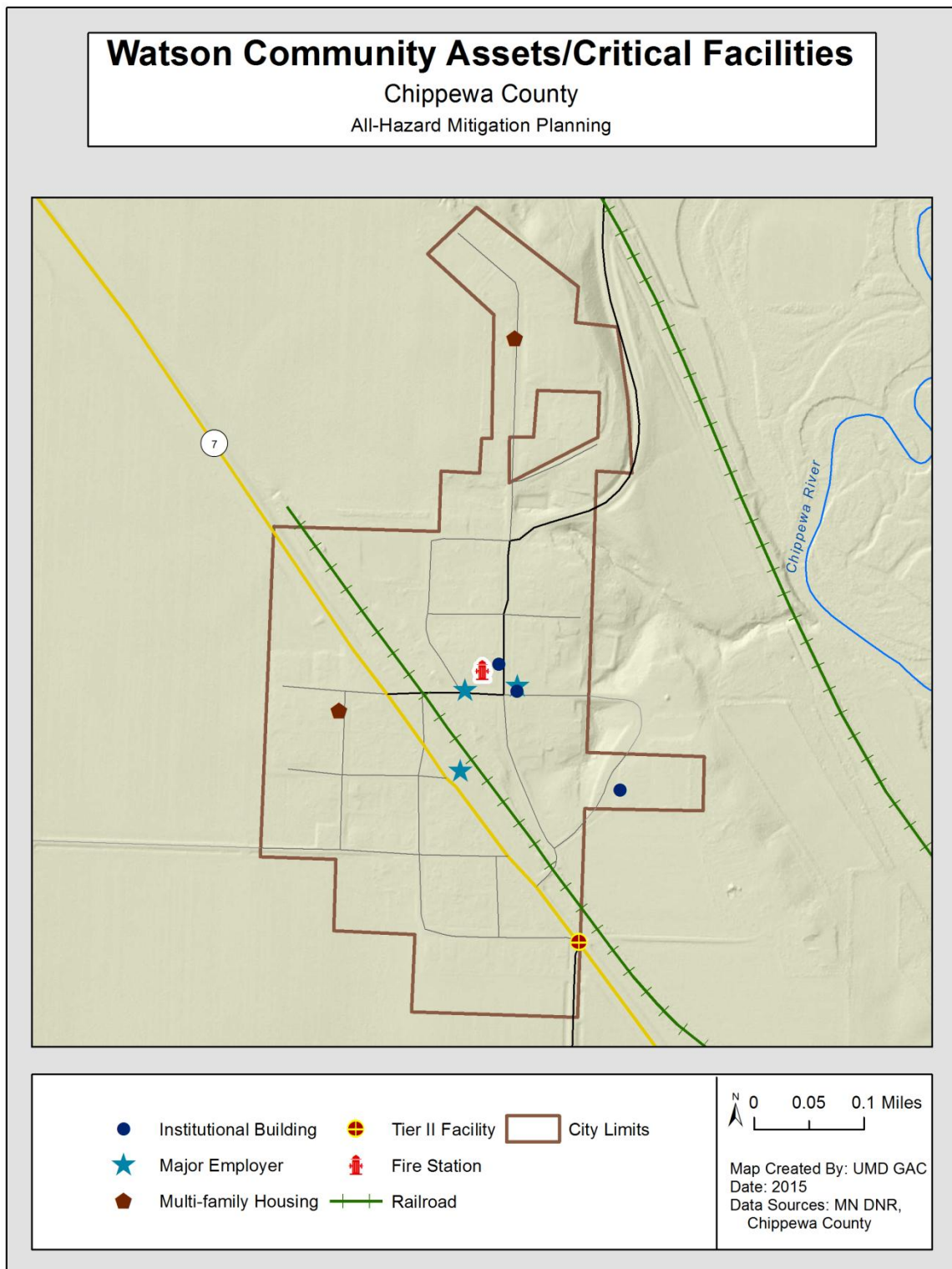
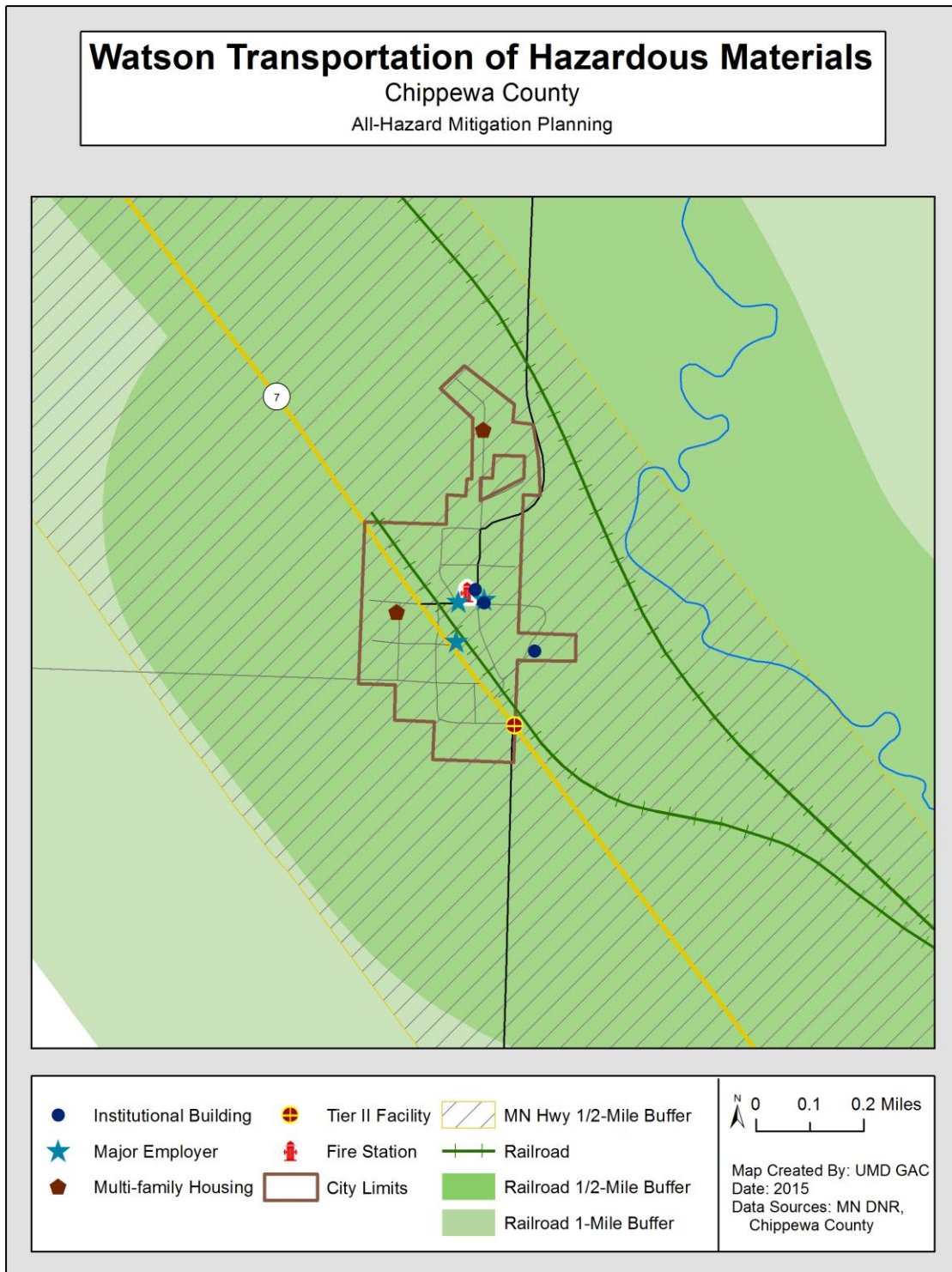




Figure 4.17 Watson Community Assets/Critical Facilities



**Figure 4.18 Watson Transportation of Hazardous Materials**



## CHAPTER 5: GOALS, OBJECTIVES, AND STRATEGIES FOR NATURAL HAZARDS

### OVERVIEW

The following tables outline the goals, objectives, and mitigation strategies for natural hazards important to Chippewa County. The goals are used as a framework for the objectives and mitigation strategies, which in turn, provide specific information on how mitigation decisions should be made. The goals, objectives, and strategies are based on the issues identified by the Local Task Force and the risk assessment in this plan. The chapter is divided into three sections; completed strategies by Chippewa County and cities, current goals, objectives, and strategies for Chippewa County and cities, and the prioritization of strategies.

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### DEFINITIONS

**Goals** are general statements. **Objectives** are action statements and start with an action verb. **Strategies** support the action of the objective.

The **Time Frame** was determined by the task force and the County Emergency Manager as an estimated timeline in which to complete the strategy.

The **Time Frame – Recurring** is a strategy type that does not have a specific length of time. Once the strategy has been completed, the responsible entity will re-start the strategy.

**Responsible Entity** is the entity in charge of initiating and completing the strategy identified. This was determined by the task force and County Emergency Manager as the most likely entity to complete the strategy.

The **Estimated Cost** was an educated guess of the cost of each strategy. Some strategies would not cost extra and were denoted “—”. Some costs were not known and denoted as “unknown”.

The **Funding Partner** is a potential partner for the county/city to obtain funding from in order to complete a strategy.

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### GENERAL MITIGATION VISION

“The county will strive to work with surrounding communities and local emergency responders to create and implement a proactive and results-oriented all-hazard mitigation plan that will make the county and region a safer and more sustainable place to live by protecting and enhancing the resources of the county as they relate to hazards that may have an impact in the future.”

## *DEVELOPMENT OF STRATEGIES*

To determine strategies for each hazard identified in the risk assessment (Chapter 4) small group problem-solving techniques were used at the third task force meeting on October 30<sup>th</sup>, 2014. Once the hazards most likely to affect Chippewa County were identified and prioritized, the task force assembled to review these hazards and their rankings and identify strategies to address mitigation for each hazard. Past hazard activities in the county influenced strategy development and strategy ranking (i.e. 1997 and 2001 flooding). In many cases, as the hazards were identified for the inventory, strategies were also discussed, providing a good starting point for the conversation.

The following outlines the plan's strategy development process. 1) Working toward group consensus, each hazard was reviewed individually. 2) Participants offered suggestions and input which stimulated a lively discussion as part of the planning process. All suggestions were considered and recorded by the facilitator. 3) A limited amount of time was set on each hazard by the facilitator to move the group forward. 4) Debate followed before the group was asked to decide if it should be part of the plan – group consensus was needed. 5) The group noted they could not be totally inclusive – some strategies may not even be considered and others may not be feasible.

### **General Criteria**

- |                          |                                    |
|--------------------------|------------------------------------|
| 1. History               | 5. Effectiveness                   |
| 2. Successful Strategies | 6. Building on what already exists |
| 3. Need                  | 7. Legal Authority                 |
| 4. Risks                 | 8. Environmental Impact            |

### **Cost/Benefit Criteria**

- |                        |   |
|------------------------|---|
| 1. Costs/Efficiencies  | 4. Overall Impact                                 |
| 2. Economic Impact     | 5. Resources Needed (Social & Fiscal)             |
| 3. Budget Requirements | 6. Benefits Provided by Project (Social & Fiscal) |

Identifying costs that would be attached to each strategy was the most difficult part of the process. Due to limited time and resources to develop the plan it wasn't feasible to spend a lot of time on estimating the costs. It is critical for the Board to constantly be evaluating the costs as part of implementation and maintenance for the All-Hazard Mitigation Plan. Strategies that dealt with rural areas seemed harder to include in the plan – more costly, harder to regulate, and would need population buy-in. Many strategies are costly, labor intensive, time consuming and it is difficult to identify the lead for the strategy. It was determined that the Emergency Manager will perform a cost-benefit review for all potential future project applications. Participants in the planning process agreed that to implement an ordinance or regulation was not the difficult part of certain strategies – would it be possible and feasible to follow-through? Participants started with strategies that were manageable to see notable progress – “baby steps”. It was reasonable to include strategies that have been started, but not yet completed.

In addition to creating new mitigation strategies for Chippewa County, the Local Task Force analyzed strategies found in the 2010 All-Hazard Mitigation Plan. The process for strategy analysis included two steps: Step 1) Discuss a strategy and determine its “status”, Step 2) Determine why the strategy has that status. Four different “Statuses” were available to assign to a strategy: 1) Completed, 2) Still Feasible 3) Recurring - does not have a specific time length and once the strategy is completed the responsible entity will restart the strategy, and 4) No longer relevant. Once a strategy was assigned a status by the Local Task Force through group consensus, the Local Task Force had to determine **why** it received that status designation. For example, a Flood Strategy that received “not completed – strategy is still feasible” may have not been completed due to fund shortage; however, a jurisdiction may see that flood project as still important to complete in the future.

Following the third Local Task Force meeting, the task force participated in an online survey to prioritize mitigation strategies. The results of this survey were compared with the prioritized hazard list and the top strategies were pulled out for the top three natural hazards (Violent Storms and Extreme Temperatures, Flooding, and Wildfire). The prioritized strategy list was reviewed, discussed, and verified at the fourth Task Force meeting on May 21<sup>st</sup>, 2015.

*HMPG FUNDED STRATEGIES: CHIPPEWA COUNTY AND CITIES*

**Table 5.1 CC & Cities Hazard Mitigation Grant Program Funded Strategies (FEMA-Related)**

<b>SUBGRANTEE</b>	<b>PROJECT</b>	<b>FEDERAL SHARE</b>	<b>DR-PROJECT NUMBER</b>	<b>CITY/LOCATION</b>	<b>DATE STARTED</b>
Chippewa County	Acquire 3 properties	\$97,755	DR-993.07	Sparta Township	June 1994
Montevideo, MN	Acquire 2 properties	\$28,200	DR-993.08	Montevideo, MN	June 1994
Chippewa County	Acquire 21 properties	\$288,014	DR-993.25	Montevideo, MN	1997
Chippewa County	Acquire 20 properties	\$312,375	DR-993.28	Montevideo, MN	April 1997
Montevideo, MN	Acquire 50 properties	\$1,227,450	DR-1175.02	Montevideo, MN	September 1997
Chippewa County	Overhead Line Conversion	\$134,775	DR-1151.04	Vallers & Lucas Townships, Lyon County	October 1997

Source: MN HSEM Mitigation Database: Appendix L, 2015

## COMPLETED STRATEGIES

**Table 5.2 CC & Cities Completed Strategies in Past 10 Years for Natural Hazards**

Hazard	Strategies	Responsible Entity
Violent Storms & Extreme Temperatures	Educate city councils on the benefits of the universal building code in times of disaster. Montevideo is the only city with a universal building code and a building inspector.	Clara City, Maynard, Milan, Montevideo, Watson
Violent Storms & Extreme Temperatures	The County Emergency Manager should review countywide siren needs annually. Look for funding to provide new or improved warning systems as necessary. New sirens were placed in Clara City, Maynard, and Milan; and Watson and Montevideo received upgrades to their radio system in 2010.	County Emergency Manager
Violent Storms & Extreme Temperatures	Work to connect Milan and Maynard to the “One-Button Emergency System”.	County Emergency Manager
Violent Storms & Extreme Temperatures	Purchased a backup generator for the Maynard Event Center. Constructed the Maynard Event Center that serves as the Emergency Operations Center for the surrounding area.	
Flood	City of Montevideo has purchased 122 properties in Flood Zones A & B since 2001.	Montevideo
Flood	City of Montevideo purchased overhead power to minimize costs associated with wire replacement due to flooding.	Montevideo
Flood	Have sandbags within city limit in event of flood.	Clara City, Maynard
Flood	Ice breakers (angled steel poles) were placed in front of Main Street Bridge and State Highway 7 Bridge to reduce potential of flooding.	Clara City
Wildfire	Create a mutual aid agreement between DNR and local fire departments to organize response to large wildfires.	West Central Firefighters Association Clara City, Maynard, Milan, Montevideo, Watson
Wildfire	Encourage DNR to give training locally.	West Central Firefighters Association Clara City, Maynard, Milan, Montevideo, Watson, DNR

## GOALS, OBJECTIVES, AND STRATEGIES

### Violent Storms and Extreme Temperatures

Goal 1: Have safe and accessible safe rooms from violent storms.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Encourage homes without basements to have a safe room where household residents may go in case of violent storms.	A. Educate contractors and homeowners on safe rooms.	Recurring	All Cities and County	\$500/city	FEMA
	B. Assist with finding funding sources for and build safe shelters in all manufactured home parks, cities, city parks, county, and state parks and public golf courses. Identify a safe room for the campgrounds in cities and the greater county.	Recurring	Clara City, Watson	\$50,000-\$100,000/shelter	FEMA
2. Investigate Snow fences in Chippewa County.	A. Purchase and install a ½ mile living snow fence along properties located in the Northwest portion of the City.	5-7 years	Clara City	Unknown	FEMA
3. Require all new manufactured home parks to provide safe shelter for park residents either through a structure on side of a plan of evacuation to safe shelter off site.	A. Require that the safe shelter plans go through local governing unit each year for review.	Recurring	All Cities	--	--
	B. Seek financial assistance for a safe shelter at Raveling Manufactured Home Park near Montevideo.	5 years	County	--	--
4. Ensure that all hospitals, schools and nursing home facilities have a severe storm plan in place to protect patients and students.	A. Each city and the County Emergency Manager should continue to do periodic visits and review plans annually.	Recurring	County Emergency Manager and All Cities	N/A	County
5. Educate residents of safe rooms in community and continue to address safe room needs in the county.	C. Build safe rooms as needed.	2-15 years	All Cities	\$100,000/shelter	FEMA



## Violent Storms and Extreme Temperatures

Goal 2: Improve severe storm warning system for all county residents.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Ensure that emergency management personnel, county sheriff, city police and emergency response persons are notified as soon as possible in the event of a severe storm.	A. Continue current programs and plans that are in place and periodically review the effectiveness of these plans.	Recurring	County EM, County Sheriff	--	--
2. Assess adequacy of existing civil defense sirens and emergency operations centers.	A. The county emergency manager should review countywide siren needs annually. Look for funding to provide new or improved warning systems as necessary.	Recurring	County EM	\$17,000/ Siren	USDA
	B. Identify funding to purchase portable generators and transfer switches to community emergency operation centers.	2-3 years	Watson	\$6,500	FEMA
3. Ensure that all communities and rural areas of the county have immediate access to severe weather warnings and communications.	A. Educate the public on the use of weather radios.	Recurring	County EM	\$500	--
	B. Make weather radios available to rural residents. <b>*New Strategy</b>	Recurring	County	\$25 each	--
4. Continue to train storm spotters.	A. Work with programs in place and periodically evaluate their effectiveness.	Every 2 years	County Emergency Manager	--	--

Violent Storms and Extreme Temperatures

Goal 3: Protect people and infrastructure from the impacts of severe weather.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Encourage that all new local electrical distribution lines be placed underground when applicable.  *New Goal, Objective, and Strategies	A. Work with utility companies to assess the safest placement of utility lines.	Recurring	County, All Cities, MN Valley Electric Cooperative, Xcel	--	FEMA
	B. Underground burial of power lines.	Recurring	County, All Cities, MN Valley Electric Cooperative, Xcel	--	

## Flood

Goal 1: Eliminate nonconforming structures in the identified 100-year floodplain.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Enforce current zoning ordinances that provide for the amortization and elimination of existing nonconforming private structures and uses in identified 100-year floodplains.	A. Work with the state and federal government to provide funding to remove nonconforming structures (residences, businesses) from the floodplains.	Recurring	Montevideo, County EM	Unknown	FEMA/DNR/ACOE
2. Buy out willing sellers of their structures in the 100-year floodplain including businesses in Montevideo.	A. Work with the state and federal government to provide funding to acquire and remove nonconforming structures in the Flood A and Flood B Zones.	Recurring	Montevideo	Unknown	FEMA/DNR/ACOE
3. Relocate Flinn's Salvage Yard.	A. Work with the state and federal government to secure funding to relocate this nonconforming use.	Unknown	County	\$350,000	FEMA/DNR/ACOE

Goal 2: Improve the safety and security of Wastewater Treatment Plants/lift stations.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Protect Maynard's Wastewater Treatment Plant	A. Build a berm along Hawk Creek.	2 years	Maynard	Unknown	FEMA

## Flood

<b>Goal 3: Minimize the flooding along Hawk Creek.</b>					
<b>OBJECTIVES</b>	<b>STRATEGIES</b>	<b>Time Frame</b>	<b>Responsible Entity</b>	<b>Estimated Cost</b>	<b>Funding Partner</b>
1. Work with the City of Willmar to keep ice out of Clara City and Maynard.	A. The cities of Clara City and Maynard should participate in dialogue with the Hawk Creek Watershed District, the city of Willmar and the MPCA. Investigate the diversion of water to Grass Lake especially during flooding. Consider seeking state or federal funding.	Recurring	Clara City, Maynard, Willmar, Hawk Creek Watershed	\$20,000	FEMA/DNR/ACOE
2. Protect the homes in Clara City that is danger of seasonal flooding in response to the ice dams at the bridges.	A. Annually review the plan of action which addresses flooding. This plan includes early sandbagging and having equipment available to move ice which will reduce flooding.	Recurring	Clara City	--	--
3. Protect Residences in Maynard.	A. Build a berm along Hawk Creek.	2 years	Maynard	Unknown	FEMA/DNR
4. Protect cemetery in Maynard.	A. Build a berm to protect the cemetery from flood events.	2 years	Church	Unknown	FEMA/DNR

## Flood

<b>Goal 4: Improve the safety and security of Flood Prone areas throughout Chippewa County.</b>					
<b>OBJECTIVES</b>	<b>STRATEGIES</b>	<b>Time Frame</b>	<b>Responsible Entity</b>	<b>Estimated Cost</b>	<b>Funding Partner</b>
1. Address flooding issues as a region.	A. Work with state agencies, local governments and emergency managers to address flooding issues as a region. Creation of network of print, radio, social medias that reach all citizens with maps of risk areas, shelters, contact information and what to do in the event of a flood.	Recurring	Clara City, Maynard, Milan, Montevideo, Watson, County EM	\$10,000	NWS/ ACOE/ DNR
2. Establish a plan of action to address flood emergencies.	A. Identify resources both local and outside of the community that are needed and contract for this assistance.	Recurring	Clara City, Maynard, Milan, Montevideo, Watson, County EM	--	--
	B. Work regionally to improve the flood forecast system.	Recurring	Clara City, Maynard, Montevideo, County EM	\$30,000	NWS/ ACOE/ DNR
3. Identify flood concerns in Chippewa County Townships.	A. Identify residences prone to flood hazards for future buyouts.	2 years	County Zoning, Townships	--	--
	B. Prioritize bridges and culverts with annual flood concerns. Determine strategies to mitigate repeatedly flooded infrastructure (ex. replacing bridges with clear-span bridges, replacing culverts).	2 years	County Engineer, Townships	--	--
	C. Identify and prioritize repeat flood-impacted township roads to be improved.	2 years	County Engineer, Townships	--	--

<b>Goal 5: Ensure continued compliance with NFIP standards for participating communities.</b>
See next section “ <b>NFIP Compliance</b> ” starting on page 18 for discussion.

## Erosion

Goal 1: Minimize property damage and reduce economic impacts of erosion.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Limit the potential loss of property and economic impact from river and ravine erosion, landslides, and slope failure.  <b>*New Goal , Objectives, and Strategies</b>	A. Support demolition and/or relocation of dwellings and infrastructure to prevent loss of property due to erosion, landslides, or slope failure	Recurring	County Emergency Manager	Unknown	FEMA, MN DNR
2. Prevent possibility of damage from river and ravine erosion, landslides, and slope failure.	A. Review, update, and enforce zoning ordinances that prohibit building in areas that are susceptible to water erosion, landslides, and slope failure.	1-2 years	County, All Cities	--	--
3. Educate the public on possible effects of erosion, landslides, and slope failure.	A. Increase public awareness and knowledge on erosion landslides, and slope failure, targeting individuals and businesses located in high risk areas.	Recurring	County Emergency Manager, County Zoning	--	--

## Drought

Goal 1: Monitor the county's ground water supplies and demands.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Encourage use of water meters to monitor water consumption.	A. Most communities have water meters. Make sure that water consumption information is available during drought times.	Recurring	All Cities	--	--
2. Monitor levels of aquifers.	A. Continue and expand the monitoring of ground water levels in order to control consumption during a drought.	Recurring	County and All Cities	--	County, SWCD, DNR

Goal 2: Adopt a wellhead protection ordinance.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Coordinate with and encourage cities within the county to adopt complementing wellhead protection ordinances/plans.  *New Goal, Objectives, and Strategies	A. Actions by County Board and City Councils.	2-10 years	County and All Cities	Staff Time	--
	B. Implement wellhead protection ordinances/plans.	2-10 years	County and All Cities	Staff Time	

## Wildfire

Goal 1: Prevent Wildfires					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Minimize the amount of natural fuel in areas prone to fire damage.	A. Work with the Minnesota DNR to include prescribed burning on all county lands and parks. Work with FSA to educate landowners about cost share funding available for controlled burns on CRP and CREP lands. Provide regulations in conservation plantings that consider controlled burns in the future.	Recurring	County SWCD, FSA, DNR	--	--
2. Provide education to the public about wildfire prevention.	A. Work with the FSA office to provide education to landowners. Some landowners may not realize that burning is allowed and beneficial.	Recurring	County SWCD, FSA	--	--



## Wildfire

<b>Goal 2: Minimize structure loss from wildfire.</b>					
<b>OBJECTIVES</b>	<b>STRATEGIES</b>	<b>Time Frame</b>	<b>Responsible Entity</b>	<b>Estimated Cost</b>	<b>Funding Partner</b>
1. Have access to additional firefighters other than those already in the county for large wildfires.	A. Create contract between DNR and local fire departments to organize response to large wildfires. This contract should address the entities responsible for wildfires on state and federal-owned land and who pays expenses.	Recurring	Clara City, Maynard, Milan, Montevideo, Watson, DNR	--	--
2. Identify dry hydrants within the county.	A. Identify the location of all dry hydrants on a map.	1 year	County	--	--

<b>Goal 3:</b>					
<b>OBJECTIVES</b>	<b>STRATEGIES</b>	<b>Time Frame</b>	<b>Responsible Entity</b>	<b>Estimated Cost</b>	<b>Funding Partner</b>
1. Provide education to the public about wildfire prevention.	A. Work with local units of government, fire departments and schools to provide educational fire safety materials to the public.	Recurring	Clara City, Maynard, Milan, Montevideo, Watson	--	--
2. Promote training programs between the DNR and local firefighters.	A. Encourage DNR to give training locally.	Recurring	Clara City, Maynard, Milan, Montevideo, Watson, DNR	--	DNR
3. Increase access to equipment suitable to fighting wildfires.	A. Work with DNR to provide more equipment for local fire departments. Look for grants for additional equipment if necessary.	Recurring	Clara City, Maynard, Milan, Montevideo, Watson	Varies according to FD	FEMA/ DNR

## Dam Failure

Goal 1: Prevent structure from cracking or breaking.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Ensure dam structures are maintained and functioning properly.	A. Coordinate dam inspections with the DNR and Army Corps of Engineers.	Recurring	DNR, ACOE	--	--

Goal 2: Provide safety to residents					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Minimize development within floodplains.	A. Enforce floodplain ordinances.	Recurring	County Zoning, Maynard, Montevideo	--	--

### *NATIONAL FLOOD INSURANCE PROGRAM (NFIP).*

The National Flood Insurance Program (NFIP) is a program regulated by the Federal Emergency Management Agency (FEMA). The NFIP provides maps for local floodplain management in an effort to reduce federal expenditures due to flood events throughout the nation. The NFIP is also the primary source for flood insurance for flood-properties and those located in 100 and 500-year floodplains. The NFIP has three basic requirements: floodplain identification and mapping, floodplain management, and the purchasing of flood insurance. Floodplains are found in four cities within Chippewa County. Currently, three communities actively participate in the NFIP, including Clara City, Maynard, and Montevideo; in addition to Chippewa County. The city of Watson does not have Special Flood Hazard Areas. Table 5.4 identifies NFIP participation, dates of initial Flood Insurance Rate Maps (FIRM), current effectiveness of map dates, and Emergency Dates if applicable.

**Table 5.4 CC & Cities NFIP Participation**

<b>Jurisdiction</b>	<b>NFIP Status</b>	<b>Initial FIRM Identified</b>	<b>Current Effective Map Date</b>	<b>Emergency Date</b>
Clara City	<b>Participating</b>	no data	<b>NSFHA</b>	<b>6/8/1984</b>
Maynard	<b>Participating</b>	no data	<b>11/15/1974</b>	<b>3/10/2011</b>
Milan	<b>Not Participating</b>	no data	<b>7/15/1977</b>	no data
Montevideo	<b>Participating</b>	<b>5/26/1972</b>	<b>8/29/1975</b>	<b>5/26/1972</b>
Watson	No Special Flood Hazard Areas	no data	no data	no data
Chippewa County	<b>Participating</b>	<b>6/17/1986</b>	<b>5/19/1987</b>	<b>6/17/1986</b>

Source: MN DNR 2015

Table 5.5 provides FEMA's NFIP Insurance Report for Clara City, Montevideo, and Chippewa County. The information in this report identifies total insurance premium amounts, number of existing policies, total insurance coverage, and total claims and amounts paid to each jurisdiction since 1978.

**Table 5.5 FEMA NFIP Insurance Report**

<b>Jurisdiction</b>	<b>Total Premium</b>	<b>Number of Policies</b>	<b>Total Coverage</b>	<b>Total Claims Since 1978</b>	<b>Total Paid Since 1978</b>
Clara City	\$637	2	\$245,000	\$22,878	2
Montevideo	\$30,847	23	\$6,887,800	\$1,764,428	112
Chippewa County	\$3,715	3	\$830,000	\$485,185	23
<b>TOTAL</b>	<b>\$35,199</b>	<b>28</b>	<b>\$7,962,800</b>	<b>\$2,272,491</b>	<b>137</b>

Source: FEMA Policy & Claim Statistics for Flood Insurance, 2015

### **NFIP Continued Compliance**

FEMA mandates that all communities participating in the NFIP must identify continued compliance with the program. The following are descriptions of Clara City, Montevideo, and Chippewa County processes for continued compliance.

#### *Clara City*

Clara City does not have any designated flood hazard areas, however there are four areas considered "flood-prone" as determined by city staff. The three of the four areas are comprised of residential development with little room for future construction. If in the event that a citizen wants to develop in these areas, staff strongly recommends that the development does not occur. However, the ultimate decision lies with the City Council. The fourth "flood-prone" area is currently agricultural land and the City may decide to pursue industrial development. If this were to occur, the City would take all necessary steps to ensure the proper fill heights would be met, in addition to any requirements/suggestions made by the DNR. Clara City is committed to working with the Minnesota DNR and FEMA to analyze the "flood-prone" areas and determine if they should be considered Flood Hazard Areas. If this were to occur, Clara City would pass the model Floodplain Ordinance as created by the DNR.

Outside of discouraging development in the "flood-prone" areas, Clara City created a Plan of Action that addresses flooding for their city. The purpose of the plan is to protect residences that are in danger of seasonal flooding in response to ice dams that form at bridges within the city. This plan includes early sandbagging and having equipment available to move/shift ice to reduce likelihood of flooding.

Below are three strategies that Clara City intends to complete as methods to continue compliance with National Flood Insurance Program.

*Strategies to Continue NFIP Compliance:*

1. Work with the MN DNR and FEMA to modernize floodplain maps.
2. Work with the MN DNR on development applications in identified Flood Prone Areas.
3. Discourage development in “flood-prone” areas.

*Montevideo*

The City of Montevideo utilizes digital FIRM maps dated August 29, 1975 to illustrate the location of 100 and 500-year floodplain boundaries within municipal limits. In order to prevent development in the 100-year floodplain, Montevideo passed a Floodplain Management Ordinance in September of 1989. The process that Montevideo uses to monitor potential development in the floodplain is through tracking building permits. The City educates all potential development applicants that development in the 100 and 500-year floodplains is very difficult to attain and many applicants do not move forward with the building permit application. If an applicant decides to continue the permit application, they would fill out a building permit application and included on the permit is an area for the Zoning Administrator to review and make comments. In this space, the Zoning Administrator would identify whether a property is located in the 100 or 500-year floodplain. If the site is in the designated floodplain, the application is sent to the DNR Area Hydrologist for review and comment. If the applicant continues and applies for a zoning variance/conditional use permit/special use permit, the Board of Zoning Adjustment would host a public hearing and make a recommendation to the City Council.

In addition to a strictly enforced Floodplain Ordinance, the City of Montevideo has recently become an active participant in the Community Rating System program facilitated by FEMA. From 2007-2009, Montevideo applied to become part of the program and in November 2009, Montevideo was accepted and ranked a Class 5 City. A Class 5 rating allows all property owners that reside in a Special Flood Hazard Area a 25% discount off their flood insurance policy. It also allows a 10% discount off flood insurance policies for those who live in a Non-Special Flood Hazard Area. As of May 1<sup>st</sup>, 2010; Montevideo residents are able to take advantage of the deduction. To maintain their status as a Class 5 Rank, Montevideo must track all flood and insurance-related questions and enforce the 50% improvement rule (properties in the flood zone cannot be improved 50% beyond their value).

Montevideo has extended numerous efforts to educate citizens regarding flood protection. The City created a pamphlet “Check Before You Buy” that discusses learning if a property is located in a floodplain, mandatory purchase requirements for flood insurance, and provides additional information on Flood Information Rate Maps, elevation certificates, historical flooding data, zoning maps, building permit requirements in flood zones, and a comprehensive list of realtors, lenders and insurance agents/contractors familiar with floodplain regulations. Further, Montevideo works with residents that live in floodplains by providing information on depth of flooding over a building’s first floor, past flood problems in the area, copies of elevation certificates on buildings built past 1997, flood-proofing, and will visit properties to review its flood

problems and explain ways to stop flooding or prevent flood damage. These services are offered free of charge.

Below are six strategies that the City of Montevideo intends to complete as methods to continue compliance with National Flood Insurance Program.

*Strategies to Continue NFIP Compliance:*

1. Work with the MN DNR and FEMA to modernize floodplain maps.
2. Work with the MN DNR to review and update the Floodplain Management Ordinance as required.
3. Work with the MN DNR on all development applications in identified Flood Hazard Areas.
4. Discourage zoning variances in Flood Hazard Areas.
5. Encourage all property owners in Flood Hazard Areas to purchase flood insurance.
6. Continue to comply with Community Rating System requirements.

### *Chippewa County*

Chippewa County utilizes digital FIRM maps dated August 1975, to illustrate the location of 100 and 500-year floodplain boundaries within the unincorporated areas of the county. To prevent future development in the 100-year floodplain, Chippewa County passed a Floodplain Management Ordinance (last amended in June 1997) that is actively updated as the MN DNR instructs. The permitting process in Chippewa County is quite extensive. A permit application is completed by an applicant and is reviewed by the Zoning Administrator. The Zoning Administrator reviews the digital FIRM maps to determine whether a property is in the floodway and what type of use the applicant proposes. If the permit is for a permitted use in the floodway, the permit goes to the Planning Commission and later the County Commission for approval. If the use is not permitted, the responsibility falls to the applicant to hire a surveyor and get elevation data of the property and submit the information to FEMA. The purpose would be to attain a document from FEMA to determine whether or not the property is in the floodplain. If this ruling is made, then the application is routinely processed. If the ruling is not made, then applicant may apply for a conditional use permit with additional standards determined in the Floodplain Management Ordinance; and must be approved by both the Planning Commission and County Commission.

In addition to a Floodplain Management Ordinance, as stated in Chippewa County's Water Plan, a zoning ordinance alone cannot adequately prepare the County for flood events. The Water Plan Committee created a specific goal to "minimize and reduce the flooding potential in the County" (Chippewa County Water Plan, 2003-2012). To accomplish this goal, the Water Plan Task Force identified three potential water storage areas and additional steps include constructing ten storage structures/basin and working with the MPCA to require water storage prior to approving or amending Storm Water National Pollution Discharge Elimination System Permits. Further, the County supports no-net-loss of wetlands, promotes voluntary restoration of drained wetlands, may accept and process eligible applications for wetland preservation on a countywide basis (wetland exempt from property tax), and will create a GIS layer of the SWCD Wetlands Inventory. Finally, the County intends to work with the Buffalo Lake Dam to continue

assisting with water retention (raising water levels when water is low and dropping during high water volumes).

Below are five strategies that Chippewa County has committed to in order to continue with NFIP compliance.

*Strategies to Continue NFIP Compliance:*

1. Work with the MN DNR and FEMA to modernize floodplain maps.
2. Work with the MN DNR to review and update the Floodplain Management Ordinance as required.
3. Work with the MN DNR on all development applications in identified Flood Hazard Areas.
4. Discourage zoning variances in Flood Hazard Areas.
5. Encourage all property owners in Flood Hazard Areas to purchase flood insurance.

## **Repetitive Loss Structures**

Repetitive loss structures are those structures which have sustained damages on two separate occasions of at least \$1,000 each have been paid under the National Flood Insurance Program (NFIP) within a ten-year time span for which the cost of repairs at the time of the flood meets or exceeds 25 percent of the market value of the structure before the damage occurred. Currently, within Chippewa County, there are four repetitive loss structures all located within Montevideo, Minnesota, all of which are residential. The address, ownership and location of all repetitive structures are identified by the Chippewa County Planning and Zoning Department and the Community Development Department of the City of Montevideo, although their specific location will not be identified in this plan.

The general land use trend within the repetitive loss property area is a combination of residential properties and parks/green space in Montevideo. Unique natural features found in the 100-year floodplain in Montevideo include the Chippewa River, granite rock outcroppings, parks, and natural prairie wetlands areas. Montevideo has a floodplain ordinance passed in 1989 that prohibits future development opportunities within the 100-year floodplain. The City educates all potential development applicants that development in the 100 and 500-year floodplains is very difficult to attain and many applicants do not move forward with the building permit application. Granite Falls has actively pursued flood acquisition funding from both FEMA and the MN DNR.

## *PRIORITIZING STRATEGIES*

Members of the Chippewa County Hazard Mitigation Task Force completed an online/print survey in order to indicate which strategies they felt were the most important in each hazard category. Using these survey results, the Emergency Manager and RDC staff created a preliminary “Prioritized Hazards List” for natural hazards. At the fourth Task Force Meeting in Montevideo on May 26<sup>th</sup>, 2015, the Local Task Force solidified their priorities by discussing the strategies that were included on the list, and those that were not. Strategies that were a high priority for the Local Task Force contained mitigation measures for violent storms and extreme temperatures, flooding, and wildfire. Based on the “Hazard Priority Levels” in chapter 4, violent storms and extreme temperatures (i.e. summer weather, winter weather, and tornados) were determined to be moderate hazards in Chippewa County. Flooding and wildfire was determined to be a low risk within the county. Any steps taken to minimize the impacts of these types of disasters could prevent a sizeable amount of damage and save lives.

The Local Task Force and the Chippewa County Emergency Manager used the following criteria to prioritize strategies according to need and feasibility. Although some hazards may be a high risk for the county, it did not guarantee a strategy addressing said hazard would also rank high or take priority.

- Current strategies – Could a current strategy be supplemented or enhanced?
- Costs – What is affordable at this time? Are there current funds addressing the hazard or strategy? Does it make sense to delay or does it only postpone higher costs and create other costs? Will it ever be affordable?
- Available resources – At this time, what funds are available? Will there be additional funds in the future? Are there other projects that take a higher priority?
- Length of project – Some projects could be addressed quickly and require minimal investment in time even though it may be fiscally costly.
- Compatibility with other plans – Is the project a high priority in other plans? Could the project be addressed collaboratively for efficiencies in resources? Would there be unnecessary duplication?
- Available information – Can a good decision be made with the current information? Is more research needed or does it make sense to wait for a current study or development for more information before making a decision?
- Impact – Some hazards can be impacted more by mitigation than others (i.e. using strategies to reduce flooding rather than strategies to reduce tornados).



**Table 5.6 CC Prioritized Strategies (Natural Hazards)**

<b>Ranked</b>	<b>Hazard</b>	<b>Strategy</b>	<b>Affected Participating Jurisdiction</b>
1	Severe Storms & Extreme Temperatures	Each city and the County Emergency Manager should continue to do periodic visits and review plan annually.	County EM, All Cities
1	Severe Storms & Extreme Temperatures	Identify funding to purchase portable generators and transfer switches to community emergency operation centers.	County, All Cities
1	Severe Storms & Extreme Temperatures	Assist with finding funding sources for and build safe shelters in all manufactured home parks, cities, city parks, county, and state parks and public golf courses. Identify a safe room for the campgrounds in cities and the greater county.	County EM, All Cities
2	Flooding	Work with state agencies, local government and emergency managers to address flooding issues as a region. Create a network of print, radio, social media that reaches all citizens with maps of risk areas, shelters, contact information and what to do in the event of a flood.	County EM, All Cities
2	Flooding	Prioritize bridges and culverts with annual flood concerns. Determine strategies to mitigate repeatedly flooded infrastructure (Ex. Replacing bridges, with clear-span bridges, replacing culverts).	County Engineer, County EM, All Cities
2	Flooding	Identify and prioritize repeat flood-impacted township roads to be improved.	County Engineer, County EM, Townships
2	Flooding	Identify structures prone to flood hazards for future buyouts.	County EM
3	Wildfire	Identify the location of all dry hydrants on a map.	County EM
3	Wildfire	Work with all units of government, fire departments, and schools to provide educational fire safety materials to the public.	County EM, All Cities, All Fire Departments, Schools

## CHAPTER 6: GOALS, OBJECTIVES, AND STRATEGIES FOR MANMADE/TECHNOLOGICAL HAZARDS

### *OVERVIEW*

The following table outlines the goals, objectives and mitigation strategies for man-made technological hazards important to Chippewa County. The goals are used as a framework for the objectives and mitigation strategies, which in turn, provide specific information on how mitigation decisions should be made. The goals, objectives, and strategies are based on the issues identified by the task force and the risk assessment in this plan.

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### *DEFINITIONS*

**Goals** are general statements. **Objectives** are action statements and start with an action verb. **Strategies** support the action of the objective.

The **Time Frame** was determined by the task force and the County Emergency Manager as an estimated timeline in which to complete the strategy.

The **Time Frame – Recurring** is a strategy type that does not have a specific length of time. Once the strategy has been completed, the responsible entity will re-start the strategy.

**Responsible Entity** is the entity in charge of initiating and completing the strategy identified. This was determined by the task force and County Emergency Manager as the most likely entity to complete the strategy.

The **Estimated Cost** was an educated guess of the cost of each strategy. Some strategies would not cost extra and were denoted "--". Some costs were not known and denoted as "unknown".

The **Funding Partner** is a potential partner for the county/city to obtain funding from in order to complete a strategy.

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### *GENERAL MITIGATION VISION*

"The county will strive to work with surrounding communities and local emergency responders to create and implement a proactive and results-oriented all-hazard mitigation plan that will make the county and region a safer and more sustainable place to live by protecting and enhancing the resources of the county as they relate to hazards that may have an impact in the future."

## ***DEVELOPMENT OF STRATEGIES***

To determine strategies for each hazard identified in the risk assessment (Chapter 4) small group problem-solving techniques were used. Once the hazards most likely to affect Chippewa County were identified and prioritized, the task force assembled to review these hazards and their rankings and identify strategies to address mitigation for each hazard. Past hazard activities in the county influenced strategy development and strategy ranking (i.e. 1997 and 2001 flooding). In many cases, as the hazards were identified for the inventory, strategies were also discussed, providing a good starting point for the discussion.

The following outlines the plan's strategy development process. 1) Working toward group consensus, each hazard was reviewed individually. 2) Participants offered suggestions and input which stimulated a lively discussion as part of the planning process. All suggestions were considered and recorded by the facilitator. 3) A limited amount of time was set on each hazard by the facilitator to move the group forward. 4) Debate followed before the group was asked to decide if it should be part of the plan – group consensus was needed. 5) The group noted they could not be totally inclusive – some strategies may not even be considered and others may not be feasible.

### **General Criteria**

- |                          |                                    |
|--------------------------|------------------------------------|
| 1. History               | 5. Effectiveness                   |
| 2. Successful Strategies | 6. Building on what already exists |
| 3. Need                  | 7. Legal Authority                 |
| 4. Risks                 | 8. Environmental Impact            |

### **Cost/Benefit Criteria**

- |                        |   |
|------------------------|---|
| 1. Costs/Efficiencies  | 4. Overall Impact                                 |
| 2. Economic Impact     | 5. Resources Needed (Social & Fiscal)             |
| 3. Budget Requirements | 6. Benefits Provided by Project (Social & Fiscal) |

Identifying costs that would be attached to each strategy was the most difficult part of the process. Due to limited time and resources to develop the plan it wasn't feasible to spend a lot of time on estimating the costs. It is critical for the Board to constantly be evaluating the costs as part of implementation and maintenance for the All-Hazard Mitigation Plan. Strategies that dealt with rural areas seemed harder to include in the plan – more costly, harder to regulate, and would need population buy-in. Many strategies are costly, labor intensive, time consuming and it is difficult to identify the lead for the strategy. It was determined that the Emergency Manager will perform a cost-benefit review for all potential future project applications. Participants in the planning process agreed that to implement an ordinance or regulation was not the difficult part of certain strategies – would it be possible and feasible to follow-through? Participants started with strategies that were manageable to see notable progress – “baby steps”. It was reasonable to include strategies that have been started, but not yet completed.

## COMPLETED STRATEGIES

**Table 6.1 CC & Cities Completed Strategies in Past 10 Years for Manmade/Technological Hazards**

<b>Hazard</b>	<b>Strategy</b>	<b>Responsible Entity</b>
Water Supply Contamination	Encourage cities to adopt wellhead protection plans.	County, Clara City, Maynard, Milan, Montevideo, Watson
Water Supply Contamination	Keep implementation of wellhead protection a top priority in county.	County
Water Supply Contamination	Purchased a battery-operated lock on Water Treatment Facility.	Milan
Wastewater Treatment System Failure	Rip-rapped sanitary sewer ponds to reduce flooding opportunities and maintain system.	Milan
Wastewater Treatment System Failure	Install alarms on city Wastewater Treatment plants.	Clara City, Maynard, Milan, Montevideo, Watson
Civil Disturbance/Terrorism	Continue to monitor activities that would need restriction. (ie. Parking and vehicle access to City Hall and County Courthouse Parking Facilities.)	County, Clara City, Maynard, Milan, Montevideo, Watson
Civil Disturbance/Terrorism	Install alarms on city water plants.	Milan, Watson
All Hazards	Citizen education regarding natural and manmade hazards and how to handle such events; including Emergency Preparedness Guides, outreach, mailings, press releases, Nixle Program (email/text message alerts for pending threats)	Milan, Montevideo

*MANMADE / TECHNOLOGICAL STRATEGIES: NO LONGER RELEVANT*

**Table 6.2 CC & Cities: Manmade / Technological Strategies – No Longer Relevant**

<b>Hazard</b>	<b>Strategies</b>	<b>Responsible Entity</b>
Fire	Find ways to provide carbon monoxide detectors to residents.	Clara City, Maynard, Milan, Montevideo, Watson FDs
<b>Reasoning:</b> The State of Minnesota mandates placement of carbon monoxide detectors in residents.		
Fire	Continue Fire Education Programs.	Clara City, Maynard, Milan, Montevideo, Watson FDs
<b>Reasoning:</b> Redundant strategy.		
Hazardous Materials	Adopt an ordinance for landlords to clean up meth labs before renting to any other family.	County, Clara City, Maynard, Milan, Montevideo, Watson
<b>Reasoning:</b> Issue has been addressed.		
Wastewater Treatment System Failure	Rebuild levee to protect Montevideo wastewater treatment plant.	Montevideo
<b>Reasoning:</b> Removed for duplication of strategies.		
Wastewater Treatment System Failure	Monitor activities around each city sanitary sewer system.	Clara City, Maynard, Milan, Montevideo, Watson
<b>Reasoning:</b> Removed for duplication of strategies.		
Civil Disturbance / Terrorism	Install alarms on Lac qui Parle Dam control facilities.	Army Corps of Engineers
<b>Reasoning:</b> Project not within Chippewa County jurisdiction.		
Civil Disturbance / Terrorism	Continue to review standoff vehicle distances.	Montevideo, County Law Enforcement
<b>Reasoning:</b> Issue has been addressed.		

*GOALS, OBJECTIVES, AND STRATEGIES*  
**Infectious Disease**

<b>Goal 1: Reduce the threat of infectious diseases through education and awareness.</b>					
<b>OBJECTIVES</b>	<b>STRATEGIES</b>	<b>Time Frame</b>	<b>Responsible Entity</b>	<b>Estimated Cost</b>	<b>Funding Partner</b>
1. Support and maintain programs that keep the county healthy and safe from infectious diseases.	A. Continue to support Countryside Public Health programs.	Recurring	Countryside Public Health & County	--	--
	B. Work to make sure mass transportation and mobile community can address infectious disease outbreak.	Recurring	Countryside Public Health	--	--
	C. Work with State of Minnesota on Quarantine/Isolation plan.	Recurring	Countryside Public Health	--	--
2. Educate the public.	A. Get uniform, accurate and up-to-date information out to the public through the risk communication service.	Recurring	Countryside Public Health	--	--
	B. Continue cooperation with Emergency Manager, Countryside Public Health and hospitals and clinic staff.	Recurring	Countryside Public Health, County Emergency Manager, Hospital and Clinic Staff	--	--
3. Ensure all community members receive updated public health and emergency information. <b>*New Objective</b>	A. Partner with ECHO Minnesota to provide public health and emergency information in the languages of all immigrants and refugees. <b>*New Strategy</b>	Recurring	Countryside Public Health, County Emergency Manager, Hospital and Clinic Staff		

<b>Goal 2: Improve the effectiveness and quality of the various efforts addressing infectious diseases that have the potential to impact the county.</b>					
<b>OBJECTIVES</b>	<b>STRATEGIES</b>	<b>Time Frame</b>	<b>Responsible Entity</b>	<b>Estimated Cost</b>	<b>Funding Partner</b>
1. Maintain and update material, plans, and agreements for addressing infectious diseases.	A. Continue cooperation between Countryside Public Health and County Emergency Manager.	Recurring	Countryside Public Health, County Emergency Manager, Hospital and Clinic Staff	--	--

## Fire

Goal 1: Protect structures from fire.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Provide residents with adequate knowledge of fire safety.	A. Continue fire education programs.	Recurring	All Fire Departments, Schools	--	FEMA
2. Ensure fire departments have adequate staff, communication equipment, and firefighting equipment to save lives and protect property.	A. Complete an annual inventory assessment of equipment, personnel, and training needs.	Recurring	All Fire Departments	--	FEMA
3. Provide adequate and timely fire protection for all cities in Chippewa County. <b>*New Objective</b>	A. Build a satellite fire station for the Montevideo Fire Department located in the City of Watson. <b>*New Strategy</b>	3-10 years	Montevideo Fire Department, City of Watson		USDA

Goal 2: Provide safety to residents					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Educate the public about fire safety.	A. Provide public education to residents, focusing on carbon monoxide poisoning, evacuation and smoke alarms.	Recurring	All City Fire Departments	--	--

## Hazardous Materials

<b>Goal 1: Provide useful and factual information about hazardous materials located in the county.</b>					
<b>OBJECTIVES</b>	<b>STRATEGIES</b>	<b>Time Frame</b>	<b>Responsible Entity</b>	<b>Estimated Cost</b>	<b>Funding Partner</b>
1. Support policies and programs that assist in creating factual and timely information about hazardous material in the county.	A. Continue current programs and periodically evaluate their effectiveness.	Recurring	Emergency Manager, All City Fire Departments	--	FEMA
2. Make sure emergency personnel have hazardous material location information.	A. Continue to use 911 systems which distribute information to emergency personnel.	Recurring	All City Fire Departments	--	--
3. Educate the public about hazardous materials.	A. Provide public education to residents on hazardous materials and proper disposal.	Recurring	County Zoning	--	--
4. Periodically inventory and map hazardous material sites in the county.	A. Provide educational material to businesses that use hazardous material.	Recurring	Emergency Manager	--	--

<b>Goal 2: Continue the effective efforts addressing hazardous material that may impact the county.</b>					
<b>OBJECTIVES</b>	<b>STRATEGIES</b>	<b>Time Frame</b>	<b>Responsible Entity</b>	<b>Estimated Cost</b>	<b>Funding Partner</b>
1. Maintain and update information, plans, and agreements for addressing hazardous material.	A. Review and update the Chippewa County Emergency Operations Plan that outlines procedures for dealing with hazardous material on an annual basis.	Recurring	County Emergency Manager	--	HSEM
	B. Continue to expand the use of mutual aid agreements and memoranda of understandings to improve coordination between state, local and federal agencies and appropriate private sectors.	Recurring	County Emergency Manager	--	--



## Hazardous Materials

Goal 3: Improve overall preparedness and equipment for handling hazardous events.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Adopt new technology and obtain training to improve the county's ability to respond to a disaster. <b>*New Objective</b>	A. Need proper personal protection equipment to respond to hazardous materials disasters for Fire Departments, Law Enforcement, and Ambulance/EMT Departments as applicable to each city.	2 years	County and all Cities	\$5,000	FEMA
	B. Continue to participate in regional exercises that test local plans and interaction between local agencies.	Recurring	County and all Cities	\$4,000/year	--
	C. Continued training in the use of the Nation Incident Management System for all hazard materials incidents that may occur in the county.	Recurring	County	\$3,500	Fire Grant/ Dept. of Justice
	D. Ensure that all Emergency Responders participate in Rail Car Incident Response Training. <b>*New Strategy</b>	Recurring	County Emergency Manager, All City Fire Departments	--	Railroad officials, FEMA
	E. Encourage that emergency responder groups, fire department, and emergency managers are trained to at least the Hazardous Materials Awareness level.	Recurring	County	\$4,000	HSEM/ Dept. of Justice
	F. Ensure that the first responder groups conduct the required terrorism and hazardous materials training and maintains current records on all completed training.	Recurring	County	\$10,000	HSEM/ Dept. of Justice
	G. Create Standard Operating Procedures for how to handle hazardous events. <b>*New Strategy</b>	1 year	County	--	--
	H. Purchase sensor to detect anhydrous ammonia leaks.	3 years	Elevators	\$500	--

## Hazardous Materials

Goal 4: Address inconsistencies and county shortcomings in dealing with a hazardous materials event.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Implement procedures or programs that address gaps or deficiencies in dealing with hazardous materials.	A. Work to get farmers and fertilizer plants to secure ammonia tanks.	Recurring	County Emergency Manager, County Zoning, Law Enforcement	Unknown	--
2. Work with county and cities to address cleanup of illegal drug labs.	A. Educate the public on the dangers of drug labs.	Recurring	County Emergency Manager	--	--

## Water Supply Contamination

### Goal 1: Protect the quality of the county's ground water resources.

OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Reduce contamination from feedlots.	A. Continue to monitor and regulate locations of feedlots.	Recurring	County Zoning Administrator	--	--
2. Reduce contamination into private wells.	A. Provide educational materials on testing private wells.	Recurring	County Zoning, Countryside Public Health	--	--
3. Minimize contamination of ground water from unused or abandoned wells.	A. Continue the abandoned well sealing program within the county.	Recurring	County Zoning, County SWCD	--	--

### Goal 2: Protect residents from contaminated ground water.

OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Provide adequate drinking water in the event of ground water contamination.	A. Identify alternate drinking water sources during an emergency in the Emergency Operations Plan.	Recurring	County Emergency Manager	--	--

### Goal 3: Focus on efforts in areas more prone to ground water contamination.

OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Implement the wellhead protection program for the county.	A. Keep implementation of wellhead protection a top priority in the county.	Recurring	County Zoning	--	--

Wastewater Treatment Facility Failure

Goal 1: Protect the quality of the county's ground water resources.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Ensure that all public facilities are working properly.	A. Continue updating sanitary sewer systems and securing funding to make these updates.	Recurring	All Cities	Unknown	USDA, MPCA

## Civil Disturbance / Terrorism

<b>Goal 1: Protect critical infrastructure.</b>					
<b>OBJECTIVES</b>	<b>STRATEGIES</b>	<b>Time Frame</b>	<b>Responsible Entity</b>	<b>Estimated Cost</b>	<b>Funding Partner</b>
1. Install security measures at city water treatment plants.	A. Install alarms on buildings.	3-4 years	Clara City, Maynard, Montevideo	\$300-500 each	--

<b>Goal 2: Reduce risk to critical government facilities.</b>					
<b>OBJECTIVES</b>	<b>STRATEGIES</b>	<b>Time Frame</b>	<b>Responsible Entity</b>	<b>Estimated Cost</b>	<b>Funding Partner</b>
1. Increase the level of security using landscape design, vehicle barriers and separation of public and private functions.	A. Continue to review landscape design to improve security of current structures and develop appropriate design for new structures.	Recurring	All Cities	--	

<b>Goal 3: Increase security at major public gathering places.</b>					
<b>OBJECTIVES</b>	<b>STRATEGIES</b>	<b>Time Frame</b>	<b>Responsible Entity</b>	<b>Estimated Cost</b>	<b>Funding Partner</b>
1. Increase level of security with landscape design and lighting.	A. Continue review of facilities and make changes as needed.	Recurring	Montevideo, County Law Enforcement	--	--
2. Separate parking facilities from arenas.	A. Continue review of parking for events.	Recurring	Montevideo, County Law Enforcement	--	--

## Civil Disturbance / Terrorism

Goal 4: Decrease vulnerability of regional and state resources in the county.					
OBJECTIVES	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner
1. Work with state and federal agencies engaged in the statewide domestic preparedness strategy to identify further options for the county.	A. Schedule discussions with school leaders, hospital administrators, emergency managers, law enforcement and local units of government to address performance in response to terrorism, focusing on schools and hospitals.	Recurring	County Emergency Manager, County Law Enforcement	\$5,000	--

## *PRIORITIZING STRATEGIES*

Members of the Chippewa County Hazard Mitigation Task Force completed an online/print survey in order to indicate which strategies they felt were the most important in each hazard category. Using these survey results, the Emergency Manager and RDC staff created a preliminary “Prioritized Hazards List” for manmade/technological hazards. At the fourth Task Force Meeting in Montevideo on May 26<sup>th</sup>, 2015, the Local Task Force solidified their priorities by discussing the strategies that were included on the list, and those that were not. Strategies that were a high priority for the Local Task Force contained mitigation measures for hazardous materials, civil disturbance/terrorism, and structure fire. These three hazards were determined to be moderate hazards in Chippewa County, indicating greater risk than some of the other hazards. Additionally, any steps taken to minimize the risks of these types of disasters could have a sizeable impact. Although Chippewa County does not have control over what types/amounts of hazardous materials are traveling through the county, they can complete strategies that would minimize risk to communities and citizens in the event of a spill.

The Local Task Force and the Chippewa County Emergency Manager used the following criteria to prioritize strategies according to need and feasibility. Although some hazards may be a high risk for the county, it did not guarantee a strategy addressing said hazard would also rank high or take priority.

- Current strategies – Could a current strategy be supplemented or enhanced?
- Costs – What is affordable at this time? Are there current funds addressing the hazard or strategy? Does it make sense to delay or does it only postpone higher costs and create other costs? Will it ever be affordable?
- Available resources – At this time, what funds are available? Will there be additional funds in the future? Are there other projects that take a higher priority?
- Length of project – Some projects could be addressed quickly and require minimal investment in time even though it may be fiscally costly.
- Compatibility with other plans – Is the project a high priority in other plans? Could the project be addressed collaboratively for efficiencies in resources? Would there be unnecessary duplication?
- Available information – Can a good decision be made with the current information? Is more research needed or does it make sense to wait for a current study or development for more information before making a decision?
- Impact – Some hazards can be impacted more by mitigation than others (i.e. using strategies to reduce flooding rather than strategies to reduce tornadoes).

**Table 6.3 CC Prioritized Strategies (Manmade/Technological Hazards)**

<b>Ranked</b>	<b>Hazard</b>	<b>Strategy</b>	<b>Affected Participating Jurisdiction</b>
1	Hazardous Materials	Ensure that all Emergency Responders participate in Rail Car Incident Response Training.	All City Fire Departments, County
1	Hazardous Materials	Continue to participate in regional exercise that test local plans and interaction between local agencies.	County EM, All Cities, All Fire Departments
2	Civil Disturbance/ Terrorism	Schedule discussions with school leaders, hospital administrators, emergency managers, law enforcement and local units of government to address performance in response to terrorism, focusing on schools and hospitals.	County EM
3	Structure Fire	Provide public education to residents, focusing on carbon monoxide poisoning, evacuation, and smoke alarms.	County EM, All Cities, All Fire Departments
3	Structure Fire	Complete an annual inventory assessment of fire equipment, personnel, and training needs.	County EM, All fire departments



## CHAPTER 7: PLAN IMPLEMENTATION & MAINTENANCE

### Implementation & Maintenance

The Chippewa County All-Hazard Mitigation Plan is intended to serve as a guide for dealing with the impact of both current and future hazards for all county people and institutions. It is not a static document but must be modified to reflect changing conditions if it is to be an effective plan. The goals, objectives, and mitigation strategies will serve as the action plan. Even though individual strategies have a responsible party assigned to it to ensure implementation; overall responsibility, oversight and general monitoring of the action plan has been assigned to the Chippewa County Emergency Manager. It will be their responsibility to gather a Local Task Force to update the All-Hazard Mitigation Plan on a routine basis. Every two years, the County Emergency Manager will call a meeting to review the plan, mitigation strategies and the estimated costs attached to each strategy. All participating parties of the original Local Task Force and cities will be invited to this meeting. Responsible parties will report on the status of their projects. Committee responsibility will be to evaluate the plan to determine whether:

- Goals and objectives are relevant.
- Risks have changed.
- Resources are adequate or appropriate.
- The plan as written has implementation problems or issues.
- Strategies have happened as expected.
- Partners participating in the plan need to change (new and old).
- Strategies are effective.
- Any changes have taken place that may affect priorities.
- Any strategies should be changed.

In addition to the information generated at the Local Task Force meetings, the County Emergency Manager will also annually evaluate the All-Hazard Mitigation Plan and update the plan in the event of a hazardous occurrence. Two-year updates are due on the anniversary of the plan approval date.

After the second update meeting (four years will have passed), the Chippewa County Emergency Manager will finalize a new Local Task Force to begin the required five-year update process. This will be accomplished in coordination with cities and the entire All-Hazard Mitigation Plan shall be updated and submitted to FEMA for approval (within 5 years of plan adoption). These revisions will include public participation by requiring a public hearing and published notice, in addition to multiple Local Task Force meetings to make detailed updates to the plan.

Public participation for updates is as critical as in the initial plan. Public participation methods that were used in the initial writing will be duplicated for future update processes – direct mailing list of interested parties, public meetings, press releases, questionnaires, and resolutions of participation and involvement. Additional methods of getting public input and involvement are encouraged such as placing copies of the plan in the Chippewa County Emergency Manager's

Office and city offices, in addition to placing the plan on the Chippewa County and UMRDC websites. Further, cities will be encouraged to place a notice on their websites stating the plan is available for review at the city offices. Notifications of these methods could be placed in chamber newsletters, the UMRDC newsletter and newspapers. Committee responsibilities will be the same as with updates.

Chapters 5 and 6 focus on mitigation strategies for natural hazards and man-made/technological hazards. Appendix 2 focuses on city-specific mitigation strategies for both natural and manmade/technological hazards. The All-Hazard Mitigation Plan proposes a number of strategies, some of which will require outside funding in order to implement. If outside funding is not available, the strategy will be set aside until sources of funding can be identified. In these situations, Chippewa County and its cities will consider other funding options such as the county's/cities' general funds, bonding and other sources. Based on the availability of funds and the risk assessment of that hazard, the county will determine which strategies should be continued and which should be set aside. Consequently, the action plan and the risk assessment serves as a guide to spending priorities but will be adjusted annually to reflect current needs and financial resources.

This last step requires an evaluation of the strategies identified in the goals and policies framework, selecting preferred strategies based on the risk assessment, prioritizing the strategy list, identifying the entity responsible for carrying out the strategy, and the timeframe and costs of strategy completion. Chippewa County and cities have incorporated the preferred strategies including identification of the responsible party to implement, the timeframe and the cost of the activity with the goals and policies framework.

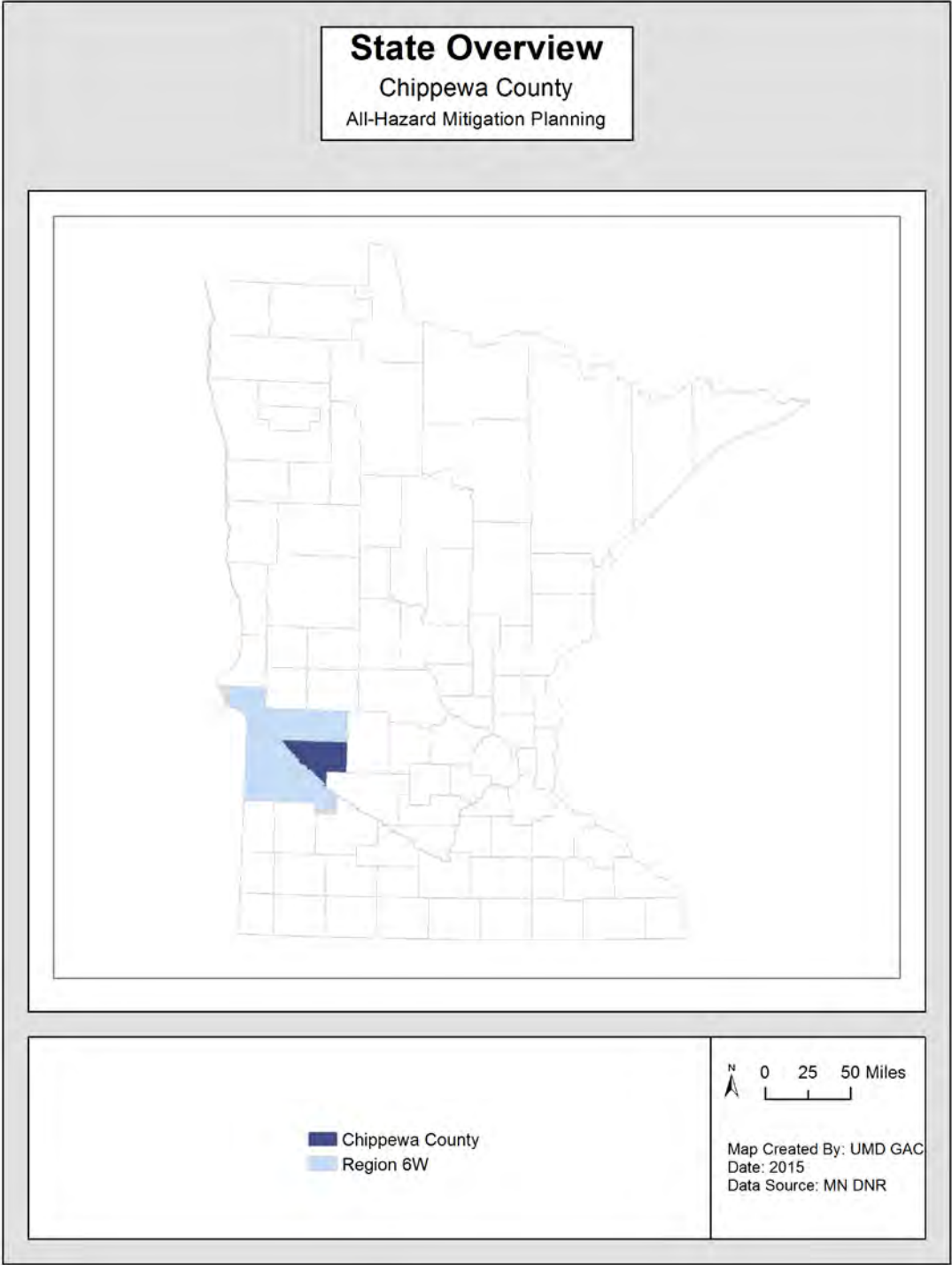
This plan will be integrated into other Chippewa County plans such as the County Comprehensive Plan, County Water Plan, County Transportation Plan, and the Emergency Operations Plan. Chapter 1 will serve as an executive summary to the All-Hazard Mitigation to be attached to those plans as necessary. The County Board and Emergency Manager will encourage cities to implement their city-specific mitigation strategies in their comprehensive plans, land use regulations, zoning ordinances, capital improvement plans and/or building codes by including mitigation strategies in their plans as listed in Table 7.1 on the following page. Further, as each land use mechanism is updated, mitigation strategies will be evaluated to determine whether they can implement or include them at that time. This evaluation will consist of basic cost-benefit analyses, much like what was used to create the mitigation strategies.

**Table 7.1 CC & Cities - Local Planning Mechanisms**

<b>Planning Mechanisms</b>	<b>Jurisdictions</b>
Comprehensive Plan	Chippewa County, Montevideo, Clara City, Milan
Emergency Operations Plan	Chippewa County
Local Water Management Plan	Chippewa County
Watershed Plan	Chippewa County
Land Use Plan	Chippewa County
Zoning Ordinance	Chippewa County, Montevideo
Building Code	Chippewa County, Montevideo
Floodplain Ordinance	Chippewa County,
Shoreland Ordinance	Chippewa County

Many of these plans or policies can help implement the goals, objectives, and strategies in Chippewa County's All-Hazard Mitigation Plan. The Chippewa County Emergency Manager is responsible for meeting with each city within the County two times throughout the next five years. During these meetings, the Emergency Manager will review all Local Planning Mechanisms and collaborate with the cities to ensure the All-Hazard Mitigation Plan is becoming as integrated into local plans as possible. As adopted versions of Chippewa County's All-Hazard Mitigation Plan will be available at all city offices, during these meetings the Emergency Manager will solicit and collect any public comments relevant to the plan and make a record for the upcoming update process to be discussed at a Local Task Force meeting. These Local Planning Mechanisms are meant to work cooperatively together in order to ensure the health, safety, and welfare of Chippewa County and its cities.

Figure A1.1 State Overview



**Figure A1.2 Chippewa County Civil Divisions**

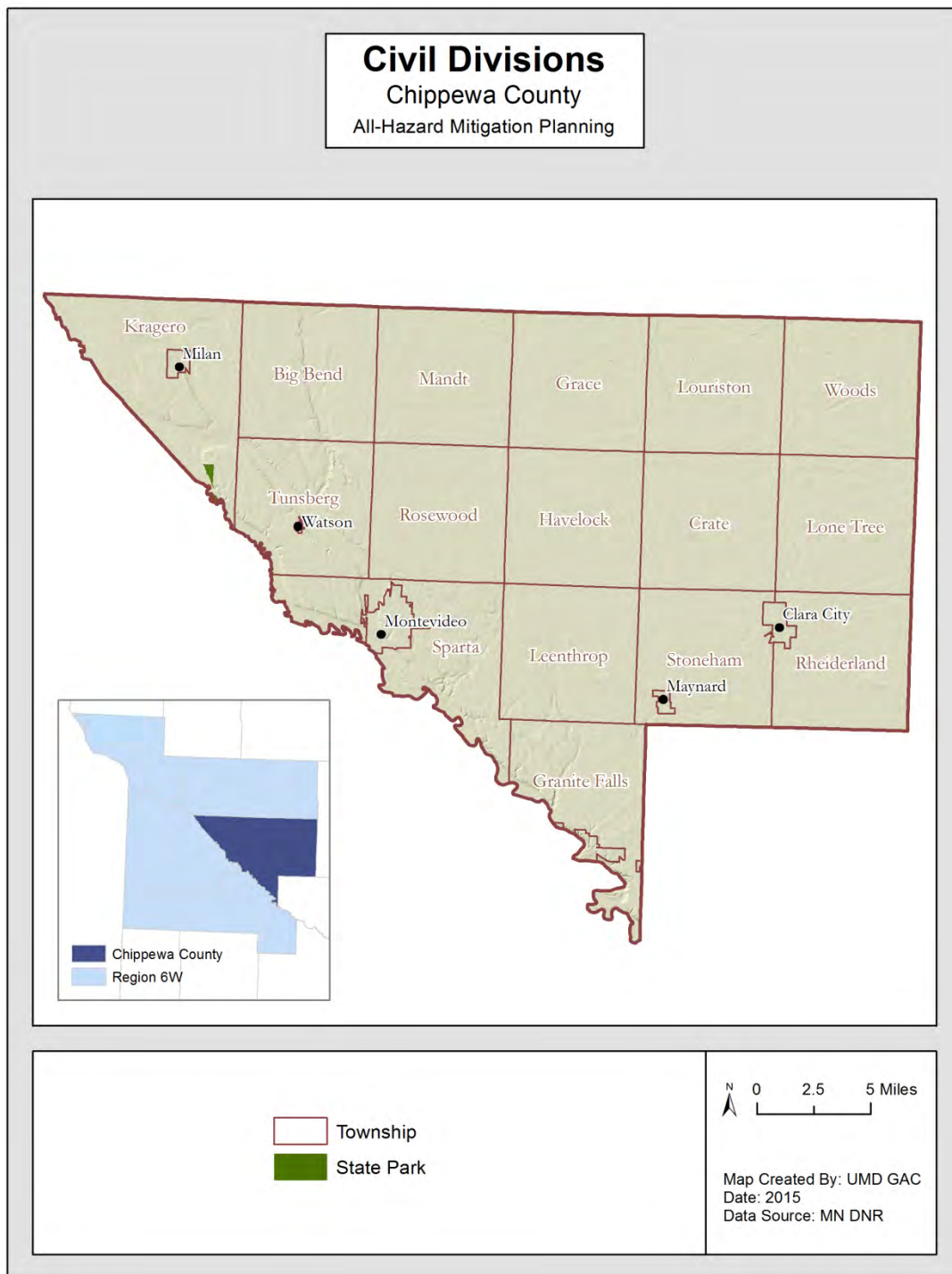


Figure A1.3 Chippewa County Land Cover

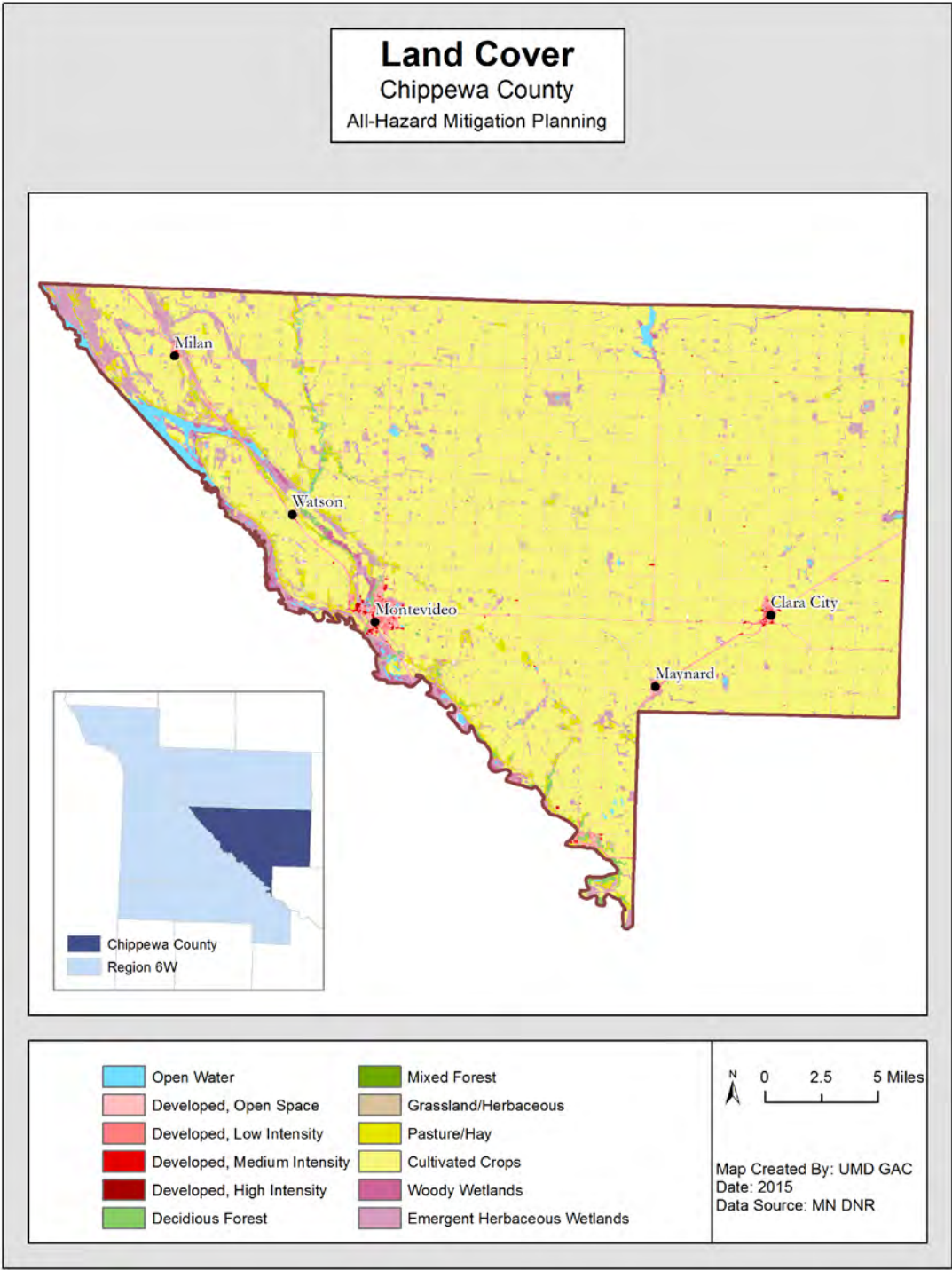


Figure A1.4 Chippewa County Hydrology & Drainage

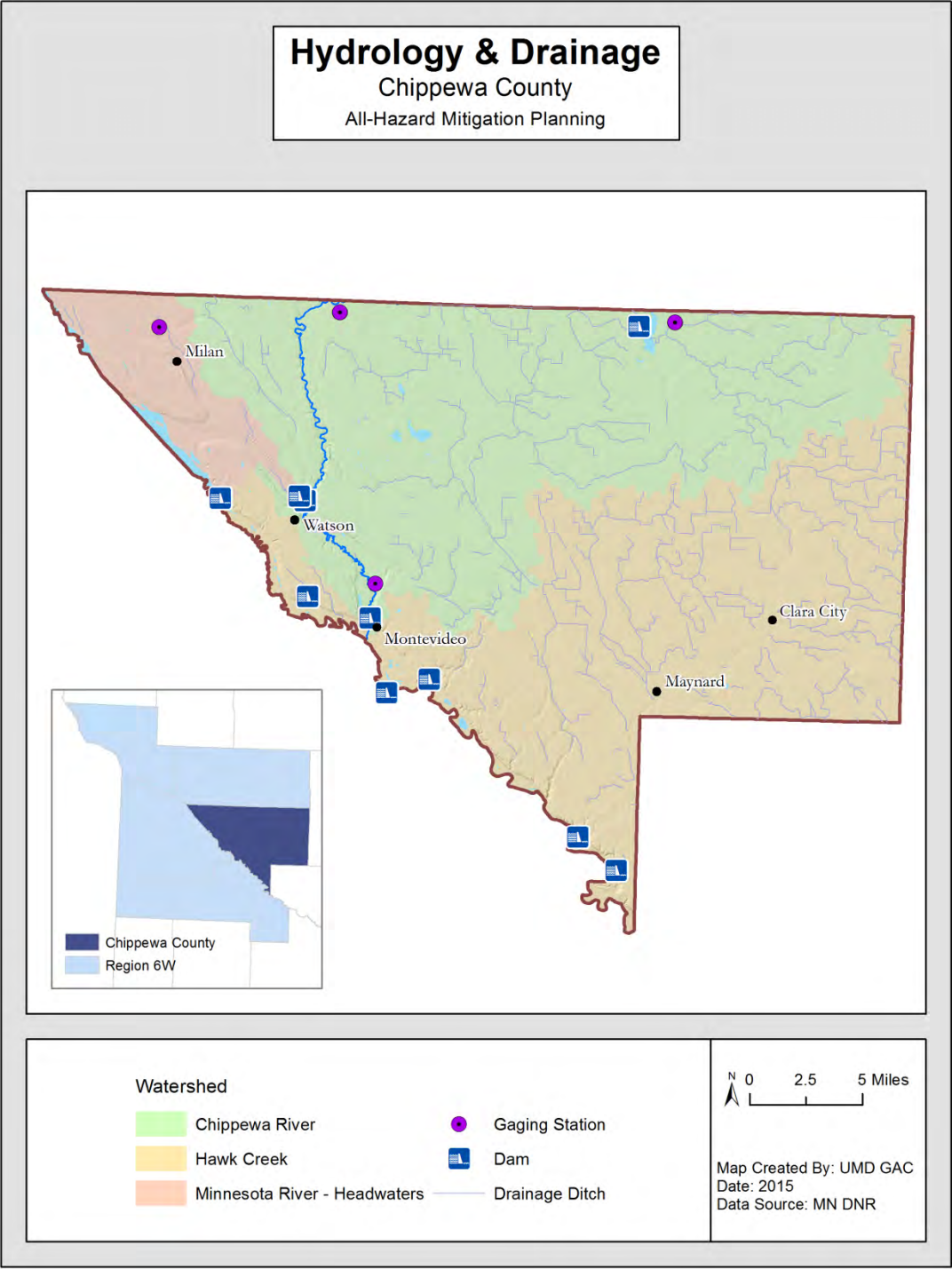




Figure A1.5 Chippewa County Natural Features

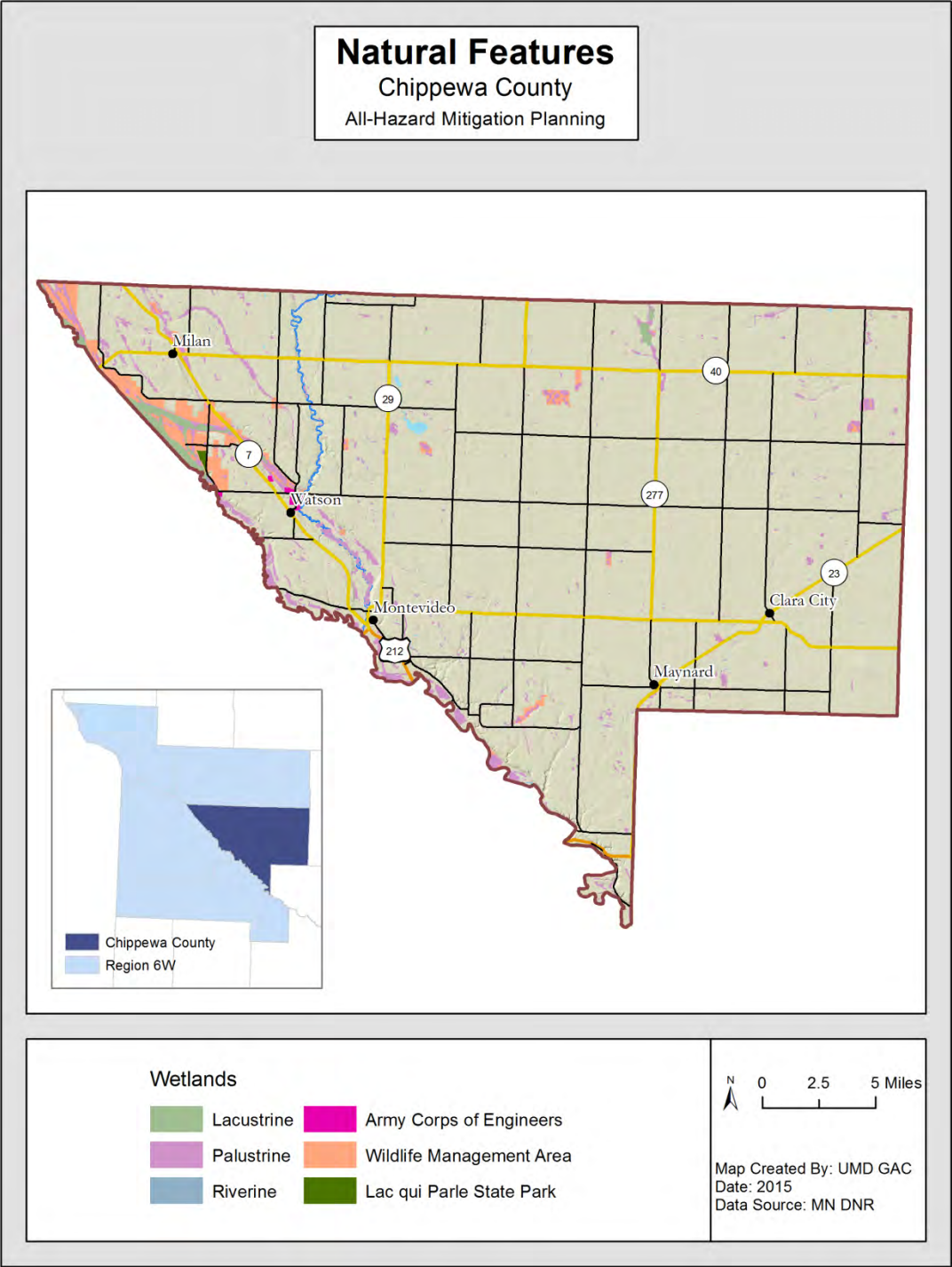




Figure A1.6 Chippewa County Land Cover

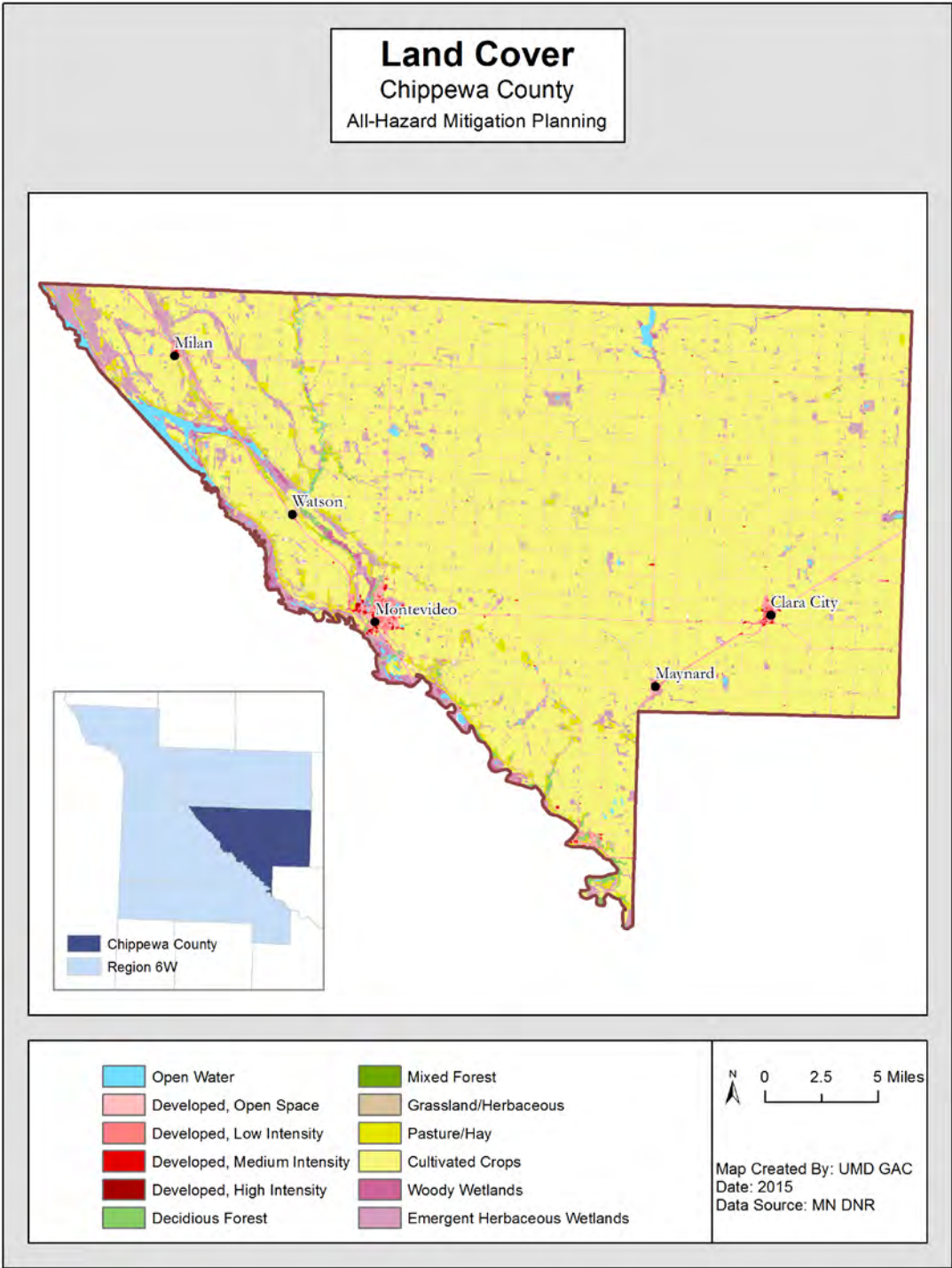


Figure A1.7 Chippewa County Population by Census Block

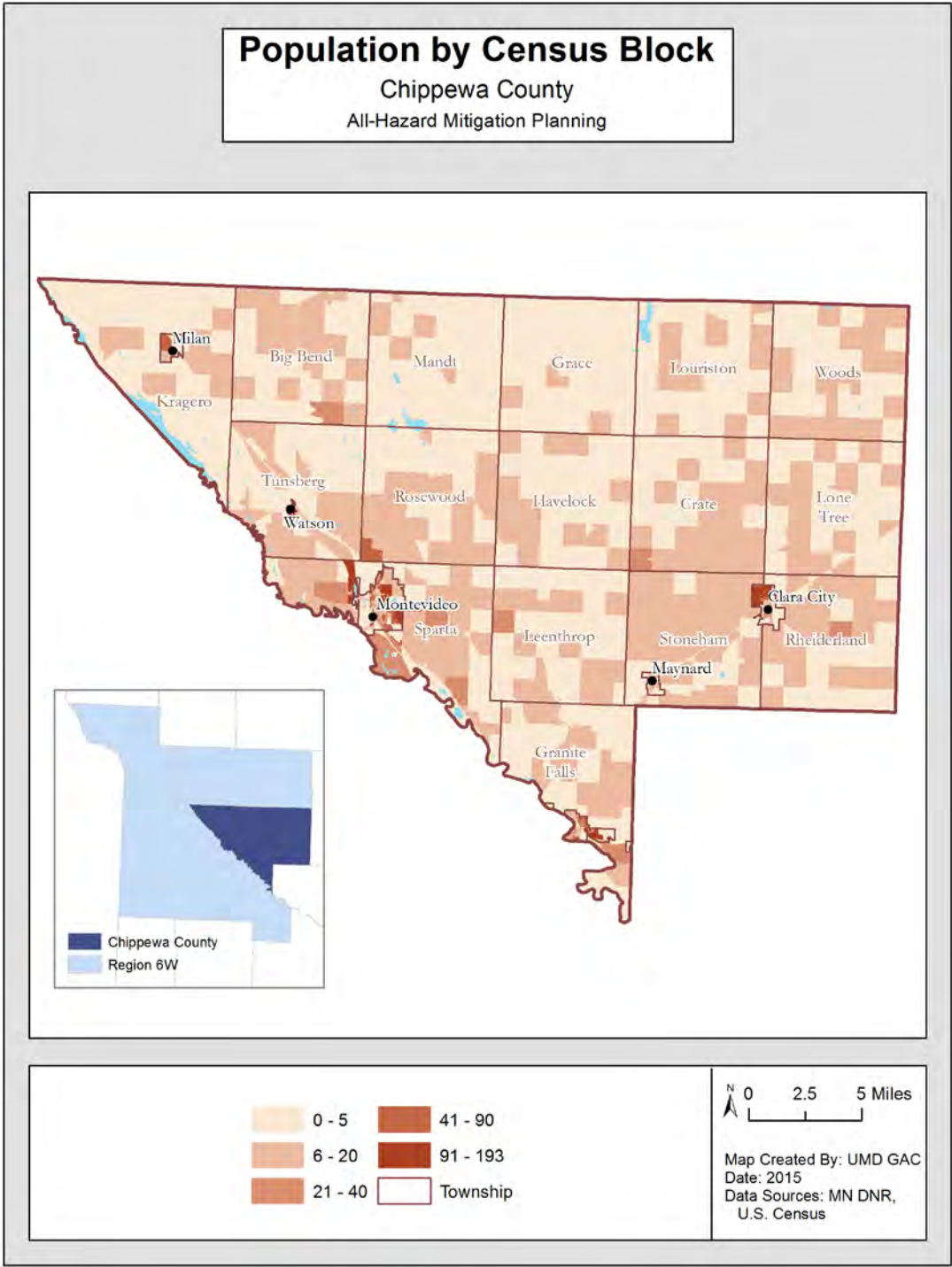


Figure A1.8 Chippewa County Transportation Infrastructure

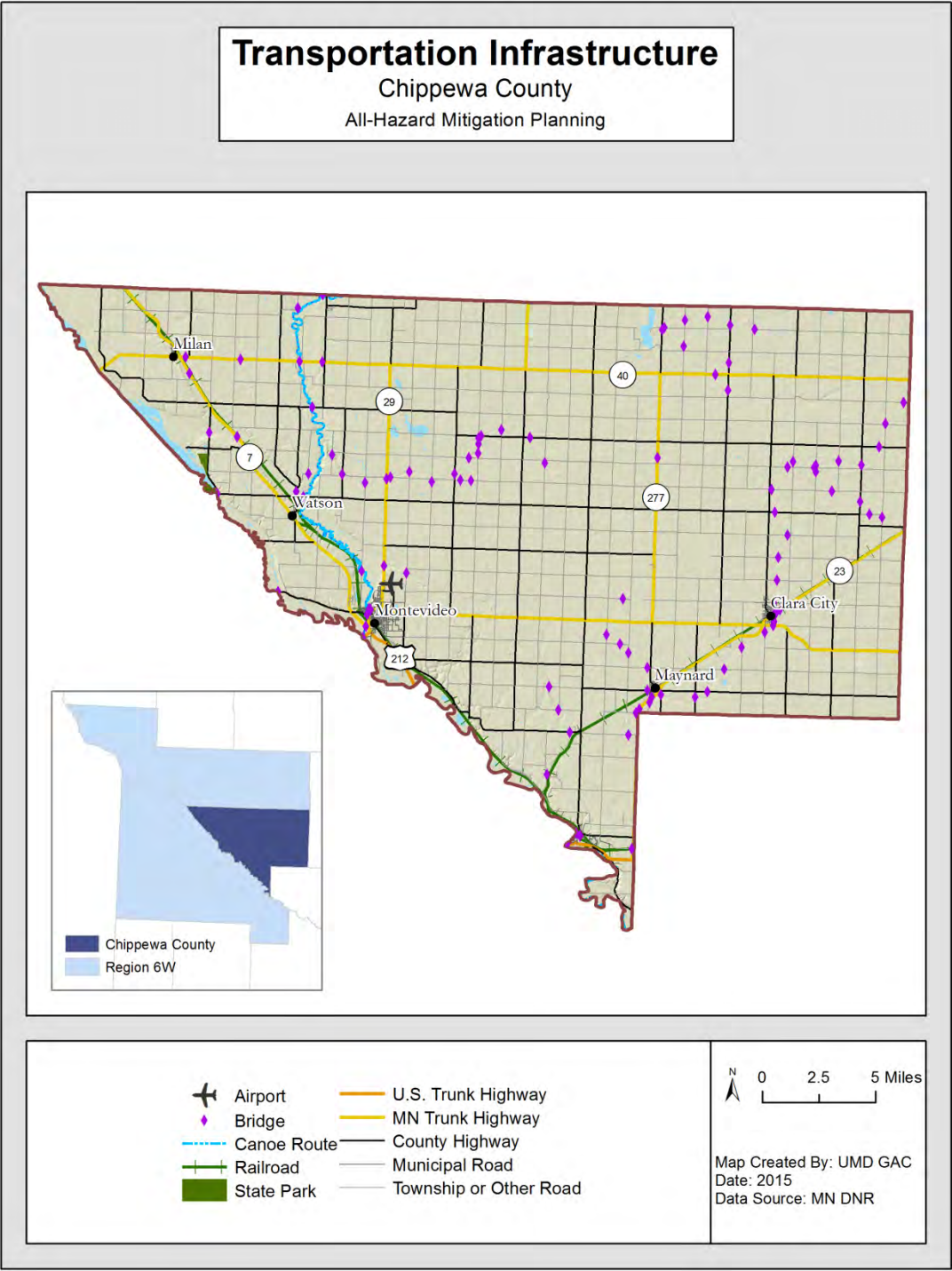
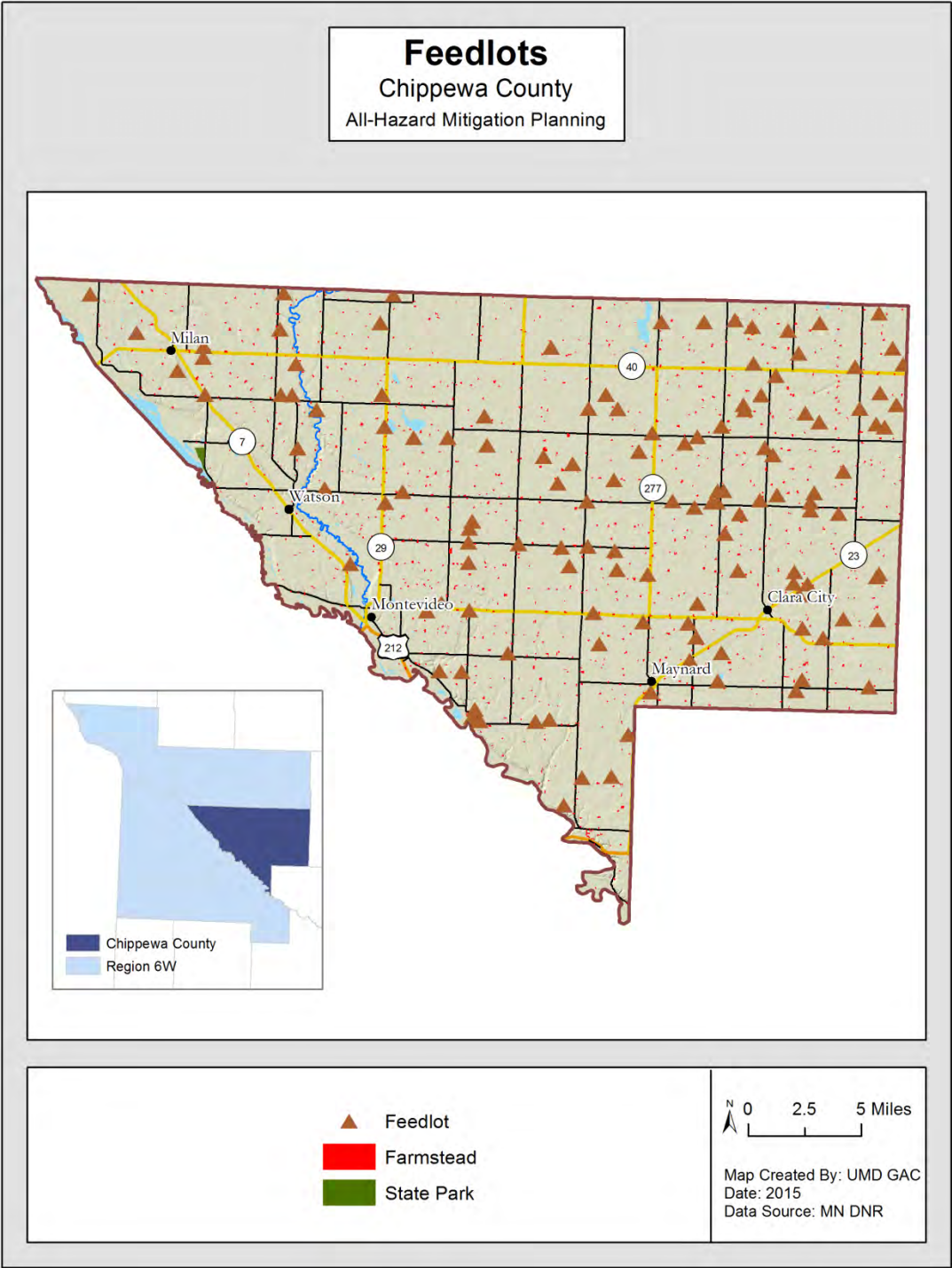


Figure A1.9 Chippewa County Feedlot Location





## APPENDIX 2: CITY SPECIFIC GOALS, OBJECTIVES AND MITIGATION STRATEGIES

### Clara City: Goals, Objectives, and Mitigation Strategies

#### Violent Storms and Extreme Temperatures

##### Goal 1: Promote safe and accessible shelter from violent storms.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reasoning for Rank
Encourage that all new homes without basements have a safe shelter where household residents may go in case of violent storms.	Construct a safe room and place in Lion's Park near the City Pool.	8-10 years	City	\$3,000	FEMA	2	Citizen Safety
	Create an Educational Packet of Emergency information for city residents and distribute information through public television and mailings.	3-5 years	City	\$500	FEMA	3	Educate citizens
Require that all manufactured homes use tie-downs.	Seek funding sources for tie-downs on existing manufactured homes.	1-2 years	City/ Residents	\$250-500 per	SCDP	7	Citizen Safety
Investigate snow fences in Chippewa County.	Install a 1/2 mile Living Snow Fence along properties in the Northwest portion of the City.	5-7 years	City	Unknown	FEMA	8	Citizen Safety

#### Flood

##### Goal 2: Improve the safety and security Wastewater Treatment Plants/lift stations.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reasoning for Rank
Protect Clara City's Lift Station.	Build a berm along Hawk Creek.	2 years	City	Unknown	FEMA	1	Citizen Safety

##### Goal 3: Minimize the flooding along Hawk Creek.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reasoning for Rank
Work with the city of Willmar to keep ice out of Clara City and Maynard.	The cities of Clara City and Maynard should participate in dialogue with the Hawk Creek Watershed District, the city of Willmar and the MPCA. Investigate the diversion of water to Grass Lake especially during flooding. Consider seeking state or federal funding.	Recurring	Clara City, Maynard, Willmar, Hawk Creek Watershed District	\$20,000	FEMA/ DNR/ ACOE	5	Citizen Safety
Protect the homes in Clara City that is danger of seasonal flooding in response to the ice dams at the bridges.	Annually review the plan of action which addresses flooding. This plan includes early sandbagging and having equipment available to move ice which will reduce flooding.	Recurring	City	Unknown	FEMA	4	Citizen Safety



Civil Disturbance/Terrorism

Goal 1: Protect critical infrastructure.							
OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reason for Ranking
Install security measures at city water treatment plants.	A. Install alarms on buildings.	3-4 years	City	\$300-500	--	6	Citizen Safety

## City of Maynard: Goals, Objectives, and Mitigation Strategies

### Violent Storms and Extreme Temperatures

#### Goal 1: Promote safe and accessible storm shelters from violent storms.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reason for Ranking
Encourage that all new homes without basements have a safe shelter where household residents may go in case of violent storms.	Create an Educational Packet of Emergency information for city residents and distribute information through public television and mailings.	1-2 years	City	\$500	FEMA	4	Citizen Safety

### Flood

#### Goal 2: Improve the safety and security Wastewater Treatment Plants/lift stations.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reasoning for Rank
Protect Maynard's Wastewater Treatment Plant.	Build a berm along Hawk Creek.	2 years	City	Unknown	FEMA/ DNR	1	Citizen Safety

#### Goal 3: Minimize the flooding along Hawk Creek.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reasoning for Rank
Work with the city of Willmar to keep ice out of Clara City and Maynard.	The cities of Clara City and Maynard should participate in dialogue with the Hawk Creek Watershed District, the city of Willmar and the MPCA. Investigate the diversion of water to Grass Lake especially during flooding. Consider seeking state or federal funding.	Recurring	Clara City, Maynard, Willmar, Hawk Creek Watershed District	\$20,000	FEMA/ DNR/ ACOE	5	Citizen Safety
Protect residences in Maynard.	Build a berm along east side of Hawk Creek.	2 years	Maynard	Unknown	FEMA/ DNR	2	Citizen Safety
Protect cemetery in Maynard.	Build a berm along Hawk Creek.	2 years	Maynard Lutheran Church	Unknown	FEMA/ DNR	3	Prevent Flooding

### Civil Disturbance/Terrorism

#### Goal 1: Protect critical infrastructure.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reason for Ranking
Install security measures at city water treatment plants.	A. Install alarms on buildings.	3-4 years	City	\$300-500	--	6	Citizen Safety



## City of Milan: Goals, Objectives, and Mitigation Strategies

### Violent Storms and Extreme Temperatures

#### Goal 1: Have safe and accessible safe rooms from violent storms.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reasoning for Rank
Encourage homes without basements to have a safe room where household residents may go in case of violent storms.	Complete an annual mailing of the Emergency Preparedness Guide.	Recurring	City Clerk	\$500	FEMA	4	Educate citizens on where to go and what to do in event of hazardous weather

#### Goal 2: Improve severe storm warning system for all county residents.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reason for Ranking
Assess adequacy of existing civil defense sirens.	Purchase a new warning siren.	1 year	City	\$17,000	FEMA	2	Ensure entire town is within warning siren hearing area
Ensure that all sectors of the county have immediate severe weather warnings and weather radios.	Obtain funding for the new radio system for EMS and FD in event of a system change.	3-4 years	City	Unknown	County	5	Provide coverage to FD/EMS and increase safety

### Wildfire

#### Goal 3: Protect the safety of residents and firefighters.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reason for Ranking
Increase access to equipment suitable to fighting wildfires.	Purchase a grass rig.	1 year	Fire Department	\$55,000	FEMA/MnDNR	3	Increase FD Preparedness

### Water Supply Contamination

#### Goal 2: Protect residents from contaminated ground water.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reason for Ranking
Improve or build proper water supply treatment plants.	Build a Water Treatment Plant, water mains, and water storage area with high security.	2 years	City/ WSN Engineering	\$3,500,000	USDA/ DEED	1	Provide potable water to residents

## City of Montevideo: Goals, Objectives, and Mitigation Strategies

### Violent Storms and Extreme Temperatures

#### Goal 1: Adopt a wellhead protection ordinance as proposed in the county Comprehensive Water Plan.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reason for Ranking
Buy out willing sellers of their structures in the 100-year floodplain including businesses in Montevideo.	Work with the state and federal government to provide funding to acquire and remove non-conforming structures in Flood A & B Zones.	Unknown	City	\$1,000,000	FEMA/ CDBG/ SCDG/ HUD/ EDA	2	Citizen Safety

#### Goal 2: Improve the safety and security of the Montevideo Wastewater Treatment Plant.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reasoning for Rank
Rebuild the levee in Montevideo to protect the Wastewater Treatment Plant.	Continue Levee Project – Phases 2 & 3	2 years	City Administration	\$13,000,000	FEMA/ ACOE/ MN State	1	Citizen Safety

#### Goal 4: Improve the safety and security of flood prone areas throughout Chippewa County.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reasoning for Rank
Address flooding issues as a region.	Creation of network of print, radio, social medias that reach all citizens with maps of risk areas, shelters, contact information and what to do in the event of an event.	Recurring	Community Development	Staff Time	--	3	Citizen Education

### Hazardous Materials

#### Goal 2: Protect residents from contaminated ground water.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reason for Ranking
Improve or build proper water supply treatment plants.	Build a Water Treatment Plant, water mains, and water storage area with high security.	2 years	City/ WSN Engineering	\$3,500,000	USDA/ DEED	1	Provide potable water to residents

## City of Watson: Goals, Objectives, and Mitigation Strategies

### Violent Storms and Extreme Temperatures

#### Goal 1: Improve severe storm warning systems for all county residents.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reasoning for Rank
Assess adequacy of existing emergency warning sirens and emergency operation centers.	Purchase a portable generator and transfer switch.	2 years	City	\$6,500	FEMA	2	Ensure that shelters have emergency back-up systems for citizen welfare
	Obtain funding to build a City Maintenance Shop/Emergency Operations Center.	3-5 years	City	\$300,000	USDA	3	Need to store City Equipment and be accessible

### Wastewater Treatment System Failure

#### Goal 1: Improve the safety and security of Granite Falls and other flood-prone areas.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reason for Ranking
Ensure that all public wastewater facilities are working properly through improvements, updates, and building.	Purchase safety equipment for operating lift stations.	2 years	City	Unknown	FEMA/ USDA	1	Protect water safety and supply

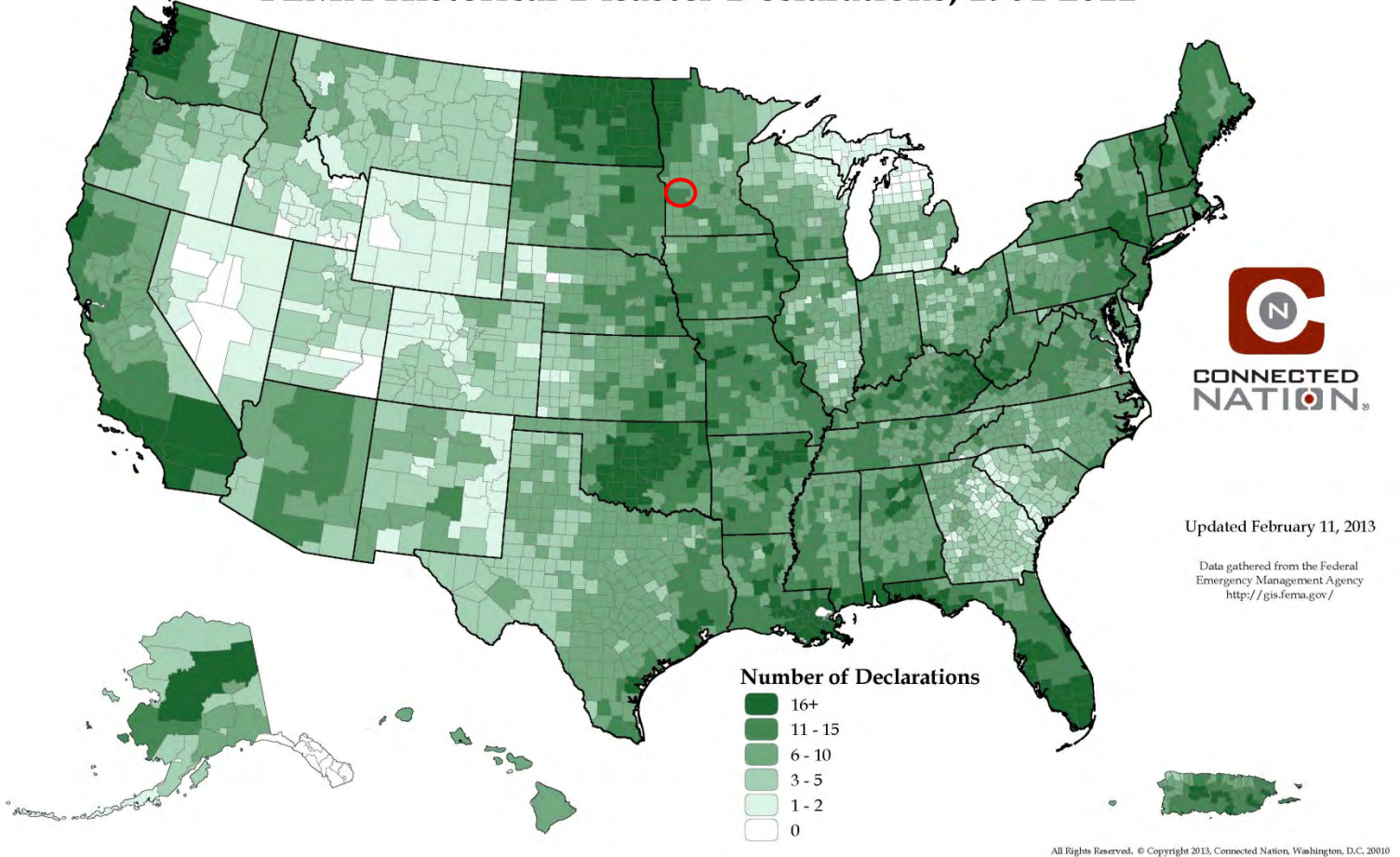
### Structure Fire

#### Goal 1: Improve the safety and security of Granite Falls and other flood-prone areas.

OBJECTIVE	STRATEGIES	Time Frame	Responsible Entity	Estimated Cost	Funding Partner	Rank	Reason for Ranking
Ensure that all public wastewater facilities are working properly through improvements, updates, and building.	Purchase safety equipment for operating lift stations.	2 years	City	Unknown	FEMA/ USDA	1	Protect water safety and supply

## APPENDIX 4: ADDITIONAL HAZARD RESEARCH

### FEMA Historical Disaster Declarations, 1964-2011

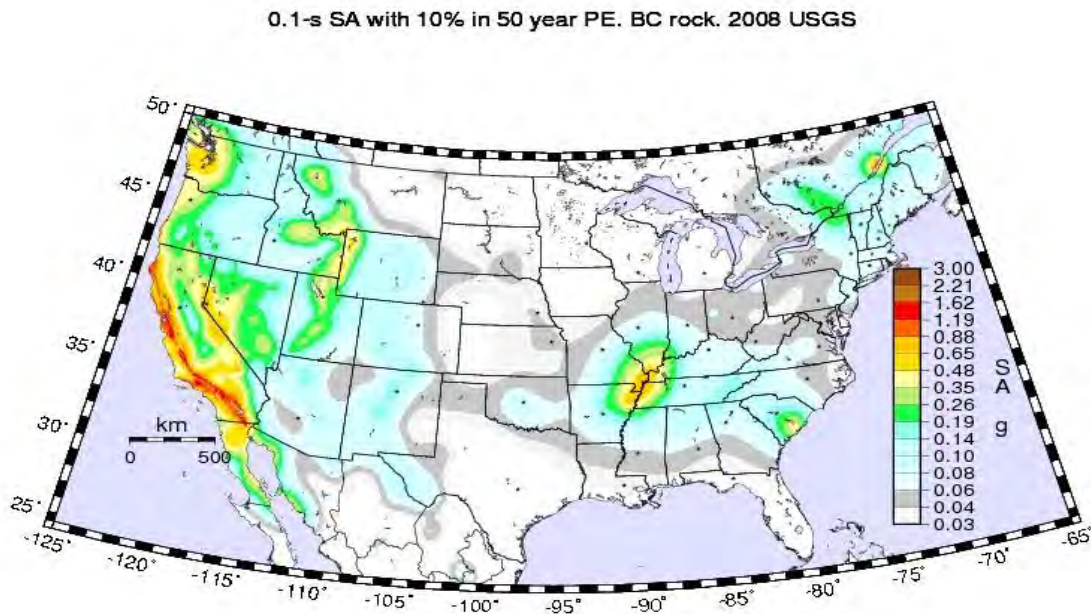


#### Presidential Disaster Declarations: 1964-2011

From 1964 to 2011, Chippewa County has witnessed 11-15 Presidential Declarations (see red circle). From 2000 to 2010, Chippewa County has experienced three Presidential Disaster Declarations: 2001 (Flood), 2009 (Flood), and 2010 (Spring Flood). There was another flood declaration during June of 2014.

Image Source: <http://www.connectednation.org/publicsafety>

## Earthquakes

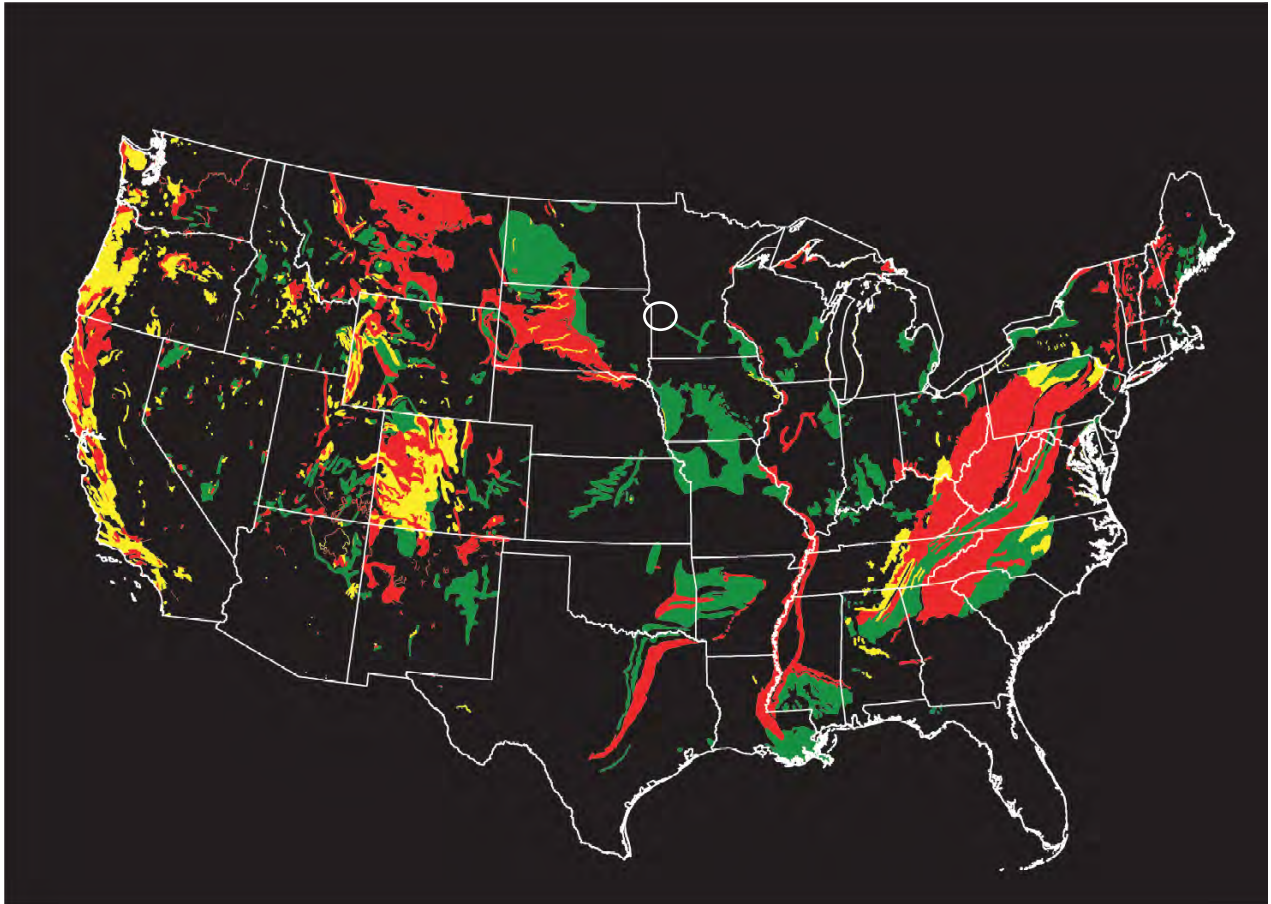


This map identifies the Probability of Exceedance for the United States at 10% in 50 years. The map measures probabilistic ground motion. All 5 counties in our region are below 3% g and therefore have a relatively low seismic risk and will not conduct an earthquake risk assessment.

### Image

Source: <http://earthquake.usgs.gov/hazards/products/conterminous/2008/maps/us/10hzSA.10in50.usa.jpg>

## Landslides

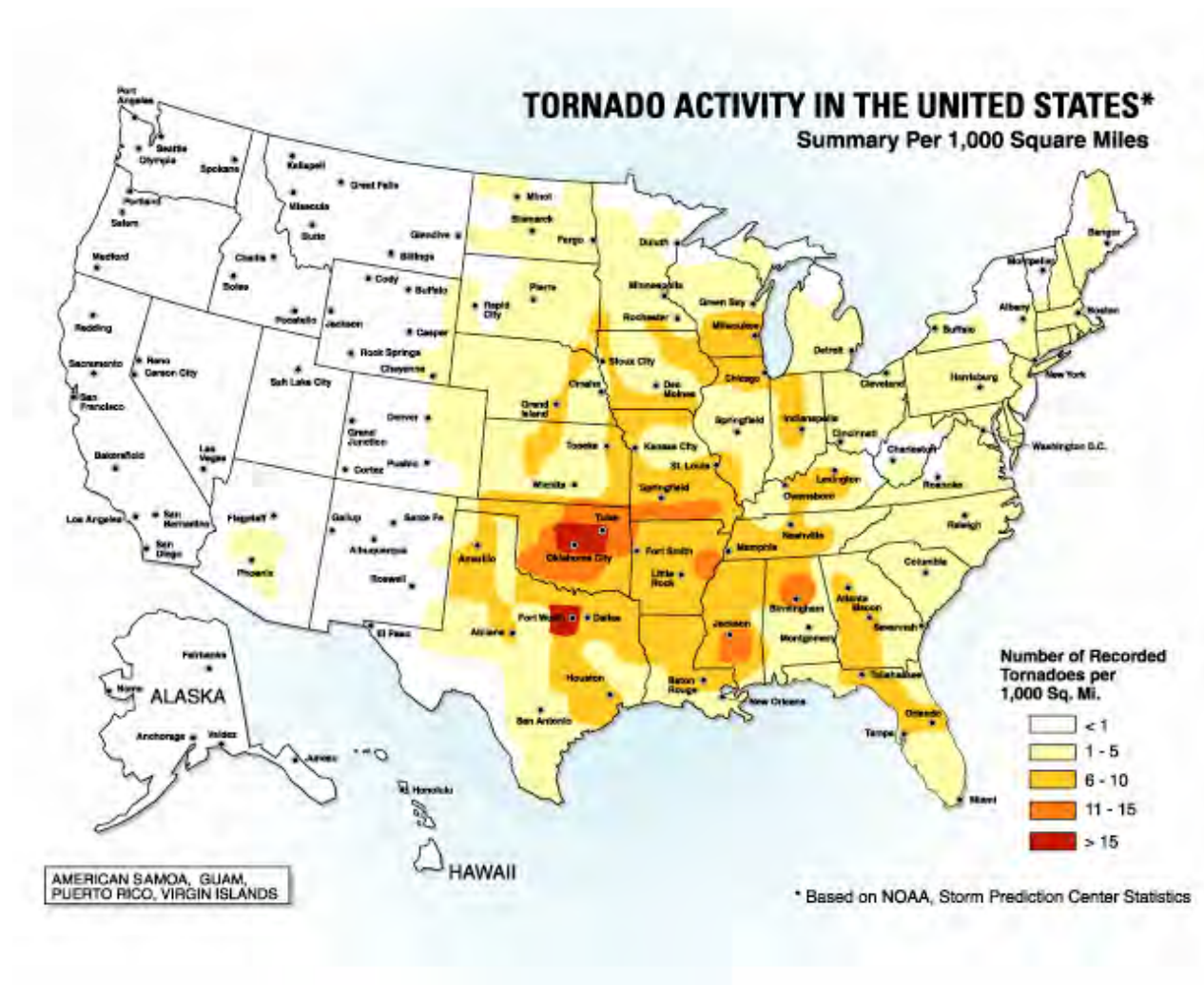


There is very low susceptibility for landslides in Chippewa County.

**Image Source:** <http://pubs.usgs.gov/fs/2005/3156/2005-3156.pdf>

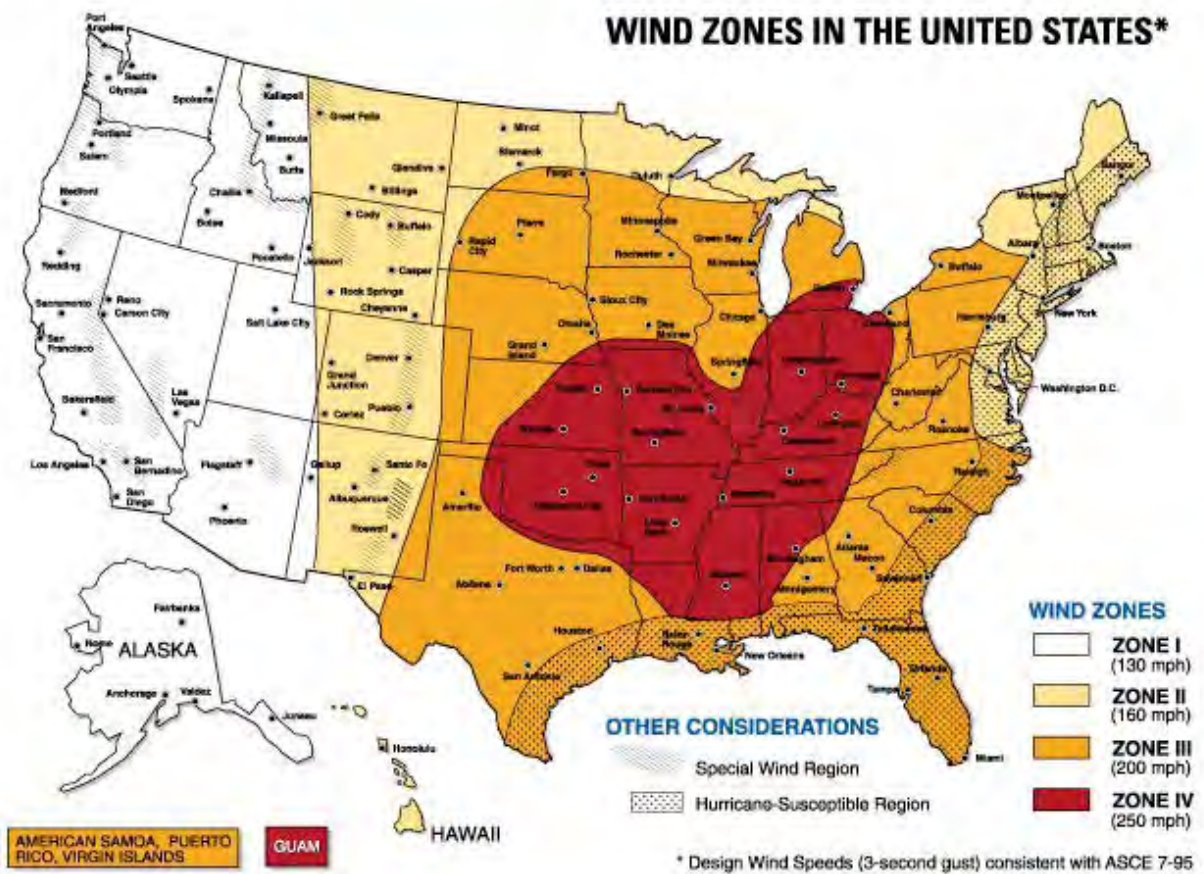


## Tornados



Tornados in Chippewa County fall in the range of 1-5 tornados every 1,000 miles and are within Wind Zone Three (200mph). The combination of these effect put Chippewa County at a “High Risk” for a tornado.

Image Source: <http://www.fema.gov/pdf/library/ism2.pdf>



Chippewa County is located in Wind Zone III (potential for 3-second gusts up to 200 mph). Straight line winds have been an increasing issue in the county causing sizable property damage.

Image Source: <http://www.fema.gov/pdf/library/ism2.pdf>



## APPENDIX 6: CLIMATIC CONDITIONS FOR THE 2001 FLOOD EVENT

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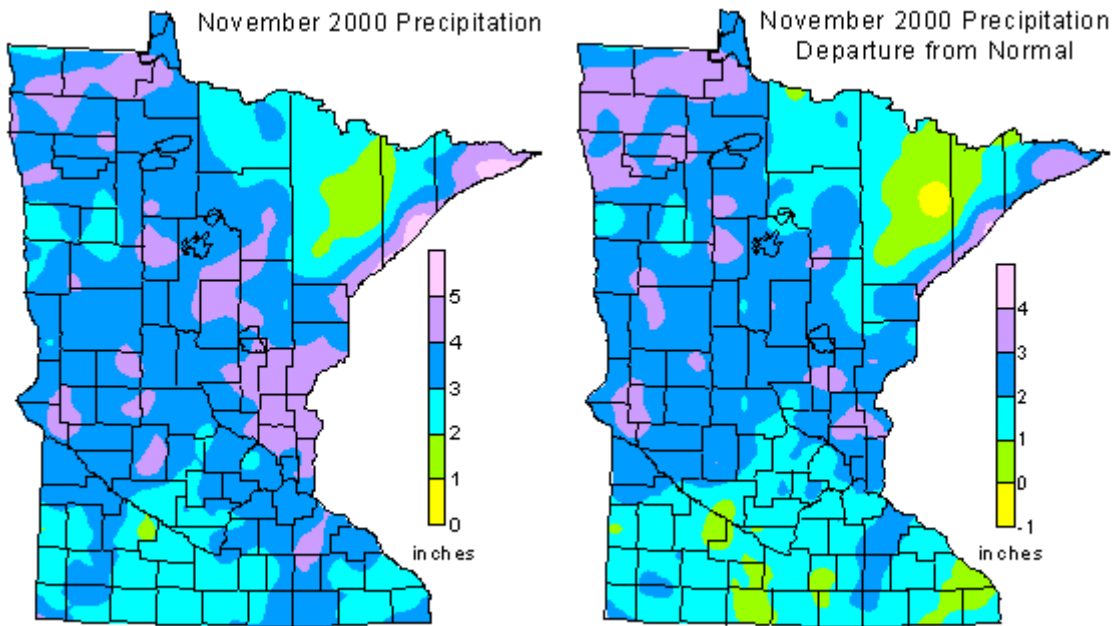
### **Climatic Conditions Leading to the Spring Flooding of 2001**

Major flooding occurred along many of Minnesota's rivers during April 2001. The flooding was caused by four contributing climatic factors:

- **significant autumn precipitation**
- **heavy winter snowfall**
- **less than ideal snowmelt scenario**
- **record-breaking April precipitation**

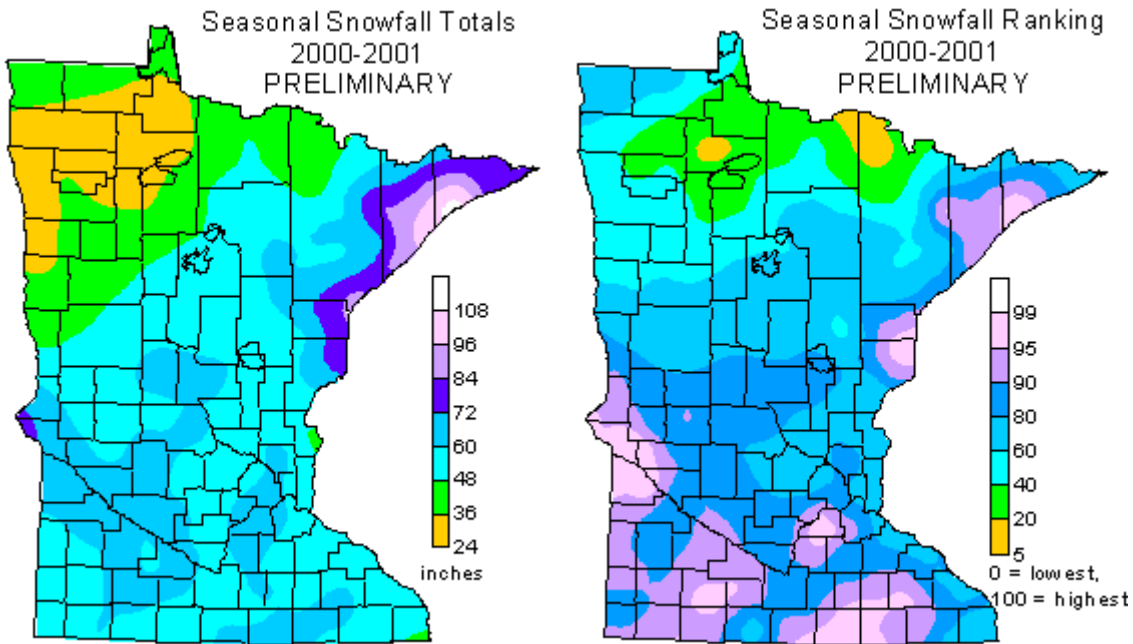
#### **1) Significant Autumn Precipitation**

Many southwestern, central, and east central Minnesota locations entered November with water deficits due to below normal growing season rainfall. However, heavy early November rains filled the upper portions of the soil profile before soil freeze-up. The figures below show that November 2000 precipitation exceeded the historical average by more than two inches in many locations.



## 2) Heavy Winter Snowfall (2000-2001)

Mid- and late-November snows blanketed much of the state with a lasting snow cover that was to persist into the early spring. The figure below shows that seasonal snowfall totals exceeding 60 inches were common throughout western and southern Minnesota. Snowfall totals in excess of 72 inches were reported in northeastern Minnesota. As seen below, snowfall totals in 2000-2001 ranked above the 80th percentile across much of southern, western, and northeastern Minnesota. In some communities, seasonal snowfall exceeded the 95th percentile. Normal annual snowfall in the southern one half of Minnesota ranges from 36 inches in the west to around 50 inches in the east. 2000-2001 snowfall topped the historical average by approximately two feet in western Minnesota, and by more than 18 inches in most southern Minnesota counties. Snow water equivalent in the snow pack at the end of the season was three to five inches in many areas. While 2000-2001 snowfall was heavy in many communities, the snowfall totals were far less than the 72 to 96 inch totals that covered most of the Red River basin and much of the Upper Minnesota River Basin in [1997](#).

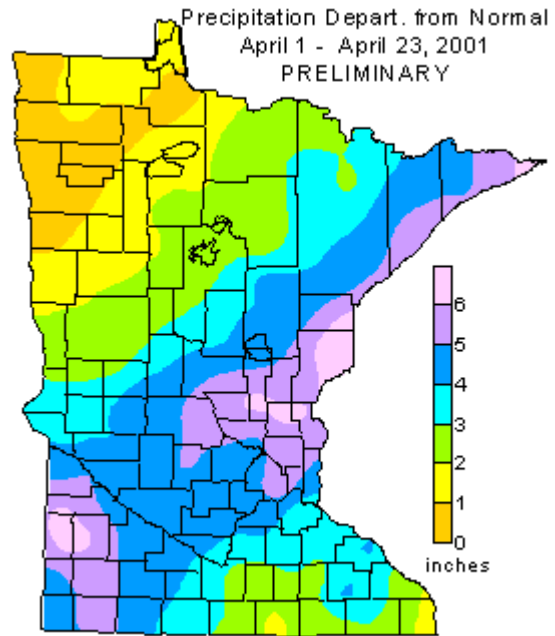
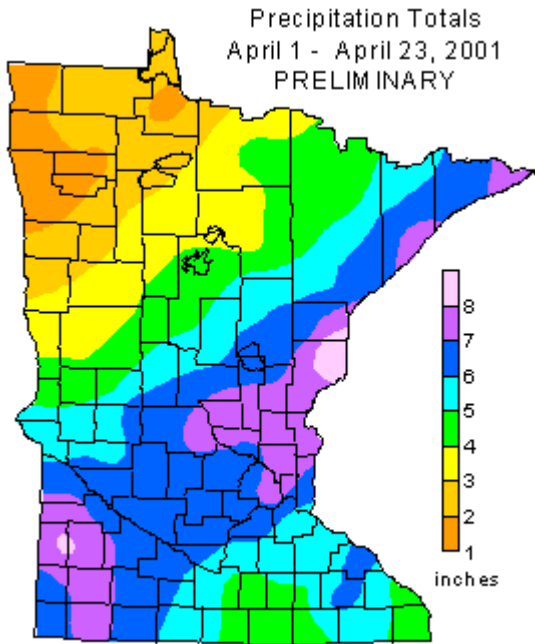


### 3) Less Than Ideal Snowmelt Scenario

The winter of 2000-2001 provided very few mid and late-winter melting days. While January was relatively mild, temperatures were still cold enough to retain most of the snow cover established during November and December. February was quite cold, finishing four to eight degrees below normal. March temperatures were three degrees below normal. The snow pack gradually diminished in depth throughout March, nevertheless snow water content did not change appreciably. Much of the melt water stayed on the landscape in the micro-relief.

### 4) Record-breaking April Precipitation

Extraordinarily heavy precipitation fell across much of Minnesota in April 2001. The figure below shows that a broad swath of southwestern, central, east central, and northeastern Minnesota received over six inches of precipitation from April 1 to April 23, 2001. Precipitation totals surpassed the historical average by more than four inches in these areas. For many communities, all-time April monthly precipitation records were set before the month came to a close.



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[mcwg@soils.umn.edu](mailto:mcwg@soils.umn.edu)

URL: [http://climate.umn.edu/doc/flood\\_2001/flood\\_2001.htm](http://climate.umn.edu/doc/flood_2001/flood_2001.htm)

Last modified: April 24, 2001

## APPENDIX 7: ADDITIONAL INFORMATION ON 1997 AND 2001 FLOOD EVENTS

### Countywide Issues

- Roads damaged from hauling of sand.
- Flooded county and township roads (many closed), bridges, culverts and county ditches.
- High groundwater all over.
- Flooding all over county – streams, creeks and wetlands as well as the major rivers and lakes.
- Lives at risk, especially in 1997.
- In 1997 only, septic tanks backed up into homes (many rural septic systems have been updated since).
- Rural flooding is an issue of concern. Rural flooding can impact structures as well as agricultural lands. Flooding of township roads caused enormous amounts of damage, but generally went unnoticed by the public.
- County – (2) two residential homes in Wegdahl were damaged; which were flood-proofed by the 2001 flood.
- County – (12) twelve residential homes were damaged in the county in the 1997 flood and two homes remain along Highway 212. All other homes have been flood-proofed, sold, or not homesteaded. Seven homes were bought out after the 1997 flood.
- County – one business (Flinn's Salvage Yard) was damaged in the 2001 flood.
- County – one business (Flinn's Salvage Yard) and feedlots were damaged in 1997 flood.
- In 1993 floods, the county had two residential and one feedlot properties damaged.

### Townships Issues

- Twenty-five percent of Maunt Township was flooded.
- Big Bend almost lost gravesites (2001 and 1997).
- Lone Tree Township (2001 and 1997 had water in houses).
- Bridge in Sparta Township – water over in 2001 and 1997.
- Wegdahl lost two homes.

### Maynard Issues

- Ice jam backs up river caused flooding.
- Residential property damaged and people were forced evacuation their homes.

### Watson Issues

- The city of Watson is shown as entirely located in the floodplain; however, flooding does not occur in town. The city can become an island in the event of major flooding.

Clara City Issues	Changes made	Future issues
<ul style="list-style-type: none"> <li>• Ice jam backed up river causing flooding.</li> <li>• Homes were sandbagged, wastewater plant surrounded, lift station sandbagged, and sanitary system overloaded in 1997 and 2001.</li> <li>• Ditch to the NW does not open up.</li> <li>• Residential property damaged and people were forced to evacuate their homes occurred.</li> </ul>	<ul style="list-style-type: none"> <li>• Plans are in place to release ice jam early in spring.</li> </ul>	<ul style="list-style-type: none"> <li>• Ice jam backs up river causing flooding.</li> </ul>

**Granite Falls Issues (includes Yellow Medicine County portion)**

- 1997 record flood.
- Dangerous for volunteers filling hundreds of thousands of sandbags and building sandbag levees around homes and businesses in 1997 and 2001.
- A sanitary lift station on the south side of Minnesota Avenue was in jeopardy in both 1997 and 2001. Dangerous sandbagging efforts by volunteers protected the lift station.
- In 1997, treated water from the water treatment plant was stored in “clear wells”. These clear wells were located in the floodplain and it was unclear if the water was contaminated. The city asked residents to boil water prior to use and hauled in truckloads of bottled water.
- Electrical lines were undersized and the power pull platform was threatened by floodwaters in the 1997 flood. This would have affected power service to two-thirds of the city.
- A water line that crossed the Minnesota River was broken by debris and floodwaters.
- Eight single-family homes and two apartments were lost displacing 20 families in 1997. No homes were lost in 2001.
- One business was lost in 1997 flood.
- Many homes along Minnesota Avenue, 15<sup>th</sup> Avenue, and throughout the city sustained damage from floodwaters in 1997 and 2001; forcing some citizens to evacuate their properties.
- The integrity of the levee was a concern in 1997 and 2001.
- Internal drainage was a problem for areas of the city in 1997.
- The Yellow Medicine County Museum flooded in both 1997 and 2001. The contents had to be removed and the building was damaged.

**Changes Made**

- Utilities crossing the river were moved or rebuilt to withstand future high water.
- Utilities behind Main Street were buried and covered with concrete.
- Water and sanitary sewer lines that crossed the river was raised and replaced. (Continued on next page)
- Twenty-eight homes were removed from floodplain.
- One business was removed from floodplain.
- Concrete walls were built around the clear wells to protect the treated water. This prevented contamination in 2001.
- Transformer was moved and put onto larger posts and distribution lines were increased, preventing future threats to the electrical lines.
- Temporary pumping stations were used in 2001 to equalize the storm sewer pressure with the floodwaters. This mitigated the internal drainage problem.

**Montevideo Issues**

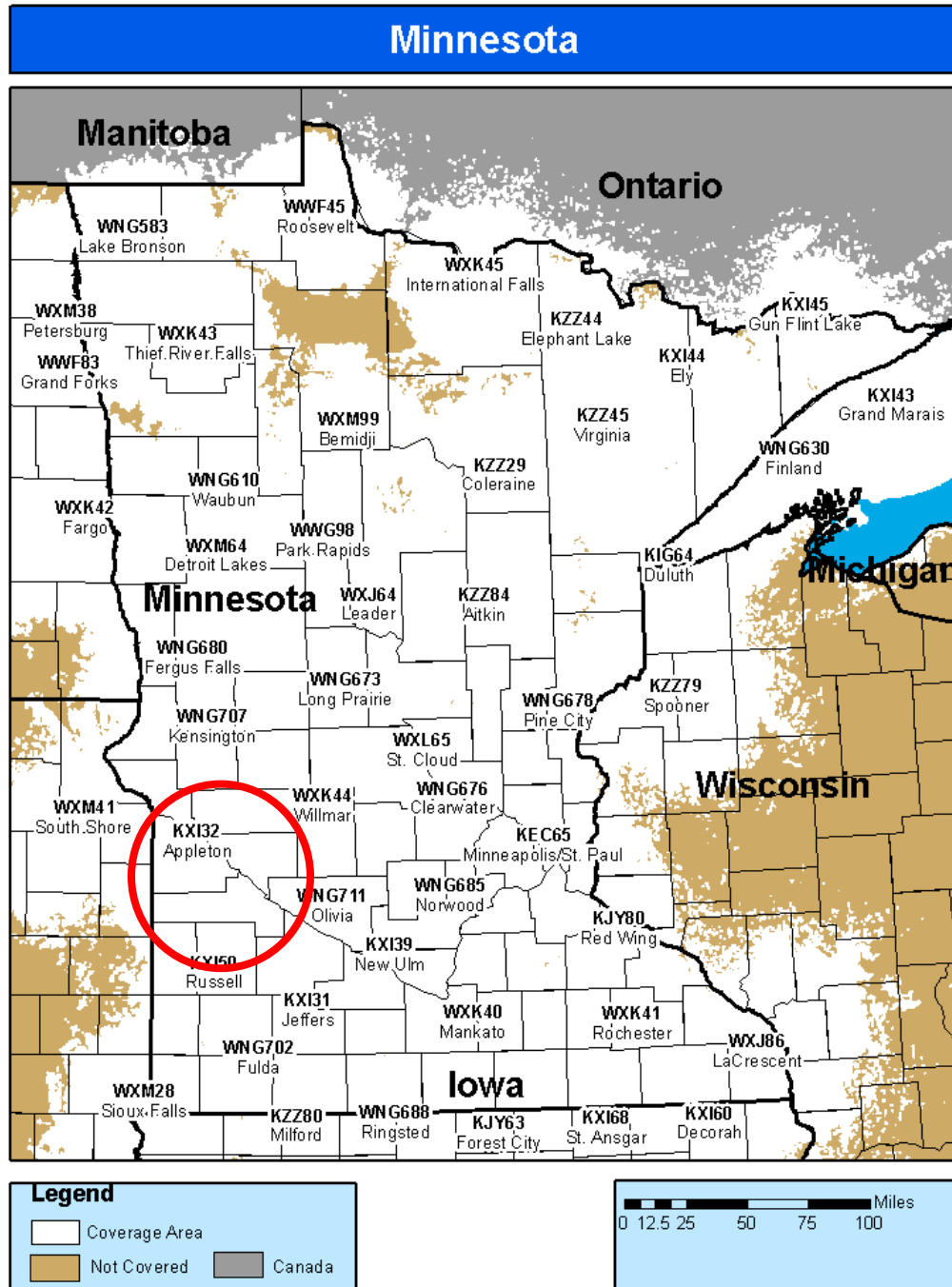
- Montevideo almost lost the wastewater treatment plant in both 1997 and 2001 floods.
- Smith Addition was flooded.
- In 2001, six basements were flooded.
- In 1997, there were homes that were badly damaged in Montevideo. Many more homes would have been damaged, had it not been for the sandbagging efforts.
- Residential properties damaged and forced evacuation of people from their homes took place.
- Electricity, water and sewer were shut off for some homes in Montevideo.
- During the 1993 flood, Montevideo did not suffer any property damage. In order to avoid flood damage, the city of Montevideo pumped low-lying areas at a cost of \$118,482.

**Changes Made**

- Water Treatment Plant moved.
- Plans to raise the levy will protect the Wastewater Treatment Plant. Construction began in 2009.
- 122 residential properties have been purchased since 2001.

## APPENDIX 8: NOAA WEATHER RADIO BROADCASTS

### Minnesota Weather Radio Broadcast Coverage (2010)

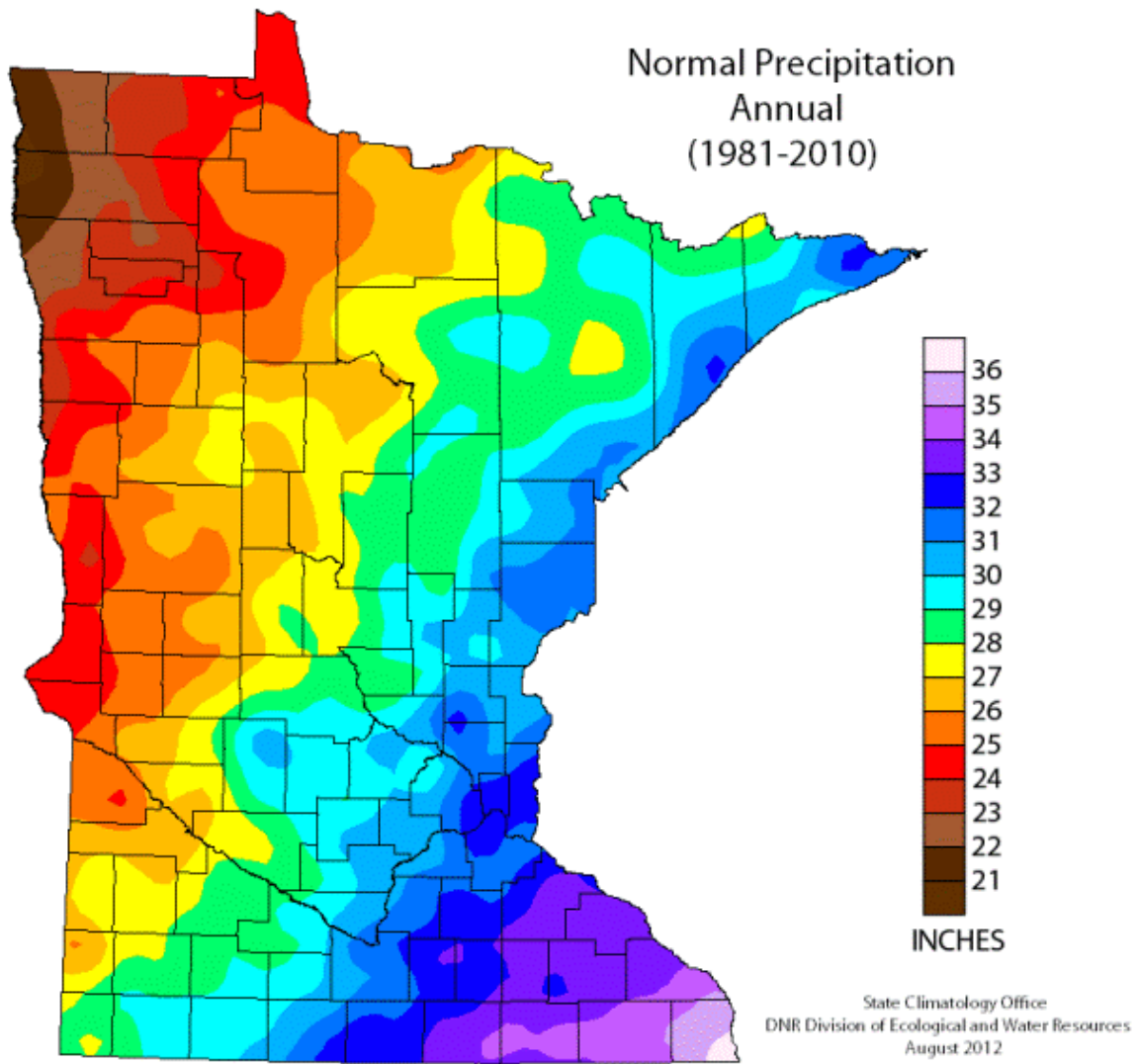


Chippewa County is covered by Appleton KX132.

Image Source: <http://www.nws.noaa.gov/nwr/Maps/PHP/MN.php>

## APPENDIX 9: NORMAL ANNUAL PRECIPITATION

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Chippewa County normally receives between 24 and 27 inches of precipitation annually.

**Image Source:** [http://www.dnr.state.mn.us/climate/summaries\\_and\\_publications/precip\\_norm\\_1981-2010\\_annual.html](http://www.dnr.state.mn.us/climate/summaries_and_publications/precip_norm_1981-2010_annual.html)



## APPENDIX 10: INVENTORY OF HAZARDOUS MATERIAL SPILLS

Spill Date	Spill Name	City	Spilled Product	Quantity Released	Initially Reported Source Of Spill
11/9/2002	Truck Rollover	Clara City	Manure	Unknown	Truck/Vehicle Cargo
6/12/2003	Clara City Coop- Agronomi Center/ Clara City Cenex	Clara City	Agriculture Pesticide / Fertilizer	5 Gallons	Unknown
9/25/2003	Clara City Piler	Clara City	Unknown	Unknown	Unknown
9/27/2004	Clara City Site	Clara City	Unknown	Unknown	Unknown
10/14/2004	SMBSC-Clara City West remote pile site	Clara City	Light Fuel Oil and Diesel	50 Gallons	Truck/Vehicle Fuel
3/22/2005	Cargill - Gluek	Clara City	Pesticide	7 Gallons	Hose Or Pipe, Not Tank Related
6/1/2005	Cargill - Gluek	Clara City	Fertilizer	7 Gallons	Truck/Vehicle Cargo
11/9/2002	Truck Rollover	Clara City	Manure	Unknown	Truck/Vehicle Cargo
6/12/2003	Clara City Coop- Agronomi Center/ Clara City Cenex	Clara City	Agriculture Pesticide / Fertilizer	5 Gallons	Unknown
9/25/2003	Clara City Piler	Clara City	Unknown	Unknown	Unknown
9/27/2004	Clara City Site	Clara City	Unknown	Unknown	Unknown
10/14/2004	SMBSC-Clara City West Remote Pile Site	Clara City	Light Fuel Oil and Diesel	50 Gallons	Truck/Vehicle Fuel
3/22/2005	Cargill - Gluek	Clara City	Pesticide	7 Gallons	Hose Or Pipe, Not Tank Related
6/1/2005	Cargill - Gluek	Clara City	Fertilizer	7 Gallons	Truck/Vehicle Cargo
9/14/2006	Clara City Force Main Break near WWTP	Clara City	Sewage Or Wastewater	Large Amount	Pipeline
12/21/2006	Kay's Natural	Clara City	Other (Described In Remarks)	55 Gallons	Barrels/Containers
Unknown	Fertilizer Plant Runoff Complaint	Clara City	Unknown	Unknown	Unknown
10/29/2007	BNSF Railroad Derailment	Clara City	Acid/Base Chemicals	20,000 Gallons	Railroad

10/12/2007	SMBSC Beet Piling Site, Diesel Spill	Clara City	Light Fuel Oil and Diesel	75 Gallons	Truck/Vehicle Fuel
11/7/2007	Xcel Energy Substation, Transformer Oil Spill	Clara City	Mineral Oil	800 Gallons	Transformers
1/6/2007	Dunner's Crossroads - Lost Truck Saddle Tank	Clara City	Light Fuel Oil and Diesel	Small Amount	Truck/Vehicle Fuel
6/17/2009	Unknown in MNDOT Ditch on Highway 23	Clara City	Unknown	Unknown	Unknown
5/21/2009	Possible Herbicide Spill Complaint	Clara City	Pesticide	Unknown	Other
11/13/2012	DNG Custom	Clara City	Liquid Swine	50 gallons	Unknown
11/21/2012	Kane Transportation	Clara City	Diesel	Unknown	Unknown
9/15/2013	Southern Minnesota Beet Sugar Coop	Clara City	Hydraulic Oil	15 gallons	Unknown
9/26/2013	Southern Minnesota Beet Sugar Coop	Clara City	Hydraulic Oil	5-10 gallons	Unknown
10/13/2013	Southern Minnesota Beet Sugar Coop	Clara City	Hydraulic Oil	More than 5 gallons	Unknown
4/3/2006	Granite Falls Energy	Granite Falls	Other (Described In Remarks)	Small Amount	Hose Or Pipe, Not Tank Related
7/25/2007	Granite Falls Energy Silage Release in Tank Alley	Granite Falls	Other (Described In Remarks)	200 Gallons	Pipeline
12/20/2007	Truck Accident, Diesel Spill	Granite Falls	Light Fuel Oil and Diesel	100 Gallons	Truck/Vehicle Fuel
3/22/2008	MN Valley Generating Plant, Oil & Grease Flood	Granite Falls	Heavy Fuel Oil	Unknown	AST - Within Containment Area
5/5/2008	Cargill - Gluek - Pesticide Spill into Secondary Container	Granite Falls	Pesticide	20 Gallons	AST - Within Containment Area
8/11/2008	Property Filling Complaint	Granite Falls	Other (Described In Remarks)	Unknown	Other
10/22/2008	Minnesota Valley Plant - Water Intake Cleanout	Granite Falls	Other (Described In Remarks)	Unknown	Pipeline
5/26/2009	MN Valley Substation - Staining Around Transformers	Granite Falls	Mineral Oil	10 Gallons	Transformers
8/5/2009	Gasoline Spill on Highway – Two Vehicle Crash	Granite Falls	Gasoline	28 Gallons	Truck/Vehicle Fuel

8/19/2010	MN Valley Generating Plant	Granite Falls	Equipment Oil/ Sheen	Less than 5 gallons	Unknown
12/22/2011	River City Metal	Granite Falls	Diesel Fuel	Unknown	Unknown
5/19/2012	Granite Falls Energy	Granite Falls	Corn Mash	Approx. 500 gallons	Unknown
11/20/2012	Xcel Energy	Granite Falls	DRO	190ppm	Unknown
3/18/2013	California Overland LTD	Granite Falls	Diesel	100-150 gallons	Unknown
11/16/2013	Granite Falls Energy	Granite Falls	5 % caustic sodium hydroxide solution	Approx. 6,000 gallons	Unknown
4/1/2014	Granite Falls Energy	Granite Falls	3-4 gallons	Diesel	Unknown
12/8/2002	Cargill - Maynard	Maynard	Mineral Oil	400 Gallons	Hose/Pipe, Not Tank Related
4/27/2006	Cargill - Gluek	Maynard	Pesticide	5 Gallons	AST Including Lines
10/18/2008	Diesel Spill from Saddle Tank -Beet Piling Area	Maynard	Light Fuel Oil and Diesel	30 Gallons	Truck/Vehicle Fuel
6/15/2009	Gasoline/water "dumping" in Chippewa County	Maynard	Gasoline	Unknown	UST Including Dispenser + Hose
5/17/2011	Citizen	Maynard	Round up	30 gallons	Unknown
10/9/2013	Southern Minnesota Beet Sugar Cooperative	Maynard	Hydraulic Oil	35 gallons	Unknown
10/18/2013	Southern Minnesota Beet Sugar Cooperative	Maynard	Hydraulic Fluid	35 gallons	Unknown
9/15/2005	Southern MN Sugar, Remote Beet Piling Site	Milan	Light Fuel Oil and Diesel	50 Gallons	Hose/Pipe, Not Tank Related
5/17/2011	Cargill	Milan	Dry Fertilizer/Nitrogen, phosphorus, potassium	9,000 lbs	Unknown
5/26/2011	Otter Tail Power	Milan	Transformer Oil, pcb unknown	3-5 gallons	Unknown
3/19/2012	Citizen	Milan	Various	Unknown	Unknown
1/9/2003	Georges Food and Fuel	Montevideo	Gasoline Regular	100 Gallons	Hose/Pipe, Not Tank Related
3/31/2004	Cable Satellite Receiver Area	Montevideo	Unknown	Unknown	Unknown
11/1/2004	Cenex Harvest States	Montevideo	Compression Gas (pressurized container)	100 Gallons	Barrels/Containers

8/27/2004	SL-Montevideo Technologies Incorporated	Montevideo	Unknown	Unknown	Unknown
4/12/2005	Residence	Montevideo	Gasoline Regular	Unknown	Unknown
6/27/2005	Jennie-o Turkey Store - Montevideo	Montevideo	Mineral Oil	200 Gallons	Barrels/Containers
6/26/2005	Jennie-o Turkey Store - Montevideo	Montevideo	Mineral Oil	50 Gallons	Hose/Pipe, Not Tank Related
2/17/2006	Jennie-o Turkey Store - Montevideo	Montevideo	Natural Gas, Propane, Other	Unknown	AST Including Lines
5/9/2006	Farmer Field	Montevideo	Unknown	Unknown	Hose/Pipe, Not Tank Related
6/2/2006	Jennie-o Turkey Store - Montevideo	Montevideo	Acid/Base Chemicals	15 Gallons	Barrels/Containers
3/19/2008	Diesel Release from AST	Montevideo	Light Fuel Oil and Diesel	Unknown	AST Including Lines
9/5/2008	Truck Accident	Montevideo	Light Fuel Oil and Diesel	75 Gallons	Truck/Vehicle Fuel
7/7/2008	Jennie-o Turkey - Diesel Spill from Refer Trailer	Montevideo	Light Fuel Oil and Diesel	30 Gallons	Truck/Vehicle Fuel
7/13/2008	Chippewa County - Maintenance Department	Montevideo	Hydraulic Fluid	35 Gallons	Hose/Pipe, Not Tank Related
9/18/2009	Big Valley Milling	Montevideo	Hydraulic Fluid	5 gallons	Unknown
4/17/2010	Unknown	Montevideo	Diesel	900 gallons	Unknown
7/15/2010	Duinick Bros.	Montevideo	Hydraulic Fluid	15 gallons	Unknown
7/27/2015	Southern Minnesota Beet Sugar Cooperative	Montevideo	Hydraulic Oil	20 gallons	Unknown
11/5/2011	Trans Systems Inc	Montevideo	Hydraulic Fluid	50-60 gallons	Unknown
6/12/2013	Unknown	Montevideo	Odor and Oily Substance	Unknown	Unknown
11/13/2013	Twin Cities and Western Railroad	Montevideo	Diesel	75-100 gallons	Unknown
2/25/2014	Farmers Union Oil	Montevideo	Diesel	Less than 20 gallons	Unknown
6/20/2014	Farmers Union Oil	Montevideo	Diesel	15-20 gallons	Unknown
8/9/2014	Unknown	Montevideo	Fuel Oil	100 gallons	Unknown
6/26/2002	Chippewa County Highway Department	Watson	Antifreeze, Glycols, Deicers	3 Gallons	Hose/Pipe, Not Tank Related
4/28/2003	Street Surface	Watson	Agriculture Pesticide / Fertilizer	2 Quarts	Truck/Vehicle Cargo

Source: Minnesota Pollution Control Agency, 2014

## APPENDIX 11: EXAMPLE CITY SURVEY

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### City Land Use

City: \_\_\_\_\_

Date of last Land Use Survey: \_\_\_\_\_

Land Use	Parcels	Acres	Percent
Agriculture			
Residential			
Commercial			
Industrial			
Public Institutions			
Religious/Non-Profit			
Parks			
General Open Space			
Water			
Floodplain			
Other _____			

## City Risk Assessment Survey – Part 1

City: \_\_\_\_\_

Most Recent Population Count: \_\_\_\_\_ as of \_\_\_\_\_

1. Have any hazardous events occurred in your city since 2010? Include date, specific event data, affected areas, amount of loss, etc.	
2. Are there new hazards in your community?	
3. Are there any vulnerable structures in: hazard areas, redeveloped areas, or recently annexed areas?	
4. In proposed annexation areas, are there or will there be more structures in hazard areas?	
5. How much land has been annexed in the past 10 years? What are the new land uses of the newly annexed land?	
6. Have any new buildings for high-risk populations been constructed in your city?	
7. What actions (if any) have been taken to reduce the vulnerability of these high-risk populations?	
8. What general types of development are located in 100 and 500 year floodplains?	100: 500:
9. What are future development opportunities in the 100 and 500 year floodplains?	100: 500:

10. Based on the City Comprehensive Plan (if applicable), what areas have been identified for future growth?	
11. Are there any unique natural features, natural areas, or other environmental and aesthetic attributes present in the floodplains?	
12. Have land uses for the parcels in your city changed since 2010? If so, which ones and to what?	
13. Does your city have an up-to-date zoning map? Is there an electronic version?	
14. Have there been any new city facilities built in your city since 2010?	
15. Have any new telecommunication and/or power facilities been built in your city since 2010?	
16. Have there been any new hospitals/clinics built in your city since 2010?	
17. How many ambulances (if any) does your city currently have?	
18. Fire Department Numbers	Firemen ____ Pumpers ____ Tankers ____ Grass Rig/Truck ____ Aerial/Ladders ____ Air Packs ____
19. Law Enforcement Numbers	Full-Time Officers ____ Part-Time Officers ____ Squad Cars ____

## Mitigation Strategies and Objectives

City: \_\_\_\_\_

<p>1. What mitigation strategies have your City completed since 2010?</p>	
<p>2. What mitigation objectives has your City worked toward since 2010?</p>	
<p>3. Would you make any changes to the previous Hazard Mitigation Plan: Goals/Objectives/Strategies?</p>	



## Inventory of Community Assets

City: \_\_\_\_\_

Date of Value Assessment: \_\_\_\_\_

Please list all community assets in your city, including the building size, replacement value, and the value of its contents and its function.

Name of Asset	Building Size (Sq.Ft)	Replacement Value (\$)	Content Value (\$)	Function Value (\$)
<b>Major Employers</b>				
<b>Business Districts</b>				
<b>Industrial Businesses</b>				
<b>Multi-Family Housing</b>				
<b>Historical Structures</b>				
<b>Institutional Buildings</b>				
<b>Schools</b>				

**Chippewa County All-Hazard Mitigation Plan  
Task Force Meeting #1: Hazard Identification**

May 28<sup>th</sup>, 2014

4:00pm – 6:00pm

Assembly Room, Chippewa County Courthouse, Montevideo

**Agenda**

- 4:00 Task Force Introductions**
- 4:05 Overview of Planning Process**
  - Hazard Mitigation: Purpose and Plan
  - Timeline for Project
  - Public Participation
- 4:20 Hazard Identification**
  - Historical Hazards
  - Gaps and Deficiencies
  - New Hazards
- 5:20 Questions and Next Meeting:** Risk Assessment
- 5:30 Brief Meeting with City Representatives**

## FOR IMMEDIATE RELEASE

### **All-Hazard Mitigation Planning to Help Create Safe, Sustainable Communities**

Chippewa County, MN – Floods, earthquakes, and tornadoes are all functions of the natural environment and become hazardous when they threaten our built environment with destruction. Each year billions of dollars are spent by federal, state, and local governments, not to mention individuals, in response to and recovery from natural disasters. Lives are lost or devastated; property is demolished or devalued; the economic viability of communities is impacted for years to come.

Many techniques have proven effective in reducing or eliminating long-term effects of natural disasters. Such mitigation techniques, when undertaken before the next flood, earthquake or tornado, can lessen the likelihood that a natural hazard will become a disaster. It is important that community planning incorporates hazard mitigation to make a community a safer place to live and work and a more sustainable environment for generations to come.

As a result of the Disaster Mitigation Act of 2000, FEMA required that in order to be eligible for Hazard Mitigation Grant Program (HMGP) funds, a local unit of government (county, city, township) must first have in place a multi-hazard mitigation plan. All counties within the region completed the necessary All-Hazard Mitigation Plans between 2009 and 2010. In order to continue to be eligible for HMGP funds, all counties must update their completed plans within five years.

Starting in May 2014, Chippewa, Big Stone, and Yellow Medicine counties with the assistance of the Upper Minnesota Valley Regional Development Commission (UMVRDC) will update the All-Hazard Mitigation plan to meet the requirements of the Disaster Mitigation Act of 2000. All cities and townships are eligible to participate in the county plan instead of completing one on their own. The process to update, write, review and submit should take approximately 18 months to complete.

It is a goal of each county to involve a great variety of people to ensure that key interests and issues are not left out and to increase the chance for lasting solutions. A task force will be assembled to represent all participating entities (county, cities, and townships) and to guide the planning. At least three public meetings will be held to solicit information, ideas, and comments. Press releases will provide periodic updates.

The first local task force meeting for the Chippewa County All-Hazard Mitigation Plan will occur on Wednesday May 28<sup>th</sup>, 2014 at 4:00pm, in the Chippewa County Courthouse Assembly Room. The main task will be to identify potential hazards. The public is invited to this meeting and time will be allocated to hear comments from the public. Input from the public is extremely important and encouraged. If you have any questions, please contact Emily Zeug-Robertson, UMVRDC, at 320-289-1981 or [emily.zeugrobertson@umvrdc.org](mailto:emily.zeugrobertson@umvrdc.org).

###

## Task Force Meeting #1

Name	Email Address	Organization/Government
Wiboy Block	cityadmin@ci.net.net	City of Clark City
JOE THASSER	JOE THASSER@YAHOO.COM	H. W. R.
Jim Anderson	janderson@federal.net	City of Miami
Sue Buckner	cityofwatson@attwinless.com	City of Watson
For the the Hon.	<del>For the Hon.</del>	<del>For the Hon.</del>
Blaine Bump	City of Watson	City Council

[illegible]

**Chippewa County All-Hazard Mitigation Plan  
Task Force Meeting #2: Risk Assessment**

September 11<sup>th</sup>, 2014

3:30pm – 5:30pm

Assembly Room, Chippewa County Courthouse, Montevideo

**Agenda**

- 3:30** Task Force Introductions and Public Comment
- 4:00** Hazard Inventory Review
- 4:15** Risk Assessment Activity
- 4:45** Discussion/Questions and Next Meeting: Mitigation Strategies
- 5:00** Meeting with City Representatives

**Next Meeting:**

**Thursday, November 6<sup>th</sup>, 2014**

**3:30pm – 5:30pm**

**Assembly Room, Chippewa County Courthouse, Montevideo**

## PRESS RELEASE

August 25, 2015

FOR IMMEDIATE RELEASE

### **Chippewa County All-Hazard Mitigation Public Meeting to be held September 11<sup>th</sup>, 2014**

A public meeting for the Chippewa County All-Hazard Mitigation Plan will take place on **September 11<sup>th</sup>, 2014 at 3:30pm in Montevideo** at the Chippewa County Courthouse Assembly Room. The primary tasks will be to discuss Clara City, Maynard, Milan, Montevideo, and Watson's risk assessments and perform a hazard inventory analysis for Chippewa County. Background information for Chippewa County's Hazard Inventory will be available at <http://www.umvrdc.org> under "What's New at UMRDC" starting September 8<sup>th</sup>, 2014. Comments on the material posted can be made by emailing [emily.zeugrobertson@umvrdc.org](mailto:emily.zeugrobertson@umvrdc.org) or by calling 320-289-1981 x 104. Input from the public is extremely important and encouraged.

As a result of the Disaster Mitigation Act of 2000, FEMA requires local units of government to update their All-Hazard Mitigation Plan every 5 years in order to continue to be eligible for Hazard Mitigation Grant Program (HMGP) funds. Chippewa County, with the assistance of the Upper Minnesota Valley Regional Development Commission (UMVRDC), is in the process of updating their All-Hazard Mitigation Plan for 2015 that meets FEMA requirements. FEMA has provided part of the funding necessary to complete this plan. The projects listed in this plan will be eligible for future HMGP funds.

If you cannot attend this meeting but would like to be involved, or if you have any questions, please contact Emily Zeug-Robertson at 320-289-1981 or [emily.zeugrobertson@umvrdc.org](mailto:emily.zeugrobertson@umvrdc.org)

###

# Chippewa County Hazard Mitigation Task Force Meeting #2

Name	Email Address	Organization/Government
Jim Birkland		Chippewa SO
Mary Gable		City of Monticello
Angie Steinbach	cdl@monticello.org	City of Monticello
Luther H. Ho-	theho@monticello.k12.wi.us	Monticello School
Wesley Black	<del>cdl@monticello.k12.wi.us</del> cityadmin@heinet.net	City of Clara City
Kristi Fennholz	in a	UMV KDC
Jim Schorndorfer		Chippewa Co. Township Assn
Julie Cunningham	White1005@gmail.com	Herald, Clara City



**Chippewa County All-Hazard Mitigation Plan  
Task Force Meeting #3: Mitigation Strategies**

November 20, 2014

3:30-5:30pm

Assembly Room, Chippewa County Courthouse, Montevideo

**Agenda**

- 3:30** Task Force Introductions
- 3:35** Review Hazard Priority List
- 3:45** Identification of Completed and New Strategies
- 5:00** Plan Maintenance and Implementation
- 5:15** Questions/Comments – Next meeting will be held February/March 2015.

# Chippewa County Hazard Mitigation Task Force Meeting #3

Name	Email Address	Organization/Government
Steve Kubiak		Chippewa Co Hwy
David Larson	Kee@co.chippewa.net	Chippewa Commission
Stacy Ruffo		Chippewa Co.
Jim Schmiedeknecht		Chippewa Co. Townships
Jim Dahlman		Commissioner
POE THESSEN		CIARA CITY
Windy Block	city admin@bea.net.net	City of Clara City
Kris Lee	Klee@countyside.co.ia.net	Countyside Advertiser
Martin Gierke	migierke@chippewa.net	Wente City Council
Tessy Luperon	sluperon@bea.net.net	County Commission
Patt Orlowski		County Council

**Chippewa County All-Hazard Mitigation Plan**  
**Task Force Meeting #4: Public Meeting and Final Draft Review**  
May 26, 2015  
3:30-5:00pm  
Assembly Room, Chippewa County Courthouse

**Agenda**

- 3:30** Welcome
- 3:35** Plan Additions
- Addition of Erosion – Gaps and Deficiencies or Strategies
  - Hazus Flood Analysis
  - Addition of State Parks to Violent Storm Strategies
  - Review Prioritization of Natural and Manmade Hazard Strategies
- 3:45** Plan Review
- Previous Feedback – Changes already made
  - Task Force and Public Comments
- 4:15** Information still needed
- 4:45** Next Steps
- 5:00** Adjourn

## PRESS RELEASE

May 12, 2015

FOR IMMEDIATE RELEASE

### **CHIPPEWA COUNTY ALL-HAZARD MITIGATION PUBLIC MEETING TO BE HELD MAY 26<sup>TH</sup>, 2015**

A public meeting for the Chippewa County All-Hazard Mitigation Plan will take place on **May 26<sup>th</sup>, 2015 at 3:30pm in the Chippewa County Courthouse Assembly Room in Montevideo.** The primary task for the meeting will be to hear public comment and suggestions on the Chippewa County All-Hazard Mitigation Plan draft. A copy of the plan is available at [www.umvrdc.org](http://www.umvrdc.org) under "What's New at UMRDC". Comments on draft plan can also be made by emailing [emily.zandt@umvrdc.org](mailto:emily.zandt@umvrdc.org) or by calling 320-289-1981 x 104. Input from the public is extremely important and encouraged.

As a result of the Disaster Mitigation Act of 2000, FEMA requires local units of government to update their All-Hazard Mitigation Plan every 5 years in order to continue to be eligible for Hazard Mitigation Grant Program (HMGP) funds. Chippewa County, with assistance from the Upper Minnesota Valley Regional Development Commission (UMVRDC), is in the process of updating their All-Hazard Mitigation Plan for 2015 which will meet FEMA requirements. FEMA has provided a portion of the funding necessary to complete this plan. The projects listed in this plan will be eligible for future HMGP funds.

If you cannot attend this meeting but would like to provide input, or if you have any questions, please contact Emily Zandt at 320-289-1981 x 104 or [emily.zandt@umvrdc.org](mailto:emily.zandt@umvrdc.org)

###

**Chippewa County Hazard Mitigation**  
Task Force Meeting #4

Name	Contact	Organization/Government
STEVE KUBISTA		CHIPPewa Co
TIM BERNHARDT		CHIPPewa Co
John J. Bernhardt		Chippewa Co
Wm. J. Dault		President, West City Council
Don Buckner		City Clerk/Treasurer, Weston
Angela Skimbeck M		Agri-Marketing, CDP
Dwight L. L. L. L.		Commissioner - Chippewa
David Nordmark		Commissioner - Chippewa
Wendy Block	city admin@kci.net.net	City of Clara City
JOSEPH J. THISEN		Clara City
Roger Knapp	ccpublicworks@kci.net.net	Clara City Pub. Works
Kathleen H. H.	heller@mtk.kci.net.net	Weston Schools
Jim Schmiedeknecht		Chippewa Co. Townships
Tracy W. FTO		Chippewa County

## APPENDIX 13: CITY AND COUNTY PLAN ADOPTION

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## APPENDIX 14: RESILIENCE REPORT

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# Resilience Report

For Chippewa County, Minnesota including and the communities of Clara City, Granite Falls, Maynard, Milan, Montevideo, and Watson

August 2012



**FEMA**

**RiskMAP**  
Increasing Resilience Together



## **Preface**

The Department of Homeland Security (DHS), Federal Emergency Management Agency's (FEMA) Risk Mapping, Assessment, and Planning (Risk MAP) program provides states, tribes, and local communities with flood risk information and tools that they can use to increase their resilience to flooding and better protect their citizens. By pairing accurate floodplain maps with risk assessment tools and planning and outreach support, Risk MAP has transformed traditional flood mapping efforts into an integrated process of identifying, assessing, communicating, planning for, and mitigating flood-related risks.

This Resilience Report provides information to help local or tribal officials, floodplain managers, planners, emergency managers, and others better understand their risk, take steps to mitigate those risks, and communicate those risks to their citizens and local businesses.

This Resilience Report is intended to provide the community a reference for management and mitigation of flood and other risks.

## Table of Contents

1.	Introduction.....	1
1.1	Risk MAP Introduction.....	1
1.2	About Flood Risk.....	1
1.3	Uses of this Report.....	2
1.4	Related Resources.....	3
2.	Risk Analysis.....	5
2.1	Overview.....	5
2.2	Hazus and Resilience.....	5
2.3	Loss Estimation Information.....	6
3.	Chippewa County Resilience Meeting.....	8
3.1	Community Resilience.....	8
3.2	Resilience Meeting.....	8
3.2.1	Overview.....	8
3.2.2	Meeting Information and Attendees.....	12
4.	Identifying Areas of Mitigation Interest (AoMIs).....	13
5.	Actions to Reduce Flood Risk.....	20
5.1	The Mitigation Action Form and Action Tracker.....	20
5.2	Types of Mitigation Actions.....	20
6.	Hazard Mitigation Planning.....	28
6.1	Getting Started.....	28
6.2	Understanding Community Risk.....	29
6.3	Developing the Mitigation Plan.....	29
6.4	Plan Adoption and Review.....	29
6.5	Implementation.....	30
7.	Mitigation Programs and Assistance.....	31
8.	County and Community Resilience Summaries.....	33
8.1	Chippewa County (Unincorporated Areas).....	33
8.2	Clara City, City of.....	36
8.3	Granite Falls, City of.....	39
8.4	Maynard, City of.....	42
8.5	Milan, City of.....	45
8.6	Montevideo, City of.....	48
8.7	Watson, City of.....	51

## Table of Contents (*continued*)

9.	Acronyms and Definitions .....	54
10.	Additional Resources .....	58
11.	Appendix – Resilience Files .....	60



# 1. Introduction

## 1.1 Risk MAP Introduction

Risk Mapping, Assessment, and Planning (Risk MAP) is a Federal Emergency Management Agency (FEMA) program that provides communities with flood information and tools they can use to enhance their mitigation plans and better protect their citizens. Through more accurate flood maps, risk assessment tools, and outreach support, such as Resilience, Risk MAP builds on Map Modernization and strengthens local ability to make informed decisions about reducing risk.

Through collaboration with State, Local, and Tribal entities, Risk Map will deliver quality data that increases public awareness and leads to action that reduces risk to life and property. The intention of FEMA is to collaborate with Federal, State, and local stakeholders to achieve the following goals:

- Address gaps in flood hazard data to form a solid foundation for risk assessment, floodplain management.
- Ensure that a measurable increase of the public's awareness and understanding of risk results in a measurable reduction of current and future vulnerability.
- Lead and support States, local, and Tribal communities to effectively engage in risk-based mitigation planning resulting in sustainable actions that reduce or eliminate risks to life and property from natural hazards.
- Provide an enhanced digital platform that improves management of Risk MAP, stewards information produced by Risk MAP, and improves communication and sharing of risk data and related products to all levels of government and the public.
- Align Risk Analysis programs and develop synergies to enhance decision-making capabilities through effective risk communication and management.

## 1.2 About Flood Risk

Floods are naturally occurring phenomena that can and do happen almost anywhere. In its most basic form, a flood is an accumulation of water over normally dry areas. Floods become hazardous to people and property when they inundate an area where development has occurred, causing losses. Mild flood losses may have little impact on people or property, such as damage to landscaping or the generation of unwanted debris. Severe flooding can destroy buildings, ruin crops, and cause critical injuries or death.

Which picture below shows more flood risk?



Even if you assume that the flood in both pictures was the same probability—let's say a 10-percent-annual-chance flood—the consequences in terms of property damage and potential injury as a result of the flood in the bottom picture are much more severe. Therefore, the flood risk in the area shown in the bottom picture is higher.



Whether or not an area might flood is one consideration. The extent to which it might flood adds a necessary dimension to that understanding.

## Calculating Flood Risk

It is not enough to simply identify where flooding may occur. Just because one knows where a flood occurs does not mean they know the **risk** of flooding. The most common method for determining flood risk, also referred to as vulnerability, is to identify the probability of flooding and the consequences of flooding. In other words:

**Flood Risk** (or Vulnerability) = **Probability x Consequences**; where

**Probability** = the likelihood of occurrence

**Consequences** = the estimated impacts associated with the occurrence

**The probability of a flood** is the likelihood that a flood will occur. The probability of flooding can change based on physical, environmental, and/or engineering factors. Factors affecting the probability that a flood will impact an area range from changing weather patterns to the existence of mitigation projects. The ability to assess the probability of a flood and the level of accuracy for that assessment are also influenced by modeling methodology advancements, better knowledge, and longer periods of record for the water body in question.

**The consequences of a flood** are the estimated impacts associated with the flood occurrence. Consequences relate to humans activities within an area and how a flood impacts the natural and built environments.

## 1.3 Uses of this Report

The goal of this report is to help inform and enable communities and tribes to take action to reduce flood risk. Possible users of this report include:

- Local elected officials
- Floodplain managers
- Community planners
- Emergency managers
- Public works officials
- Other special interests (e.g., watershed conservation groups, environmental awareness organizations, etc.)

State, local, and tribal officials can use the summary information provided in this report to:

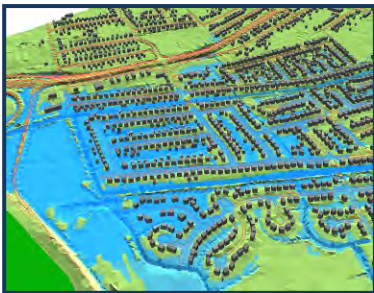
- **Update local hazard mitigation plans.** As required by the 2000 Federal Stafford Act, local hazard mitigation plans must be updated at least every five years. Summary information presented in Section 7 of this report can be used to identify areas that may need additional focus when updating the risk assessment section of a local hazard mitigation plan. Information found in Section 6 pertains to the different mitigation techniques and programs and can be used to inform decisions related to the mitigation strategy of local plans.



Vulnerability of infrastructure is another important consideration.



Flooding along the Wabash River in Clark County, Illinois, contributed to a federal disaster declaration on June 24, 2008.

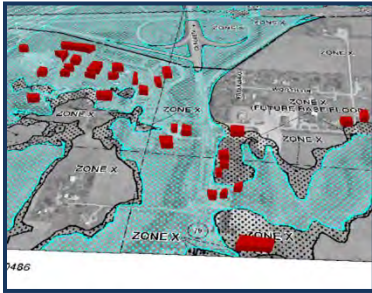


- **Update community comprehensive plans.** Planners can use flood risk information in the development and/or update of comprehensive plans, future land use maps, and zoning regulations. For example, zoning codes may be changed to better provide for appropriate land uses in high-hazard areas.
- **Update emergency operations and response plans.** Emergency managers can identify low-risk areas for potential evacuation and sheltering and can help first responders avoid areas of high-depth flood water. Risk assessment results may reveal vulnerable areas, facilities, and infrastructure for which planning for continuity of operations plans (COOP), continuity of government (COG) plans, and emergency operations plans (EOP) would be essential.
- **Develop hazard mitigation projects.** Local officials (e.g., planners and public works officials) can use flood risk information to re-evaluate and prioritize mitigation actions in local hazard mitigation plans.
- **Communicate flood risk.** Local officials can use the information in this report to communicate with property owners, business owners, and other citizens about flood risks, changes since the last FIRM, and areas of mitigation interest. The report layout allows community information to be extracted in a fact sheet format (see Section 7 for information about each community).
- **Inform the modification of development standards.** Floodplain managers, planners, and public works officials can use information in this report to support the adjustment of development standards for certain locations. For example, heavily developed areas tend to increase floodwater runoff because paved surfaces cannot absorb water, indicating a need to adopt or revise standards that provide for appropriate stormwater retention.

## 1.4 Related Resources

For a more comprehensive picture of a community's flood risk, FEMA recommends that state and local officials use the information provided in this report in conjunction with other sources of flood risk data, such as those listed below.

- **FIRM and FIS.** The information in these regulatory products indicate areas with specific flood hazards by identifying the limit and extent of the 1-percent-annual-chance floodplain and the 0.2-percent-annual-chance floodplain. Flood Insurance Rate Maps (FIRMs) and Flood Insurance Studies (FISs) do not identify all floodplains in a flood risk project. The FIS includes summary information regarding other frequencies of flooding, as well as flood profiles for riverine sources of flooding. In rural areas and areas for which flood hazard data are not available, the 1-percent-annual-chance floodplain may not be identified. In addition, the 1-percent-annual-chance floodplain may not be



Examples of how FEMA data can be leveraged to identify and measure vulnerability.

identified for flooding sources with very small drainage areas (less than 1 square mile). To obtain FIRM and FIS materials, visit the following web sites:

- FEMA Map Service Center: <http://msc.fema.gov>
- **Flood or multi-hazard mitigation plans.** Local hazard mitigation plans include risk assessments that contain flood risk information and mitigation strategies that identify community priorities and actions to reduce flood risk. This report was informed by existing mitigation plans.
- **Other risk assessment reports.** Hazus, a free risk assessment software application from FEMA, is the most widely used flood risk assessment tool available. Hazus can run different scenario floods (riverine and coastal) to determine how much damage might occur as a result. Hazus can also be used by community officials to evaluate flood damage that can occur based on new/proposed mitigation projects or future development patterns and practices. Hazus can also run specialized risk assessments, such as what happens when a dam or levee fails. Flood risk assessment tools are available through other agencies as well, including the National Oceanic and Atmospheric Administration (NOAA) and the U.S. Army Corps of Engineers (USACE). Other existing watershed reports may have a different focus, such as water quality, but may also contain flood risk and risk assessment information. See Section 9 for additional resources.
- **State Resources.** State agencies maintain useful information that is relevant to the risks present in their respective communities:
  - Minnesota Department of Natural Resources – FEMA Floodplain Maps: [http://www.dnr.state.mn.us/waters/watermgmt\\_section/floodplain/fema\\_firms.html](http://www.dnr.state.mn.us/waters/watermgmt_section/floodplain/fema_firms.html)





Flooding impacts non-populated areas too, such as agricultural lands and wildlife habitats.



For more information about Hazus and data inputs, visit <http://www.fema.gov/plan/prevent/hazus/index.shtm> or enter keywords “fema hazus” into an internet search engine.

## 2. Risk Analysis

### 2.1 Overview

Flood hazard identification uses FIRMs and FISs to identify where flooding can occur along with the probability and depth of that flooding. Flood risk assessment is the systematic approach to identifying how flooding impacts the environment. In hazard mitigation planning, flood risk assessments serve as the basis for mitigation strategies and actions by defining the hazard and enabling informed decision making. Fully assessing flood risk requires the following:

- Identifying the flooding source and determining the flood hazard occurrence probability
- Developing a complete profile of the flood hazard including historical occurrence and previous impacts
- Inventorying assets located in the identified flood hazard area
- Estimating potential future flood losses caused by exposure to the flood hazard area

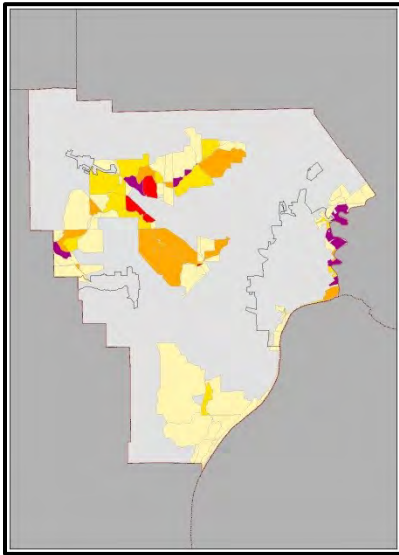
Flood risk analyses are different methods used in flood risk assessment to help quantify and communicate flood risk. Flood risk analysis can be performed on a large scale (state, community) level and on a very small scale (parcel, census block). Advantages of large-scale flood risk analysis, especially at the watershed level, include identifying how actions and development in one community can affect areas up- and downstream. On the parcel or census block level, flood risk analysis can provide actionable data to individual property owners so they can take appropriate mitigation steps.

### 2.2 Hazus and Resilience

There are a variety of methods for estimating flood loss. FEMA’s methodology for estimating loss uses the risk assessment tool, Hazus. Originally developed for earthquake risk assessment, Hazus has evolved into a multi-hazard tool developed and distributed by FEMA that can provide risk assessment information for floods, earthquakes, and hurricane winds. Hazus is a nationally accepted, consistent flood risk assessment tool to assist individuals and communities to create a more accurate picture of flood risk. Organizations can improve the results of Hazus analysis through input of local GIS data layers.

FEMA performed a Hazus Average Annualized Flood Loss (AAL) analysis for the nation. This initial national flood loss analysis covers the continental United States, covering 48 states and the District of Columbia. The summary results of the total annualized flood losses were released for use in Discovery and Resilience meetings and in some cases in updating mitigation plans. These summary results consisted of just the total annualized losses for each county at the census block level. The data were not broken out by loss types, nor did it include any of the 5 different storm return period losses that were performed and used to calculate the AAL. This data is used to show relative flood losses by Census Block for a selected area, such as watershed or county. Since the study





Sample Hazus Map

used the level 1 Hazus analysis, the relative losses are shown for each census block. The Hazus analysis uses an area weighted method that averages the total building values of the census block evenly across the area of the block. This can at times incorrectly represent the losses if the structures are not evenly located across the census block. Therefore, the AAL data should be used as an initial indicator for possible risk. Communities are encouraged to perform more detailed level Hazus analysis by using their building information and updated floodplain information.

A starting point for the Resilience Map is Level 1 Hazus data, showing where flood risk varies by geographic location. For emergency management, this map is a tool that can help identify losses based on predicted events so that resources can be assigned accordingly. Loss information can support floodplain management efforts, providing scientific support for higher regulatory standards. Awareness of exposed essential facilities and infrastructure can help local planners to identify mitigation actions that could protect citizens from service disruption in disaster events.

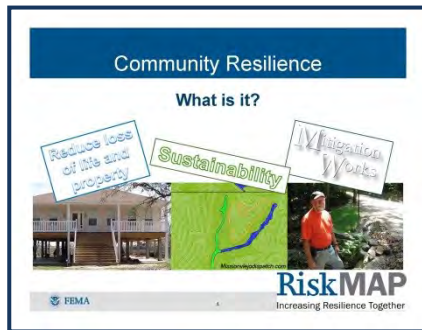
### 2.3 Loss Estimation Information

Loss estimate methodologies using the best available data will result in an approximation of risk. Such estimates should be used to understand relative risk from flood and potential losses. Uncertainties are inherent in any loss estimation methodology, arising in part from approximations and simplifications that are necessary for a comprehensive analysis (e.g., incomplete inventories, demographics, or economic parameters).

Flood loss estimates may result in useful information about :

- **Residential Asset Loss** includes direct building losses (estimated costs to repair or replace the damage caused to the building) for all classes of residential structures including single family, multi-family, manufactured housing, group housing, and nursing homes; as well as content losses.
- **Commercial Asset Loss** includes direct building losses for all classes of commercial buildings including retail, wholesale, repair, professional services, banks, hospitals, entertainment, and parking facilities. This also includes content and inventory losses.
- **Other Asset Loss** includes losses for facilities categorized as industrial, agricultural, religious, government, and educational. This also includes content and inventory losses.
- **Essential Facility Losses** considers facilities which provide services to the community and should be functional after a flood, including schools, police stations, fire stations, medical facilities, and emergency operation centers. These facilities are typically considered critical facilities for mitigation planning purposes.

- **Infrastructure.** For analysis of infrastructure, consider transportation systems and lifeline utility systems. Transportation systems include highways, railways, light railways, busses, ports and harbors, ferries, and airport systems. Utility systems include potable water systems, wastewater, oil, natural gas, electric power, and communication systems.
- **Business Disruption** includes the losses associated with the inability to operate a business due to the damage sustained during the flood. Losses include inventory, income, rental income, wage, and direct output losses, as well as relocation costs.
- **Annualized Losses** can be calculated by taking losses from multiple events over different frequencies and expressing the long-term average by year. This factors in historic patterns of frequent smaller floods with infrequent but larger events to provide a balanced presentation of flood damage.
- **Loss Ratio.** A loss ratio expresses the scenario losses divided by the total building value for a local jurisdiction and can be a gage to determine overall community resilience as a result of a scenario event. For example, a loss ratio of 5 percent for a given scenario would indicate that a local jurisdiction would be more resilient and recover more easily from a given event, versus a loss ratio of 75 percent which would indicate widespread losses. An annualized loss ratio uses the annualized loss data as a basis for computing the ratio. Loss ratios are not computed for business disruption.
- **Hazus Flood Risk Value.** On the Resilience Map, flood risk is expressed in the following five categories for census blocks that have flood risk: very low, low, medium, high, and very high. It is based on the 1-percent-annual-chance total asset loss by census block.



### 3. Chippewa County Resilience Meeting

#### 3.1 Community Resilience

Resilience is the ability to recover from or adjust easily to misfortune. In this case, resilience is how quickly or easily your community can return to normal after a flood event.

#### 3.2 Resilience Meeting

The planning, data delivery, and development of the Resilience Meeting was a collaborative effort between FEMA and the following partners: Minnesota Department of Natural Resources (MDNR) – Division of Ecological and Water Resources, Minnesota Department of Public Safety – Homeland Security and Emergency Management Division, and STARR, a contractor to FEMA. Prior to the meeting, the Planning team collaborated to establish project specific priorities, identify unique issues, determine data availability and requirements, document each community’s flood history, and review Multi-Hazard Mitigation Plans for status, expiration, and specifically identified mitigation actions. The Planning team also developed an invitation list consisting of state, county and community stakeholders.

##### 3.2.1 Overview

The objective of the Resilience Meeting is to increase the understanding and awareness in communities of their flood risk by discussing local flood-related issues, identifying potential strategies or actions to reduce flood risk, and providing communities with information regarding potential resources or programs designed to support the mitigation of flood risk. By participating in the Resilience Meeting communities are able to identify actions to reduce their constituents’ vulnerability to flood-related issues. The aim of the Resilience Meeting is to encourage communities to take the lead in protecting their constituents through mitigation activities.

Some examples of possible topics of discussion during the meeting include:

- Developing or enhancing a hazard mitigation plan;
- Local efforts taken on to document flood and/or other hazards;
- Possible mitigation activities and actions;
- Mitigation grants to support mitigation activities.

Prior to the Resilience Meeting, Hazard Mitigation Plans and a variety of data layers were examined to gain an understanding of the hazards in each community.

Chippewa County has a Hazard Mitigation Plan, All-Hazard Mitigation Plan for Chippewa County, and includes the communities of Clara City, Granite Falls, Maynard, Milan, Montevideo, and Watson. The plan was approved in August 2010 and expires in August 2015.

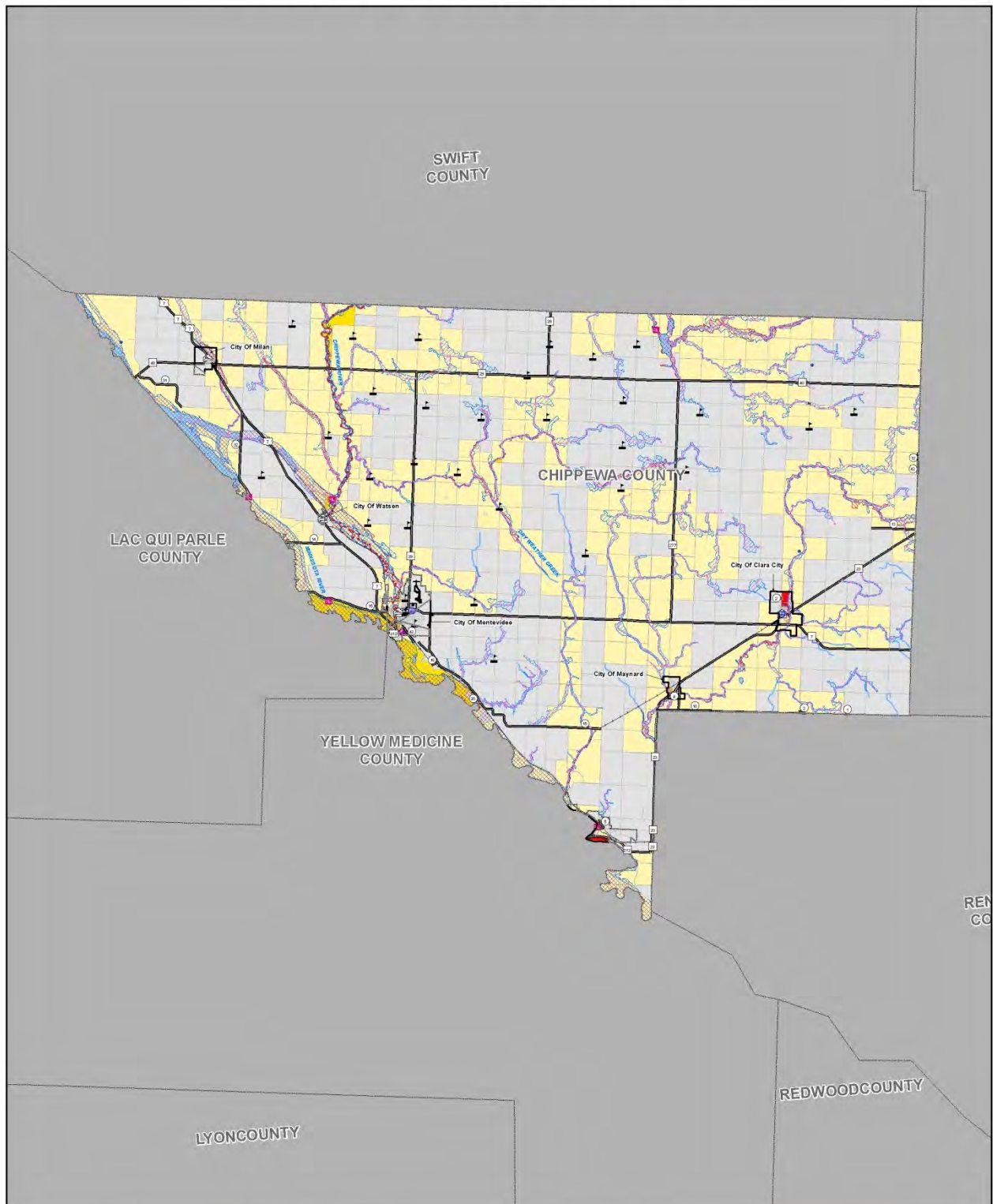


## Resilience Map Data

Data Types	Source	Notes
Base Map	Preliminary DFIRM Data	
Hydrography	Minnesota Data Deli, Preliminary DFIRM Data	<a href="http://deli.dnr.state.mn.us/">http://deli.dnr.state.mn.us/</a>
Transportation	Minnesota Department of Transportation	<a href="http://www.dot.state.mn.us/maps/gisbase/html/datafiles.html">http://www.dot.state.mn.us/maps/gisbase/html/datafiles.html</a>
Community Data	DFIRM, CIS	
Census blocks	Census 2000 Data	
LOMCs (LOMAs, LOMR-Fs)	National Flood Hazard Layer (NFHL)	
Hazus Level 1 AAL	Hazus	
Coordinated Needs Management Strategy (CNMS)	FEMA	
Critical Facilities	Hazus, Minnesota Data Deli	<a href="http://deli.dnr.state.mn.us/">http://deli.dnr.state.mn.us/</a>
Dams	Minnesota Data Deli	<a href="http://deli.dnr.state.mn.us/">http://deli.dnr.state.mn.us/</a>
Levees	Minnesota Data Deli	<a href="http://deli.dnr.state.mn.us/">http://deli.dnr.state.mn.us/</a>
Areas of Mitigation Interest	Community-identified in plans or meeting	

The data layers referenced above were used to produce a Resilience Map, which presents a general overview of features related to hazards and hazard mitigation in Chippewa County. The map was presented at the Resilience Meeting, which took place on August 29, 2012, to engage participating stakeholders in discussion about solutions to the hazards in their communities. The map is shown on the following page of this report.

## Resilience Map: Chippewa County, Minnesota



**Base Data**

- Corporate Limits
- Populated Places
- Interstates
- Major Roads
- Lakes
- Levees
- LOMA
- Rivers and Streams
- State Boundary
- Watershed Boundary
- Dams

### MAP SYMBOLLOGY

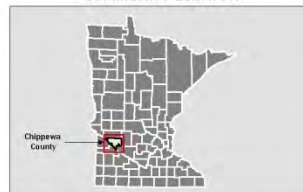
**Flood Risk**

- Very Low
- Low
- Medium
- High
- Very High
- SFHA
- Effective Flooding
- Streams Undergoing Preliminary Study
- CNMS
- Validated
- Unknown
- Unverified

### Critical Facilities

- Emergency Operation Center
- Fire Station
- Hospital
- Other
- Police Station
- School
- Airport

### COMMUNITY LOCATOR

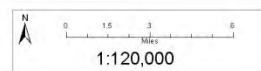


### Resilience Map

Chippewa County, MN



RELEASE DATE  
August 29, 2012





The first step of the Resilience Meeting is to sit down with each community and identify Areas of Mitigation Interest (AoMIs) on the Resilience Map. Section 4 of this report describes the types of AoMIs that communities may identify. Communities can identify new AoMIs not currently identified in their Hazard Mitigation Plans, if applicable, and also may identify mitigation actions currently listed in their Hazard Mitigation Plan. Communities may also identify mitigation interests such as creating or updating their Hazard Mitigation Plan, encouraging residents to join the NFIP by conducting an outreach campaign, designating a Local Floodplain Manager, or participating in the NFIP’s community rating system. Section 5 of this report provides examples of Mitigation Actions communities may adopt from structural projects requiring funding partnership or grant to local initiatives.

Once identified on the Resilience Map, AoMIs were then assessed and documented using the Action Tracker form and submitted to the Action Tracker (Section 5).

Section 8 of this report contains AoMI information relevant to each community identified in Chippewa County. The following mitigation actions were identified: NFIP Compliance Training, property acquisitions, levee construction and maintenance, storm shelter development, and the rebuilding of interior drainage pumps.

The number of AoMIs for each community identified at the Resilience Meeting is summarized below.

It is important to note, participation in the Resilience Meeting does not preclude communities from identifying additional AoMIs in the future and inputting that data into the Action Tracker. Hazard Mitigation Planning is a continuous process as described in Section 6.

Community Name	Number of Mitigation Actions Identified
Chippewa County (Unincorporated Areas)	2
Clara City, City of	1
Maynard, City of	1
Montevideo, City of	4



### 3.2.2 Meeting Information and Attendees

On August 29, 2012, FEMA and the State of Minnesota, with support from STARR (a contractor to FEMA), facilitated a Resilience Meeting for Chippewa County. The meeting, held at Chippewa County Courthouse, 629 North Eleventh Street, Montevideo, Minnesota, was attended by representatives from the communities of Clara City, Montevideo, and Chippewa County. The participants discussed local flood-related issues, identified potential strategies or actions to reduce flood risk, and obtained information regarding potential resources or programs designed to support communities in the mitigation of flood risk. The table below lists the meeting participants.

Affiliation	Title	First Name	Last Name
Chippewa County (Unincorporated Areas)	Chairman, Board of Commissioners	Jim	Dahlving
Chippewa County (Unincorporated Areas)	Land and Resource Management	Scott	Williams
Chippewa County (Unincorporated Areas)	Emergency Management	Marvin	Garbe
Clara City, City of	Administrator	Windy	Block
Montevideo, City of	Manager	Steven	Jones
Montevideo, City of	Community Development	Nick	Haggenmiller
Montevideo, City of	Engineer	Dave	Berryman
MDNR	Mapping Hydrologist	Suzanne	Jiwani
FEMA Region V	Engineer, Risk Analysis	Suzanne	Vermeer
Homeland Security Emergency Management	Regional Coordinator	Amy	Card
Homeland Security Emergency Management	Mitigation Planner	Jim	McClasky
STARR	Project Manager	Bo	Murphy



Dams vary in size and shape, the amount of water they impound, and their assigned hazard classification.



This dam failure caused flooding that damaged several homes and vehicles.

## 4. Identifying Areas of Mitigation Interest (AoMIs)

Many factors contribute to flooding and flood losses; some are natural, some are manmade, and others are a combination. In response to these risks, there has been a focus by the federal government, state agencies, and local jurisdictions to mitigate properties, structures, and infrastructure against the impacts of flood hazards so that future losses and impacts can be reduced. AoMIs are important to defining a more comprehensive picture of flood risk and mitigation activity in a watershed, identifying target areas and potential projects for flood hazard mitigation, encouraging local collaboration, and communicating how various mitigation activities can successfully reduce flood risk.

The Resilience Report and Resilience Map focus on identifying AoMIs that may be contributing (positively or negatively) to flooding and flood losses in the flood risk project. AoMIs are identified through revised hydrologic and hydraulic and/or coastal analyses, other studies, or previous flood studies; community supplied data from mitigation plans, floodplain management plans, and local surveys; and the mining of federal government databases (e.g., flood claims, disaster grants, and data from other agencies). Below is a list of the types of AoMIs that may be located in the project area.

### Dams

A dam is a barrier built across a waterway for impounding water. Dams vary from impoundments that are hundreds of feet tall and contain thousands of acre-feet of water (e.g. Hoover Dam) to small dams that are a few feet high and contain only a few acre-feet of water (e.g. small residential pond). “Dry dams,” which are designed to contain water only during floods and do not impound water except for the purposes of flood control, include otherwise dry land behind the dam.

While most modern, large dams are highly engineered structures with components such as impervious cores and emergency spillways, most smaller and older dams are not. State dam safety programs emerged in the 1960s, and the first Federal Guidelines for Dam Safety were not prepared until 1979. By this time, the vast majority of dams in the United States had already been constructed.

Why is a dam an AoMI?

- Many older dams were not built to any particular standard and thus may not withstand extreme rainfall events. Older dams in some parts of the country were made out of an assortment of materials. These structures may not have any capacity to release water and could be overtopped, which could result in catastrophic failure.

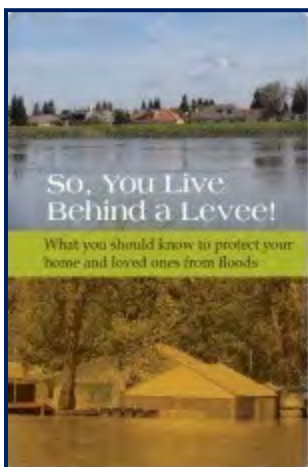


- Even dams that follow current dam safety programs may not be regulated, as downstream risk may have changed since the dam was constructed. Years after a dam is built, a house, subdivision, or other development may be constructed in the area downstream of the dam. Thus, a subsequent dam failure could result in damage. Since these dams are not regulated, it is impossible to predict how safe they are.
- A significant dam failure risk is structural deficiencies associated with older dams that are not being adequately addressed today through needed inspection/maintenance practices.
- For larger dams that were constructed in the past, a flood easement may have been obtained on a property; however, since that time the construction of buildings, though not allowed, was completed anyway. These buildings were usually constructed in violation of the flood easement.
- When a new dam is constructed, the placement of such a large volume of material in a floodplain area (if that is the dam location) will displace flood waters and can alter how the watercourse flows. This can result in flooding upstream, downstream, or both.
- For many dams, the dam failure inundation zone is not known. This is the area that would be flooded if the dam failed and the impoundment behind the dam drained. Not having knowledge of these risk areas could lead to unprotected development in these zones. Also, larger federal dams that do have inundation mapping are frequently restricted to “For Official Use Only” and are not made available to the public due to terrorism concerns.

### **Levees and Significant Levee-Like Structures (Embankments)**

FEMA defines a levee as “a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.” Levees are sometimes referred to as dikes. Soil used to construct a levee is compacted to make the levee as strong and stable as possible. To protect against erosion and scouring, levees can be covered with everything from grass and gravel to harder surfaces like stone (riprap), asphalt, or concrete.

Similar to dams, many levees have been built with minimal design standards. Many older levees were constructed in a variety of ways, from a farmer piling dirt along a stream to prevent nuisance flooding to levees made out of old mining spoil material. As engineered structures, levees are designed to a certain height and river water elevation. These structures can be overtopped or fail if a flood event is greater than the engineering design anticipated.



For more information about the risks associated with living behind levees, consult the publication “So You Live Behind a Levee!” published by the American Society of Civil Engineers at <http://content.asce.org/ASCELeveeGuide.html>

A floodwall is a vertical wall that is built to provide protection from a flood in a similar manner as a levee. Typically made of concrete or steel, floodwalls often are erected in urban locations where there is not enough room for a levee. Floodwalls are sometimes constructed on a levee crown to increase the levee's height.

Most new dams and levees are engineered to a certain design standard. If that design is exceeded, they could be overtopped or fail catastrophically, causing more damage than if the levee was not there in the first place. Many levees in the nation are built to the 1-percent-annual-chance flood protection rating, and the areas behind them are still at some risk for flooding. This threat is called residual risk. In some states, residual risk areas can extend up to 15 miles from a riverbank. Although the probability of flooding may be lower because a levee exists, risk is nonetheless still present. The American Society of Civil Engineers' publication "So You Live Behind a Levee!" provides an in-depth explanation of levee and residual risk.

Major embankments, on the other hand, are rarely designed with any flood protection level in mind. Railroads, road abutments, and canals—especially in the Western United States—are not considered levees or dams and have issues such as unknown construction materials/methods. These embankments are not regulated from a flood risk standpoint.

How can levees and major embankments contribute to flooding and flood losses?

- Like dams, many levees in the United States were constructed using unknown techniques and materials or may have been poorly maintained over time. These levees have a higher failure rate than those that have been designed to today's standards and have an active maintenance program.
- A levee might not provide the flood risk reduction it once did as a result of flood risk changes over time. Flood risk can change due to a number of factors, including increased flood levels due to climate change or better estimates of flooding, development in the watershed increasing flood levels and settlement of the levee or floodwall, and sedimentation in the levee channel. Increased flood levels mean decreased flood protection. The lack of adequate maintenance over time will also reduce the capability of a levee to contain the flood levels for which it was originally designed.
- Given enough time, any levee will eventually be overtopped or damaged by a flood that exceeds the levee's capacity. Still, a widespread public perception of levees is that they will always provide protection. This perception may lead to not taking mitigation actions such as purchasing flood insurance.



Canal levee breaches as a result of Hurricane Katrina in New Orleans in 2005. Note damages can be more extensive due to high velocity flood flows than if the levee was not there.



If the pinch point is a bridge or culvert, it can get washed out causing an area to become isolated and potentially more difficult to evacuate.



When a facility such as a hospital is flooded, it can result in a significant hardship on the community.

- A levee is a system that can fail due to its weakest point, and therefore maintenance is critical. Many levees in the United States have been poorly maintained or not maintained at all. Maintenance also includes maintaining the drainage systems behind the levees so they can keep the protected area dry.

### Stream Flow Pinch Points

A flow pinch point occurs when a human-made structure, such as a culvert or bridge, constricts the flow of a river or stream. The results of this constriction can be increased damage potential to the structure, an increase in velocity of flow through the structure, and the creation of significant ponding or backwater upstream of the structure. Regulatory standards regarding the proper opening size for a structure spanning a river or stream are not consistent and may be non-existent. Some local regulations require structures to pass a volume of water that corresponds to a certain size rain event; however, under sizing, these openings can result in flood damage to the structure itself. After a large flood event, it is not uncommon to have numerous bridges and culverts “washed out.”

How can stream flow pinch points contribute to flooding and flood losses?

- Flow pinch points can back water up on property upstream of the structure if not designed properly.
- These structures can accelerate the flow through the structure causing downstream erosion if not properly mitigated. This erosion can affect the structure itself, causing undermining and failure.
- If the pinch point is a bridge or culvert, it can get washed out causing an area to become isolated and potentially more difficult to evacuate.
- Washed-out culverts and associated debris can wash downstream and cause the next pinch point to fail.

### High-Risk Essential Facilities

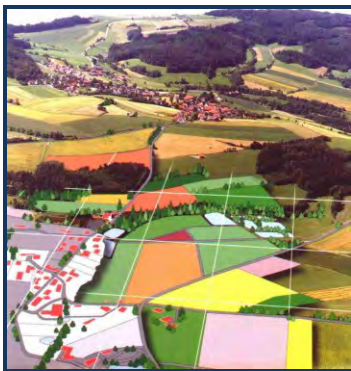
Essential facilities, sometimes called “critical facilities,” are those whose impairment during a flood could cause significant problems to individuals or communities. For example, when a community’s wastewater treatment is flooded and shut down, not only do contaminants escape and flow into the floodwaters, but backflows of sewage can contaminate basements or other areas of the community. Similarly, when a facility such as a hospital is flooded, it can result in a significant hardship on the community not only during the event but long afterwards as well.

How can high-risk essential facilities contribute to flooding and flood losses?

- Costly and specialized equipment may be damaged and need to be replaced.



Clusters of past flood insurance claims can show where there is a repetitive flood problem.



Rooftops, pavements, patios, and driveways contribute to the impervious area in a watershed.

- Impairments to facilities such as fire stations may result in lengthy delays in responding and a focus on evacuating the facility itself.
- Critical records and information stored at these facilities may be lost.

### **Past Flood Insurance Claims and Individual Assistance/Public Assistance Hotspots**

Assistance provided after flood events (flood insurance in any event and Individual Assistance [IA] or Public Assistance [PA] after declared disasters) occurs in flood affected areas. Understanding geographically where this assistance is being provided may indicate unique flood problems.

Flood insurance claims are not always equally distributed in a community. Although estimates indicate that 20 to 50 percent of structures in identified flood hazard areas have flood insurance, clusters of past claims may indicate where there is a flood problem. However, clusters of past claims and/or areas where there are high payments under FEMA's IA or PA Programs may indicate areas of significant flood hazard.

Why are past claim hot spots AoMIs?

- A past claim hotspot may reflect an area of recent construction (large numbers of flood insurance policies as a result of a large number of mortgages) and an area where the as-built construction is not in accordance with local floodplain management regulations.
- Sometimes clusters of past claims occur in subdivisions that were constructed before flood protection standards were in place, places with inadequate stormwater management systems, or in areas that may not have been identified as SFHAs.
- Clusters of IA or PA claims may indicate areas where high flood insurance coverage or other mitigation actions are needed.

### **Significant Land Use Changes**

Recent or proposed development in SFHAs must be carefully evaluated to ensure that no adverse impacts occur as a result. Development, whether it is a 100-lot subdivision or a single lot big box commercial outlet, can result in large amounts of fill and other material being deposited in flood storage areas. Development in flood hazard areas is only protected to a certain standard; floods that exceed those standards will damage the developed areas. Development also includes all necessary infrastructure and services to maintain that development over time.



One of the factors that contributes to flooding in a watershed is the amount of ground that is available to absorb water. When development occurs, hard surfaces such as rooftops, pavements, patios, and driveways do not allow water to absorb into the ground, and more of the rainwater becomes runoff flowing directly into streams and drainage ways. As a result, the “peak flow” in a stream or drainage way after a storm event will be higher and occur faster. Without careful planning, major land use changes can affect the impervious area of a site and result in a significant increase in flood risk.

Sometimes a major land use change may be for planning purposes only. For example, a land use change that rezones land from a classification such as floodplain that restricts development to a zone such as industrial or high density residential could result in significant new infrastructure and structures in high flood risk areas.

How can past or planned major land use changes in SFHAs contribute to flooding and flood losses?

- Development in areas mapped SFHA reduces flood storage areas, which can make flooding worse at the development site and downstream of it.
- Impervious surfaces speed up the water flowing in the streams, which can increase erosion and the danger that fast-flowing floodwaters pose to people and buildings.
- Rezoning flood-prone areas to high densities and/or higher intensity uses can result in more people and property at risk of flooding and flood damage.

### Key Emergency Routes Overtopped During Frequent Flooding Events

Roads are not always designed to flood protection levels. In fact, many major roadways including interstate highways, U.S. highways, and state routes are chronically flooded. When an alternative route is available, inconvenience is avoided and minor losses result. However, when no or lengthy alternate routes are available, when the road being overtopped conveys more traffic than alternate routes, or there is a large economic driver (i.e., industrial park), overtopping can result in significant economic losses as well as impact public safety.

Why are overtopped roads AoMIs?

- Such areas, when identified, can be accounted for and incorporated into evacuation and other operational plans.
- Overtopped roads can sometimes be elevated or reinforced to reduce the overtopping.



When large highways close due to flooding, traffic is detoured causing inconvenience and economic loss.

### **Drainage or Stormwater-Based Flood Hazard Areas, or Areas Not Identified as Floodprone on the FIRM But Known to Be Inundated**

Flood hazard areas exist everywhere. While FEMA maps many of these, others are not identified. Many of these areas may be located in communities with existing, older, and often inadequate stormwater management systems or in very rural areas. Other similar areas could be a result of complex or unique drainage characteristics. Even though they are not mapped, awareness of these areas is important so adequate planning and mitigation actions can be performed.

Why are drainage or stormwater-based flood hazard areas or unidentified floodprone locations AoMIs?

- So further investigation of such areas can occur and, based on scientific data, appropriate mitigation actions can result (i.e., land use and building standards).
- To create viable mitigation project applications in order to reduce flood losses.

### **Areas of Mitigation Success**

Flood mitigation projects are powerful tools to communicate the concepts of mitigation and result in more resilient communities. Multiple agencies have undertaken flood hazard mitigation actions for decades. Both structural measures—those that result in flood control structures—and non-structural measures have been implemented in thousands of communities. An extensive list of mitigation actions can be found in Section 5.

Why are areas of mitigation success AoMIs?

- Mitigation successes identify those areas within the community that have experienced a reduction or elimination of flood risk.
- Such areas are essential in demonstrating successful loss reduction measures and in educating citizens and officials on available flood hazard mitigation techniques.
- Avoided losses can be calculated and shown.

The Action Tracker is a valuable communication tool between FEMA, the State, and local officials to help organize, prioritize, and continually update and add mitigation actions and activities. For communities the Action Tracker is a valuable tool for identifying local areas of risk as they arise, updating Hazard Mitigation Plans, identifying projects for Capital Improvement Projects, and/or mitigation grants as they arise.

Before Mitigation and After Mitigation



Communities will need to prioritize projects as part of the planning process. FEMA can then help route federal mitigation dollars to fund these projects.



FEMA uses the Action Form and Action Tracker website to document and track local mitigation needs and actions.

## 5. Actions to Reduce Flood Risk

### 5.1 The Mitigation Action Form and Action Tracker

The Mitigation Action Form and Action Tracker are new Risk MAP tools designed to supplement existing mitigation planning processes. The Action Form, which aligns with questions on the Action Tracker website, can be completed by anyone that has identified a potential AoMI. Once in the Action Tracker, an AoMI can be tracked by a variety of entities, such as the community, the State of Minnesota, and FEMA, for different uses such as:

- To identify all AoMIs in a community, State, or Region,
- To document AoMIs in between mitigation plan updates,
- To track progress on mitigation activities,
- To assess the ability of the Risk MAP program to encourage communities to take action to reduce risk.

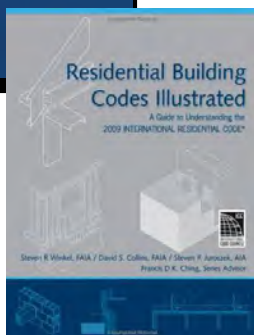
### 5.2 Types of Mitigation Actions

Mitigation provides a critical foundation on which to reduce loss of life and property by avoiding or lessening the impact of hazard events. This creates safer communities and facilitates resilience by enabling communities to return to normal function as quickly as possible after a hazard event. Once local officials understand risk from flooding and other hazards, the community is in a better position to identify potential mitigation actions that can reduce that risk to its people and property. FEMA mitigation plan requirements encourage communities to understand their vulnerability to hazards and take actions to minimize vulnerability and promote resilience.

There are 3 general categories of mitigation actions: Local Plans and Regulations, Community Identified Programs, and Structure and Infrastructure Projects. The FEMA Mitigation Action Form requests the identification of potential mitigation actions in one of these 3 categories. The outline presented below lists the types of the actions within each category:

#### Local Plans and Regulations

- **Building Codes.** The use and enforcement of building codes and development standards can ensure structures are able to withstand flooding. Potential actions include:
  - Adopt the International Building Codes.
  - Adopt ASCE 24.
  - Add or increase "freeboard" requirements (feet above BFE) in flood damage ordinance.
  - Extend freeboard requirement passed mapped floodplain to include equivalent land elevation.
  - Prohibit any fill within floodplain areas.
  - Prohibit all first floor enclosures below BFE for all structures in flood hazard areas.





- Use subdivision design standards to require elevation data collection during platting and to have buildable space on lots above the base flood elevation.
- Consider orientation of new development during design (e.g., subdivisions, buildings, infrastructure, etc.).
- Set the design flood elevation at or above the historical high water mark if it is above the mapped BFE.
- Require standard tie-downs of propane tanks.
- **Planning and Land Use Regulations** can mitigate flooding by influencing development. Consider updating and aligning Comprehensive and Master Plans, as well as other local plans to ensure that risk is considered at all levels of community planning. Strategies include:
  - Develop a floodplain management plan and update it regularly.
  - Adopt a post-disaster recovery ordinance based on a plan to regulate repair activity, generally depending on property location.
  - Establish a "green infrastructure" program to link, manage, and expand existing parks, preserves, greenways, etc.
  - Determine and enforce acceptable land uses to alleviate the risk of damage by limiting exposure in such hazard areas. Floodplain and coastal zone management can be included in comprehensive planning.
  - Consider hazards during infrastructure planning. For example, decisions to extend roads or utilities to an area may increase exposure to flood hazards.
  - Limit the percentage of allowable impervious surface within developed parcels.
  - Ensure the zoning ordinance encourages higher densities only outside of known hazards areas.
  - Prohibit or limit floodplain development through regulatory and/or incentive-based measures.
  - Require that floodplains be kept as open space.
  - Regularly calculate/document the amount of flood-prone property preserved as open space.
  - Limit the density of developments in the floodplain.
  - Pass and enforce an ordinance that regulates dumping in streams and ditches.
  - Consider obtaining easements for planned and regulated public use of privately owned land for temporary water retention and drainage.
  - Establish setback requirements and use large setbacks near erosion prone areas.
  - Protect public and private cemeteries with grassy berms and fences to prevent contents from floating away during flooding.





- **Stormwater Management.** Rainwater and snowmelt can cause flooding and erosion in developed areas. Stormwater management practices to prevent this includes:
  - Prepare and adopt a community-wide stormwater management master plan.
  - Complete a stormwater drainage study/plan for known problem areas.
  - Use stream restoration/channelization to ensure adequate drainage/diversion of stormwater.
  - Regulate development in upland areas in order to reduce stormwater run-off through a stormwater ordinance.
  - Link flood hazard mitigation objectives with EPA Stormwater Phase II initiatives.
  - Install, re-route, or increase the capacity of a storm drainage system.
  - Increase drainage or absorption capacities with detention and retention basins, relief drains, spillways, drain widening/dredging or rerouting, logjam and debris removal, extra culverts, bridge modification, dike setbacks, flood gates and pumps, or channel redirection.
  - Increase capacity of stormwater detention/retention basins.
  - Increase dimensions of drainage culverts in troublesome areas.
  - Design a "natural runoff" or "zero discharge" policy for stormwater in subdivision design.
  - Require more trees be preserved/planted in landscape designs to reduce the amount of stormwater runoff.
  - Require developers to plan for on-site sediment retention.
  - excessive stormwater/firefighting water source.
  - Encourage use of porous pavement, vegetative buffers, and islands in large parking areas and conforming pavement to land contours so as not to provide easier avenues for stormwater.
  - Encourage the use of permeable driveways and surfaces to reduce runoff and encourage groundwater recharge.
  - Provide grassy swales along roadside.
  - Adopt erosion and sedimentation control regulations for construction and farming.
- **Floodplain Management.** The National Flood Insurance Program (NFIP) enables property owners in participating communities to purchase insurance protection against flood losses. Actions to achieve eligibility in the program, maintain compliance, and ensure a successful local floodplain management program include:
  - Participate in the National Flood Insurance Program (NFIP).
  - Participate in the NFIP Community Rating System (CRS) or increase CRS rating.
  - Incorporate the ASFP's "No Adverse Impact" policy into local floodplain management plans/programs.



- Designate a Local Floodplain Manager/CRS Coordinator who achieves CFM certification.
- Adopt ordinances that meet minimum Federal and state requirements to comply with the NFIP.
- Revise the floodplain ordinance to incorporate cumulative substantial damage/improvement requirements.
- Adopt a "no-rise" in BFE clause for the flood damage prevention ordinance.
- Include requirements in the local floodplain ordinance for homeowners to sign non-conversion agreements for areas below BFE. Revise and update regulatory floodplain maps.
- Incorporate the procedures for tracking high water marks following a flood into emergency response plans.
- Complete and maintain FEMA elevation certificates for pre-FIRM and/or post-FIRM buildings.
- Require and maintain FEMA elevation certificates for all new/improved buildings located in floodplains.
- Establish and publicize a user-friendly, publically-accessible repository for inquirers to obtain FIRM maps.
- Develop an educational flyer targeting NFIP policyholders on ICC during post-flood damage assessments.
- Annually notify the owners of repetitive loss properties of FMA funding.
- Conduct NFIP Community Workshops to provide information and incentives for property owners to acquire flood insurance.
- Consider offering Incentives for building above required freeboard minimum (code plus).

### Community Identified Program

- **Develop Funding Mechanisms for Local Risk Reduction**, such as:
  - Use taxes to support a regulatory system.
  - Use impact fees to help fund public hazard mitigation projects related to land development (e.g., increased runoff).
  - Levy taxes to finance maintenance of drainage systems or to construct reservoirs.
- **Incentives for Local Risk Reduction.** Studies have shown that many people are willing to take actions to reduce their risk IF they believe they are actually AT risk. Improve flood awareness through outreach activities such as:
  - Encourage homeowners to purchase flood insurance.
  - Annually distribute flood protection/safety pamphlets/brochures to the owners of flood-prone property.
  - Encourage homeowners to install backflow valves to prevent reverse-flow flood damages.
  - Encourage residents in flood-prone areas to consider elevating homes.





- Encourage the public to help with debris control by securing debris, yard items, or stored objects that may otherwise be swept away, damaged, or pose a hazard if floodwaters would pick them up and carry them away.
- Encourage residents to keep storm drains clear of debris during storms (not to rely solely on Public Works).
- Educate citizens about safety during flood conditions, including the dangers of driving on flooded roads.
- Use outreach programs to: 1) advise homeowners of risks to life, health, and safety; 2) facilitate technical assistance programs that address measures that citizens can take; or 3) facilitate funding for mitigation measures.

- **Maintenance Program.** Regular maintenance will help drainage systems and flood control structures to continue to function properly. Some ideas include:

- Perform regular drainage system maintenance, such as sediment and debris clearance, as well as detection and prevention/discouragement of discharges into stormwater/sewer systems from home footing drains, downspouts, or sewer pumps.
- Implement an inspection, maintenance, and enforcement program to help ensure continued structural integrity of dams and levees.
- Routinely clean debris from support bracing underneath low-lying bridges.
- Routinely clean and repair stormwater drains.
- Regularly clear sediment build-up on riverbanks near aerial lines.
- Incorporate ice jam prevention techniques as appropriate

### Structure and Infrastructure Projects

- **Structure Protection.** There are many ways to protect residential and non-residential structures from flood damage, including:
  - Acquire or relocate structures and preserve lands subject to repetitive flooding from voluntary property owners.
  - Elevate structures so that the lowest floor, including the basement, is raised above the base flood elevation. Utilities or other mechanical devices should also be raised above expected flood levels.
  - Manufactured homes should be elevated above the base flood elevation and anchored or, more preferably, kept out of the floodplain.
  - Relocate utilities and water heaters above BFE and consider the use of tankless water heaters if there are space limitations.



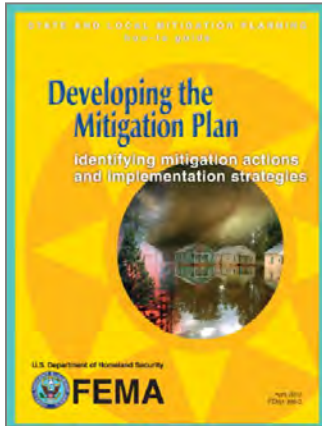




- In a basement, wet-floodproofing may be preferable to attempting to keep water out completely because it allows for controlled flooding to balance exterior and interior wall forces and discourages structural collapse. Use water resistant paints or other materials to allow for easy cleanup after floodwater exposure in accessory structures or in a garage area below an elevated residential structure.
- Encourage wet floodproofing of areas above BFE.
- Dry floodproof non-residential structures by strengthening walls, sealing openings, or using waterproof compounds or plastic sheeting on walls to keep water out.
- **Infrastructure and Critical Facility Protection.** Techniques can be used to protect infrastructure and critical facilities from flood events, such as:
  - Require all critical facilities meet requirements of Executive Order 11988 and be built 1 foot above the 500-year flood elevation.
  - Elevate roads above the base flood elevation to maintain dry access. In situations where flood waters tend to wash roads out, construction, reconstruction, or repair can include not only attention to drainage, but also stabilization or armoring of vulnerable shoulders or embankments.
  - Raise low-lying bridges.
  - Consider back-up generators for pumping and lift stations in sanitary sewer systems along with other measures (e.g., alarms, meters, remote controls, and switchgear upgrades).
  - Raise electrical components of sewage lift stations above BFE.
  - Install flood telemetry system in sewage lift stations.
  - Floodproof sewage treatment plants located in flood hazard areas.
  - Build earthen dike around flood-threatened critical facilities.
  - Install/upgrade stormwater pumping stations.
  - Raise manhole openings using concrete pillars.
  - Install watertight covers or inflow guards on sewer manholes.
  - Depending on its infrastructure capabilities, encourage the use of check valves, sump pumps, and backflow prevention devices in homes and buildings.
- **Flood Control Structures** can be built to prevent flood damage. Examples include:
  - Use structural flood control measures (e.g., levees, dams, or floodwalls) to channel water away from people and property.
  - Use minor structural projects that are smaller and more localized (e.g., levees, floodwalls, dams) in areas that cannot be mitigated through non-structural activities or where structural activities are not feasible due to low densities.
  - Consider dikes, levees, floodwalls, and berms to minimize the impacts of flooding.



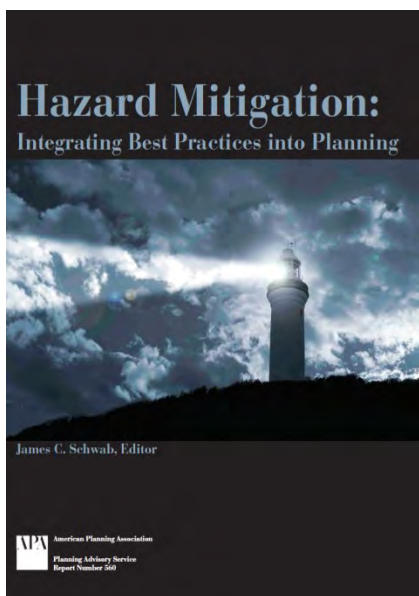
- Use revetments (hardened materials placed atop existing riverbanks or slopes) to protect against floods.
- **Natural Systems** provide floodplain protection, riparian buffers, and other ecosystem services that mitigate flooding. It is important to preserve such functionality with the following:
  - Use vegetative management, such as vegetative buffers, around streams and water sources.
  - Retain natural vegetative bed in stormwater channels.
  - Protect/enhance landforms that serve as natural mitigation features (i.e., riverbanks, wetlands, dunes, etc.).
  - Protect and preserve wetlands to help prevent flooding in other areas.
  - Retain thick vegetative cover on public lands flanking rivers.
  - Establish and manage riparian buffers along rivers and streams.
  - Develop an open space acquisition, reuse, and preservation plan targeting hazard areas.
  - Develop a land banking program for the preservation of the natural and beneficial functions of flood hazard areas.
  - Compensate an owner for partial rights, such as easement or development rights, to prevent a property from being developed.
  - Use transfer of development rights to allow a developer to increase densities on another parcel that is not at risk in return for keeping floodplain areas vacant.
- **Soil Stabilization or Erosion Control.** To stabilize slopes that may be susceptible to erosion, consider options such as:
  - Prevent erosion with proper bank stabilization, sloping or grading techniques, planting vegetation on slopes, terracing hillsides, or installing riprap boulders or geotextile fabric.
  - Plant mature trees in the coastal riparian zone to assist in dissipation of the wind force in the breaking wave zone.
  - Stabilize cliffs with terracing or plantings of grasses or other plants to hold soil together.
  - Use a hybrid of hard/soft engineering techniques (i.e., combine low-profile rock, rubble, oyster reefs, or wood structures with vegetative planting or other soft stabilization techniques).
  - Implement marine riparian habitat reinstatement/revegetation.
  - Use a rock splash pad to direct runoff and minimize the potential for erosion.



Refer to FEMA Mitigation Planning How To Guide #3 (FEMA 386-3) "Developing the Mitigation Plan - Identifying Mitigation Actions and Implementation Strategies" for more information on how to identify specific mitigation actions to address hazard risk in your community.

As many mitigation actions are possible to lessen the impact of floods, how can a community decide which ones are appropriate to implement? There are many ways to identify specific actions most appropriate for a community. Some factors to consider may include the following:

- **Site characteristics.** Does the site present unique challenges (e.g., significant slopes or erosion potential)?
- **Flood characteristics.** Are the flood waters affecting the site fast or slow moving? Is there debris associated with the flow? How deep is the flooding?
- **Social acceptance.** Will the mitigation action be acceptable to the community?
- **Technical feasibility.** Is the mitigation action technically feasible (e.g., making a building watertight to a reasonable depth)?
- **Administrative feasibility.** Is there administrative capability to implement the mitigation action?
- **Legal.** Does the mitigation action meet all applicable codes, regulations, and laws? Public officials may have a legal responsibility to act and inform citizens if a known hazard has been identified.
- **Economic.** Is the mitigation action affordable? Is it eligible under grant or other funding programs? Can it be completed within existing budgets?
- **Environmental.** Does the mitigation action cause adverse impacts on the environment or can they be mitigated? Is it the most appropriate action among the possible alternatives?



FEMA in collaboration with the American Planning Association has released the publication, "Integrating Hazard Mitigation into Local Planning." This guide explains how hazard mitigation can be incorporated into several different types of local planning programs. For more information go to [www.planning.org](http://www.planning.org) or <http://www.fema.gov/library>.

## 6. Hazard Mitigation Planning

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. Mitigation activities may be implemented prior to, during, or after an incident. However, it has been demonstrated that hazard mitigation is most effective when based on an inclusive, comprehensive, long-term plan that is developed before a disaster occurs. Hazard mitigation planning helps communities develop strategies to reduce their risk to natural hazard events.

Mitigation Plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage. The planning process is as important as the plan itself. It creates a framework for risk-based decision making to reduce damages to lives, property, and the economy from future disasters.

### 6.1 Getting Started

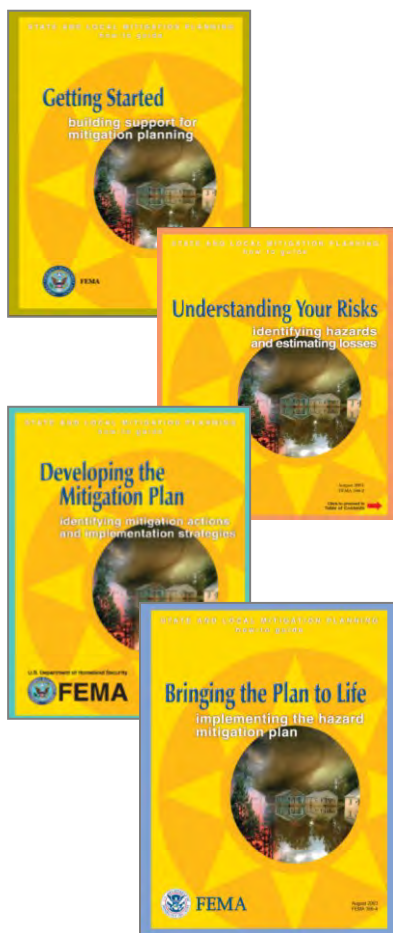
An important first step in developing a single or multi-jurisdictional plan is to identify and gather local resources to help plan development. There are a variety of resources to consider.

- Technical resources include local universities, regional planning agencies, program staff and professional associations.
- Financial resources may be available from a number of FEMA grant programs or by splitting up the cost collaboratively amongst plan stakeholders.
- Written resources include existing planning documents such as Comprehensive Plans, Land Use Plans, Capital Improvement Plans, Community Budgets, Emergency Operations Plans, Flood Insurance Studies, Risk MAP products, Floodplain management Ordinances, Landslide Studies, etc.
- Human resources are those dedicated and interested individuals identified to be on the planning team.

Planning team members can come from a variety of groups, organizations or boards, including:

- individuals such as local planning or emergency management staff, leaders of previous hazard mitigation planning efforts, local residents, business owners, elected officials,
- Regional, Tribal, State or Federal agencies,
- academic institutions,
- professional organizations,
- local and regional agencies involved in hazard mitigation activities,
- agencies with the authority to regulate development and neighboring communities.





FEMA has developed a series of guidance on developing local hazard mitigation plans.

## 6.2 Understanding Community Risk

The second step in hazard mitigation planning is to assess the local risk. Risk assessment provides the factual basis for mitigation activities proposed in the plan. There are four steps to perform a risk assessment:

- Hazard identification is the process of determining those hazards that threaten a given area.
- After hazards are identified, profile the hazard to determine the impact, extent and probability.
- Inventory of assets involves identification of critical facilities that are vulnerable to hazards. Examples of critical facilities include essential facilities like hospitals, schools, or police and fire stations. Other critical facilities may include transportation systems, utility systems, high potential loss facilities like nuclear power plants or dams, and hazardous material facilities.
- Finally, estimate the potential losses from a natural hazard event.

The results of hazard identification include a list of all hazards that threaten the community, a list of sources of this information (plans, reports, web sites, articles), a list of hazards to be investigated further, and a list of hazards that will not be considered further in the plan, including an explanation why ruled out.

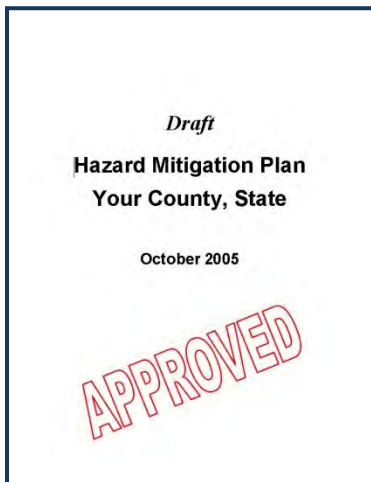
## 6.3 Developing the Mitigation Plan

The third step of mitigation planning is to develop the plan. A mitigation plan should include mitigation goals and objectives that are long-term, measurable and connected to potential future mitigation actions. The risk assessment should be used to develop problem statements for each hazard that clearly define the hazard, frequency, timing, and level of impact. An example of a problem statement is “Tornadoes and high winds occur at least once every three years and cause loss of life and structural damage. The high school has been hit several times.” These problem statements should be used to develop goals. The goal for the high school could be, “Protect existing critical facilities from tornadoes and high winds.”

## 6.4 Plan Adoption and Review

Individual communities are responsible for developing and adopting the hazard mitigation plan, and then submitting the plan to the state for review. The State Hazard Mitigation Officer (SHMO) is responsible for developing a state-wide plan and supporting local and tribal efforts. The SHMO also conducts a preliminary review of local and tribal plans, checking the plan for completeness and for state and federal requirements. If the state does not approve the plan, it may return it to the community rather than sending it on to FEMA.





FEMA has ten Regional Offices tasked with reviewing and approving state, tribal and local hazard mitigation plans. FEMA adds its comments to the state's review comments and discusses areas of diverging opinion with the state reviewer. FEMA ensures that the comments are precise and specifies any required and recommended revisions. Then FEMA transmits its findings to the local community through the SHMO. FEMA Regional Offices also provide technical assistance to states and tribes.

## 6.5 Implementation

Once approved by the state and FEMA, local officials commit to the mitigation goals and actions by adopting the mitigation plan. To begin implementation, stakeholder responsibilities should be reviewed and clarified to confirm that individuals and agencies understand their roles and responsibilities, such as:

- The planning team can oversee implementation.
- Local officials can provide direction, visibility and budget.
- State agencies can provide technical assistance and funding.
- Nonprofit and private sectors, academia and citizens can provide time, money and knowledge.

It is important that communities publicize adoption of the plan, including that it was approved by FEMA. Public support can be encouraged by beginning a mitigation action immediately and publicizing the initiation and ongoing progress.

## 7. Mitigation Programs and Assistance

Not all mitigation activities require funding, and those that do are not limited to outside funding sources. For those mitigation actions that require assistance through funding or technical expertise, several state and federal agencies have flood hazard mitigation grant programs and offer technical assistance. These programs may be funded at different levels over time or may be activated under special circumstances such as after a presidential disaster declaration.

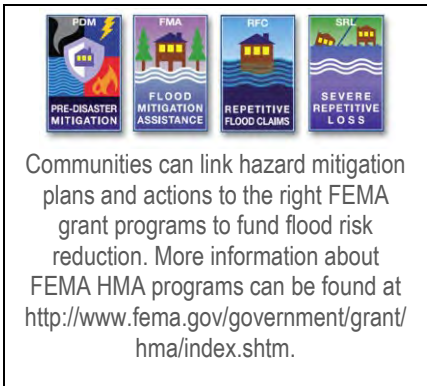
FEMA awards many mitigation grants each year to states and communities to undertake mitigation projects to prevent future loss of life and property resulting from hazard impacts, including flooding. The FEMA Hazard Mitigation Assistance (HMA) programs provide grants for mitigation through the programs listed below.

**FEMA Hazard Mitigation Assistance Programs**

Mitigation Grant Program	Authorization	Purpose
Hazard Mitigation Grant Program (HMGP)	Robert T. Stafford Disaster Relief and Emergency Assistance Act	Activated after a presidential disaster declaration; provides funds on a sliding scale formula based on a percentage of the total federal assistance for a disaster for long-term mitigation measures to reduce vulnerability to natural hazards
Flood Mitigation Assistance (FMA)	National Flood Insurance Reform Act	Reduce or eliminate claims against the NFIP
Pre-Disaster Mitigation (PDM)	Disaster Mitigation Act	National competitive program focused on mitigation project and planning activities that address multiple natural hazards (program under review)
Repetitive Flood Claims (RFC)	Bunning-Bereuter-Blumenauer Flood Insurance Reform Act	Reduce flood claims against the NFIP through flood mitigation; properties must be currently NFIP insured and have had at least one NFIP claim
Severe Repetitive Loss (SRL)	Bunning-Bereuter-Blumenauer Flood Insurance Reform Act	Reduce or eliminate the long-term risk of flood damage to SRL residential structures currently insured under the NFIP

The HMGP and PDM programs offer funding for mitigation planning and project activities that address multiple natural hazard events. The FMA, RFC, and SRL programs focus funding efforts on reducing claims against the NFIP. Funding under the HMA programs is subject to availability of annual appropriations, and HMGP funding is also subject to the amount of FEMA disaster recovery assistance provided under a presidential major disaster declaration.

FEMA's HMA grants are awarded to eligible states, tribes, and territories (applicant) that, in turn, provide subgrants to local governments and communities (subapplicant). The applicant selects and prioritizes subapplications developed and submitted to them by subapplicants and submits



them to FEMA for funding consideration. Prospective subapplicants should consult the office designated as their applicant for further information regarding specific program and application requirements. Contact information for the FEMA Regional Offices and State Hazard Mitigation Officers (SHMO) is available on the FEMA website ([www.fema.gov](http://www.fema.gov)).

**Individual Assistance (IA)** is money or direct assistance to individuals, families and businesses in an area whose property has been damaged or destroyed and whose losses are not covered by insurance. It is meant to help with critical expenses that cannot be covered in other ways. This assistance is not intended to restore a damaged property to its condition before the disaster. Assistance includes:

- **Temporary Housing** can include money made available to rent a different place to live or a government provided housing unit when rental properties are not available.
- **Repair or Replacement.** Money is available to homeowners to repair damage to, or replace, a primary residence damaged in a disaster that is not covered by insurance. The goal is to make the damaged home safe, sanitary, and functional.
- **Permanent Housing Construction** is direct assistance or money for the construction of a home. This type of help occurs only in insular areas or remote locations specified by FEMA, where no other type of housing assistance is possible.
- **Other** than housing needs, money is available for necessary expenses and serious needs caused by the disaster, including disaster-related medical and dental costs, funeral and burial cost, clothing, household items, tools or educational materials required for a job or school, fuel for primary heat source, clean-up items, disaster-damaged vehicle, moving and storage expenses related to the disaster, other necessary expenses or serious needs as determined by FEMA, and other expenses that are authorized by law.

#### **Public Assistance (PA)**

The mission of the Federal Emergency Management Agency's (FEMA) Public Assistance (PA) Grant Program is to provide assistance to state, Tribal and local governments, and certain types of Private Non-Profit (PNP) organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President.

Through the PA Program, FEMA provides supplemental Federal disaster grant assistance for debris removal, emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain PNP organizations. The PA Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process.

The Federal share of assistance is not less than 75% of the eligible cost for emergency measures and permanent restoration. The grantee (usually the State) determines how the non-Federal share (up to 25%) is split with the subgrantees.

Several additional agencies including USACE, Natural Resource Conservation Service (NRCS), U.S. Geological Survey (USGS), and others have specialists on staff and can offer further information on flood hazard mitigation. The State NFIP Coordinator and SHMO are state-level sources of information and assistance, which vary among different states.

## 8. County and Community Resilience Summaries

The following section provides an overview of each of the communities in Chippewa County, Minnesota and their results from the Resilience Meeting, which took place on August 29, 2012, in terms of Locally-Identified Problem Areas and Locally-Identified Mitigations Actions. Communities are encouraged to add additional actions as they arise within the community as well as maintain and update the actions recorded in the Action Tracker as part of this Resilience meeting.

### 8.1 Chippewa County (Unincorporated Areas)

#### Overview

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

Community Name	CID	Total Community Population	NFIP Participant	CRS Rating	Mitigation Plan Effective Date	Mitigation Plan Expiration Date
Chippewa County (Unincorporated Areas)	270066	12,441	Y	N/A	2010	2015

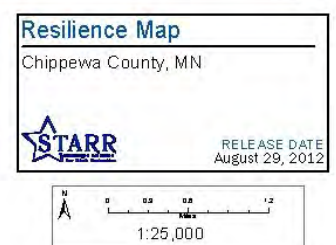
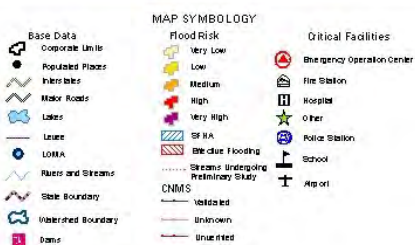
- Mitigation Plan: All-Hazard Mitigation Plan for Chippewa County
- Past Federal Disaster Declarations: 9
- NFIP policy coverage (policies/value): 5 policies totaling approximately \$1,200,000
- NFIP-recognized repetitive loss properties: 5

#### Locally-Identified Problem Areas

Sections 4 of the Resilience Report provides more information regarding Areas of Mitigation Interest (AoMI) and how they are identified and defined. The following map shows the AoMIs identified by the community in the mitigation plan or at the Resilience Meeting. Only the map panels with AoMIs identified on them have been included in this report for the Unincorporated Areas of Chippewa County. For the complete set of all the full size maps for the Unincorporated Areas of Chippewa County, please see Appendix A.

Please note that your community can update and identify new AoMIs and Mitigation Actions at any time using the Action Tracker.

The map displays the geographical context of the proposed Shakopee Lake Dam. It shows the Shakopee River flowing through the region, with several lakes and wetlands. The proposed dam is located on the Shakopee River, near the intersection of the river and the Shakopee Lake. The map includes labels for various locations, including 'Shakopee Lake Dam', 'Shakopee Lake', and 'Shakopee River'. The map is divided into sections, with the proposed dam location marked by a red dot and labeled 'Shakopee Lake Dam'. The map also shows the locations of several other dams, including the 'Shakopee Lake Dam' and the 'Shakopee Lake Dam'. The map is titled 'SWIFT COUNTY' and 'CHIPPEWA COUNTY'.



## Locally-Identified Mitigation Actions

Section 5 of the Resilience Report provides detailed information about potential mitigation actions that could be considered for each type of flood-related problem (or AoMI). The table below reports the actions identified either in the local hazard mitigation plan or at the Resilience Meeting and entered into FEMA's Action Tracker, a datasystem that houses locally-identified mitigation actions. To access the Action Tracker and modify community actions, register at the Action Tracker website at <http://fema.starr-team.com>.

Map Identifier	Mitigation Activity Name	Mitigation Action Status	Category Type (Category Subtype)	Responsible Agency	Estimated Cost	Funding Source (Funding Type)	Additional Detail
1	NFIP Compliance Training for County FPA and Board	Identified	Floodplain Management	Multiple	Unknown	Other	For the responsible agency, the Building Code Department, Community Development, and Planning are listed. For the potential funding source, it's stated there is no need for funding but the state NFIP coordinator and FEMA may be able to provide training.
2	Pursue HM Plan Actions Identified for County	Identified	Floodplain Management	Multiple	Unknown	FEMA	For the responsible agency, emergency management and planning are listed

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## 8.2 Clara City, City of

### Overview

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

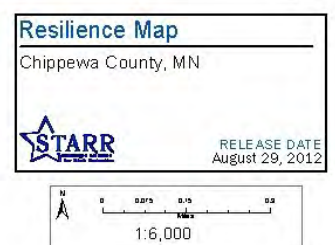
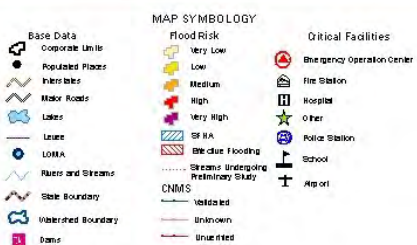
Community Name	CID	Total Community Population	NFIP Participant	CRS Rating	Mitigation Plan Effective Date	Mitigation Plan Expiration Date
Clara City, City of	270067	1,360	Y	N/A	2010	2015

- Mitigation Plan: All-Hazard Mitigation Plan for Chippewa County
- Past Federal Disaster Declarations: 9
- NFIP policy coverage (policies/value): 2 policies totaling approximately \$98,000
- NFIP-recognized repetitive loss properties: 0

### Locally-Identified Problem Areas

Sections 4 of the Resilience Report provides more information regarding Areas of Mitigation Interest (AoMI) and how they are identified and defined. The following map shows the AoMIs identified by the community in the mitigation plan or at the Resilience Meeting. For a full size version of the following map, please see Appendix A. Please note that your community can update and identify new AoMIs and Mitigation Actions at any time using the Action Tracker.

The map displays the geographical layout of Clara City, Minnesota, with various land use zones and infrastructure. Five specific locations are highlighted with green dots and numbered 1 through 5. Location 1 is situated in the northern part of the city, within a red-shaded area. Locations 2 and 3 are clustered in the central urban area, near the Clara City Volunteer Fire Department. Location 4 is located in the southern part of the city, near a yellow-shaded area. Location 5 is positioned further south, near a river or stream. The map also shows the boundaries of Chippewa County to the west and south, and a major road running diagonally through the city.





## Locally-Identified Mitigation Actions

Section 5 of the Resilience Report provides detailed information about potential mitigation actions that could be considered for each type of flood-related problem (or AoMI). The table below reports the actions identified either in the local hazard mitigation plan or at the Resilience Meeting and entered into FEMA's Action Tracker, a datasystem that houses locally-identified mitigation actions. To access the Action Tracker and modify community actions, register at the Action Tracker website at <http://fema.starr-team.com>.

Map Identifier	Mitigation Activity Name	Mitigation Action Status	Category Type (Category Subtype)	Responsible Agency	Estimated Cost	Funding Source (Funding Type)	Additional Detail
1-5	Hawk Creek Bridge Crossings	Identified	Structure and Infrastructure Projects (Flood Control/ Management)	Public Works	Unknown	County	Lat - Long varies for the five bridges...State Highway 7 Bridge: 44.949, -95.364; Main Street Bridge: 44.952, -95.363; Center East Avenue Bridge: 44.958, -95.363; State Highway 23 Bridge: 44.957, -95.363; Watchler Avenue Bridge: 44.964, -95.364

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### 8.3 Granite Falls, City of

#### Overview

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

Community Name	CID	Total Community Population	NFIP Participant	CRS Rating	Mitigation Plan Effective Date	Mitigation Plan Expiration Date
Granite Falls, City of	270068	2,897	Y	N/A	2010	2015

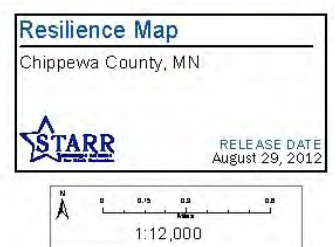
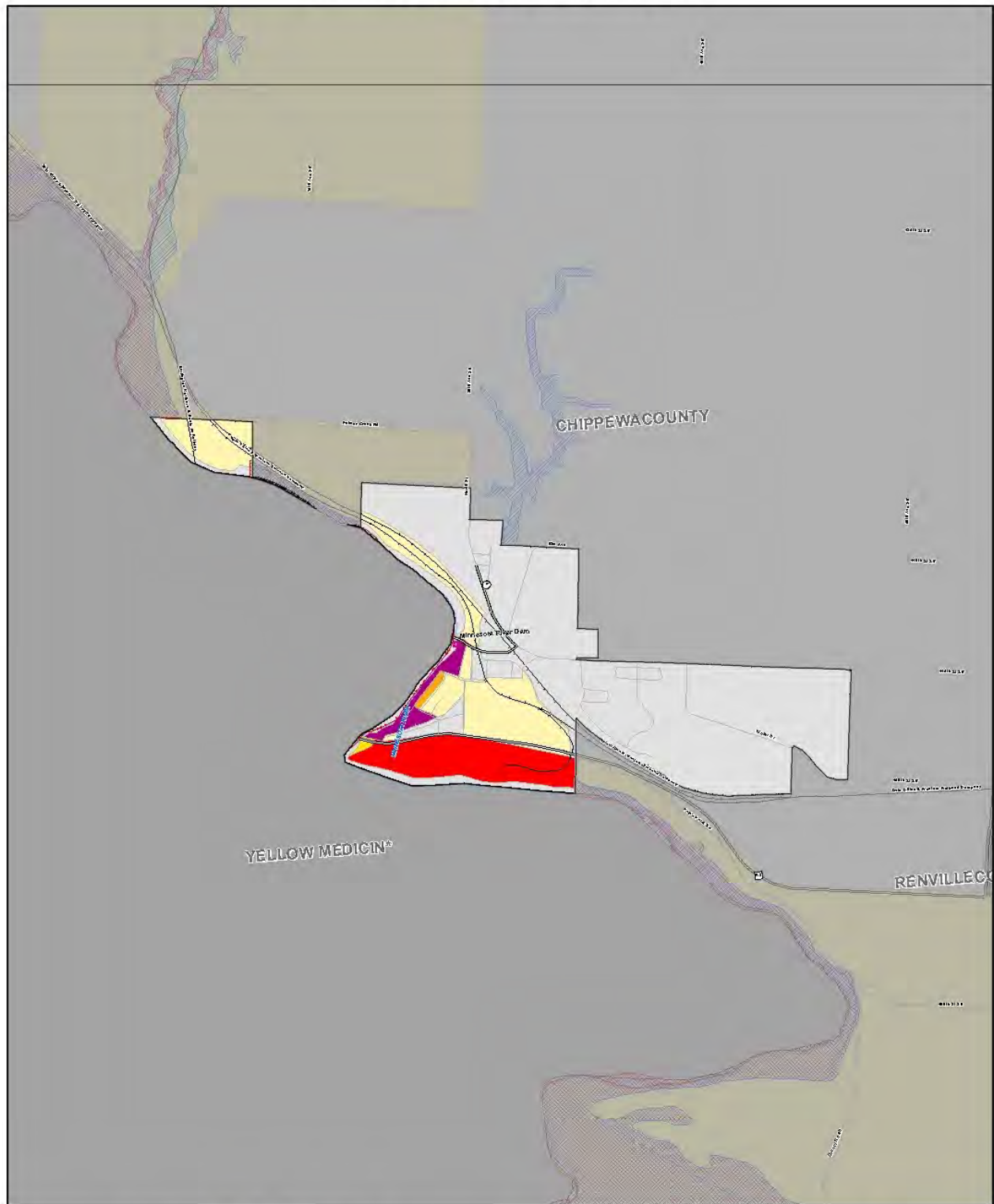
- Mitigation Plan: All-Hazard Mitigation Plan for Chippewa County
- Past Federal Disaster Declarations: 9
- NFIP policy coverage (policies/value): 39 policies totaling approximately \$9,367,000
- NFIP-recognized repetitive loss properties: 16

#### Locally-Identified Problem Areas

Sections 4 of the Resilience Report provides more information regarding Areas of Mitigation Interest (AoMI) and how they are identified and defined. The following map shows the AoMIs identified by the community in the mitigation plan or at the Resilience Meeting. For a full size version of the following map, please see Appendix A.

There were no AoMIs or Mitigation Actions identified in the City of Granite Falls during the Resilience Meeting. However, the City of Granite Falls can identify AoMIs and Mitigation Actions at any time using the Action Tracker.

## Resilience Map: City of Granite Falls



## Locally-Identified Mitigation Actions

Section 5 of the Resilience Report provides detailed information about potential mitigation actions that could be considered for each type of flood-related problem (or AoMI). The table below reports the actions identified either in the local hazard mitigation plan or at the Resilience Meeting and entered into FEMA's Action Tracker, a datasystem that houses locally-identified mitigation actions. To access the Action Tracker and modify community actions, register at the Action Tracker website at <http://fema.starr-team.com>.

Map Identifier	Mitigation Activity Name	Mitigation Action Status	Category Type (Category Subtype)	Responsible Agency	Estimated Cost	Funding Source (Funding Type)	Additional Detail
N/A							

The Action Tracker is a tool for use by FEMA, States, and communities to document mitigation actions. Users can register on the home page, then select an area of interest using either the interactive map or by selecting their Region, State, and community name. The Action Form, which can be downloaded from the top right side of the webpage, mimics the data entry boxes for entering a new action or modifying an existing action. Updating actions as they are progressed or refined supports FEMA goals to increase community resilience. For communities, the Action Tracker is a valuable tool for identifying local areas of risk as they arise, updating Hazard Mitigation Plans, identifying projects for Capital Improvement Projects, and/or mitigation grants as they may arise. Please contact Thomas Smith at [Thomas.Smith6@fema.dhs.gov](mailto:Thomas.Smith6@fema.dhs.gov) for more information or support.

## 8.4 Maynard, City of

### Overview

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

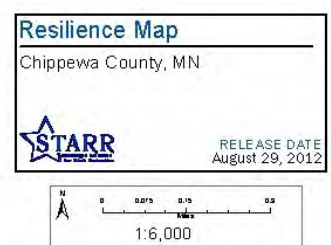
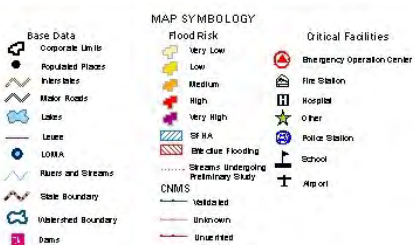
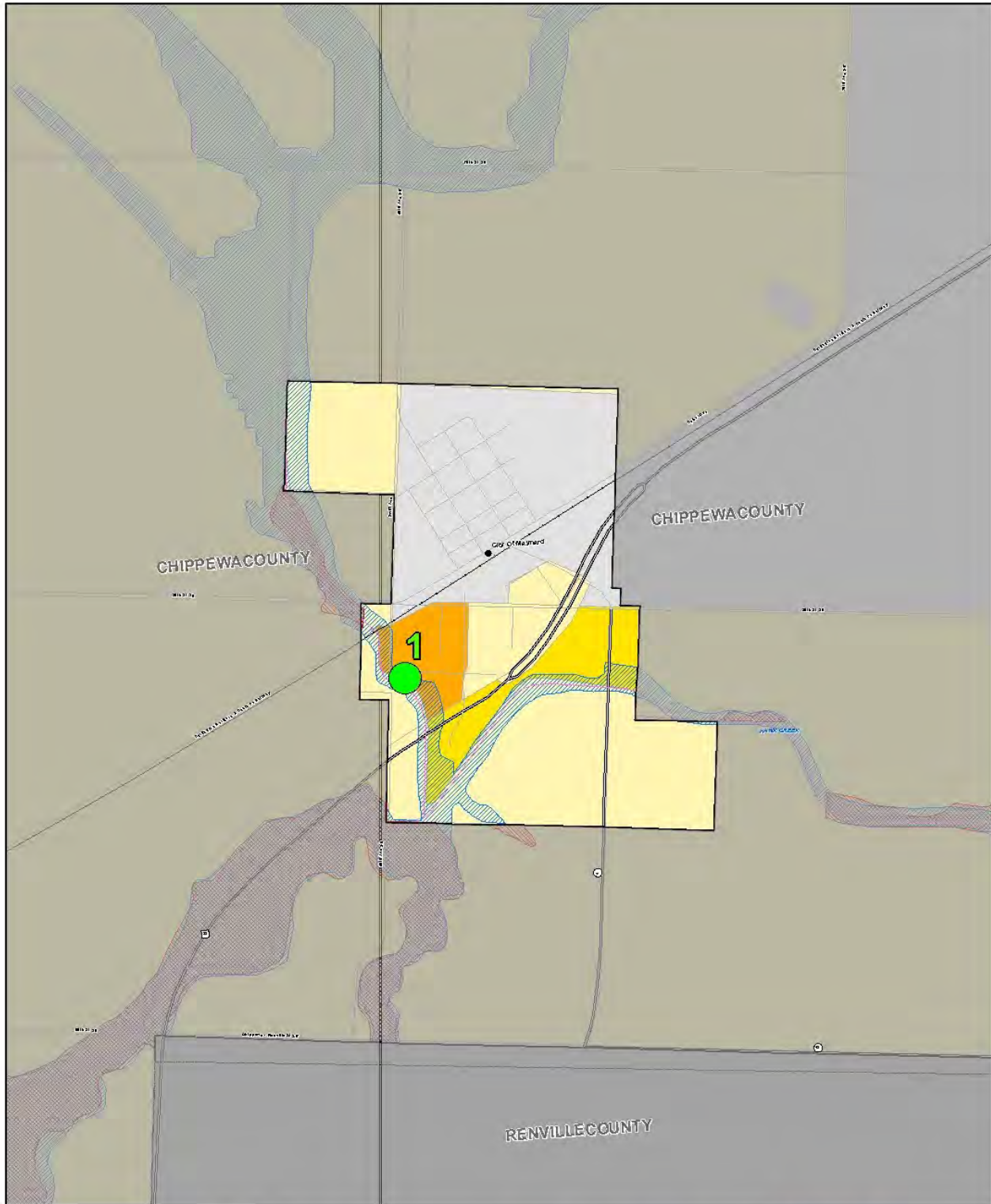
Community Name	CID	Total Community Population	NFIP Participant	CRS Rating	Mitigation Plan Effective Date	Mitigation Plan Expiration Date
Maynard, City of	270587	366	Y	N/A	2010	2015

- Mitigation Plan: All-Hazard Mitigation Plan for Chippewa County
- Past Federal Disaster Declarations: 9
- NFIP policy coverage (policies/value): N/A
- NFIP-recognized repetitive loss properties: 0

### Locally-Identified Problem Areas

Sections 4 of the Resilience Report provides more information regarding Areas of Mitigation Interest (AoMI) and how they are identified and defined. The following map shows the AoMIs identified by the community in the mitigation plan or at the Resilience Meeting. For a full size version of the following map, please see Appendix A. Please note that your community can update and identify new AoMIs and Mitigation Actions at any time using the Action Tracker.

## Resilience Map: City of Maynard



## Locally-Identified Mitigation Actions

Section 5 of the Resilience Report provides detailed information about potential mitigation actions that could be considered for each type of flood-related problem (or AoMI). The table below reports the actions identified either in the local hazard mitigation plan or at the Resilience Meeting and entered into FEMA's Action Tracker, a datasystem that houses locally-identified mitigation actions. To access the Action Tracker and modify community actions, register at the Action Tracker website at <http://fema.starr-team.com>.

Map Identifier	Mitigation Activity Name	Mitigation Action Status	Category Type (Category Subtype)	Responsible Agency	Estimated Cost	Funding Source (Funding Type)	Additional Detail
1	Ditch Bank Levee	Identified	Flood Control/Management (Dams/Levees)	Community Development	Unknown	Multiple Sources	For the potential funding source, the state and FEMA are listed.

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## 8.5 Milan, City of

### Overview

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

Community Name	CID	Total Community Population	NFIP Participant	CRS Rating	Mitigation Plan Effective Date	Mitigation Plan Expiration Date
Milan, City of	270589	369	N	N/A	2010	2015

- Mitigation Plan: All-Hazard Mitigation Plan for Chippewa County
- Past Federal Disaster Declarations: 9
- NFIP policy coverage (policies/value): N/A
- NFIP-recognized repetitive loss properties: 0

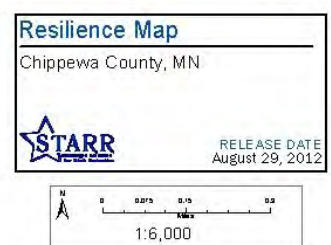
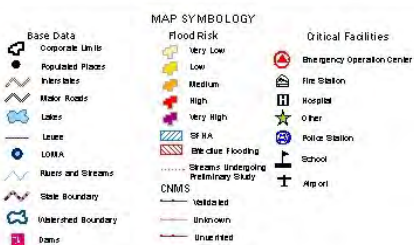
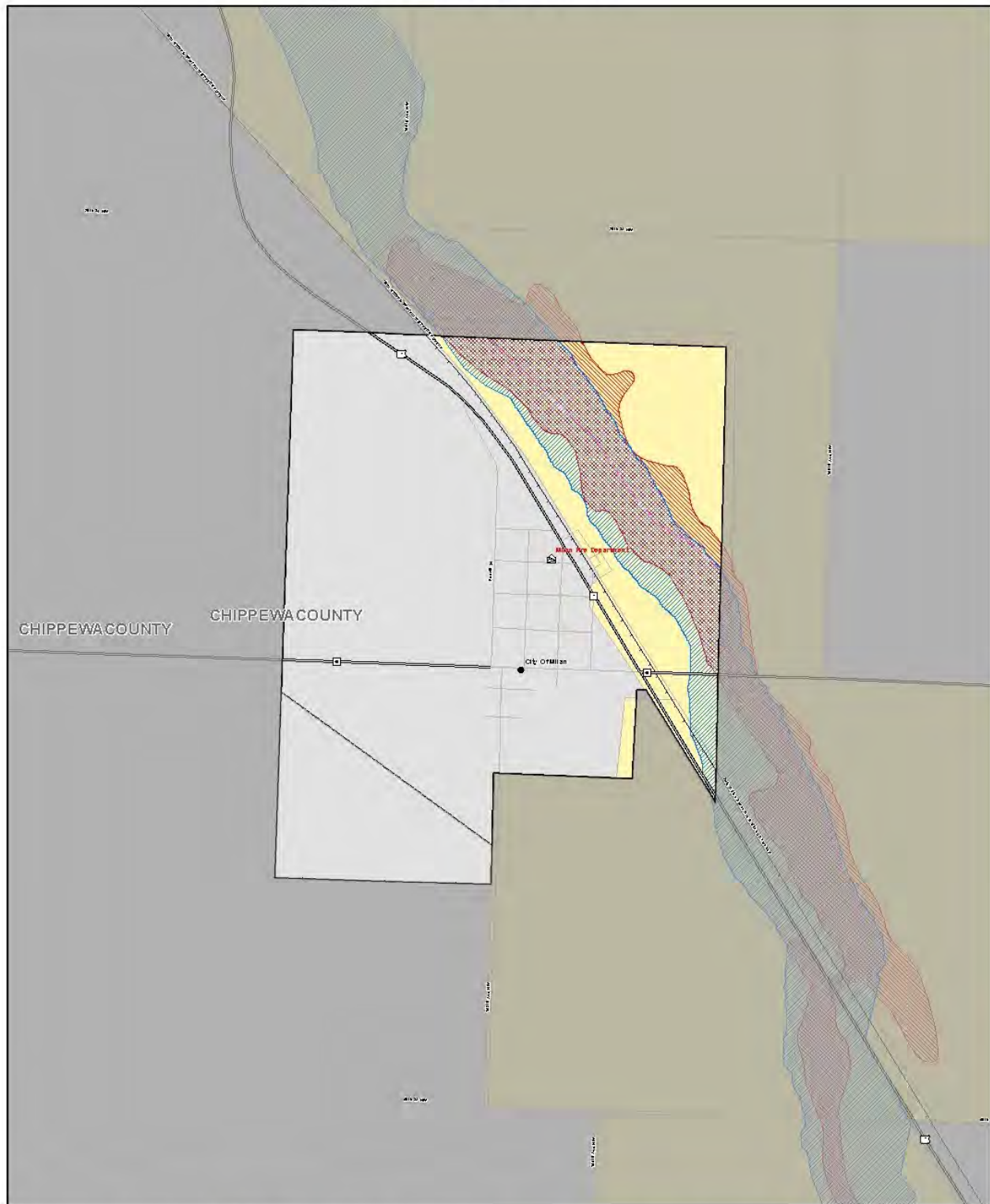
### Locally-Identified Problem Areas

Sections 4 of the Resilience Report provides more information regarding Areas of Mitigation Interest (AoMI) and how they are identified and defined. The following map shows the AoMIs identified by the community in the mitigation plan or at the Resilience Meeting. For a full size version of the following map, please see Appendix A.

There were no AoMIs or Mitigation Actions identified in the City of Milan during the Resilience Meeting. However, the City of Milan can identify AoMIs and Mitigation Actions at any time using the Action Tracker.



## Resilience Map: City of Milan



## Locally-Identified Mitigation Actions

Section 5 of the Resilience Report provides detailed information about potential mitigation actions that could be considered for each type of flood-related problem (or AoMI). The table below reports the actions identified either in the local hazard mitigation plan or at the Resilience Meeting and entered into FEMA's Action Tracker, a datasystem that houses locally-identified mitigation actions. To access the Action Tracker and modify community actions, register at the Action Tracker website at <http://fema.starr-team.com>.

Map Identifier	Mitigation Activity Name	Mitigation Action Status	Category Type (Category Subtype)	Responsible Agency	Estimated Cost	Funding Source (Funding Type)	Additional Detail
N/A							

The Action Tracker is a tool for use by FEMA, States, and communities to document mitigation actions. Users can register on the home page, then select an area of interest using either the interactive map or by selecting their Region, State, and community name. The Action Form, which can be downloaded from the top right side of the webpage, mimics the data entry boxes for entering a new action or modifying an existing action. Updating actions as they are progressed or refined supports FEMA goals to increase community resilience. For communities, the Action Tracker is a valuable tool for identifying local areas of risk as they arise, updating Hazard Mitigation Plans, identifying projects for Capital Improvement Projects, and/or mitigation grants as they may arise. Please contact Thomas Smith at [Thomas.Smith6@fema.dhs.gov](mailto:Thomas.Smith6@fema.dhs.gov) for more information or support.

## 8.6 Montevideo, City of

### Overview

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

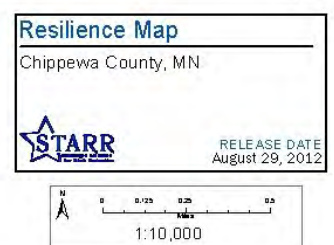
Community Name	CID	Total Community Population	NFIP Participant	CRS Rating	Mitigation Plan Effective Date	Mitigation Plan Expiration Date
Montevideo, City of	275243	5,383	Y	5	2010	2015

- Mitigation Plan: All-Hazard Mitigation Plan for Chippewa County
- Past Federal Disaster Declarations: 9
- NFIP policy coverage (policies/value): 31 policies totaling approximately \$9,459,800
- NFIP-recognized repetitive loss properties: 7

### Locally-Identified Problem Areas

Sections 4 of the Resilience Report provides more information regarding Areas of Mitigation Interest (AoMI) and how they are identified and defined. The following map shows the AoMIs identified by the community in the mitigation plan or at the Resilience Meeting. For a full size version of the following map, please see Appendix A. Please note that your community can update and identify new AoMIs and Mitigation Actions at any time using the Action Tracker.

The map displays the City of Montevideo with four green numbered circles (1, 2, 3, 4) marking specific locations. The map includes major roads such as 80th Ave SW, 40th St SW, 50th Ave SW, 60th St SW, and 15th St SW. It also shows geographical features like Spring Creek, Carlton Lake, and the Twin Cities & Western Railroad Company. The City of Montevideo is labeled in the center.





## Locally-Identified Mitigation Actions

Section 5 of the Resilience Report provides detailed information about potential mitigation actions that could be considered for each type of flood-related problem (or AoMI). The table below reports the actions identified either in the local hazard mitigation plan or at the Resilience Meeting and entered into FEMA's Action Tracker, a datasystem that houses locally-identified mitigation actions. To access the Action Tracker and modify community actions, register at the Action Tracker website at <http://fema.starr-team.com>.

Map Identifier	Mitigation Activity Name	Mitigation Action Status	Category Type (Category Subtype)	Responsible Agency	Estimated Cost	Funding Source (Funding Type)	Additional Detail
1	Storm Shelter	Scoped	Structure and Infrastructure Projects (Structural)	Community Development	Unknown	Multiple Sources	For the hazard type, tornado and wind are listed. For the potential funding source, FEMA and the property owner are listed.
2	Buyouts in Smith Avenue	In Progress	Structure and Infrastructure Projects	Other	Unknown	Multiple Sources	For the responsible agency, the City Manager is listed. For the funding source, the community, state, and FEMA are listed.
3	Rebuild Existing Interior Pump in Smith Park	Scoped	Structure and Infrastructure Projects (Other)	Other	Unknown	Multiple Sources	For the mitigation category sub-type, interior pump is listed. For the responsible agency, the City Manager is listed. For the potential funding source, the community, state, and FEMA are listed.
4	Phase 3 Levee Construction and Buyouts	In Progress	Structure and Infrastructure Projects	Other	Unknown	Multiple Sources	For the responsible agency, the City Manager is listed. For the potential funding source, the community, state, FEMA, USACE, and MNDNR are listed.

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## 8.7 Watson, City of

### Overview

The information below provides an overview of the community's floodplain management program information as of the date of this publication.

Community Name	CID	Total Community Population	NFIP Participant	CRS Rating	Mitigation Plan Effective Date	Mitigation Plan Expiration Date
Watson, City of	270610	205	N	N/A	2010	2015

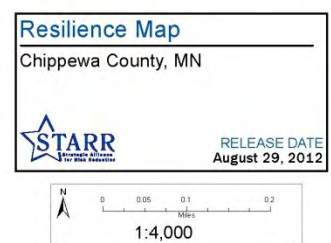
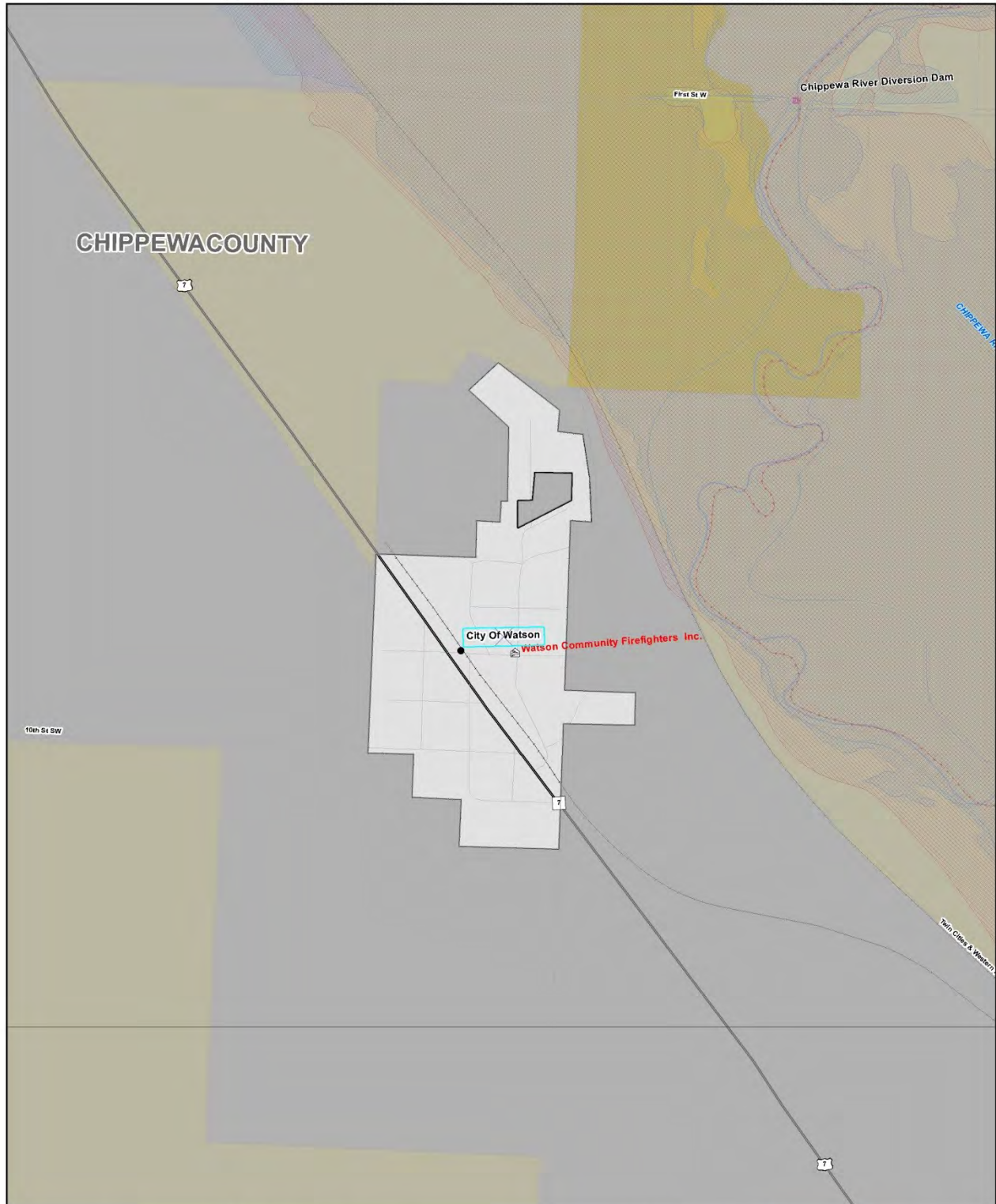
- Mitigation Plan: All-Hazard Mitigation Plan for Chippewa County
- Past Federal Disaster Declarations: 9
- NFIP policy coverage (policies/value): N/A
- NFIP-recognized repetitive loss properties : 0

### Locally-Identified Problem Areas

Sections 4 of the Resilience Report provides more information regarding Areas of Mitigation Interest (AoMI) and how they are identified and defined. The following map shows the AoMIs identified by the community in the mitigation plan or at the Resilience Meeting. For a full size version of the following map, please see Appendix A.

There were no AoMIs or Mitigation Actions identified in the City of Watson during the Resilience Meeting. However, the City of Watson can identify AoMIs and Mitigation Actions at any time using the Action Tracker.

## Resilience Map: City of Watson



## Locally-Identified Mitigation Actions

Section 5 of the Resilience Report provides detailed information about potential mitigation actions that could be considered for each type of flood-related problem (or AoMI). The table below reports the actions identified either in the local hazard mitigation plan or at the Resilience Meeting and entered into FEMA's Action Tracker, a datasystem that houses locally-identified mitigation actions. To access the Action Tracker and modify community actions, register at the Action Tracker website at <http://fema.starr-team.com>.

Map Identifier	Mitigation Activity Name	Mitigation Action Status	Category Type (Category Subtype)	Responsible Agency	Estimated Cost	Funding Source (Funding Type)	Additional Detail
N/A							

The Action Tracker is a tool for use by FEMA, States, and communities to document mitigation actions. Users can register on the home page, then select an area of interest using either the interactive map or by selecting their Region, State, and community name. The Action Form, which can be downloaded from the top right side of the webpage, mimics the data entry boxes for entering a new action or modifying an existing action. Updating actions as they are progressed or refined supports FEMA goals to increase community resilience. For communities, the Action Tracker is a valuable tool for identifying local areas of risk as they arise, updating Hazard Mitigation Plans, identifying projects for Capital Improvement Projects, and/or mitigation grants as they may arise. Please contact Thomas Smith at [Thomas.Smith6@fema.dhs.gov](mailto:Thomas.Smith6@fema.dhs.gov) for more information or support.



## 9. Acronyms and Definitions

### A

AAL	Average Annualized Loss
ALR	Annualized Loss Ratio
<i>AoMI</i>	<i>Areas of Mitigation Interest</i>

### B

BCA	Benefit-Cost Analysis
BFE	Base Flood Elevation
BMP	Best Management Practices

### C

CFR	Code of Federal Regulations
COG	Continuity of Government Plan
COOP	Continuity of Operations Plan
CRS	Community Rating System
CSLF	Changes Since Last FIRM

### D

DHS	Department of Homeland Security
DMA 2000	Disaster Mitigation Act of 2000

### E

EOP	Emergency Operations Plan
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### F

FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FRD	Flood Risk Database
FRM	Flood Risk Map
FRR	Flood Risk Report
FY	Fiscal Year

### G

GIS	Geographic Information System
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### H

HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program

### I

IA	Individual Assistance
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### L

LOMA	Letter of Map Amendment
LOMC	Letter of Map Change
LOMR-F	Letter of Map Revision Based on Fill

### N

NFIA	National Flood Insurance Act
NFIP	National Flood Insurance Program
NRCS	Natural Resource Conservation Service

### P

PA	Public Assistance
PDM	Pre-Disaster Mitigation

### R

RFC	Repetitive Flood Claims
Risk MAP	Mapping, Assessment, and Planning

### S

SFHA	Special Flood Hazard Area
SHMO	State Hazard Mitigation Officer
SRL	Severe Repetitive Loss

### U

USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey

**0.2-percent-annual-chance flood** – The flood elevation that has a 0.2-percent chance of being equaled or exceeded each year. Sometimes referred to as the 500-year flood.

**1-percent-annual-chance flood** – The flood elevation that has a 1-percent chance of being equaled or exceeded each year. Sometimes referred to as the 100-year flood.

**Average Annualized Loss (AAL)** – The estimated long-term weighted average value of losses to property in any single year in a specified geographic area

**Annualized Loss Ratio (ALR)** – Expresses the annualized loss as a fraction of the value of the local inventory (total value/annualized loss).

**Base Flood Elevation (BFE)** – Elevation of the 1-percent-annual-chance flood. This elevation is the basis of the insurance and floodplain management requirements of the NFIP.

**Berm** – A small levee, typically built from fill dirt.

**Cfs** – Cubic feet per second, the unit by which discharges are measured (a cubic foot of water is about 7.5 gallons).

**Consequence (of flood)** – The estimated damages associated with a given flood occurrence.

**Crest** – The peak stage or elevation reached or expected to be reached by the floodwaters of a specific flood at a given location.

**Dam** – Any artificial barrier that impounds or diverts water and that: (1) is 25 feet or more in height from the natural bed of the stream or watercourse measured at the downstream toe of the barrier or from the lowest elevation of the outside limit of the barrier if it is not across a stream channel or watercourse, to the maximum water storage elevation or (2) has an impounding capacity at maximum water storage elevation of 50 acre-feet or more.

**Design flood event** – The greater of the following two flood events: (1) the base flood, affecting those areas identified as SFHAs on a community's FIRM; or (2) the flood corresponding to the area designated as a flood hazard area on a community's flood hazard map or otherwise legally designated.

**Erosion** – Process by which floodwaters lower the ground surface in an area by removing upper layers of soil.

**Essential facilities** – Facilities that, if damaged, would present an immediate threat to life, public health, and safety. As categorized in Hazus, essential facilities include hospitals, emergency operations centers, police stations, fire stations, and schools.

**Flood** – A general and temporary condition of partial or complete inundation of two or more acres of normally dry land area or of two or more properties (at least one of which is your property) from: overflow of inland or tidal waters; unusual and rapid accumulation or runoff of surface waters from any source; mudflow; or collapse or subsidence of land along the shore of a lake or similar body of water as a result of erosion or undermining caused by waves or currents of water exceeding anticipated cyclical levels that result in a flood as defined above.

**Flood Insurance Rate Map (FIRM)** – An official map of a community, on which FEMA has delineated both the SFHAs and the risk premium zones applicable to the community. See also Digital Flood Insurance Rate Map.

**Flood Insurance Study (FIS)** – Contains an examination, evaluation, and determination of the flood hazards of a community, and if appropriate, the corresponding water-surface elevations.

**Flood risk** – Probability multiplied by consequence; the degree of probability that a loss or injury may occur as a result of flooding. Sometimes referred to as vulnerability.

**Floodborne debris impact** – Floodwater moving at a moderate or high velocity can carry floodborne debris that can impact buildings and damage walls and foundations.

**Floodwall** – A long, narrow concrete or masonry wall built to protect land from flooding.

**Floodway (regulatory)** – The channel of a river or other watercourse and that portion of the adjacent floodplain that must remain unobstructed to permit passage of the base flood without cumulatively increasing the water surface elevation more than a designated height (usually 1 foot).

**Floodway fringe** – The portion of the SFHA that is outside of the floodway.

**Flow pinch point** – A point where a human-made structure constricts the flow of a river or stream.

**Freeboard** – The height above the base flood added to a structure to reduce the potential for flooding. The increased elevation of a building above the minimum design flood level to provide additional protection for flood levels higher than the 1-percent-chance flood level and to compensate for inherent inaccuracies in flood hazard mapping.

**Hazus** – A GIS-based risk assessment methodology and software application created by FEMA and the National Institute of Building Sciences for analyzing potential losses from floods, hurricane winds, and earthquakes.

**High velocity flow** – Typically comprised of floodwaters moving faster than 5 feet per second.

**Loss ratio** – Expresses loss as a fraction of the value of the local inventory (total value/loss).

**Levee** – A human-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

**Mudflow** – A river of liquid and flowing mud on the surfaces of normally dry land areas, as when earth is carried by a current of water.

**Probability (of flood)** – The likelihood that a flood will occur in a given area.

**Risk MAP** – A FEMA strategy to work collaboratively with state, local, and tribal entities to deliver quality flood data that increases public awareness and leads to action that reduces risk to life and property.

**Riverine** – Of or produced by a river. Riverine floodplains have readily identifiable channels.

**Special Flood Hazard Area (SFHA)** – Portion of the floodplain subject to inundation by the base flood.

**Stafford Act** – Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-707, signed into law November 23, 1988; amended the Disaster Relief Act of 1974, PL 93-288. This Act constitutes the statutory authority for most federal disaster response activities especially as they pertain to FEMA and FEMA programs.

**Stillwater** – A rise in the normal level of a water body.

**Vulnerability** – Probability multiplied by consequence; the degree of probability that a loss or injury may occur as a result of flooding. Sometimes referred to as flood risk.

## 10. Additional Resources

**ASCE 7** – National design standard issued by the American Society of Civil Engineers (ASCE), *Minimum Design Loads for Buildings and Other Structures*, which gives current requirements for dead, live, soil, flood, wind, snow, rain, ice, and earthquake loads, and their combinations, suitable for inclusion in building codes and other documents.

**ASCE 24-05** – National design standard issued by the ASCE, *Flood Resistant Design and Construction*, which outlines the requirements for flood resistant design and construction of structures in flood hazard areas.

National Flood Insurance Program (NFIP), Federal Emergency Management Agency (FEMA),  
[www.floodsmart.gov](http://www.floodsmart.gov)

FEMA, [www.fema.gov](http://www.fema.gov)

ASCE, 2010. *So, You Live Behind a Levee!* Reston, VA.

**FEMA Publications** – available at [www.fema.gov](http://www.fema.gov)

FEMA, 1985. *Manufactured Home Installation in Flood Hazard Areas*, FEMA 85. Washington, DC, September 1985.

FEMA and the American Red Cross, 1992. *Repairing Your Flooded Home*, FEMA 234/ARC 4476. Washington, DC, August 1992.

FEMA, 1996. *Addressing Your Community's Flood Problems*, FEMA 309. Washington, DC, June 1996.

FEMA, 1998. *Homeowner's Guide to Retrofitting*, FEMA 312. Washington, DC, June 1998.

FEMA, 1999. *Protecting Building Utilities from Flood Damage*, FEMA 348. Washington, DC, November 1999.

FEMA, 2003. *Interim Guidance for State and Local Officials - Increased Cost of Compliance Coverage*, FEMA 301. Washington, DC, September 2003.

FEMA, 2000. *Above the Flood: Elevating Your Floodprone House*, FEMA 347. Washington, DC, May 2000.

FEMA, 2001. *Understanding Your Risks: Identifying Hazards and Estimating Losses*, FEMA 386-2. Washington, DC, August 2001.

FEMA, 2002a. *Getting Started: Building Support for Mitigation Planning*, FEMA 386-1. Washington, DC, September 2002.

FEMA, 2002b. *Integrating Manmade Hazards into Mitigation Planning*, FEMA 386-7. Washington, DC, September 2002.

FEMA, 2003a. *Developing the Mitigation Plan: Identifying Mitigation Actions and Implementing Strategies*, FEMA 386-3. Washington, DC, April 2003.

FEMA, 2003b. *Bringing the Plan to Life: Implementing the Hazard Mitigation Plan*, FEMA 386-4. Washington, DC, August 2003.

FEMA, 2004a. *Design Guide for Improving School Safety in Earthquakes, Floods, and High Winds*, FEMA 424. Washington, DC, January 2004.

FEMA, 2004b. *Federal Guidelines for Dam Safety: Emergency Action Planning for Dam Owners*, FEMA 64. Washington, DC, April 2004.

FEMA, 2005. *Integrating Historic Property and Cultural Resource Considerations into Hazard Mitigation Planning*, FEMA 386-6. Washington, DC, May 2005.

FEMA, 2006a. *Multi-Jurisdictional Mitigation Planning*, FEMA 386-8. Washington, DC, August 2006.

FEMA, 2006b. *Using the Hazard Mitigation Plan to Prepare Successful Mitigation Projects*, FEMA 386-9. Washington, DC, August 2008.

FEMA, 2006c. *“Designing for Flood Levels Above the BFE,” Hurricane Katrina Recovery Advisory 8, Hurricane Katrina in the Gulf Coast: Building Performance Observations, Recommendations, and Technical Guidance*, FEMA 549, Appendix E. Washington, DC, July 2006.

FEMA, 2007a. *Property Acquisition Handbook for Local Communities*, FEMA 317. Washington, DC, September 2007.

FEMA, 2007b. *Public Assistance Guide*, FEMA 322. Washington, DC, June 2007.

FEMA, 2007c. *Using Benefit-Cost Review in Mitigation Planning*, FEMA 386-5. Washington, DC, May 2007.

FEMA, 2007d. *Design Guide for Improving Critical Facility Safety from Flooding and High Winds: Providing Protection to People and Buildings*, FEMA 543. Washington, DC, January 2007.

FEMA, 2007e. *Selecting Appropriate Mitigation Measures for Floodprone Structures*, FEMA 551. Washington, DC, March 2007.

FEMA, 2007f. *Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds: Providing Protection to People and Buildings*, FEMA 577. Washington, DC, June 2007.

FEMA, 2008. *Reducing Flood Losses Through the International Codes: Meeting the Requirements of the National Flood Insurance Program*, FEMA 9-0372, Third Edition. Washington, DC, December 2007.

## **11. Appendix – Resilience Files**

The Resilience Report Appendices are digital products. They can be found on the CD or DVD that was delivered with this report.

Appendix A – Full Size Resilience Maps

Appendix B – AoMI GIS Data

# County Capabilities Checklist

<b>County Name</b>							
<b>Reviewer</b>							
<b>CAPABILITIES</b>	<b>WE HAVE ONE</b>	<b>THIS PLAN IS AVAILABLE ONLINE</b>	<b>POINT PERSON IS ON PLANNING TEAM</b>	<b>POINT PERSON SHOULD BE ON PLANNING TEAM</b>	<b>POINT PERSON CONTACT</b>	<b>LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN</b>	<b>OTHER POINT PERSON CONTACT</b>
<b>Local Planning Plans and Tools</b>							
Capital Improvement Plan							
Redevelopment Plan							
Growth Management Plan							
Emergency Operations Plan							
County / Local Emergency Plan							
County / Local Recovery Plan							
Local Mitigation Plan							
Economic Development Plan							
Land-use Plan							
Pandemic or Public Health Incident Response Plan							
Transportation Plan							
School Disaster Plan							
Environment and Natural Resources Plan							
Strategy Implementation Plan							
County Parks Plan							
Water / Watershed Management Plan							
SWCD Local Water Management Plan							
Wildfire Plan							



Critical Facilities Plan (Mitigation/Response/Recovery)							
College Campus Plans							
Evacuation Route Map / Plan							
Critical Facilities Inventory							
Vulnerable Population Inventory							
Soil Conservations Plans							
Continuity Operations Plan							
Storm Water Plan							
National Flood Insurance Program							
Emergency Response Plan							
Emergency Action Plan							
Groundwater Protection Plan							
Wellhead Protection Plan							
Snow Removal Plan							
Communications Plan							
Regional Development Plans							
NFIP Floodplain Management Plan							
Emergency Response Plan for Nuclear Generating Plant							
Local Planning Assistance Mock-Hazard Plan							
Road Closure Plan							
Human Quarantine Plan							
Wildfire Integrated Response Plan							

National Fire Plan							
Water Emergency and Conservation Plan							
Community Needs Assessment							

CAPABILITIES	WE HAVE ONE	THIS PLAN IS AVAILABLE ONLINE	POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	OTHER POINT PERSON CONTACT
<b>Policies / Ordinance</b>							
Zoning Ordinance							
Building Code							
Planning Ordinance							
Bluff Land Ordinance							
Fire Code							
Floodplain Ordinance							
Subdivision Ordinance							
Nuisance Ordinance							
Storm Water Ordinance							
Drainage Ordinance							
County Park Ordinance							
Site Plan Review Requirements							
Karst Ordinance							
Shoreland Ordinance							
City Ordinance							
Steep Slope Ordinance							
Soil Erosion Control Ordinance							
Sanitary Sewage Treatment System Ordinance / Solid Waste Management Plan & Ordinance							
Historic Preservation Ordinance							
Land Use Ordinance							
Methamphetamine Lab Ordinance							
Wild & Scenic River District							

<b>CAPABILITIES</b>	<b>WE HAVE ONE</b>	<b>POINT PERSON IS ON PLANNING TEAM</b>	<b>POINT PERSON SHOULD BE ON PLANNING TEAM</b>	<b>POINT PERSON CONTACT</b>	<b>LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN</b>	<b>OTHER POINT PERSON CONTACT</b>
<b>Local Staff/ Departments</b>						
Building Code Official						
Building Inspector						
Mapping Specialist (GIS)						
Engineer						
Land Use Planner						
Public Works Official						
Emergency Management Coordinator / Emergency Management Program						
NFIP Floodplain Administrator						
Bomb and/or Arson Squad						
Emergency Response Team						
Hazardous Materials Expert						
Local Emergency Planning Cmte						
County Emergency Mgmt Cmsn						
Sanitation Department (or Solid Waste)						
Transportation Department						
Economic Development Department						
Environmental Health Department						
Public Works Department						
Building Department						
Housing Department						

Planning Department						
Zoning Department						
Planning Consultant						
Regional Development Commission						
Historic Preservation						
Public Health Coordinator/Department						
Water / Watershed Planner						
Critical Infrastructure Planner						
City Administrator						
County Administrator						
County Assessor						
Environment Services Department						
Citizen Planning Team						
Soil & Water Conservation District						
Sheriff's Department						
Management Information Systems						
Social Services						
County Commissioners						
Fire Department						
Red Cross						
Electric Service Providers (involved)						
Highway Engineer						
Pipeline Companies (involved)						
Hospitals (involved)						
Public Library						
Department of Health						
Human Services						
County Auditor						

Environmental Quality Board						
Watershed Districts						
Community Awareness & Emergency Response (CAER)						
Police Department						
Township Representatives						
Technical Committee						
Non-Governmental Organizations						
Hazardous Substances Emergency Events Surveillance System						
County Attorney						

CAPABILITIES	POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	OTHER POINT PERSON CONTACT
<b>State of Minnesota</b>					
Minnesota Department of Natural Resources					
Minnesota Department of Agriculture					
Minnesota Department of Transportation					
Minnesota Department of Public Safety					
Minnesota Pollution Control Agency (MPCA)					
Minnesota Historical Society					
Minnesota Department of Homeland Security & Emergency Management Programs (HSEM)					
Minnesota Department of Health					
Minnesota Highway Patrol					
Minnesota National Guard					

CAPABILITIES	POINT PERSON IS ON PLANNING TEAM	POINT PERSON SHOULD BE ON PLANNING TEAM	POINT PERSON CONTACT	LIST ADDITIONAL JURISDICTIONS THAT HAVE THEIR OWN	OTHER POINT PERSON CONTACT
<b>National Organizations</b>					
National Weather Service					
U.S. Forest Service					
U.S. EPA					
U.S. Fish and Wildlife Service					
U.S. Army Corps of Engineers					
U.S. Geological Survey					
Federal Emergency Management Agency (FEMA)					
USDA Natural Resources Conservation					