Crow Wing County Hazard Mitigation Plan

June 28

2011

The Crow Wing County Hazard Mitigation plan is intended to reduce the threat of natural, human induced and technological hazards through the assessment of these hazards and through the development of an action plan specifying goals, objective, and strategies. Through this advanced planning, Crow Wing County will continue to be a leader in ensuring the safety and public protection of the entire countywide community.

Acknowledgments

Board of Commissioners

Philip J. Trusty, Chair

Paul M. Thiede, Vice Chair
Rosemary Franzen
Rachel Reabe Nystrom
Doug Houge

Emergency Management Director

John Bowen

Citizen Planning Team Members

Sue Lenzen
Brian Blom
Patsy Olson
Scott Bowers
Clarice Kemper
Kent A. Rees
Amy Fischer
Mary Gottsch
Marty Peisch
John Bowen
Lindy Johnson
Kari Christiansen

Technical Advisory Team Members

Joyce Mueller/Gwen Anderson
Pat Gaertner
John Bowen
Lyndon Robjent/Tim Bray
Amy Fischer
Chris Etzler

Facilitation

Chris Etzler, Project lead
Tad Erickson, Community & Economic Development Planner

Special Acknowledgements

Marc Williams, Crow Wing County GIS, Mapping

Crow Wing County Hazard Mitigation Plan

Table of Contents

Appendices

1.0 Purpose, Introduction, and Planning Process

1.1 Purpose

This plan is intended to reduce the threat of natural, human induced and technological hazards through the assessment of these hazards and through the development of an action plan specifying goals, objectives, and strategies. Through this advanced planning, Crow Wing County will continue to be a leader in ensuring the safety and public protection of the entire countywide community. The purpose for the creation of this plan is to:

1. Foster communication between cities, townships, businesses, community organizations, public and private facilities, organizations, and similar entities throughout the county

2. Promote sound public policy designed to protect life and property from natural, human caused and technological hazards

3. Develop and implement educational programs to increase public awareness of the risks associated with all hazards

4. Provide for a safer and more enjoyable countywide community

1.2 Background

The Crow Wing County All Hazard Mitigation Plan was funded through the Pre-Disaster Mitigation (PDM) Program established by the Disaster Mitigation Act of 2000 and through county in-kind contributions. Intended to break the cycle of disaster and rebuild. The Federal Emergency Management Agency (FEMA) program offers financial assistance to local governments to prepare and implement their local all hazard mitigation plans. More information on the PDM program can be found through the Federal Emergency Management Agency, Minnesota Homeland Security and Emergency Management, or the Minnesota Local Planning Assistance Center.

1.3 Introduction

Definition of Mitigation: Hazard Mitigation is defined as any action taken to eliminate or lessen the risk of natural and human caused or technological hazards to life and property. Mitigation measures might include public education, development of regulations or public policy, structural hazard control or

protection projects, altering or retro fitting facilities, acquisition or relocation of structures, or the development of improved or increased warning systems.

1.4 The Planning Process

To assist in the development of the Crow Wing County Hazard Mitigation Plan, the County secured the assistance of the Region Five Development Commission. The Region Five Development Commission assisted with all phases of the planning process as outlined within this section. The following timeline provides a narrative overview of each of these phases:

1.4.1 Data Collection

February 2008 through April 2008

The data collection process focused on the examination of existing plans, programs, and policies currently maintained by Crow Wing County. These plans, programs, and policies are further broken down as follows:

Planning Documents Reviewed:

- Crow Wing County Comprehensive Plan
- Crow Wing County Comprehensive Water Plan
- USGS Water Resources Investigations Report #02-4023
- Crow Wing County Emergency Operations Plan
- Soil Survey of Crow Wing County
- Crow Wing County Nitrate-Nitrogen Probability Map
- Floodplain Management Handbook for Local Officials
- State of Minnesota Hazard Mitigation Plan

Programs Reviewed:

- Crow Wing County Emergency Management Programs
- Crow Wing County National Flood Insurance Program (NFIP) Participation
- Crow Wing County Public Health Programs
- Crow Wing County Sheriff Department Programs
- Environmental Programs EPA and MPCA
- Minnesota Department of Homeland Security & Emergency Management Programs

Policy Documents Reviewed:

- Crow Wing County Ordinance

1.4.2 Public and Local Government Participation Component

April 2008 through October 2008

Crow Wing County recognizes the importance of public participation in developing a strong all-hazard mitigation plan. To this extent, Crow Wing County invited members of the public to participate in seven separate occasions during the planning process. These meetings were as follows:

Crow Wing County PDM Technical Advisory Team Meeting 1
Held: September 5, 2008 – 9:00 to 11:00 a.m.
Location: Crow Wing County Land Services Building
Topics: Introduction of the PDM Planning process including a detailed timeline of the project. Examined the information collected at that time in depth with the participants. Looked at the next steps in the process and announced public open house.
Approximate Attendance: 6 Persons

TECHNICAL ADVISORY TEAM MEMBERS		
John Bowen Emergency Management	Pat Gaertner IS	Lyndon Robjent/Tim Bray Highway Department
Gwen Anderson Health Department	Chris Etzler Region 5	Amy Fischer Emergency Management

Crow Wing County PDM Planning Open House
Held: October 22, 2008 – 2:00 to 4:00 p.m.
Location: Crow Wing County Land Services Building
Topics: Introduction of the PDM Planning process including both a description and an overview of the project as presented by the Region Five Development Commission staff. Participants had the opportunity to ask questions during a question and answer session. Several attendees volunteered to participate on the Planning Team.
Approximate Attendance: 18 Persons

Crow Wing County PDM Review of GIS Needs
Held: October 30, 2008 – 9:00 to 10:00 a.m.
Location: Crow Wing County Land Services Building
Topics: Reviewed other PDM plans and their GIS components. Discussed GIS needs for the Crow Wing County PDM project. Set timeline for completion of GIS components.
Approximate Attendance: 18 Persons

Crow Wing County PDM Full Planning Team Meeting 1
Held: January 20, 2009 – 10:00 a.m. to 12:00 p.m.
Location: Crow Wing County Land Department Conference Room
Topics: Team members were given an overview of the hazard mitigation planning process and began identifying and classifying hazards to be addressed within the hazard mitigation plan. These hazards were classified either as Natural Hazards or Human-caused/Technological Hazards (HCT). Once a list of hazards was established participants volunteered to participate on either the Natural Hazards Subcommittee or the Human-caused/Technological Hazards Subcommittee.
Approximate Attendance: 12 Persons

PLANNING TEAM MEMBERS

Sue Lenzen City of Breezy Point Resident	Clarice Kemper City of Pine River Resident	Marty Peisch City of Brainerd Resident
Brian Blom Cuyuna Regional Medical Center	Kent A. Rees City of Emily Resident	John Bowen Crow Wing County Sheriff's Office
Patsy Olson Long Lake Township Clerk	Amy Fischer Crow Wing County Emergency Management	Lindy Johnson City of Crosby Resident
Scott Bowers Crow Wing Power	Mary Gottsch Brainerd Lakes Chamber	Kari Christiansen Central Lakes College

Crow Wing County PDM Planning Natural Hazards Team Meeting 1
Held: February 19, 2009, 10:00 a.m. – 12:00 p.m.
Location: Crow Wing County Land Service Department Conference Room
Topics: All subcommittee meetings were open to the public. In these meetings, subcommittees assessed specific risks associated with Natural Hazards. These risk assessments and identification matrices are presented throughout this plan.
Approximate Attendance: 11 Persons

Crow Wing County PDM Planning HCT Team Meeting 1
Held: February 24, 2009, 10:00 a.m. – 12:00 p.m.
Location: Crow Wing County Land Service Department Conference Room
Topics: All subcommittee meetings were open to the public. In these meetings, subcommittees assessed specific risks associated with Human-

caused/Technological Hazards. These risk assessments and identification matrices are presented throughout this plan.

Approximate Attendance: 8 Persons

Local Government Participation-

All eighteen (18) cities located within Crow Wing County have engaged in hazard analysis, have passed resolutions approving this Hazard Mitigation Plan, and are participating.

The local government participation process began by requesting that each local government adopt a resolution stating their desire to participate in the planning process. Townships exist as the unincorporated areas of Crow Wing County; therefore it was unnecessary for them to both to adopt a resolution of participation or a resolution to approve the County's hazard mitigation plan. Such resolutions, however, were approved by most townships. Cities which participated in the implementation plan were required to submit a resolution approving this plan. All resolutions adopted by local governments within Crow Wing County are located within Appendix H of this plan**.**

The following is a list of jurisdictions (cities) participating in the Crow Wing County Hazard Mitigation Planning Process. All townships in Crow Wing County are unincorporated and therefore remain under the jurisdiction of Crow Wing County. To qualify as a participating jurisdiction a city must: (1) identify at least one task within Section 4.0 of this plan the jurisdiction will complete, or participate in completing; and (2) formally adopt the Crow Wing County Hazard Mitigation Plan by resolution. Any city within Crow Wing County may be added to this list by contacting the Crow Wing County Emergency Management Director and completing the two objectives mentioned above.

	CITIES		***TOWNSHIPS***	
	Baxter	Fort Ripley	Bay Lake	Long Lake
	Brainerd	Garrison	Crow Wing	Maple Grove
	Breezy Point	Ironton	Daggett Brook	Mission
	Crosby	Jenkins	Deerwood	Nokay Lake
	Crosslake	Manhattan Beach	Fairfield	Oak Lawn
	Cuyuna	Nisswa	Fort Ripley	Pelican
	Deerwood	Pequot Lakes	Garrison	Roosevelt
	Emily	Riverton	Ideal	Rosslake
	Fifty Lakes	Trommald	Irondale	Timothy
			Jenkins	Wolford
			Little Pine	

Local governments not participating in the 2008 to 2010 Crow Wing County Hazard Mitigation Planning process will be contacted by the County's Emergency Management Director upon the beginning of any plan revision process to extend an invitation to participate in the revision process by resolution. All resolutions signed at that time will be included within the plan revision and forwarded along

with the revised plan to the Minnesota Homeland Security and Emergency Management and FEMA.

Prior to the start of the Crow Wing County All-Hazard Mitigation planning process, local officials from all townships and cities within the County received a copy of the local government official survey. This survey was used to gather local officials' opinions on comprehensive plan related issues within the County as well as hazard mitigation related questions including identification of potential hazards within the county and also risk assessment related questions.

Local officials then participated in a series of meetings held throughout 2008 and 2009. In these meetings local officials provided opinions and comments related to hazards of concern within their communities as well as the likelihood of the occurrence of those hazards. All information received through the inclusion of local government officials was used to establish the goals and objectives presented within the *Crow Wing County All Hazard Mitigation Plan.*

Other Participants
In an effort to provide a broad perspective, the invitation to participate in the planning process was expanded beyond those representing local government. Invitation to participate was sent t:

- Service organizations
- Hospitals
- Schools
- Colleges
- Neighboring counties

Several representatives of these organizations attended the initial open house but chose not to participate beyond. For a complete list of those who were invited and those who attended, see appendix D.

Public Involvement

Public involvement throughout all stages of the Crow Wing County Mitigation plan played an important role in the development of the plan.
Public Survey- During the early stages of mitigation planning a public survey was conducted to determine baseline assumptions about the public's awareness of existing or potential hazards. The Crow Wing County Hazard Mitigation planning questionnaire was sent to a random sampling of 1900 Crow Wing County households to gather community opinions regarding past and potential disasters within the County. Out of the 1900 questionnaires sent, 280 households responded to the survey resulting in a 43% rate of response. County residents also were given the opportunity to respond to the questionnaire on-line.

39 residents chose to use the on-line tool. To view the summary and general findings of the survey, see appendix D.

Public notices and Public hearings-In addition, a series of public notices were announced in order to garner as much public involvement and input as possible. A list of these public notices, as well as a list of attendees to the resulting public hearings is located as an attachment to appendix D.

Public Review Period-Furthermore, a thirty day public review period was conducted from June 9th to July 8th 2010. In this public review period draft copies of the Crow Wing Hazard Mitigation Plan were available for public review at the Crosslake and Brainerd public libraries. Furthermore the plan was also available for public review and comment on the Counties Website. (http://www.co.crow-wing.mn.us/public_service_annoucements1.html).

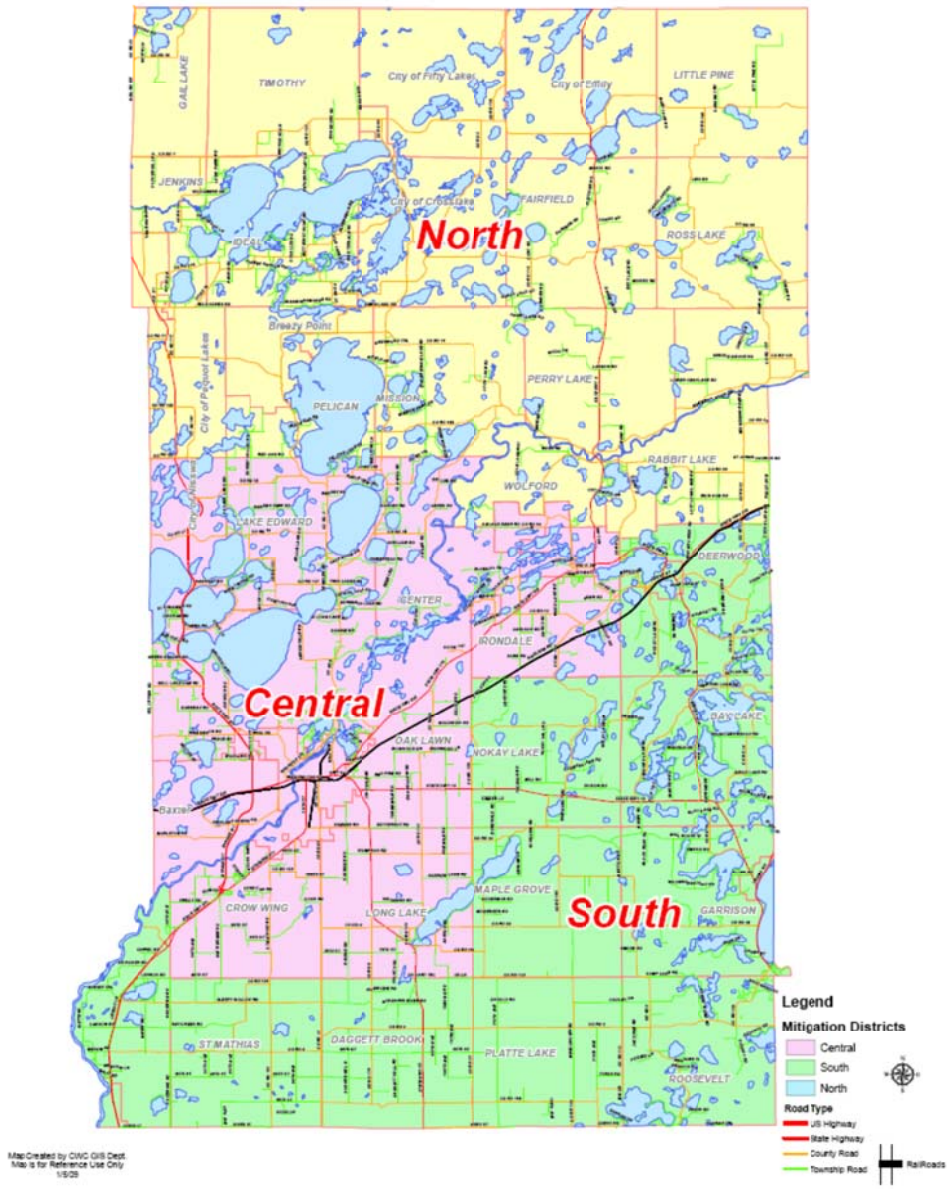
Sectoring of Crow Wing County for Hazard Mitigation Planning-
In developing a plan that addresses hazards on a county-wide basis as well as locally, it is important to divide the planning area into smaller, more manageable sections. For the purposes of developing this plan, the county was divided into three sectors. The local governments included within each sector are listed as follows generally beginning with local governments in the northwest portion of the sector to southeast.

Sector 1 (North): The North Sector of Crow Wing County contains many lakes and is less populous . It contains the cities of Jenkins, Manhattan Beach, Fifty Lakes, Cross Lake, Breezy Point, Pequot Lakes, and Emily,

Sector 2 (Central): The Central Sector of Crow Wing County is the most populated sector. It contains the cities of Nisswa, Trommald, Cuyuna, Ironton, Crosby, Ironton, Riverton, Deerwood, Brainerd, and Baxter.

Sector 3 (South): And the South Sector of Crow Wing County is mostly agricultural and is less populated. It contains the cities of Garrison and Fort Ripley.

Crow Wing County Mitigation Districts



1.4.3 Development of Goals, Objectives and Strategies

Dates

The Technical Advisory Team created strategies and action items to achieve the hazards mitigation goals of Crow Wing County's Hazard Mitigation Plan and Comprehensive Plan. The strategies and action items were developed through consultation with Crow Wing County staff, members of the planning team, Region Five staff, City staff/officials, town board members, and the public at large.

Prioritization of hazards is based on their frequency, severity and impacts on the natural environment, local systems, the built environment, and vulnerable populations.

These goals, objectives, strategies and priorities were developed over the course of a series of meeting s between these groups over the course of two years. The following documents these meetings, consultations, and public opinion information gatherings:

Meeting Dates:

Technical Advisory Team – Meeting	09/05/2008
Public Open House	10/22/2008
Meeting with GIS	10/30/2008
Full Planning Team – Meeting	01/20/2009
Natural Hazards Planning Team	02/19/2009
Planning Team meeting	02/24/2009
Planning meeting – Goals	12/16/2009
Planning Team meeting	01/22/2010
Technical Advisory Team – Meeting	01/27/2010
Technical Advisory Team –Meeting	04/07/2010
Committee Of the Whole -- Meeting	05/18/2010
Technical Advisory Team & HSEM -Meeting	07/082010
Technical Advisory Team – Meeting	08/24/2010
Full Planning Team	09/28/2010

1.4.4 Drafting and Development

April 2009 through September 2010

In the drafting and development phase, Region Five Development Commission staff prepared the Crow Wing County Hazard Mitigation Plan public review document with the cooperation of the Crow Wing County Emergency Management Director, the Crow Wing County Environmental Services Department (ESD), the Crow Wing County Planning & Zoning Department, and the Crow Wing County Soil & Water Conservation District. The plan was then forwarded onto process participants, local officials, Minnesota Homeland Security and Emergency Management, and the general public for review and comment

1.4.5 Public Review, County Adoption, State and FEMA Review and Adoption

June 8th 2010 through July 8th 2010

Copies of the Crow Wing County Hazard Mitigation Plan document were sent to all local units of government within the County and made available on Crow Wing Counties website. A published notice notifying interested persons of this was published in the official newspaper of the County. A draft of the plan was also made available at both the Cross Lake, and Brainerd Libraries from June 8th 2010 through July 8th 2010.

The Crow Wing County Emergency Management Director (John Bowen) led the plan development process and coordinated with both the Region Five Development Commission, and the planning task force on reviewing drafts, and submitting information.

2.0 Community Profile

2.1 General Overview

Crow Wing County is located 100 miles northwest of the Twin Cities Metropolitan Area. Its length, north to south, is 45 miles and its width, east to west, stretches 27 miles. To the north and west, Cass County borders Crow Wing County; to the south and southeast, lie Morrison and Mille Lacs Counties; and to the east, Aitkin County.

Table 2.1

Crow Wing County Land Use Summary

Definition	Acreage	% of County
Coniferous Forest	31,802	4.3%
Cultivated Land	13,284	1.8%
Decidous Forest	272,629	36.9%
Farmsteads	3,044	0.4%
Forest Cut-Overs (regrowth)	26,579	3.6%
Grassland	114,361	15.5%
Gavel Pits	3,285	0.4%
Mixed Woods Forests	43,203	5.8%
Open Water	105,556	14.3%
Other Rural Development	11,660	1.6%
Shrubby Grassland	4,573	0.6%
Urban Industrial	5,805	0.8%
Wetlands - Bogs	22,048	3.0%
Wetlands - Marshes	81,585	11.0%
Bare Rock	9	
Other	1	
Total	**739,424**	**100.0%**

Source: LMIC, State Planning Agency; 2002
Crow Wing County Comprehensive Water Plan

Natural resources have always played a vital role in the growth and development of Crow Wing County. What is now a booming tourism industry began with trapping and fur trading along the Leech Lake Trail, a major corridor used by Native Americans and trappers during the early to mid 1800's. The introduction of the railroad opened Crow Wing County to logging of its large stands of white and red pine trees from 1890 – 1920. Iron mining along the Cuyuna Range also emerged at this time, as did small-scale agricultural operations in the southern portion of the county. The railroads brought settlers looking for logging, mining and farming jobs to the area. They also brought vacationers and tourists to lakeside resorts and cabins located close to train stations.

Beginning in the 1920's, Crow Wing County experienced intense growth and development spurred by the introduction of the automobile and the construction of roads and highways. The Leech Lake Trail was converted to Trunk Highway 371. Interstate 94, US Highways 10 and 169 and Highway 210 were also built, dramatically shortening the travel time from St. Cloud and the Twin Cities. Not only were more people coming to Crow Wing County, but they were able to access increasingly remote areas, which lead to large-scale development and fragmentation of the County's natural areas. From 1924 to 1965, the number of

season and permanent lake homes along the Highway 371 corridor increased by 88 percent.

Today, Crow Wing County continues to attract people of all age groups. Approximately 28 percent, or 209,211 acres, of the county is covered by lakes, streams, and wetlands. Another 50 percent, or 374,488 acres, is covered by forests. These features, coupled with the county's steep hills and rolling topography, are highly sought by families and retirees looking to relocate to the area.

The Brainerd/Baxter area has emerged as a regional job and shopping center, which has allowed more people to live and work in the area year-round. Highway expansion and improvements, along with advances in telecommunications technology and high-speed internet service have aided the transition.

2.2 Local Community Overview

The local communities of Crow Wing County include twenty-nine townships and fifteen cities. Brainerd, the county seat, is the largest city with an estimated 61,390 people in 2007. The cities of Crow Wing County are: **Baxter, Brainerd, Breezy Point, Crosby, Crosslake, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Jenkins, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, and Trommald.**

The cities of Cuyuna, Manhattan Beach, and Tommald did not participate in the planning process.

Formatted: Tab stops: 4.02", Left

Lake Edwards Township is the largest of the twenty-nine townships in the county with a population estimate in 2000 of 1,995 people. The Crow Wing County Townships include: Bay Lake, Center, Crow Wing, Daggett Brook, Deerwood, Fairfield, Fort Ripley, Gail Lake, Garrison, Ideal, Irondale, Jenkins, Lake Edwards, Little Pine, Long Lake, Maple Grove, Mission, Nokay Lake, Oak Lawn, Pelican, Perry Lake, Platte Lake, Rabbit Lake, Roosevelt, Ross Lake, Saint Mathias, Timothy, and Wolfrod. For a summary of demographic information, see appendix B.

The Townships of Center, Gail Lake, Lake Edwards, Perry Lake, Platte Lake, and Rabbit Lake did not participate in the planning process.

Below is a brief summary of each city within Crow Wing County. *(For a summary of demographic information, see appendix C)*

2.2.1 Baxter

Contact: Gordon Heike
City Administrator
(218) 454-5100

Baxter was named after Luther Baxter, an attorney for the Northern Pacific Railroad and incorporated on May 25, 1939. At that time it operated a large railroad tie-treating plant. Farming was also an important early industry. For years the most notable resident was the legendary 26 foot tall animated and talking statue of Paul Bunyan, located at Paul Bunyan Land Amusement Park, at the intersections of Hwy 371 and 210. Purchased by Sherm Levis in 1950 the giant was the centerpiece of the park for generations of children. In 2003, the park announced that due to the high cost of running the park, it would be closing. A local family owned business, This Old Farm, was interested in keeping the entire park. They purchased and moved Paul Bunyan, Babe the Blue Ox and the park rides onto their land east of Brainerd on State Hwy 18. Tourism and service industries have become the biggest employers in Baxter in modern times.

2.2.2 Brainerd

Contact: Dan Vogt
City Administrator
(218)-828-2307

The city of Brainerd owes its existence to the Northern Pacific Railroad. The railroad cut through the forest, graded the lowlands and sliced down hills, laying ties and rails and on March 11, 1871, the first construction train rolled into Brainerd which at that time was only known as “The Crossing”. The 1870 the township of Brainerd was organized and named after Anne Eliza Brainerd Smith, daughter of the Northern Pacific Railroad President, John Gregory Smith. Brainerd was organized as a city on March 6, 1873.

The most famous landmark in Brainerd is probably the water tower which was built from 1919-1922. Later, affectionately known as “Paul Bunyan’s flashlight” it was the first all concrete elevated tank used by a municipality in the U.S. From

1951-71 there was a twenty-year debate on adding fluoride to the city water supply.

No Brainerd history would be complete without mentioning the tragedy of the WW II, Bataan Death March. Following the surrender of Luzon on the Bataan Peninsula, Philippines, U.S. soldiers were forcibly marched 100 mile to Camp O'Donnell; 43 Brainerd guardsmen lost their life on this island. Today, the citizens of Brainerd are still reminded of the great sacrifice made when the carillon bells play from the courthouse roof. The bells were installed as a memorial to those who d

2.2.3 Breezy Point

Contact: Kathy Millard
City Clerk
218-562-4441

In the early 1920's Captain Billy Fawcett purchased an 80 acre parcel of land on the western shore of Pelican Lake. Fawcett soon started building rustic cabins for a resort, and a hotel was added in 1922. In 1923 a nine-hole golf course was added, and an extravagant Lodge was finished in 1925. Breezy Point Resort became the destination for the rich and famous. As the resort grew, the surrounding area grew as well and

Incorporated as the Village of Pelican Lakes in 1939. The name was changed to "City of Breezy Point" due to a misplaced order for furniture. Because there was a town named Pelican Lakes on Pelican Lake next to Pelican Township, a load of furniture ordered by the resort was mistakenly shipped to Pelican Rapids, which is over 100 miles west of Pelican Lake. The owners of the resort, concerned about the lack of identity for their growing resort, and for the city they had established, petitioned the city government for a name change. The town officials received a petition with 54 names on it at the October 1969 meeting and Ordinance #16 was adopted unanimously at the December 1969 meeting. Thus in 1969 the Village of Breezy Point was created and named after the Breezy Point Resort, and it was incorporated into a city in 1974.

2.2.4 Crosby

Contact: Joel Peck
City Administrator
218-546-5021
Cindy Nelson
City Clerk
218-546-5021

Crosby was incorporated in July of 1910 as were many of the neighboring towns. Rail lines were brought in initially to facilitate logging the vast stands of pine and later supported the mining industry. Many small towns sprang up to house and supply the miners as more and more mines were opened.

The Croft mine operated in northeast Crosby until 1934. The ore at 55% iron was exceptionally rich and coveted for the making of steel. Today it is a historical site, much of the equipment and many artifacts remain; guided tours are available during the summer months.

The Hallett Community Center opened in 1999 in part from a philanthropic donation from the Hallett Family Trust in answer to a visioning session by area residents. Although located in Crosby, the facility benefits all of the communities in the area and offers a seasonal ice-skating arena, swimming, recreational activities and community events.

2.2.5 Crosslake

Contact: Thomas Swenson
City Administrator
218-692-2688

Jennifer Max
City clerk
218-692-2688

The following is an excerpt of Cross Lake history written by Arly Boyce in 1934, 7th grader, for a school project

The Cross Lake community is located about thirty-two miles north of Brainerd. It is called “Cross Lake” because the lake from which it takes its name is crossed by currents of two rivers, forming a cross.

The Sioux and Chippewa Indians lived here in the early times.

The logging headquarters was located just east of Cross Lake. About three hundred men were employed there and included 150 teams of horses, three barns, three dwellings, a post office, a store, two warehouses and a blacksmith shop. The headquarters operation took up about 200 acres. The logging itself took place in an area north by Leech Lake.

One of the early industries of Cross Lake was fishing. Some of the early settlers fished for market. By 1934 the leading industry in Cross Lake was resorts. Tourism is still the leading industry, but many resorts are selling out and more people own their own lake home.

2.2.6 Cuyuna
Contact: Cuyuna Fire Chief: Marvin "Butch" Holmvig
218-546-6248
218-820-9940 cell

Cuyuna Mayor: Lloyd Brix
218-546-6967
218-820-6968 cell

City Clerk 218-546-5883

The Cuyuna area was a border area between the Dakota (Sioux) and the Ojibwe (Chippewa) Indians. The Cuyuna area also served as a long portage route from Mille Lacs Lake to the upper Mississippi River. There were many trading posts and missions in the general area. The 1870 General Land Office survey notes indicated the presence of an American Indian trail between Little Rabbit, Portage, June, and Little Mahnomen Lakes. The treaty of 1837 with the Mississippi Band of Ojibwe opened the area to European settlement.

The first active iron mine on what was to become the Cuyuna Range, named after the combined names of *Cuy*ler Adams and his dog *Una*, was the Kennedy mine, located on the south shore of Rabbit Lake. In those days of difficult travel, a small village would naturally spring up near an active mine, and thus the village of Cuyuna was established as the second town in the area. Cuyuna was incorporated in July of 1910.

Total iron ore production from the Cuyuna Range eventually exceeded 100,000,000 tons. Today the mines are closed but the pits between the mountainous tree-covered piles of overburden that was removed from them have filled with pristine clear water and are a Mecca for scuba divers, anglers and nature lovers who visit them annually. They remain as a living memory of the mining era.

2.2.7 Deerwood

Contact: Mary Kadlec
City Clerk
218-534-3152

Deerwood is the oldest community on the Cuyuna Range. Located between Lakes Reno and Serpent, it is located on the main line of the Northern Pacific Railroad. Deerwood was platted on February 1, 1892, and incorporated as a village on October 8,

1909.

In the early 1860's the Northern Pacific Railroad Company was chartered to build a railroad from Carlton, Minnesota to Puget Sound. A section house erected along the north shore of Reno Lake, a hundred miles west of Duluth, grew into a little community called Withington. The similarity of its name to that of Worthington in the southern part of the state later prompted it to change its name to Deerwood.

The beauty of the many lakes and forests in the area struck the entrepreneurs who sought to develop the rich resources opened by the railroad. Deerwood, with its first hotel, became a favorite stopover. Tales of the fabulous fishing and hunting to be found in the surrounding area soon began to lure men to take the train, usually from Duluth, and rent a room at the Shannon Inn. From there they could engage a team to take them to a favorite lake where they could rent a boat for the day's hunting or fishing.

2.2.8 Emily

Contact: Pat Kestner
City Clerk
218-763-2480

Emily Township was named for Emily Lake, one of a group of four lakes having feminine names: Anna, Emily, Mary, and Ruth. It has never been ascertained whether the women were of one family or the surname of any of them. It is most likely that they were the daughters or wives of early lumbermen. The City of Emily is on the west shore of Lake Emily and was platted November 22, 1905, by John and Amelia Lambert and incorporated on March 7, 1957. The Post Office began service in 1900.

Emily was one of the first towns platted in the entire region. It was a logging outpost at the turn of the century. It is located on Minnesota Hwy #6 in the heart of the north central Minnesota. Beautiful pine and hard wood forests and dozens of clean, clear lakes surround the city. Some of the lakes are over 100 feet deep and have excellent public landings and great fishing.

2.2.9 Fifty Lakes
Contact: Karen Stern
City Clerk
218 763-3113

The area known as Fifty Lakes was first platted into one square mile sections in about 1863.

One of the first people to move into the area was W.W. Allen in the 1870's. Later in 1905 the township government was formed and named after this man. In 1922 Robert Dudley, a musician, bought the corner grocery store in Fifty Lakes. He opened a post office in 1926 in the store and referred to it as Fifty Lakes Post Office. He called it Fifty Lakes because he said he could count 50 lakes within a radius of five miles. Approximately two thirds of the land within Fifty Lakes is tax forfeited County or State land. There are about twenty "named" lakes within the Fifty Lakes area.

The city built a new City Hall and Municipal Liquor building in 2005.

2.2.10 Fort Ripley

Contact: Mary Tschida
City Clerk
218-828-1818

Fort Ripley Mayor:
Gerald Tschida
218-828-1818

In 1848, Secretary of War, William Marcy ordered Brigadier General George M. Brooke, Commanding the Department of the Wet, to establish a military post

near the junction of the Mississippi and Crow Wing Rivers. After extensive reconnaissance, the final selection was located on the western bank of the Mississippi River nearly opposite the mouth of the Nokaysippi River, seven miles south from the confluence of the Crow Wing River. Fort Ripley was built to keep the peace among the Winnebago, Dakota and Chippewa Indians.

The city of Fort Ripley grew across the river from the fort. By the early 1900's Fort Ripley was a thriving town and at one time possessed a railroad station, bank, telephone office, hotel, restaurants, stores, warehouses, water tank, lumber yard and seven saloons. A local lumber camp employed over 300 men.

In 1930 Camp Ripley was established as a training center for the Minnesota National Guard. In 1934 ice took the bridge out one spring and then people living on the west side of the river were ordered to move. The town lost business and it took almost twenty years to build them back up and recover.

In 1955 the State of Minnesota notified all the involved people that the highway would be widened and their homes and land would be bought, everyone was stunned. The businesses were just recovering and now they were being asked to move. This caused the city to slip into a decline. Over 40 years would pass before that section of highway was completed in 2005, linking Brainerd and Minneapolis. The Fort Steak House and a convenience store/post office are all that remain of this once prosperous town.**

***Fort Ripley, A Town That Wouldn't Die;* Marie Pearson

2.2.11 Garrison

Contact: Cathy Thompson
City Clerk
320-692-4270

The Garrison and Mille Lacs Lake area was first populated by the Sioux and later by the Chippewa. Permanent villages dotted the shores of the "Spirit Lake" as it was called. Natives fought back and forth for control of the area for decades. Eventually the Chippewa drove the Sioux south and west onto the plains. The abundance and ease of gathering food; fish, fur, fowl, berries, maple syrup and wild rice; made living near the lake very desirable.

Garrison Township was named in honor of Oscar E. Garrison, a land surveyor and civil engineer, who was born at Fort Ann, NY on July 21, 1825 and died on his farm in Garrison township April 2, 1886. Garrison platted the city and resort community which was first a town site known as Rowe. He took his homestead claim in Garrison Township in 1882. In 1884, Garrison's wife Mary became postmaster and the name was changed at that time. The city was not incorporated until May 3, 1937. There are over 200 lakes within a twenty-mile radius of Garrison.

The earliest and most popular destination was the home of Joseph and Josephine Ruttger on near-by Bay Lake. When Josephine's legendary cooking began to draw crowds, the family decided to start charging for food and lodging. Turn-of-the-century fishermen were happy to accept accommodations in the Ruttger's barn. Ruttger's Bay Lake Lodge was established in 1898. This was the first resort in the Brainerd area and remains today. It is the oldest family run resort in the State of Minnesota. With an estimated 2007 population of 226, Garrison, MN is the smallest city in the world with a McDonald's.

2.2.12 Ironton

Contact: Cheryl Buchite
City Clerk
218-546-5625

Ironton, a city in Klondike Township was platted on September 6, 1910 by Agnes Lamb and Carrie and John Hill. It was incorporated on June 5, 1911 and separated from the township on March 22, 1912. The post office was established in 1910 and a Northern Pacific Railroad station soon followed.

The town is adjacent to the Armour No. 1 and Armour No.2 mines. Construction of the town was derailed for a time, when ore was discovered under part of the original platted area. Buildings had to be moved at the expense of the mining company holding the lease. But the town eventually settled into the layout seen today.

Ironton is a small town with old fashioned friendliness and progressive ideas. There is an industrial area on the west side of town. Ironton is the home of Minnesota's newest lakes. Rainbow trout and brook trout are stocked in some of the areas 14 reclaimed mine pits. The trout are not alone, Sunfish, crappie, bass and northern also flourish in the rich, clean environment. Snorkeling, SCUBA diving, hiking, kayaking and canoeing are also on the agenda in Ironton. In the winter a snowmobile trail is open through the Cuyuna Country Recreation Area.

2.2.13 Jenkins

Contact: Krista Okerman

City Clerk
218-568-4637

Jenkins railway village and township were named for George W. Jenkins, a lumberman, who platted this village. The city of Jenkins was incorporated in 1969; the post office was established in 1895; it had a station of the Northern Pacific Railroad.

2.2.14 Manhattan Beach

Contact: Barb Hanson
City Clerk
218-543-4030

A city located north of Crosslake on Ox Lake in Watertown Township, incorporated on June 24, 1941; its post office began in 1939.

2.2.15 Nisswa

Contact: Laurie Hemish
City Clerk,
218-963-4444

Smiley Township was organized on August 21, 1900 and was one of the first townships to be settled in what is now Crow Wing County. From very early days it was the headquarters for the Mississippi Chippewa, and was the home of Chief Hole in the Day. He was so named because he was born during an eclipse of the sun.

Early in the 1880's Webb Hill established a stopping place at what is now Nisswa. Game of all kind could be had by stepping outside the yard. Wild fruit and berries were abundant while in season.

In 1897 and 1898 lumbering was the most important occupation in the township. The logs were run from Nisswa Lake to Gull Lake into the Crow Wing River and thru the Mississippi River. The railroad was built through Nisswa in 1899.

In 1901 the first summer cottage was built on Nisswa Lake by Judd LaMoure, a senator from Pembina, North Dakota. Not long after a second cottage was built just south of the LaMoure cottage.

2.2.16 Pequot Lakes

Contact: Sandra Peine
City Clerk
218-568-5222

The area around Pequot township settled very rapidly and on December 4, 1900 the county commissioners accepted a petition for organization as Sibley Township. Settlers came to the area with some frequency after the building of the railroad. The township of Pequot was officially platted in 1900, and the village of Pequot was incorporated soon after on June 3, 1902. It was the first incorporated village in Crow Wing County. Even though Brainerd had been incorporated twice, it had never held a village status, having been either a township or a city.

School District #41 was organized in 1896 and the Pequot Post Office was established the same year.

The establishment of a large sawmill near the Pequot station brought a large group of settlers to this township, originally. With the passing of the lumbering era, farms were opened up and then summer resorts attracted a great deal of attention. In 1940, the village of Pequot changed it name to Pequot Lakes, to symbolize the importance of its resort business.

2.2.17 Riverton

Contact: Carrie Johnson
City Clerk
218-546-5225

Riverton is a small community on the Mississippi River 11 miles northeast of Brainerd along MN HWY 210. It was incorporated in 1912. Like the other cities in the area, mining played a large part in the development of the town. As more mines were opened small towns would spring up to house and supply the needs of the miners. Most of the communities have disappeared, but Riverton remains as a bedroom community to the larger towns in the area. It had a Post Office from 1913-1965. The residential population today is around 105.

The first known inhabitants of the area that became Riverton were the Sioux Indians, dating back to the 1700's. Between the years 1821 and

1885 a band of Ojibwe, under the leadership of Chief Wabose, or Rabbit, came to the area and expanded their settlements. Tribal rivalries meant that the threat of conflict among the Sioux and Ojibwe was nearly always present.

The area surrounding Riverton became active in fur trading, hunting, logging, and prospecting. Situated on the east shore of Little Rabbit Lake, Riverton was platted by the Riverton Townsite Company, with Daniel Waite listed as president and Will C. Brown as secretary. Brown was one of the first to establish residence in Riverton

2.2.18 Trommald

Contact: Mona Geske
City Clerk
218-546-6543

Trommald is a mining city in Wolford Township, named for A. G. Trommald, county registrar of deeds, 1904-30. It was incorporated on August 9, 1917. The community had a post office, 1917-1967, and a station of the Northern Pacific Railroad.

This iron mining town on the Cuyuna Range was in close proximity to Miller Lake and Black Bear Lake. In the 1920's the population was over 300 as miners and their families lived within easy walking distance of the mines that employed them. Shortly after all mining operations had ceased, the city fell into decline. Other cities in the area, Iron Hub, Manganese, Oreland and Wolford, which supported the mines, have disappeared. By the 1970's the population of Trommald had dipped to 82 and today is a bedroom community for the nearby cities of Crosby and Brainerd. In 2009, there were an estimated 120 residents in Trommald. The area is now a center for recreation; a portion of the city is located within the recently opened Cuyuna State Recreation Area.

2.3 General County History

Crow Wing County was established on May 23, 1857 and organized March 3, 1879. The county is named for the Crow Wing River.

The village of Crow Wing, at the confluence of the Crow Wing and Mississippi rivers, was the first known white settlement in the county. It was platted in 1856 after the Red River Trail and nearby sawmills attracted settlers to the area. The construction of the Northern Pacific Railroad from Duluth in the 1870's was the catalyst for a spurt of development and population growth. The railroad allowed for the large-scale logging of the red and white pine forests located in the northern and eastern pats of the county. The federal government contributed to the growth by constructing major reservoirs, creating the Gull and Whitefish lake chains. Built to maintain adequate water flow for barge traffic on the Mississippi

River, theses reservoirs became the basis for a later boom in resort and lakeshore development.

By the early 1900's southern Crow Wing County had become a developed agricultural area and iron ore had been discovered in the Crosby/Ironton region. The Cuyuna Range developed rapidly during World War I. By 1920, Brainerd and Crosby/Ironton were the two largest urban centers in the region.

During this same era resort-based tourism industry flourished with the completion of rail access between Brainerd, Minneapolis/St. Paul, and Duluth. Resort development was closely linked to railroad accessibility to a given lake – rail passengers utilized lake steamers operating for rail stations. The Lake Hubert rail station was the principle access point.

After 1920, especially after World War II, the increase in tourism was tied to the development of the highway system. At this time the growth in resort usage was being matched by development of cabins/second homes along the lakes.

Since the 1950's the economy has undergone significant changes. The Cuyuna Range mines shut down, filled with water, and were designated the Cuyuna Country State Recreation Area. The resorts have become major year-round destinations with golf courses, tennis courts, and conference facilities. The second home market has exploded driving development of what had been considered marginal lakeshore property and, increasingly, non-lakeshore land. In recent years, the local economy has diversified with increasing strength in retail sales, engineering and technology industries, education, medical services, and regional state government facilities.

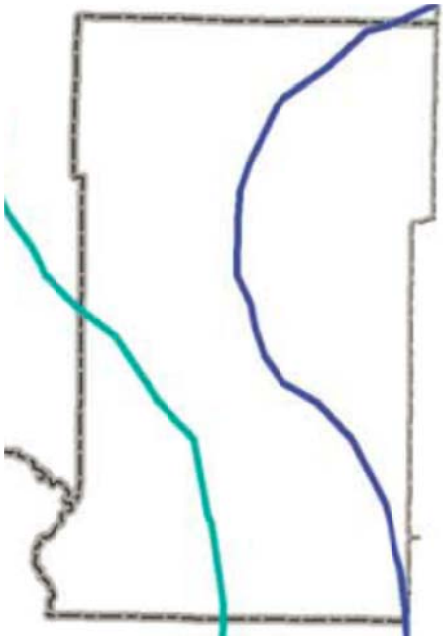
2.4 Physical Characteristics

2.4.1 Climate and Precipitation

Table 2-2 and table 2-3 summarize temperature and precipitation data, respectively, for Crow Wing County as recorded in the period 1971 to 2000. Tables 2-4 and 2-5 summarize growing season information. Table 2-5 shows probable dates of the first freeze in fall and the last freeze in spring. Table 2-6 provides data on the length of the growing season.

In winter, the average temperature is 10 degrees F and the average daily minimum temperature is -2 degrees F. The lowest temperature on record, which occurred in 1996, is –54 degrees F. In summer, the average temperature is 66 degrees F and the average daily maximum temperature is 79 degrees F. The highest recorded temperature, which occurred on August 10, 1936, is 106 degrees. On average, Crow Wing County will see 4.3 days a year with a maximum temperature greater than 90 degrees. An average of 190 days each year will have a minimum temperature less than 32 degrees and 54 days less than 0 degrees.

The total annual precipitation is 27.22 inches. Of this, 20 inches, or about 72 percent, usually falls in April through September. The growing season for most crops falls within these periods. In 2 years out of 10, the total precipitation is less than 22 inches. The heaviest 1-day rainfall during the period of record was 4.2 inches on July 27, 1963. An average year in Crow Wing County will have 93 days with precipitation totals greater than 0.01 inches, 57 days greater than 0.1 inches, 18 days greater than .5 inches and 5 days with more than 1 inch.



The average seasonal snowfall is 46.8 inches. The greatest one day snow fall amount occurred on March 4, 1985, an amount of 24 inches. On average, 111 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly for year to year. Table 2-7 is a summary of the monthly average snowfall amounts.

Table 2-2

Temperature Summary
BRAINERD, MN

1971-2000 NCDC Normals

Element	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Max °F	18.5	26	37.5	54	68.6	77	81	78.8	68.8	56.2	37.4	23.3	52.2
Min °F	-7.5	-1	13.6	29.3	42.3	51	56	53.4	42.4	31.4	17.7	1.9	27.6
Mean °F	5.5	12.5	25.6	41.7	55.5	64	69	66.1	55.6	43.8	27.6	12.6	39.9
HDD base 65	1846	1472	1223	700	322	107	34	73	294	657	1124	1624	9476
CDD base 65	0	0	0	0	25	75	145	107	12	0	0	0	364

Source: http://mrcc.isws.illinois.edu/climate_midwest/mwclimate_data_summaries.htm#

Table 2-3

Precipitation Summary
BRAINERD, MN

1971-2000 NCDC Normals

Element	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Precip (in)	0.8	0.6	1.47	2	3.33	4.2	4.1	3.56	2.83	2.51	1.64	0.68	27.7

Source: http://mrcc.isws.illinois.edu/climate_midwest/mwclimate_data_summaries.htm#

Table 2-4

Snowfall Summary
BRAINERD, MN

1971-2000 NCDC Normals

Element	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN
Snow(in)	13	6.7	9.6	2.1	0	0	0	0	0	0.5	6.7	8.2	46.8

Source: http://mrcc.isws.illinois.edu/climate_midwest/mwclimate_data_summaries.htm#

Table 2-5

Growing Season Summary

Derived from 1971-2000 Averages

Date of Last Spring Occurrence	Date of First Fall Occurrence

Base Temp °F	Median	Early	90%	10%	Late	Median	Early	90%	10%	Late
32	14-May	18-Apr	27-Apr	25-May	8-Jun	20-Sep	6-Aug	4-Sep	5-Oct	10-Oct
30	7-May	16-Apr	25-Apr	20-May	26-May	24-Sep	6-Aug	7-Sep	8-Oct	10-Oct
28	30-Apr	11-Apr	22-Apr	18-May	25-May	2-Oct	1-Sep	19-Sep	11-Oct	16-Oct
24	22-Apr	26-Mar	7-Apr	6-May	10-May	6-Oct	20-Sep	24-Sep	31-Oct	4-Nov
20	11-Apr	24-Mar	29-Mar	18-Apr	2-May	28-Oct	22-Sep	9-Oct	4-Nov	10-Nov
16	6-Apr	19-Mar	24-Mar	15-Apr	21-Apr	3-Nov	2-Oct	19-Oct	20-Nov	27-Nov

Source: http://mrcc.isws.illinois.edu/climate_midwest/mwclimate_data_summaries.htm#

Table 2-6

Length of Growing Season (Days)

Derived from 1971-2000 Averages

Base Temp °F	Median	Shortest	10%	90%	Longest
32	131	89	109	150	156
30	147	89	117	158	159
28	155	118	125	169	182
24	170	139	143	201	213
20	200	159	178	213	225
16	211	176	191	238	247

Source: http://mrcc.isws.illinois.edu/climate_midwest/mwclimate_data_summaries.htm#

2.4.2 Bedrock Geology History

Sedimentary rocks of Cretaceous age were deposited roughly 65 to 100 million years ago over a broad area of Minnesota that extended as far north as the western end of the Mesabi Iron Range. Subsequent erosion has removed most of these strata, leaving only scattered outliers, which in Crow Wing County have been identified locally by drill hole data. The Cretaceous rocks were deposited uncomfortably on top of weathered Precambrian bedrock. Sloan (1964) suggested that the Cretaceous strata in Crow Wing County are related to the Colerain Formation, which was exposed by mining operations along the western Mesabi Iron Range, northeast of Crow Wing County. Bolin's (1956) study of Cretaceous strata from a drill core in Crow Wing County described gray shale, sandy shale, and sand with micro fauna of Foraminifera and fish teeth, scales, and bone fragments. Based on this fossil assemblage, Bolin interpreted the Cretaceous strata to be of Cenomanian age.

Most of Crow Wing County is underlain by Precambrian bedrock that varies in age from Achaean (approximately 2,700 million years of age, or Ma) to Paleo-proterozoic (approximately 2,200 to 1,800 Ma). The Achaean rocks that underlie the northwest portion of the county are poorly understood due to lack of drill hole or outcrop data. However, this part of the county is thought to be similar to typical Achaean "greenstone-granite" terrains that are well exposed in northeastern Minnesota and can be extended

into the county by the use of geophysical imagery. In Crow Wing County, these include greenstone belts made up predominantly of metamorphosed mafic volcanic rocks, but include metamorphosed gabbros recognized in drill core and iron-formations inferred from linear aeromagnetic data. The greenstone belts are separated by belts of metamorphosed sedimentary rocks.
Paleoproterozoic rocks in Crow Wing County are part of the Penokean orogeny, a term that refers to a belt of deformed rocks that can be traced discontinuously east from central Minnesota to the Grenville Front in eastern Canada. Rocks of the Penokean orogeny were deformed to varying degrees between roughly 1,900 and 1,760 Ma, during a protracted episode of deformation referred to as the Penokean orogeny (Southwick and others, 1988). In east-central Minnesota, the Penokean orogeny is divided into two sub-terrains—the fold-and-thrust belt, and the younger foreland basin that contains the Animikie Group.

The geologic evolution of the Penokean orogeny fold-and-thrust belt involved deposition of sedimentary and volcanic rocks within a poorly understood basin that formed as a result of extension, thinning, and sagging of the preexisting Achaean crust. Faults that would have developed during this extensional phase may have provided conduits for magmas to work their way to the surface to be

extruded as volcanic rocks or emplaced as hypabyssal (shallow-level) mafic intrusions. These faults also would likely have contributed to a complex basin topography, producing local sub-basins within the larger basin, and may have provided pathways for hydrothermal fluid (heated ground water) circulation.

After extensional basin development, the rocks underwent a compressional phase of deformation, the Penokean orogeny, which can also be thought of as basin closure. This orogenic phase induced folding, thrust faulting, and metamorphism of the basin-filling rocks, leading to that part of the orogeny now referred to as the fold-and-thrust belt. A younger, secondary basin (the foreland basin, Fig. 1) formed north of and on top of the partially eroded fold-and-thrust belt. Sedimentary rocks of the Animikie Group that were deposited into this foreland basin unconformably overlie Achaean rocks to the north and Paleoproterozoic rocks of the fold-and-thrust belt to the south. The Animikie Group includes the Biwabik Iron Formation on the Mesabi Iron Range and iron-formation of the Emily district in the Cuyuna range.

Rocks of the fold-and-thrust belt contain early recumbent (overturned) folds, refolded by west-trending, upright folds. In contrast, only the later upright folds affected strata along the southern margin of the overlying Animikie Group. Thus, rocks of the fold-and-thrust belt have undergone two periods of deformation (Holst, 1982), whereas rocks of the younger, overlying Animikie basin were only affected by the second deformation. Aeromagnetic maps and a study of aeromagnetic and gravity data (Carlson, 1985) show that the anomaly patterns characteristic of the Cuyuna North range continue to the northeast beneath rocks of the Animikie Group. *(Source: Geological Atlas of Crow Wing County, 2004)*

2.4.3 General Soils

Two kinds of glacial till, of slightly different age and markedly different composition, have been deposited in Crow Wing County. Brown sandy till with sand and loam texture occurs in the southern part of the county, south and east of Brainerd and in the northern
part, near the Whitefish Chain of lakes. The other type of till, termed ‘red clay till’,

occurs in the eastern part of the county along the northern and southern shores of Mille Lacs Lake. To the West, gravel and sand outwash occur in the county and includes large areas along the Mississippi River.

Comment [KJR1]: Whats in the west?

The Natural Resource Conservation Service (NRCS) is currently working on updating the soil survey legend to be more compatible with others across the state. An updated and digital version of the soil survey would be helpful for

further analysis including identification of high water tables and organic soils, both of which can be significant limitations of development. Most soils in Crow Wing County are susceptible to both wind and water erosion when the original forest cover (Figure 8) is removed.

2.4.4 Erosion Prone Soils

The erodibility index (EI) for a soil map unit is determined by dividing the potential erodibibility for the soil map unit by the soil loss tolerance (T) value established for the soil in the FOTG as of Januaty 1, 1990.

A soil map unit with an EI of eight (8) or greater is considered to be highly erodible land (HEL).
Potential erodibility is based on default values for rainfall amount and intensity, percent and length of slope, surface texture and organic matter, permeability, and plant cover. Actual erodibility and EI for any spe3cific map unit depends on the actual values for these properties.

2.4.5 Hydrology

Hydrology is the study of the movement, distribution, and quality of water throughout Earth, and thus addresses both the hydrologic cycle and water resources.

Water is the lifeblood of Crow Wing County. Of its 731,000 acres, 14 percent or approximately 102,000 acres are covered by scenic lakes, rivers and streams – and an additional 14 percent of the county is covered by wetlands. This great abundance of surface water is what attracts people to Crow Wing County.

The Crow Wing County Comprehensive Local Water Plan (CLWP) is a comprehensive analysis of water and related land resources coupled with a recommended series of action strategies designed to achieve maximum water

resource use and achieve water management goals. The plan has been developed under the legislative authority and mandate of the Comprehensive Local Water Management Act (Minnesota Statutes, Chapter 110B) and it's associated State Rule (MCAR, Chapter 9300).
Water Planning involves identifying what works best to protect and enhance water resources. In administration of the counties water plan, Crow Wing County is committed to the following principals of actions:

1.) Providing exceptional customer service that empowers landowners to manage and protect their land and water resources.
2.) Coordinating funding, staff, and grass roots efforts to maximize effectiveness of public dollars and programs.
3.) Managing, enhancing, and expanding the availability or educational materials and a network or resources and contacts.
4.) Identifying existing and potential threats to surface and ground water resources with action plans to minimize them.

Crow Wing County's current Water Plan was developed in 2008 and has identified 6 priority concerns:

1) Establish and maintain an organized countywide surface water quality

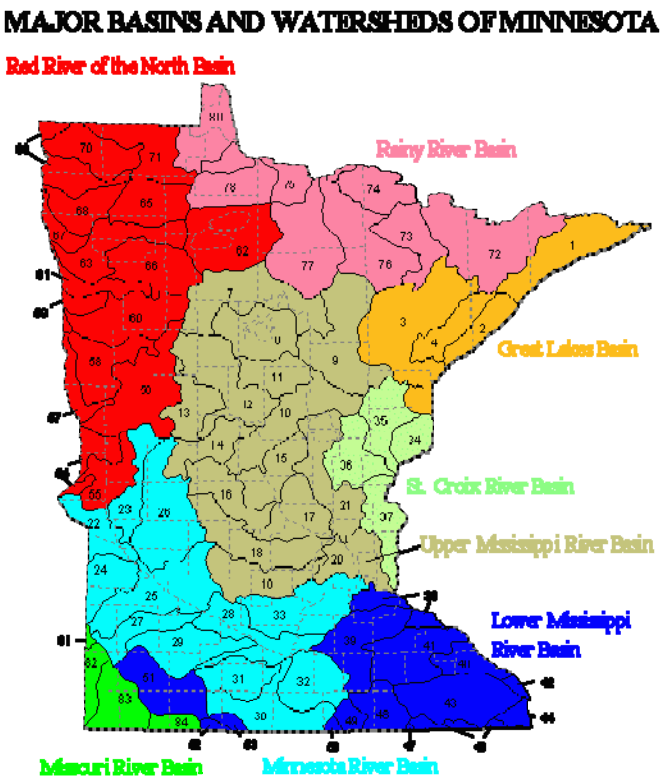
monitoring program
2) Address stormwater runoff to minimize impacts to water
3) Protect ground water quality
4) Address wastewater needs throughout the County
5) Minimize the adverse effects of development on water quality countywide

6) Coordinate the development and implementation of educational programs on water quality protection

In addition to Lakes, rivers and streams; wetlands are a valuable resource in Crow Wing County. In fact, all 8 main types of wetlands are found here in the county. Activities in a wetland are regulated by the Minnesota Wetland Conservation Act (WCA). WCA is administered locally by Crow Wing County

Planning & Zoning in county-jurisdictional areas and by the Crow Wing Soil & Water Conservation District (SWCD) in many municipalities.

2.4.5.a Aquifer Systems



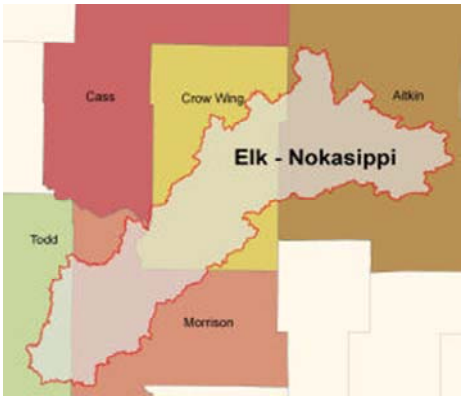
Most ground-water supplies in Crow Wing County are pumped from the surficial sand aquifer and several buried sand aquifers. The Quaternary sediments, which formed these aquifers, were deposited by several glaciers that entered and receded from the county. Sediments deposited during the most recent glacial period, the Late Wisconsinan, are better understood than those from previous
Glaciations. Most of the mapped aquifers on this plate were deposited during the Late Wisconsinan. More than 99 percent of wells in the county are completed in Quaternary sediments; less than 1 percent of the wells are completed in bedrock. Of the wells in Quaternary sediments, 72 percent are completed in buried sand aquifers, 24 percent are completed in surficial sands as watertable wells, and 3 percent are completed in buried sands under unconfined conditions. The surficial sand aquifer comprises outwash from the Brainerd assemblage and Mille Lacs deposits, fine sand from Glacial Lakes Brainerd and Aitkin, and terrace sediments. The surface extent of the individual sand units is mapped on Plate 3, Part A, Surficial Geology. The surficial sand aquifer is widely used in western and central Crow Wing County (wells completed in the surficial sand are shown on..
Quaternary buried artesian sand aquifers are the most important ground-water source where till is at the surface. However, the buried artesian aquifers are also heavily used in areas where the surficial
sand aquifer is present. Where sufficient well log data exist, the buried sand aquifers were individually mapped .
A small number of wells completed in bedrock exist in the county. About half of them are near the Mississippi River, and the rest are scattered throughout the county.

2.4.5.b Watersheds

Crow Wing County is crossed by five different watersheds. They are listed along with a brief description in order of their size within Crow Wing County.

The Elk-Nokasippi 8-Digit Hydrologic Unit Code (HUC) subbasin is located in the Northern Lakes and Forest Ecoregion of Minnesota. This predominantly forested watershed is 1,079,950 acres in size. Approximately seventy six percent of the land in this HUC is privately owned, and the remainder is largely tribal, state, county or federally owned land

Watershed Overview



8 Digit Hydrologic Unit Code:	**07010104**
Drainage Area:	**1,079,950 Acres**
Major Basin:	**Mississippi Basin**
Stream Miles:	**2,149**
2006 303d Stream Miles:	**136.4**
Population:	60,139
Farm Count:	1,455
Watersheds Upstream:	**Prairie-Willow Pine Crow Wing**
Watersheds Downstream:	**Platte-Spunk**

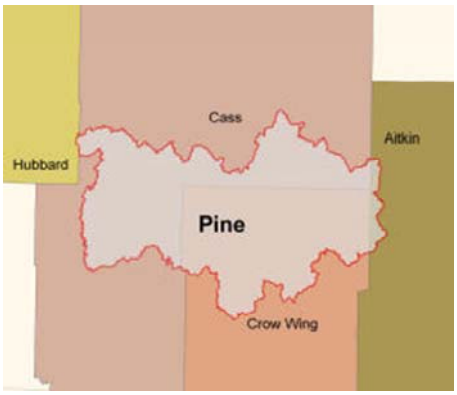
Assessment estimates indicate 1,455 farms located in the watershed. Approximately fifty eight percent of the operations are less than 180 acres in size, forty percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size. Fifty nine percent of the producers are full time operators not reliant on off-farm income

The main resource concerns in the basin are excessive soil erosion, woodland management, surface water quality, groundwater quality and quantity, surface water management, wetland management, and riparian development issues. Associated with the erosion issues and riparian development are increased sediment and pollutant (mercury, excess nutrients) loadings to surface waters. Declining wildlife habitat is also a concern.

The Pine River 8-Digit Hydrologic Unit Code (HUC) subbasin is located in the Northern Lakes and Forest Ecoregion of Minnesota. This largely forested watershed is 502,196 acres in size. Approximately fifty six percent of the land in this HUC is privately owned, and the remainder is state, county, or federally owned public land.

Assessment estimates show 355 Farms in the watershed. Approximately fifty nine percent of the operations are less than 180 acres in size, thirty nine percent are from 180 to 1000 acres in size, and the remaining farms are greater than

Watershed Overview



8 Digit Hydrologic Unit Code:	07010105
Drainage Area:	502,196 Acres
Major Basin:	Mississippi Basin
Stream Miles:	1,291
2006 303d Stream Miles:	0
Population:	22,325
Farm Count:	355
Watersheds Upstream:	None
Watersheds Downstream:	Elk-Nokasippi

The main resource concerns on the cropland are wind and water soil erosion, wetland protection, storm water management, timberland management, shoreline management and restoration, sedimentation, and cropland runoff. Associated with the cropland runoff are increased pollutant loadings to surface waters (mercury, sediment, excess nutrients). Declining wildlife habitat is also a concern.

The Crow Wing 8-Digit Hydrologic Unit Code (HUC) subbasin is located in the Northern Lakes and Forest and North Central Hardwoods Forest Ecoregions of Minnesota. This largely forested watershed is 1,245,251 acres in size. Approximately seventy two percent of the land in this HUC is privately owned.

Assessment estimates indicate 1,434 Farms in the watershed. Approximately fifty seven percent of the operations are less than 180 acres in size, forty percent are

from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size. Fifty eight percent of the producers are full time operators and do not rely on off-farm income.

The main resource concerns in the basin are excessive soil erosion, woodland management, surfacewater quality, groundwater quality and quantity, surfacewater management, wetland management, and riparian development issues. Associated with the surfacewater management and riparian development are increased sediment and pollutant (mercury, excess nutrients loadings to surface waters. Declining wildlife habitat is also a concern.

Watershed Overview

8 Digit Hydrologic Unit Code:	07010106
Drainage Area:	1,245,755 Acres
Major Basin:	Mississippi Basin
Stream Miles:	2,615
2006 303d Stream Miles:	116.7
Population:	43,542
Farm Count:	1,434
Watersheds Upstream:	Redeye Long Prairie
Watersheds Downstream:	Elk-Nokasippi

The Platte-Spunk 8-Digit Hydrologic Unit Code (HUC) subbasin is located in the North Central Hardwood Forest Ecoregion of Minnesota. This largely agricultural watershed is 652,677 acres in size. Estimates show ninety six percent of the land in this HUC is privately owned, and the remainder is County, State or Federally owned public land.

There are 1,919 Farms in the Platte-Spunk Watershed. Approximately forty nine percent of the operations are less than 180 acres in size, forty eight percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size.

The main resource concerns in the basin are wind and water soil erosion, woodland management, surface water quality, groundwater quality and quantity, surface water management, and wetland management. Associated with the resource concerns are increased pollutant loadings to surface waters (mercury

Watershed Overview

8 Digit Hydrologic Unit Code:	**07010201**
Drainage Area:	**652,677 Acres**
Major Basin:	**Mississippi Basin**
Stream Miles:	**1174.6**
2006 303d Stream Miles:	**36.1**
Population:	**55,884**
Farm Count:	**1,919**
Watersheds Upstream:	**Elk - Nokasippi**
Watersheds Downstream:	**Clearwater - Elk**

polychlorinated biphenyls, fecal coliform). Declining wildlife habitat is also a concern throughout the watershed.

The Rum (Wahkon) River 8-Digit Hydrologic Unit Code (HUC) subbasin is located in Minnesota's Northern Lakes and Forests Ecoregion and the North Central Hardwoods Forest Ecoregion. Approximately ninety one percent of the 997,060 acres in this HUC are privately owned. The remaining acres are owned by county, federal, state or tribal entities.

Watershed Overview

8 Digit Hydrologic Unit Code:	**07010207**
Drainage Area:	**997,060 Acres**
Major Basin:	**Mississippi Basin**
Stream Miles:	**1.656**
2006 303d Stream Miles:	**156.5**
Population:	**110,366**
Farm Count:	**2,153**
Watersheds Upstream:	**None**
Watersheds Downstream:	**Twin Cities**

Assessment estimates indicate 2,153 Farms in the watershed. Approximately sixty nine percent of the operations are less than 180 acres in size, twenty nine percent are from 180 to 1000 acres in size, and the remaining farms are greater than 1000 acres in size. Of the 2,134 operators in the basin, 52% are full time producers not reliant on off farm income.

The main resource concerns in the watershed are Soil Quality, Surface/drinking Water Quality, Nutrient / Animal Waste Management, Stormwater Management, Sediment and Erosion Control, Groundwater Protection, Water quality and Quantity, and Protection of Shoreline / Riparian Areas.

Many of the resource concerns relate directly to agricultural practices and increased development in the region, resulting in fragmentation and increased

sediment and pollutant (mercury, PCBs, excess nutrients) loadings to surface waters.

2.4.5.c Protected Waters, Ditches and Control Structures

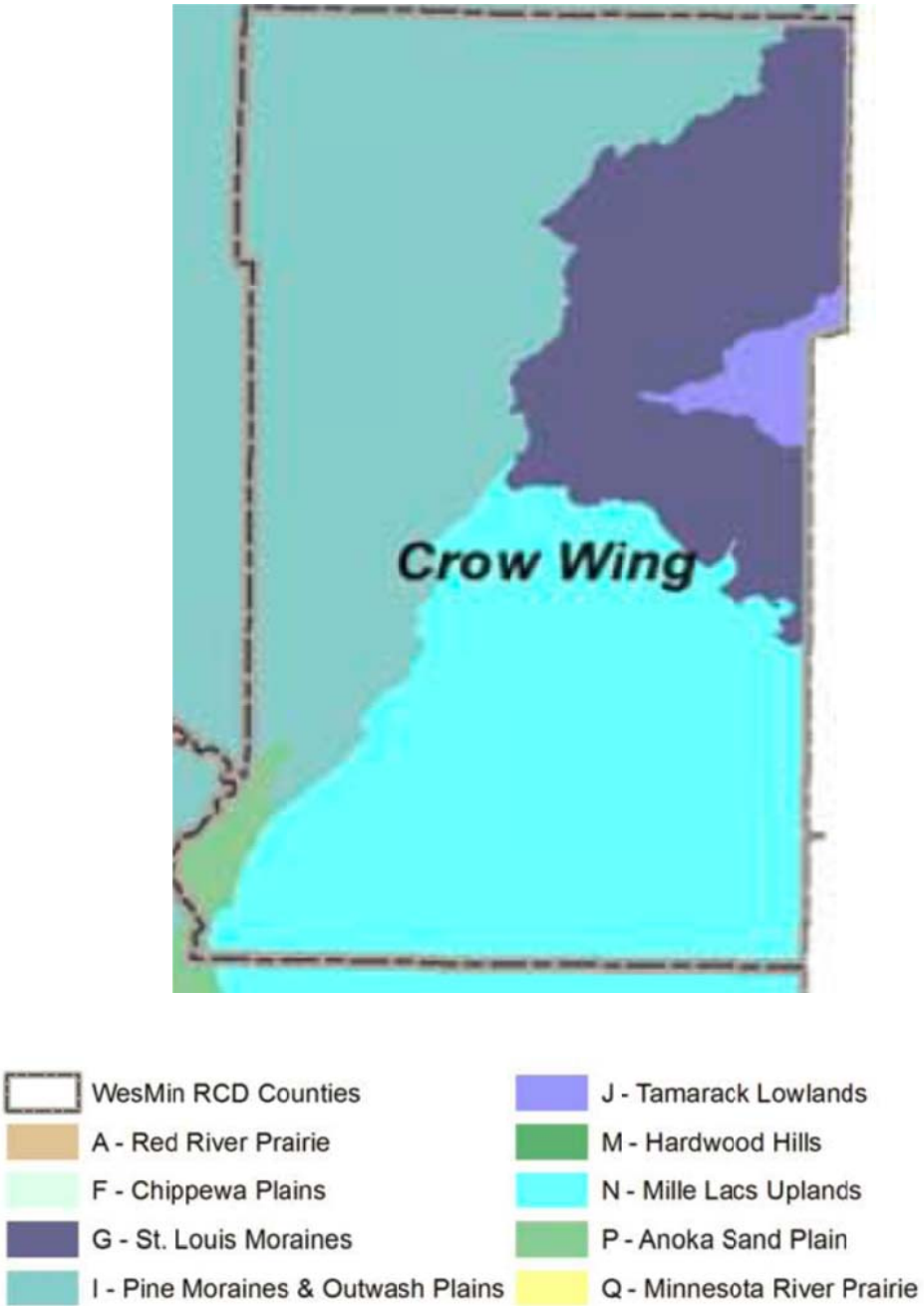
Wetlands, forests, and shore land vegetation buffers function to keep surface and groundwater clean by trapping sediments and nutrients from entering our water. Wetlands also help to reduce flooding by storing water. Wetlands and vegetation are not only important for water quality, they also provide critical habitat for birds and wildlife.

Areas with steep slopes are very susceptible to erosion. There are both onsite and offsite effects of erosion. Onsite erosion may result in the loss of top soil, and vegetation and may reduce property and/or aesthetic value. Negative offsite effects include soil erosion that carries se4diments and nutrients into surface waters, which can cause degradation to the water quality and increased water temperatures.

(2008 Crow Wing County Comprehensive Local Water Plan)

2.4.6 Land Cover

It is estimated that two percent (2%) of the land in the County is already developed. Not only is lakeshore property in danger of being over developed, but the amount of suitable land in the whole County is limited since fourteen percent (14%) of the County is covered by lakes, rivers and streams, fourteen percent (14%) is covered by wetlands, and another twenty percent (20%) is public land. Table 2-7 shows land use in number of acres per use, and in %acres of the whole per use.


Crow Wing
WesMin RCD Counties
A - Red River Prairie
F - Chippewa Plains
G - St. Louis Moraines
I - Pine Moraines & Outwash Plains
J - Tamarack Lowlands
M - Hardwood Hills
N - Mille Lacs Uplands
P - Anoka Sand Plain
Q - Minnesota River Prairie

Farmland In Crow Wing County

Crow Wing County Land Use

Description	Acres	%Acres
Urban/Industrial	5,801.80	0.8
Farmsteads and Rural Residences	3,044.00	0.4
Other Rural Developments	11,660.20	1.6
Cultivated Land	13,284.00	51.8
Grassland	114,359.50	15.5
Shrubby Greassland	4,573.20	0.6
Regeneration/Young Forest	16,583.90	3.6
Mixed Forest	43,207.10	5.8
Deciduous Forest	272,660.30	36.9
Coniferous Forest	31,818.70	4.3
Wetlands: Bogs	22,048.00	3
Wetlands: Marsh and Ferns	81,587.30	11
Water	105,554.60	14.3
Gravel Pits and Open Mines	3,285.90	0.4
Bare Rock	8.90	Less than 0.1
Total	**739480**	**100%**

2.4.7 Topography

Crow Wing County has two state forests, the Crow Wing State Forest and Emily State Forest. It also has the Cuyuna Lakes State Trail which lies in the Upper Mississippi River Basin.

The topography of the region is gently rolling to flat, with waters and wetlands generously interspersed with the woodlands that cover the landscape. It is home to an abundance of wildlife. Visitors may have the opportunity to see white-tailed deer, cottontail rabbit, snowshoe hare, raccoon, red fox, gray fox, coyote, mink, muskrat, squirrels, and beaver. Occasionally, black bears may be observed. American bald eagles and osprey frequent the area, and many species of waterfowl also take advantage of the abundant aquatic habitat found in the marshes and lakes of the county. There are many lakes and rivers in Crow Wing County. The main river is the Crow Wing River although there are smaller streams in the county too. It has about 417 recognized lakes.

3.0 Risk Assessment

3.1 Hazard Overview

Crow Wing County faces the challenge of several potential natural, human caused and technological hazards. The following is an assessment of the frequency of occurrence, historical impacts, and rankings of real and potential hazards facing Crow Wing County. This assessment is based on the best available information, including information obtained by local, state, and federal sources as well as through local official and citizen participation.

To quantify risk assessment information gathered for each identified hazard, color coding is used according to the following:

Frequency Future timeframe event most likely to occur		
	Highly Likely	Near 100% probability in next year
	Likely	At least 1 chance in next 10 years
	Occasional	At least 1 chance in next 100 years
	Unlikely	Less than 1% Probability in next 100 years

Warning Amount of warning time prior to hazard event occurring		
	None to Minimal	None to three hours of warning time
	3 to 6 Hours	Three to six hours of warning time
	6 to 12 Hours	Six to twelve hours of warning time
	More than 12 Hrs	More than twelve hours of warning time

Impact Measures the perceived level of impact on the entire County		
	Substantial	Widespread injury, loss of life and property damage
	Major	Significant property damage, great injury and loss of life
	Minor	Limited property damage, minimal injury and loss of life
	Limited	Cosmetic property damage, no loss of life, minimal injury

Area Total area of Sector effected including all cities and townships		
	Catastrophic	Majority or all of the sector effected
	Critical	Twenty-five to fifty percent of sector effected
	Limited	Ten to twenty-five percent of sector effected
	Negligible	Localized area of sector effected

Duration		
Length of duration of hazard event limited to the event itself or length of time the event can cause injury to persons, loss of life, and/or potential property damage		
	More than 24 Hrs	Over 24 hours
	12 to 24 Hours	Twelve to twenty-four hours
	1 to 12 Hours	One to twelve hours
	Less than 1 Hour	Less than one hour

Risk to Life/Injury and Risk to Property		
Measures the perceived risk to bodily harm or injury and/or property damage in the immediate proximity where the specific hazard occurs.		
	Very High	Total loss of life and destruction of property
	High	High loss of life, injury or property damage
	Limited	Small loss of life, injury, and property damage
	Minimal	No loss of life, cosmetic property damage if any

Through survey and meetings of the Citizen Planning Team, 31 hazards were identified. The Citizen Planning Team then reviewed and discussed each identified potential hazard by referencing the Minnesota State Hazard Mitigation plan and the thirteen criteria assessment process listed in table 3-1. Two hazards addressed in the State's plan are not addressed in the Crow Wing County plan as they do not apply. These two Hazards are:

-**Coastal Erosion** (The county has no coastal areas)
-Sinkholes (The geography of Crow Wing County is not vulnerable to sinkholes and does not lend itself to this type of hazard.)

Table 3.1.1 Hazard Assessments

Frequency	Warning Time	Impact	Area
Duration	Risk to Citizens & People	Risk to Animals & Livestock	Risk to Housing & Living Quarters
Risk to Critical Facilities & Response Time	Risk to Special Facilities & Community Resources	Risk to Infrastructure & Lifelines	Risk to HazMat Facilities & Public Health Concerns
Risk to Commercial & Industrial Facilities			

Through this process the Planning Team determined that many can be combined and that two were not relevant and significant to the county to warrant further discussion at this time. After reviewing the State Hazard Mitigation Plan, the remaining nineteen were then separated into two groups. The two groups include Natural hazards and Human Caused/ Technological (HCT). These hazards were then discussed, ranked and evaluated using a series of worksheets that are documented in Appendix F. The following hazards were identified for detailed analysis:

Table 3.1.2

Natural	Technological/Human Caused
Severe Summer Storms	Fire
Tornado	Controlled Burns
Flooding	Airport - Crash
Winter Storms	Communication Breakdown
Extreme Temperatures	Power Failure
Wind Storm (sustained)	Hazardous Materials Accident - Transportation
Infectious Disease	Hazardous Materials Accident - Fixed Facilities
Wildfire	Domestic Terrorism
Drought	Water Pollution
Earthquake	Public Health
Dust Storm	Population Influx
Solar Flares/Storms	Dam Failure

This chapter identifies all hazards affecting Crow Wing County. It provides information on the history and extent of hazards, evaluates the possible effects, identifies vulnerable populations and assets (buildings, critical facilities, and essential infrastructure), and estimates potential loses that may occur. This process identifies the most critical problems and issues that require mitigation action.

3.2 PROFILING NATURAL HAZARDS

Natural Hazard refers to all atmospheric, hydrologic, geologic (especially seismic and volcanic), and wildfire phenomena that, because of their location, severity, and frequency, have the potential to affect humans, their structures, or their activities adversely.

3.2.1 Severe Summer Storms

THUNDERSTORM
Thunderstorms can occur anywhere in the world and at any time of the day, however in Crow Wing County they are most likely to occur between the months of May and August. All thunderstorms produce lightning and thunder. Some have the potential to produce damaging straight-line winds, large hail, heavy rain, flooding, and tornadoes. A thunderstorm is classified as “severe” when it contains either singly, or a combination of hail 3/4" or greater, winds gusting in excess of 50 knots (57.5 mph), and/or tornado.

Hazard Profile

Past events

The following table documents occurrences of severe thunderstorms in Crow Wing County dating from 1956 to 1999. The majority of Crow Wing Counties severe thunderstorms have occurred in lightly populated areas of the county, however municipalities within Crow Wing County have not been without risk to sever summer storms as one can see from the table.

Table 3.2.1.1 Severe Thunderstorms in Crow Wing County

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 CROW WING	08/12/1956	1700	Tstm Wind	0 kts.	0	0	0	0
2 CROW WING	07/07/1959	2100	Tstm Wind	0 kts.	0	0	0	0
3 CROW WING	06/25/1969	0800	Tstm Wind	0 kts.	0	0	0	0
4 CROW WING	07/15/1969	0145	Tstm Wind	0 kts.	0	0	0	0
5 CROW WING	09/20/1970	2045	Tstm Wind	0 kts.	0	0	0	0
6 CROW WING	07/13/1974	1620	Tstm Wind	55 kts.	0	0	0	0
7 CROW WING	06/09/1976	1830	Tstm Wind	52 kts.	0	0	0	0
8 CROW WING	08/14/1978	1615	Tstm Wind	51 kts.	0	0	0	0
9 CROW WING	08/09/1979	1805	Tstm Wind	0 kts.	0	0	0	0
10 CROW WING	06/05/1980	1630	Tstm Wind	63 kts.	0	0	0	0
11 CROW WING	06/05/1980	1845	Tstm Wind	63 kts.	0	0	0	0
12 CROW WING	07/18/1980	0025	Tstm Wind	61 kts.	0	0	0	0
13 CROW WING	08/21/1982	2010	Tstm Wind	0 kts.	0	0	0	0
14 CROW WING	07/02/1983	2100	Tstm Wind	0 kts.	0	0	0	0
15 CROW WING	04/27/1984	1055	Tstm Wind	0 kts.	0	0	0	0
16 CROW WING	04/27/1984	1240	Tstm Wind	0 kts.	0	0	0	0
17 CROW WING	06/06/1984	1645	Tstm Wind	0 kts.	0	0	0	0
18 CROW WING	04/21/1985	2045	Tstm Wind	52 kts.	0	0	0	0
19 CROW WING	07/04/1986	0045	Tstm Wind	0 kts.	0	0	0	0
20 CROW WING	08/06/1986	1507	Tstm Wind	60 kts.	0	0	0	0
21 CROW WING	07/10/1987	2345	Tstm Wind	0 kts.	0	0	0	0
22 CROW WING	05/24/1989	1015	Tstm Wind	0 kts.	0	0	0	0
23 CROW WING	07/02/1989	2035	Tstm Wind	0 kts.	0	0	0	0
24 CROW WING	07/17/1990	0305	Tstm Wind	56 kts.	0	0	0	0

25 CROW WING	09/13/1990	1634	Tstm Wind	0 kts.	0	0	0	0
26 CROW WING	06/27/1991	0015	Tstm Wind	65 kts.	0	0	0	0
27 CROW WING	06/27/1991	0030	Tstm Wind	65 kts.	0	0	0	0
28 Pierz	06/19/1994	2115	Thunderstorm Winds	0 kts.	0	0	0	0
29 CROW WING	06/19/1994	2130	Thunderstorm Winds	0 kts.	0	0	1K	0
30 Brainerd	06/19/1994	2200	Thunderstorm Winds	0 kts.	0	0	1K	0
31 Cross Lake	07/12/1995	0430	Thunderstorm Winds	60 kts.	0	0	5K	0
32 Brainerd	07/14/1995	0400	Thunderstorm Winds	0 kts.	0	0	0	0
33 Pequot Lakes	07/14/1995	0415	Thunderstorm Winds	0 kts.	0	0	0	0
34 Pequot Lakes	06/29/1996	03:21 PM	Tstm Wind	60 kts.	0	0	0	0
35 Brainerd	06/29/1996	03:50 PM	Tstm Wind	55 kts.	0	0	19K	0
36 Merrifield	06/29/1996	03:50 PM	Tstm Wind	60 kts.	0	0	0	0
37 Cross Lake	07/11/1996	07:43 PM	Tstm Wind	50 kts.	0	0	0	0
38 Brainerd	07/21/1996	07:30 PM	Tstm Wind	78 kts.	0	0	0	0
39 Brainerd	07/21/1996	07:46 PM	Tstm Wind	50 kts.	0	0	0	0
40 Garrison	08/06/1996	09:58 PM	Tstm Wind	61 kts.	0	0	0	0
42 Brainerd	06/28/1997	01:02 PM	Tstm Wind	87 kts.	0	0	0	0
43 Crosby	06/28/1997	01:06 PM	Tstm Wind	70 kts.	0	0	0	0
44 Brainerd	10/08/1997	09:57 PM	Tstm Wind	50 kts.	0	0	0	0
45 Pequot Lakes	10/08/1997	10:10 PM	Tstm Wind	50 kts.	0	0	0	0
46 Cross Lake	06/27/1998	10:50 PM	Tstm Wind	52 kts.	0	0	0	0
47 Breezy Pt	06/27/1998	11:55 PM	Tstm Wind	50 kts.	0	0	0	0
48 Cross Lake	07/20/1998	05:15 PM	Tstm Wind	55 kts.	0	0	0	0
49 Pequot Lakes	07/20/1998	05:30 PM	Tstm Wind	50 kts.	0	0	0	0
50 Crosby	07/20/1998	06:15 PM	Tstm Wind	50 kts.	0	0	0	0
51 Brainerd	09/25/1998	11:46 PM	Tstm Wind	78 kts.	0	0	1.0M	0
52 Deerwood	06/06/1999	04:10 PM	Tstm Wind	50 kts.	0	0	0	0
53 Crosby	06/06/1999	04:25 PM	Tstm Wind	50 kts.	0	0	0	0
54 Baxter	06/09/1999	05:01 PM	Tstm Wind	50 kts.	0	0	0	0
55 Brainerd	06/09/1999	05:05 PM	Tstm Wind	50 kts.	0	0	0	0
56 Pequot Lakes	07/04/1999	01:10 PM	Tstm Wind	55 kts.	0	0	0	0
57 Brainerd	07/22/1999	11:15 PM	Tstm Wind	50 kts.	0	0	0	0
58 Deerwood	07/22/1999	11:15 PM	Tstm Wind	50 kts.	0	0	0	0
59 Cross Lake	07/25/1999	03:45 PM	Tstm Wind	70 kts.	0	3	0	0

60 Cross Lake	07/25/1999	03:53 PM	Tstm Wind	50 kts.	0	0	0	0
61 Nisswa	07/25/1999	03:53 PM	Tstm Wind	50 kts.	0	0	0	0
62 Brainerd	08/31/2000	12:00 AM	Tstm Wind	80 kts.	0	0	200K	0
63 Brainerd	06/13/2001	07:30 PM	Tstm Wind	87 kts.	0	0	0	0
64 Baxter	07/17/2001	07:58 PM	Tstm Wind	50 kts.	0	0	0	0
65 Breezy Pt	08/08/2001	03:23 PM	Tstm Wind	50 kts.	0	0	0	0
66 Emily	08/08/2001	03:45 PM	Tstm Wind	50 kts.	0	0	0	0
67 Cross Lake	04/16/2002	09:00 PM	Tstm Wind	50 kts.	0	0	0	0
68 Breezy Pt	07/08/2002	07:10 PM	Tstm Wind	50 kts.	0	0	0	0
69 Deerwood	07/21/2002	07:35 AM	Tstm Wind	50 kts.	0	0	0	0
70 Pequot Lakes	04/18/2004	07:35 AM	Tstm Wind	56 kts.	0	0	0	0
71 Cross Lake	04/18/2004	07:50 AM	Tstm Wind	56 kts.	0	0	0	0
72 Jenkins	04/28/2004	04:35 PM	Tstm Wind	60 kts.	0	0	0	0
73 Pequot Lakes	07/13/2004	12:28 AM	Tstm Wind	55 kts.	0	0	0	0
74 Brainerd	09/23/2004	01:55 PM	Tstm Wind	60 kts.	0	0	0	0
75 Cross Lake	09/23/2004	01:55 PM	Tstm Wind	60 kts.	0	0	0	0
76 Nisswa	09/23/2004	01:55 PM	Tstm Wind	60 kts.	0	0	0	0
77 Nisswa	09/23/2004	12:40 PM	Tstm Wind	60 kts.	0	0	0	0
79 Merrifield	06/20/2005	11:07 AM	Tstm Wind	55 kts.	0	0	0	0
80 Merrifield	06/20/2005	11:30 AM	Tstm Wind	55 kts.	0	0	0	0
81 Cross Lake	06/23/2005	09:00 PM	Tstm Wind	55 kts.	0	0	0	0
82 Nisswa	06/29/2005	06:35 PM	Tstm Wind	50 kts.	0	0	0	0
83 Brainerd	06/29/2005	07:45 PM	Tstm Wind	50 kts.	0	0	0	0
84 Brainerd	08/09/2005	03:55 AM	Tstm Wind	60 kts.	0	0	0	0
85 Nisswa	08/09/2005	04:00 AM	Tstm Wind	60 kts.	0	0	0	0
86 Crosby	08/09/2005	04:15 AM	Tstm Wind	60 kts.	0	0	0	0
88 Cross Lake	06/05/2006	01:15 PM	Tstm Wind	50 kts.	0	0	0	0
89 Brainerd/crow Wing C	07/01/2006	12:40 AM	Tstm Wind	60 kts.	0	0	0	0
90 Breezy Pt	07/25/2006	06:35 PM	Tstm Wind	50 kts.	0	0	0	0
91 Pequot Lakes	07/25/2006	06:35 PM	Tstm Wind	50 kts.	0	0	0	0
92 Brainerd	07/29/2006	02:00 AM	Tstm Wind	55 kts.	0	0	0	0
93 Cross Lake	05/21/2007	15:44 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
94 Brainerd	08/13/2007	18:05 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
95 Brainerd	08/13/2007	18:21 PM	Thunderstorm Wind	53 kts.	0	0	0K	0K

96 Garrison	08/13/2007	18:40 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
98 Brainerd	06/12/2008	19:24 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
99 Brainerd	06/12/2008	19:40 PM	Thunderstorm Wind	52 kts.	0	0	0K	0K
100 Cross Lake	06/12/2008	22:30 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
101 Cross Lake	06/12/2008	23:15 PM	Thunderstorm Wind	50 kts.	0	0	0K	0K
102 Nisswa	07/11/2008	17:27 PM	Thunderstorm Wind	60 kts.	0	0	0K	0K
				TOTALS:	0	3	1.225M	0

Source: http://www4.ncdc.noaa.gov

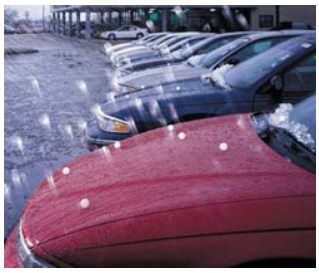
LIGHTNING

Lightning occurs when there is a build up and discharge between positive and negative charges within a cloud, two clouds, cloud to air, or between a cloud and the ground. When this difference becomes great enough a lightning bolt strikes. Lightning presents a danger as it is present in all thunderstorms, however approximately 80% of all lightning activity occurs within a cloud, from cloud to air, and cloud to cloud. Table 3.2.1.2 shows recorded damages caused by lightning.

Table 3.2.1.2 Lightning in Crow Wing County

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 Brainerd	07/13/1997	05:45 AM	Lightning	N/A	0	0	1.5M	0
2 Baxter	06/11/1998	07:00 AM	Lightning	N/A	0	1	0	0
3 Brainerd	03/08/2000	07:45 AM	Lightning	N/A	0	0	50K	0
4 Brainerd	07/08/2000	09:38 PM	Lightning	N/A	0	0	1K	0
5 Cross Lake	06/22/2003	08:15 PM	Lightning	N/A	0	0	0	0
6 Jenkins	04/28/2004	04:15 PM	Lightning	N/A	0	0	0	0
				TOTALS:	0	1	1.551M	0

Source: http://www4.ncdc.noaa.gov



HAIL STORM

Also the product of a thunderstorm, hail is formed when water droplets are carried through thunderstorm updrafts to the freezing regions of the cloud. The droplets are then pushed through the updrafts and downdrafts of the cloud mixing with other water droplets until a pellet of ice is formed that can no longer be supported by the updrafts. When this occurs the ice pellets or hailstones fall to the ground. Most hail in Minnesota ranges in size from pea size to golf ball size however larger hailstones have been reported on a more infrequent basis. Table 3.2.1.3 displays recorded Crow Wing County hail events.

Table 3.2.1.3 Hail in Crow Wing County

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 CROW WING	08/13/1971	1153	Hail	1.00 in.	0	0	0	0
2 CROW WING	07/12/1978	2030	Hail	1.75 in.	0	0	0	0
3 CROW WING	08/02/1979	1658	Hail	1.00 in.	0	0	0	0
4 CROW WING	09/01/1979	1410	Hail	1.00 in.	0	0	0	0
5 CROW WING	06/05/1980	1620	Hail	1.00 in.	0	0	0	0
6 CROW WING	06/05/1980	1630	Hail	2.00 in.	0	0	0	0
7 CROW WING	07/14/1980	0045	Hail	1.00 in.	0	0	0	0
8 CROW WING	09/08/1980	1600	Hail	0.75 in.	0	0	0	0
9 CROW WING	05/10/1982	1540	Hail	1.75 in.	0	0	0	0
10 CROW WING	05/10/1982	1550	Hail	1.75 in.	0	0	0	0
11 CROW WING	04/26/1984	1635	Hail	1.75 in.	0	0	0	0
12 CROW WING	04/26/1984	1835	Hail	1.75 in.	0	0	0	0
13 CROW WING	06/21/1985	1530	Hail	0.75 in.	0	0	0	0
14 CROW WING	07/03/1985	1745	Hail	1.75 in.	0	0	0	0
15 CROW WING	08/04/1986	1740	Hail	1.75 in.	0	0	0	0
16 CROW WING	08/29/1987	2140	Hail	0.75 in.	0	0	0	0
17 CROW WING	05/07/1988	1630	Hail	1.50 in.	0	0	0	0
18 CROW WING	06/24/1988	2100	Hail	1.75 in.	0	0	0	0
19 CROW WING	05/24/1989	1125	Hail	1.75 in.	0	0	0	0
20 CROW WING	05/29/1989	1110	Hail	0.75 in.	0	0	0	0
21 CROW WING	05/29/1989	1210	Hail	1.50 in.	0	0	0	0
22 CROW WING	05/29/1989	1230	Hail	1.50 in.	0	0	0	0
23 CROW WING	08/28/1989	1700	Hail	2.75 in.	0	0	0	0
24 CROW WING	07/17/1990	0355	Hail	1.00 in.	0	0	0	0
25 CROW WING	06/28/1991	1915	Hail	1.75 in.	0	0	0	0
26 CROW WING	07/05/1991	1832	Hail	0.75 in.	0	0	0	0
27 CROW WING	09/15/1991	0215	Hail	1.00 in.	0	0	0	0
28 CROW WING	06/13/1992	1442	Hail	1.75 in.	0	0	0	0
29 CROW WING	06/13/1992	1510	Hail	1.75 in.	0	0	0	0
30 CROW WING	08/07/1994	1435	Hail	2.00 in.	0	0	0	1K
31 Pine Center	08/07/1994	1500	Hail	1.00 in.	0	0	0	0
32 CROW WING	08/27/1994	0925	Hail	1.75 in.	0	0	0	0

33 Island Lake	08/27/1994	0935	Hail	1.00 in.	0	0	0	0
34 Brainerd	07/14/1995	0350	Hail	0.75 in.	0	0	0	0
35 Pequot Lakes	08/08/1995	2248	Hail	0.75 in.	0	0	0	0
36 Breezy Point	08/08/1995	2301	Hail	2.50 in.	0	0	0	0
37 Brainerd	05/17/1996	08:47 PM	Hail	1.75 in.	0	0	0	0
38 Pequot Lakes	07/01/1996	03:15 PM	Hail	0.75 in.	0	0	0	0
39 Cross Lake	07/01/1996	03:30 PM	Hail	1.00 in.	0	0	0	0
40 Cross Lake	07/01/1996	03:55 PM	Hail	0.75 in.	0	0	0	0
41 Brainerd	07/11/1996	05:40 PM	Hail	1.75 in.	0	0	0	0
42 Crosby	07/11/1996	06:10 PM	Hail	0.75 in.	0	0	0	0
43 Swanburg	07/11/1996	06:38 PM	Hail	1.75 in.	0	0	0	0
44 Cross Lake	07/21/1996	03:40 PM	Hail	0.75 in.	0	0	0	0
45 Fifty Lakes	09/10/1996	12:55 PM	Hail	0.75 in.	0	0	0	0
46 Brainerd	10/26/1996	05:35 PM	Hail	1.00 in.	0	0	0	0
47 Pine Center	08/02/1997	07:36 PM	Hail	1.25 in.	0	0	0	0
48 Ft Ripley	09/18/1997	04:30 PM	Hail	1.75 in.	0	0	0	0
49 Emily	06/01/1998	03:55 PM	Hail	1.00 in.	0	0	0	0
50 Cross Lake	06/01/1998	04:55 PM	Hail	1.00 in.	0	0	0	0
51 Fifty Lakes	06/01/1998	05:02 PM	Hail	1.75 in.	0	0	0	0
52 Crosby	07/20/1998	06:15 PM	Hail	0.75 in.	0	0	0	0
53 Crosby	07/20/1998	06:35 PM	Hail	1.00 in.	0	0	0	0
54 Nisswa	09/26/1998	02:30 AM	Hail	1.75 in.	0	0	0	0
55 Crosby	09/26/1998	12:03 AM	Hail	1.00 in.	0	0	0	0
56 Deerwood	06/06/1999	04:09 PM	Hail	1.75 in.	0	0	0	0
57 Ft Ripley	07/28/1999	11:37 PM	Hail	0.75 in.	0	0	0	0
58 Ft Ripley	07/28/1999	11:46 PM	Hail	1.75 in.	0	0	0	0
59 Brainerd	08/15/1999	10:04 AM	Hail	1.00 in.	0	0	0	0
60 Brainerd	08/15/1999	10:20 AM	Hail	1.25 in.	0	0	0	0
61 Cross Lake	08/14/2000	12:03 PM	Hail	1.75 in.	0	0	0	0
62 Emily	08/14/2000	12:13 PM	Hail	1.00 in.	0	0	0	0
63 Emily	05/15/2001	05:00 PM	Hail	0.75 in.	0	0	0	0
64 Brainerd	06/11/2001	04:40 PM	Hail	1.50 in.	0	0	0	0
65 Baxter	06/13/2001	07:14 PM	Hail	0.75 in.	0	0	0	0
66 Cross Lake	06/13/2001	07:58 PM	Hail	0.75 in.	0	0	0	0

67 Baxter	07/17/2001	07:58 PM	Hail	1.00 in.	0	0	0	0
68 Ft Ripley	07/17/2001	08:10 PM	Hail	0.88 in.	0	0	0	0
69 Jenkins	07/02/2003	07:17 PM	Hail	1.75 in.	0	0	0	0
70 Pequot Lakes	07/02/2003	07:17 PM	Hail	1.00 in.	0	0	0	0
71 Pequot Lakes	07/02/2003	08:25 PM	Hail	0.75 in.	0	0	0	0
72 Breezy Pt	07/02/2003	08:35 PM	Hail	0.75 in.	0	0	0	0
73 Ft Ripley	06/08/2005	02:14 AM	Hail	0.88 in.	0	0	0	0
74 Brainerd	06/20/2005	10:49 AM	Hail	0.75 in.	0	0	0	0
75 Cross Lake	06/23/2005	09:15 PM	Hail	0.75 in.	0	0	0	0
76 Nisswa	05/29/2006	02:17 PM	Hail	0.75 in.	0	0	0	0
77 Brainerd	05/29/2006	02:29 PM	Hail	0.88 in.	0	0	0	0
78 Emily	05/29/2006	03:20 PM	Hail	1.00 in.	0	0	0	0
79 Crow Wing	08/13/2007	18:10 PM	Hail	1.00 in.	0	0	0K	0K
80 Brainerd	08/13/2007	18:11 PM	Hail	0.88 in.	0	0	0K	0K
81 Brainerd	08/13/2007	18:15 PM	Hail	1.75 in.	0	0	0K	0K
82 Brainerd	08/13/2007	18:20 PM	Hail	0.75 in.	0	0	0K	0K
83 Baxter	08/13/2007	18:25 PM	Hail	0.75 in.	0	0	0K	0K
84 Ft Ripley	08/13/2007	18:25 PM	Hail	1.00 in.	0	0	0K	0K
85 Baxter	08/13/2007	18:28 PM	Hail	1.50 in.	0	0	0K	0K
86 Brainerd	08/13/2007	18:30 PM	Hail	0.88 in.	0	0	0K	0K
87 Brainerd	05/31/2008	17:20 PM	Hail	0.75 in.	0	0	0K	0K
88 Barrows	07/02/2008	00:10 AM	Hail	0.75 in.	0	0	0K	0K
89 Brainerd	07/02/2008	00:20 AM	Hail	1.00 in.	0	0	0K	0K
90 Nisswa	07/11/2008	17:05 PM	Hail	0.75 in.	0	0	0K	0K
				TOTALS:	0	0	0	1K

Source: http://www4.ncdc.noaa.gov

WINDSTORMS (STRAIGHT-LINED WINDS)

Windstorms can occur at any time throughout the year, however most commonly are experienced with severe thunderstorms in warm weather months. Windstorms most commonly include downbursts, tornadoes, and straight lined winds and are defined as events with wind speeds greater than 60 miles per hour.

History
Limited information is available related to windstorms however Table 3.2.1.1 displays high winds during a thunderstorm event.

Plans, Programs and Policies
- Windbreaks: Natural Vegetative Cover

Risks & Vulnerabilities

Table 3.2.1.4 Summer Storms							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Likely	Minimal	Major	Limited	Less than 1 Hour	Limited	Limited
Central	Likely	Minimal	Major	Critical	Less than 1 Hour	High	High
South	Likely	Minimal	Major	Limited	Less than 1 Hour	Limited	Limited

Plans, Programs & Policies
- National Weather Service storm monitoring activities
- NOAA Weather Radio
- Severe Weather Shelters
- Severe Weather Alert System
- Infrastructure Improvements

3.2.2 Tornado

Definition

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud. It is spawned by a thunderstorm and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. Tornado season is generally March through August, although tornadoes can occur at any time of year. In Minnesota the earliest verified tornado occurred on April 19, 1820. Nearly 75% of tornadoes in Minnesota occur in the months of May, June, and July. They tend to occur in the afternoons and evenings: over 80 percent of all tornadoes strike between noon and midnight. The magnitude of tornadoes is measured according to the Enhanced F Scale. This scale (Table 3.2.2.1) displays the magnitude of a particular tornado based on several criteria including amount of destruction, wind speeds, and other data collected after the affected area has been assessed. Most tornadoes last less than 30 minutes, but they can exist for more than an hour. The majority of tornadoes are classified in the F0 and F1 category. The path of a tornado can range from a few hundred feet to miles, and tornado widths may range from tens of yards to more than a quarter of a mile.

Before 2007, tornados were measured according to the Fujita Scale, more commonly referred to as the "F" scale. The F scale is displayed in table 3.2.2.3.

Despite a higher number of tornadoes reported in recent years, the number of fatalities and injuries due to tornadoes has been decreasing. This is thanks in part to better national Weather Service tools in detecting tornadoes, namely the NEXRAD Doppler radar network installed in the mid 1990's. Also, the ability to alert the public has improved with more National Weather Service radio transmitters and a close relationship with media outlets. An energetic spotter network has also been the key to alerting the public in Minnesota. There have only been 7 deaths due to tornadoes in Minnesota in the last 16 years (1992 – 2008). In fact, the increasing number of tornadoes reported may be a direct result of improved communications networks, public awareness, warning systems and training.

Table 3.2.2.1 Enhanced F Scale

FUJITA SCALE			DERIVED EF SCALE		**OPERATIONAL EF SCALE**	
F Number	Fastest 1/4-mile (mph)	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	**EF Number**	**3 Second Gust (mph)**
0	40-72	45-78	0	65-85	**0**	**65-85**
1	73-112	79-117	1	86-109	**1**	**86-110**
2	113-157	118-161	2	110-137	**2**	**111-135**
3	158-207	162-209	3	138-167	**3**	**136-165**
4	208-260	210-261	4	168-199	**4**	**166-200**
5	261-318	262-317	5	200-234	**5**	**Over 200**

Enhanced F Scale Damage Indicators

Table 3.2.2.2

Number	DAMAGE INDICATOR	ABR
1	Small barns, farm outbuildings	SBO
2	One- or two-family residences	FR12
3	Single-wide mobile home (MHSW)	MHSW
4	Double-wide mobile home	MHDW
5	Apt, condo, townhouse (3 stories or less)	ACT
6	Motel	M
7	Masonry apt. or motel	MAM
8	Small retail bldg. (fast food)	SRB
9	Small professional (doctor office, branch bank)	SPB
10	Strip mall	SM
11	Large shopping mall	LSM
12	Large, isolated ("big box") retail bldg.	LIRB
13	Automobile showroom	ASR
14	Automotive service building	ASB
15	School - 1-story elementary (interior or exterior halls)	ES
16	School - jr. or sr. high school	JHSH
17	Low-rise (1-4 story) bldg.	LRB

18	Mid-rise (5-20 story) bldg.	MRB
19	High-rise (over 20 stories)	HRB
20	Institutional bldg. (hospital, govt. or university)	IB
21	Metal building system	MBS
22	Service station canopy	SSC
23	Warehouse (tilt-up walls or heavy timber)	WHB
24	Transmission line tower	TLT
25	Free-standing tower	FST
26	Free standing pole (light, flag, luminary)	FSP
27	Tree - hardwood	TH
28	Tree - softwood	TS

The Fujita Scale

Table 3.2.2.3

F-Scale	Intensity Phrase	Wind Speed	Type of Damage Done
F0	Gale Tornado	40-72 mph	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate Tornado	73-112 mph	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant Tornado	113-157 mph	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe Tornado	158-206 mph	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted
F4	Devastating Tornado	207-260 mph	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible Tornado	261-318 mph	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel re-inforced concrete structures badly damaged.
F6	Inconceivable Tornado	319-379 mph	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

Figure 3.2.2.1

History

Tornadoes occur in every county in Minnesota. Since 1950, Crow Wing County has experienced 22. All but three of the tornado events in Crow Wing County occurred either in the late afternoon or evening. Zero deaths and 16 injuries were reported. The total property damage recorded was $10.9 million. The

earliest damage-causing event on record in the Storm Events Database occurred in 1966; the most recent in 2001. Tornado magnitudes before 2007 were measured on the Fujita Scale, shown in Table 3.2.2.3.

Table 3.2.2.4 Tornadoes in Crow Wing County

Date	Time	Mag	Dth	Inj	PrD	CrD
6/11/1966	5:00 PM	F4	0	0	250K	0
6/11/1966	5:05 PM	F4	0	0	250K	0
6/13/1968	8:11 PM	F0	0	0	0K	0
8/6/1969	3:48 PM	F4	0	0	2.5M	0
7/27/1971	6:15 PM	F0	0	0	3K	0
8/9/1971	8:35 PM	F0	0	0	25K	0
7/27/1972	4:40 PM	F0	0	0	0K	0
6/16/1973	12:45 AM	F0	0	0	3K	0
6/25/1973	6:08 PM	F3	0	2	2.5M	0
7/3/1974	2:00 AM	F1	0	0	25K	0
8/26/1977	7:00 PM	F3	0	11	2.5M	0
8/26/1977	8:15 PM	F2	0	0	25K	0
7/3/1985	6:05 PM	F0	0	0	250K	0
7/3/1985	6:19 PM	F0	0	0	0K	0
7/3/1985	6:30 PM	F2	0	0	25K	0
9/16/1988	3:37 PM	F0	0	0	0K	0
5/29/1989	11:00 AM	F0	0	0	0K	0
7/5/1991	6:41 PM	F3	0	3	2.5M	0
7/5/1991	6:59 PM	F1	0	0	0K	0
7/5/1991	7:08 PM	F1	0	0	0K	0
10/26/1996	6:00 PM	F2	0	0	50K	0
6/13/2001	7:10 PM	F2	0	0	0	0
			0	16	10.905M	0

Source: http://www4.ncdc.noaa.gov

Dth: Deaths
Inj: Injuries
Mag: Magnitude
PrD$: Property Damage

Tornado Myths:

MYTH: Areas near rivers, lakes, and mountains are safe from tornadoes.
FACT: No place is safe from tornadoes. In the late 1980's, a tornado swept through Yellowstone National Park leaving a path of destruction up and down a 10,000 ft. mountain.

MYTH: The low pressure with a tornado causes buildings to "explode" as the tornado passes overhead.
FACT: Violent winds and debris slamming into buildings cause most structural damage.

MYTH: Windows should be opened before a tornado approaches to equalize pressure and minimize damage.
FACT: Opening windows allows damaging winds to enter the structure. Leave the windows alone; instead, immediately go to a safe place.

Risks & Vulnerability Assessment

Damage from tornados can interrupt infrastructure, scattering debris over roads and bridges, and tearing out power lines. Table 3.2.2.5 shows an equal risk as well as an equal vulnerability to a tornado in Crow Wing County. Though this may be the case, a closer evaluation will indicate a higher risk in the Central Sector due to the population density and more critical facilities.

Table 3.2.2.5 Tornados							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Likely	Minimal	Major	Limited	Less than 1 Hour	Limited	Limited
Central	Likely	Minimal	Major	Critical	Less than 1 Hour	High	High
South	Likely	Minimal	Major	Limited	Less than 1 Hour	Limited	Limited

Plans, Programs & Policies

- National Weather Service Storm Monitoring Activities
- NOAA Weather Radio
- Severe Weather Shelters
- Severe Weather Alert System
- Local Television and Radio Stations
- EAS System
- Local Warning Sirens

3.2.3 Flooding

Flooding is defined as the accumulation of water within a water body and the overflow of excess water onto adjacent floodplain lands. The floodplain is the land adjoining the channel, river, stream, lake, or other water body that is susceptible to flooding. The majority of areas of flooding have been identified by FEMA and mapped for floodplain management.

The 100 year floodplain is a misleading term. It identifies areas that have a 1% chance of occurring annually. These areas may be flooded more than once every one hundred years. These Special Flood Hazard Areas (SFHA) are mapped by FEMA and the Minnesota Department of Resources through the National Flood Insurance Program (NFIP). The Flood Insurance Rate Maps (FIRM) are used to determine what areas need flood insurance and are on file with the Crow Wing County Emergency Management Director.

River flooding occurs when the water overtops the stream banks and encroaches into the floodplain. Flooding in rivers and streams generally result from a

combination of deep, late-winter snowpack, frozen soil that prevents infiltration, rapid snowmelt, and heavy widespread precipitation.

"Flash flood" is a term widely used by flood experts and the general population. However, there is no single definition or method to distinguish flash flooding for river and other floods. For the purpose of this plan, we will define flash flooding as flooding that occurs due to localized drainage and is outside the boundaries of the FIRM floodplain. Flash floods result from powerful, concentrated, slow-moving thunderstorms. The effect of a flash flood is often greater in areas with inadequate storm sewers and storm drainage systems.

A type of flood that is less frequent in Crow Wing County but has the potential to cause significant localized damage, is slow rising lake levels. Above average precipitation over a long term period will increase the risk of potential lake flooding, especially in land locked basins with poor lake outlet.

Flooding History

The list of federally declared disasters, input from the Natural Disasters Planning Committee, and the Storm Events Database were utilized to profile the history of flood events in Crow Wing County. Table 3.2.3.1 lists the documented and known flood events in the county. Flooding and heavy rain have both been known to cause road damage. Floodwaters that cover the surface of the road often cause the base of the road to wash away and the surface asphalt to crack and fail. This failure to roads can lead to utility damage. Major flooding in Minnesota took place in 1950, 1965, 1968, 1972, 1987, 1993, 1997, 2001, 2006, and 2007. These floods are considered among the most severe in Minnesota's history in terms of stream flow magnitude, extent of lands inundated, loss of life, and property damage.

Though Crow Wing County has several rivers, the history of flooding in the County is minimal. Due to river characteristics, soil type, land use, etc. overland flooding in Crow Wing County has little damage effect on property. The following is a synopsis of potential impacts on the communities of Crow Wing County.

Synopsis

Table 3.2.3.1 Flooding and Flash Flooding in Crow Wing County

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 Fort Ripley	07/22/1972		Flash Flood	10.84"				
2 Pequot Lakes	07/06/1996	11:00 AM	Flash Flood	N/A	0	0	0	0
3 MNZ034 - 036	04/05/1997	07:00 AM	Flood	N/A	0	0	0	0
4 MNZ033>034	04/06/1997	04:50 PM	Flood	N/A	0	0	0	0
5 Brainerd	07/07/2002	08:00 PM	Flash Flood	N/A	0	0	250K	0
				TOTALS:	0	0	250K	0

Source: http://www4.ncdc.noaa.gov

Risks & Vulnerability Assessment

An analysis of Tables 3.2.3.2 and 3.2.3.3 reveals that flooding is more likely to adversely affect the Central section due to increased population and impervious surfaces, although flooding can harm both people and property across the balance of Crow Wing County.

Table 3.2.3.2 Flooding

Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Occasional	More than 12 Hours	Minor	Negligible	More than 24 Hours	Limited	High
Central	Occasional	More than 12 Hours	Minor	Limited	More than 24 Hours	High	High
South	Occasional	More than 12 Hours	Minor	Negligible	More than 24 Hours	Limited	Limited

Table 3.2.3.3 Flash Flooding

Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Likely	Minimal	Minor	Negligible	More than 24 Hours	Limited	High
Central	Likely	Minimal	Minor	Limited	More than 24 Hours	Limited	High
South	Likely	Minimal	Minor	Negligible	More than 24 Hours	Limited	High

Plans, Programs & Policies

- 100-year Floodplain Mapping
- Participation in NFIP
- Flood emergency response plan include within Emergency Operations Plan (EOP)

3.2.4 Winter Storms and Events

Minnesota is a place of extreme weather. Winter storms are an expected event by many people. The more extreme storms occur less frequently.

BLIZZARD

A blizzard includes strong winds averaging or frequently gusting to, or above, 35 miles an hour and very low visibility due to blowing or falling snow. These are the most dangerous winter storms and can be especially severe when combined with temperatures below 10 degrees.

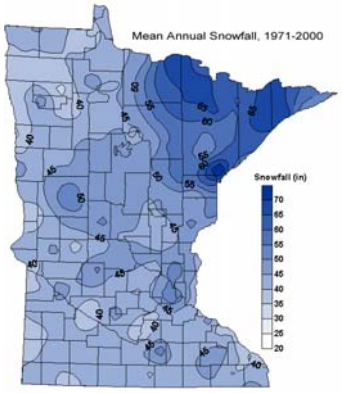
ICE STORMS

Ice storm conditions are most common when a rain event occurs and air temperature exceeds 32 degrees Fahrenheit, but the surface temperature remains at or below freezing. When the precipitation meets the surface and structures, ice accumulations occur. The National Weather Service defines an ice storm as accumulations of ice greater than ¼ inches.

Figure 3.2.4.1

SLEET

Sleet forms when precipitation originating as rain travels through freezing temperatures causing the precipitation to freeze before reaching the ground. Generally, sleet storm events are shorter in duration than ice storms, and generally have lower impacts.



http://www.climate.umn.edu

EXTREME COLD

While there is no clear definition of "extreme cold", the term can be generally defined as temperatures well below zero degrees Fahrenheit. Exposure to extremely cold temperatures can cause frostbite, hypothermia, and can be life threatening. In addition, extremely cold conditions can cause damage to infrastructure, automobiles, etc., if proper measures are not taken for cold weather preparation. Extreme cold is also associated with wind chill. Wind Chill is the term used to describe the rate of heat loss on the human body resulting from the combined effect of low temperature and wind. As winds increase, heat is carried away from the body at a faster rate, driving down both the skin temperature and eventually the internal body temperature. While wind chill will take heat away from an object faster, it cannot cool that object below the actual temperature.

HEAVY SNOW OR SNOW STORM

Heavy snow is typically defined as a snow event with four or more inches of accumulation in a 12-hour time period, six or more inches of snow in an 18-hour time period, and 12 or more inches of snow in a 24-hour time period. When visibility falls below one-half mile a snow event is considered heavy regardless of

wind speed. Table 3.2.4.1 provides a list of winter storm related activity as reported by the NOAA.

History

Typically at least one or more of the winter storm events listed above occur within Crow Wing County at least annually. These storms can occur at any time of day and generally occur during between the months of October and April. Each occurrence is often times are a combination of the above events.

Table 3.2.4.1 Severe Winter Storms and Ice Storms in Crow Wing County

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 MNZ012 - 019>021 - 024>026 - 028 - 031>038 - 042>045 - 052 - 053	11/04/1993	0800	Heavy Snow	N/A	0	0	0	0
2 MNZ002 - 003 - 011 - 012 - 016>048 - 054>057 - 064 - 065 - 071>073 - 080 - 081 - 089 - 090 - 097 - 098	11/12/1993	1600	Ice Storm And Snow	N/A	0	0	0	0
3 MNZ001>003 - 012 - 015>020 - 022>067 - 071>075 - 080>083 - 089>092 - 097 - 098	11/24/1993	0800	Heavy Snow	N/A	0	0	0	0
4 MNZ002 - 003 - 011 - 012 - 015>061	03/23/1994	0600	Heavy Snow And Ice	N/A	0	0	0	0
5 MNZ011 - 012 - 018>021 - 025 - 026 - 032>038 - 040>096	04/28/1994	0400	Heavy Snow And Ice	N/A	0	0	0	0
6 MNZ020 - 021 - 029>098	11/27/1994	0500	Heavy Snow/ice	N/A	0	0	0	0
7 MNZ001>003 - 012 - 015>044	02/14/1995	1400	Heavy Snow	N/A	0	0	0	0
8 MNZ003>020 - 029>059 - 064>067 - 071>075 - 080>083 - 089>091 - 097 - 098	03/04/1995	1200	Heavy Snow Andblowing Snow	N/A	0	0	0	0
9 MNZ013>016 - 019 - 020 - 022>045 - 050 - 052 - 053	03/27/1995	0100	Heavy Snow	N/A	0	0	0	0
10 Central Minnesota	10/23/1995	1200	Heavy Snow	N/A	0	0	0	0
11 MNZ012 - 018>021 - 025>026 - 033>038	01/17/1996	06:00 PM	Heavy Snow	N/A	0	0	0	0
12 MNZ012 - 018>021 - 025>026 - 033>038	01/28/1996	04:15 AM	Heavy Snow	N/A	0	0	0	0
13 MNZ012 - 018>021 - 025>026 - 033>038	02/26/1996	04:00 PM	Heavy Snow	N/A	0	0	0	0
14 MNZ033>038	03/24/1996	05:00 AM	Heavy Snow	N/A	0	0	0	0
15 MNZ010>012 - 018>021 - 025>026 - 033>038	01/04/1997	04:00 AM	Winter Storm	N/A	0	0	0	0

16 MNZ025 - 033>038	03/13/1997	04:00 AM	Heavy Snow	N/A	0	0	0	0
17 MNZ034 - 036 - 038	11/13/1997	04:30 AM	Heavy Snow	N/A	0	0	0	0
18 MNZ012 - 019>020 - 025>026 - 033>037	03/31/1998	04:00 PM	Heavy Snow	N/A	0	0	0	0
19 MNZ010 - 018>020 - 025>026 - 034>037	11/09/1998	04:00 PM	Winter Storm	N/A	0	0	0	0
20 MNZ010>012 - 018>021 - 025>026 - 033>038	02/01/1999	05:00 AM	Ice Storm	N/A	0	0	0	0
21 MNZ012 - 019>021 - 026 - 033>038	03/08/1999	07:00 AM	Heavy Snow	N/A	0	0	0	0
22 MNZ033>038	02/15/2000	04:00 AM	Heavy Snow	N/A	0	0	0	0
23 MNZ034>037	03/15/2000	12:00 AM	Heavy Snow	N/A	0	0	0	0
24 MNZ020 - 033>038	01/29/2001	09:30 PM	Ice Storm	N/A	0	0	0	0
25 MNZ025 - 033>038	02/07/2001	12:00 PM	Heavy Snow	N/A	0	0	0	0
26 MNZ010>012 - 018>021 - 025>026 - 033>038	02/24/2001	12:00 AM	Heavy Snow	N/A	0	0	0	0
27 MNZ010 - 012 - 018>020 - 025>026 - 033>038	11/26/2001	01:00 PM	Winter Storm	N/A	0	0	500K	0
28 MNZ012 - 019>021 - 033>038	03/07/2002	12:00 PM	Heavy Snow	N/A	0	0	0	0
29 MNZ010 - 012 - 018>021 - 025>026 - 033>038	03/09/2002	01:00 AM	Heavy Snow	N/A	0	0	0	0
30 MNZ010>012 - 018>021 - 025>026 - 033>037	12/17/2002	10:00 PM	Ice Storm	N/A	0	0	0	0
31 MNZ025 - 033>038	04/16/2003	04:00 AM	Ice Storm	N/A	0	0	0	0
32 MNZ010 - 012 - 018>019 - 025>026 - 033>038	11/22/2003	03:00 PM	Heavy Snow	N/A	0	0	0	0
33 MNZ012 - 019>021 - 025>026 - 033>037	01/25/2004	03:00 AM	Heavy Snow	N/A	0	0	0	0
34 MNZ012 - 019>021 - 025>026 - 033>038	01/21/2005	06:00 AM	Heavy Snow	N/A	0	0	0	0
35 MNZ034	02/23/2007	22:00 PM	Winter Storm	N/A	0	0	0K	0K
36 MNZ033 - 034	04/02/2007	23:00 PM	Winter Storm	N/A	0	0	0K	0K
37 MNZ033 - 034	12/01/2007	08:26 AM	Winter Storm	N/A	0	0	0K	0K
38 MNZ011 - 018 - 034	04/05/2008	23:00 PM	Winter Storm	N/A	0	0	0K	0K
39 MNZ010 - 018 - 026 - 034	04/25/2008	15:00 PM	Winter Storm	N/A	0	0	0K	0K
40 MNZ019 - 026 - 033>035 - 037	12/13/2008	17:00 PM	Winter Storm	N/A	0	0	0K	0K
41 MNZ034	12/30/2008	02:30 AM	Heavy Snow	N/A	0	0	0K	0K
42 MNZ034	03/10/2009	11:00 AM	Winter Storm	N/A	0	0	0K	0K

43 MNZ010>012 - 019>021 - 025>026 - 033>035 - 037	04/01/2009	00:00 AM	Winter Storm	N/A	0	0	0K	0K
				TOTALS:	0	0	500K	0

Source: http://www4.ncdc.noaa.gov

Risks & Vulnerability Assessment

Due to the northerly climate that Crow Wing County finds itself in, it is highly vulnerable to the effects of extreme cold. The following tables provide significant data as to both the frequency and the vulnerability of Crow Wing County to extreme cold.

Table 3.2.4.2 Severe Winter Storms

Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Highly Likely	6 to 12 Hours	Minor	Catastrophic	12 to 24 Hours	Limited	High
Central	Highly Likely	6 to 12 Hours	Minor	Catastrophic	12 to 24 Hours	Limited	Very High
South	Highly Likely	6 to 12 Hours	Minor	Catastrophic	12 to 24 Hours	Limited	High

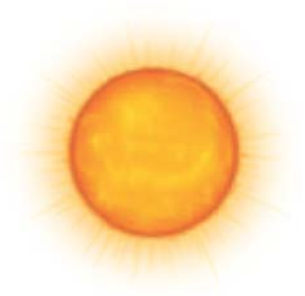
Table 3.2.4.3 Ice Storms

Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Highly Likely	6 to 12 Hours	Minor	Critical	More than 24 Hours	High	High
Central	Highly Likely	6 to 12 Hours	Minor	Catastrophic	More than 24 Hours	High	High
South	Highly Likely	6 to 12 Hours	Minor	Critical	More than 24 Hours	High	High

Plans, Programs & Policies

- Infrastructure improvements
- Snow fencing and windbreaks including natural vegetation
- Cold weather awareness and public education
- Snow removal, (salt, sand, etc.)

3.2.5 Extreme Temperatures



Minnesota has some of the most diverse weather in the entire United States. It is threatened by both extreme heat and extreme cold in any given year. It is more likely to have temperatures that are categorized as extreme cold, however, the temperature reaches up to or above 100 degrees or more generally at least once a year. Minnesota's hottest day on record was July 29, 1917 in Beardsley, Minnesota at 114.5 degrees F. The coldest day was -60 degrees F recorded on February 2, 1996 near Tower, Minnesota.

EXTREME HEAT

Extreme heat refers to the impacts on the human and physical environment due to heat. The impacts of heat are typically measured using the heat index, which measures the temperature felt by the human body by combining actual temperature with humidity. As both heat and humidity increase the effects on the human body become of greater concern.

History of Extreme Temperatures in Crow Wing County

The history of extreme heat in Crow Wing County has not been recorded in terms of damage to property and life; however there are recordings for the temperature itself. Crow Wing County has broken the 100 degree F mark numerous times and the hottest recorded day in Crow Wing County measured at 108 degrees F on July 14, 1936.

It is a fact that a high heat index and extremely high temperatures can be very dangerous. From FEMA and their website www.fema.gov, the effects of heat:

- In a normal year, approximately 175 Americans die from extreme heat. Young children, elderly people, and those who are sick or overweight are more likely to become victims.
- Between 1936 and 1975, nearly 20,000 people succumbed to the effects of heat and solar radiation.
- Because men sweat more than women, men are more susceptible to heat illness because they become more quickly dehydrated.
- Sunburn can significantly slow the skin's ability to release excess heat.

EXTREME COLD

Extreme cold events are days where the mean daily temperature (average of the high and low recorded temperatures over a 24-hour period) falls below 32° F. Prolonged exposure to extreme cold temperatures will lead to serious health problems such as hypothermia, cold stress, frostbite, or freezing of the exposed extremities such as fingers, toes, nose and earlobes. Infants, seniors, people who are homeless and those living in a home without adequate heat are most susceptible to such conditions. As the temperature drops and wind speed increases heat can leave the body more rapidly. This phenomenon is known as the wind-chill effect, which can exacerbate an extreme cold event.

History

Extreme cold in Crow Wing County happens with some regularity. Extreme cold is most likely to occur between the months of December and March.

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 All Of Minnesota	01/15/1994	0100	Extreme Cold	N/A	1	0	0	0
2 MNZ010>012 - 018>021 - 025>026 - 033>038	01/15/1997	03:30 AM	Extreme Windchill	N/A	0	0	0	0
3 MNZ010>012 - 018>021 - 025>026 - 033>038	01/14/2005	03:00 AM	Extreme Cold/wind Chill	N/A	0	0	0	0
4 MNZ010>012 - 018>021 - 025>026 - 033>038	02/16/2006	06:00 PM	Extreme Cold/wind Chill	N/A	0	0	0	0
5 MNZ012 - 018 - 034	01/29/2008	21:00 PM	Extreme Cold/wind Chill	N/A	0	0	0K	0K
6 MNZ010>012 - 018>021 - 025>026 - 034	12/15/2008	18:00 PM	Extreme Cold/wind Chill	N/A	0	0	0K	0K
				TOTALS:	1	0	0	0

Risks & Vulnerability Assessment

Just as Crow Wing County is vulnerable to extreme cold during the winter months, it is also vulnerable to extreme heat during the spring, summer, and fall months. It is not uncommon for Crow Wing County to experience a temperature

difference of 100-120 degrees between the low temperatures in winter and the high temperatures during the summer.

This extreme temperature disparity, year after year, does have a considerable affect on the vulnerability of the counties infrastructure, namely on transportation and pipelines. For example a newly paved stretch of roadway will expand during the hot summer months, allowing moisture to accumulate within its porous surfaces. Now, when the temperature drops during the fall and winter months, the roadway contracts. However the moisture that remains in the porous surface of the roadway expands once it freezes. Water is peculiar. When most substances change from liquid to solid form, they shrink together, become denser, their molecules packed most closely together. But when water changes from a sloshy liquid to solid ice, it expands, becomes less dense. Which is why ice floats to the top of your Coke, rather than sinking like a stone to the bottom.

This dynamic between the surface of the roadway and moisture/ice causes the roadways to crack, crumble, and results in potholes. Subsequently the cost/vulnerability passed along to the a county in a colder region can be greater Due to Crow Wing Counties high number of severe summer storms, a resultant number of sustained high winds are experienced within the jurisdiction as well.

than a county in a more moderate climate.

The following table expresses the vulnerability Crow Wing County has in regard to extreme temperatures.

Table 3.2.5.2 Ice Storms							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Highly Likely	More than 12 Hours	Minor	Catastrophic	More than 24 Hours	High	High
Central	Highly Likely	More than 12 Hours	Minor	Catastrophic	More than 24 Hours	High	High
South	Highly Likely	More than 12 Hours	Minor	Catastrophic	More than 24 Hours	High	Limited

Plans, Programs & Policies

- National Weather Service
- Local radio and television
- Red Cross
- Helping Your Neighbor Program
- Center for Disease Control

3.2.6 Wind Storm (Sustained)

The National Weather Service defines a *Wind Advisory* as sustained winds of 30 to 39 mph lasting for at least one hour. A *High Wind Warning* is defined as sustained winds of at least 40 mph for one hour or more, or gusts to 58 mph or more.

History

Though limited to no information detailing with the history of damage caused by sustained winds in Crow Wing County, it is a real threat. The specific threat is the damage caused by soil erosion on lake shores and tilled fields.

Risks & Vulnerability Assessment

The following table expresses the vulnerability of Crow Wing County to wind storms.

Table 3.2.6.1 Wind Storm (Sustained)							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Highly Likely	6 to 12 Hours	Minor	Critical	More than 24 Hours	Limited	Limited
Central	Highly Likely	6 to 12 Hours	Minor	Critical	More than 24 Hours	Limited	Limited
South	Highly Likely	6 to 12 Hours	Minor	Critical	More than 24 Hours	Limited	Limited

Plans, Programs & Policies

Windbreaks: Natural Vegetative Cover

3.2.7 Infectious Disease

Emerging infectious diseases are infections that have newly appeared in a population or have existed but are rapidly increasing in incidence or geographic range. In the mid-twentieth century, antibiotics cured many of the diseases that were life-threatening. Eradicating the specter of debilitating and fatal diseases, people were optimistic about a world without infectious diseases. Since then new diseases emerged that temper that optimism, such as AIDS and new strains of influenza. In recent years, the increasing mobility of people throughout the world brought the recurrence of diseases that were thought to be eradicated such as monkey pox.

(Minnesota State Hazard Mitigation Plan; Centers for Disease Control Monkeypox web site, <www.cdc.gov/ncidod/monkeypox/index.htm.)

History

Bacteria existed long before humans evolved, and bacterial diseases probably co-evolved with each species. Many bacterial diseases that we see today have been around for as long as we have, others may have developed later.

Between the middle of 1918 and the middle of 1919, the worldwide Spanish Influenza epidemic killed at least 21 million human beings – well over twice the number of combat deaths in World War I. The "Spanish" flu had first appeared in America in spring 1918.

All over the world, Spanish Influenza ravaged civilian populations. One-quarter of all Americans suffered bouts of influenza. More than 600,000 Americans died, 10,000 of them were Minnesotans. The city of St. Paul saw more than 1,000 deaths, Minneapolis more than 1,300.

In recent years, the State of Minnesota has not had an infectious disease outbreak that reached epidemic proportion.

Table 3.2.7.1

Time Course of Common Infections
(all in days)

Disease	Incubation period	Latency period	Infectious period
Measles	8-13	6-9	6-7
Mumps	12-26	12-18	4-8
Pertussis	6-10	21-23	7-10
Rubella	14-21	7-14	10-12
Diphtheria	2-5	14-21	2-5
Varicella	13-17	8-12	10-11
Hepatitis B	50-110	13-17	19-22
Poliomyelitis	7-12	1-3	14-20
Influenza	1-3	1-3	2-3

Source: http://uhavax.hartford.edu/bugl/histepi.htm

The tables on the next two pages list several common source and host-to-host epidemics, the causative agent (followed by V for virus, B for bacteria, and P for protozoa), sources of infection, and the reservoirs of the infection. Current knowledge tells us that humans are the only reservoirs for sexually transmitted diseases.

Table 3.7.2.2

Common Source Epidemic Diseases			
Disease	**Causative Agent**	**Infection Sources**	**Reservoirs**
Anthrax	*Bacillus anthracis* (B)	Milk or meat from infected animals	Cattle, swine, goats, sheep, horses
Bacillary Dysentery	*Shigella dysenteriae* (B)	Fecal contamination of food and water	Humans
Botulism	*Clostridium botulinum* (B)	Soil-contaminated food	Soil
Brucellosis	*Brucella melitensis* (B)	Milk or meat from infected animals	Cattle, swine, goats, sheep, horses
Cholera	*Vibrio cholerae* (B)	Fecal contamination of food and water	Humans
Giardiasis	*Giardia* spp. (P)	Fecal contamination of water	Wild mammals
Hepatitis	Hepatitis A,B,C,D,E (V)	Infected humans	Humans
Paratyphoid	*Salmonella paratyphi* (B)	Fecal contamination of food and water	Humans
Typhoid Fever	*Salmonella typhi* (B)	Fecal contamination of food and water	Humans

Host-to-host Epidemics			
Disease	**Causative Agent**	**Infection Sources**	**Reservoirs**
Respiratory Diseases			
Diphtheria	*Corynebacterium diphtheriae* (B)	Human cases and carriers; infected food and fomites	Humans
Hantavirus pulmonary syndrome	Hantavirus (V)	Inhalation of contaminated fecal material	Rodents
Meningococcal meningitis	*Neisseria meningitidis* (B)	Human cases and carriers	Humans
Pneumonococcal pneumonia	*Streptococcus pneumonia* (B)	Human carriers	Humans
Tuberculosis	*Mycobacterium tuberculosis* (B)	Sputum from human cases; contaminated milk	Humans, cattle
Whooping cough	*Bordetella pertussis* (B)	Human cases	Humans
German measles	Rubella virus (V)	Human cases	Humans
Influenza	Influenza virus (V)	Human cases	Humans, animals
Measles	Measles virus (V)	Human cases	Humans

Table 3-22 Continued

Disease	Causative Agent	Infection Sources	Reservoirs
Sexually Transmitted Diseases			
HIV-Disease	HIV (V)	Infected body fluids, blood, semen, etc.	Humans
Chlamydia	*Chlamydia trachomatis* (B)	Urethral, vaginal, and anal secretions	Humans
Gonorrhea	*Neisseria gonorrheae* (B)	Urethral and vaginal secretions	Humans
Syphilis	*Treponema pallidum* (B)	Infected exudate or blood	Humans
Trichomoniasis	*Trichomonas vaginalis* (P)	Urethral, vaginal, prostate secretions	Humans
Vector-borne diseases			
Epidemic typhus	*Rickettsia prowazekii* (B)	Bite by infected louse	Humans, lice
Lyme disease	*Borrelia burgdorferi* (B)	Bite from infected tick	Rodents, deer, ticks
Malaria	*Plasmodium* spp. (P)	Bite from infected Anopheles mosquito	Humans, mosquitoes
Plague	*Yersinia pestis* (B)	Bite by infected flea	Wild rodents
Rocky Mountain spotted Fever	*Rickettsia rickettsii* (B)	Bite by infected tick	Ticks, rabbits, mice
Direct-contact diseases			
Psittacosis	*Chlamydia psittaci* (B)	Contact with birds or bird excrement	Wild and domestic birds
Rabies	Rabies virus (V)	Bite by carnivore	Wild and domestic carnivores
Tularemia	*Franciscella tularensis* (B)	Contact with rabbits	Rabbits

Source: http://uhavax.hartford.edu/bugl/histepi.htm

Risks & Vulnerability Assessment

Crow Wing County recognizes its degree of vulnerability to infectious diseases and has developed the following tables showing its degree of vulnerability. Like any jurisdiction with increased human interaction, that jurisdiction/community will by nature be at risk for the spread of infectious disease.

Table 3.2.7.3 – Pandemic Disease							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Occasional	More than 12 Hours	Substantial	Catastrophic	More than 24 Hours	High	Limited
Central	Occasional	More than 12 Hours	Substantial	Catastrophic	More than 24 Hours	High	High

South	Occasional	More than 12 Hours	Substantial	Catastrophic	More than 24 Hours	High	Limited

Table 3.2.7.4 – Endemic Disease							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Highly Likely	6 to 12 Hours	Minor	Limited	More than 24 Hours	High	Limited
Central	Highly Likely	6 to 12 Hours	Minor	Limited	More than 24 Hours	Very High	Limited
South	Highly Likely	6 to 12 Hours	Minor	Limited	More than 24 Hours	Very High	Limited

Plans, Programs & Policies

- Center for Disease Control
- Center for Infectious Disease Research & Policy
- Minnesota Department of Health

3.2.8 Wild Fire

A wildfire is essentially an uncontrolled fire spreading through vegetative fuels over a large area. Wildfires can be caused by natural causes such as lightning, but are often times caused by humans. There are four types of wildfire: ground, surface, crown, and spotting. Ground fire is the starting of a wildfire and usually due to the small size of the fire, it may be difficult to detect until it has reached the surface stage. The surface fire generally burns approximately four feet in height and the difficulty of extinguishing the fire is associated with potential nearby fuels. Once a fire begins burning the tops of trees it is known as a crown fire. This fire can be extremely difficult to control due to winds which may cause spotting. Spotting is caused by the throwing or blowing of large embers of crown fire or surface fire ahead of a wildfire. Spotting makes the controlling of a fire extremely difficult depending on wind speeds, etc.

History

Though limited information regarding the history of wildfire is available for Crow Wing County, there is potential for such an event as witnessed by nearby Todd and Hubbard County residents in 1980 and 1976. Table 3.2.8.1 shows four largest fires recorded in Minnesota.

Table 3.2.8.1 Droughts in Minnesota

Year	Event
2000	CarlosEdge fire burned 8,000 acres, destroyed over 4 structures, and endangered the towns of Linnwood, Stacy and Wyoming.

1980	Motley fire burned 6,800 acres, destroyed over 20 structures, and endangered the towns of Motley and Phillbrook.
1977	Wildland fires destroyed hundreds of thousands of acres of forestland and millions of dollars in homes and improved property. Suppression costs that year totaled around $25 million.
1976	Badoura fire burned 23,000 acres and a dozen buildings in just six hours.

Risks & Vulnerability Assessment

The vulnerability of wild fires to Crow Wing County poses considerable impact. Crow Wing County possesses all the factors that provide the conditions necessary for wild fires, heat, drought, wind, etc. While much of the county consists of agricultural areas that pose an economic vulnerability there are eighteen municipalities (18) that pose not only economic vulnerability, but also a vulnerability to the loss of life as well.

The table below summarizes the vulnerability of crow wing to wild fires. Note that the vulnerability to the loss of property is significantly higher for the central sector. This reflects the presences of higher density populations in city centers within the central sector.

Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Highly Likely	Minimal	Major	Negligible	1 to 12 Hours	Minimal	Limited
Central	Highly Likely	Minimal	Major	Negligible	1 to 12 Hours	Limited	High
South	Highly Likely	Minimal	Major	Negligible	1 to 12 Hours	Limited	Limited

Plans, Programs & Policies

- Local Fire Departments and Associations
- Minnesota Department of Natural Resources
- Rural Fire Assistance Program (Department of Interior)
- US Forest Service
- National Interagency Fire Center

3.2.9 Drought

Although the definition of a drought varies from location to location, a simple definition of the hazard is a prolonged period of dry weather due to a deficiency in precipitation. Drought is further defined as meteorological, agricultural, hydrological, and socioeconomic. Meteorological drought refers to a period of

dry weather associated with lack of precipitation, agricultural drought refers to crop damage as a result of drought, hydrological drought refers to a drop in surface and groundwater levels as a result of drought, and socioeconomic drought refers to impacts on humans individually or collectively.

History

Drought has a history of occurring every one to two decades since the early 1900s. In more recent decades, drought is occurring more frequently, once per decade since the 1970s.

Table 3.2.9.1 Drought in Crow Wing County

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD	CrD
1 MNZ010 - 018 - 025>026 - 033>034 - 036>038	07/18/2006	12:00 AM	Drought	N/A	0	0	0	0
2 MNZ010 - 018 - 025>026 - 033>034 - 036>038	08/01/2006	12:00 AM	Drought	N/A	0	0	0	0
3 MNZ010 - 018 - 025>026 - 033>034 - 036>038	09/01/2006	12:00 AM	Drought	N/A	0	0	0	0
4 MNZ010>012 - 018>021 - 033>034 - 036	08/01/2007	00:00 AM	Drought	N/A	0	0	0K	0K
				TOTALS:	0	0	0	0

Source: http://www4.ncdc.noaa.gov

Risks & Vulnerability Assessment

Although Crow Wing County is located near, and has vast water resources, its vulnerability to drought is still present. Crow Wing has experienced several periods classified as droughts, and it seems the trend is more frequent droughts.

The following table summarizes the counties vulnerability to drought.

Table 3.2.9.2 Drought							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Likely	More than 12 Hours	Minor	Catastrophic	More than 24 Hours	Limited	Minimal
Central	Likely	More than 12 Hours	Minor	Catastrophic	More than 24 Hours	High	Limited
South	Likely	More than 12 Hours	Major	Catastrophic	More than 24 Hours	High	Minimal

Plans, Programs & Policies

- Water usage monitoring

- Local water usage limits, bans, and regulations
- US Department of Agriculture
- Local medical centers

3.2.10 Insect Infestation, Invasive Species, and Excessive Wildlife Population

An infestation is the presence of a large number of pest organisms in an area or field, on the surface of a host or anything that might contact a host, or in the soil. Infestations results when an area is inhabited or overrun by these pest organisms, in numbers or quantities large enough to be harmful, threatening, or noxious to native plants, animal species and/or human populations.

A pest is defined as any organism (e.g., invertebrates/insects, mammals, birds, pathogens/parasites, fungi, nonnative species) judged as a threat to other living species in its surrounding environment. Most pests either compete with humans or other animals and plants for natural resources or transmit diseases to humans, their crops, or their livestock.

A host is an animal or plant on which, or in which, a pest lives. Human populations are generally impacted by insect or animal infestations (e.g., mosquitoes, deer ticks, rabies-carrying animals/bird) which can result in human health impacts such as illnesses, disease and/or deaths, and can lead to potential epidemics or endemics if not maintained or controlled.

However, infestations also occur from the introduction of non-native species (invasive species) that may not necessarily impact human health, but that create a nuisance or agricultural hardships by destroying crops and defoliating populations of native plant and tree species or entire ecological communities or plantations. In such a case, areas may become quarantined or affected species may have to be destroyed or cut down to prevent further spread of the pest organism.
Source: http://www.suffolkcountyny.gov/Respond/PDFs/Sec_5.4.7.pdf

Risks & Vulnerability Assessment

One of Crow Wing Counties major assets is its water resources. Due to a large number of rivers, lakes, streams, and wetlands, Crow Wing County enjoys not only the ecological, aesthetic, and recreational benefits of such water abundance, but also the economic benefits through a well developed tourist industry. Subsequently, any hazards that pose a threat to Crow Wing Counties water resources pose substantial vulnerability to Crow Wing County as a whole.

One such vulnerability would be the potential decline of Crow Wing Counties waters due to invasive species such as Eurasian milfoil.

The following table summarizes the vulnerability of Crow Wing County to Insect Infestation, Invasive Species, and Excessive Wildlife Population

Table 3.2.10.1 Insect Infestation							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Highly Likely	More than 12 Hours	Limited	Catastrophic	More than 24 Hours	Limited	Minimal
Central	Highly Likely	More than 12 Hours	Limited	Catastrophic	More than 24 Hours	High	Limited
South	Highly Likely	More than 12 Hours	Limited	Catastrophic	More than 24 Hours	High	Limited

Table 3.2.10.2 Invasive Species							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Highly Likely	More than 12 Hours	Minor	Catastrophic	More than 24 Hours	Limited	Limited
Central	Highly Likely	More than 12 Hours	Minor	Catastrophic	More than 24 Hours	Limited	Limited
South	Highly Likely	More than 12 Hours	Minor	Catastrophic	More than 24 Hours	Limited	Minimal

Types of Invasive Species Located in or near Crow Wing County

Invasive Aquatic Animals

Common Carp	Rusty Crayfish
Faucet Snail	Spiny Water Flea
Ruffe	Zebra Mussel

Invasive Aquatic Plants

Curly-Leaf Pondweed	Eurasian Watermilfoil

Invasive Terrestrial Plants

Reed Canary Grass	Japanese Knotweed
Yellow Iris	Leafy Spurge
Amur Silver Grass	Musk or Nodding Thistle
Amur Maple	Norway Maple
Birdsfoot Treefoil	Orange Hawkweed
Black Locust	Oxeye Daisy
Buckthorn	Perennial Sow Thistle
Bull Thistle	Purple Loosestrife
Butter and Eggs or Common Toadflax	Queen Ann's Lace

Canada Thistle	Reed Canary Grass
Common Tansy	Russian Olive
Cow Vetch	Siberian Elm
Creeping Charlie	Siberian Pea Shrub
Crown Vetch or Axseed	Smooth Brome Grass
Exotic Honeysuckles	Spotted Knapweed
Grecian Foxglove	White and Yellow Sweet Clover
Hoary Alyssum	Wild Parsnip
Garlic Mustard	Japanese Barberry

Table 3.2.10.3 Excessive Wildlife Population

Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Occasional	More than 12 Hours	Minor	Catastrophic	More than 24 Hours	High	Minimal
Central	Occasional	More than 12 Hours	Minor	Catastrophic	More than 24 Hours	High	Limited
South	Occasional	More than 12 Hours	Minor	Catastrophic	More than 24 Hours	High	Minimal

3.2.11 Earthquake

An earthquake is "…a sudden motion or trembling caused by an abrupt release of accumulated strain in the tectonic plates that comprise the earth's crust." These rigid plates, known as tectonic plates, are some 50 to 60 miles in thickness and move slowly and continuously over the earth's interior. The plates meet along their edges, where they move away, past or under each other at rates varying from less than a fraction of an inch up to five inches per year. While this sounds small, at a rate of two inches per year, a distance of 30 miles would be covered in approximately one million years (FEMA, 1997).

Seismic activity is commonly described in terms of magnitude and intensity. Magnitude (M) describes the total energy released and intensity (I) subjectively describes the effects at a particular location. Although an earthquake has only one magnitude, its intensity varies by location. Magnitude is the measure of the amplitude of the seismic wave and is expressed by the Richter scale. The Richter scale is a logarithmic measurement, where an increase in the scale by one whole number represents a tenfold increase in measured amplitude of the earthquake. Intensity is a measure of the strength of the shock at a particular location and is expressed by the Modified Mercalli Intensity (MMI) scale.
Source: Minnesota All-Hazard Mitigation Plan

History

There is a limited history and probability of earthquakes in Crow Wing County. The only one on record occurred on July 26, 1979 in Nisswa with a maximum intensity of III and a magnitude of 1.
Source: Minnesota All-Hazard Mitigation Plan

On September 3rd, 1917, another earthquake shook the central part of Minnesota. Intensity VI (Modified Mercalli scale) effects were noted at Staples. The shock was also felt about 30 miles east in Brainerd, in Crow Wing County.
Source: NOAA Satellite and Information Service, http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms.

Risks and Vulnerabilities

While a variety of hazards can occur at any time and any place, Crow Wing County has minimal vulnerability to the risk of earthquakes. Historically, a small number of earthquakes have occurred near Crow Wing County, but the effects have been quite minimal and in some cases imperceptible.

The following table summarizes Crow Wing Counties degree of vulnerability to the threat of earthquakes.

Table 3.2.11.1 Earthquake							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Unlikely	Minimal	Limited	Catastrophic	Less than 1 Hour	Minimal	Limited
Central	Unlikely	Minimal	Limited	Catastrophic	Less than 1 Hour	Minimal	Limited
South	Unlikely	Minimal	Limited	Catastrophic	Less than 1 Hour	Minimal	Limited

3.2.12 Dust Storms

A dust storm is a strong, violent wind that carries fine particles such as silt, sand, clay, and other materials, often for long distances. The fine particles swirl around in the air during the storm. A dust storm can spread over hundreds of miles and rise over 10,000 feet. They have wind speeds of at least 25 miles per hour.

Dust storms usually arrive with little warning and advance in the form of a big wall of dust and debris. The dust is blinding, making driving safely a challenge. A dust storm may last only a few minutes at any given location, but often leave serious car accidents in their wake, occasionally massive pileups. The arid regions of Central and Eastern Oregon can experience sudden dust storms on windy days. These are produced by the interaction of strong winds, fine-grained surface material, and landscapes with little vegetation. The winds involved can be as small as "dust devils" or as large as fast moving regional air masses.

Approximately half of the dust in today's atmosphere may result from changes to the environment caused by human activity, including agriculture, overgrazing, and the cutting of forests. Data from dust traps near urban areas like Las Vegas show that the spread of housing and other human construction across the desert directly causes increases in dust storms by destabilizing the surface and vegetation.

Intensive tillage of soils in agricultural uses is also a significant condition releasing soil to make it easily transportable by high winds. Depending on the crop and region involved, tillage may be occurring in the spring and/or in the autumn. Research in north-central Oregon and south-central Washington indicates that region's dust problem isn't simply a matter of soil being redistributed from one field to another by the wind. Fine particulate becomes suspended in the air and may travel thousands of miles. Scientists indicate that the region is truly losing soil.
Source: Oregon State Hazard Mitigation Plan, Dust Storms Chapter, pp 1 –

History

The County has not experienced any past occurrences of dust storms.

0 DUST STORM **event(s) were reported in** Crow Wing County, Minnesota **between** 01/01/1950 **and** 02/28/2011**.**
Source: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms

Risks and Vulnerabilities

While Crow Wing County has limited vulnerability to dust storms, there are certain specific areas that might be more vulnerable to dust storms such as gravel pits, construction sites, etc.

Table 3.2.12.1 Dust Storms							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Unlikely	More than 12 Hours	Major	Catastrophic	More than 24 Hours	Minimal	Minimal
Central	Unlikely	More than 12 Hours	Major	Catastrophic	More than 24 Hours	Limited	Limited
South	Unlikely	More than 12 Hours	Major	Catastrophic	More than 24 Hours	Limited	Minimal

Risks and Vulnerabilities

Table 3.2.13.1 Solar Flares/Storms							
Sector	Frequency	Warning Time	Impact	Area	Duration	Life/Injury	Property
North	Highly Likely	More than 12 Hours	Limited	Catastrophic	12 to 24 Hours	Minimal	Minimal
Central	Highly	More than 12	Limited	Catastrophic	12 to 24 Hours	Minimal	Minimal

	Likely	Hours					
South	Highly Likely	More than 12 Hours	Limited	Catastrophic	12 to 24 Hours	Minimal	Minimal

3.2.13 Human caused fire

Fire is the rapid oxidation of a material in the chemical process of combustion, releasing heat, light, and various reaction products.[1] Slower oxidative processes like rusting or digestion are not considered to be part of this definition.

The *flame* is the visible portion of the fire and consists of glowing hot gases. If hot enough, the gases may become ionized to produce plasma.[2] Depending on the substances alight, and any impurities outside, the color of the flame and the fire's intensity might vary.

Fire in its most common form can result in conflagration, which has the potential to cause physical damage through burning. Fire is an important process that affects ecological systems across the globe. The positive effects of fire include stimulating growth and maintaining various ecological systems. Fire has been used by humans for cooking, generating heat, signaling, and propulsion purposes.

The negative effects of fire include decreased water purity, increased soil erosion, increased in atmospheric pollutants, and an increased hazard to human life

Fire prevention is intended to reduce sources of ignition, and is partially focused on programs to educate people from starting fires.[17] Buildings, especially schools and tall buildings, often conduct fire drills to inform and prepare citizens on how to react to a building fire. Purposely starting destructive fires constitutes arson and is a crime in most jurisdictions.

Model building codes require passive fire protection and active fire protection systems to minimize damage resulting from a fire. The most common form of active fire protection is fire sprinklers.

To maximize passive fire protection of buildings, building materials and furnishings in most developed countries are tested for fire-resistance, combustibility and flammability. Upholstery, carpeting and plastics used in vehicles and vessels are also tested.

3.3 VULNERABILITY ASSESSMENT

3.3.1 Methodology

The measure of vulnerability is the level of risk that a structure or population is exposed to. All hazards pose some degree of risk. The level of risk is relative to the severity of the hazard which is dependent upon many natural factors and causes. There for assessing vulnerability is a matter of a best estimate. Some hazards affect localized or specific areas whereas other hazards are more broad reaching in their scope. Hazards affecting localized areas are more easily quantifiable in terms of vulnerability. For example floods affect a specific area, whereas the path of a tornado is highly unpredictable making assessing vulnerability more difficult.

Throughout this plan and specifically in section 3.2 Profiling Natural Hazards, the vulnerability of both human life, and property has been assessed by measuring five factors that affect the risk of a given hazard. These factors include:

Frequency
Warning Time
Impact
Area
Duration

For each hazard that was profiled in Section 3.2 a table such as the one below has been provided with the measures of each risk factor relative to each hazard.

Frequency	Warning Time	Impact	Area	Duration

In addition to measuring the level of risk, the level of exposure to those risks have been assessed and referred to as vulnerability. Vulnerability has been categorized in two ways:

Loss of life/Injury
Damage to property

For Each hazard that was profiled in Section 3.2, a table such as the one below has been provided with the measures of the estimated level of vulnerability Life/Injury and property have relative to each hazard.

Life/Injury	Property

3.4 Assessing Vulnerability

3.4.1 Addressing repetitive loss properties

Definition:

Repetitive loss properties are defined as properties experiencing more than two or more claims to the NFIP over a 10 year period.

(No such repetitive loss properties exist within Crow Wing County.)

3.5 Assessing Vulnerability

3.5.1 Identifying Structures, Infrastructure, and critical facilities.

Critical Facilities

For a comprehensive list of community/public facilities see Appendix A.

Emergency Facilities

Emergency facilities listed within this plan include:

law enforcement
ambulance
fire
emergency shelter

gathering places.

This information can be found in the tables below.

Table 3.0

	AGENCY	ADDRESS	CITY	PHONE
Sheriff/ Police	Crow Wing County Sheriff's Office	304 Laurel Street	Brainerd	218-829-4749
	Baxter Police	13190 Memorywood Drive	Baxter	218-454-5090
	Brainerd Police	225 East River Road	Brainerd	218-829-2805
	Breezy Point Police	8319 Co. Rd.11	Breezy Point	218-562-4488
	Crosby Police	2 Second St SW	Croby	218-546-5137

	Crosslake Police	37028 Co. Rd. #66	Crosslake	218-692-2222
	Cuyuna Police	PO Box 536	Deerwood	218-546-2692
	Deerwood Police	PO Box 195	Deerwood	218-534-3399
	Emily Police	21236 2nd St, P.O. Box 68	Emily	218-763-1100
	Nisswa Police	P.O. Box 128, 5442 City Hall St	Nisswa	218-963-4301
	Pequot Lakes Police	4638 County Rd 11	Pequot Lakes	218-568-8111
Fire	Brainerd Fire	23 Laurel St	Brainerd	
	Crosby Fire			
	Crosslake Fire			
	Cuyuna Fire			
	Deerwood Fire			
	Emily Fire			
	Fifty Lakes Fire			
	Garrison Fire			
	Ideal Corners Fire			
	Ironton Fire			
	Mission Fire			
	Nisswa Fire			
	Pequot Lakes Fire			
	Minnesota DNR			
Ambulance	North Ambulance	Brainerd, Crosslake, Pine River, Aitkin		
	Crosby Ambulance	Crosby		
	North Ambulance Air	Brainerd Regional Airport		

Hazardous Materials Facilities

Hazardous wastes include a wide range of household, commercial, industrial products and substances. Some of the more common products that individuals and businesses use include paints, fertilizers, cleaning solvents, acids, lead, heavy metals and other substances. Due to their toxic nature, these products and their containers require special use and disposal.

Businesses that generate, use or store defined amounts of these chemicals or substances are required to register with the MPCA. A list of hazardous waste

generators within the County is on record at the Crow Wing County Emergency Management Directors office.

Infrastructure

Pipelines

The following are pipeline operators within Crow Wing County. Due to the sensitive nature of pipelines, all location and description information is maintained by the Crow Wing County Emergency Management Director. For more information related to pipelines including locations, incident information, and similar information contact the Crow Wing County Emergency Management Director.

Solid Waste

Crow Wing County operates an integrated solid waste disposal site. The facility is located on MN State Highway 210, between the cities of Brainerd and Ironton MN

This site accepts materials resulting from demolition of a structure, built in cabinetry, ceramic fixtures, roofing, shingles, glass-wood-plastic, conduit-metal-wiring, insulation(fiberglass, cellulose, etc.) tile (ceramic floor, vinyl, etc.), and drywall (from demo projects only) .

This site does not accept: Ashes, asbestos, Dead animals, Garbage, Food & Beverage Containers, Liquids, Septic Tank Pumping, Sludge, Infectious Waste, Vehicles, Machinery, Hazardous Waste, Other substances deemed unacceptable by the, Minnesota Pollution Control Agency (MPCA). *(Source: http://www.pca.state.mn.us)*

Landfills

Minnesota disposes of some if its waste or garbage in landfills, which may be called "dumps" by some. The Minnesota Pollution Control Agency (MPCA) distinguishes between landfills and dumps by regulating the ongoing operations of open landfills and the closure and maintenance of closed landfills. However, the MPCA does not permit or regulate the use of dumps.

Crow Wing County has one open landfill and two closed.

Open Landfill

The ***Crow Wing County MMSW Landfill*** is located at 15728 State Highway 210 In Brainerd. Mr/ Doug Morris 2188241290

Closed Landfills

The ***Crosby Sanitary Landfill*** (Landfill) is located in Crow Wing County, Irondale Township. It received its first permit to accept waste on February 1, 1977 and continued operating until March 1, 1985. The Landfill was under public ownership when in operation and is located on Highway 6, just northeast of Crosby.

In accordance with the legislation enacted in 1992, (Minn. Laws 1992, Ch. 513, Art. 2, Sec. 2, Subd.3), the Minnesota Pollution Control Agency (MPCA) assessed and classified closed landfills in Minnesota. According to that assessment and classification, the Landfill was given a ranking of B and a score of 16. After completion of the cover in 1997, the Landfill was rescored to D 1.

The Landfill was originally 12 acres in size and contains approximately 87,000 yards of waste. During construction of the landfill cover, the footprint was reduced to 8 acres. The Environmental Monitoring System is composed of 5 monitoring wells, with one well located in an up-gradient direction and four downgradient.

The Fifty Lakes Modified Sanitary Landfill (Landfill) is located in Crow Wing County, Fifty Lakes Township (T138N, R27W, Sect. 20). The Landfill received its first permit to accept waste on November 1, 1982, and continued operating until November 1, 1987. This site is 4 Acres in size and contains approximately 28,000 yards of waste. The Landfill was under public ownership when in operation.

In accordance with the legislation enacted in 1992, (Minn. Laws 1992, Ch. 513, Art. 2, Sec. 2, Subd.3), the Minnesota Pollution Control Agency (MPCA) assessed and classified closed landfills in Minnesota. According to that assessment and classification, the nk of C indicated that the landfill required a cover upgrade, construction of gas vents and future corrective actions because the cover did not meet MPCA standards. The site was rescored in 1997 during the Annual Report Forum and resulted in a rank of B and a score of 7. The rank

was elevated because an adjacent dump fits the criteria of a small site that could be relocated. The dump site was investigated during the fall of 1997 and it was determined that it should be covered in place. The closure of this site took place during the summer of 1998. Following cover construction the site was rescored and received a rank and score of D4, respectively. Since that time, cover erosion and site vandalism required a rescoring of the site to a C10.

Sanitation Providers

Table 3.1 lists sanitation providers within Crow Wing County.

Table 3.1

Provider	Address	City	Phone	Comments
Waste Management	7968 Industrial Park Rd S	Baxter	800-777-8404	
Nisswa Roll Off	Box 843	Nisswa	218-963-0014	Roll offs only
Blue Lakes Disposal	16927 N Riverside Dr	Brainerd	218-828-4558	
Grinning Bear Rubbish Removal	Box 86	Pine River	218-587-4990	
Pequot Lakes/Gull Lake Sanitation	PO Box 639	Pequot Lakes	218-568-4630	
North Country Sanitation & Rolloff	PO Box 470	Pequot Lakes	218-543-4701	Roll offs only
Hengel Ready Mix & Construction, Inc.	12883 Upper Sylvin Road SW	Pillager	218-746-3355	Roll offs only
Bob Lemieur Roll-Off, Refuse & Recycling	14827 Pine Ave	Little Falls	320-632-5212	
Range Disposal	PO Box 535	Deerwood	218-543-5200	
Garrison/Nisswa Disposal	PO Box 308	Aitkin	218-927-6435	
Crosslake Roll Off & Recycling	PO Box 695	Crosslake	218-692-3902	
Waste Partners Environmental Services	PO Box 677	Pine River	218-824-8727	
Emily Rolloff & Recycling	PO Box 367	Emily	218-821-3330	Roll offs only

Transportation

Airports

Crow Wing County has one Municipal Airport. The Brainerd Lakes Regional Airport is located three miles east of Brainerd on Mn Highway 210. This commercial airport operates daily passenger and freight service.

The Brainerd Lakes Regional Airport Commission controls, operates, and manages the jointly owned City/County airport operations. It establishes policy in

order to ensure that quality aviation related services are provided to the Brainerd Lakes regional area.

The Airport Manager oversees the daily operation of the airport, carrying out the policies and procedures of the airport commission. Management of the facility includes a variety of operations including marketing, maintenance, operations, security and administration.

The clerical office duties, tenant billing, and parking program are administered by the Airport Office Associate.

Operation and maintenance of the airfield, terminal building, and airport owned hangars are handled by the maintenance and custodial staff. Aircraft rescue and firefighting duties are also handled by these employees.

Railroads

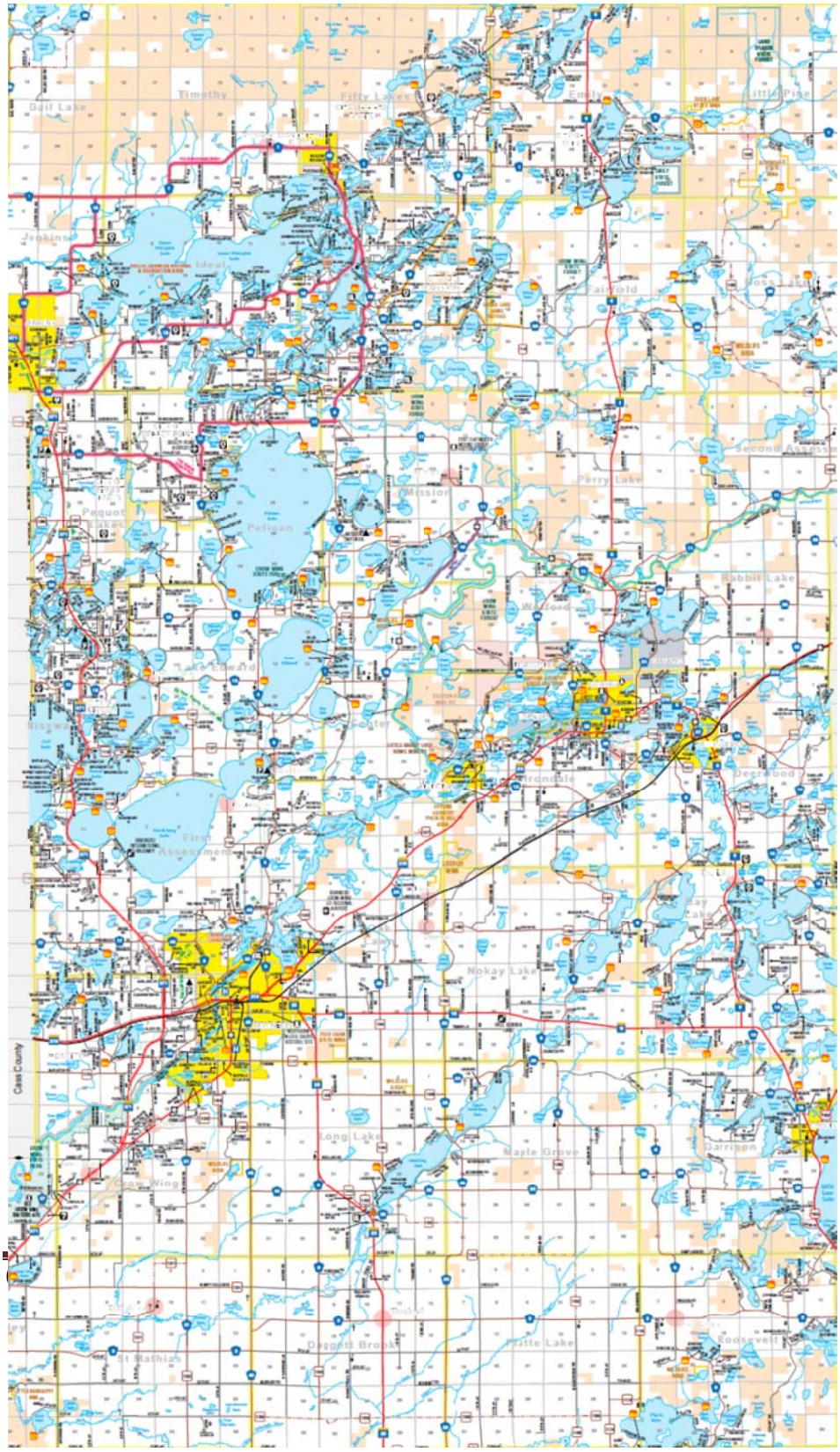
The Burlington Northern Sante Fe Railroad operates a main line segment through the county. The rail line generally runs adjacent to Mn Highway 210 and it carries approximately 9 trains per day that average approximately 49 mph.

The primary manifest on the trains passing through Crow Wing County are: Coal, Iron ore, lumber, newsprint, printing paper, paperboard, propane, lube oil, motor oil, asphalt, canned beverages, coiled sheet steel, recycled iron and steel, cement, gypsum, crushed stone, limestone, soda ash for glass, and kaolin clay for paper.

Roads

Crow Wing County is crossed by several primary transportation corridors: Mn Highway's 371, 210, 6, 18, and US Highway 169.

Accommodating north/south traffic into and through Crow Wing County, MN 371 travels along the western county border as it enters the county near Fort Ripley to the south and exits at Jenkins to the north. See County Road Map below.


Timothy
Fifty Lakes
Emily
Little Pine
Gail Lake
Jenkins
Ideal
Fairfield
Pequot Lakes
Pelican
Perry Lake
Mission
Rabbit Lake
Deerwood
Trondhjem
Nokay Lake
Cass County
Long Lake
Maple Grove
Garrison
Crow Wing
Daggett Brook
Little Lake
Roosevelt
St Mathias

Transit

A. **Brainerd Area Taxi** - Provides transportation for individuals and group0s in the area. Also delivers packages of many kinds locally and statewide.

B. **Dial-A-Ride** - In the greater Crow Wing County area, a combination of flexible routes and dial-a-ride service is available on a limited basis. The City of Brainerd and Crow Wing County have joined forces to provide public transportation opportunities to the residence of Crow Wing County.

C. **Reichert Bus Service -** Reichert Bus Service currently provides School Bus service, Chartered Motor coach service, Transit service, quality Fleet Repair service, Day Tours and Limousine Service to the Central Minnesota area.

D. **Medi-Van, Inc. -** is a professional, specialized transportation system designed to transport patients from their residence or nursing homes to scheduled appointments. Advance scheduling notice is recommended. Primarily for patients who have physical/mental disabilities (i.e. wheelchair-bound) and who have difficulty getting to and from appointments. Have ICC permission to transport across state lines. Their staff handles billing with MA, Health Plan, or the individual.

E. **Abbott Northwestern Hospital's Van-** Provides one-way or round –trip transportation to the Abbott Northwestern Hospi9tal or affiliated metro area specialists' offices. Patients must be referred by their hometown physicians, meet the van at designated sites, must be ambulatory and able to travel up to four (4) hours, and must live in Greater MN or Western WI. Thirty Dollar ($30.00) charge each way includes one family member of caregiver at no additional cost. May qualify for hardship discount program.

F. **American Legion Walter Scott Erickson, Post #557-** Walter Scott Erickson Post #557 has its own van which transports seniors from Deerwood to Crosby Nutrition Center for meals. Also brings meals to shut-ins on return trip back to Deerwood.

G. **Arrowhead Transit – AEOA –** Offers transportation from Deerwood and Crosby to Brainerd on the first Friday of the month, and transportation to Palisade on the third Friday of the month.

H. **Bay Lake Area Lions –** Mobility Bus – Mobility bus provides transportation for disabled in the Deerwood, Crosby, and Garrison areas.

I. **Crow Wing County Veteran's Service –** Local contact point for veterans and their dependents to apply for state and federal veterans benefits. Also supplies transportation from Brainerd to St. Cloud and Minneapolis VA Medical Centers. Must be ambulatory for transportation.

J. **Mission Township Volunteer Drivers** – Volunteer drivers to help people get to treatments or medical appointments.

K. **Crosby Ironton Transportation –** Provides transportation for the communities of Crosby and Ironton.

L. **Peoples Express –** State-wide non-emergency medical transportation, wheelchairs, stretchers, geri-chairs.

M. **Pequot Lakes/Crosslake Senior Van –** Provides transportation to seniors for errands around Pequot Lakes on Tuesdays, from Pequot Lakes to Brainerd and back on Fridays, and from Crosslake to Brainerd and back on Thursdays.

N. **Road to Recovery –** Provides transportation to those in need of radiation or chemotherapy treatments as well as to those with other medical needs as well. Serves Crosslake, Merrifield, Ideal Corners, Jenkins, Fifty Lakes, Emily, Pequot Lakes, Nisswa, Breezy Point, Crosby-ironton, Garrison, Brainerd, and Baxter.

O. **Salvation Army –** Emergency Transportation assistance – Transportation assistance is available Monday-Friday 8am to 4pm. This service is

available to those in an emergency situation, and is offered in the form of a gas voucher or bus ticket.

P. **Shriner's Hospital for Children –** Free medical treatment for handicapped or burned children to age 18. Includes certain transportation, parent housing and education.

Q. **Lakes Area Interfaith Caregivers –** Nonprofit organization providing volunteers to meet unmet needs in the areas of transportation, home visits, homemaking, chore/repairs, and respite care for people in need throughout Crow Wing County.

Utilities

A. **Mille Lacs Energy -** Mille Lacs Energy provides progressive, reliable electric services to most of Aitkin County and parts of Mille Lacs and Crow Wing Counties. We're here to provide the service you need, while supplying you with information on efficiency and safety.

B. **Minnesota Power & Light** - Minnesota Power, a division of ALLETE, provides electricity in a 26,000-square-mile electric service territory located in northeastern Minnesota including Crow Wing County. Minnesota Power supplies retail electric service to 144,000 retail customers and wholesale electric service to 16 municipalities.

C. **Crow Wing Coop. Power & Light** - is a private company categorized under Distribution, Electric Power and located in Brainerd, MN. It was established in 1936 and incorporated in Minnesota. Current estimates show this company has an annual revenue of $56,041,633.00 and employs a staff of approximately 100 individuals.

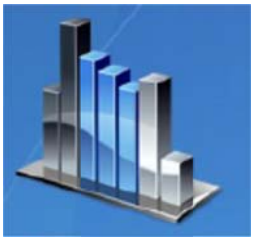
D. **Centerpoint Energy (Formerly Minnegasco).** - CenterPoint Energy is Minnesota's largest natural gas distribution company, serving more than 745,000 residential, commercial and industrial customers in over 240 communities including Crow Wing County.

E. **Excel Energy** - Based in Minneapolis, Minn., Xcel Energy operates in 8 Western and Midwestern states including Minnesota and areas of Crow Wing County and provides a comprehensive portfolio of energy-related

products and services to 3.4 million electricity customers and 1.9 million natural gas customers through its regulated operating companies.

F. **Northern Natural Gas** - Northern Natural Gas - Northern Natural Gas is based in Omaha, Nebraska, and operates an interstate natural gas pipeline extending from the Permian Basin in Texas to the Upper Midwest extending as far north as Crow Wing County.

At Northern, we provide transportation and storage services to approximately 76 utilities and numerous end-use customers in the Upper Midwest. We provide cross-haul and grid transportation between other interstate and intrastate pipelines in the Permian, Anadarko, Hugoton and Midwest areas. Northern also operates three natural gas storage facilities and two liquefied natural gas peaking units. These storage facilities are fully contracted and are central to meeting our customers' peak-day system requirements.



G. **Consolidated Telephone** - CTC services the areas of Sullivan Lake, Randall, Pillager, Outing, Nokay Lake, Nisswa, Motley, Mission, Lincoln, Leader, Freedhem, Little Falls, Brainerd and Baxter with Local Phone Service, High Speed Internet and now Digital TV with all the latest features.

H. **Crosslake Telephone & Cable** - Crosslake Communications provides telephone, long distance, cable TV and internet to the residents of Crosslake, Minnesota.

I. **Emily Cooperative Telephone** – provides modern telecom products like voice services high speed internet and digital quality cable television over a state of the art network.

J. **Integra Telcom** - Integra Telecom, Inc. ("Integra")* is a facilities-based, integrated communications carrier, dedicated to providing a better choice for businesses in eleven western states including Minnesota and Crow Wing County. It owns and operates a best-in-class carrier network that differentiates itself by staffing locally based customer care, technical, and account management professionals whose goal is to provide high-level, personalized client service and satisfaction.

K. **Nextera Communications** - Nextera brings new technology and solutions to the market faster. Nextera is the first Minnesota telecommunications company to deliver data and telephony via a fully digital, managed IP

(internet protocol) network infrastructure. This managed network environment provides a high-quality, carrier-grade solution. Nextera's network is fully redundant with smart gateways located in Brainerd, Duluth, St. Cloud and Minneapolis.

L. **TDS Metrocom** - At TDS, we provide innovative Voice, Internet, and Entertainment services to rural and suburban communities nationwide, as well as leading-edge business technology. But it's our commitment to each community we serve that truly sets us apart.

M. **Quest Communications** - Minnesota's Qwest® seeks to improve every aspect of Minnesotans' lives through investments in telecommunications infrastructure, community outreach and the creation of quality jobs.

N. **Brainerd Public Utilities** - For more than 100 years, BPU has provided reliable electric, water and wastewater services to the City of Brainerd.

Drinking Water

Drinking water in Crow Wing County is provided by a number of municipal water systems as well as individual well water.

Storm and Waste Water

Double-digit population growths and skyrocketing development has resulted in a dramatic increase in unsewered development in Minnesota's popular lakes county. To help assure protection of human health and the quality of the waters, a county wide decentralized sanitary district with pilot subordinate districts has been established in Crow Wing County.

The objective of the district is to develop an effective strategy for implementation of a decentralized wastewater management district on a local level to ensure that onsite/cluster wastewater systems within the district are properly operated, maintained, and that there is future planning for replacement needs.

The Crow Wing County Commissioners established the Crow Wing County Sanitary Management District in August of 2005. The Subordinate Management District (the pilot district to enact the management standards for onsite treatment systems) was established by county board action in February of 2006. The Subordinate District included the townships of Unorganized, Mission, Center, Pelican, Lake Edwards, Ideal, and the City of Cross Lake. The county board has appointed the members of the District Board.

The District's management program helps to ensure that onsite systems used to treat wastewater discharged from homes and businesses in unsewered areas effectively protect public health, and water resources. It is a management program administered by the District that assists property owners

through operation and maintenance of the wastewater treatment systems installed on their properties.

Wells

Abandoned or broken off wellheads can act like a big sink drain for surface water runoff, allowing unfiltered and unchecked water to enter an aquifer. For the reason, it is important to cap or permanently seal any abandoned wells. Since wells lead underground, and therefore out of sight and out of mind, it is important to raise public awareness of issues surrounding their potential to contribute to ground water pollution.

These factors increase the necessity for monitoring wells in areas of high risk to groundwater quality it is also notable to mention that surface related groundwater pollution is most dangerous for water drawn for human consumption from shallow wells. The high volume of current and expected development in the County can also impact groundwater in areas with overlapping threats in order to provide an early indication of contamination before it spreads. Many of the different state and local units of government are and have been monitoring groundwater along with developing wellhead protection plans. This information can be useful in developing local ordinances and plans to protect and conserve groundwater within Crow Wing County. Potential recommendations could include restricting certain activities and construction in areas with a high risk for pollution.

Crow Wing County Population and Housing Characteristics

Table 3.2 Population

	Number	Percent %
1970	34,826	
1980	41,722	
1990	44,249	
2000	55,099	
2002	57,132	
Percent % of Change 1990-2000	10,850	24.52
Percent % of Change 1970-2000	20273	58.00
65 and Over of 2000 Population	9410	
85 and Over of 2000 Population	1135	

Population By Race

	Number	Percent %
White	53,801	97.6
Black or African American	170	0.3
American Indian or alaska Native	429	0.8

Asian	152	0.3
Native Hawaiian and Oher Pacific Islanders	7	0.0
Other Single Race	112	0.2
Two or More Races	428	0.8
Total	55,099	100.0
Hispanic or Latino	381	0.61

Education Attainment

	Number	Percent %
No schooling completed	169	0.5
Nursery to 4th grade	21	0
5th and 6th grade	174	0.5
7th and 8th grade	1,541	4.2
9th grade	510	1.4
10th grade	948	2.6
11th grade	773	2.1
12th grade, no diploma	934	2.5
High school graduate (includes equivalency)	12,452	33.6
Some college, less than 1 year	3,120	8.4
Some college, 1 or more years, no degree	6,204	16.7
Associate degree	3,407	9.2
Bachelor's degree	4,731	12.8
Master's degree	1,399	3.8
Professional school degree	590	1.6
Doctorate degree	119	0.3
Total	37,092	100

Housing

	Number	Percent %
Number of Households	22250	
Persons per Household	2.43	
Number of Housing Units	33483	
Vacant Units Non Seasonal	976	
Vacant Units Seasonal	10257	
Owner Occupied Units	17732	79.70
Renter Occupied Units	4518	20.30

Age of Housing

	Number	Percent %
Built 1999 to March 2000	1,528	4.6
Built 1995 to 1998	3,300	9.9
Built 1990 to 1994	3,105	9.3
Built 1980 to 1989	5,319	15.9
Built 1970 to 1979	6,007	17.9
Built 1960 to 1969	3,898	11.6

Built 1950 to 1959	3,540	10.6
Built 1940 to 1949	2,656	7.9
Built 1939 or earlier	4,130	12.3
Total	33,483	100

Heating Method

	Number	Percent %
Utility gas	12,196	54.8
Bottled, tank, or LP gas	3,990	17.9
Electricity	2,985	13.4
Fuel oil, kerosene, etc.	1,429	6.4
Coal or coke	2	0
Wood	1,377	6.2
Solar energy	0	0
Other fuel	208	0.9
No fuel used	63	0.3
Total	22,250	100

Group Quarter

	Number	Percent %
Correctional institutions	87	8.36
Nursing homes	406	39
Other institutions	213	20.46
College dormitories	0	0
Military quarters	0	0
Other noninstitutional group quarters	335	32.18
Total	1,041	100

Market Values

Estimated Market Value	$6,412,621,100

Economic Development

	Number per Household	Family
Average Income	$46,758	$54,727
Median Income	$37,589	$44,847
Per Capita Income	$19,174	
Total Population	55,099	
Total Income	$1,056,443,700	

Poverty

	Number	Percent %
Income below poverty level	15936	29.4
Income at or above poverty level	38279	70.6

Industry

	Number of Employees	Avg Weekly Wage
Construction	2051	$906
Manufacturing	2681	$743
Wholesale trade	556	$755
Retail trade	4855	$426
Transportation and warehousing, and utilities		
Transportation and warehousing	609	$639
Utilities	142	$1,285
Finance, insurance, real estate and rental and leasing		
Finance and insurance	1136	$860
Real estate and rental and leasing		
Professional , scientific, management, administrative, and waste management services		
Professional ,scientific, and technical services	897	$964
Management of companies and enterprises	53	$850
Administrative and support and waste management services	1018	$387
Educational, health and socials services		
Educational services	2020	$644
Health care and social assistance	5161	$678
Arts, entertainment, recreation, accommodation and food services		
Arts, entertainment, and recreation	302	$207
Accommodation and food services	3793	$249
Other services	894	$287
Total	28474	$598

Transportation

	Number	Percent %
Car, truck, or van:	23,291	91.6
Drove alone	20,606	81.1
Carpooled	2,685	10.6
Public transportation:	131	0.5
Bus or trolley bus	106	0.4
Streetcar or trolley car	6	0
Subway or elevated	0	0
Railroad	4	0
Ferryboat	0	0
Taxicab	15	0
Motorcycle	7	0
Bicycle	19	0

Walked	690	2.7
Other means	143	0.6
Worked at home	1,139	4.5
Total:	25,420	100
Average Travel Time to Work	20.5	

3.6 Assessing Vulnerability

3.6.1 Estimating Losses

Limited data currently exists to fully estimate the potential loss of each hazard presented throughout this plan. As this data becomes available, Crow Wing County will provide more thorough loss estimations in future updates of this plan. The current process of obtaining this data is very timely and expensive. As the development of information management continues, the ability to estimate these potential dollar losses will be available.

The next plan update should include:

- A description of vulnerability by types and numbers of existing structures and infrastructure by hazard.
- A description of vulnerability by types and numbers of future structures and infrastructure by hazard.
- An estimation of potential dollar losses to vulnerable structures.
- An estimate for each identified hazard.

3.6.2 Using Township Market Values to estimate financial losses.

Since data is limited and the current process of obtaining loss data is expensive, one alternative method is to use existing market values to estimate losses. The following is a table outlining the most recent estimated market values of properties listed by Townships:

Estimated Market Value of Townships
in Crow Wing County

Table 3.3

Bay Lake	$604,048,300
Center	$166,703,500

Crow Wing	$146,427,500
Dagget Brook	$70,823,000
2nd Assmt-Dean Lake	$31,107,100
Deerwood Twp	$256,158,600
Fairfield	$109,720,900
Fort Ripley Twp	$109,905,900
Gail Lake Twp	$25,346,500
Garrison Twp	$200,102,400
Ideal	$1,038,241,600
Irondale	$129,608,300
Jenkins Twp	$182,018,100
Lake Edward	$511,954,900
Little Pine	$30,286,200
Long Lake	$180,266,600
Maple Grove	$143,435,100
Mission	$384,746,700
Nokay Lake	$107,655,000
Oak Lawn	$167,292,400
Pelican	$330,218,700
Perry Lake	$62,032,000

Platte Lake	$60,716,100
Rabbit Lake	$77,716,600
Roosevelt	$149,909,900
Ross Lake	$117,669,200
St. Mathias	$77,925,600
Timothy	$70,195,100
Wolford	$82,645,800
1st Assmt-unorganized	$787,743,500
Total	**$6,412,621,100**

3.7 Assessing Vulnerability

3.7.1 Analyzing development trends.

Crow Wing County is growing rapidly. From 1890 to 2000, the County's total population grew by 40,000 people, and increase of 40% over 110 years. From 1990-2000, the population increased by 10,000 (25%), the 11th greatest increase by percentage in the state. Assuming this same growth rate continues over the next 20 years, the population that took 100 years originally will now take only 20 years to increases the same amount.

To understand what this growth means for Crow Wing County, it is important to understand where the growth is occurring. Population growth as not been evenly distributed throughout the County. The highest rates of growth occurred in areas featuring large lakes, highly valued scenic amenities, and good transportation systems. The percentage of seasonal home also tends to be highest in these areas, indicating even greater populations and development pressures than reflected in the 2000 census results. Municipalities along the Highway 371 and 169 corridors are growing rapidly, as are those abutting the Whitefish Chain, Pelican Lake. And Mille Lacs Lake. These areas should be the focus of intense growth management, with emphasis placed on preserving lakes, forests, and wetlands- the very amenities that make these areas desirable places to live and vacation.

Economic Trends

Crow Wing County's largest employers exist in the cities of Brainerd, Baxter, and Crosby-Ironton. The cites of Pequot Lakes, breezy Point, Nisswa, and Deerwood also provide a large number of jobs. All of these cities have downtown areas and industrial parks with existing infrastructure for commercial and industrial uses. Encouraging commercial and industrial growth and redevelopment in existing cities' downtowns and industrial parks presents a challenge to the County since cities have their own planning and zoning outside the Count's jurisdiction. The County only ha jurisdiction over townships, each of which has seven percent or less of all parcels classified as commercial, and which do not have the infrastructure to support intensive commercial and industrial development.

Housing Trends

As population increases, Crow Wing County residents are concerned about where people will reside. Development and annexation could be haphazard and disorderly if not properly planned leading to the continued loss of agricultural, open space and natural area, and to the inefficient and expensive provision of infrastructure and services, particularly for the County's growing population.

One way to assess residential growth and development rates in Crown Wing County is to look at trends and locations for building permits, variances, rezoning requests, conditional use permits, and the number and types of subdivision plats. According to permit records from 1990 to 2000 there were several townships that doubled the number of new dwelling permits than those in most other townships. It will be important for the County to gain a better undersigning of why this is happening in these and other location through the County. Source: (Crow Wing County Comprehensive Plan)

3.8 Multi-Jurisdictional Mitigation Assessment

Table 3.4 below illustrates the outcomes from the community-based risk assessment for each participating jurisdiction. The Planning team divided the County into its three major sectors (North, Central, and South), based upon its physical and demographic characteristics. While the majority of communities throughout the county have no unique risks, some face risks that are unique to their communities.

In this table, risks are described for each participating jurisdiction and unique risks are identified within their jurisdictional boundaries.

Table 3.4

Sector 1	Cities	Risks	Unique Risks
	Jenkins	Subject to all 31 identified risks except Dam Failure.	No Unique Risks.
	Manhattan Beach	Subject to all 31 identified risks except Dam Failure.	No Unique Risks.
	Fifty Lakes	Subject to all 31 identified risks except Dam Failure.	No Unique Risks.
	Crosslake	Subject to all 31 identified risks.	Dam Failure (Downstream from dam).
	Breezy Point	Subject to all 31 identified risks except Dam Failure.	Airport- Crash (increased risk due to presence of airport)
	Pequot Lakes	Subject to all 31 identified risks except Dam Failure.	No Unique Risks.
	Emily	Subject to all 31 identified risks except Dam Failure.	No Unique Risks.
Sector 2			
	Nisswa	Subject to all 31 identified risks except Dam Failure.	No Unique Risks.
	Trommald	Subject to all 31 identified risks except Dam Failure.	No Unique Risks.
	Cuyuna	Subject to all 31 identified risks except Dam Failure.	No Unique Risks.
	Ironton	Subject to all 31 identified risks except Dam	No Unique Risks.

		Failure.	
	Crosby	Subject to all 31 identified risks except Dam Failure.	No Unique Risks.
	Riverton	Subject to all 31 identified risks except Dam Failure.	No Unique Risks.
	Deerwood	Subject to all 31 identified risks except Dam Failure.	No Unique Risks.
	Brainerd	Subject to all 31 identified risks.	Dam Failure (Downstream from dam).
	Baxter	Subject to all 31 identified risks.	Dam Failure (Downstream from dam).
Sector 3			
	Garrison	Subject to all 31 identified risks except Dam Failure.	
	Fort Ripley	Subject to all 31 identified risks.	Dam Failure (Downstream from dam).

Vulnerable Structures and local Assets

An extensive list of vulnerable structures and community assets has been compiled for each community throughout the Crow Wing County. The list of vulnerable structures includes the name of the structure/organization that the structure is affiliated with/owned by, as well as the physical address of the structure. Vulnerable Structures included are:

- **Places of Worship**
- **Civic Centers**
- **Golf Courses**
- **City recreational property**
- **Festival/Arts events**
- **Clinics**
- **Hospitals**

- **City Halls/Public Works Garages**
- **Daycare Facilities**
- **Group Homes**
- **Historical Societies**
- **Industrial Parks**
- **Jails/Prisons/Girls-Boys Homes**
- **Nursing Homes**
- **Assisted Living Facilities**
- **Schools**
- **State Facilities**
- **Town Hall Buildings**
- **Sporting event centers**
- **Bus Stations**
- **Fairgrounds**
- **Grandstands**
- **Historic Places**
- **Libraries**
- **Museums**
- **Theaters**
- **Parks**

Due to the volume of vulnerable structures, a comprehensive list of these structures, in each community throughout Crow Wing County is provided in Appendix A attached to this plan.

4.0 Action Plan [Goals, Objectives, Strategies & Funding]

4.0 ACTION PLAN [GOALS, OBJECTIVES, STRATEGIES AND FUNDING]

Eliminating or reducing the risks on persons, property, and the environment is the focus of the Crow Wing County Hazard Mitigation Plan. The goals and objectives presented within this section are intended to address natural, human-cased and technological hazards within the County before they occur through the use of local, state, and federal resources. To clarify the following action the following terms are defined:

GOAL: The overall desired effect including both long term or ongoing and terminal effects.

COSTS: The estimated cost to achieve the corresponding objective. The different monetary costs associated with the varying degree of severity in the descriptions column have been determined based upon the vulnerability of the jurisdiction to each hazard, as well as the types and number of structures within the jurisdiction. The costs are identified by using the following table:

DESCRIPTION	APPROXIMATE LOW	APPROXIMATE HIGH
LOW	$0.00	$5,000.00
MODERATE	$5,001.00	$50,000.00
HIGH	$50,001.00	$250,000.00
VERY HIGH	$250,001.00	And up

OBJECTIVES: Steps that will be taken to achieve the goal or desired effect. For the purpose of this plan, Objectives are identified with a number.

STRATEGIES: The action or method used to attain the objective. For the purpose of this plan, Strategies are identified with a number followed by a letter.

TASK LEADER: Either individual or collective responsible agency, department, organization, group, or person that will carry out the corresponding objective. Contact information for all Task Leaders is as follows:

Emergency Management
Director: John Bowen
Law Enforcement Center
304 Laurel Street
Brainerd, MN 56401
218-824-1044

Planning & Zoning
Administrator: Chris Pence
Planning & Zoning
322 Laurel Street
Suite 14
Brainerd, MN 56401
218-824-1125

Highway Department
Engineer: Tim Bray
Highway Department
16589 CR142
Brainerd, MN 56401

Public Health
Manager: Gwen Anderson
Community Service Bldg
204 Laurel Street
Suite 12
218-824-1080

Sheriff Department
Sheriff: Todd Dahl
Law Enforcement Center
304 Laurel Street
Brainerd, MN 56401
218-829-4749

Management of Information Systems (MIS)
Director: Jim Eder
Central Services
202 Laurel Street
Brainerd, MN 56401
218-824-1052

City Information is listed in section 2.2 on pages 18-29.

TIMELINE: Date or timeframe the objective will be achieved in. If an objective is ongoing or no specific date can be set to carry out the objective then it is labeled as "ongoing."

Prioritization of Action Items

Assigned Value
This section outlines the prioritization of the action items presented within this plan. Each action item or objective contained within this plan is assigned a prioritization value based on the following table. These values are ranked 1 to 6 with 1 being a "highest priority" value and 6 being the "least priority" value.

Priority	Category
1.	Policy Improvements: Includes making changes to any policy(ies) maintained by Crow Wing County.
2.	Process Improvements: Includes making changes to any programs or processes conducted by Crow Wing County.
3.	Physical Improvements: Includes any projects related to improvement of structures or physical terrain to minimize or eliminate hazards.
4.	Information Gathering: Includes any action related to the inventorying or gathering of information.

5.	Outreach Projects: Includes the dissemination of information to the public.
6.	Communication Efforts: Includes ongoing cooperation and communication with organizations/agencies external to Crow Wing County.

Prioritization by Time Schedule
Each action item presented within this section is scheduled for completion according to a specified timeline. All items of the same assigned value will be implemented according to the time schedule provided depending on the prioritization by costs.

Prioritization by Costs
Each action item is assigned an estimated cost. This estimate is purely a figure used to assess potential costs associated with the action item to be carried out and is not intended to represent any exact value or project cost. Cost benefit estimates were made on all action items during the development of this action plan. All action items of the same assigned value will be implemented contingent upon Crow Wing County securing any necessary funding. This means that if an action item is a #1 priority, is scheduled to be completed in 2010, but funding cannot be secured until 2012, the item must be held until 2012 to be completed.

A thorough cost benefit analysis to determine the cost benefit ratio will be conducted by the implementing agency prior to the implementation of each project derived from this plan.

4.1a National Flood Insurance Plan (NFIP) Compliance

This section of the plan describes how the County and other participating jurisdictions participate in the National Flood Insurance Program (NFIP). The objective of the NFIP program is to provide flood insurance to property owners to reduce their risk exposure due to floods. Flood Information Rate Maps (FIRMs) have been created to show different degrees of risk for communities, which help determine the cost of flood insurance. The lower the degree of risk indicates a lower flood insurance premium. Nationally, about 20% of NFIP policies are in low flood risk areas.

Table 4.1 shows Crow Wing County's current participation in the NFIP.

Table 4.1

	NFIP Status*			
Jurisdiction:	**Y**	**N**	**N/A**	**# of NFIP Policy Holders**
Crow Wing County	**X**			
Baxter	**X**			

Brainerd	**X**			
Breezy Point			**X**	
Crosby	**X**			
Crosslake	**X**			
Cuyuna			**X**	
Deerwood			**X**	
Emily			**X**	
Fifty Lakes	**X**			
Fort Ripley	**X**			
Garrison			**X**	
Ironton			**X**	
Jenkins		**X**		
Manhattan Beach			**X**	
Nisswa	**X**			
Pequot Lakes			**X**	
Riverton	**X**			
Trommald			**X**	

Y = Participating
N = Not Eligible (did not adopt model ordinance or are sanctioned)
N/A = Not Mapped

Note: The above description is being changed since Crow Wing County is participating in NFIP's Map Modernization Project. Digital Flood Information Rate Maps (D-FIRMs) will be provided to the county for the purpose of determining rates for NFIP policies. D-FIRMs are an improvement in the accuracy of previous maps since they are digitally based.

The following milestones are listed for the county and its jurisdictions to participate in the D-FIRM process:

- Preliminary D-FIRMS were released by FEMA on May 27, 2010

- MN DNR is currently in the process of providing the preliminary D-FIRM maps for review. MN DNR is planning map review meetings in August 2011. MN DNR will also be reviewing the status of local floodplain ordinance to coordinate with the new maps and include in the discussion at the meetings.

- A letter of official determination will be sent to each jurisdiction upon approval of the D-FIRMs.

Action Items
As part of the D-FIRM process, the county and cities currently participating in the NFIP program will be participating in flood map review and review of the ordinances. Other cities may be invited into the process per invitation by MN DNR since new areas of risk are being identified.

The County will encourage other jurisdictions not participating in the NFIP program through the MN DNR process in rolling out he DFIRM maps.

Goal – County's Goal is to increase participation in the NFIP program and have all county jurisdictions enrolled in the NFIP program by the fall of 2012.

****The Crow Wing County Emergency Management Director will meet with Jenkins *(only city not participating)* city staff to ensure future participation in the NFIP.**

Mitigation Action	Priority/Status	Projected Completion Date	Comments
Review D-FIRMS	High/New	2012	**Crow Wing County, Baxter, Brainerd, Crosby, Crosslake, Fifty Lakes, Fort Ripley, Nisswa, Riverton designated flood plain managers**
Approve D-FIRMS	High/New	2012	**Crow Wing County, Baxter, Brainerd, Crosby, Crosslake, Fifty Lakes, Fort Ripley, Nisswa, Riverton designated flood plain managers**
Review and Update Floodplain Ordinance as necessary	High/New	2012	**Crow Wing County, Baxter, Brainerd, Crosby, Crosslake, Fifty Lakes, Fort Ripley, Nisswa,**

			Riverton designated flood plain managers
NFIP Public Education*	High/New	2012	**Crow Wing County, Baxter, Brainerd, Crosby, Crosslake, Fifty Lakes, Fort Ripley, Nisswa, Riverton designated flood plain managers**

*FEMA and DNR conduct outreach to increase the number of NFIP policyholders in the state. Crow Wing County and participating jurisdictions will develop public education to inform property owners about the importance of becoming policyholders. Ideas for public education are:

- linking FloodSmart to county or city websites to developing outreach as part community preparedness
- conducting local media campaigns
- outreach to the business community
- displays at the county fair or other events

4.1b NATURAL HAZARD GOALS, OBJECTIVES AND STRATEGIES

Natural hazard mitigation measures presented throughout this planning process have been divided into the following groups:

- Severe Summer Storms
- Tornado
- Flooding and Flash Flooding
- Winter Storms
- Extreme Temperatures
- Sustained Wind Storm
- Infectious Disease
- Wildfire
- Drought
- Earthquake
- Dust Storm
- Solar Flares/Storms

4.1.1 SEVERE SUMMER STORMS Thunderstorm/Lightning/Hail/High Wind

Goal: To adequately be prepared for and minimize the damage caused by severe summer storms.

Objective 1: Minimize the impacts of severe summer storms on life and property

Strategies	Priority	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Continue to provide Posters, brochures, media materials **Task Leader:** Emergency Management	5							X	FEMA, HMA, HSEM, NOAA,	LOW
1b: Provide information on making structures safer: materials, building storm shelters, etc. **Task Leader:** Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of "Participating Cities"	5							X	FEMA, HMA.	LOW
1c: Enhance building codes to prevent damage from high winds **Task Leader:** County Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of "Participating Cities"	1							X	FEMA, HMA.	LOW
1d: Designate community shelters for evacuees **Task Leader:** Emergency Management Director	3							X	Local funding sources.	HIGH
1e: Establish storm shelters in area recreational facilities **Task Leader:** Emergency Management Director, Parks Dir.	3							X	FEMA, HMA	HIGH
1f: Require storm shelters for all mobile home parks, multiple family dwellings **Task Leader:** County Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of "Participating Cities"	1							X	Local funding sources.	MODERATE
1g: Encourage NOAA weather radio use **Task Leader:** Emergency Management Director	5							X	FEMA, HMA, HSEM, NOAA	LOW
1h: Promote NOAA weather radio use through rebates programs **Task Leader:** Emergency Management Director	5							X	Local funding sources.	LOW
1i: Continue to upgrade and improve Emergency Warning Systems **Task Leaders:** Emergency Management Director	3							X	FEMA, HMA, NOAA	HIGH
1j: Install new or upgraded siren warning systems **Task Leader:** Emergency Management Director, Emergency Management Director for the Cities of "Participating Cities"	3							X	FEMA, HMA, NOAA	HIGH
1k: Encourage cities to participate in state programs **Task Leaders:** Emergency Management Director	6							X	Local funding sources.	LOW
1l: Provide education on what causes storm damage	5							X	FEMA,	LOW

Task Leader: Emergency Management Director									HMA, HSEM, NOAA,	
1m: Recommend a list of building materials capable of handling high winds in areas without natural windbreaks **Task Leader:** Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of "Participating Cities"	5							X	FEMA, HMA, NOAA	LOW
1n: Recommend the use of windbreaks in all new development where natural or man-made windbreaks do not exist **Task Leader:** County Planning & Zoning Administrator or Commission for the Cities of "Participating Cities"	5							X	Local funding sources.	MODERATE
1o: Provide public education on the dangers of wind, especially winds associated with thunderstorm activity **Task Leader:** Emergency Management Director	5							X	FEMA, HMA, HSEM, NOAA,	LOW
1p: Provide information on reinforcement measures that can be taken by landowners to prevent damage caused by wind **Task Leader:** Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of "Participating Cities", Emergency Management Director	5							X	FEMA, HMA, USDA, NRCS	LOW

Objective 2: Minimize the impacts of severe summer storms on roadways

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
2a: Identify potential areas of repeating road washout **Task Leader:** Highway Engineer, Town Boards	4							X	Local funding sources.	LOW
2b: Improve potential areas of repeating road washout **Task Leader:** Highway Engineer, Town Boards	3							X	Local funding sources.	MODERATE
2c: Replace aging/failing bridges and culverts that are inadequate **Task Leader:** Highway Engineer, Town Boards	4							X	MNDOT	MODERATE

4.1.2 TORNADO

Goal: To adequately be prepared for and minimize the damage caused by tornado activity.

Objective 1: Minimize the impacts of tornadoes on life and property

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Continue to provide Posters, brochures, media materials **Task Leader:** Emergency Management Director	5							X	FEMA, HMA, HSEM, NOAA,	LOW
1b: Distribute educational materials with County mailings **Task Leader:** Emergency Management Director	5							X	FEMA, HMA, HSEM, NOAA,	LOW
1c: Provide information on making structures safer, materials, building storm shelters, etc. **Task Leader:** County Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of "Participating Cities"	5							X	FEMA, HMA, HSEM, NOAA,	LOW
1d: Require storm shelters for all mobile home parks, multiple family dwellings **Task Leader:** County Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of "Participating Cities"	1							X	Local Funding Sources.	MODERATE
1e: Encourage NOAA weather radio use **Task Leaders:** Emergency Management Director	5							X	NOAA	LOW
1f: Continue to upgrade and improve Emergency Warning Systems **Task Leaders:** Emergency Management Director	3							X	FEMA, HMA	HIGH
1g: Require all warning systems to be radio activated by dispatch and have battery back-up **Task Leaders:** Emergency Management Director	3					X			FEMA, HMA	HIGH
1h: Establish neighborhood calling trees **Task Leaders:** Emergency Management Director	2			X					Local Funding Sources.	LOW

4.1.3 FLOODING AND FLASH FLOODING

Goal: To adequately be prepared for and minimize the damage caused by floods.

Objective 1: Minimize the impacts of flooding on life and property

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Restrict building in floodplain areas that consistently flood – Includes cities **Task Leader:** Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of "Participating Cities"	1							X	Local Funding Sources.	LOW
1b: Encourage development of parks and open space areas along floodplain areas that consistently flood **Task Leader:** Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of **"Participating Cities"**	5							X	Local Funding Sources..	MODERATE
1c: Continue to update Emergency Operation Plan yearly **Task Leader:** Emergency Management Director	1							X	FEMA, HMA	LOW
1d: Encourage early participation of individual landowners in the FEMA National Flood Insurance Program by persons within floodplain areas **Task Leader:** Planning & Zoning Administrator, Emergency Management Director	1							X	FEMA, HMA, HSEM, NOAA,	LOW
1e: Develop a schedule to regularly patrol streams and rivers for beaver dams **Task Leader:** CW Water Protection Specialist, DNR,	2							X	DNR, CWSWCD	LOW
1f: Maintain sandbags and flood fighting equipment **Task Leader:** Emergency Management Director.	3							X	DNR, CWSWCD	MODERATE
1g: Review D-Firm Maps **Task Leader: DNR/Local Flood Plan Coordinator/Emergency Management**	1		X						DNR, CWSWCD	LOW
1H: Review current NFIP model ordinance. **Task Leader: Local Flood Plan Coordinator/Emergency Management**	1		X						DNR, CWSWCD	LOW
1I: Determine if a new NFIP ordinance needs to be adopted. **Task Leader: Local Flood Plan Coordinator/Emergency Management Director/ local governing body.**	1		X						DNR, CWSWCD	LOW

Objective 2: Minimize impacts of <u>flash floods on life and property</u>

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
2a: Provide public education on dangers of flash flooding **Task Leader:** Emergency Management Director	5							X	FEMA, HMA, HSEM, NOAA,	LOW
2b: Encourage municipalities to require the development of new storm sewer infrastructure capable of handling a ten to twenty year rain event in new subdivisions **Task Leader:** Planning & Zoning Administrator, Emergency Management Director	1			X					FEMA, HMA, HSEM, NOAA,	HIGH
2c: Educate property owners on landscaping methods **Task Leader:** Planning & Zoning Administrator, Crow Wing County SWCD	5		X						FEMA, HMA, HSEM, NOAA,.	LOW

Objective 3: Minimize the impacts of <u>flash floods on roadways</u>

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
3a: Identify and improve potential and historical areas of road washout **Task Leader:** Highway Engineer, Town Boards	4							X	MNDOT	LOW
3b: Improve potential and historical areas of road washout	3							X	FEMA, HMA, HSEM,	MODERATE

Task Leader: Highway Engineer, Town Boards									NOAA, MNDOT	
3c: Keep culverts and drainage ditches free of debris **Task Leader:** County Highway Engineer, Town Boards, City of Crow Wing Public Works	2							X	MNDOT	MODERATE
3d: Replace aging/failing bridges and culverts that are inadequate **Task Leader:** Highway Engineer, Town Boards	4							X	MNDOTN, LOCAL FUNDING SOURCES	MODERATE

4.1.4 WINTER STORMS

Goal: To adequately be prepared for and minimize the damage caused by winter storms throughout the County.

Objective 1: Minimize the impacts of winter storm activity and cold weather events on citizens

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Encourage through education, event preparedness; i.e. Furnace inspection **Task Leader:** Public Health Director, Emergency Management Director	5							X	FEMA, HMA, HSEM, NOAA,	LOW
1b: Encourage the review of winter driving techniques **Task Leader:** Emergency Management Director, Public Health Director, Sheriff, MN Department of Public Safety	5							X	LOCAL FUNDING SOURCES	LOW
1c: Continue to promote the need for emergency supplies and blankets in traveling vehicles **Task Leader:** Emergency Management Director, Public Health Director, Sheriff, MN Department of Public Safety, Red Cross	5							X	FEMA, HMA, HSEM, NOAA,	LOW
1d: Encourage the elderly and those that care for the elderly, to keep an ample supply of medication **Task Leader:** Emergency Management Director, Public Health Director	5							X	LOCAL FUNDING SOURCES	LOW
1e: Establish "Good Neighbor" programs **Task Leader:** Emergency Management Director	2							X	LOCAL FUNDING	MODERATE

									SOURCES	

Objective 2: Minimize the impacts of winter storm activity and cold weather events on property

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
2a: Provide information on building materials and practices that increase structural safety, and increase energy conservation in cold weather conditions **Task Leader:** Planning & Zoning Administrator	5							X	FEMA, HMA, HSEM, NOAA,	LOW
2b: Encourage the planting of trees and natural vegetation in new development to minimize large snow accumulation **Task Leader:** Planning & Zoning Administrator, Crow Wing County SWCD	5							X	LOCAL FUNDING SOURCES.	MODERATE
2c: Promote inspection and trimming of trees that potentially could fall onto power lines **Task Leader:** Emergency Management Director, Electric Service Providers	2							X	LOCAL FUNDING SOURCES	MODERATE
2d: Promote the use of snow fencing **Task Leader:** Emergency Management Director	5							X	LOCAL FUNDING SOURCES	LOW

Objective 3: Prevent or minimize the impacts of winter storm activity and cold weather events on infrastructure including individual septic treatment systems

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
3a: Draw upon local and hazard mitigation funding to ensure power infrastructure can withstand ice storm conditions **Task Leader:** Planning & Zoning Administrator	6		X						FEMA, HMA, HSEM, NOAA,	HIGH
3b: Provide information to landowners with Individual Septic Treatment Systems on ways to protect their systems from extreme cold **Task Leader:** Planning & Zoning Administrator	5							X	FEMA, HMA, HSEM, NOAA,	LOW

Objective 4: Minimize the impacts of winter storm activity and cold weather events on roadways

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
4a: Encourage the planting of natural vegetation or the placement of snow fences or similar devices along roadways to minimize snow accumulation **Task Leader:** Highway Engineer	5							X	LOCAL FUNDING SOURCES	LOW
4b: Continue providing exceptional snow removal, salting, and sanding to minimize the impacts of snow accumulations on motorists **Task Leader:** Highway Engineer	3							X	LOCAL FUNDING SOURCES	MODERATE
4c: Promote the use of snow fencing, including "living snow fencing" **Task Leader:** Highway Engineer	5							X	FEMA, HMA, HSEM, NOAA,	MODERATE

4.1.5 EXTREME TEMPERATURES

Goal: To adequately be prepared for and minimize the damage caused by extreme temperatures.

Objective 1: Lesson the impact of extremely high temperature on the people of Crow Wing County

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Publish a special section with emergency information on extreme heat; include the phone numbers of emergency services offices and hospitals. **Task Leader:** Emergency Management Director, Public Health Director	5							X	FEMA, HMA, HSEM, NOAA,	LOW
1b: Sponsor a "Helping Your Neighbors" program through your local school system to encourage children to think of those persons who require special assistance such as elderly people, infants or people with disabilities during severe weather conditions **Task Leader:** Public Health Director	6		X						LOCAL FUNDING SOURCES	LOW

Objective 2: Lesson the impact of extremely cold temperatures on the people of Crow Wing County

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		

1a: Publish a special section with emergency information on extreme cold temperatures; include the phone numbers of emergency services offices and hospitals. **Task Leader:** Emergency Management Director, Public Health Director	5							X	FEMA, HMA, HSEM, NOAA,	LOW
1b: Sponsor a "Helping Your Neighbors" program through your local school system to encourage children to think of those persons who require special assistance such as elderly people, infants or people with disabilities during severe weather conditions **Task Leader:** Public Health Director	6		X						LOCAL FUNDING SOURCES	LOW

4.1.6 WIND STORM (SUSTAINED)

Goal: To adequately be prepared for and minimize the damage caused by strong sustained winds.

Objective 1: Minimize the impacts of sustained wind storms on property

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Recommend a list of building materials capable of handling high winds in areas without natural windbreaks **Task Leader:** Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of "Participating Cities"	5							X	LOCAL FUNDING SOURCES	LOW
1b: Encourage property owners to trim trees that are near buildings **Task Leader:** Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of "Participating Cities"	5							X	LOCAL FUNDING SOURCES	LOW
1c: Encourage property owners to remove dead and diseased trees **Task Leader:** Planning & Zoning Administrator, Planning & Zoning Administrator or Commission for the Cities of "Participating Cities"	5							X	LOCAL FUNDING SOURCES	LOW

Objective 2: Minimize the impacts of sustained wind storms on lakeshore

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
2a: Encourage landowners to keep lakeshore in natural state **Task Leader:** Crow Wing County SWCD, MN DNR	5							X	DNR, CWSWCD	LOW
2b: Explore other methods of shoreline retention, such as the use of transition mats, grout bags, footings, and tetrapods **Task Leader:** Crow Wing County SWCD, MN DNR	5							X	. DNR, CWSWCD	MODERATE

4.1.7 INFECTIOUS DISEASE

Goal: To adequately be prepared for and minimize the damage caused by Infections Disease outbreaks within Crow Wing County.

Objective 1: Foster and support health related programs related to the mitigation or planning for infectious disease

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Encourage the continued cooperation between Crow Wing County Public Health Department and the Minnesota Department of Health **Task Leader:** Public Health Director	6							X	LOCAL FUNDING SOURCES	LOW

4.1.8 WILDFIRE

Goal: To adequately be prepared for and minimize the damage caused by wildfires throughout Crow Wing County.

Objective 1: Continue strong wildfire prevention measures

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Continue to provide public education materials related to the prevention of forest fires and wildfire **Task Leader:** MN DNR	5							X	DNR	LOW
1b: Continue to conduct controlled burns as necessary to prevent the spread of wildfires **Task Leader:** MN DNR	3							X	DNR	MODERATE
1c: Ensure the strong coordination between local fire departments and associations as well as those from outside areas to provide fire protection, which will reduce the impact of wildfires **Task Leader:** MN DNR, Emergency Management Director	6							X	LOCAL FUNDING SOURCES	LOW

Objective 2: Work to promote preventative measures to reduce risk of wildfire

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
2a: Promote positive forestry management techniques including the removal of dead, dry vegetation and trees which may ignite as a result of lightning or human related causes **Task Leader:** MN DNR, Emergency Management Director	5							X	DNR	LOW
2b: Encourage the use of landscape design that will minimize the risk of wildfire **Task Leader:** MN DNR, Planning & Zoning	5							X	DNR, LOCAL FUNDING SOURCES	LOW
2c: Continue to monitor the removal of trees and vegetation around electrical lines and if possible bury electrical lines **Task Leader:** Emergency Management Director, Electric Service Providers	6							X	DNR, LOCAL FUNDING SOURCES	MODERATE
2d: Continue to enforce burning restrictions when necessary **Task Leader: Emergency Management Director**	5							X	DNR, LOCAL FUNDING SOURCES	LOW

4.1.9 DROUGHT

Goal: To adequately be prepared for and minimize the damage caused by drought throughout the County.

Objective 1: Minimize the impacts of drought on agriculture

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Encourage the wise utilization of water resources regardless of time of year **Task Leader:** Crow Wing County SWCD	5							X	DNR, CWSWCD, MPCA	LOW
1b: **Encourage crop rotation and planting crops according to water needs** **Task Leader:** Crow Wing County SWCD	5							X	DNR, CWSWCD, MPCA	LOW
1c: Promote mulch gardens **Task Leader:** Crow Wing County SWCD	5							X	DNR, CWSWCD, MPCA	LOW

Objective 2: Minimize the stress the drought causes to farmers

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
2a: Promote area support group **Task Leader:** Public Health Director	5							X	LOCAL FUNDING SOURCES	LOW

Objective 3: Minimize the impacts of drought on livestock

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
3a: Promote shelter belts **Task Leader:** Crow Wing County SWCD	5							X	CWSWCD, DNR	LOW
3b: Recommend sprinklers to cool animals **Task Leader:** Crow Wing County SWCD	5							X	CWSWCD, DNR	MODERATE

4.1.10 INSECT INFESTATION, INVASIVE SPECIES, AND EXCESSIVE WILDLIFE POPULATION.

Goal: To adequately be prepared for, prevent, and minimize the damage caused by infestation of insects, invasive species and excessive wildlife population throughout the County.

Objective 1: Minimize the impact of insect infestation, invasive species, and excessive wildlife population on agriculture.

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a. Promote Purchase of crop insurance **Task Leader: MN DNR, Crow Wing County SWCD**	5							X	CWSWCD, DNR	

Objective 2: Prevent the spread of harmful invasive species throughout the County.

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
2a: Promote the campaign against "aquatic hitchhikers" **2b. Promote campaign to educate public on bmps concerning the spread of invasive species** **Task Leader: MN DNR, Crow Wing County SWCD**	5							X	CWSWCD, DNR	LOW

4.1.11 EARTHQUAKE

GOAL: **To adequately be prepared for and minimize the damage caused by earthquakes throughout the County.**

Objective 1: ***Minimize the physical and economic impact of earthquakes on infrastructure, structures, and on human lives.***

Strategies	PRIORIY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		

1a: Continue to support local, state and federal emergency management programs **Task Leader:** Emergency Management Director	5							X	FEMA, HMA, HSEM, NOAA,	LOW
1b: Continue to provide educational information on what to be aware of **Task Leader:** Emergency Management Director	5							X	FEMA, HMA, HSEM, NOAA,	LOW

4.1.12 DUST STORM

GOAL: **To adequately be prepared for and minimize the damage caused by dust storms throughout the County.**

Objective 1: ***Minimize the physical and economic impact of dust storms on infrastructure, structures, and on human lives***

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
A1. Promote the control of sands and gravel along traffic routes and mining sites. **Task Leader: MN DNR, Crow Wing County SWCD**	5							X	CWSWCD, DNR	LOW
A2 Promote the development of agriculture, grasses, shrubs, windbreaks, and shelterbelts. **Task Leader: MN DNR, Crow Wing County SWCD**	5							X	CWSWCD, DNR	LOW

4.2 HUMAN CAUSED/TECHNOLOGICAL HAZARD GOALS, OBJECTIVES AND STRATEGIES

Human caused and technological hazard mitigation measures presented throughout this planning process have been divided into the following groups:

- Fire
- Dam Failure
- Hazardous Material (Transport and Train)

- Hazardous Material (Fixed facilities)
- Water Pollution
- Power Failure
- Terrorism
- Communication Breakdown

4.2.1 Fire

Goal: To adequately be prepared for and minimize the damage caused by fire throughout the County.

Objective 1: To adequately be prepared for and minimize the damages and effects caused by Fire.

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Take inventory of all regional firefighting equipment needs. Ie. Emergency vehicles, firefighting suits/equipment, and communication systems. **Task Leader:** Emergency Management Director	4							X	LOCAL SOURCES OF FUNDS	LOW
2a: Encourage citizens to purchase/use smoke detectors.	5							X	FEMA, HMA, HSEM, NOAA,	LOW

4.2.2 Dam Failure

Goal: To adequately be prepared for and minimize the damages and effects caused by dam failure.

Objective 1: Eliminate or reduce as much as feasible, risks associated with the failure of dams within Crow Wing County

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Maintain contact and coordination with the Minnesota Dam Safety Official **Task Leader:** Crow Wing County SWCD	6							X	CWSWCD	LOW

4.2.3 Hazardous Material (Transport and Train)

Goal: To be prepared for and minimize the damage caused by hazardous material spills during transportation.

Objective 1: Ensure safe transportation of materials through pipelines in Crow Wing County

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Educate and encourage the use of Gopher State One Call. "Call before you dig" **Task Leader:** Emergency Management Director, County Planning & Zoning, Planning & Zoning Administrator or Commission for the "Participating Cities", Pipeline Companies	5							X	FEMA, HMA, HSEM, NOAA	LOW
1b: Ensure that proper measures to enhance pipeline integrity are being followed **Task Leader:** Emergency Management Director, Pipeline Companies	6							X	LOCAL FUNDING SOURCES	LOW
1c: **Encourage pipeline companies to maintain an**	6							X	FEMA, HMA,	LOW

unobstructed right-of-way **Task Leader:** Emergency Management Director									HSEM, NOAA,	

Objective 2: Ensure the safe transportation of hazardous materials on roadways within Crow Wing County

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
2a: **Enforce laws regarding the transporting of hazardous materials** **Task Leader:** Sheriff, City Police, State Patrol	2							X	MNDOT	MODERATE
2b: Support effort to increase funding for rural road safety programs **Task Leader:** Highway Engineer	6							X	LOCAL FUNDING SOURCES	LOW
2c: Ensure that the roadways within Crow Wing County can safely accommodate the vehicles hauling hazardous material **Task Leader:** Highway Engineer	2							X	MNDONT, LOCAL FUNDING SOURCES	HIGH

4.2.4 Hazardous Material (Fixed facilities)

Goal: To prepare for and minimize the damage caused by hazardous material spills within fixed facilities.

Objective 1: Ensure the safe operation, storage, and maintenance of facilities holding, distributing, or using hazardous material substances

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Maintain an updated list of all hazardous materials sites as required by the Minnesota Emergency Response Commission **Task Leader:** Emergency Management Director	4							X	FEMA, HMA, HSEM, NOAA,	LOW
1b: Ensure all fire, police, and medical emergency response professionals are trained and equipped to respond to hazardous material incidents **Task Leader:** Emergency Management Director	2							X	FEMA, HMA, HSEM, NOAA,	HIGH
1c: Provide public education on hazardous material incidents in the form of media releases, articles, Crow Wing County Website, etc. **Task Leader:** Emergency Management Director	5							X	FEMA, HMA, HSEM, NOAA,	LOW

4.2.5 Water Pollution

Goal: To adequately be prepared for and minimize the impact of water pollution.

Objective 1: Eliminate or reduce as much as feasible, risks associated with groundwater contamination

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: **Encourage the development of local wellhead protection plans** **Task Leader: respective local jurisdictions**	5							X	LOCAL FUNIDNG SOURCES	LOW
1b: Support and encourage existing programs	6							X	FEMA, HMA,	LOW

designed to provide support and education to landowners for individual well testing **Task Leader: Local jurisdictions**									HSEM, NOAA,	

Objective 2: Eliminate or reduce as much as feasible, risks associated with surface water contamination

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
2a: Provide support and assistance to local governments, property associations, lake associations or similar groups in the development of local surface water management plans **Task Leader:** Crow Wing County SWCD	6							X	CWSCWD, DNR	LOW
2b:.Implement the Priority Concerns & Action Steps of the 2008 Crow Wing County Comprehensive Local Water Plan **Task Leader: CW Emergency Management Director**	1							X	CWSCWD, DNR	LOW

4.2.6 Power Failure

Goal: To prepare for and minimize the impacts of a power failure.

Objective 1: Eliminate or reduce as much as feasible, the threat of a power loss in Crow Wing County

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Encourage the building of generation sources within Crow Wing County **Task Leader:** Electrical Service Providers	6							X	FEMA, HMA, HSEM, NOAA,	VERY HIGH
1b: Continue with power management programs where there is a voluntary control of electrical use by individual users **Task Leader:** Electrical Service Providers	6							X	LOCAL FUNDING SOURCES	LOW
1c: Continue education efforts focused on conservation **Task Leader:** Electrical Service Providers, Emergency Management Director	6							X	FEMA, HMA, HSEM, NOAA,	LOW

Objective 2: Eliminate or reduce as much as feasible, the impact of a power failure in Crow Wing County

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
2a: Encourage critical facilities to install back-up generators **Task Leader:** Emergency Management Director	3							X	FEMA, HMA, HSEM, NOAA,	MODERATE
2b: Educate citizens on steps to take in case of failure. **Task Leader:** Emergency Management Director, Electrical Service Providers	5							X	FEMA, HMA, HSEM, NOAA,	LOW

4.2.7 Terrorism

Goal: To prepare for and minimize the loss of life associated with terrorism.

Objective 1: Eliminate or reduce as much as feasible crime and terrorism

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		
1a: Continue to support local, state and federal anti-terrorism programs **Task Leader:** Sheriff, Emergency Management Director	6							X	FEMA, HMA, HSEM, NOAA,	MODERATE
1b: Continue to provide educational information on what to be aware of **Task Leader:** Sheriff, Emergency Management Director	5							X	FEMA, HMA, HSEM, NOAA,	LOW

4.2.8 Communication Breakdown

Goal:

Objective 1:

Strategies	PRIORITY	Timeframe							Potential Funding Resources	Cost
		2010	2011	2012	2013	2014	2015	Ongoing		

1a: Establish an 800MHz Advisory Board authorized to research and develop a plan to resolve the communication dilemma, and implement a system that will be viable for years to come **Task Leader:** Sheriff, Emergency Management Director	4							X	FEMA, HMA, HSEM, NOAA, LOCAL FUNDING SOURCES.	LOW

4.3 Maintenance Process

4.3.1 Monitoring, Evaluating and Updating the Plan

Paramount to the success of the Crow Wing County All Hazard Mitigation plan is the commitment of County officials, staff, and the entire countywide community to the implementation of the goals, objectives, and strategies set forth in section 4.0 of this plan. Changes resulting from internal and external forces, coupled with the completion of individual goals, objectives and policies may be cause for revision of this plan.

Regular Revisions (annually or every eighteen (18) months)-
In order to respond to these changes the **Crow Wing County Emergency Management Director will review this plan at least every eighteen (18) months** to ensure goals, objectives and policies are being met in accordance to the implementation schedule of the plan.

Plan Updates-
Every three to five years Crow Wing County shall update and revise this plan to ensure it remains consistent with the overall goal of mitigation of potential hazards within Crow Wing County. The Emergency Management Director will bring the Citizens Planning Team and Technical Advisory Team together as part of this review and revision process. FEMA requires the updated plan be submitted to the State and FEMA every five years for review.

See appendix M for recommended revisions for the plan update.

Implementation of Plans, Programs, and Policies

The implementation schedule of the Crow Wing County Hazard Mitigation Plan calls for the updating and revision of several Crow Wing County plans, programs, and policies. As this plan is implemented, the Crow Wing County Emergency Management Director will coordinate these revisions with the persons identified as "Task Leaders" within the implementation schedule of the plan. Plans, programs, and policies to be updated include:

Plans to be revised as necessary:

- Crow Wing County Comprehensive Plan
- Crow Wing County Comprehensive Water Plan
- Crow Wing County Emergency Operations Plan

Programs to be revised as necessary:

- Crow Wing County Emergency Management Programs
- Crow Wing County National Flood Insurance Program (NFIP) Participation
- Crow Wing County Public Health Programs
- Crow Wing County Sheriff Department Programs

Policies to be revised as necessary:

- Crow Wing County Ordinance

4.3.2 Incorporation into Existing planning mechanisms

The following organizations will be given electronic copies of the Crow Wing County Hazard Mitigation Plan, that will enable them to incorporate the mitigation strategies outlined in this document into their existing plans and policies:

- Crow Wing County Public Health
- Crow Wing County Sheriff Department
- State Health Improvement Plan(SHIP)
- Brainerd School District
- Pequot Lakes School District
- Crosby Ironton School District
- Central Lakes College
- Minnesota Pollution Control Agency
- All Municipalities throughout the County
- All Major hospitals throughout the County
- The Brainerd Public Library
- The Cross Lake Public Library

4.3.3 Continued public involvement

Public hearings and open houses will be announced and held throughout the updating process on an ongoing basis.

Ongoing Public Participation

In order to ensure public involvement in future revisions to this plan, Crow Wing County shall follow a similar procedure, including the memberships of public members on any future Hazard Mitigation Planning Teams and Subcommittees and the regular publishing and updating of information related to the hazard mitigation plan revision process. Mechanisms that are to be used to ensure ongoing public participation include the following:

- General public membership on future hazard mitigation planning teams and subcommittees
- Posting of the Crow Wing County Hazard Mitigation Plan on the Crow Wing County Website
- Published notices of all public hazard mitigation related meetings
- Maintain copies of the Crow Wing County Hazard Mitigation Plan at all libraries and similar public information outlets within Crow Wing County

Plan Responsibilities

The Crow Wing County Emergency Management Director is responsible for all monitoring, maintenance, coordination, implementation and retention of the Crow Wing County Hazard Mitigation Plan with the ongoing support of the Crow Wing County Board of Commissioners and Crow Wing County Departments. Please direct all inquiries related to this plan or Crow Wing County Emergency Management to:

John Bowen
Emergency Management Director
Law Enforcement Center
304 Laurel Street
Brainerd, MN 56401

Via Telephone: **(218) 824-1044**

Via e-mail: **john.bowen@co.Crow Wing.mn.us**

The Crow Wing County Hazard Mitigation Plan, on file with the Emergency Management Director, is available as a reference for others researching the same information for future updates of their plans. A copy of the plan is also the office of each of the following Crow Wing County Departments:

- Planning & Zoning
- Highway
- Public Health
- MIS
- Sheriff

4.4 POTENTIAL FUNDING SOURCES

Implementation of the mitigation strategies is often dependent on funding assistance from Federal and State sources.

FEMA provides funding for structural projects through hazard mitigation grant programs, such as the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Assistance Program, and the Flood Mitigation Assistance Program.

Strategies that qualify for FEMA assistance include structural improvements to dams, bridges, culvert replacement, as well as emergency generators and warning sirens. Financial support for other mitigation strategies proposed in this plan may be sought through alternative funding sources. Projects may be implemented with the assistance of non-profit organizations, or funds secured from Community Foundations. There are many State and Federal programs, in addition to private funding sources, that are available. A summary table of sources is provided as Appendix I.

Many communities believe they are unable to take steps in preventing damage from hazards due to lack of funding. Appendix I is intended to provide some examples of funding options. This list is not comprehensive and should be added to when new funding programs are created and recognized.

4.5 CITY PARTICIPATION IN MITIGATION STRATEGIES

Cities throughout Crow Wing County were provided a number of opportunities to identify their willingness to participate in the implementation of the tasks presented within Section 4.0 of this plan. Any city may, at any time, participate in the implementation of any of the tasks identified by this plan. To be included within this plan a city must first contact the Crow Wing County Emergency Management Director. Questionnaires were sent to each of the eighteen cities in the County, the responses from the cities have been compiled in Appendix G.

Below is a list of the participating cities within Crow Wing County (All 18 Cities are participating) :

Baxter	Fifty Lakes
Brainerd	Fort Ripley
Breezy Point	Garrison
Crosby	Ironton
Crosslake	Jenkins
Cuyuna	Nisswa Jenkins
Deerwood	Manhattan Beach
Emily	Pequot Lakes
Trommald	Riverton

The following table shows the tasks and/or strategies that each participating community has committed to implementing:

Section/Task Number	Participating Cities
4.1.1 Severe Summer Storms (p. 50)	
1a Provide posters, brochures; media materials	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1b Provide info for making structures safer	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1c Enhance building codes	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1d Designate shelters	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1e Est. Storm shelters in rec. areas	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1f Req. storm shelters in mobile home prk	Baxter, Brainerd, Breezy Point, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1g Encourage NOAA weather radio use	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach,
1h Promote NOAA weather radio with rebates	Baxter, Brainerd, Breezy Point, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1i Upgrade and improve Emergency Warnings	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach,
1j Install New/Upgraded siren systems	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1k Encourage to participate in state programs	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1l Educate on what causes storm damage	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1m Recommend building materials	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.

1n Recommend windbreaks	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1o Educate on dangers of wind	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1p Provide info on reinforcement against wind	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
2a Identify repeating road washout areas	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach,
2b Improve repeating road washout areas	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
2c Replace inadequate bridges and culverts	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
4.1.2 Tornado (p. 58)	
1a Continue to provide posters/Brochures	Baxter ,Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1b Distribute Educational material	Baxter ,Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Nisswa, Pequot Lakes, Riverton, Trommald.
1c Provide info on making structures safe	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1d Require storm shelters for mobile home parks	Baxter, Brainerd, Breezy Point, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1e Encourage NOAA weather radio use	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1f Cont. improve Emer. Warning system	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1g All warning systems radio activated	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1h Est. Neighborhood calling tree	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach,

	Pequot Lakes, Riverton, Trommald.Nisswa
4.1.3 Flooding (p. 62)	
1a Restrict Buildings in Floodplain areas	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1b Encourage development of parks and open space along floodplain and areas that tend to flood	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1c Update Emergency Op. plan annually	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1d Encourage early participation in NFIP	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1e Develop a schedule to patrol streams	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1f Maintain sandbags and flood fighting equipment	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1g Review D-Firm Maps	All 18 Cities
1h Review current NFIP model ordinance	All 18 Cities
1i Determine if a new NFIP ordinance needs to be adopted.	All Cities
2a Provide public Edu. On flash floods	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2b Enc municipalities to require new storm sewer infrastructure	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
2c Edu Land owners on landscape method	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa
3a Identify road washout areas	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
3b Improve identified road washout areas	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Ironton, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
3c Keep culverts free from debris	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
3d Replace inadequate bridges and culverts	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort

	Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
4.1.4 Winter Storms (p. 65)	
1a Encourage furnace inspections	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1b Encourage reviewing winter driving	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1c Continue to promote blankets traveling	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1d Encourage Elderly to keep xtra meds	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1e Establish “Good Neighbor” programs	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2a Provide building mat info	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2b Encourage planning trees/vegetation	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2c Promote inspection/tree trimming	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2d Promote use of snow fencing	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
3a Ensure power infrastructure is in place	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
3b Provide info on septic protection	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
4a Encourage nat veg or snow fencing	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
4b Cont snow removal/saltin/ etc	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.

4c Promote snow fencing/living snow fenc	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
Section/Task Number	**Participating Cities**
4.1.5 Extreme Temperatures (p. 69)	
1a Publish extreme heat info	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1b Sponsor “help your Neighbors”	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2a Publish extreme cold info	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2b Sponsor “help your Neighbors”	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
4.1.6 Wind Storms (sustained) (p. 72)	
1a Recommend building materials	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
1b Encourage prop owners to trim trees	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1c Encourage prop owners to re dead trees	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2a Encourage natural state of lakeshores	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
2b Explore shoreline retention methods	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
4.1.7 Infectious Disease (p. 79)	
1a Encourage cooperation CWPH MDH	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
4.1.8 Wildfire (p. 76)	
1a Cont to provide pub edu forest fire prev	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Pequot Lakes, Riverton, Trommald.

1b Cont conduct controlled burns	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
1c Ensure coordination between fire agenc	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
2a Promote positive forest bmp	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2b Encourage landscape desing	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa
2c Cont to monitor re of trees/vegetation	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa
2d Cont to enforce burning restrictions	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
4.1.9 Drought (p. 78)	
1a Encourage wise utilization of water	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald
1b Encourage crop rotation & planting	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald
1c Promote mulch gardens	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2a Promote area support groups	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald
3a Promote shelter belts	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald
3b Recommend Sprinklers to cool animals	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald
4.2.1 Fire (p. 76)	
1a Inventory of regional firefighting equip needs	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1b Encourage citizens to use smoke detec	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa,

	Pequot Lakes, Riverton, Trommald.
4.2.2 Dam Failure (pg129)	
1a Contact with MN Dam Safety Official	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach Riverton, Trommald.
4.2.3 Hazardous Material (Transport & Train) (p. 129)	
1a Edu encourage gopher st 1 calling	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
1b Ensure proper pipeline measurements	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
1c Encourage pipeline co to maintain	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
2a Encorce haz mat transport laws	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2b Support rural road safety funding	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2c Ensure cw co roadways sfty trnsp hzmt	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
Section/Task Number	**Participating Cities**
4.2.4 Hazardous Material (Fixed facilities) (p. 130)	
1a maint list of haz mat sites	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1b Trained for response to haz material incidents	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1c pub edu on haz mat incidents	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
4.2.5 Water Pollution (p. 131)	
1a Encourage wellhead protect plans	Baxter, Brainerd, Breezy Point, Cosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
1b Support existing well programs	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort

	Ripley, Garrison, Manhattan Beach, Nisswa, Riverton, Trommald.
2a Provide assist to lug prop asoc surf wat	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2b Implement CW co Comp plan	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
4.2.6 Power Failure (p. 132)	
1a Encourage building of generation sources	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Pequot Lakes, Riverton, Trommald.
1b Cont power management program	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1c Cont conservation edu efforts	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2a Encourage critical facility generators	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
2b Edu citizens on power failure steps	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
4.2.7 Terrorism (p. 133)	
1a cont support anti terror efforts	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
1b Cont to provide edu info	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.
4.2.8 Communication Breakdown (p. 133)	
1a Est an 800 MHz Advisory board	Baxter, Brainerd, Breezy Point, Crosby, Cuyuna, Deerwood, Emily, Fifty Lakes, Fort Ripley, Garrison, Manhattan Beach, Nisswa, Pequot Lakes, Riverton, Trommald.

4.6 Ongoing Benchmark Table

In future updates of this plan an ongoing table will be developed that will document and describing the completed strategies/tasks. This table will identify which strategies from section 4.0 of this plan have been completed, by which communities, and provide and document when the action was completed.

Also, this ongoing table will list any strategies that have been abandoned or deferred by any communities and provide reasons why.

This ongoing table will act as a benchmark for progress.

Below is a template example of what the table will look like:

Strategy	**Date Completed**	**Date Abandoned**	**Deferred to :**	**Community**	**Description**	
Example: Strategy 101	07/13/2010	Or 07/13/2010	Or 07/13201/5	Brainerd	Describe how strategy was accomplished, why it was abandoned or why it was deferred.	