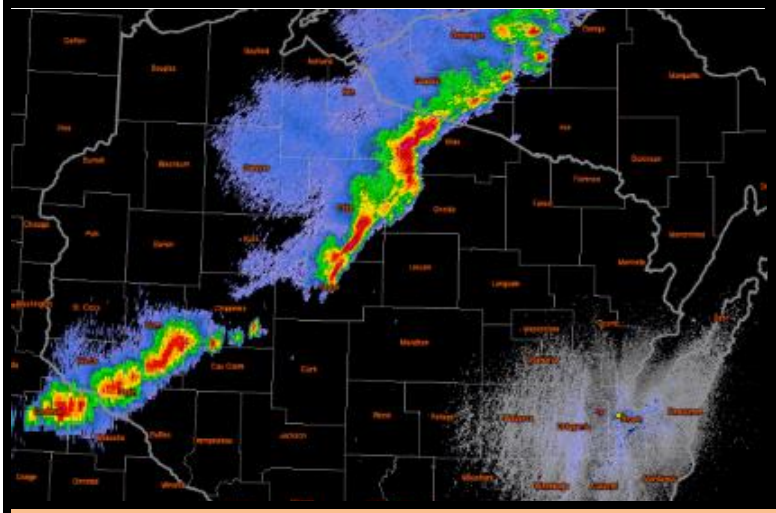

VILAS COUNTY
ALL HAZARDS MITIGATION PLAN
UPDATE – DRAFT 2024

Prepared with the assistance of the North Central Wisconsin Regional Planning Commission

VILAS COUNTY ALL HAZARDS MITIGATION PLAN UPDATE

prepared for:

Vilas County Emergency Management

by:

North Central Wisconsin Regional Planning Commission

adopted by Vilas County Board on:

DATE

This update was prepared at the request and under the supervision of the Vilas County Law Enforcement & Emergency Management Committee and its Emergency Management Director by the North Central Wisconsin Regional Planning Commission (NCWRPC). For more information, contact:

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INTRODUCTION

Part I of the Vilas County All Hazards Mitigation Plan (AHMP) describes and documents the process used to update the plan. This includes how it was prepared and who (committee, organizations, departments, staff, consultants, etc.) was involved in the process. It also describes the local government involvement, the time period in which the update was prepared, and who to contact to answer questions and make recommendations for future amendments to the plan.

LEGISLATIVE REQUIREMENT FOR MITIGATION PLANNING

The development of the Vilas County All Hazards Mitigation Plan Update is a response to federal regulations requiring the update of a local hazard mitigation plan every five years. The Disaster Mitigation Act of 2000 (DMA2K) amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), creating the framework for state, local (counties and incorporated municipalities), tribal and U.S. territorial governments to engage in hazard mitigation planning to receive certain types of non-emergency disaster assistance. Requirements and procedures to implement hazard mitigation planning provisions may be found in the Code of Federal Regulations, Stafford Act Title 44, Chapter 1, Part 201 (44 CFR Part 201).

Since the DMA2K, additional laws have been passed that help to shape hazard mitigation policy. These are codified in amendments to the Sandy Recovery Improvement Act (SRIA) of 2013, the National Flood Insurance Act of 1968, and the Water Infrastructure Improvements for the Nation (WIIN) Act of 2016.

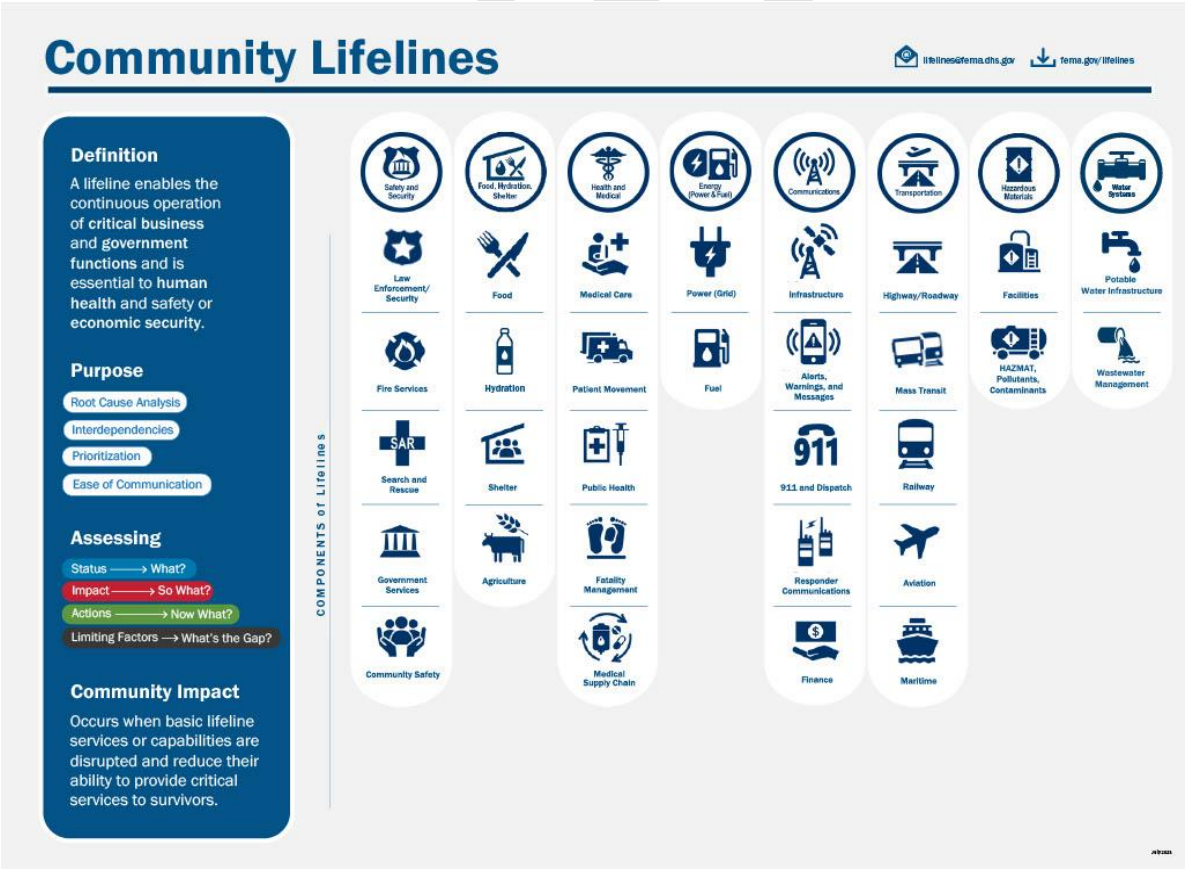
The following grant programs have hazard mitigation plan adoption requirements: Hazard Mitigation Grant Program (HMGP), Public Assistance Grant Program (PA), Building Resilient Infrastructure and Communities (BRIC), Flood Mitigation Assistance (FMA), Fire Management Assistance Grant Program (FMAG), and Rehabilitation of High Hazard Potential Dams Grant Program (HHPD).

Local hazard mitigation plans form the foundation of a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction and repetitive damage. The Federal Emergency Management Agency (FEMA) supports local mitigation planning to foster partnerships among all levels of government, to develop and strengthen non-governmental and private partnerships, to reduce the costs associated with disaster response and recovery by promoting mitigation activities, and to promote more disaster-resilient and sustainable communities.

Community resilience is the ability of a community to prepare for anticipated hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions. Activities such as disaster preparedness (which includes prevention, protection, mitigation, response and recovery) and reducing community stressors (the underlying social, economic and environmental conditions that can weaken a community) are key steps to resilience.

"Community lifelines" (see Figure 1) are the infrastructure of resilience that enable the continuous operation of critical government and business functions and is essential to human health and safety or economic security. FEMA developed the community lifelines concept as a disaster response tool, to highlight the priority areas of focus for initial incident stabilization. However, lifelines exist steady-state, and enable all other aspects of society. As such, FEMA now incorporates community lifelines into all of its planning and reporting requirements, including mitigation. Mitigation planning helps to understand risk to and vulnerability of lifelines, to prioritize mitigation investments, and to reduce the likelihood that lifelines will fail as a result of an incident.

FIGURE 1 - FEMA "Community Lifelines"



Source: FEMA

The Stafford Act lays out requirements for local mitigation plans which are further clarified by FEMA policy guidance.

THE FIVE PARTS OF AN ALL HAZARDS MITIGATION PLAN UPDATE

The Vilas County All Hazards Mitigation Plan Update was categorized into five parts in order to address FEMA's local mitigation plan requirements. The five parts are as followed:

- Part I: Update Process
- Part II: Planning Area
- Part III: Risk Assessment
- Part IV: Mitigation Strategy
- Part V: Plan Maintenance Process and Adoption

DEVELOPMENT OF THE ALL HAZARDS MITIGATION PLAN UPDATE

The Vilas County Emergency Management Department received a Planning Grant in September 2022 to develop an update to its All Hazards Mitigation Plan through the Hazard Mitigation Grant Program (HMGP).

The North Central Wisconsin Regional Planning Commission (NCWRPC) finalized a work agreement with Vilas County and began preparation of the All Hazards Mitigation Plan Update at the request of the County Emergency Management Director in early 2023.

The update planning process included regular Task Force committee meetings as well as extensive involvement from the local units of government within Vilas County and the counties surrounding Vilas. A variety of local and regional agencies were involved in the development of the plan at various stages, and extensive opportunity for public participation was provided, including public informational meetings.

The remainder of this chapter expands on and provides more detail on key aspects of the plan update process.

KEY ELEMENTS OF THE UPDATE TO THE PREVIOUS, 2019, PLAN

The major enhancements to the Vilas County All Hazards Mitigation Plan developed through this Update are as follows:

- ✓ Review of Recommended Revisions - The final Crosswalk for the previous plan approval passed the plan with no recommended revisions.

- ✓ Review and update of planning area chapter - The planning area description and inventory was expanded and improved with additional information and updated statistics.

- ✓ Expanded Hazard Coverage - New hazards addressed in the Update include Electromagnetic Pulse (EMP).

- ✓ Review and update of risk assessment - The risk assessment was updated with documentation on recent hazard events. The priority level of hazards facing the County was also reviewed and updated.

- ✓ Climate Change - A new section directly addressing the impact of climate change is incorporated into the Risk Assessment. The previous plan made only indirect references.

- ✓ High Hazard Dams - High hazard potential dams were specifically addressed in the risk assessment as well as other areas of the Plan Update.

- ✓ Review and update of Mitigation Strategy - The mitigation strategies chapter begins with a complete progress report on the strategies from the 2019 plan, establishment of new set of strategies for next five-year cycle and an updated prioritization of projects.

- ✓ The concept of Community Lifelines is introduced into the Plan, see Chapter 1.

- ✓ Concept of Community Resilience is introduced into the Plan, see Chapter 5.

- ✓ New FEMA plan requirements were addressed, including underserved/vulnerable populations, impacts of climate change on future conditions, effects of climate change and development trends, participating community assessment, and expanded NFIP requirements.

ALL HAZARDS MITIGATION PLAN UPDATE TASKFORCE

The Vilas County All Hazard Mitigation Plan Update was prepared under the guidance of an advisory taskforce that consisted of members of the County's Local Emergency Planning Committee or LEPC, as a cross section of government, agency, and interest group representatives from across the County. Periodic meetings were held with the NCWRPC staff, the County Emergency Management Staff, and the Task Force to provide input on the types of hazards to be considered, appropriate mitigation strategies, and to review draft reports. Task Force members and their representation are as follows:

- Jerry Burkett, Chair
- Pat Weber, Vice Chair
- Lori Scarcelli, Sheriff's Office
- Tammi Boers, Health Officer
- Michael Anderson, Eagle River Fire Chief
- Michael Dassler, Aspirus Hospital
- Tim Price, Department of Natural Resources
- Sherri Congleton, Emergency Management Director
- Kristen Hansen, Lac Du Flambeau Tribe
- Thomas Numrich, Highway Department
- Jay Wittman, Interstate Batteries

LOCAL GOVERNMENT INVOLVEMENT

There were a number of opportunities for the local units of government to become involved in the planning process.

In July of 2023 a hazard mitigation issues survey was sent to each town chairperson and clerk requesting which hazards are a concern, input on past and future mitigation measures, and to document other information that could be incorporated into the All Hazards Mitigation Plan Update. Responses were received from 7 of 14 towns. A significant amount of information was gleaned from these questionnaires and incorporated into the update document.

The City of Eagle River was formally introduced to the update process at a separate meeting on November 8, 2023. The participants at this meeting provided information on hazards that have significance to the area, discussed critical facilities and provided mitigation strategy ideas for the plan update.

Discussion from this meeting indicated that the City is most concerned about high wind or ice resulting in power outage during the winter or times of excessive heat. Of particular concern to City officials is the potential need for sheltering residents that are of lower income during an extended power outage with appropriate warming or cooling.

NEIGHBORING COMMUNITY INVOLVEMENT

One of the requirements of the update process was to include neighboring communities. In previous plans, the NCWRPC experienced low attendance in response to invitations to county emergency management staff from surrounding counties. As a result, NCWRPC staff corresponded via email during the update process with the group of EM staff from Oneida, Forest, Iron, Price, and Gogebic (MI) counties. Ideas were exchanged about All

Hazards Mitigation Plan processes and strategies between the various counties.

LOCAL AND REGIONAL AGENCY INVOLVEMENT

Another requirement of the update process was to involve local and regional agencies that have a role in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and non-profit interests. To meet this objective, the NCWRPC invited a diverse group of stakeholders to discuss potential hazard mitigation strategies.

The meeting was held on November 8, 2023, at the Vilas County Courthouse. Agencies and organizations invited included the following:

- Tammi Boers-Director of Public Health
- Rachael Cornelius-Community Health Educator
- David Sadenwasser-Zoning Administrator
- Robert Hom-Eagle River Union Airport Manager
- Michael Anderson-Eagle River Area Fire Department Chief
- Mariquita Sheehan-Conservation Specialist
- Sherri Congleton-Emergency Management Director

Discussions with those in attendance revolved around the issue with gaps in the current weather radar system. Robert Hom River Union Airport Manager will look at options to add a radar site in the City of Eagle River. Having local radar would provide a more accurate and timely severe weather notification to Vilas County. The Airport Manger also wants to let agencies at the meeting know that the Airport has a large hanger that can be used as a shelter in an emergency. There was also a discussion about the new LiDAR that was acquired in the Spring of 2022, that could help with updating the floodplain mapping accuracy.

UNDERSERVED COMMUNITIES AND VULNERABLE POPULATIONS

FEMA has placed an emphasis on underserved communities and socially vulnerable populations. These concepts present an opportunity to expand local hazard mitigation plans to help increase the community benefits of hazard mitigation.

The term “underserved communities”’ refers to populations sharing a particular characteristic or geography that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life. Social vulnerability is the potential for loss for an individual or social group, recognizing that some characteristics influence an

individual's or group's ability to prepare for, respond to, cope with, or recover from an event.

Within Vilas County, the City of Eagle River, and the Lac Du Flambeau Band of Lake Superior Chippewa tribe there are a number of population groups that are often identified as underserved or vulnerable. These include school aged children, disabled persons, the elderly, minorities, persons with limited English proficiency, and low-income individuals or families. Geographic analysis of these populations was conducted by NCWRPC Staff, see Appendix C, to assist with the analysis and discussion of underserved and/or socially vulnerable populations within Vilas County. Specifically, the Lac Du Flambeau Band of Lake Superior Chippewa tribe, located in the southwest part of Vilas County, was highlighted as being a vulnerable and underserved community. The tribe maintains its own all hazards mitigation plan and Vilas County emergency management coordinates with tribal officials.

Outreach and involvement to address underserved and underserved populations included identifying and contacting agencies and organizations that advocate or serve those individuals. Due to the small, rural nature of the area, the number of resources is limited. The following were invited to participate in the mitigation process:

Tammi Boers – Director of Public Health
Rachael Corneilus- County Health Educator

PUBLIC REVIEW PROCESS AND PLAN UPDATE ADOPTION

Opportunities for public comment were provided to review the Plan Update during the drafting stage and prior to Plan approval. See APPENDIX A for copies of public meeting notices. A copy of draft Plan elements was made available on the Internet during the planning process. Links that open an email submission form to the County Emergency Management Director or NCWRPC Staff were provided for questions or comments. The final Plan document will remain on the Internet until the next draft update is posted for review. The public can continue to submit questions or comments at any time via the email link. (See Contact Information, below, for web addresses.)

County Law Enforcement & Emergency Management Committee meetings are always open to the public (unless entering into legal closed session), and the public can bring questions or comments regarding this Plan Update to any regular meeting. Meeting schedules can be obtained by checking the County website, contacting the County Clerk's Office or the Emergency Management Director (see Contact Information, below).

A public informational meeting on the draft update was held at the Vilas County Courthouse on November 8, 2023. Notice was published in the local newspaper. Unfortunately, no members of the public chose to attend this meeting. In addition, no comments were received via U.S. Mail or email as a result of this meeting.

[Placeholder Text: The final adoption process will be summarized here upon its completion. Following WEM and FEMA signoff on the draft report, this process will include final committee review and approval with public hearing and draft resolution; county board meeting for adoption of Plan Update by resolution; and printing and distribution of final document.]

Eagle River was asked to adopt the Plan for its jurisdiction at their own properly posted and open public meeting, see APPENDIX B for the local units' resolutions of adoption.

INCORPORATED PLANS, STUDIES, REPORTS AND TECHNICAL DATA

Many plans, reports, and technical data sources were referenced and incorporated into the Vilas County All Hazards Mitigation Plan Update. These sources include but are not necessarily limited to the following:

Wisconsin Department of Natural Resources, North Central Wisconsin Regional Planning Commission and Vilas County geographic information system databases provided much of the base data for the mapping and analysis within the Plan Update. Statistical reports and data from the US Census and Wisconsin Departments of Administration, Revenue and Workforce Development were used for the demographic background in Part 2 of this Plan Update. Land use data in Part 2 was obtained from the Vilas County Comprehensive Plan.

Wisconsin Department of Natural Resources Wetlands Inventory and Dams Database were used to identify and map wetlands and dams within the County for Maps and Tables in Parts 2 and 3 of this Plan. The WisDNR Dams Database also provided information on high hazard dams within the County. NFIP DFIRM flood zone maps for Vilas County provided the mapping of 100-year floodplain areas in Part 2 and for the flooding risk assessment in Part 3. The FEMA Flood Insurance Study for Vilas County provided background information on flooding conditions within the County. The FEMA Community Status Book was also referenced.

NOAA National Climatic Data Center severe weather event data was used extensively for the risk assessment in Part 3. The wildfire section of the risk assessment was based on the Wisconsin Department of Natural Resources' fire occurrence database and statewide Communities At Risk (CAR) assessment.

Other plans, reports, and documents were reviewed by staff during the planning process including but not limited to the State of Wisconsin Hazard Mitigation Plan, the Hazard Analysis for the State of Wisconsin, the Wisconsin Repetitive Loss Report, the Vilas County Zoning Ordinance, the Vilas County Land and Water Resource Management Plan, the Vilas County Vilas County Emergency Operations Plan, and the City of Eagle River Comprehensive Plan. Although these may not have been directly incorporated, the review provided valuable insight and direction to the planning process.

CONTACT INFORMATION

Questions or comments related to this Plan Update can be directed to the County Emergency Management Director at any time. For more information contact:

Sherri Congleton, Director
Vilas County Emergency Management
330 Court Street
Eagle River, WI 54521

715-479-3690

shcong@vilascountywi.gov

Go to:

https://www.vilascountywi.gov/departments/public_safety/emergency_management.php
https://www.ncwrpc.org/vilas-county-all-hazards-mitigation-plan-2024/
https://wem.wi.gov/state-planning/
https://www.fema.gov/hazard-mitigation-planning

INTRODUCTION

Part II of the Vilas County All-Hazards Mitigation Plan provides general geographical information on Vilas County including demographic and economic characteristics. The general development patterns of the County are described in terms of current land use and future development trends.

In addition to developing an understanding of the planning area, this chapter represents the beginning stages of assessing vulnerability by inventorying the numbers, types and values of existing buildings, infrastructure, and critical facilities within each participating jurisdiction in the planning area. This overall summary of each jurisdiction's vulnerability to hazards describes the potential impact on the community.

Land use and development trends are analyzed to project the number and type of potential future buildings, infrastructure, and critical facilities within each jurisdiction so that mitigation options can be considered in future land use decisions.

The resulting information is an important element of the planning process since sound alternative mitigation strategies cannot be formulated and evaluated without an in-depth knowledge of the relevant conditions in the study area.

GENERAL GEOGRAPHY

LOCATION

Vilas County is located in north central Wisconsin (See Map 1) and is bounded by Iron and Price Counties on the west, Oneida County on the south, Forest County on the east and the Upper Peninsula of Michigan on the North. Vilas County lies 292 miles north of Milwaukee; 149 miles northeast of Green Bay; 86 miles north of Wausau and 224 miles north of Madison. Major metropolitan areas outside of Wisconsin with transportation linkages to Vilas County are Chicago, 364 miles southeast; Minneapolis-St. Paul, 266 miles southwest; and Duluth, 184 miles northwest.

The largest incorporated area is the City of Eagle River in the southeast corner. There are also a number of unincorporated "hamlets" within the County including: Arbor Vitae, Boulder Junction, Conover, Lac Du Flambeau, Land O' Lakes, Manitowish Waters, Phelps, Presque Isle, Sayner, Star Lake, St Germain, and Winchester which are distinguishable by their downtown-like business districts. The County is also home to the majority of the Tribal lands of the Lac du Flambeau Band of Lake Superior Chippewa Indians

CIVIL DIVISIONS

There are 15 municipalities (14 towns and 1 city) and one Tribal Nation in the Vilas County planning area. The City of Eagle River is the County Seat. These units of government provide the basic structure of the decision-making framework. The County has a total surface area of 1,018 square miles, of which about 14.9 % is water. The area and proportion of the County within each civil division is presented in Table 1. Lac Du Flambeau Tribal lands cover approximately 172 square miles between Vilas, Oneida, and Iron Counties.

Table 1: Geographical Size by Civil Division

Area in square miles

Municipality	Water area	Land area	Total area	Area as % of County
Arbor Vitae town	8.69	62.57	71.26	7.0%
Boulder Junction town	18.47	81.92	100.39	9.9%
Cloverland town	3.80	31.38	35.19	3.6%
Conover town	7.21	79.97	87.18	8.6%
Lac du Flambeau town	27.40	100.30	127.71	12.5%
Land O'Lakes town	12.23	83.08	95.31	9.4%
Lincoln town	4.60	32.56	37.16	3.7%
Manitowish Waters town	6.08	30.35	36.43	3.6%
Phelps town	13.96	94.86	108.82	10.7%
Plum Lake town	11.13	88.93	100.03	9.8%
Presque Isle town	12.73	61.71	74.44	7.3%
St. Germain town	6.04	34.00	40.04	3.9%
Washington town	6.15	41.40	47.55	4.7%
Winchester town	5.47	48.13	53.60	5.3%
Eagle River city	0.18	2.55	2.73	0.03%
Vilas County	144.14	873.71	1,017.84	100%

Source: U.S. Census and NCWRPC

TOPOGRAPHY

Vilas County is in the Northern Highlands area of Wisconsin. This area has some of the highest elevations in the state, ranging from about 1,560 feet above sea level along Squaw Creek in the southwest corner of the County to 1,845 feet at Muskellunge Hill. Relief is low.

The County has a diverse landscape ranging from broad, nearly level glacial outwash plains to rough, broken glacial moraines and areas of

pitted outwash. The County has three major areas with distinct physical characteristics. An area of drumlins and ground moraines is in the eastern part of the County. Its topography is characterized by low, smoothly rounded, elongated, and oval ridges that are nearly level to moderately steep and area interspersed with long, narrow drainageways.

The Winger Moraine, a major end moraine that is predominantly undulating to steep, extends across the northwestern part of the County. This end moraine is rough and broken. It is characterized by short, steep slopes and ridges and by numerous wet depressions, most of which have no outlets.

Outside of the moraine areas lies an outwash plain. Much of the outwash is pitted, resulting in a rolling or hilly topography with many enclosed basins and depressions. Large sand flats are in scattered areas on this outwash plain. The communities of Eagle River, Manitowish Waters, Conover, St. Germain, and Boulder Junction are on these flats. The sand flats north of Conover, the ones south of Eagle River and the ones between Manitowish Waters and Lac du Flambeau are characterized by low relief. In some areas, these flats are pitted with depressions. Several small end moraines and drumlins also are in scattered areas on the outwash plain.

CLIMATE

Winters in Vilas County are very cold. Summers are short and fairly warm. A short freeze-free period in summer limits cropping to forage and small grain crops and to adapted vegetables. Precipitation is fairly well distributed throughout the year. It is the highest in summer. Snow covers the ground during much of the period from late fall through early spring.

In winter, the average temperature is 13 degrees, and the average daily minimum temp is 3 degrees. In summer, the average temp is 64 degrees, and the average daily high is 75 degrees. Total annual precipitation is about 34 inches, of which about 25 inches, or more than 70%, usually falls in April through September. Thunderstorms occur on about 34 days each year. The average seasonal snowfall is about 85 inches. On the average, 87 days of the year have at least 1 inch of snow on the ground, but the number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60%. Humidity is higher at night, and the average at dawn is about 80%. The sun shines 60% of the time possible in summer and 80% in winter. The prevailing wind is from the west-northwest. Average wind speed is highest in spring at 13 miles per hour.

Vilas County, Wisconsin — Planning Context — Map 1

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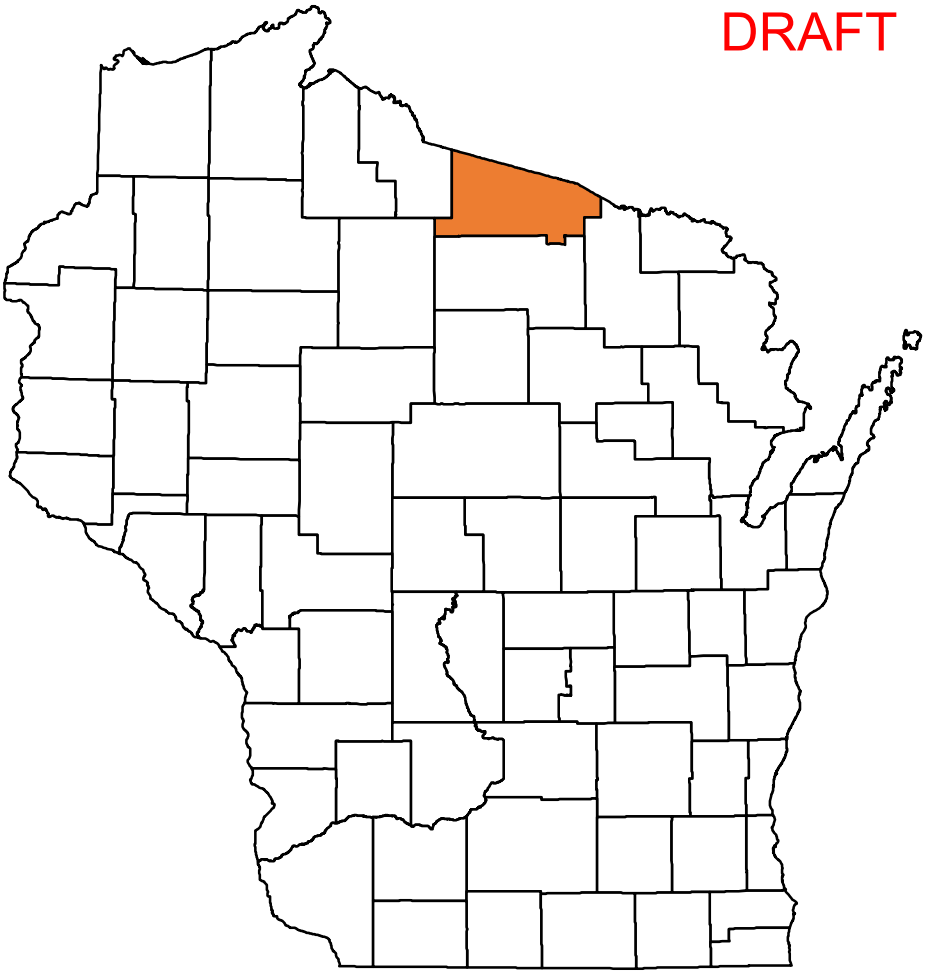

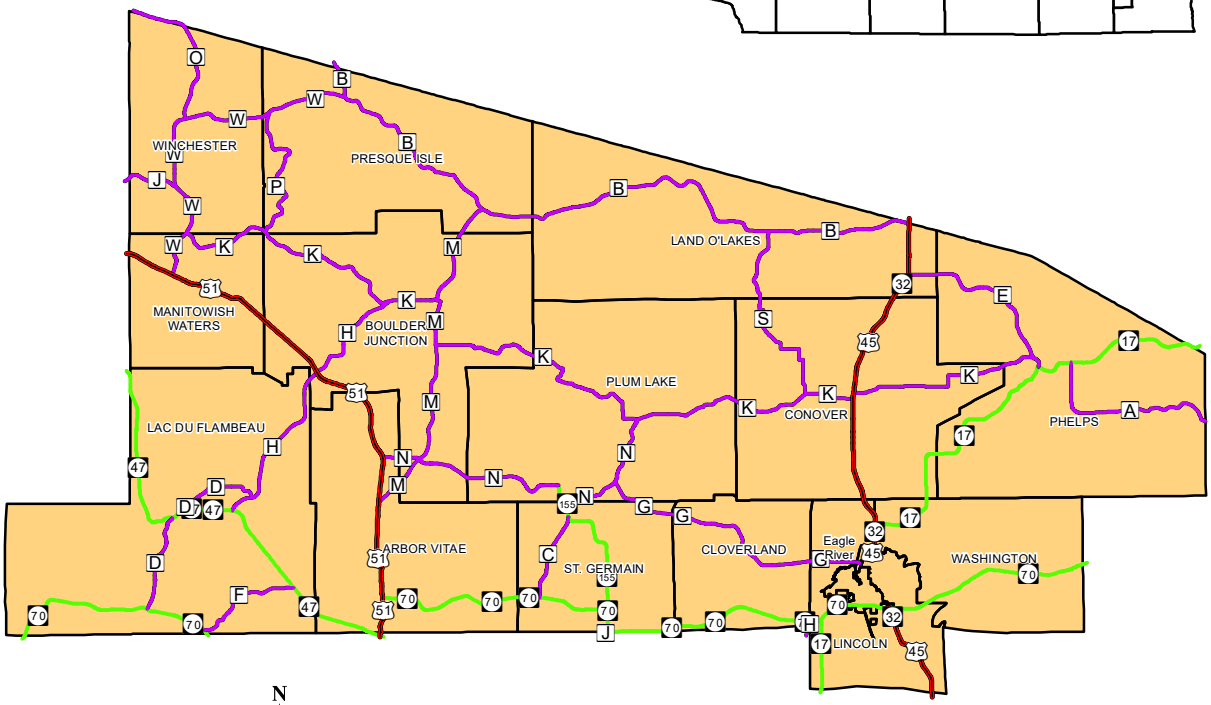

Source: WIDNR, NCWRPC

This map is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information and sata used for reference purposes only. NCWRPC is not responsible for any inaccuracies herein contained.

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DEMOGRAPHIC AND ECONOMIC PROFILE

POPULATION AND HOUSEHOLDS

According to the Wisconsin Department of Administration (WDOA), Vilas County had an estimated population of 23,047 for 2020. This represents a greater than 6% increase over the 2017 Census reported population of 21,607 people. Vilas has outpaced all of its neighbors and the overall state average (refer to Table 2). If the growth rate continues at the current level, there will be approximately 25.582 people in Vilas County in 2025, and 28,117 people in 2030.

Table 2: Population of Adjacent WI Counties

County	2017	2020	# Change	% Change
Vilas	21,607	23,047	1,440	6.6%
Forest	9,256	9,179	-77	-0.8%
Iron	5,927	5,698	-229	-3.8%
Oneida	36,225	37,845	1,620	4.4%
Price	14,028	14,054	26	0.18%
Wisconsin	5,783,278	5,893,718	110,440	1.9%

Source: U.S. Census, WisDOA and NCWRPC

Between 2010 and 2020, most of the communities within Vilas County have experienced a slight to significant increase in their population base with the exception of the Town of St. Germain, as shown in Table 3. The highest level of growth occurred in the Town of Winchester with a 37.8 percent increase between 2010 and 2020. The Town of Presque Isle was second with a 30.2 percent increase. Also notable was the City of Eagle River with a 16.4 percent increase. Most of the population change was above 5 percent in the municipalities and county since 2010.

Population concentrations and trends are important when prioritizing hazard mitigation strategies. Eagle River is the most densely populated and developed area in the County. Other areas of population concentrations include the Towns of Lincoln, St. Germain and Arbor Vitae. Map 2 shows areas of residential population concentrations in the County. Overall population density of the County is 23 persons-per-square-mile and ranges from a high of 596 in the City of Eagle River to a low of 5.5 in the Town of Plum Lake.

Table 3: Population and Households of Minor Civil Divisions						
Minor Civil Division	**2010 Pop.**	**2010 Households**	**2020 Pop.**	**2020 Households**	**% '10-'20 Pop.**	**'10-'20 % Households**
Arbor Vitae Town	3,316	1,501	3,403	1,576	2.62%	5.0%
Boulder Junction Town	933	441	1,057	514	13.29%	16.55%
Cloverland Town	1,029	470	1,068	498	3.79%	5.96%
Conover Town	1,235	574	1,318	605	6.72%	5.40%
Lac du Flambeau Town	3,441	1,269	3,552	1,684	3.23%	32.70%
Land O'Lakes Town	861	433	944	418	9.64%	-3.46%
Lincoln Town	2,423	1,102	2,659	1,226	9.74%	11.25%
Manitowish Waters Town	566	285	624	418	10.25%	46.67%
Phelps Town	1,200	544	1,238	660	3.17%	21.32%
Plum Lake Town	491	235	553	235	12.63%	0%
Presque Isle Town	618	298	805	240	30.26%	-19.46%
St. Germain Town	2,085	953	2,083	1,077	-0.10%	13.01%
Washington Town	1,451	679	1,587	800	9.37%	17.82%
Winchester Town	383	190	528	230	37.86%	21.05%
Eagle River City	1,398	684	1,628	736	16.45%	7.60%
County Total	**21,430**	**9,658**	**23,047**	**10,917**	**7.5%**	**13.0%**

Source: U.S. Census, WisDOA, American Community Survey, and NCWRPC

The County's population is generally older with a median age of 56 years in 2020, versus the statewide median age of 40 years. Over the next few decades, the residential base will become even older, aging more quickly than the state as a whole. In fact, the number of persons 60 and older will likely increase to more than 50 percent of the population by 2030. This will have implications affecting the demand for emergency services, medical facilities, CBRF's, and support services through Public Health, Social Services, and Commission On Aging.

SEASONAL POPULATION

In addition to the regular full-time resident population, Vilas County is known as a popular tourist destination. This is reflected in the make-up of its housing stock where 51% of all housing units have been identified as seasonal/recreational. The impact of this seasonal population cannot be overlooked when planning for hazards. Table 4 shows estimated seasonal housing units by municipality. The estimated seasonal population was determined based on the number of seasonal housing units and the average household size of those units. Determining when and for how long these seasonal residents will be in the County is problematic, but the numbers give some indication of what weekend or other peak period population levels might be.

Another component of the seasonal population includes short-term accommodations such as campgrounds or hotel-style lodging. The scope of this plan did not provide for a detailed inventory of accommodations; however the County Comprehensive Plan did identify 1,091 hotels/motels and short-term rental type accommodations and 35 campgrounds available around the County. The plan also estimated a peak seasonal population of over 27,000 in the County.

Table 4: Estimated Seasonal Resident Population

Municipality	Seasonal Housing Units	Estimated Seasonal Population
Arbor Vitae town	1,142	2,295
Boulder Junction town	822	1,652
Cloverland town	589	1,184
Conover town	932	1,873
Lac du Flambeau town	1,800	3,618
Land O'Lakes town	1,056	2,123
Lincoln town	901	1,811
Manitowish Waters town	718	1,443
Phelps town	940	1,889
Plum Lake town	553	1,112
Presque Isle town	1,193	2,398
St. Germain town	1,058	2,127
Washington town	1,080	2,171
Winchester town	631	1,268
Eagle River city	77	155
Vilas County	**13,492**	**27,119**

Source: U.S. Census and NCWRPC

EMPLOYMENT

According to the Wisconsin Department of Workforce Development (WI DWD), Vilas County had 9,434 employed residents in 2020.

The leisure & hospitality sector has the highest number of employees in Vilas County at about 1,773 or 18.8% of total employment in 2020. Within the leisure & hospitality sector is the prominent sub-sector: food service & drinking places. With the extent of lakes and recreation land, Vilas County is a popular tourist destination, creating more demand for restaurants, bars and hotels. Although food service is the second highest industry sub-sector, none of these employers appear on the list of top employers in the County (refer to Table 5) as jobs in food service and drinking places tend to be seasonal with primarily part-time positions.

Education & health is the second leading employment sector in the County with about 1,647 positions or 17.5% of total employment. The Education sub-sector is well represented on the top employers list with Northland Pines School District as well as Lac du Flambeau public school. As a result of the demand for health services generated by the County's aging population, health services are also a large source of employment with three major facilities among the top employers in the County: Aspirus Hospital, Lac du Flambeau Heath Services and Marshfield Clinic.

Retail trade includes operations such as gasoline stations, furniture stores, food and beverage stores, and novelty shops that also often depend on seasonal tourism is the third leading sector in Vilas County with 1,318 or 14.0% of total employment.

Construction includes the subsectors of construction of buildings, heavy and civil engineering construction, and specialty trade contractors that provide about 889 jobs or 9.4% of total employment in Vilas County. It is not unusual to employ a high number of construction jobs given Vilas County's 7.5 percent population growth over the past decade.

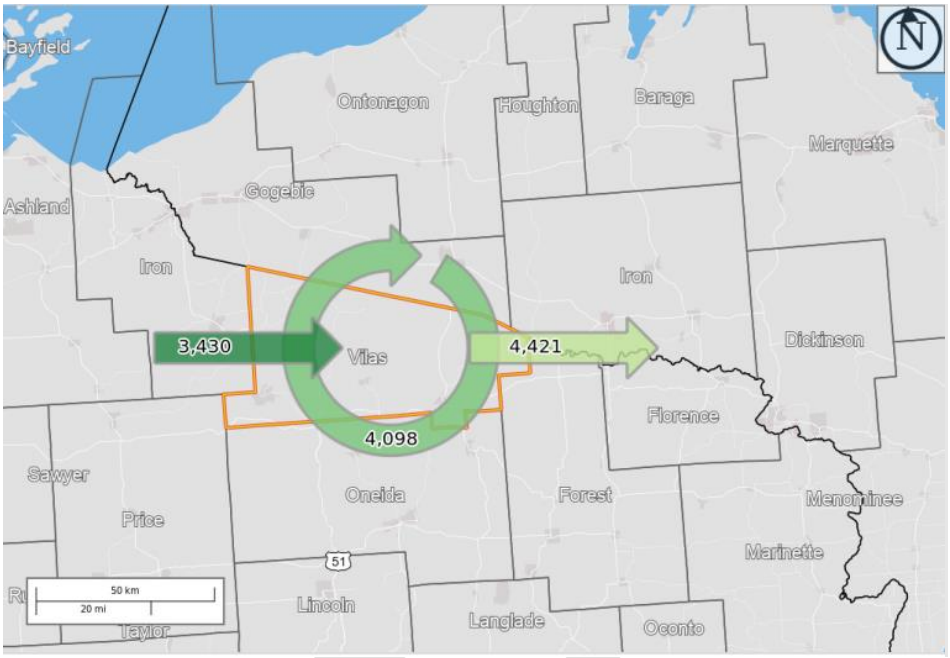
Table 5: Top Employers in Vilas County		
Company	**Product or Service**	**Location**
Aspirus, Inc.	General medical & surgical hospitals	Various Locations
Northland Pines School Dist.	Elementary & secondary schools	Various locations
Lac du Flambeau Band of Lake Superior Chippewa	Tribal government and services	Lac du Flambeau
Trig's Food & Drug Store	Supermarkets & other grocery stores	Eagle River
Pukall Lumber Company	Building supply manufacturing & sales	Arbor Vitae
County of Vilas	Executive & legislative offices	Various Locations
Lac du Flambeau School District	Elementary & secondary schools	Lac du Flambeau
Mastec Eagle River	Electric Contractors	Eagle River
State of Wisconsin	Executive & legislative offices	Various locations
Pick n Save (Kroger)	Supermarkets & other grocery stores	Eagle River

Source: NCWRPC. Representative Sample in Random Order. May not include all operations of similar sizes.

Identifying locations of large employment is important when prioritizing hazard mitigation strategies. Analyzing employment sectors within the County confirms Eagle River and Lac du Flambeau as the primary employment and service hubs in the County, however, many of the unincorporated "places" like Arbor Vitae are also significant employment centers.

In addition to the seasonal swells in employment, the number of people working in a given locality fluctuates on a daily basis. The county is a net exporter of labor. In other words, the County has fewer local jobs than residents who work. Over 45% of the County's workforce enters from other counties while about 52% of working residents travel to work outside the county. A visual representation of worker inflow and outflow in Vilas County can be found in Figure 1.

Figure 1: Vilas County Worker Inflow and Outflow, 2020



Source: U.S. Census LEHD, 2020

LAND USE/LAND COVER AND DEVELOPMENT PATTERNS

Land use is an important determinant in the potential impact a particular hazard may have, and in action which may be taken to mitigate the hazard impacts. An understanding of the amount, type, and spatial distribution of urban and rural land uses within the County is an important consideration in the development of a sound hazard mitigation plan.

The NCWRPC has categorized land use in Vilas County into classifications. Aerial photos were used to digitize land use Geographic Information System (GIS) coverage. Map 2 shows the land use and development concentrations in Vilas County. Table 6 shows the acreage and percentage of each classification.

AGRICULTURE

Very little productive agricultural land exists within Vilas County in terms of traditional agriculture and production of cash crops. In fact, such uses comprise less than 1% of the county's total land use. The Town of Washington has the largest area of tillable land in the county. Sandy soils and a limited growing season make cash cropping very difficult. However, cranberry operations in the Towns of Boulder Junction and Manitowish Waters have been a strong agricultural component in production and for generating tourism.

COMMERCIAL (BUSINESS)
Commercial uses are found throughout the county. In all less than 1% of the county's land is in this use. Commercial uses include hotels, motels, and resorts which are located throughout the county, particularly along lakeshores. It also includes commercial developments located along highways, such as gas/service stations, gift shops, restaurants, etc. Other commercial uses include those uses which provide goods and services required by both year-round and seasonal populations such as grocery stores, medical facilities, banks, etc.

There are several small communities with concentrations of development, including a mix of residential and commercial, with the largest being the City of Eagle River. There is concentrated commercial in the form of local downtown areas in several towns such as Boulder Junction, Manitowish Waters, St. Germain, Phelps, Presque Isle, Sayner, and Land O' Lakes to name a few. The downtown areas play a large role in Vilas County's community character and Northwoods aesthetic. Most of the local business activity is located along the road system, scattered throughout the county. Higher concentrations of commercial uses exist along the state and federal highways, including STH 70, USH 45, and STH 51. Much of the local business activity is home-based, and consists of local trade, service, and retail.

GOVERNMENT/PUBLIC/INSTITUTIONAL
Such uses are comprised of lands used for public schools, cemeteries, airfields, active and closed landfill sites, transfer stations/recycling sites, public facility, and service buildings (i.e., municipal buildings, community centers), and provision of community utilities and services such as power, gas, and telephone.

INDUSTRIAL
Industrial uses in Vilas County are very low and comprise less than 1% of the county's total existing land use. The majority of industrial uses in the county consist of active and abandoned gravel pits. Because of the desire for municipal water, sewer, fire protection, cheap land and other services, most industrial uses are typically located in incorporated municipalities, which is why the highest concentration of industrial use occurs in the City of Eagle River. Although historically industrial uses have been segregated from residential areas, certain industrial facilities may be compatible with these areas if there is an adequate buffer and protection. Because protection of the natural environment, including water, air, and forest resources is so important in Vilas County, heavy polluting industries will likely not be a part of the area's industrial growth. The City of Eagle River does have the county's only industrial parks.

Table 6 Generalized Land Use in Vilas County		
General Category	**Acres**	**Percent**
Agriculture	4,629	0.7%
Commercial	3,974	0.6%
Industrial (includes quarries)	1,388	0.2%
Governmental/Public/Institutional	1,622	0.2%
Open Lands	1,594	0.2%
Outdoor Recreation	1,790	0.3%
Residential	37,518	5.8%
Transportation	6,267	1.0%
Woodlands	495,393	76.1%
Water	96,713	14.9%
Total Acres	650,886	100.0%

Source: NCWRPC GIS Inventory 2020

OPEN LANDS

Open lands are areas that have no development and are clear of large concentrations of trees, such as open wetlands or fallow farm fields. Less than 2% of land is in this category.

OUTDOOR RECREATION

Vilas County has many areas that are dedicated for public parks and outdoor recreation. With an array of recreational resources provided from local, county, state, and federal sources, the effects of a growing population and accompanying service demands will place greater demands on the recreational facilities. Less than 1% of the county is used for parks and recreation, but that does not include the vast resources of land and outdoor recreation found in the Nicolet and Chequamegon National Forests, the Northern Highland-American Legion State Forest, and the Vilas County Forest.

RESIDENTIAL USES

Residential development has consumed less than 6% of the total land in Vilas County. Residential uses are split into four categories: single family, single family with business, two-family residential, and multi-family residential. Residential development patterns can be generally characterized into four categories. These include: 1) high and low density lakeshore residential, 2) community and neighborhood concentrations, 3) remote subdivisions, and 4) rural, large-parcel forestry/residential. A majority of residential development occurs along or in close proximity to the lakeshore areas. Lakeshore development has occurred on the majority of the county's lakes which are 50 acres or greater. As the larger lakes become developed, the trend will shift the development pressure to the

numerous smaller-sized lakes (less than 50 acres). Much of the lakeshore development consists of second homes and seasonal conversions to permanent housing. Scattered low-density development is occurring in many areas of Vilas County, radiating outward from the lakeshore areas. This demand is impacting land prices and is also creating a larger market (demand) for forested land as available lakeshore property is becoming scarce and expensive.

WOODLANDS

Over three-fourths of the county is comprised of forest land. The majority of this land in forest use is owned and managed by public entities including the U.S. Forest Service, Wisconsin Department of Natural Resources, and the Vilas County Forestry Department. Much of this land is heavily used for recreation and for commercial timber production.

These areas are not only used by local residents, but also attract people from around the nation, and thus protection of these areas is important to maintaining the county's viable tourist economy. Protection of environmentally sensitive areas, such as riparian and forested habitats and floodway areas, whether on public or private land, is important for the same reason.

SURFACE WATER

Vilas County contains approximately 96,650 acres of surface water, including lakes, streams, and islands, which comprise approximately 14.9% of the county's total area. There are approximately 1,320 lakes in Vilas County, including 563 named lakes and 757 unnamed lakes, more than any other county in the state. There are approximately 263 lakes of 50+ acres. The largest is Trout Lake at 3,816 acres. It is also the deepest lake in the County with a maximum depth of 115 feet. There are 3,383 miles of shoreline in Vilas County.

In addition to the significant number of lakes in the county there are also numerous rivers and streams, total approximately 402 miles. The major river system which travels through Vilas County is the Wisconsin River, which originates at Lac Vieux Desert in the Town of Phelps. Because Vilas County has some of the highest elevations in the state, it is the source of other major river systems such as the Flambeau which with the Wisconsin drain to the Mississippi as well as the Brule and Menominee which flow to Lake Michigan and the Presque Isle discharging to Lake Superior.

Vilas County, Wisconsin Generalized Land Use Map

Map 2

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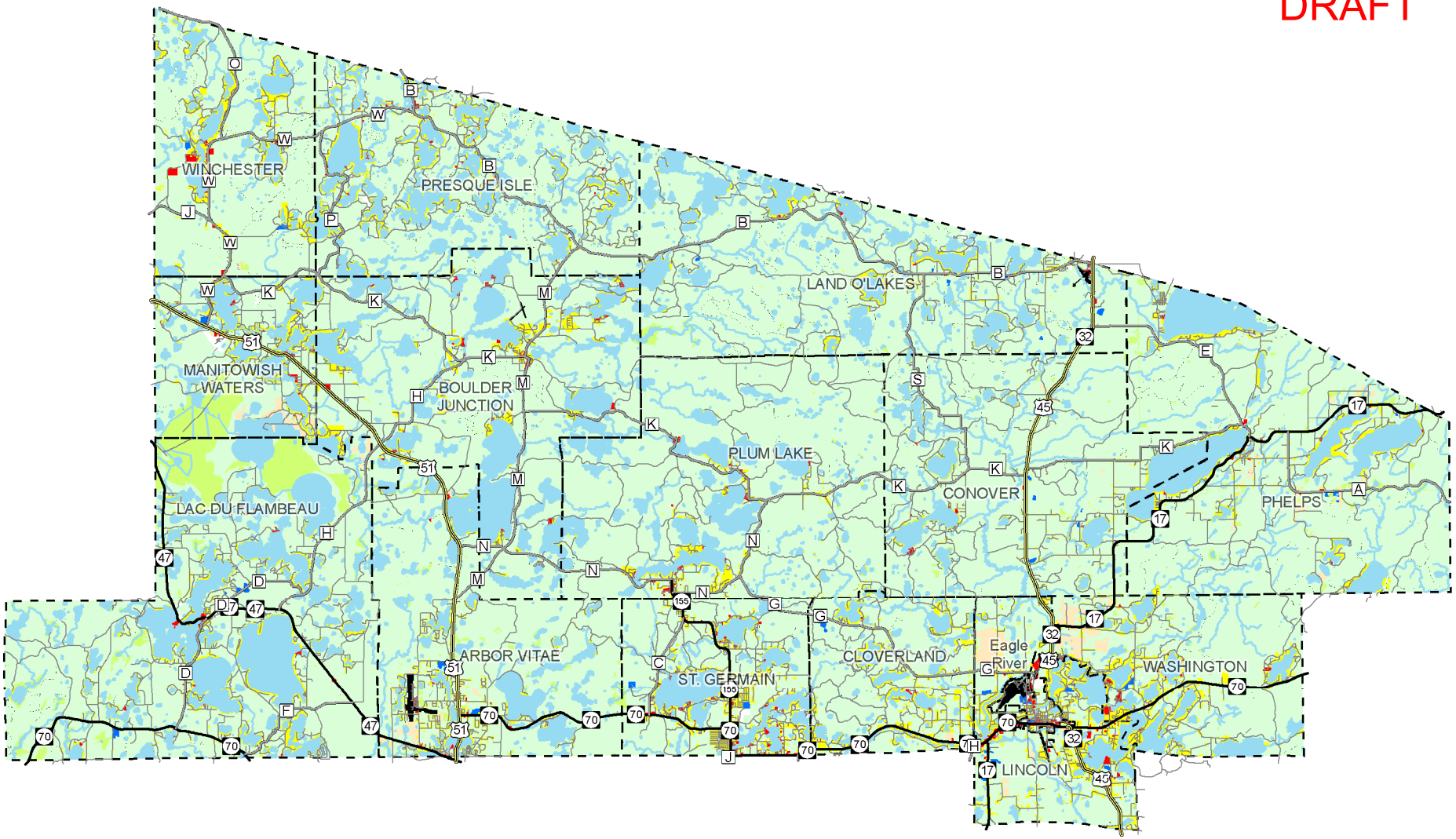

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Source: WI DNR, 2010 Airphoto Interpretation, NCWRPC

N W E S

0 1 2 4 6 8 Miles

- US Highways
- State Highways
- County Highways
- Local Roads
- Minor Civil Divisions
- Agriculture
- Commercial
- Governmental
- Industrial
- Open Lands
- Residential
- Transportation
- Woodlands
- Water

The majority of Vilas County lies within two watersheds: the Upper Chippewa River Basin in the west/northwest and the Upper Wisconsin River Basin in the central, southern, and eastern areas. In addition, a small portion in the east is included in the Upper Green Bay Basin. Overall, 13 watersheds are included within the county either completely or partially.

Floodplains and wetlands are important subsidiary components to the surface water system as described below.

Floodplain

The primary value of floodplains is their role in natural flood control. Flood plains represent areas where excess water can be accommodated whether through drainage by streams or through storage by wetlands and other natural detention/retention areas. Specific areas that will be inundated will depend upon the amount of water, the distance and speed that water travels, and the topography of the area. If uninterrupted by development, the areas shown on Map 4 as floodplains should be able to handle the most severe (regional) flood, i.e., those that have a probability of occurring once every one hundred years.

There is a value in preserving and protecting these natural flood control areas from encroachment. First, by preventing development in the floodplain, the cost of building dikes, levies, or other man-made flood control devices will be saved. Second, for each structure constructed in a flood-prone area, that area expands, potentially subjecting other structures originally built outside the delineated flood hazard area to the risk of flooding. Each new structure (or modification to existing) placed in the flood plain puts more life and property in danger.

Counties, cities, and villages are required to adopt reasonable and effective floodplain zoning ordinances. The requirement is found in section 87.30 of the Wisconsin Statutes and Chapter NR 116 of the Wisconsin Administrative Code. Floodplain zoning is designed to protect individuals, private property, and public investments from flood damage.

Floodplain zoning maps identify areas where major floods occur. Regulations prohibit development in the floodway, the most dangerous flood area. In other flood areas, the flood fringe, development that is built above flood levels and otherwise flood-protected is allowed if it is in accordance with local ordinances. For regulatory purposes, a floodplain is generally defined as land where there is a one percent chance of flooding in any year (also known as the 100-year floodplain).

In order to participate in the Federal Emergency Management Agency's (FEMA) National Flood Insurance Program (NFIP), the County has

completed a Flood Insurance Study and a Flood Insurance Rate Map (FIRM) that encompasses Vilas County, see Table 7 for summary of NFIP status. This FIRM delineates the "A" Zones including the floodway and flood fringe which are those areas inundated by the 100-year flood within the County.

Table 7A FEMA Community Status Book Report
Communities Participating in the National Flood Insurance Program
Wisconsin - Vilas County

Community	Initial FHBM	Initial FIRM	Current Map	Program Entry
Vilas County	04/17/81	06/05/12	06/05/12	02/21/14
City of Eagle River	12/28/73	06/05/12	06/05/12	N/A

Source: FEMA, 2023.

Concerns about the maps had made Vilas County hesitant to join the National Flood Insurance Program (NFIP). In 2010, as part of FEMA's effort to modernize the floodplain maps, the Wisconsin DNR began updating the Vilas County maps, resolving some of the discrepancies. The new maps use new digital mapping standards and are thus referred to as DFIRMs. The revised maps became effective starting June 5, 2012. Based on these new maps, Vilas County reconsidered its stance on the NFIP, and joined in February 2014. However, the City of Eagle River still has not reconsidered entry into the NFIP. Note that federal lending regulations require flood insurance whether or not a community participates in the NFIP. NFIP participation reduces the cost of the insurance.

Vilas County flew Quality Level 1 Light Detection and Ranging (LiDAR) county-wide with 8 points nominal pulse density per sq meter in the spring of 2022 as a strategic partner with USGS. The county expects the USGS to have the finalized base data later this year and anticipates the full deliverables in early 2024.

With new high-density LiDAR data available the county hopes it will prompt movement by FEMA to update floodplains county-wide with more accurate delineation that will encourage participation in the flood insurance program.

For purposes of this plan, the NCWRPC downloaded the revised floodplain mapping from the County's land records database. Although unofficial, these digital files indicate there are 6,256 acres of floodplain in Vilas County, or about one percent of the area of the County. Map 4 shows the approximate area of the revised floodplains in Vilas County. Floodplains in Vilas are generally small, and floods occur only during periods of exceptionally heavy rainfall or in conjunction with snowmelt. Currently,

there are no repetitive loss structures, those with multiple flood insurance claims, in Vilas County.

Table 7B Compliance with NFIP Requirements-Participating Jurisdictions		
	Vilas County	**City of Eagle River**
NFIP	Participating	Not Participating
Adoption of Minimum NFIP Criteria	Vilas County has adopted a Floodplain Zoning Ordinance and associated FIRMs based on FEMA and DNR requirements	
Adoption of Latest FIRM	DFIRM 6/5/2012	
Implementation and Enforcement of floodplain regulations	Zoning Administrator administers Chapter 23 Code of Ordinances-Floodplain Zoning Ordinance	
Designated Agency for NFIP Compliance	Vilas County Zoning & Planning Zoning Administrator	
Implementation of Substantial Damage Provisions of Ordinance	Trained county staff inspects all damaged floodplain structures to determine if substantial damage has occurred after an event	
Floodplain Management Efforts that Contribute to Continued Compliance with NFIP	Cooperation and education with other municipalities, county departments, state agencies, and industry partners	
Reasons for Nonparticipation	N/A	Concerns about NFIP mapping and historical lack of significant flooding issues
Source: NCWRPC interviews with local zoning officials		

The Biggert-Waters Flood Insurance Reform Act was signed into law in July 2012. This act implemented significant reforms to the structure of flood insurance under the National Flood Insurance Program (NFIP). Then, on March 21, 2014, President Obama signed the Homeowner Flood Insurance Affordability Act of 2014 (HFIAA) into law amending the NFIP further. These new laws impact the various elements of the NFIP, including Insurance, Flood Mapping, Mitigation, and Floodplain management.

HFIAA repeals and modifies certain provisions of the Biggert-Waters Flood Insurance Reform Act and makes additional program changes to other

aspects of the program not covered by that Act. Many provisions of the Biggert-Waters Flood Insurance Reform Act remain and are still being implemented. The new law lowers the recent rate increases on some policies, prevents some future rate increases, and implements a surcharge on all policyholders. The Act also repeals certain rate increases that have already gone into effect and provides for refunds to those policyholders. Both of these laws are important to local floodplain managers and planners because rate structure increases may increase interest of policy holders that own flood prone properties in alternatives to mitigate both flood risk and flood insurance costs for those properties.

Boulder Lake (NCWRPC)

Wetlands

Wetlands perform many indispensable roles in the function of the hydrologic cycle and local ecological systems. In terms of hazard mitigation, they act as water storage devices in times of high water. Like sponges, wetlands absorb excess water and release it back into the watershed slowly, preventing flooding and minimizing flood damage. As more impermeable surfaces are developed, this excess capacity for water runoff storage becomes increasingly important.

The DNR has identified the location of wetlands on their WISCLAND database. According to this, Vilas County has about 110,632 acres, or 17 percent of its total area. Map 2 shows these wetland areas in Vilas County. These wetlands include a wide variety of wetland types ranging from emergent/wet meadow to scrub/shrub, to deciduous and coniferous forested wetlands. One of the largest wetland areas in the County, at about 18 square miles, is Powell Marsh, a designated waterfowl refuge.

Eradication of wetlands can occur through the use of fill material. This can destroy the hydrological function of the site and open the area to improper development. The Wisconsin Department of Natural Resources (DNR) has promulgated minimum standards for managing wetlands.

Vilas County, Wisconsin Surface Water & Dams Map 3

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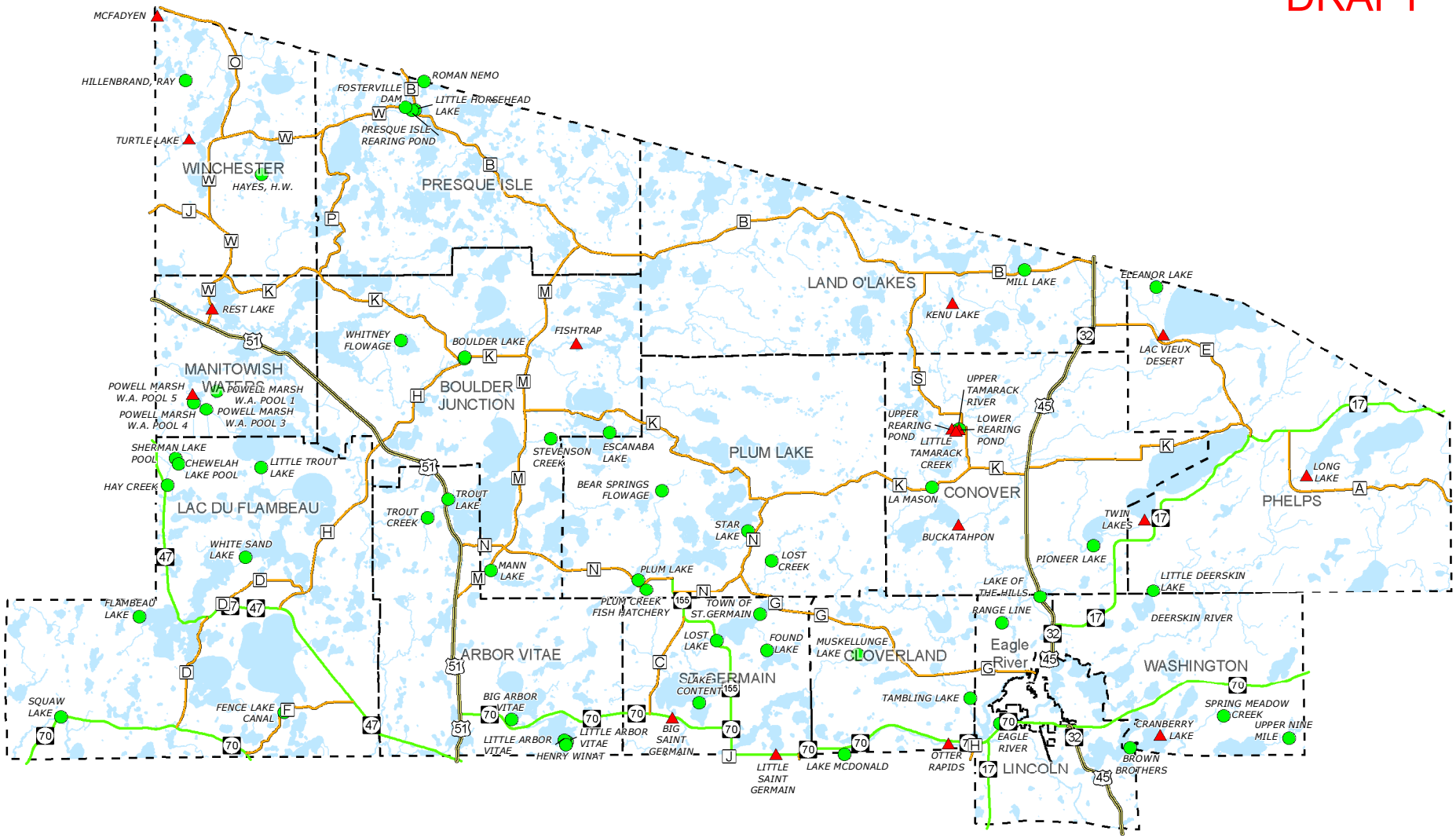

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Source: WI DNR, NCWRPC

N W E S

0 1 2 4 6 8 Miles

- Minor Civil Divisions
- US Highways
- State Highways
- County Highways
- Water

Dams

- Large
- Small

Vilas County, Wisconsin Floodplains & Watersheds Map 4

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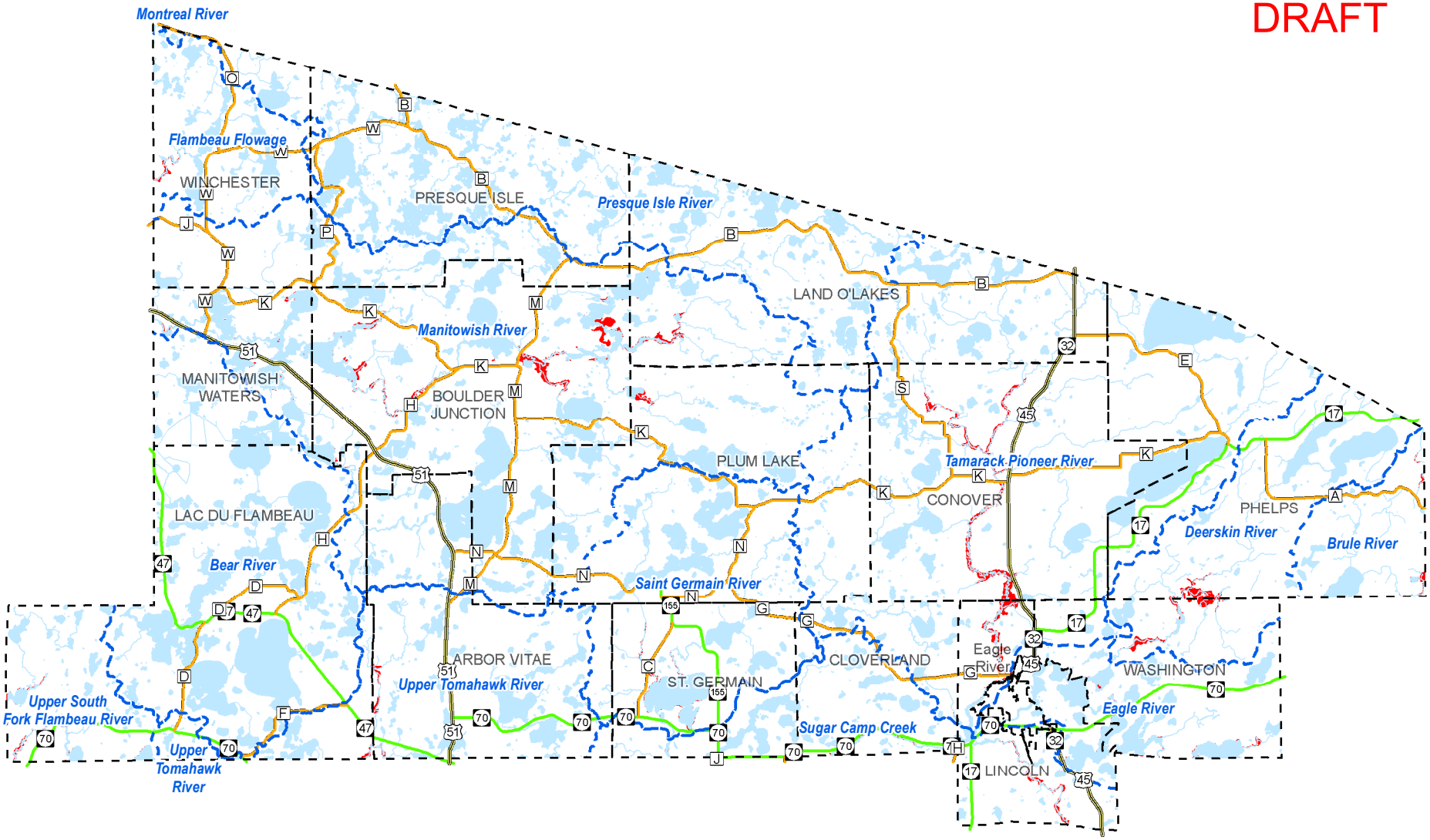

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Source: WI DNR, FEMA, NCWRPC

N W E S

0 1 2 4 6 8 Miles

- Minor Civil Divisions
- US Highways
- State Highways
- County Highways
- Watershed Boundaries
- Flood Way
- Water

FUTURE GROWTH AND DEVELOPMENT IN VILAS COUNTY

Vilas County's population has increased 6.6% over the last 3 years (2017 to 2020) for a net gain of 1,440 residents. While the County continues to grow, the rate of growth has declined from the very high rates observed during the 1990's.

From a net growth perspective, residential migration into Vilas County has been solely responsible for all of its population growth because natural growth has been negative (more deaths than births). This growth pattern is reflective of an aging population and the trend in seasonal-to-permanent housing markets.

Based on the county existing land use map (Map 2), a large percentage of existing shoreline on the larger lakes is developed. The focus will move to smaller lakes and stream areas, then to the off-water parcels. In recent years, the demand for private forest land has increased dramatically. The reason for this can be primarily attributed to the decreasing available supply of waterfront property. As the amount of available waterfront property in the county declines, the demand for forest land has been increasing.

According to the current Vilas County Comprehensive Plan, development patterns can be generally characterized into four categories. These include: 1) high and low density lakeshore residential, 2) community and neighborhood concentrations, 3) remote subdivisions, and 4) rural, large-parcel forestry/residential. A majority of residential development occurs along or in close proximity to the lakeshore areas. Lakeshore development has occurred on the majority of the county's lakes which are 50 acres or greater. As the larger lakes become built out, the trend will shift the development pressure to the numerous smaller-sized lakes (less than 50 acres). Much of the lakeshore development consists of second homes and seasonal conversions to permanent housing. Scattered low-density development is occurring in many areas of Vilas County, radiating outward from the lakeshore areas. This demand is creating a larger market (demand) for forested land as available lakeshore property is developed.

Three major trends are identified in the Comprehensive Plan relative to development in the County:

- ✓ Conversion of seasonal to permanent residences will increase as the baby-boomer generation migrates northward for its retirement location.

- ✓ Waterfront development pressure and cost of shoreline property will increase as fewer lakefront properties are available.

- ✓ Large, privately-owned parcels adjacent to lakes will likely face heavy development pressure for subdivision.

- ✓ Pressure as the result of 2017 Wisconsin Act 59 allowing rentals of seven days or more.

The Comprehensive Plan projects overall residential land demand based on the addition of 700 units for year-round residents, and an additional 400 units for seasonal uses. This accounts for seasonal housing making up about 56 percent of the housing stock. Combined about 1,400 new housing units (2010–2030) or about 70 per year per year will be added to the housing stock. Assuming a county wide average of about 2 acres of land needed per unit, 140 acres per year on average is expected to be needed to accommodate anticipated population growth by the year 2040.

Commercial and industrial development is subject to market forces and difficult to predict, however, the Comprehensive Plan projects future development of about 200 acres for commercial uses and about 70 acres for industrial uses over the next 20 years.

Therefore, between 2020 and 2040 based on data presented in the County Comprehensive Plan, it is anticipated that approximately 970 acres will be needed every five-years to support residential, commercial and industrial development demands in Vilas County. Over the twenty-year period about 3,880 acres will be needed to meet overall development demands. However, the backlog of parcels currently available will buffer the amount of "new" acreage taken for development.

New infrastructure or public facilities will be somewhat minimal as budget constraints will curtail local government ability to develop new facilities and result in a tendency to make do with existing infrastructure and delay expansion plans. However, the county will continue to look at existing facility improvements and expansions to meet pressing needs as they arise.

IMPACT OF CHANGES IN POPULATION, LAND USE AND DEVELOPMENT

The dynamics of a given community's population, how land use changes over time and how local development trends affect population and land use have implications for emergency services and hazard mitigation. The Hazard Mitigation Taskforce identified the following impacts from its assessment of the changes in population, land use and development trends within Vilas County and the City of Eagle River.

- Increases in new housing and other development can increase the vulnerability and risk to hazards. For example, growth and development can increase the risk of flooding by increasing stormwater runoff, disrupting natural drainage systems and reducing flood storage.
- Increases in population and/or housing also result in increasing demand for emergency services, which is a particular challenge during tight governmental budgetary conditions, as has been persistent in Wisconsin for some time now.
- With the majority of the County being sparsely populated rural areas, both costs to provide services and response times increase. In addition, communications and mitigating potential impacts are often more challenging (e.g., warning systems and public storm shelters).
- Vilas County's population is aging. Demands for senior services in the County will only increase, including for emergency response. The aging population poses unique challenges for emergency preparedness and response services, such as sheltering in place and evacuation strategies. Seniors who reside in remote, rural areas may need special attention during a hazard event (e.g., transportation for dialysis during a winter storm, access to medicine or other medical needs).
- There is geographic variability across the County. Emergency service needs, mitigation priorities, and local resources will vary by community and area. Many residents have access to resources, tools, equipment, and friends or family that enable them to "weather the storm," clean up storm damage, and offer support to their neighbors and community.
- Although the number has been declining, there remains a significant number of mobile homes in the County, which are more vulnerable during certain types of storm events.
- The large amount of public forest land and shoreland development, with associated outdoor recreational uses and seasonal homes, also have unique risks and challenges.

PUBLIC FACILITIES AND SERVICES

TRANSPORTATION

The transportation system of Vilas County provides the basis for movement of goods and people into, out of, though, and within the County. An efficient transportation system is essential to the sound social and economic development of the County and the Region. The analysis of transportation routes should be considered in the possible event of a disaster (See Map 5).

The principal highways serving Vilas County are (north-south) US Highways 45 & 51 and State Highway 17 and (east-west) State Highways 47 and 70 State Highways 32, 47 and 155 also serve the County. These highways link the County with neighboring communities and are vital to the County's tourism and recreation-based economy.

Networks of county trunk highways collect traffic from rural land uses. These county highways serve an important role in linking the area's recreation and timber resources to the County's major highways and population centers. Local roads provide access to local development and forest areas, as well as the County's lake areas.

Northwoods Transit Connections is a joint service through the Oneida-Vilas Transit Commission to provide transportation for the elderly and disabled as well as the general public within the two counties and surrounding area. A volunteer driver network is also available.

The County does not have any rail lines within its boundaries; however, access to rail service through the Watco is available in Rhinelander, just south of Vilas County. The line runs east-west through the southern and central part of Oneida County with access at Rhinelander.

Vilas County, Wisconsin Transportation

Map 5

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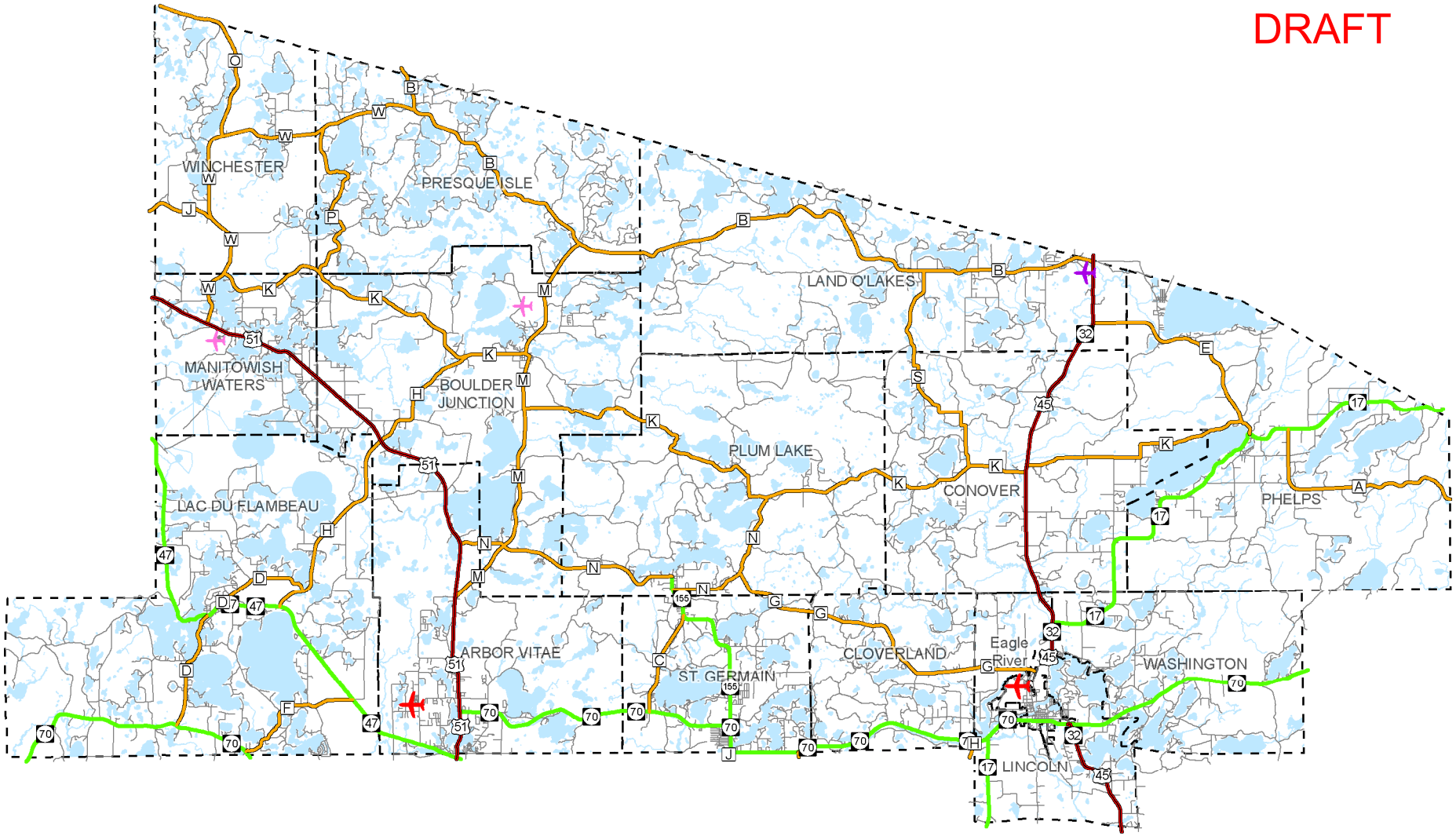

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Source: WI DNR, NCWRPC

N W E S

0 1 2 4 6 8 Miles

- Minor Civil Divisions
- US Highways
- State Highways
- County Highways
- Local Roads
- Large General Aviation
- Medium General Aviation
- Small General Aviaton

Commercial air service is available at the Rhinelander-Oneida County Airport located approximately two miles west of the City of Rhinelander. In addition, there are a number of smaller airports serving corporate and tourism/recreation uses. These include Eagle River Union Airport, Lakeland/Noble F. Lee Memorial Airport in Arbor Vitae, Land O' Lakes Airport, Manitowish Waters Airport and Boulder Junction Airport. There are also a number of privately owned air strips in the County.

UTILITIES

Utility systems are important in hazard mitigation planning because of the dependency on water, wastewater treatment, gas service, electricity, and communications. Because of this reliance and vulnerability to hazards, utility systems must be identified for this Plan.

The protection of the public water supply facilities from potential contamination from hazards such as flooding is a consideration for hazard mitigation planning. Vilas County has four municipalities that manage water and wastewater services through a public system. The City of Eagle River has a municipal water and sewer system that serves commercial, residential and industrial customers. Land O Lakes municipal water and sewer system services approximately 50% of the residents in Land O Lakes. The Phelps Sanitary District #1 serves 90% of the community of Phelps. The Lac du Flambeau Tribal public sewer system serves approximately 75% of the households in Lac du Flambeau including Tribal facilities.

The protection of the wastewater facilities is an important consideration for hazard mitigation planning because of its potential to contaminate nearby waterbodies in the event of high water. Also, of concern during periods of flooding is the threat of damage to infrastructure and associated facilities.

Excel Energy, Wisconsin Public Service, WeEnergies, and Eagle River Light & Water provide electrical service and natural gas service throughout the county. Eagle River Light and Water services the City of Eagle River and the immediate surrounding area via power purchased through Wisconsin Public Power, Inc. (WPPI). WeEnergies services the northern half of the Town of Washington with electric, all of the Towns of Phelps, Conover, and Land O' Lakes with both electric and natural gas, and the Towns of Presque Isle, Boulder Junction, Manitowish Waters, and Winchester with gas facilities only. Wisconsin Public Service serves the remainder of the county with both gas and electric service. Gas and other petroleum pipelines are not mapped due to homeland security concerns.

Vilas County, Wisconsin Utilities

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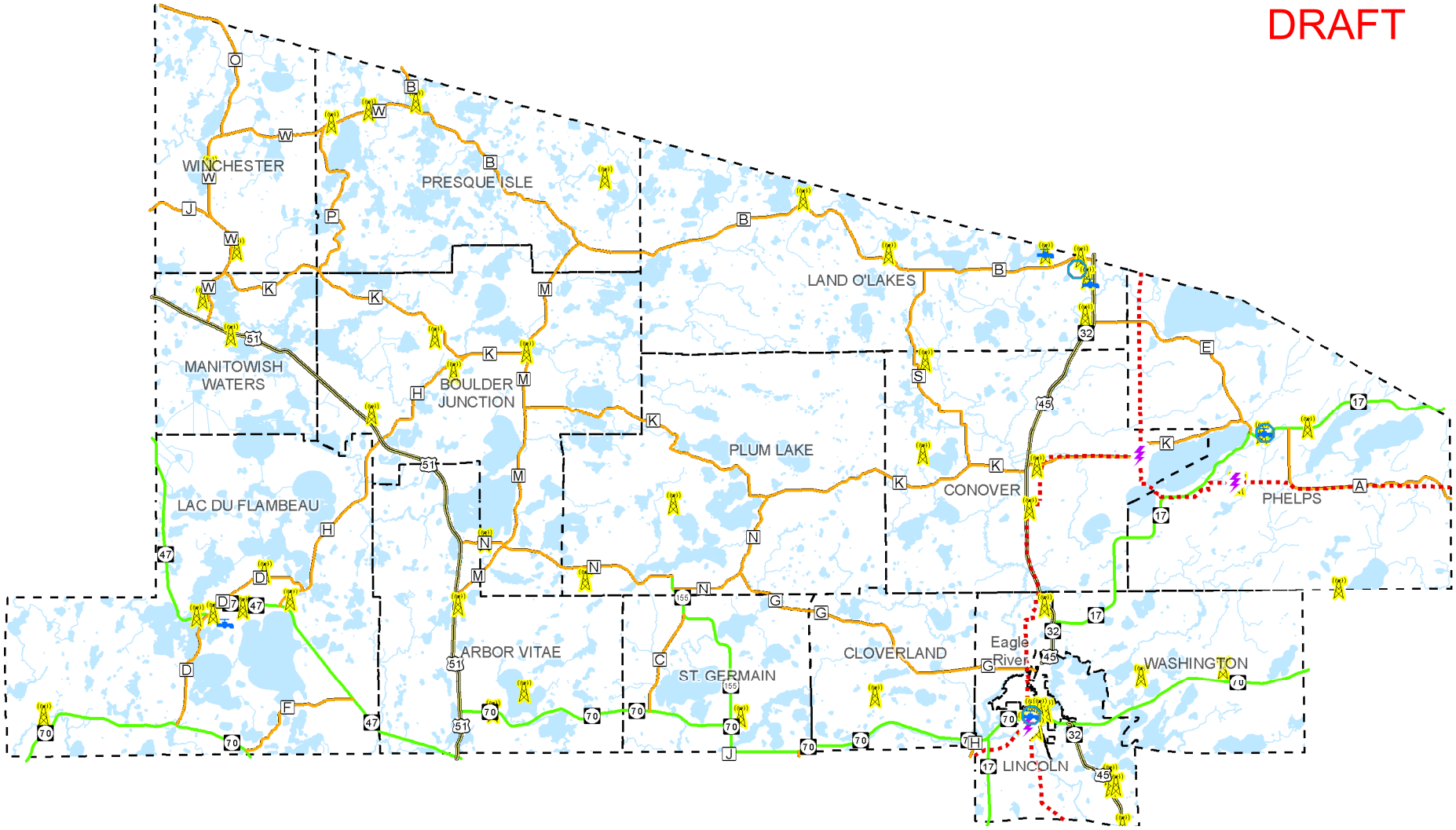

Minor Civil Divisions
US Highways
State Highways
County Highways
Substations
High Voltage Powerline
Waste Water Treatment Plant
Public Water Supply
Communication Towers

N
W E
S

0 1 2 4 6 8 Miles

Map 6

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Source: WI DNR, NCWRPC

The infrastructure of electric and telephone lines as well as broadband internet should be considered in the events of high wind, ice storms, tornadoes, flooding, and fire.

The primary telephone provider in the County is Frontier Communications. A number of providers offer cell phone services. Nationwide, cellular telephone systems account for about half of all 911 calls. Service coverage is based upon the handset receiving a direct line-of-sight signal from a system provider's antenna on a tower. Limitations for receiving a signal include topography and the thickness & type of building materials. Signals generally cannot travel well in dense forest cover, over tall hills, or through thick or multiple cement walls.

EMERGENCY SERVICES AND FACILITIES

The type and location of public emergency services are an important consideration in hazard mitigation planning, because of the potential direct involvement of such facilities in certain hazard situations.

Within Vilas County, fire suppression, rescue, and emergency medical services are municipally based. There are several fire departments in Vilas County, all staffed with volunteer personnel. All of these fire departments include rescue capabilities; nine of these fire departments provide ambulance service. Ambulance service in the City of Eagle River and the Towns of Cloverland, Lincoln, and Washington is provided by Aspirus Health based at the hospital in Eagle River. Ambulance service in the Town of Arbor Vitae is provided by Oneida County. However, all of these municipalities are also served by municipal first responders. The City of Eagle River and the Towns of Cloverland, Lincoln, and Washington are members of a joint fire commission and are served by the Eagle River Area Fire Department.

Eagle River Area FD. (City of Eagle River)

All fire and EMS agencies in Vilas County operate through agreements that form a Mutual Aid Box Alarm System (MABAS). MABAS is a coordinated, preplanned program to get the right equipment and personnel on scene in a timely fashion. Mutual aid agreements also include regional entities like federal and state fire suppression agencies and agencies in adjoining counties in Wisconsin and Michigan.

The lead law enforcement agency in Vilas County is the Vilas County Sheriff's Office. Other law enforcement agencies in the County include: the City of Eagle River Police Department and the Lac du Flambeau Tribal Police.

The Lac du Flambeau Band of Chippewa Indians has its own Police Department that is dispatched through the Vilas County Sheriff's Office Communication Center. The Tribal Police respond to calls on reservation lands in Vilas, Oneida and Iron Counties. In Vilas County this service area covers 71,345 acres.

The Eagle River Police Department provides police protection to City residents. Dispatching is provided for the Department through the Vilas County Sheriff's Office Communication Center. The Eagle River Police Department has a mutual aid agreement with the Sheriff's Office.

CRITICAL COMMUNITY FACILITIES

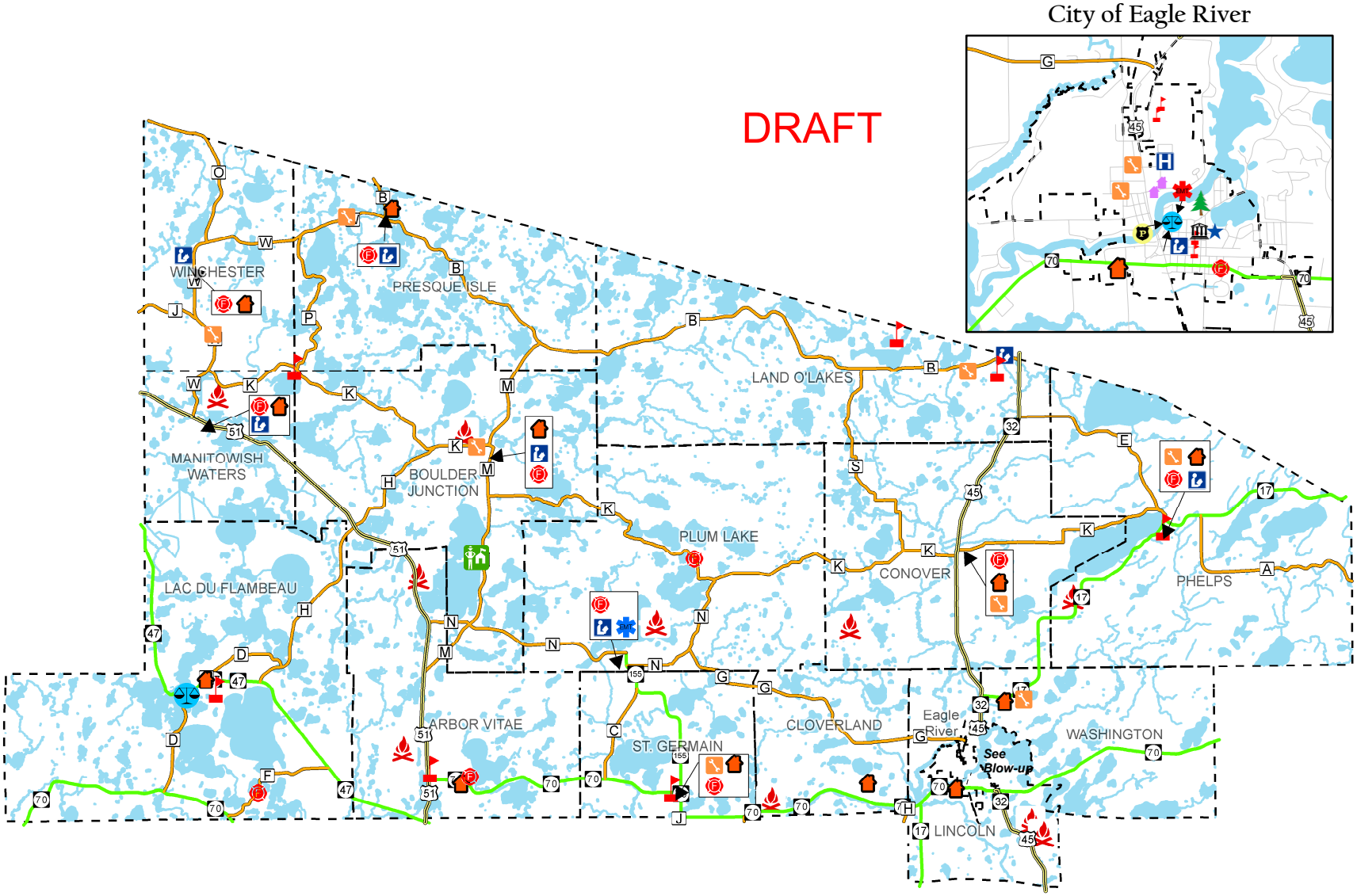
In addition to emergency service facilities, other community facilities are also important in hazard mitigation planning. Government administration buildings serve as the headquarters that link to resources in helping solve potential problems. Hospitals are very important for knowing where injured residents have to be transported and as to how many people each hospital can handle if a hazard would breakout.

Three general medical and surgical hospitals serve Vilas County: Aspirus Eagle River Hospital in the City of Eagle River, a 25-bed facility, Howard Young Medical Center located primarily in Oneida County (Arbor Vitae/Woodruff area). Clinics include Marshfield Clinic Eagle River Center, and Aspirus Clinics in Eagle River and Land O' Lakes.

There are various assisted living facilities located around Vilas County. Elderly care facilities are vulnerable, because of the high level of assistance with the residents that live there. The schools are another facility that is important since hundreds of the county's children are there for much of the year. Map 7 shows the location of selected types of critical community facilities within Vilas County.

Vilas County, Wisconsin Critical Facilities Map 7

DRAFT



Minor Civil Divisions
US Highways
State Highways
County Highways
4
Water
Trees for Tomorrow
Schools

Ambulance Service
City Garage / Town Garage
City Hall
Court House
Emergency Operation Center
Fire Station
Hospital

Library
Assisted Living Facility
Police Department
Ranger Station
Sheriff's Department
Town Hall

N
W E
S

0 1 2 4 6 8 Miles

Source: WI DNR, NCWRPC, ATC

This map is neither a legally recorded map nor a survey and is not intended to be used as one. This drawing is a compilation of records, information and data used for reference purposes only. NCWRPC is not responsible for any inaccuracies herein contained.

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INVENTORY & VALUE OF STRUCTURES/PROPERTY IN VILAS COUNTY

The value of the real estate and personal property in a community reflects the upper end of the potential for property damage in each community. The annual equalized value of each municipality represents the Department of Revenue estimate of market value (Agricultural land is included at Use Value) of all taxable property. Property tax levies of jurisdictions are apportioned to each municipality on the basis of equalized value. Table 8 lists each municipality's total equalized values for real estate, personal property, and all property and 0020 the percentage each municipality represents of the county total.

Table 8: Value by Municipality, 2022

Municipality	Assessed Land Value	Assessed Improvement Value	Managed Forest Land Value	Estimated Fair Market Value
CITY OF EAGLE RIVER	$52,116,900	$133,026,300	$0	$222,577,300
TOWN OF ARBOR VITAE	$209,753,900	$336,336,400	$9,086,900	$681,867,900
TOWN OF BOULDER JUNCTION	$248,110,700	$249,219,600	$1,595,200	$624,844,000
TOWN OF CLOVERLAND	$120,748,000	$127,179,600	$4,773,200	$350,142,400
TOWN OF CONOVER	$224,505,500	$259,732,600	$8,984,300	$451,112,800
TOWN OF LAC DU FLAMBEAU	$520,103,000	$412,151,000	$15,188,700	$1,187,610,100
TOWN OF LAND O LAKES	$247,709,000	$199,280,000	$13,709,200	$515,880,800
TOWN OF LINCOLN	$238,453,000	$338,846,900	$1,034,100	$743,538,900
TOWN OF MANITOWISH WATERS	$291,132,100	$271,100,700	$2,409,300	$752,294,900
TOWN OF PHELPS	$200,203,200	$216,437,200	$5,416,900	$472,648,900
TOWN OF PLUM LAKE	$146,461,000	$109,780,500	$9,723,700	$340,829,800
TOWN OF PRESQUE ISLE	$334,073,000	$257,882,200	$13,615,500	$652,084,200
TOWN OF ST GERMAIN	$336,903,200	$364,652,100	$7,657,000	$836,663,000
TOWN OF WASHINGTON	$257,371,000	$250,224,000	$6,560,000	$740,926,500
TOWN OF WINCHESTER	$150,652,000	$135,867,300	$9,523,100	$333,179,500
County Total	**$3,578,295,700**	**$3,661,716,400**	**$109,277,100**	**$8,906,201,000**

Source: Statement of Values

The valuation of property in a community reflects the potential for property damage across the community. However, only taxable properties are included in this valuation. Tax-exempt government properties are not included. With Vilas County owning many critical facilities that are needed in times of disaster, the potential for damage to these structures could be devastating for the county. In Table 9a, the county-owned facilities are listed with the general location they are in and the value of the facilities. Estimates for local government facilities are given in Table 9b - c. Tribal facilities are included in Table 9d.

Table 9a: Value of County-Owned Properties

Name	Value*	Location
Courthouse - Justice Center	$62,745,796	Eagle River city
Highway Department	$4,701,559	Eagle River city
Highway Shop - Arbor Vitae	$3,511,296	Arbor Vitae town
Highway Shop - Boulder Jct	$2,933,789	Boulder Junction town
Forestry Office / Shop	$1,263,928	Eagle River city
Fairgrounds	$1,044,886	Eagle River city
Oldenburg Sports Complex	$472,962	Cloverland town
Misc. Parks & Recreation	$3,737,746	Various locations
E911 System, Towers, and buildings	$4,449,831	Various locations
Total	**$84,897,170**	**Above locations**

**Includes insured buildings, contents, and property in the open.*

Source: Statement of Values, WI Local Gov. Prop. Ins. Fund & NCWRPC Estimate.

Table 9b: Value of City Owned Properties

Property	Value
Street Department	$2,162,583
City Parks & Rec. - various	$867,500
Pleasure Island Golf Course	$943,300
McKinley Blvd Golf Course	$3,664,700
Info Bureau - Depot	$350,100
City Hall	$2,889,200
Sewer & Water - various	$3,084,000
Liftstations - various	2,479,700
Pine Substation	$490,000
Adams & Mill Substation	$1,934,900
Airport	$2,428,200
Misc. Buildings/Facilities	$1,441,300
Sunstien Substation	$4,258,900
Wastewater Treatment Plant	$11,216,300
Building Contents & Property in the Open	$18,742,411
Total	**$57,892,894**

Source: City of Eagle River

Table 9c: Value of Town Owned Properties		
Municipality	**Property**	**Value***
Arbor Vitae town	Town Hall / Community Center	$1,256,615
	Fire Station	$1,426,763
	Fireman's Park	$353,822
	Town Garage	$868,529
	Brandy Park	$746,055
Boulder Junction town	Town Hall / Community Center	$1,961,177
	Fire Station	$677,329
	Museum	$215,233
	Misc. Recreation	$132,233
	Maintenance Garage	$572,264
	Recycling Center	$112,821
Cloverland town	Town Hall	$457,017
Conover town	Town Hall / Community Center / FD	$2,468,400
	Chamber Info Center	$525,360
	Town Garage	$471,593
	Town Park	$1,534,214
Lac du Flambeau town	Town Hall	$1,955,374
	Fire Department	$1,246,946
	Transfer Station	$255,297
Land O' Lakes town	Town Hall / FD	$3,165,636
	Library	$2,895,400
	Misc. Recreation	$950,629
	Town Garage	$795,269
	Airport	$907,227
	Misc. Property	$128,692
Lincoln town	Town Hall	$1,338,577
Manitowish Waters town	Town Hall / Community Center	$2,857,009
	Lion's Pavilion and other recreational	$217,466
	Town Garage and Misc. Storage	$682,040
	Airport	$1,261,426
	Library	$2,329,110
	Rest Lake Park	$1,243,439
Phelps town	Town Hall / Garage / FD	$2,765,183
	Misc. Property	$215,800
Plum Lake town	Town Hall	$809,200
	Town Garages/Salt Shed/Storage	$2,290,200
	Library	$1,922,200
	Misc Recreation & Other	$1,71,400
	Fire Department	$619,400
	Ambulance Station	$308,400
Presque Isle town	Town Hall/ Community Cntr / Library	$2,282,011
	Fire Department	$889,497
	Town Garage / Salt Shed	$1,442,472
	Transfer Station	$164,245
	Misc. Recreation	$305,988
St. Germain town	Town Hall	$1,726,345
	Fire Department	$na
Washington town	Town Hall	$424,353
	Town Garage	$894,729
	Recycling Center	$83,892
	Misc. Property	$11,896
Winchester town	Library	$629,728
	Park Pavilion	$241,935
	Town Garages	$153,799
	Emergency Services Bldg	$579,563
	Recycling Center	$120,630

*Source: Local Gov. Insurance Declarations & NCWRPC Estimates. *Includes contents & property in the open*

Table 9d Value of Tribal Owned Properties	
Name	**Value**
Casino / Hotel	$125,000,000
Tribal Police Dept.	$600,000
Zaasijiwan Headstart	$240,000
Cultural Center	$3,500,000
Community Wellness Ctr	$7,000,000
Youth Center	$450,000
Tribal Planning & Info Ctr	$600,000
Tribal Center	$4,700,000
GLITC	$600,000
Health Care Center	$1,500,000
Family Resource Center	$330,000
Total	**$144,520,000**

Source: NCWRPC Estimates.

Vilas County Courthouse. (NCWRPC)

INTRODUCTION

Analyzing the hazards in a community is an important and vital step in the mitigation plan update process. Before mitigation strategies can be determined, a risk assessment must be made. Part III of the Vilas County All-Hazards Mitigation Plan Update will focus on the following:

- Identification of all types of natural hazards that can affect Vilas County
- An analysis of the hazards identified as pertinent to Vilas County

The Hazard Analysis will consist of:

- Background Information
- History of previous occurrences of hazard events
- An analysis of the County's vulnerability to future events
- An estimate of future probability and potential losses from the hazard

HAZARD IDENTIFICATION

The process of identifying those hazards that should be specifically addressed in the Vilas County All-Hazards Mitigation Plan Update was based on consideration of a number of factors. The process included a review of past hazard events to determine the probability of future occurrences and threat to human safety and property damage.

Worksheets from the Wisconsin Guide to All-Hazards Mitigation Planning were used by the Plan Update Taskforce to evaluate and rank the listing of possible hazards to help identify which hazards should be included in the Plan Update according to threat to human safety and possible damage to property.

The resulting priority ranking of hazards accepted by the committee is as follows:

1. Thunderstorms/ High Winds/Hail/Lightning
2. Winter Storm/Extreme Cold
3. Tornado
4. Epidemic/Pandemic
5. Drought/Extreme Heat
6. Forest Fires/Wildfires
7. Hazmat Incident
8. Electromagnetic Pulse (EMP)/ Long-term Power Outage
9. Dam Failure/Flooding

This Plan Update focuses on natural hazards that have or could cause disasters that can be mitigated on a local level. Technological or manmade hazards include things like transportation incidents, explosions, and structural fire, civil or prison disturbances, mass casualty events (active shooter, etc.), nuclear incidents, war, and terrorism. Vilas County already has action plans for these types of events, so they are not included in this planning process. Low magnitude earthquakes occur in Wisconsin every few years, but none have exceeded a magnitude of 3.9, which would have vibrations similar to the passing of a semi-truck, therefore, earthquakes are not covered in this plan. Vilas County does not have coastal hazard issues and conditions for landslide or subsidence problems are not significant in the County.

It should be noted that the project to develop this plan was limited in its scope by the available budget. Some things are covered indirectly like disease vectors (insect, rodent, bird, etc.) in the epidemic section. Other issues are beyond the established scope of work, such as invasive species loss, drug addiction and other community health issues. However, the County may be addressing specific problems through other means. For example, Land and Water Conservation works on invasive species, and the Health Department deals with a wide range of community health issues beyond bacteria and viruses.

CLIMATE CHANGE & HAZARD RISK ASSESSMENT

While the assessment of hazard risk is largely based on past weather events and existing development trends, projecting future risks and vulnerabilities is also subject to the influence of possible large-scale, longer-term climatic changes. This section explores how the area's climate is changing and how climate change may impact the probability and severity of natural hazards.

There is ongoing debate over the existence, causes, severity, and impacts of global climatic changes, such as global warming. According to the National Academy of Sciences, the Earth's surface temperature has risen by about 1 degree Fahrenheit in the past century, with accelerated warming during the past two decades. There is strong evidence that most of the warming over the last 50 years is attributable to human activities. Increasing global temperatures are expected to raise sea level and impact local climate conditions such as precipitation levels. Changing regional climate could alter forests, crop yields, and water supplies. It could also affect human health, animals, and many types of ecosystems. Most of the United States is expected to warm, although sulfates may limit warming in some areas. Scientists currently are unable to determine which parts of the United States will become wetter or drier, but there is likely to be an

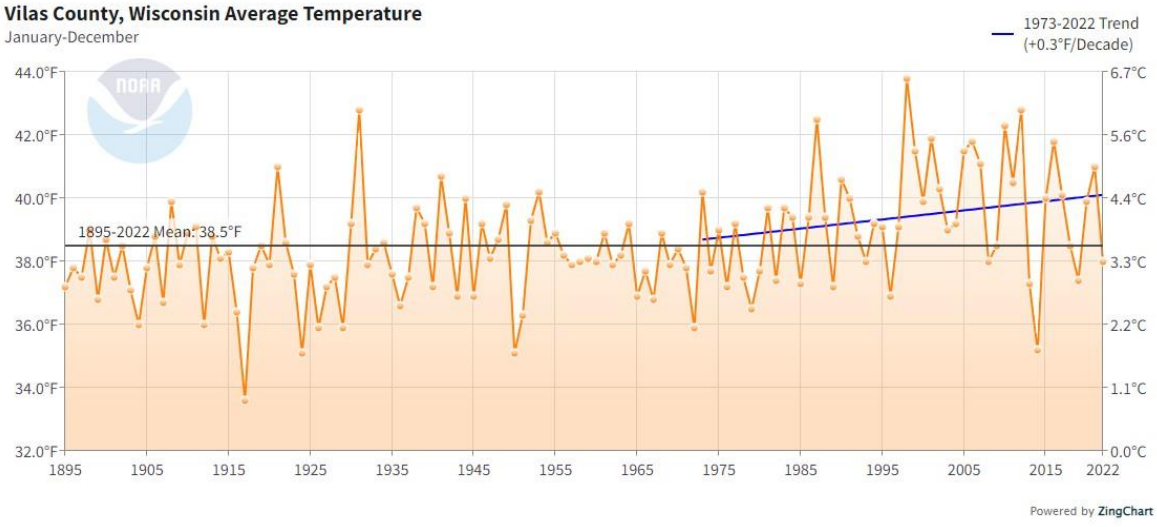
overall trend toward increased precipitation and evaporation, more intense rainstorms, and drier soils.

Regardless of the debate over the causes of climate change, there is clear evidence that Wisconsin's climate is indeed changing. The 2003 report entitled Confronting Climate Change in the Great Lakes Region published by the Union of Concerned Scientists and the Ecological Society of America projected that by 2030, summers in Wisconsin may resemble those in Illinois overall, in terms of temperature and rainfall. By 2100, the summer climate will generally resemble that of current-day Arkansas, and the winter will feel much like current-day Iowa.

To further document these climate changes and explore their impacts on our State, the Wisconsin Initiative on Climate Change Impacts (WICCI) was formed as a collaborative effort of the University of Wisconsin and the Wisconsin Department of Natural Resources. Also, The National Oceanic and Atmospheric Administration (NOAA) tracks historical and current temperature and precipitation data. The following are some of the key climatic trends being experienced in Wisconsin according to analyses. (www.wicci.wisc.edu & www.ncei.noaa.gov/monitoring):

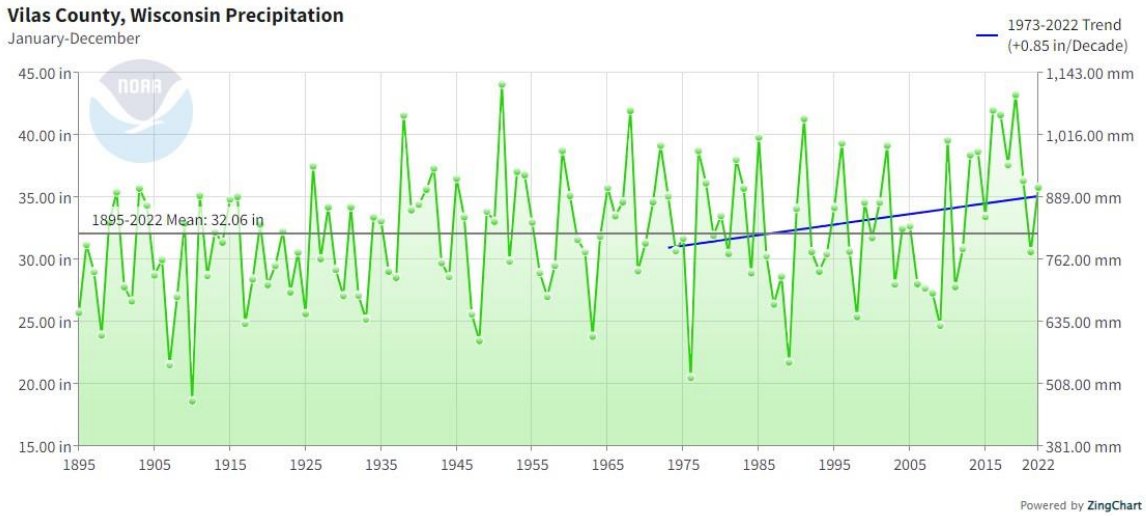
1. **RISING TEMPERATURES** - Average temperatures are rising and are projected to continue to rise. The annual average temperature in Vilas County has increased approximately 0.3 Fahrenheit every decade between 1973 and 2022. In total the average temperature has increased approximately 2 degrees over that time period.

Vilas County Annual Average Temperature, 1895-2022, with 50-Year Trendline



2. **MORE AND HEAVIER PRECIPITATION** - Vilas County is experiencing more annual precipitation, and is expected to get wetter in the future, but there is significant seasonal and geographic variation to the precipitation. The data shows that the annual average precipitation has increased across the County over the past 50 years by approximately 0.85 inches every decade.

Vilas County Annual Average Precipitation, 1895-2022, with 50-Year Trendline



3. **POTENTIAL CLIMATE CHANGE OUTCOMES ON NORTHERN WISCONSIN**

- Wildfires are expected to be more frequent and burn more acres.
- Increased likelihood of droughts.
- Warmer winters reduce snowpack and accelerate snowmelt.
- Shrinking frozen ground duration.
- Invasive species and forest pests will benefit from climate change.

HAZARD ANALYSIS

The hazard analysis for each hazard included in this Plan Update is broken down into four components, as follows:

1. Background on Hazard - The next step after identifying a hazard is to define the hazard and give some general background behind it. This can include occurrence of the hazard within the County or State. This

section may also give some indication of the risk to public health and safety and to personal and public property.

2. History of Hazards - Past experiences of disasters are an indication of the potential for future disasters for which Vilas County would be vulnerable. A review of past occurrences for each identified hazard in Vilas County was completed.

Some disasters have had damage that exceeded the capabilities of local communities and State agencies. Federal assistance is then requested. Federal assistance may be offered through a variety of programs. Assistance may be directed to agricultural producers, individuals and families, businesses, or local governments. There have been 4 natural disasters in Vilas where a Presidential Declaration was requested since 1971. They include the following:

- 1976 Drought - Emergency Declaration Approved
- 1984 Tornados - Emergency Declaration Approved
- 1999 Severe Storms/Flooding - Disaster Declaration Approved
- 2020 Covid-19 Pandemic-Disaster Declaration Approved

It should be noted that this significantly underestimates the number of hazard events that have occurred in Vilas County. Almost every year there are significant weather events or disasters that cause thousands of dollars in damage for which no Federal disaster assistance is requested. Major indicators of hazard severity are the deaths, injuries, and economic losses resulting from natural hazards and disasters.

The National Oceanic and Atmospheric Administration (NOAA) and National Climatic Data Center (NCDC) publish the National Weather Service (NWS) data describing recorded weather events and resulting deaths, injuries, and damages. From January 1, 1950, to December 31, 2022, NCDC reported 354 days with severe weather events for Vilas County. There was 1 death, 4 injuries, 46 days with property damage, 4 days with crop damages over that period.

Note that since the earlier NCDC data is somewhat incomplete, this report focuses on the 10-year period from 2013 to 2022 for hazard analysis purposes. Other sources of data are used to supplement the NCDC data. These sources included other plans and reports, documents from the Vilas County Emergency Management Department, past local newspaper articles, the Wisconsin Department of Natural Resources (DNR), Wisconsin Emergency Management (WEM), and the National Weather Service.

3. Vulnerability Assessment For Hazards - For each hazard identified, a summary of the impact that may be caused to the community is given. When possible, existing buildings, infrastructures, and critical facilities located in the hazard areas are identified. Critical facilities are community buildings that are especially important to the health and welfare of the population following hazard events. Examples of such facilities include hospitals, police & fire stations, town halls, and shelters.

Because this is a multi-jurisdictional plan, FEMA requires that the plan access each jurisdiction's risks where they vary from the risks facing the entire planning area. This section of the plan will identify variations in vulnerability for specific municipalities where they occur.

4. Future Probability and Potential Dollar Losses for Hazard - The historic data and vulnerability assessment for each hazard is used to project the potential future probability of that hazard occurring in the County and the potential damages in dollars that might be reasonably expected. This section sets the benchmark to mitigate for each hazard.

HAZARD ANALYSIS: TORNADOS

Background on Tornado Hazard:
A tornado is a relatively short-lived storm composed of an intense rotating column of air, extending from a thunderstorm cloud system. It is nearly always visible as a funnel, although its lower end does not necessarily touch the ground. Average winds in a tornado, although never accurately measured, are between 100 and 200 miles per hour, but some tornados may have winds in excess of 300 miles per hour.

A tornado path averages four miles but may reach up to 300 miles in length. Widths average 300 to 400 yards, but severe tornados have cut swaths a mile or more in width or have formed groups of two or three funnels traveling together. On average, tornados move between 25 and 45 miles per hour, but speeds over land of up to 70 miles per hour have been recorded. Tornados rarely last more than a couple of minutes in a single location or more than 15 to 20 minutes in a ten-mile area.

Tornados are classified into six intensity categories, EF0-EF5. This scale is an updated or "enhanced" version of the Fujita Tornado Scale (or "F Scale"). The scale estimates wind speeds within tornados based upon the damage done to buildings and structures. It is used by the National Weather Service in investigating tornadoes and by engineers in correlating building design and construction standards against anticipated damage caused by different wind speeds.

Wisconsin lies along the northern edge of the nation's maximum frequency belt for tornados, known as "Tornado Alley". Tornado Alley extends northeast from Oklahoma into Iowa and then across to Michigan and Ohio. Winter, spring and fall tornados are more likely to occur in southern Wisconsin than in northern counties. Tornados have occurred every month in Wisconsin.

History of Tornados in Vilas County:
Vilas County has had 14 verified tornados, from 1950 to 2017 (Table 11). In addition, the NCDC data contains 3 funnel clouds and 1 dust devil report. Vilas hasn't had a confirmed tornado touch down since August of 2020.

Table 10
Tornado Wind and Damage Scale

Tornado Scale	Wind Speeds	Damage
EF0	65 to 85 MPH	Some damage to chimneys, TV antennas, roof shingles, trees, and windows.
EF1	86 to 110 MPH	Automobiles overturned, carports destroyed, trees uprooted
EF2	111 to 135 MPH	Roofs blown off homes, sheds and outbuildings demolished; mobile homes overturned.
EF3	136 to 165 MPH	Exterior walls and roofs blown off homes. Metal buildings collapsed or are severely damaged. Forests and farmland flattened.
EF4	166 to 200 MPH	Few walls, if any, standing in well-built homes. Large steel and concrete missiles thrown far distances.
EF5	OVER 200 MPH	Homes leveled with all debris removed. Schools, motels, and other larger structures have considerable damage with exterior walls and roofs gone. Top stories demolished

Source: National Weather Service

Most recently, there have been two confirmed EF1 tornados in Vilas County. On August 9, 2020, as thunderstorms tracked across north-central Wisconsin during the evening, three tornadoes and wind damage were reported through the area. One tornado produced a path of tree damage, and its peak winds were estimated to be around 95 MPH. The other tornado in the County also produced tree damage and peak winds were estimated to be around 90 MPH. Both of these tornadoes lasted under 15 minutes and resulted in no injuries, deaths, or property damage.

On May 22, 2011, unstable air combined with a surface boundary and an upper air disturbance to produce thunderstorms. Storms became severe during the afternoon and early evening, causing numerous incidents of large hail and isolated straight-line wind damage. A spotter saw a funnel cloud near Lac du Flambeau.

On July 27, 2010, a cold front combined with a warm and humid air mass triggered thunderstorms that moved across northeast Wisconsin. The storms produced hail to golf ball size, wind gusts to 95 mph, funnel clouds and heavy rainfall that led to flash flooding. Downed trees and power lines were common, and thousands of homes lost power. A funnel cloud was spotted at Lac du Flambeau.

On August 13, 2008, an upper-level storm system produced weather conditions favorable for the development of funnel clouds across central and northern Wisconsin. A funnel cloud was seen and photographed by several people near Little St. Germain Lake. None of the funnels touched the ground as tornadoes.

In August of 1998, a large "dust devil" developed and picked up two lawn chairs and knocked over concrete parking markers in Arbor Vitae.

Table 11 Reported Tornados in Vilas County							
Date	**Time CST**	**Location**	**EF Scale**	**Width Yards**	**Path Miles**	**Injuries**	**Est. Cost**
5/4/64	1800	Saint Germain	1	125	2.0	1	25K
6/26/69	1630	2 mi W Manitowish Waters - 3 mi SW Presque Is.	1	35	9.0		250K
6/26/69	1700	Lac Du Flambeau - 9 mi NW Land O Lakes	2	35	28.9		250K
7/7/70	1900	Winchester - Boulder Junction - Conover	1	n/a	37.9		n/a
7/12/73	0300	Boulder Junction - Sayner	1	100	19.5		25K
6/13/81	2045	Sayner - 3 mi NE Sayner	1	50	3.0		25K
7/3/83	0439	Eagle River	1	20	0.5		250K
4/27/84	1437	Fawn Lake - Star Lake	3	880	29.0	3	25M
7/24/86	1415	Saint Germain	1	50	0.3		250K
7/24/88	2030	Eagle River	1	50	0.1		250K
8/1/88	1852	1 mi W Saint Germain	1	50	1.0		25K
8/1/88	1922	2 mi SE Eagle River	0	25	0.3		0
4/26/94	1455	1.5 mi N Conover - 3 mi SE Land O'Lakes	1	150	4.5		50K
7/14/95	1640	Phelps	1	250	3.5		50K
8/1/98	1310	Arbor Vitae	Dust Devil	n/a	n/a		0
8/13/08	1735	St. Germain	Funnel Cloud	n/a	n/a		0
7/27/10	1845	Lac du Flambeau	Funnel Cloud	n/a	n/a		0
5/22/11	1755	Lac du Flambeau	Funnel Cloud	n/a	n/a		0
8/09/20	18:44	Starlake	1	400	6.18	0	0
8/09/20	19:28	St Germain/Cloverland	1	250	5.89	0	0
					Totals	4	26.53M

Source: National Weather Service and NCDC

The strongest Vilas County tornado during this time period occurred on April 27, 1984, and warranted a Presidential Emergency Declaration. This was an EF-3 tornado which developed near Fawn Lake in Oneida County and travelled to Star Lake in Vilas County before dissipating. The tornado leveled several thousand acres of forest, destroyed or damaged 80 homes and cabins, ripped up docks and tossed boats in the air or wrapped them around trees. A Fawn Lake man was killed after getting his family to safety. The NCDC report indicates that three other people were injured during the event. In Vilas County, the hardest hit areas were St. Germain Lake, Lost Lake and Star Lake. The tornado travelled 29 miles and reached a maximum width of 880 yards with a duration of about 30 minutes. Damages were estimated at around $25 million.

On July 7, 1970, an EF-1 tornado developed across Iron County in northwest Wisconsin and travelled east-southeastward for nearly 38 miles across Vilas County. The tornado travelled from Winchester to Boulder

Junction to Conover. Extensive damage to woods and lake property was noted in the path of the tornado.

On May 4, 1964, an EF-1 tornado was first reported 10 miles southwest of St. Germain and travelled just over 7 miles before dissipating in St. Germain. The tornado had a maximum width of 125 yards. The local storm report indicated the tornado touched down twice and crossed over the Big St. Germain drawing water to a height of 200 feet. There was considerable damage to resorts and woods in the path of the tornado. The NCDC report indicated that one person was injured.

Tornado Vulnerability Assessment:
Although Vilas County is mostly a rural county, there are concentrations of population scattered throughout County. Subdivisions, rural unincorporated communities like Arbor Vitae, Lac du Flambeau, Boulder Junction, etc. and the Eagle River area can be regarded as more vulnerable because these areas pose more of a risk to human safety and property damage. Map 8 illustrates these areas within the County.

Mobile homes are of significant concern in assessing the hazard risks from tornados. In general, it is much easier for a tornado to damage and destroy a mobile home than standard constructed houses and buildings. Since about 5 percent of Vilas County's housing units are mobile homes, vulnerability to health and safety along with property damage is much greater. Research by the NWS shows that between 1985 and 1998, 40 percent of all deaths in the nation from tornados were in mobile homes, compared to 29 percent in stick-built homes, and 11 percent in vehicles.

While mobile homes are scattered throughout the County, many are concentrated in mobile home parks. Vilas County has approximately 10 mobile home parks, see Map 8 for locations. The total number of mobile homes reported in the 2020 American Community Survey for Vilas County was 1,218.

Besides mobile homes, there are many other areas vulnerable to tornados such as campgrounds. Like mobile homes parks, campgrounds are of concern in the County because often times there is a concentration of people in them and there is little shelter provided. Map 8 also shows the location of campgrounds in the County.

Youth camps present another concern for Vilas County. Youth camps operate during the summer months and contain large populations of juveniles and young adults. Most youth camps consist of cabins used for sleeping and daily activities. A large number of these cabins are wood structures with no basements. This presents a problem for safely sheltering people in the event of a tornado.

The following is a list of things that may be affected by a tornado. Much of this list can be referenced in Part II.

- Community facilities – hospitals, schools, "prisons/jails"
- Public Service - police and fire departments
- Utilities - power lines, telephone lines, radio communication
- Transportation – debris clean-up
- Residential – nursing homes, garages, trees and limbs, siding, windows
- Businesses – signs, windows, siding, billboards
- Agricultural - buildings, crops, livestock

Based on review of historic tornado events, no specific areas in the county have unusual risks. The risk for tornado is relatively uniform and a countywide concern. The City of Eagle River (planning meeting) and Town of Lac du Flambeau (mitigation survey) identified tornado as a significant concern due to potential for damage, disruption, and power outage.

Future Probability and Potential Dollar Losses – Tornados:
While uncommon, the two tornados in 2020 serve as reminders of the threat of a tornado in Vilas County. Prior to these tornados, one would have to go back 25 years to 1995 for the last tornado that touched down in Vilas County. However, the funnel cloud sightings between 2008 and 2011 also posed a threat to the County.

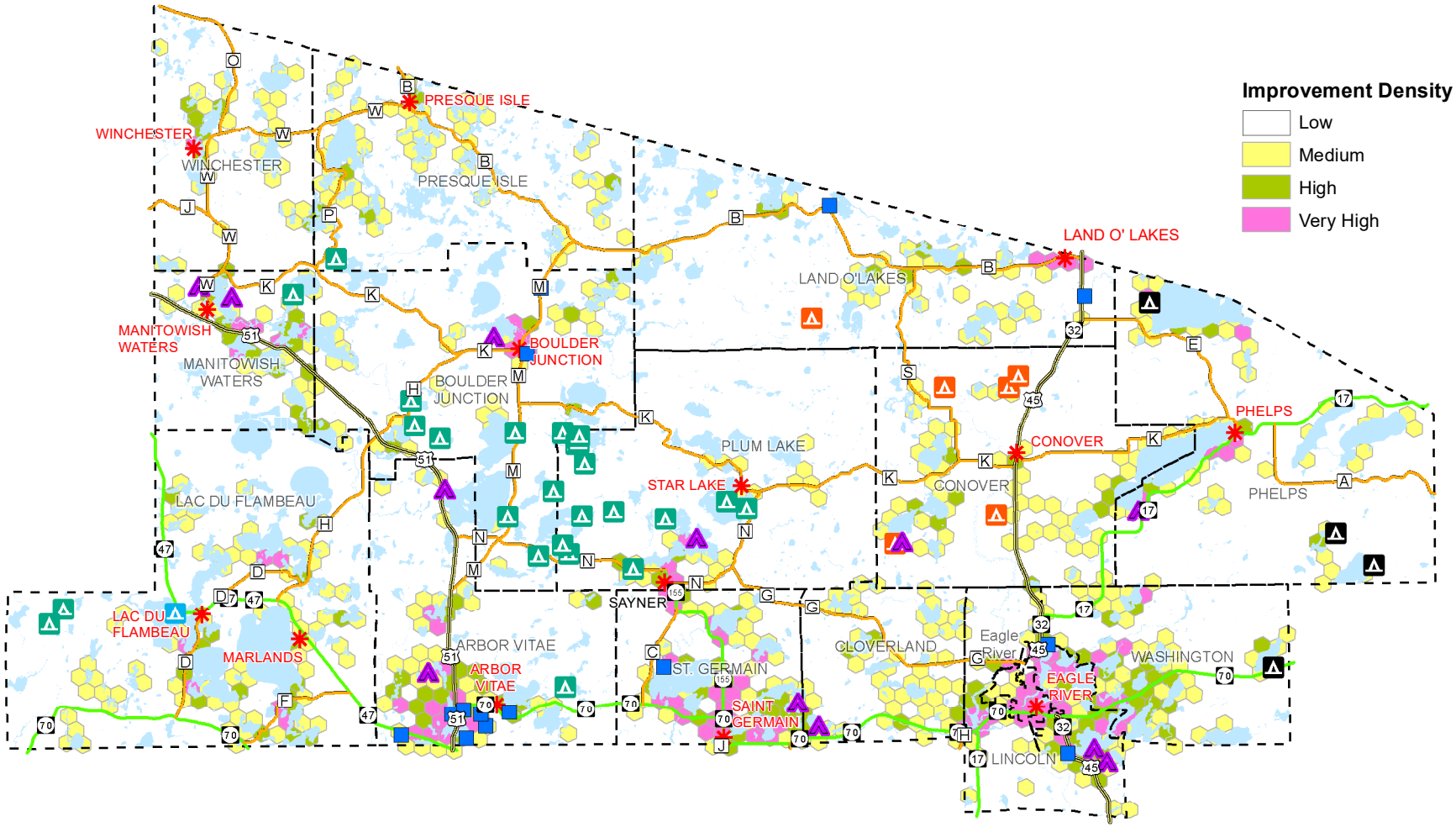
Incorporating the extended historic data available from the National Weather Service (1950 to 2022), the tornado frequency in Vilas would be about every 4.5 years on average. This equates to a probability of 0.22 or about a 22 percent chance in a given year. However, it is difficult to account for fluctuations in the occurrences where there is a very active period in the 1980's between periods of no activity in the 1950's and 2000's. Table 12 indicates the probability of tornados of a specific magnitude.

Historic data is again used to estimate potential future dollar losses due to tornadoes. Estimated damages resulting from various tornados in Vilas County range from $0 to $25 million. On average, Vilas County might expect damages of $1.7 million per tornado, however, only one of these 16 historic tornados resulted in damages exceeding $1 million, five others had $250,000, and the rest were $50,000 or less. Over the next ten-year period, tornado losses in Vilas County could approach $4.3 million.

Table 12 Probability of Intensity for any given Tornado in Vilas County						
Tornado Scale	**EF0**	**EF1**	**EF2**	**EF3**	**EF4**	**EF5**
Number of Reported Tornados*	1	13	1	1	0	0
Probability of Occurrence	6.3%	81.1%	6.3%	6.3%	<1.0%	<1.0%
*Source: National Weather Service & NCWRPC – *Based on historical data from 1950 to 2022*						

Storm Damage: Trees Down Near Conover, July 2010. (WDNR)

Vilas County, Wisconsin Tornado Vulnerability Map 8



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Source: WI DNR, NCWRPC, ATC

HAZARD ANALYSIS: WINTER STORMS / EXTREME COLD

Background on Winter Storms/Extreme Cold Hazard:
A variety of weather phenomena and conditions can occur during winter storms. For clarification, the following are National Weather Service approved descriptions of winter storm elements:

Heavy snowfall – the accumulation of six or more inches of snow in a 12-hour period or eight or more inches in a 24-hour period.

Lake Effect Snow – Snow showers are created when cold, dry air passes over a large warmer lake, such as one of the Great Lakes, and picks up moisture and heat resulting in heavy but localized snow fall. This type of snowstorm has the potential to be a significant hazard or be life threatening.

Blizzard – the occurrence of sustained wind speeds in excess of 35 miles per hour accompanied by heavy snowfall or large amounts of blowing or drifting snow.

Ice Storm – an occurrence where rain falls from warmer upper layers of the atmosphere to the colder ground, freezing upon contact with the ground and exposed objects near the ground.

Freezing drizzle/freezing rain – the effect of drizzle or rain freezing upon impact on objects that have a temperature of 32 degrees Fahrenheit or below.

Sleet – solid grains or pellets of ice formed by the freezing of raindrops or the refreezing of largely melted snowflakes. This ice does not cling to surfaces.

Wind chill – an apparent temperature that describes the combined effect of wind and low air temperatures on exposed skin.

Winter storms can vary in size and strength and include heavy snowfall, blizzards, ice storms, freezing drizzle/freezing rain, sleet, wind chill, and blowing and drifting snow conditions. Extremely cold temperatures accompanied by strong winds can result in wind chills that cause bodily injury such as frostbite and death.

True blizzards are rare in Wisconsin. They are more likely to occur in the northwestern part of the state than in south-central Wisconsin, even though heavy snowfalls are more frequent in the southeast. However, blizzard-like conditions often exist during heavy snowstorms when gusty

winds cause the severe blowing and drifting of snow. Heavy snow and ice storms have been part of nearly every winter in Vilas County.

Dangerously cold conditions can be the result of the combination of cold temperatures and high winds. The combination of cold temperatures and high wind creates a perceived temperature known as "wind chill". Wind chill is the apparent temperature that describes the combined effect of wind and air temperatures on exposed skin. When wind blows across the skin, it removes the insulating layer of warm air adjacent to the skin. When all factors are the same, the faster the wind blows the greater the heat loss, which results in a colder feeling. 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.

The National Weather Service issues wind chill advisories when wind chill readings of -20 to -34 degrees are expected. Wind chill warnings are issued when wind chill values are expected at or below -35 degrees. Extreme cold events are most likely during the months of January and February.

History of Winter Storms/Extreme Cold in Vilas County:
The NCDC has reported 51 major winter storm events for Vilas County between 2013 and 2022. All of these storms contained some form of cold, snow, sleet, freezing rain, or ice conditions.

More recently, on February 24, 2019, a fierce, late winter storm produced heavy snow, freezing rain, and high winds across much of central and northern Wisconsin. At the height of the storm, travel was not recommended across parts of central and northern Wisconsin as blizzard conditions made travel nearly impossible. Some of the highest snowfall totals for the two-day storm included 18.9 inches near Eagle River and wind gusts over 40 miles per hour. The combination of ice, snow, and strong winds caused power outages and tree damage in many locations.

On October 27, 2017, snow showers developed in the Lake Superior snowbelt as cold air wrapped around a low-pressure system that moved across northern Wisconsin. Snowfall totals were as high as 6 inches in 12 hours in northwest Vilas County. A total of 6.0 inches of snow fell at Presque Isle.

Vilas County must also contend with lake effect snow. One example occurred on November 10, 2011, when lake-effect snow showers developed behind a departing low-pressure system as cold air passed over the much warmer waters of Lake Superior. Parts of northwest Vilas County received more than 8 inches of snow. The highest totals were 8.8 inches at Presque Isle, 8.4 inches two miles east of Presque Isle and 8.0 inches at Boulder Junction.

On April 16, 2003, the north-central part of the state was affected by an ice storm that brought significant freezing rain and sleet. Dozens of traffic accidents were reported on icy roads. The weight of accumulated freezing rain downed trees, limbs and power lines. A total of 15,000 people were without power into the morning of the 18th in Lincoln, Oneida and Vilas Counties.

In March 1996, a powerful storm brought two waves of winter weather to North Central Wisconsin over a 38-hour period. The heaviest snow occurred in Vilas, Oneida, Forest and Langlade counties where 6 to 9 inches were measured between the 23rd and 24th. Later, a mixture of freezing rain, sleet and snow redeveloped as a powerful cold front strengthened pushing colder air into the region. The mixed precipitation changed over to heavy snow northwest of a line from Merrill to Iron Mountain, Michigan. An additional 6 to 12 inches of snow fell in this area between the 24th and the 25th. Strong north winds gusting as high as 40 mph produced blizzard conditions at times, with visibilities as low as 100 feet. Snow drifts reached heights of 6 to 8 feet on some of the rural county roads in Oneida and Vilas counties. Total snow accumulations from the two-day event included: 20 inches in northwest Vilas County with 19 inches at Arbor Vitae.

On November 15, 1996, Vilas County experienced one of the worst ice storms in a few decades. Trees, power lines, and roads were coated with up to 2 inches of ice. Damage was extensive and power was out over 3-days for some. Shelters were set up to keep people warm.

Blizzard conditions affected Vilas County on January 29, 1996, when a powerful artic cold front roared across central and northeast Wisconsin. Strong winds gusting as high as 45 mph whipped fresh, powdery snow into a fury, resulting in zero visibility and icy roads. Cold temperatures and wind created wind chill readings in the 30 to 50 below zero range.

The National Weather Service issues wind chill advisories when wind chill readings of -20 to -34 degrees are expected. Wind chill warnings are issued when wind chill values are expected at or below -35 degrees. The NCDC has reported 6 extreme cold events for Vilas County between 2008 and 2017.

The most recent extreme cold event was on January 7, 2015. This was actually part of cold snap resulting from a surge of bitter artic air with seven straight days below zero and daily average temperatures 15 to 20 degrees below normal. The coldest temps were on January 7 with a wind chill warning in effect for a large part of the state including Vilas County.

Temperatures fell into the 10 to 15 below zero range across the county and combined with high winds to produce bitter cold wind chills from -32 to -38 degrees.

In February 1996, actual temperature reached 44 degrees below zero at Arbor Vitae during a five-day cold spell that saw a number of record lows set and at least one death across central and northeastern Wisconsin. Wind chill readings were 50 to 70 degrees below zero. The cold weather was responsible for numerous school closures, stalled vehicles, frozen pipes, and broken water lines. Electrical and telephone outages occurred due to snapped wires and lines. All of the outdoor events of the Badger State games had to be cancelled and ski hills were forced to close.

Winter Storms / Extreme Cold Vulnerability Assessment:
Winter storms and extreme cold present a serious threat to the health and safety of affected citizens and can result in significant damage to property. Heavy snow or accumulated ice can cause the structural collapse of buildings, down power lines, motor vehicle accidents or isolate people from assistance or services. Extreme cold includes the risk of frostbite and hypothermia.

The following is a list of things that may be adversely affected by a winter storm or extreme cold. Many of these community assets can be referenced in Part II.

- Infrastructure – operation of emergency services, operation of public facilities and schools
- Utilities – down power and telephone lines
- LP Gas at residences freezing in temps below -40 degrees.
- Septic systems - freezing
- Transportation – automobile accidents, roadway plowing, salting/sanding
- Residential – roofs
- Businesses – commerce
- Agricultural - livestock

Based on review of the historic events of winter storms and extreme cold, there are no specific areas in the County that have unusual risks. The risk for winter storms and extreme cold is relatively uniform and a countywide concern. Heavy snow, ice and excessive cold are significant concerns for a number of communities as identified in the mitigation survey results from the Towns of Conover, Land O' Lakes, Phelps, Washington and Winchester due to the northern climate of Vilas County. The City of Eagle River, as well, discussed in their mitigation planning meeting their concern

for ice causing power outages and cold temperatures causing freezing problems for their sewer and water facilities.

Future Probability & Potential Dollar Losses – Winter Storms/Extreme Cold:
Based on historical frequency, 2013 to 2022, Vilas County can expect 4.4 significant winter storms per year on average. In other words, the probability is 1.0 or a 100 % chance in a given year.

For extreme cold temperatures, based on historical frequency, Vilas County can expect an occurrence about every 1.4 years on average for a probability of 0.7 or a 70% chance in a given year. Although, since extreme cold temperatures often accompany winter storms, a probability of 100% chance in a given year cannot be ruled out.

Estimating potential future losses for winter storms is difficult. Damages and losses are typically widespread. Auto accidents and additional snow removal time are typical impacts of winter storms, and such claims are not aggregated or tracked for monetary damage. Winter storms do have the potential to be extremely destructive, particularly in the case of ice storms. Potential future losses per incident might range from $5,000 to $2 million based on experiences from other counties.

HAZARD ANALYSIS: ELECTROMAGNETIC PULSE (EMP)/LONG-TERM POWER OUTAGE

Background on EMP/ Long-Term Power Outage Hazard:
An electromagnetic pulse (EMP) is a brief burst of electromagnetic energy. An EMP can be from natural or artificial causes and have the potential to disrupt and permanently damage electrical components and entire systems of infrastructure like the electrical grid, communications equipment, and water and wastewater systems. A natural EMP such as a lightning strike can physically damage objects like buildings and aircraft.

While there is no evidence that EMPs are a physical threat to humans, an EMP attack or naturally occurring geomagnetic disturbance could impact millions of people across the country. Weapons like high altitude-nuclear detonations and electromagnetic bombs can generate EMP and damage or destroy electronic devices over widespread areas.

The first recorded damage from an EMP came from a solar storm in 1859 and is known as the Carrington event. This EMP caused many telegraph systems in North America and Europe to fail. Another notable EMP occurred in 1962, when a 1.4 megaton nuclear weapon was detonated 250

miles above Johnston Island. Streetlights and fuses failed on the Island of Oahu and telephone service was disrupted on the Island of Kauai.

A power failure is defined as any interruption or loss of electrical service due to disruption of power transmission caused by accident, sabotage, natural hazards, or equipment failure. The reasons for a power failure can for instance be a defect in a power station, damage to a power line or other part of the distribution system, a short circuit, or the overloading of electricity mains. Power failure is usually the result of a cascade effect of other hazards including but not limited to thunderstorms, windstorms, ice storms, snowstorms, and flooding.

A significant power failure is defined as any incident of a long duration which would require the involvement of the local and/or state emergency management organizations to coordinate provision of food, water, heating, shelter, etc. A power outage may be referred to as a blackout if power is lost completely. However, if some power supply remains but the voltage level is below the minimum level specified for the system it is termed a brown out.

EMP/Long-Term Power Outage Vulnerability Assessment:

Vilas County, like any other county, is not immune to the potential risks associated with EMPs. The County's reliance on electronic infrastructure leaves it vulnerable to the disruptive effects of a naturally occurring EMP, like a solar storm, or a deliberate human-induced attack.

There are ways to protect or harden items against EMP effects. The first method called "metallic shielding," is where a steel or copper enclosure is put around electrical equipment to create a barrier and harden the equipment. The other method is called "tailored hardening," and this involves redesigning the most vulnerable elements and circuits to be more rugged. These hardened elements will be able to withstand must higher currents. Currently, Vilas County's publicly owned and operated electrical infrastructure has not been protected or hardened against potential EMP events. It is also unlikely that privately owned electrical infrastructure has been protected or hardened either.

Due to society's heavy reliance on electricity, the loss of service can disrupt many ordinary activities. Emergency communications may be impaired if it becomes necessary to rely on radio communications. Power failures pose a great threat to at risk populations such as the elderly, people who are hospitalized, and developmentally disabled. Power failures are particularly threatening to hospitals since many life-critical medical devices and tasks require power. Though facilities like these have developed their own emergency plans to deal with issues such as these. Other life-critical

systems such as telecommunications also require power in emergency situations.

A prolonged power failure can impact heating, food spoilage, inability to cook, water supplies, industrial processes, and businesses. The most likely cause of injury or death is from unsafe use of alternate fuel sources for heating, cooking, and lighting. The entire community is vulnerable to the potential impacts of an electricity outage.

An extended utility outage in the County would represent an inconvenience for most residents, with economic losses for some businesses. The greatest economic loss would be for the utility itself, which must provide the crews and equipment to restore service. It is likely that a widespread and prolonged utility outage would occur making the entire county vulnerable to this hazard. Unlike other hazards, power failure has a history of being largely spread out, affecting more households during one event compared to other hazards. The loss of power generally results from damage to power lines (due to high wind, ice, traffic accidents, etc.) or transmission equipment (often resulting from animal damage). The ongoing maintenance and operational procedures of each utility provider are intended to minimize the risk of service disruption.

History of EMP/Long-Term Power Outage in Vilas County:

Vilas County has never experienced the effects of an EMP event.

The NCDC database for Vilas County between 2013 and 2022 contains 14 storm events that list power outage of varying degrees in the narrative. A storm event typically results in 3 to 5 outages on average within the area, so the actual number of outages is much higher, closer to 200.

Examples of how power outages are instigated, and the breadth of their resulting impacts are described in the following paragraphs.

On December 16, 2021, a strong storm system brought a sweeping cold front through the region during the late evening hours and early morning hours. Strong wind gusts were observed that led to pockets of tree damage and numerous power outages. Over 50,000 people were left without power in northeast Wisconsin and disasters were declared in the towns of Lincoln and Phelps.

Other instances of power outage include an event on August 19, 2011, where thunderstorm winds downed power lines and large tree branches in Conover. Isolated severe thunderstorms produced large hail and gusty winds across north-central Wisconsin. The storms knocked out electricity to 2,000 customers and caused at least $120,000 in damage.

On October 27, 2010, an intense storm produced wind guests over 60 mph across Northeast Wisconsin. The high winds caused widespread power outages with as many as 60,000 residents without power. A Vilas County After-Action report indicates that some areas remained without power for up to a week. The report details how the County dealt with mass care and sheltering, communications, and emergency public information and warning issues. It was noted that the County's sheltering plan(s) worked well. Communications, however, presented some challenges. The principal broadcast radio station serving Vilas County was off the air because of the power outage. Telephone communication was further compromised by homeowners using land line telephone systems that are dependent on household power for their operation. Additionally, households without power were unable to recharge their cell phones.

On April 16, 2003, a cold front that moved through Wisconsin from the north brought a shallow layer of cold air into the north-central part of the state. Significant freezing rain and sleet fell as precipitation formed in warmer air aloft and then fell through a layer of cold air near the ground. Dozens of traffic accidents were reported on icy roads. The weight of accumulated freezing rain downed trees, tree limbs and power lines. A total of about 15,000 customers of one utility company were still without power on the morning of the 18th in the Eagle River, Rhinelander, Minocqua, Tomahawk and Merrill areas.

Future Probability and Potential Dollar Losses – EMP/Long-Term Power Outage:
Based on historical data presented here (frequency of past events 2013-2022), Vilas County can expect regular power outages. Minor, localized power outages should be expected annually based on NCDC data showing 11 to 19 instances per year on average. The probability of a more significant power outage event like the October 2010 episode is more on the order of 0.10 or a 10% chance in a given year.

Loss data attributable to the effects of a power outage is not readily available at this time.

HAZARD ANALYSIS: SEVERE THUNDERSTORM / HIGH WIND / HAIL / LIGHTNING

Background on Severe Thunderstorm Hazard:
The National Weather Service definition of a severe thunderstorm is a thunderstorm event that produces any of the following: downbursts with winds of 58 miles per hour or greater (often with gusts of 74 miles per hour or greater), hail 1 inch (recently increased from ¾ inch) in diameter or greater or a tornado. Strong winds, hail, and lightning will be addressed in this section; however, tornadoes will be referenced as a separate hazard.

Lightning results from discharge of energy between positive and negative areas separated by rising and falling air within a thunderstorm. This discharge heats the surrounding air to 50,000 degrees. Hail results as the warm rising air cools, forming ice crystals which are held by the updrafts until accumulating enough weight to fall. The hail size depends on the strength of the updrafts keeping it up.

Thunderstorms frequency is measured in terms of incidence of thunderstorm days or days on which thunderstorms are observed. Wisconsin averages between 30 and 50 thunderstorm days per year depending on location. A given county may experience ten or more thunderstorm days per year. The southwestern area of the state normally has more thunderstorms than the rest of the state.

History of Severe Thunderstorms in Vilas County:
The NCDC has reported 58 severe storm events for Vilas County between 2013 and 2022, discounting multiple reports for the same event. These storms typically contain some form of heavy rain and strong winds. About 20 significant hail events, typically related to a severe thunderstorm, were listed during this time period. However, while lightning is associated with virtually every severe thunderstorm, there was only 1 notable lightning incident identified in the NCDC database between 2013 and 2022.

Most recently on June 28, 2022, thunderstorms developed ahead of a cold front across north-central Wisconsin during the afternoon hours producing hail up to a quarter size in Winchester and nickel sized hail near Conover in Wisconsin.

On September 24, 2019, a cold front caused a line of strong to severe thunderstorms to form and move through central and north-central Wisconsin during the evening hours. The storms mainly produced wind damage including tree limbs and blew shingles off a roof. Property damage was estimated at $5,000.

Severe thunderstorms stretched out along a line across northern Wisconsin and moved east at about 45 mph on September 22, 2017. Areas in Vilas impacted included Arbor Vitae, Boulder Junction, Lac du Flambeau, Sayner and Winchester. Wind gusts up to 60 mph and some hail was reported.

Other recent examples of the impacts a severe thunderstorm can have include July 21, 2016, and August 19, 2011. A worst-case scenario for thunderstorms is illustrated by the events of July 1999 which resulted in a disaster declaration. The following paragraphs describe these storms.

On July 21, 2016, thunderstorms impacted the area between Presque Isle & Boulder Junction and Phelps. Strong winds up to 75 mph caused over $200,000 in damages downing powerlines and hundreds of trees. At least six buildings sustained damaged.

One of the three Presidential declarations involving Vilas County has been associated with severe thunderstorms since 1971. The declaration covered the cumulative effects of multiple storms across several counties that occurred during July 1999 including events on July 5, 23, 29 & 30.

On July 23, 1999, trees and power lines were downed in Vilas County. Two campers were damaged by fallen trees at a campground in Boulder Junction but there were no injuries.

During the evening of July 30, 1999, thunderstorm wind gusts over 70 mph (and possibly as high as 100 mph) produced significant damage across the far north-central part of the state. The hardest hit areas were Vilas and Oneida Counties with damages of around $1 million reported by NCDC. In Vilas, an estimated 100,000 trees were downed by the storm that left a damaged path 15 to 20 miles wide and 40 to 50 miles long across the County. Two people were killed by falling trees in Oneida County. The storm left 50,000 people without electrical service across the area, damaged 150 to 200 homes and blocked all major highways and secondary roads in the northern one-third of Oneida County. A falling tree damaged a Bengal tiger cage at the zoo in Hazelhurst (Oneida County), allowing 2 tigers to escape for a brief period.

Strong winds are often the principal cause of damage in a thunderstorm event. Two examples illustrate the potential impact of straight-line thunderstorm winds (not tornadic) in Vilas County; including July 2010 and April 2004.

On July 27, 2010, a cold front combined with a warm and humid air mass triggered thunderstorms that moved across northeast Wisconsin. The storms produced hail to golf ball size, wind gusts to 95 mph, funnel clouds

and heavy rainfall that led to flash flooding. Downed trees and power lines were common around Manitowish Waters and other scattered locations around Vilas County as thousands of homes lost power. The storms produced downburst winds southwest of Conover with wind speeds of 80 to 90 mph and even higher gusts, snapping or uprooting hundreds of trees, some as large as three feet in diameter, along a 5-mile-long path. Several homes and cabins were damaged by the fallen trees. The storm moved over a camp where 650 people were located. The camp staff heard the warning and was able to get everyone to safety before the storm hit. There were no injuries noted by the NCDC from the storm, but they reported damages of $100,000.

On April 18, 2004, an intense area of low pressure moved toward Wisconsin from the plains as a warm front lifted north across the state. Severe thunderstorms developed in north-central Wisconsin in the vicinity of the front. Wind gusts estimated at 75 mph caused considerable damage in Eagle River where part of the roof was torn off a high school gymnasium, a wall of a convenience store was damaged and a tree toppled onto a church, puncturing a hole in the roof. A small building was destroyed at a marina 2 miles east of Eagle River. Trees and power lines were downed across much of the County and around 7,400 customers in the County lost electrical service. The NCDC reported damages of $200,000.

The most recent hail event reported by the NCDC occurred on July 12. 2017 when isolated severe thunderstorms with large hail, gusty winds, and a weak tornado (Portage Co.) hit north-central Wisconsin during the evening. Ping-pong ball size (about 1.25 inches) hail was reported at the Eagle River Airport.

Other notable hail incidents in Vilas County include the following. In May 2008, large hail damaged vehicles and structures near St. Germain. Every car on the lot of an auto dealership sustained damage as well as almost every vehicle at a repair shop in town. A man was unable to get his hand around a hailstone that crashed through the kitchen skylight of his home. The NCDC reported damages of $250,000. In June of 1999, the Eagle River area was particularly hard-hit by hail up to 3 inches in diameter, causing nearly one-half million dollars in damage. One residence alone sustained $60,000 in damage to cars and a home.

The most recent lightning event reported by the NCDC occurred in Manitowish Waters on August 29, 2013, however, no other information is available other than a damage estimates of about $2,000. Another significant lightning event not reported in the NCDC was identified by local news reports on September 20, 2017. Again, in Manitowish Waters, the reports indicate a home was destroyed by fire caused by lightning.

Other notable lightning incidents in Vilas County include the following. On July 21, 2002, thunderstorms developed along a warm front. Lightning from one of the thunderstorms set fire to a home in Arbor Vitae, destroying the entire structure. In June 1999, lightning struck a woman while she fished from a boat on Yellow Birch Lake near Eagle River. On the morning of April 3, 1999, lightning struck a 125-foot pine tree causing its trunk to explode in Boulder Junction. The lightning created a track several inches deep as it traveled through the ground to an attached garage. When it reached the garage, it blew the phone and power line connections off the wall and started the electrical wiring on fire in the garage attic. The phone and electrical wiring in the house were so charged they scorched the walls around them. Natural gas lines leading to the house were destroyed.

Severe Thunderstorm Vulnerability Assessment:
The National Weather Service can forecast and track a line of thunderstorms that may be likely to produce severe high winds, hail, and lightning but where these related hazards form or touch down and how powerful they might be, remains unpredictable. The distribution of thunderstorms and related hazard events have been widely scattered throughout the County.

Many thunderstorm events (without tornadoes) have caused substantial property and infrastructure damage and have the potential to cause future damage. In order to assess the vulnerability of the Vilas County area to thunderstorms and related storm hazards, a review of the past events indicate significant impacts to:

- Infrastructure – hospitals, schools, street signs, police, and fire departments
- Utilities - electric lines/poles/transformers, telephone lines, radio communication
- Transportation – debris clean-up
- Residential - mobile homes, garages, trees and limbs, siding, windows
- Businesses – signs, windows, siding, billboards
- Agricultural - buildings, crops, livestock
- Vehicles – campers, boats, windshields, body, paint

Based on review of the historic patterns of thunderstorms associated with high wind, hail, or lightning, there are no specific municipalities that have unusual risks. The events are relatively uniform and a countywide concern. The heavily forested nature of the county led a number of communities (Towns of Arbor Vitae, Lac du Flambeau, Land O' Lakes, Presque Isle, Washington and Winchester) to identify strong winds as a significant concern due to the potential for trees and powerlines down.

Similarly, the City of Eagle River mitigation planning meeting identified concerns for strong winds resulting in power outages and other disruption.

Future Probability and Potential Dollar Losses - Severe Thunderstorms:
Based on historical frequency, Vilas County can expect 3.9 thunderstorm events per year on average. In other words, the probability is 1.0 or a 100% chance of multiple storms in a given year. The probability of a thunderstorm with damaging hail in Vilas County is also at 1.0 or 100% chance with about 2 incidents in a given year. The probability of a significant lightning event is about 0.1 or a 10% chance in a given year.

There is some concern regarding the apparent trend in increased intensity of rainfall events across the State of Wisconsin and the potential for significant impact on Vilas County; with Ashland and Bayfield counties, just to the west of Vilas, experiencing significant flooding in each of the past three years. Short duration - high volume rainfall events, or wave of successive events hitting the same areas over relatively short periods of time, is a hazard risk that warrants further study within Vilas County.

According to the NCDC, historic thunderstorm events with associated high wind averaged $10,218 in damage per incident. Historic thunderstorm events with associated hail damage averaged $17,857 in property damage. There was insufficient data to calculate average lightning damages for the time period, but historic lightning events have reached $75,000 per incident. Losses in Vilas County associated with severe thunderstorms including high wind, hail and lightning could approach $723,500 over the next ten-year period.

HAZARD ANALYSIS: EPIDEMIC / PANDEMIC

Background on Epidemic / Pandemic Hazard:
Communicable diseases, sometimes called infectious diseases, are illnesses caused by organisms such as bacteria, viruses, fungi and parasites. Sometimes the illness is not due to the organism itself, but rather a toxin that the organism produces after it has been introduced into a human host. Communicable diseases may be transmitted (spread) either by one infected person to another, from an animal to a human, or from some inanimate object (doorknobs, tabletops, etc.) to an individual. Some communicable diseases can be spread in more than one way.

Pandemic Influenza is a global disease outbreak. An outbreak occurs when a new influenza virus emerges for which people have little or no immunity, and for which there is no vaccine. The disease spreads easily

from person to person, causes serious illness or death, and can sweep across the county and around the world in a very short time frame.

History of Epidemic / Pandemic in Vilas County:
COVID-19 is a disease caused by a new virus strain that began spreading in people in December 2019. On March 11, 2020, the COVID-19 outbreak was characterized as a pandemic by the World Health Organization. Then on April 4, 2020, a Presidential Disaster Declaration was signed for the pandemic in the United States. Over the next three years, the pandemic was dynamic and constantly changing with cases surging in waves coinciding with new variants of the virus. However, On May 11, 2023, the federal government ended the Public Health Emergency in the U.S. as much of the population had returned to life as normal.

A low level of COVID-19 virus activity remained in the community, and there were still concerns about surges or new variants. As of the end of the public health emergency, the U.S. Center for Disease Control has reported that there have been approximately 103,910,034 cases of COVID-19 in the United States alone with a death toll now exceeding 1 million at 1,135,343.

Virus pandemics are naturally occurring events. Global outbreaks have occurred four times in the last century, in 1918, 1957, 1968 and 2009. The greatest loss occurred in 1918 when the Spanish Flu (H1N1) killed an estimated 20-40 million people worldwide between 1918 and 1919. The mortality rate in the United States was 550,000. The Asian Flu (H2N2) occurred from 1957 to 1958 with a mortality rate of 70,000 in the United States. The Hong Kong Flu (H3N2) occurred from 1968 to 1969 with a mortality rate of 34,000 in the United States.

2009 saw the rise of a new variant of the H1N1 virus, popularly referred to as the Swine Flu. Lab confirmed deaths from Swine Flu total about 14,000 worldwide with 3,400 deaths in the United States. However, most experts now agree that the actual death toll attributable to the 2009 Swine Flu is 10 to 15 times the confirmed number. Spread of H1N1 flu occurs in the same way that seasonal flu spreads. Flu viruses are spread mainly from person to person through close range coughing or sneezing by people with influenza. As a result of preparation and mitigation strategies such as vaccinations and public education, the threat of a full blown H1N1 pandemic in the U.S. has receded. The possibility for a pandemic, though, still exists.

A previous pandemic flu threat that still looms is the avian flu. Birds can contract avian flu and pass it along to humans. Some strains of the avian flu are more virulent than others. Public health experts continue to be alert to the risk of a possible re-emergence of an epidemic of avian among

people primarily in Asia in 2003. People who had been very close contact with infected birds (for example, people who lived with chickens in their houses) contracted a virulent form of avian flu and there was a high death rate from this disease. Thus far, the avian flu virus has not mutated and has not demonstrated easy transmission from person to person. However, were the virus to mutate in a highly virulent form and become easily transmissible from person to person, there would be significant potential for a pandemic that could disrupt all aspects of society and severely affect the economy.

The Vilas County Health Department tracks communicable disease through a channel of communications at the local, state, and regional levels between public health, private physicians, hospitals, and labs. This communication channel allows for prompt investigation of possible outbreaks and unusual situations, and to implement control measures to minimize further transmission of disease to others.

In Vilas County, there have been 6,528 totals cases of COVID-19 resulting in 109 deaths as of the end of the public health emergency in May of 2023. For Wisconsin, total cases reached 2,014,524 with 16,485 deaths. By comparison, there were 13,511 confirmed or probable cases of the 2009 H1N1 from April 2009 to March 2010 with 1,320 hospitalized and 55 deaths across Wisconsin.

The next epidemic / pandemic situation may not be a "flu" but could be a developing "super bug" such as antibiotic resistant MRSA or some as yet unknown bacteria or virus.

Epidemic / Pandemic Vulnerability Assessment:
Most communicable diseases are dealt with through traditional health department activities. The complexity and magnitude of a Pandemic Influenza outbreak would tax the normal capabilities of the medical service community and the Emergency Management Department would assist in all activities surrounding an event of this severity.

The possibility of a communicable disease epidemic or pandemic outbreak is equal across the County, but the ability to predict where and when an event will occur is very difficult. As COVID-19 has demonstrated, even an isolated little county in northern Wisconsin cannot avoid the impacts of a global pandemic. Although Vilas County's overall case rate was slightly lower than the state average (29,200 per 100,000 versus 34,599) the COVID death rate in the County was more than double (488 per 100,000 versus 283).

Future Probability and Potential Dollar Losses – Epidemic / Pandemic:
The future probability of a communicable disease\pandemic influenza outbreak is difficult to determine. The probability would appear low, but the threat exists, and the impact of a widespread event is very severe. Significant economic disruption can occur due to loss of employee work time and costs of treating or preventing spread of the pathogen.

The probability of an outbreak might be calculated across a hundred-year period. Based on the three major events identified here, the likelihood of an event occurring in any given year would be 3%.

HAZARD ANALYSIS: FOREST FIRES / WILDFIRES

Background on Forest Fire / Wildfire Hazard:

Wildfire Aftermath, Conover. (WDNR)

A forest fire is an uncontrolled fire occurring in a forest or in woodlands generally outside the limits of incorporated villages or cities. A wildfire is any instance of uncontrolled burning in brush, marshes, grasslands or field lands. For the purpose of this analysis, both of these kinds of fires are being considered together.

Forest fire or wildfire can occur at any time the ground is not completely snow covered. The season length and peak months may vary appreciably from year to year. Land use, vegetation, amount of combustible materials present and weather conditions such as wind, low humidity and lack of precipitation are the chief factors in fire season length.

History of Forest Fire / Wildfire in Vilas County:
The Wisconsin DNR maintains a database of wildfire data. This data represents the most comprehensive source. Between 2013 and 2022, there was an average of 22.1 fires that have burned 9.3 acres annually. The typical fire in Vilas County burns a little over a third of an acre.
The principal reason these fires are small is the rapid response of local fire departments. This history of small fires is not indicative of the actual risk. For example, more recently there have been some larger fires in the County. The largest fire in the past ten years was the Sugarbush fire, which burned just under 14 acres during May 2021. The cause of the fire was unknown and remained contained on the Lac Du Flambeau Indian Reservation.

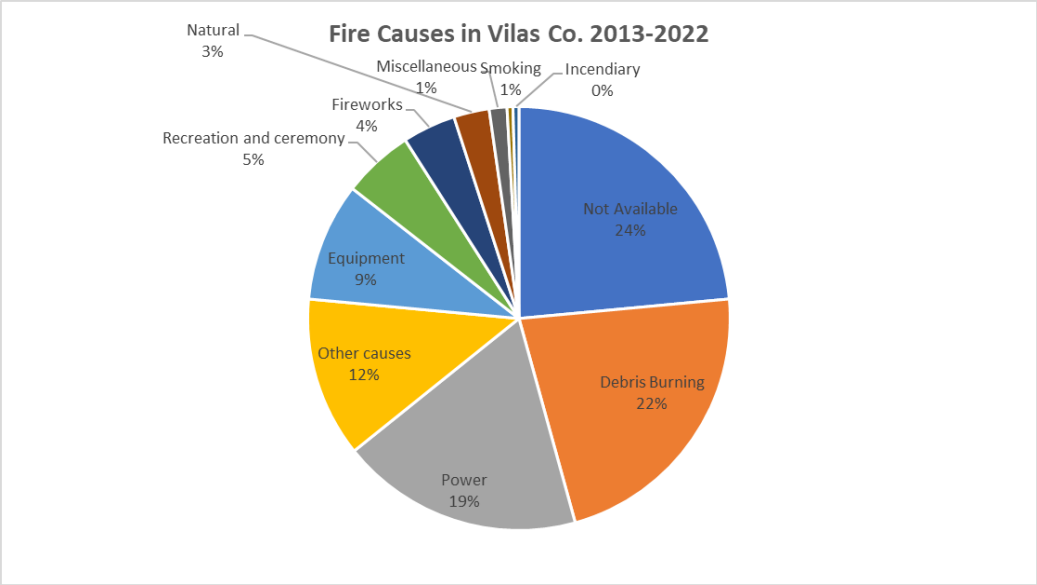
In 2012, a fire caused by a downed power line in Land O' Lakes covered 80 acres. This was the largest fire in Vilas County since 1979. In 2010, a single fire in Conover burned in excess of 30 acres.

The Duck Lake fire in the Upper Peninsula of Michigan may serve as an example of the potential threat. The total cost attributed to the wildfire is $450,557. Damage assessments found 136 structures lost: 49 homes/cabins (including a store and a motel), 23 garages, 38 sheds or outbuildings and 26 campers on 21,135 burnt acres.

May is the leading month for wildfire in Vilas with about a third of the total number of fires between 2013 and 2022. Wildfires have occurred in each month of the year but January, February and December during this time period in Vilas.

The Town of Lac du Flambeau experienced the most wildfires between 2013 and 2022 with 79 and also leads the County in total acres burned with 33 acres. The City of Eagle River had the fewest fires with 1 over that period and also the least area burned at 0.01 acres.

The chart below breaks down the causes of wildfire within Vilas County between 2013 and 2022 as classified by the WisDNR. The principal cause of wildfire in Wisconsin as a whole is generally debris burning, however, in Vilas County at least during this time period, the leading cause of wildfire was "Not Available" according to WisDNR coding. About 24% of wildfires in the database were classified in this way. The "Not Available" classification generally refers to fires of an unknown cause. The incendiary tag was not directly given to any of the fires between 2013 and 2022.



Source: WDNR, 2013-2022

Debris Burning was the next leading category at 22%. This is not surprising given the rural nature of the county where burning is common. Power is the third leading category at 19%. Other categories of note include: other causes at 12%, equipment at 9%, recreation and ceremony at 5%, fireworks at 4%, among a few lesser causes.

Forest Fire / Wildfire Vulnerability Assessment:
Vilas County has 498,444 acres of forestland, or 77 percent of the total land area, scattered throughout the County. The potential for property damage from fire increases each year as more recreational and retirement homes are developed on wooded land.

Rural buildings may be more vulnerable because of lack of access. Access to buildings off main roads is sometimes long, narrow driveways with minimal vertical clearance making it hard for emergency vehicles to combat fires. These buildings also may not have much of a defensible space because of little area between the structures themselves and highly flammable vegetation.

Campgrounds are also a concern because of campfires. Vilas County has federal, state, county, and numerous privately owned campgrounds throughout the County. Locations of the campgrounds are shown on Map 8.

The trend toward introducing more human development into fire prone areas has brought about the term wildland urban interface or WUI. The WUI identifies areas where structures and human development meet or

intermingle with undeveloped wildlands. It is within these areas where wildfire poses the greatest risk to human lives and property.

The WDNR has completed a statewide evaluation of fire risk, referred to as the CAR or Communities At Risk assessment. This assessment uses extensive DNR geo-databases to analyze and map hazardous woodland fuel types and the degree of the intermixing of development with wildlands. The assessment identifies the level of risk for each community on a scale of very high, high, moderate, or low, and also have a community of concern designation, see Map 9. The Towns of St Germain, Cloverland and Lincoln are rated very high. Lac du Flambeau, Arbor Vitae, Manitowish Waters, Boulder Junction, Plum Lake, Conover, Land O'Lakes, Washington and the City of Eagle River have a high-risk level and the Town of Phelps is designated a community-of-concern. The Towns of Presque Isle and Winchester are rated low risk for wildfire.

Vilas County, Wisconsin Wildfire Risk

Map 9

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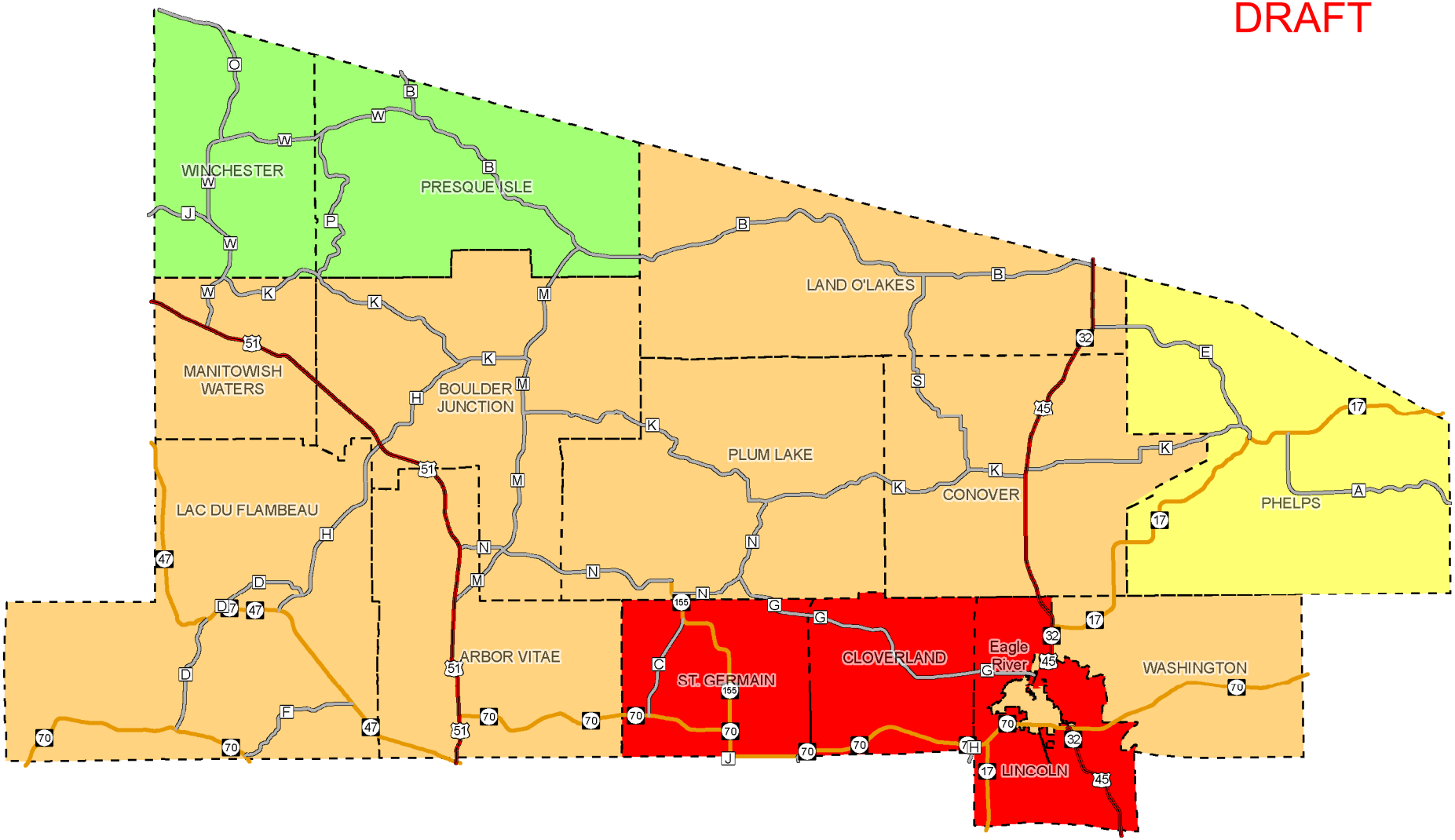

Minor Civil Divisions
US Highways
State Highways
County Highways

Wildfire_Risk
- Very High
- High
- Concern
- Low

N W E S

0 1 2 4 6 8 Miles

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Source: WI DNR, NCWRPC

Future Probability and Potential Dollar Losses – Forest Fire / Wildfire:
Forest and wildfires are relatively common occurrences in Vilas County. Over the last 10 years, there has been an average of 22 fires per year in the County. In other words, the probability is 1.0 or 100% chance of wildfire each year.

Because of the relatively small impact of typical individual fires in the County, loss data is not tracked. This makes it difficult to develop an estimate of potential future dollar losses. However, with 22 fires per year, the County should expect some fires to "get out of hand" with the potential to easily meet or exceed the millions in damages of the Duck Lake Fire that occurred in the Upper Peninsula of Michigan.

HAZARD ANALYSIS: DROUGHT / EXTREME HEAT

Background on Drought / Extreme Heat Hazard:
A drought is an extended period of unusually dry weather, which may be accompanied by extreme heat (temperatures which are 10 or more degrees above the normal high temperature for the period). There are basically two types of drought in Wisconsin: agricultural and hydrologic. Agricultural drought is a dry period of sufficient length and intensity that markedly reduces crop yields. Hydrologic drought is a dry period of sufficient length and intensity to affect lake and stream levels and the height of the groundwater table. These two types of drought may, but do not necessarily, occur at the same time.

Droughts, both agricultural and hydrologic, are relatively common in the state. Small droughts of shortened duration have occurred at an interval of about every ten years since the 1930's.

Extended periods of warm, humid weather can create significant risks for people, particularly the elderly who may lack air conditioning or proper insulation or ventilation in their homes. Animals are also at risk during extended periods of heat and humidity. The National Weather Service issues a Heat Advisory when the Heat Index ranges from 105 to 114 degrees daytime and remains at or above 80 degrees at night, during a 24-hour period. The heat index combines the effects of heat and humidity to better reflect the risk of warm weather to people and animals. When heat and humidity combine to reduce the amount of evaporation of sweat from the body, outdoor activity becomes dangerous even for those in good shape. The index measures the apparent temperature in the shade. People exposed to the sun would experience an even higher apparent temperature. A heat index of 105 is considered dangerous and prolonged exposure can result in heat stroke, exhaustion and cramps. People should be reminded to use extreme caution when the heat index is between 95

and 105. A heat index of 95 occurs when the temperature is 90 degrees, and the relative humidity is 50 percent.

History of Drought / Extreme Heat in Vilas County:
NCDC reports indicate that much of Wisconsin, including Vilas County, was under drought conditions between 2005 and 2013. Periods below normal precipitation led to ongoing moisture deficits despite periodic storm events creating breaks in the dry pattern. One report on northern Wisconsin lake levels in early 2009 stated that Anvil Lake was at its lowest level since 1943. This was 7.2 feet below the lake's highest recorded level. At one point, the Governor declared a state of emergency to get assistance to the state's agricultural sectors. The extended dry conditions posed serious challenges for farmers from drought stressed crops to issues providing feed for livestock.

Beginning in 2013, improved rainfall across the Midwest gradually relieved the drought in Wisconsin. Nationally, however, what is being tagged as the 2012-2015 North American Drought has affected over 80% of the U.S. as well as parts of Canada and Mexico, and drought continues to affect parts of the country. This drought has exceeded the 1988-89 drought, which also affected Wisconsin/Vilas County, as the costliest natural disaster in U.S. history.

Vilas County was one of 64 counties that were included in a Presidential Emergency Declaration for the drought of 1976-1977. Stream flow measuring stations recorded recurrence intervals from 10 to 30 years. Numerous private and municipal wells went dry due to the lowered groundwater tables and agricultural losses during this drought were set at $624 million. Federal monies totaled only 19% of losses attributed to the drought.

Despite all this drought, there are no incidences of excessive heat listed by the NCDC for Vilas County between 2013 and 2022. The last excessive heat event reported by the NCDC was in 1999 when consecutive days between July 23 and July 31 of high temperatures combined with high humidity levels resulted in heat related illnesses and caused some roads to buckle.

Drought / Extreme Heat Vulnerability Assessment:
Droughts can have a dramatic effect on the limited agriculture and cranberry operations located in Vilas County. Even small droughts of limited duration can reduce crop growth and yields, adversely affecting farm income. More substantial events can decimate croplands and result in total loss, hurting the local economy.

Irrigation and other groundwater withdrawal can negatively impact the environment by drawing water that naturally goes to aquifers and surface water. Drought can exacerbate the problem when high withdrawal rates versus little precipitation deplete waterbodies and aquifer supplies, therefore decreasing drinking water supplies, drying streams, and hindering aquatic and terrestrial wildlife. During severe droughts, some wells - mainly private wells - will go dry.

Another significant area of impact from drought includes the tourism sector of the economy. As lake levels go down, there is less tourism seen in the County. Recent drought conditions have left lake levels down significantly, and many boat launches cannot be used.

Droughts can trigger other natural and man-made hazards as well. They greatly increase the risk of forest fires and wildfires because of extreme dryness. In addition, the loss of vegetation in the absence of sufficient water can result in flooding, even from average rainfall, following drought conditions.

The following is a list of things that may be adversely affected by a drought. Many of these community assets can be referenced in Part II.

- Infrastructure – municipal water supplies
- Surface water –groundwater reserves, recreation, and wildlife
- Forests- forest productions industry
- Agricultural - crops, livestock

Essentially, the entire County is at risk from the impacts of drought on forestry and tourism. Specific areas more susceptible to drought conditions would be those with notable agricultural areas like Lincoln, Manitowish Waters and Washington.

According to Wisconsin Emergency Management, excessive heat has become the deadliest hazard in Wisconsin in recent times. Extreme heat can happen anywhere within Vilas County affecting everyone; however, the elderly and young are the ones with the highest risk of getting heat related injuries, which can lead to death. Ways to prevent injuries include wearing light-colored clothing, drinking plenty of water, slow down, and do not stay in the sun for too long.

Future Probability and Potential Dollar Losses – Drought/Extreme Heat:
Based on the historic data presented here (frequency of past events), Vilas County can expect a drought every ten years on average, which is a probability of 0.10 or a 10 percent chance in a given year. A significant

severe drought is somewhat less common, affecting Wisconsin once about every 15 years.

Drought is another hazard lacking good loss figures at the county level. However, a look at aggregate data for the last two major droughts can give some indication of potential impact. The last two major droughts in Wisconsin resulted in losses of $9.6 million (1976-77) to $18 million (1987-88) per county on average.

Normally, central Wisconsin is known for its cold winters, however, extreme heat waves will affect Vilas County in the future. Vilas County can perhaps expect a heat wave once every 18 years or a 5.5 percent chance in a given year based on the historic data available.

HAZARD ANALYSIS: HAZARDOUS MATERIALS INCIDENTS - FIXED SITE / TRANSPORT

Background on Hazardous Materials Incidents Hazard:
A hazardous materials incident occurs with the uncontrolled release or threatened release of hazardous materials from a fixed site or during transport that may impact public health and safety and/or the environment.

Under the Emergency Planning and Community Right to Know Act (EPCRA), a hazardous material is defined as any chemical that is a physical hazard or health hazard [defined at 29 CFR 1910.1200(c)] for which the Occupational Health and Safety Administration (OSHA) requires a facility to maintain a Material Safety Data Sheet (MSDS). Under EPCRA there is no specific list of hazardous materials. An extremely hazardous substance (EHS) is defined as one of 356 substances on the United States Environmental Protection Agency list of extremely hazardous substances, identified at 40 CFR Part 355.

Wisconsin Emergency Management/ State Emergency Response Commission (WEM/SERC) is responsible for implementing EPCRA, also known as the Superfund Amendments and Reauthorization Act (SARA) of 1986, at the state and local levels. WEM/SERC has designated that each of the 72 counties in Wisconsin have Local Emergency Planning Committees (LEPCs) that are set up in accordance with the federal legislation and who are responsible for implementation of EPCRA at the county level. WEM/SERC further designated that the county emergency management director shall be a member of the LEPC to ensure continuity and coordination of emergency response planning.

WEM/SERC is also responsible for administering the Emergency Planning Grant that provides funding on a formula basis to county LEPCs for local planning and program administration and the Equipment Grant which provides matching funding for computer equipment and hazardous materials response equipment. Under 1991 WI Act 104 the WEM/SERC contracts with regional hazardous materials response teams as well as providing hazardous materials response equipment funding, on a matching basis, to county designated hazardous materials response teams.

Each Wisconsin county is designated as an emergency planning district and has a Local Emergency Planning Committee (LEPC) to administer the local program. LEPC membership includes local elected officials, members of emergency response agencies (fire, law enforcement, EMS, health, etc.), and representatives for transportation, public works, the media, community groups, environmental groups, and owners/operators of facilities. LEPCs are responsible for receiving and maintaining filings of facility submissions. They also maintain a county-wide emergency response plan, develop and maintain facilities' offsite emergency response plans and the county's hazard analysis for both fixed facilities and transportation. LEPCs assess the county hazmat response resources and equipment, respond to public requests for information under "community right-to-know" law, and conduct hazmat training and exercises. Wisconsin has annual exercise requirements and the LEPC attempts to involve facilities, response agencies, and other local officials in the exercises.

The county-wide emergency response plan includes: the county hazard analysis summary, a list of facilities storing hazardous materials, identification of transportation routes for extremely hazardous substances (EHS), procedures for notification or releases, response to releases, procedures for sheltering and evacuation, and a schedule for training and exercising. Individual facility off-site plans include: facility name and location, name of facility emergency planning coordinator with 24 hr. contact phone number, list of primary emergency responders, list of resources available from/at facility, list of outside resources available, hazard analysis of the facility with a vulnerability zone for release of EHS stored at facility, identification of special facilities (i.e., schools, hospitals, nursing homes, day care centers, etc.) within the zone, population protection procedures (sheltering and evacuation) and attachments. These plans are developed and maintained by the LEPC.

The statewide Wisconsin Hazardous Material Response System (WHMRS) is intended to assist communities (or regions) who have been overwhelmed by the effects of a hazardous material emergency/release by providing specialized hazardous material resources to aid the stricken communities in incident stabilization and hazard mitigation activities. The focus of the

statewide system is to provide quick strike capability to ensure incident assessment, stabilization, and mitigation, thus reducing the threat to the public, responders, and the environment.

To provide a high level of hazardous materials response capabilities to local communities, Wisconsin Emergency Management contracts and manages twenty-one Regional Hazardous Materials Response Teams. The teams are divided into Task Forces: Northeast Task Force (includes Vilas), Northwest Task Force, Southeast Task Force, and the Southwest Task Force. These Task Forces are then divided into Type I, Type II, and Type III teams, all with complimentary capabilities and training requirements. In Marathon County there is a Wausau based Type II team that operates in partnership with Oneida County (Rhinelander) to serve Vilas County. The WHMRS may be activated for an incident involving a hazardous materials spill, leak, explosion, injury or the potential of immediate threat to life, the environment, or property. The WHMRS responds to the most serious of spills and releases requiring the highest level of skin and respiratory protective gear. This includes all chemical, biological, or radiological emergencies.

HAZMAT Incident

History of Hazardous Materials Incidents in Vilas County:
Since 2008 Vilas County has recorded numerous hazardous material spills. Many of these spills consisted of small amounts of product that did not meet the reporting requirements. In most cases these incidents were quickly resolved by the response of a local municipal fire department and County Emergency Management. The following Table 14 displays the date, location and description of the spills.

The latest incident reported here occurred on February 20, 2017, when an unknown quantity of natural gas released into the atmosphere due to a construction incident in Arbor Vitae.

Table 14	Reportable Hazardous Materials Spills in Vilas County Since 2008	
Date	**Location**	**Description**
03/05/2015	Arbor Vitae	12 gallons of gasoline on pavement.
03/13/2015	Lac du Flambeau	20 gallons of gas on pavement.
04/28/2015	Washington	15 gallons of gas on shoulder of Carpenter Lake Road. Clean up by REI Engineering.
04/30/2015	Eagle River	5 to 7 gallons of Ferrie Chloride cleaned up with oil dry.
07/23/2015	Arbor Vitae	Unknown quantity of natural gas released into air. Six residences evacuated.
07/30/2016	Lac du Flambeau	Unknown quantity of mineral oil spilled on grassy area.
10/17/2016	Arbor Vitae	Approx. 2,000 gallons of hot asphalt spilled into roadside ditch. Was contained with sand berms and removed after cooled.
02/20/2017	Arbor Vitae	Unknown quantity of natural gas released into air due to construction incident.
11/05/2018	Manitowish Waters	Approximately 20 gallons of fuel oil on open soil.
06/18/2019	Cloverland	Mineral Oil without PCBs or PCB less than 50ppm
06/30/2019	Winchester	Gasoline
09/23/2019	Lincoln	Engine Waste Oil
03/08/2020	Eagle River	Gasoline
07/01/2020	Eagle River	Gasoline
06/17/2021	Plum Lake	Diesel Fuel roadway and roadside ditch-150 gallons
03/15/2022	Boulder Junction	40 gallons of diesel fuel from generator
06/29/2022		26 gallons non-pcb mineral oil from transformer knocked over by tree
08/25/2022	Lincoln	Accident caused release of emulsion
10/07/2022	St Germain	20 gallons of diesel
05/14/2023	Phelps	Gasoline at the boat dock
07/04/2023	Manitowish Waters	20 gallons of diesel leaking from truck tank due to truck fire
07/18/2023	Eagle River	100 octane low level lead plane rollover
09/04/2023	Boulder Junction	Sea plane tipped over. Originally thought to have breached tanks but unfounded
09/26/2023	Eagle River	Ambulance ruptured gas tank and leaked 15 gallons of gasoline onto impervious surface and about 5 gallons down into storm drain

Source: Vilas County Emergency Management

Hazardous Materials Incidents Vulnerability Assessment:
Some of the risk factors that make hazardous materials incidents a keen concern in Vilas County is reviewed below:

Fixed Facilities
Approximately twenty-eight facilities within Vilas County have reported that they had a hazardous substance present at any one time. The County recently added two facilities with planning requirements for extremely hazardous substances: sulfuric acid. This was reconfirmed by the 2024 Northeast Region Commodity Flow Report

Two other notable hazardous substances at fixed facilities in the County include aviation fuel at area airports, liquefied petroleum gas and diesel fuel storage.

Also of note are temporary hot mix batch plants set up in various locations for limited times during construction season.

Highway

Trucks carry the bulk of hazardous materials to and through the County. Regular shipments of gasoline, propane, acid and other substances are delivered across the County. Every roadway in the County is a potential route for hazardous material transport, but major transportation routes are Federal and State Highways 51, 45, 17, 47, 70, 32 and 155 (See Map 5 Transportation Routes in Part II).

Pipeline

ANR Pipeline Company provides a pipeline to move petroleum through the County. Natural gas service lines also run throughout much of the County. The locations of these facilities are not mapped for homeland security reasons.

Based on the location of the fixed facilities, the City of Eagle River has a higher probability of chemical release. A hazardous materials incident can have far reaching impacts, however, those communities which are traversed by major highways are also susceptible to a higher risk, refer to Maps 5 and 6.

Future Probability & Potential Dollar Losses – Hazardous Materials Incidents:

Based upon historical data presented (frequency of past events), Vilas County can expect about 2.7 hazardous material spills per year on average. This equates to a probability of 1.0 or a 100% chance in a given year. In addition to a significant event, the County can expect numerous smaller spills that often go unreported. These events still require resources and the response of local fire departments.

Historical data from hazardous material spills that have a known response cost, was used to determine an average cost for a hazardous material spill response. Nine incidents have associated response costs ranging from $1,200 to $25,000. Using this data, Vilas County can expect an average hazardous material response cost of $4,000. This potential cost is only reflective of the initial response and clean-up. Additional clean-up and disposal costs may apply. The costs of smaller less significant spills are usually absorbed by Fire Department budgets. These costs are hard to estimate as they are seldom reported and recorded. Over the next ten-

year period Vilas County can expect $108,000 in hazmat response costs as a result of hazardous materials incidents.

HAZARD ANALYSIS: FLOODING/DAM FAILURE

Background on Flooding/Dam Failure Hazard:
There are a variety of classifications for flooding including coastal, dam failure, flash, lake, riverine, stormwater and urban/small stream. Vilas County has the potential for all these types except coastal. The following descriptions of the types of flooding are compiled from various FEMA and other notable hazard planning sources:

Coastal – Different from other types of flooding which relate to movement of water through a watershed, coastal flooding is due to the effect of severe storm systems on tides resulting in a storm surge. Primarily known as an ocean-based event, the Great Lakes coastal areas can also be affected.

Dam Failure – More of a technology related hazard than a natural hazard, various factors can result in the failure of the structural technology that is a dam, thus causing flooding of areas downstream of the dam often similar in effect to flash flooding.

Flash – Involves a rapid rise in water level moving at high velocity with large amounts of debris which can lead to damage including tearing out of trees, undermining buildings, and bridges, and scouring new channels. Dam failure, ice jams and obstruction of the waterway can also lead to flash flooding. Urban /built-up areas are increasingly subject to flash flooding due to removal of vegetation, covering of ground with impermeable surfaces and construction of drainage systems.

Lake – Prolonged wet weather patterns can induce water-level rises that threaten lakeshore areas.

Riverine – Also known as overbank flooding, this is the most common type of flooding event. The amount of flooding is a function of the size and topography of the watershed, the regional climate, soil and land use characteristics. In steep valleys, flooding is usually rapid and deep, but of short duration, while flooding in flat areas is typically slow, relatively shallow, and may last for long periods.

The cause of flooding in rivers is typically prolonged periods of rainfall from weather systems covering large areas. These systems may saturate the ground and overload the streams and reservoirs in the smaller sub-basins

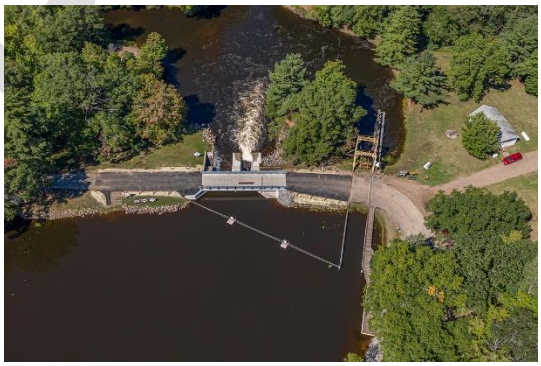
that drain into larger rivers. Annual spring floods are typically due to the melting of snowpack.

Stormwater – Water from a storm event that exceeds the capacity of local drainage systems, either man-made or natural, can result in flooding. Inadequate storm sewers and drainage systems are often the primary factor resulting in this type of flooding.

Urban and Small Stream – Locally heavy rainfall can lead to flooding in smaller rivers and streams. Streams through urban or built-up areas are more susceptible due to increased surface runoff and constricted stream channels.

As with much of Wisconsin, when it happens flooding in Vilas County tends to occur in the spring when melting snow adds to normal runoff and in summer or early fall after intense rainfalls. Flooding occurs in the spring due to snowmelt and frozen soil. As described in Part II, there are approximately 402 miles of streams in Vilas County within thirteen watersheds. Floodplains along these tributaries as well as some lakes are narrow but extensive throughout the County.

There are about 58 dams (with another 22 abandoned dam locations) listed in the WisDNR inventory for Vilas County (See Map 3 and Table 15). These dams serve many useful purposes including agricultural uses, providing recreational areas, electrical power generation, erosion control, water level control and flood control. From the inventory, Vilas County has 14 large dams (including Rest Lake and Otter Rapids). The Wisconsin DNR regulates all dams on waterways to some degree; however, the small dams are not stringently regulated for safety purposes. The federal government has jurisdiction over large dams that produce hydroelectricity. In Vilas County, the Otter Rapids Dam has the ability to produce hydroelectricity and a number of the other dams are used in regulation of flow for downstream hydro-dams.



Rollaways Reservoir Dam & Boat Hoist (WVIC)

Table 15	Large Dams in Vilas County				
Name	**EAP Year**	**Hazard Rating**	**Stream Name**	**Owner**	**Hydraulic Height**
Long-On-Deerskin		Low	Deerskin River	WVIC	3
Little Saint Germain		Significant	Little St. Germain Creek	WVIC	5
Turtle Lake	2017	Low	Turtle River	Town of Winchester	2
Little Tamarack Flowage	2015	Low	Little Tamarack Creek	Lake District	7
Powell Marsh Pool 5	2016	Low	Trib. to Dead Pike Lake	WDNR	6.2
Twin Lakes		Significant	Twin River	WVIC	4
Powell Marsh Pool 4	2016	Low	Surface runoff	WDNR	2
Cranberry Lake	2001	Low	Inlet Cranberry Lake	Coleman	6
Rest Lake	2021	High	Manitowish River	Xcel Energy	10
Lac Vieux Desert		Significant	Wisconsin River	WVIC	7
Buckatabon		Significant	Buckatabon Creek	WVIC	5
Big Saint Germain		Significant	Saint Germain River	WVIC	2
Otter Rapids	2023	High	Wisconsin River	WPS	13
Fishtrap	2018	High	Manitowish River	WDNR	7

Source: WDNR Dams Database

A dam can fail for a number of reasons such as excessive rainfall or melting snow. It can also be the result of poor construction or maintenance, flood damage, weakening caused by burrowing animals or vegetation, surface erosion, vandalism, or a combination of these factors. Dam failures can happen with little warning resulting in the loss of life and significant property damage in an extensive area downstream of the dam.

The WDNR assigns hazard ratings to large dams within the state. When assigning hazard ratings, two factors are considered: existing land use and land use controls (zoning) downstream of the dam. Dams are classified into three categories that identify the potential hazard to life and property downstream should the dam fail. A high hazard indicates that a failure would most probably result in the loss of life. A significant hazard indicates failure could result in extensive property damage. A low hazard exists where failure would result in only minimal property damage and loss of life is unlikely. For Vilas County, only two dams, Otter Rapids and Rest Lake, have a high hazard rating, and six have a rating of significant: Little Saint Germain, Twin Lakes, Lac Vieux Desert, Buckatabon, Big Saint Germain, and Fishtrap. Just over half of the large dams currently have emergency action plans (EAPs) currently in place.

History of Flooding/Dam Failure in Vilas County:
Flooding was noted as a principal cause of damage in one of three Presidential Declarations in Vilas County since 1971. However, the storms that resulted in this declaration during 1999 affected a number of counties. County records indicate that within Vilas, flooding was not a significant issue as it was in many of the other affected counties. Flooding was limited to roadways and culverts.

Within the ten-year period of analysis for this report, the NCDC reports only one flooding event. Most recently, on June 11, 2017, street flooding was reported in Lac du Flambeau with minor damage. A spotter in the area measured 6.5 inches of rain that day.

The next most recent flooding event occurred on July 17, 2011, flash flooding was noted for the City of Eagle River as the passage of a weak upper-level disturbance through a very unstable air mass created a line of severe thunderstorms during the evening hours. Heavy rains caused a small section of Highway 70 to flood in a low-lying area. A home had a basement wall cave in due to high water. The NCDC reported damages of about $5,000.

Beyond the ten-year window, the NCDC reports five other flooding events for Vilas County. In April 1996, heavy runoff from spring snow melt and rain resulted in widespread minor flooding across north central Wisconsin. Numerous roads and culverts were washed out in Vilas and other counties. Later in 1996, approximately 1.5 inches of rain fell over a one-hour period on August 5, causing flash flooding in the St. Germain vicinity. Heavy runoff from hillsides caused small mudslides, which deposited up to 2 feet of mud on area roads.

Two instances also occurred in 2000. On July 2, heavy rain fell over saturated ground in Vilas County and Oneida County, resulting in some street flooding and backed up storm sewers in Eagle River. Then, on August 14, severe thunderstorms developed in the vicinity of a front that stalled across northeast Wisconsin. Heavy rainfall caused street flooding at several locations in the Lac du Flambeau area. Both were noted as urban and small stream type flooding.

In September of 2001, heavy rain from thunderstorms resulted in flooding of streets and low spots in the City of Eagle River. This event was also noted as urban and small stream type flooding by NCDC. It is noted by Emergency Management that Eagle River always has street flooding during periods of heavy rain. This is due to storm drain overflow and not small stream flooding.

Vilas County has not experienced a dam failure with any loss of life or substantial property damage. Dams occasionally develop holes or other damage but have not caused flooding problems.

Flooding/Dam Failure Vulnerability Assessment:
Vilas County historically does not have a serious flooding problem. A majority of the floodplain area with the County is located on flowage type water bodies, such as the Manitowish Flowage, where water levels can be actively controlled. Flood events in the County have not caused substantial property or infrastructure damage in the past and are generally classified as minor. However, there is some potential to cause future damage, since a significant number of structures still exist in the floodplain. In addition, demand for shoreland property eventually results in pressure to develop less suitable areas.

Past flooding events in Wisconsin have typically impacted communities in the following areas:

- Infrastructure – flooded public facilities
- Roadways – washouts, inundated roadways, debris clean-up
- Residential structures – flooded basements, damaged septic systems
- Businesses – loss of commerce
- Agriculture - inundated cropland

To assess the vulnerability of the Vilas County area to flooding hazards, basic inventory data described in Part II must be analyzed. For this purpose, consideration should be given to structures (specifically critical facilities), infrastructure, and cropland.

One of the first reports to reference in assessing vulnerability to structures during flooding is the Wisconsin Repetitive Loss Report. The Repetitive Loss Report provides information to the status of repetitive loss properties by community. FEMA classifies a repetitive loss structure "when more than one flood insurance claim of at least $1,000 is made within a ten-year period". The information is used as a floodplain management tool and to supplement information provided by communities for flood mitigation grants administered by WEM. According to the report, there are no repetitive loss structures within Vilas County.

Since no structures are listed in the Repetitive Loss Report, structures within floodplains were analyzed, see methodology outlined below. The floodplain boundaries within Vilas County are shown on Map 10 (from Map 4). Table 16 shows the number of structures in each municipality identified as "vulnerable to flooding" according to proximity to floodplains. There was a total of 647 structures identified in the designated floodplain

boundaries, see Map 10. Estimated value of structures located within the floodplain in Vilas County is over $85 million.

Table 16 Improvement Values for Structures in Floodplain

Municipality	*Structure Count*			*Combined Structure Value*			
	Primary	Accessory	Commercial	Primary	Accessory	Commercial	Total
Arbor Vitae	0	0	0	0	0	0	0
Boulder Junction	18	40	0	$5,019,150	$1,350,850	$0	$6,370,000
Cloverland	4	6	0	$862,950	$292,900	$0	$1,155,850
Conover	5	12	0	$1,485,450	$329,000	$0	$1,191,950
Lac du Flambeau	6	9	0	$792,600	$248,250	$0	$1,040,850
Land O' Lakes	4	2	0	$849,750	$16,450	$0	$866,200
Lincoln	16	52	0	$3,954,750	$1,391,600	$0	$5,346,350
Manitowish Waters	93	139	2	$25,157,550	$4,088,150	$1,468,800	$30,346,350
Phelps	0	1	0	$0	$16,750	$0	$16,750
Plum Lake	0	0	0	0	0	0	0
Presque Isle	0	0	0	0	0	0	0
St. Gremain	73	62	3	$20,272,050	$1,445,400	$776,800	$22,494,250
Washington	25	48	18	$5,499,300	$490,000	$5,8135,400	$12,977,600
Winchester	0	0	0	0	0	0	0
Eagle River	2	6	1	$376,800	$224,850	$2,239,000	$2,840,650
Vilas County	246	377	24	$63,647,850	$11,069,100	$10,298,000	$85,014,950

Source: Vilas County Mapping and NCWRPC

Methodology – Structures within Floodplains:

1. *NCWRPC downloaded a digital GIS coverage of the updated FEMA floodplain maps from Vilas County Land Records.*
2. *A building outlines coverage was also obtained from Vilas County.*
3. *The floodplain coverage was then combined with the building outlines coverage to identify those structures within the floodplain boundary.*
4. *Total structures within the floodplain were then tabulated by municipality and coded by type (Primary, Accessory, and Commercial)*
5. *Square footage of each building outline was used to estimate the value of each building type.*
6. *Values were calculated: Commercial ($200), Primary ($120), and Accessory ($50) per square foot.*

In addition to structural damage from flooding, there may also be significant damage to public roadways, particularly to roadway surfaces, culverts and bridges. Floods may inundate roadways in the County for varying periods. Such interruptions in the County transportation network may cause travel delays through detours.

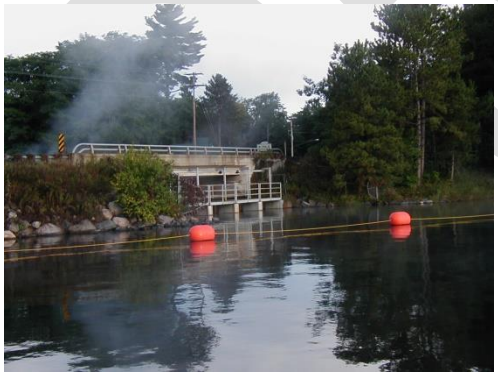
The primary impact from damage to roadways is to businesses. The monetary impact is unknown, but floods may restrict public access and even close businesses. Tourism is an important industry in the County and several campgrounds, lodges and restaurants may be affected by flooding.

The areas considered to have a higher risk for impact from flooding include those communities with structures in floodplains as shown in Map 10.

Future Probability and Potential Dollar Losses – Flooding/Dam Failure:
Based on the historic data presented here (frequency of past events - 2013 to 2022), Vilas County can expect a flood event about every 5 years on average. This equates to a probability of 0.2 or about a 20 percent chance in a given year.

As indicated earlier, no dam breaks have been identified within Vilas County. Therefore, there is no historic frequency upon which to base a future probability, other than to say that the probability of a dam failure is very low. However, due to the significant number of dams and particularly large dams with high or significant hazard ratings, dam failure is an important hazard event to plan for in Vilas County.

Historic data is again used to estimate potential future dollar losses due to flood. Based on the 2011 flood event where the NCDC reported damages of approximately $5,000, Vilas County can anticipate property losses of approximately $5,000 on average, between the public and private sector for each flood occurrence. Over the next ten-year period, flood losses in Vilas County could approach $10,000.



Rest Lake Dam. (WDNR)

Potential flood losses for structures by jurisdiction are reflected in Table 15. While structures outside mapped floodplains may also be lost or damaged in a flood, structures within flood plains represent the greatest risk for flood damage.

Vilas County, Wisconsin Flood Vulnerability Map 10

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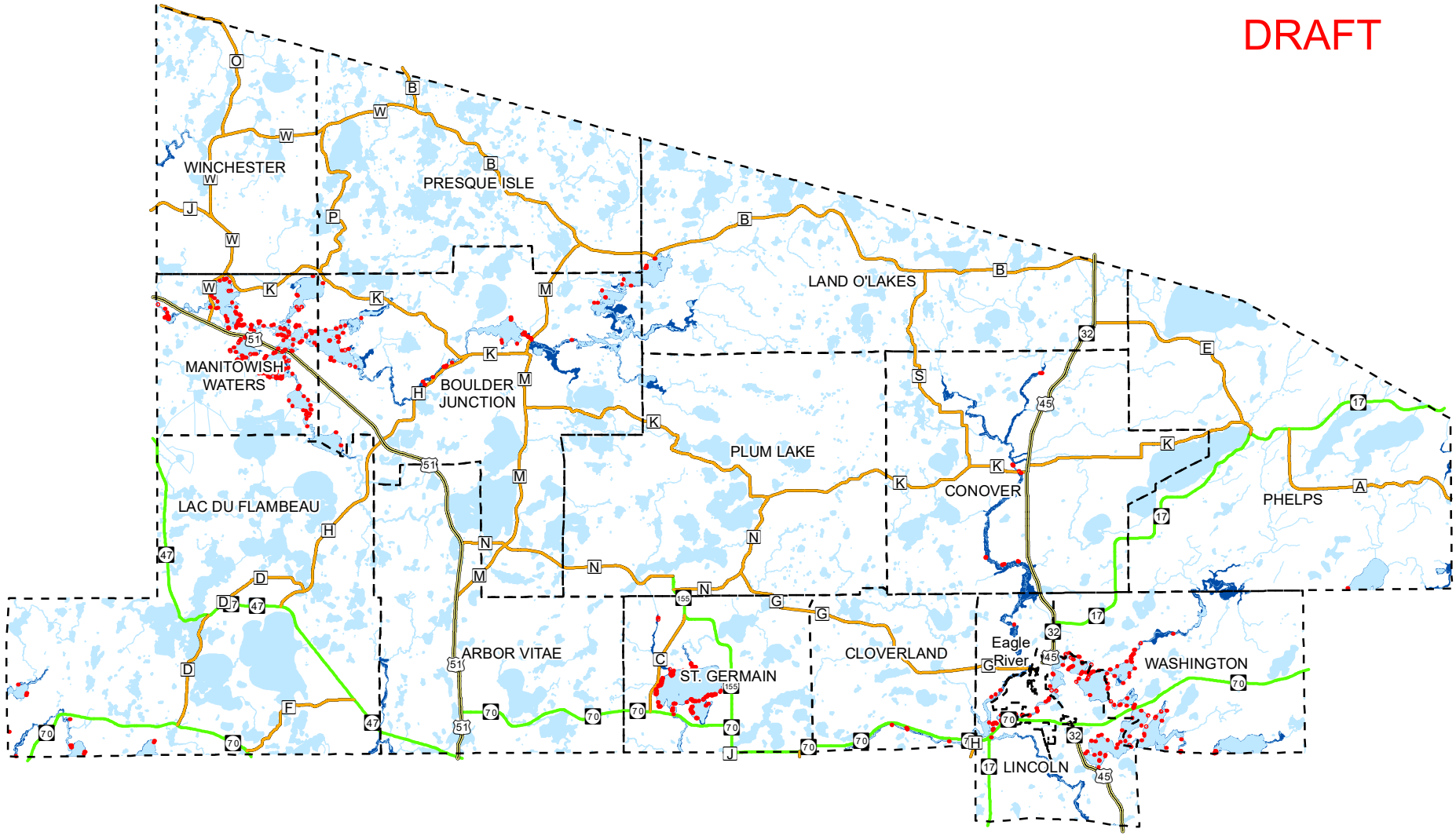

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Source: WI DNR, FEMA, NCWRPC

N W E S

0 1 2 4 6 8 Miles

- Minor Civil Divisions
- Buildings In Floodplain
- US Highways
- State Highways
- County Highways
- Water
- Floodplain

INTRODUCTION

Hazard mitigation is any action taken to reduce or eliminate the long-term risk to human life and property damage from natural hazards. This chapter describes the mitigation goals and actions to be taken by Vilas County, the City of Eagle River and other units of government within the county for each of the hazards identified in Part III – Risk Assessment. The intention is to reduce or avoid long-term vulnerability to the identified hazards.

Part IV of the Vilas County All Hazards Mitigation Plan Update will discuss the following factors in establishing the multi-jurisdictional mitigation strategies:

- Benchmark Progress of Previous Plan 2019-2024
- Review of Mitigation Goals
- Prioritize Identified Mitigation Strategies
- Update Mitigation Action Plan

PROGRESS REPORT 2019 - 2024

Table 17 identifies the completed, deleted, or deferred mitigation actions from the previous (2019) Plan. For each action recommendation, a brief status report is provided which describes the progress made on that measure. If an item remains unchanged, a description is provided as to why no action has been taken and whether that item is deferred to the new Plan.

The table also provides the new status of each recommendation with regard to the updated Plan alongside the original timeframe target for comparison. Many of the recommendations are on-going efforts and are carried over as such in the updated action plan. Some have had significant progress or have been deferred but are recommended for further action with a new target date or on-going status. If the recommendation has been completed with no further specific action anticipated within the next five-year planning period, it is shown as "Removed from list" and will not appear in the updated action plan. In some cases, an incomplete action is not selected for various reasons (noted) and is also shown as "Removed from list".

This progress report serves as a benchmark for progress in achieving the multi-jurisdictional mitigation goals of Vilas County and the local jurisdictions that participated in the Plan.

TABLE 17 BENCHMARK FOR PROGRESS 2019 - 2023 Plan			
2019 -2023 Plan Measure	*Progress Report*	*Original Status*	*New Status*
Promote the increased use of NOAA National Weather Radios (NWR).	County continues to promote weather radio as a supplemental warning but not providing new units at this time.	On-going (1)	On-going (1)
Continue to add/update Emergency Management Department link off existing County website.	County continues to maintain website with useful program information and links.	On-going (2)	On-going (2)
Maintain "reverse 911" emergency notification system and expand public outreach on availability and use of system.	County continues to maintain a reverse 911 type emergency notification system.	On-going (3)	On-going (3)
Promote system registration for the reverse 911 system through media contacts, psa's and public appearances.	Promotion of system on-going.	On-going (4)	On-going (4)
Continue training for Law Enforcement, Fire, EMS, First Responders and the public in the identification of dangerous weather formations.	Continue to work with National Weather Service to provide training when available.	Annual (5)	On-going (5)
Update County Emergency Response Zone Atlas.	Last update completed in 2014. Update cycle dependent on funding.	2021 (6)	Removed from list (-)
Install back-up generator for community center. (St. Germain)	Continue to look for funding options for generator.	2020 (7)	2026 (6)
Update aerial photography to include LIDAR for use by County & City emergency services and for further improvement in flood zone mapping.	LIDAR update were acquired in 2022 that will be used to help update floodplain maps New aerial photography anticipated to be acquired in 2025.	2020 (8)	2025 (7)
Establish west side Land O' Lakes fire/rescue hall and shelter facility.	Town is still working on establishment of west side facility.	2023 (9)	2026 (8)
Maintain listing of warming centers and promote along with other winter hazards awareness information.	County maintains a list of warming centers and promotes this information annually as needed.	Annual (10)	Annual (12)
Promote lightning safety awareness to reduce risk.	County does lightning safety awareness as needed.	Annual (11)	As needed. (13)
Install emergency warning siren.	Limited program to date. Expanded program to include all towns.	2020 (12)	2026 (14)
Develop emergency storm/tornado shelters through new facilities or retrofitting existing facilities with necessary improvements and/or equipment.	No progress to date. City of Eagle River, Town of Land O'Lakes and Town of Phelps have indicated interest in emergency Shelters.	2023 (13)	2025 (15)
Promote Firewise program and related educational materials to increase community awareness of wildfire risk within the County.	DNR and County continue to promote Firewise and a number of communities and facilities have/are using Firewise principals.	On-going (14)	On-going (16)
Develop Community Wildfire Protection Plans (CWPP) for high-risk towns.	A number of towns have completed CWPPs and continue to be scheduled.	On-going (15)	On-going (17)

Fire Inspector Training to compliment CWPP and Firewise Programming	DNR and County continue to promote Firewise, and a number of communities and facilities have/are using Firewise principals.	Ongoing (14)	Annually (18)
Continue to develop mass care plans and regularly conduct various public health preparedness exercises to assist in planning and preparation for possible epidemic/pandemic or other public health situation.	County continues to conduct a variety of tabletop and functional exercises to support planning for a variety of public health concerns.	Annually (18)	Annually (20)
Annually review and update as necessary County Emergency Operations Plan Annex H related to public health emergencies.	County continues to review Annex H and related plans for a variety of public health concerns on an annual basis. Now, currently developing "mass immunization clinic" plans.	On-going (17)	Annually (19)
Continue support for Type II Emergency Response Team to deal with extremely hazardous spill situations.	County continues to maintain its partnership with Oneida County HazMat Team.	On-going (19)	On-going (21)
Relocate LP storage tanks at Eagle River Airport	No progress to date.	2022 (20)	Removed from list (-)
Continue to implement recommendations of the 2011 After Action Improvement Plan for Long Term Power Outage in Vilas County.	County continues to work to address issues related to extended power outage including exercises to aid planning and preparation.	On-going (22)	On-going (22)
Continue to work with energy providers and ATC within the county to coordinate communication and response to power outage situations.	Progress has been made. Continued work with energy providers and ATC on communication coordination is emphasized.	On-going (23)	On-going (23)
Maintain list of cooling centers and promote along with other extreme heat/sun exposure hazards awareness information.	County maintains a list of cooling centers and promotes this information annually as needed.	Annual (24)	Annual (24)
The County Board and City Council will periodically discuss the issue of their participation in the National Flood Insurance Program (NFIP)	Vilas County has entered the National Flood Insurance Program at this time. Recommendation remains for City of Eagle River.	On-going (25)	On-going (25)
Continue to work with dam owners to review Emergency Action Plan (EAP) for each significant and high hazard dam.	On-going work item for Emergency Management.	On-going (26)	On-going (26)

LOCAL HAZARD MITIGATION GOALS

The mitigation strategy is based on a set of goals to reduce or avoid long-term vulnerabilities to the hazards identified in the Risk Assessment. The goals were established by the Mitigation Planning Team during the development of the original Plan and reviewed by the Planning Team for the update. These goals represent the desired conditions to strive for through the mitigation efforts of the County, City and other units of government.

The mitigation goals for reducing or avoiding the long-term vulnerability of Vilas County are as follows:

- Prepare and protect residents and visitors from all hazards.
- Create safety awareness to citizens and travelers of Vilas County to protect them during and after winter storm and extreme cold events.
- Minimize the threat to human life and property damage caused by thunderstorms and associated hail, high wind and lightning.
- Protect the health, safety, and welfare of county residents and visitors, along with mitigating future loss of property from tornados.
- Protect the safety and property of residents from forest and wildfires.
- Improve County preparedness for dealing with an epidemic/pandemic.
- Protect people and natural resources from adverse effects of hazardous material incidents.
- Reduce the number of power outages due to natural hazards in Vilas County.
- Create safety awareness for citizens of Vilas County to help protect themselves during extreme heat events.
- Improve County preparedness for dealing with extended drought.
- Lessen the impact floods have on people, property, and the environment.
- Prevent loss of life and reduce the risk of property damage in downstream areas that result from a dam failure.
- Implement comprehensive safeguards and resilient infrastructure to shield the community from the effects of an electromagnetic pulse (EMP) attack or natural event.

PRIORITIZATION OF STRATEGIES

The Mitigation Planning Team considered a number of factors in identifying and ranking proposed mitigation strategies. The matrix, below, describes the factors incorporated into the prioritization process. The resulting priority of each strategy is shown in the summary Table 18.

Prioritization Factors for Vilas County Mitigation Strategies

Strategy Prioritization Factor	*Description of Factor Considerations*
Priority of Hazard Type	The ranking of hazard types, tornado, flooding, etc., accounts for threat to human safety and possible property damage and was carried over to groups of strategies by hazard type. Strategies believed to benefit multiple hazards (listed under "All Hazards") were valued higher.
Ease of Implementation	Strategies where existing staff and resources are adequate were valued higher than those where additional resources are necessary. Consideration was also given to strategies that meet other countywide goals or incorporated as part of another county project. Project timing was also a consideration as to when funding such as grant applications might be available and when various activities could be scheduled.
Perceived Cost versus Potential Benefit	Although a detailed cost-benefit analysis was deemed beyond the scope of this study, the Committee weighed the perceived costs of each strategy against the potential benefit anticipated. Proposals that seemed economically unfeasible were rejected.
Multi-jurisdictional Application	Strategies benefiting multiple jurisdictions were valued more than those pertaining to fewer jurisdictions.

Members of the Team scored each strategy based on these prioritization factors and assigned a high, medium or low rating to reflect their relative level of priority for that strategy. A 3-point weighted scale was used to average the scores into the overall high, medium or low priority for the County or local units as shown in Table 18.

MITIGATION ACTION PLAN

The mitigation strategies are organized by hazard beginning with some overall strategies that apply to a number of different hazards and are listed under the category, "all hazards". For each hazard, a goal was established as to what the County intends to achieve by implementing the specific action strategies and is based on the risk assessment findings. Each action strategy is then briefly described and followed by a discussion of the jurisdictions/agencies that will pursue the action including the proposed lead jurisdiction/agency.

Each section of this part is broken down as follows:

Goal:
Broad, long-term mitigation goals to reduce or avoid vulnerabilities to the identified hazard are stated.

Action:
Each action strategy proposed to aid in achieving the overall goal for the identified hazard is described. A given action strategy may be comprised of a number of related sub-actions.

Participating Jurisdictions:
The proposed lead agency or lead jurisdiction is identified along with a listing of the other agencies or jurisdictions that the recommended action applies to. This does not preclude other agencies or jurisdictions from participating in the action.

The chapter concludes with a summary of the recommended mitigation strategies shown in Table 18. Table 18 also contains project cost estimates where available, potential time frames, and existing and potential programs and resources to accomplish the mitigation strategy.

Hazard: All Hazards

Goal:
Prepare and protect residents and visitors from all hazards.

Action 1:
The County will continue to promote and support use of National Oceanic and Atmospheric Administration (NOAA) weather radios as a supplemental notification system to its primary reverse 911system, see below, for weather advisories to the general public and special locations. NOAA Weather Radio (NWR) is a nationwide network of radio stations broadcasting continuous

weather information direct from a nearby National Weather Service office. NWR broadcasts National Weather Service warnings, watches, forecasts and other hazard information 24 hours a day. NWR is not only for tornados, but also for other hazards as well making it a single source for comprehensive weather and emergency information. NWR also broadcasts warning and post-event information for all types of hazards--both natural and environmental (such as chemical releases).

Participating Jurisdictions for Action 1:
Lead agency will be Vilas County Emergency Management. Jurisdictions participating in this action will include: Vilas County, City of Eagle River, Lac du Flambeau Tribe and all Towns.

Action 2:
The County will continue to add and update information on its Emergency Management Department web site. The web site should contain information describing the types of natural and man-made hazard disasters in the County and how to respond when a hazard threatens. The site should also contain information on ordinances pertaining to hazards, locations of tornado shelters, and links to other sites with useful information on related matters such as burning permits and weather conditions.

Participating Jurisdictions for Action 2:
Lead agency will be Vilas County Emergency Management. The only directly participating jurisdiction will be Vilas County. Other jurisdictions may choose to maintain and update their websites with appropriate hazard related information or link to the County site.

Action 3:
The County has implemented a reverse 911 type emergency notification system and expand public outreach on the availability and use of the system. The system is a web-based early warning system that can deliver targeted emergency notifications to phone numbers in an affected area. The selected area can be the entire county or as small as one block. The system also automatically issues alerts to areas included in National Weather Service warnings for severe storms or tornados. Residents must enroll to receive the notifications on their home or mobile phone.

Participating Jurisdictions for Action 3:
Lead agency will be Vilas County Emergency Management. The only directly participating jurisdiction will be Vilas County.

Action 4:
Continue to promote reverse 911 system for emergency notification. This will involve media contacts, psa's and public appearances. Residents must enroll, at no cost to receive emergency notifications from the reverse 911 system.

Participating Jurisdictions for Action 4:
Lead agency will be Vilas County Emergency Management. The only directly participating jurisdiction will be Vilas County.

Action 5:
The County should continue and promote the training of Law Enforcement Officers, Municipal Fire Department Members, Emergency Medical Services Personnel, and Municipal First Responders in the identification of dangerous weather patterns. The National Weather Service (NWS) provides this type of training through their Weather Spotter Program.

Participating Jurisdictions for Action 5:
Lead agency will be Vilas County Emergency Management in conjunction with the National Weather Service - Green Bay. Jurisdictions participating in this action will include Vilas County, City of Eagle River, Lac du Flambeau Tribe and all Towns including corresponding police and fire departments, EMS and First Responders.

Action 6:
The Town of St. Germain identified a need to install an emergency back-up generator at its Community Center, in response to the mitigation issues survey. It was also suggested that other towns upgrading or replacing community centers, like Town of Winchester, should also ensure the availability of back-up power to enable use of their facilities in emergency situations.

Participating Jurisdictions for Action 6:
Lead agencies will be the Towns of St. Germain and Winchester. St. Germain and Winchester will be the only directly participating jurisdiction, but this recommendation applies to any other town remodeling or replacing community center facilities.

Action 7:
The County and City should obtain new aerial photography for use by their emergency services and for other hazard related planning purposes. Periodic updating of the aerial photo imaging enables time comparison which can enhance assessment of change and trends. Currently, the County is participating with the Wisconsin Regional Orthophotography Consortium (WROC) to pool resources and reduce the cost of the imagery on a five year cycle. Updated photography could be used to identify structures that were constructed or demolished in flood zone areas. This could serve as an important planning tool. Aerial photography has potential use for planning and response to other hazard situations as well.

Participating Jurisdictions for Action 7:
Lead agencies will be the Vilas County Land Information Department, the City of Eagle River and the Lac du Flambeau Tribe. Jurisdictions participating in this action will include Vilas County, City of Eagle River, and Lac du Flambeau Tribe.

Action 8:
The Town of Land O' Lakes has been working to establish an additional fire/rescue hall. The need for a new fire/rescue hall with emergency shelter was identified in the mitigation issues survey for the previous AHMP. The geographic size of the Town in conjunction with the number of lakes affects response time. This second fire hall would provide additional response capabilities on the west side of the Town. Similarly, the Town of Phelps has begun planning for the development of a new fire hall on its east side.

Participating Jurisdictions for Action 8:
Lead agencies will be the Towns of Land O' Lakes and Phelps. Land O' Lakes and Phelps will be the only directly participating jurisdictions.

Action 9:
The county should designate areas for brush and storm debris collection.

Participating Jurisdictions for Action 9:
The County should work with municipalities to identify areas designated for brush and storm debris collection.

Action 10:
The County should seek options for the installation of a local weather radar system to provide accurate and timely weather updates. A local weather radar system would address gaps in the NOAA/NWS network, leading to more enhanced weather forecasting/reporting. Typical sites are sponsored by TV stations to use for on-air broadcasting, NWS often subscribe to the data, as well as it being made available as a deliverable to state/local governments.

Participating Jurisdictions for Action 10:
Lead agencies should be Vilas County's Emergency Management Department.

Action 11:
The County should create local level emergency preparedness plans.

Participating Jurisdictions for Action 11:
Lead agencies should be Vilas County's Emergency Management Department.

Hazard: Winter Storms / Extreme Cold

Goal:
Create safety awareness in citizens and travelers of Vilas County to protect them during and after winter storm events.

Action 12:
The County should actively maintain its list of warming centers and disseminate that information to the public as needed. The County also continues to promote winter hazards awareness on an annual basis, including home and travel safety measures, such as avoiding travel during winter storms. When travel cannot be avoided, having a shovel, sand, warm clothing, food, water, etc. in vehicles is encouraged. Other winter / extreme cold problems common in northwoods counties include freezing of septic systems and residential LP Gas (extreme cold).

Participating Jurisdictions for Action 10:
Lead agency will be Vilas County Emergency Management. Vilas County will be the only directly participating jurisdiction.

Hazard: Severe Thunderstorms / Hail / Lightning / Wind

Goal:
Minimize the threat to human life and property damage caused by associated hail, high wind and lightning.

Action 13:
Due to the wide variety of variety of recreation activities throughout the County, public awareness of proven lightning safety guidelines to reduce risk should be promoted. Areas of concern include golf courses, country clubs, parks ball fields (and other athletic fields), public beaches and boat launches. Efforts should be made to get managers and staff of such facilities "up to speed" with procedures and training for lightning safety. Another common measure is erecting of signs that inform people when to get out of the water or off a golf course (etc.) when lightning threatens.

Participating Jurisdictions for Action 13:
Lead agency will be Vilas County Emergency Management. Participating jurisdictions will include: Vilas County, City of Eagle River, Lac du Flambeau Tribe and all Towns.

Hazard: Tornados

Goal:
Protect health, safety, and welfare of county residents and visitors, along with mitigating future loss of property from tornados.

Action 14:
In response to the mitigation issues survey, several towns have identified the need to install a tornado / emergency warning siren(s). The only other location currently within Vilas County with active tornado sirens is the Lac du Flambeau tribal area. The County has no control / participation with any siren operations.

Participating Jurisdictions for Action 14:
Lead agency will be the Town of St. Germain. St. Germain will be the only directly participating jurisdiction.

Action 15:
In response to the mitigation issues survey, several Towns indicated a need for emergency shelters. In some cases, a new facility was recommended, but others suggested retro-fitting existing facilities such as a town hall or community center with necessary improvements and/or equipment such as back-up generators, heating or air conditioning units. The City of Eagle River also expressed such a need. Campgrounds and mobile home parks are other places within the County where construction of a shelter should be considered due to lack of access to emergency shelter facilities.

The older population demographic of the County results in a significant segment of the population with a higher susceptibility to extreme heat and cold. A useful mitigation tool is to have town halls/fire stations or community centers properly equipped to be utilized as warming or cooling locations (or even just a place to recharge cellphones) for these residents (and others) as necessary.

Funding for the construction of shelters may be available through the Wisconsin Department of Commerce's Community Development Block Grant (CDBG). Shelter development is also eligible under FEMA mitigation grants including construction of safe rooms. In some cases, the value of the land on which a shelter facility is built may be counted toward required match for the FEMA grants.

Participating Jurisdictions for Action 15:
Lead agencies will be the City of Eagle River and Towns of Land O' Lakes and Phelps. These will be the only directly participating jurisdictions, but the recommendation applies to all towns with a need.

Hazard: Forest Fires and Wildfires

Goal:
Protect the safety and property of residents from forest and wildfires.

Action 16:
The County, in conjunction with the WDNR, should promote the Firewise program and related educational materials to increase community awareness of wildfire risk particularly in areas not eligible for CWPP funding within the County. Outreach efforts should include information on how to protect homes and structures from wildfires. Since Vilas County is mostly rural with many industrial woodland parcels, emphasis should be placed on building construction materials and establishing defensible areas around structures. Roofs and exterior siding should be made of ignition-resistant materials. At least 30 feet should be left between homes and surrounding combustible vegetation. Outreach efforts can exist in the form of web sites, local newspaper articles, and pamphlets to homeowners.

Participating Jurisdictions for Action 16:
Lead agency will be Vilas County Emergency Management in conjunction with WDNR. Participating jurisdictions include Vilas County, Lac du Flambeau Tribe, and all Towns.

Action 17:
Towns with high risk of wildfire should develop Community Wildfire Protection Plans (CWPPs). In Vilas County, the majority of towns have been identified by WDNR as very high or high risk for wildfire including: St Germain, Cloverland, Lincoln, Lac du Flambeau, Arbor Vitae, Manitowish Waters, Boulder Junction, Plum Lake, Conover, Land O'Lakes and Washington. Phelps is designated as a community-of-concern.

A CWPP identifies and prioritizes areas for hazardous fuels reduction treatments and recommends types and methods of treatment that will protect at-risk areas and critical infrastructure. WisDNR has grant funding and technical support available for community wildfire protection planning. Approximately half of the towns within the County have completed or are in the process of developing a CWPP. Towns identified as high risk that don't yet have a CWPP program in place should begin the process.

Participating Jurisdictions for Action 17:
Lead agencies will be those high-risk Towns still in need of a CWPP in conjunction with WDNR. Jurisdictions participating in this action will include: Vilas County, City of Eagle River, and all Towns in conjunction with their respective fire departments.

Action 18:
In the mitigation issues survey, Town of Washington indicated interest in fire inspector training. This probably stems from their community wildfire protection planning activities. Fire inspector training involves training of individuals to evaluate properties for Firewise principals and advising home owners on making their homes more resistant to wildfire. Typically, the area fire department has some responsibility for this type of inspection activity, but departments may have a limited number of personnel assigned to inspections and a larger jurisdictional area to cover. Broadening the range of people that can do the inspections allows more homeowners to be reached more quickly as well as providing more resident support; thus improving the effectiveness of any CWPP / Firewise programming.

Participating Jurisdictions for Action 18:
Lead agency will be the Town of Washington. Jurisdictions participating in this action will include Town of Washington and other towns with interest in fire inspector training.

Hazard: Epidemic / Pandemic

Goal:
Improve County preparedness for dealing with an epidemic/pandemic.

Action 19:
The County should continue to review Annex H and related plans for a variety of public health concerns on an annual basis. As part of this on-going process the Health Department is working on a "mass immunization clinic" plan. A complicated range of issues, including traffic control and volunteer recruitment/management, must be worked out for an effective plan.

A severe epidemic/pandemic outbreak affecting Vilas County would quickly over-tax the normal capacities of the county's health services. While an incident of this magnitude would likely involve federal and state agencies, other county and local departments and agencies, including Emergency Management, would become involved. The mass clinic plan involves developing and strengthening partnerships with healthcare providers and other community agencies to coordinate responses and to educate clients and the public.

Participating Jurisdictions for Action 19:
Lead agency will be Vilas County Health Department in conjunction with Vilas County Emergency Management. The only directly participating jurisdiction will be Vilas County, but a broad coalition of public and private entities will need to come together for an effective response to a severe pandemic situation.

Action 20:
Vilas County continues to conduct a variety of tabletop and functional exercises to support planning for a variety of public health concerns in preparation for possible severe epidemic/pandemic situations. Implementing these (and other) interventions in a timely and coordinated manner will require advance planning. Communities must be prepared for consequences such as increased workplace absenteeism related to child-minding responsibilities if schools need to dismiss students or childcare programs close.

Participating Jurisdictions for Action 20:
Lead agency will be Vilas County Health Department in conjunction with Vilas County Emergency Management. Jurisdictions participating in this action will include: Vilas County, City of Eagle River, and Lac du Flambeau Tribe.

Hazard: Hazardous Materials Incidents - Fixed Site / Transport

Goal:
Protect people and natural resources from adverse effects of hazardous material incidents.

Action 21:
The County will continue to maintain its contract with Oneida County for the Type II Emergency Response Team to respond to serious hazardous materials release. Maintaining the Type II Team provides more immediate response to incidents that require a Hazardous Material Team response.

Participating Jurisdictions for Action 21:
Lead agency will be Vilas County Emergency Management. Vilas County will be the only directly participating jurisdiction.

Hazard: Power Outage

Goal:
Reduce the number of power outages due to natural hazards in Vilas County.

Action 22:
The County will continue to implement the recommendations of the 2011 After Action Improvement Plan for Long Term Power Outage in Vilas County. Corrective actions or recommendations cover four main objective areas including: Mass Care & Sheltering, Communications & Response Coordination, Utility Restoration and Public Information. A number of the recommended corrective actions have been implemented, but others need further work. Some of these include: developing contact lists for shelter facilities, developing welfare check procedures, developing "comprehensive" special needs population list and client list sharing procedures, and other public information actions.

Participating Jurisdictions for Action 22:
Lead agency will be Vilas County Emergency Management. Vilas County will be the only directly participating jurisdiction.

Action 23:
The County will continue to work with power companies serving the area to develop communication protocols for improved information sharing to mitigate public confusion and disappointment created by the lack of accurate information in emergency situations with downed lines and loss of power. A model of utilizing a pre-designated liaison with other response agencies and the public is an effective tool in improving communications and coordination.

Participating Jurisdictions for Action 23:
Lead agency will be Vilas County Emergency Management in conjunction with WPS / WE Energies, Xcel Energy and Eagle River Light. Vilas County will be the only directly participating jurisdiction.

Hazard: Drought / Extreme Heat

Goal:
Improve County preparedness for dealing with extended drought.

Goal:
Create safety awareness for citizens of Vilas County to help protect themselves during extreme heat events.

Action 24:
The County should actively maintain its list of cooling centers and disseminate that information to the public as needed. The County also continues to promote heat hazards awareness on an annual basis, including home and travel safety measures. Include information regarding checking on neighbors or others known to live alone or that may be at a disadvantage in fending for themselves.

Participating Jurisdictions for Action 24:
Lead agency will be Vilas County Emergency Management. Participating jurisdictions include Vilas County, City of Eagle River, Lac du Flambeau Tribe and all Towns.

Hazard: Flooding / Dam Failure

Goal:
Lessen the impact floods have on people, property, and the environment.

Goal:
Prevent the loss of life and reduce the risk of property damage in downstream areas that result from a dam failure.

Please note: actions denoted with an asterisk (*) relate to compliance with the National Flood Insurance Program (NFIP).

Action 25:
The County recently entered into the National Flood Insurance Program (NFIP). However, the City of Eagle River remains a non-participant in the NFIP. Note, however, that federal lending regulations require flood insurance whether or not a community participates in the NFIP. NFIP participation reduces the cost of the insurance. In addition, with the recent tightening of lending regulations, many financial institutions are looking more carefully at NFIP status.

Now that the WDNR has updated the Vilas County maps, many of the discrepancies have been resolved. The revised maps have excluded nearly 2,000 acres from the area previously identified as floodplain. The City of Eagle River should reconsider entry into the NFIP based on these new maps. Entry into the NFIP primarily entails adoption of a floodplain zoning ordinance as a complement to existing county shoreland zoning. A minimum standard model is available.

Participating Jurisdictions for Action 25:
Lead agency will be the City of Eagle River. Participating jurisdictions will include Vilas County and the City of Eagle River.

Action 26:
Vilas County will continue to work with dam owners and operators to review and test the dam failure Emergency Action Plan (EAP) for each significant and high hazard dam within the County as well as other dams as appropriate.

Emergency situations and/or dam failures are not common events, but the dams within the County are aging and as a result becoming more of a concern. The EAP can become outdated, lose its effectiveness and no longer be workable if the plan is not practiced. Those involved may become unfamiliar with their roles and responsibilities, especially with the turnover of local officials. If the plan is not updated, the information contained in it may become outdated and useless.

FEMA guidelines for dam safety indicate that training and exercises are necessary to maintain operational readiness, timeliness and responsiveness. The status of training and levels of readiness should be evaluated in periodic simulated emergency exercises for response personnel and the dam owner/operator. There are five types of exercises, including: orientation seminar, drill, tabletop exercise, functional exercise and full-scale exercise. They range in complexity from simple to more complex, but it is not required that every exercise program include all five types.

Participating Jurisdictions for Action 26:
Lead agency will be Vilas County Emergency Management. Participating jurisdictions will include: Vilas County and towns with significant or high hazard dams in conjunction with dam owners/operators.

Action 27:
Conduct a hydrology study related to the impacts of a large-volume rainfall and how to mitigate. Areas of northwestern and southwestern Wisconsin have been caught unprepared as several large-volume rainfall events have devastated large areas. The proposed study would provide modeling of extreme rainfall events in Vilas County to identify potential problem areas in advance and help the County prepare for the anticipated impacts. These problem areas could then be targeted for projects to mitigate against those impacts. Then the modeling would show precipitation levels and timing and an H&H analysis would ultimately show where the water would go and what improved structures and population centers would be at risk.

Participating Jurisdictions for Action 27:
Lead agency will be Vilas County Emergency Management. Vilas County will be the only directly participating jurisdiction.

ACTION 28*:
Vilas County is now currently participating in the National Flood Insurance Program (NFIP) and should work to ensure continued compliance. Compliance primarily entails adopting and enforcing floodplain management regulations that meet minimum criteria. All towns are included under the umbrella of the County through the state mandated county shoreland zoning.

Participating Jurisdictions for Action 28:
Lead agency includes Vilas County Zoning. The only directly participating jurisdiction is Vilas County at this time.

ACTION 29*:
Vilas County should seek to mitigate the impacts of flooding through the voluntary acquisition and demolition of structures in the floodplain, particularly those with flood damage following a flood event.

Participating Jurisdictions for Action 29:
Lead agencies include Vilas County Planning and Zoning and Emergency Management. The only directly participating jurisdiction is Vilas County at this time.

Action 30:
Vilas County should work with local municipalities to replace damaged or failing culverts. A prioritized list of these culverts should be created, focusing on replacing the most essential ones for managing water drainage and preventing flooding first.

Participating Jurisdictions for Action 30:
Lead Agencies include Vilas County Highway department and various local streets and highway departments that have failing culverts.

Electromagnetic Pulse

Goal:
Implement safeguards and resilient infrastructure to shield the community from the effects of an electromagnetic pulse (EMP) attack or natural event.

Action 31:
The county will explore installing Faraday cages and purchasing critical electronic equipment with electromagnetic shielding to reduce vulnerability to EMP effects. A Faraday cage is an enclosure used to block some electromagnetic fields. A Faraday shield may be formed by a continuous covering of conductive material, or in the case of a Faraday cage, by a mesh of

such materials. Critical infrastructure should be identified that may be at risk to EMP and vital to the safety of Vilas County.

Participating Jurisdictions for Action 31:
Lead agencies include Vilas County Emergency Management and Information Technology (IT) departments.

Action 32:
Vilas County will develop emergency response plans that account for the potential impact of EMPs.

Participating Jurisdictions for Action 32:
Vilas County Emergency Management will be responsible for creating electromagnetic pulse response plans.

TABLE 18 SUMMARY OF MITIGATION STRATEGIES VILAS COUNTY ALL HAZARDS MITIGATION PLAN UPDATE					
MITIGATION MEASURES (See Expanded Description in Plan Text)	**RESPONSIBLE UNITS**	**COST ESTIMATE**	**EXISTING AND POTENTIAL RESOURCES TO IMPLEMENT**	**PROJECT * TIMEFRAME**	**PRIORITY LEVEL**
ALL HAZARDS					
1. Continue to promote and support the use of National Oceanic and Atmospheric Administration (NOAA) weather radios.	County EM Dept.	Staff Time	Dept. Budget.	On-going	High
2. Continue to add/update Emergency Management Department link off existing County website.	County EM Dept.	Staff Time	Dept. Budget	On-going	Medium
3. Maintain a reverse 911 emergency notification system and expand public outreach on availability and use of system.	County EM Dept.	$15,000/yr	Dept. Budget	On-going	High
4. Promote reverse 911 system registration through media contacts, psa's and public appearances.	County EM Dept.	Staff Time	Dept. Budget	On-going	High
5. Coordinate NWS Internet based training for Law Enforcement, Fire, EMS, First Responders and the public in the identification of dangerous weather formations.	County EM Dept. / City of Eagle River / LdF Tribe	Staff Time	National Weather Service	On-going	Medium
6. Install back-up generator(s) for community center(s) to facilitate operating an emergency shelter.	St. Germain / Winchester / Plum Lake	$20,000	Town Funds	2026	Medium
7. Update aerial photography for use by Vilas County and City of Eagle River. Used for 911 and emergency response. Can also be used with new LiDAR to help improve floodplain mapping.	Co. Land Info. Dept. / City of Eagle River / LdF Tribe	$80,000	Dept. Budget / Local Match Funds / WI Land Information Program Retained Fees	2025	High
8. Establish west side Land O' Lakes fire/rescue hall and shelter facility. Establish east side facility in Phelps.	Land O'Lakes / Phelps	Costs to be determined	Town Funds / Federal - Assistance to Firefighters Grant (AFG)	2026	Medium
9. Designate areas for brush and storm debris.	County EM Dept. / Towns / City	Staff Time	Dept. Budget	2026	Medium
10. Seek options for local weather radar system to provide accurate and timely weather updates.	City of Eagle River / Eagle River Airport / County EM Dept.	Staff Time	Public / Private Partnership	2025	High

MITIGATION MEASURES (See Expanded Description in Plan Text)	RESPONSIBLE UNITS	COST ESTIMATE	EXISTING AND POTENTIAL RESOURCES TO IMPLEMENT	PROJECT * TIMEFRAME	PRIORITY LEVEL
11. Create local level emergency preparedness plans.	County EM Dept. / Towns / City	Staff Time	Dept. Budget	On-going	High
WINTER STORM / EXTREME COLD					
12. Maintain listing of warming centers and promote along with other winter hazards awareness information.	County EM Dept. / County Health Dept.	Staff Time	Dept. Budgets	Annual	High
SEVERE THUNDERSTORM / HAIL / LIGHTNING / WIND					
13. Promote lightning safety awareness to reduce risk.	County EM Dept. / City / All Towns / LdF Tribe	Staff Time	Dept. Budget / Local Funds	As needed	Medium
TORNADO					
14. Install emergency warning sirens.	All Towns	$15,000	Town Funds	2026	Medium
15. Develop emergency storm/tornado shelters through new facilities or retrofitting existing facilities with necessary improvements and/or equipment.	Land O' Lakes / Phelps / Arbor Vitae / Presque Isle / Lincoln / Plum Lake others as needed	Costs to be determined	Local Funds / FEMA / Hazard Mitigation Grants / CBDG Program	2025	High
FOREST FIRE / WILDFIRE					
16. Promote Firewise program and related educational materials to increase community awareness of wildfire risk within those towns not under a CWPP Program.	County EM Dept. / LdF Tribe / All Towns	Staff Time	Dept. Budget	On-going	Medium
17. Develop Community Wildfire Protection Plans (CWPP) that incorporate Firewise components for high-risk towns.	Affected Towns / WDNR	$24,999 ea.	WisDNR National Fire Plan Funding	On-going	Medium
18. Fire inspector training to complement CWPP and Firewise programming.	T. Washington / others as applicable	Costs to be determined	WisDNR assistance	Annual	High
EPIDEMIC / PANDEMIC					
19. Annually review and update as necessary County Emergency Operations Plan Annex H related to public health emergencies.	County Health Dept. / County EM Dept.	Staff Time	Dept. Budgets	Annual	High

MITIGATION MEASURES (See Expanded Description in Plan Text)	RESPONSIBLE UNITS	COST ESTIMATE	EXISTING AND POTENTIAL RESOURCES TO IMPLEMENT	PROJECT * TIMEFRAME	PRIORITY LEVEL
20. Continue to develop mass care plans and regularly conduct various public health preparedness exercises to assist in planning and preparation for possible epidemic / pandemic or other public health situation.	County Health Dept. / County EM Dept.	Staff Time	Dept. Budgets	Annual	High
HAZARDOUS MATERIALS INCIDENTS - FIXED SITE / TRANSPORT					
21. Continue support for Type II Emergency Response Team to deal with extremely hazardous spill situations.	County	$5,000/yr	EPCRA / HazMat Grant	On-going	High
POWER OUTAGE					
22. Continue to implement recommendations of the 2011 After Action Improvement Plan for Long Term Power Outage in Vilas County.	County EM Dept. / City of Eagle River	Staff Time / Costs to be determined	Dept. Budgets	On-going	High
23. Continue to work with energy providers and ATC within the county to coordinate communication and response to power outage situations.	County EM Dept. / City of Eagle River	Staff Time	Dept. Budgets	On-going	High
DROUGHT / EXTREME HEAT					
24. Maintain listing of cooling centers and promote along with other extreme heat/drought exposure hazards awareness information.	County EM Dept. / County Health Dept.	Staff Time	Dept. Budgets	Annual	Medium
FLOODING / DAM FAILURE					
25. The City Council should periodically discuss the issue of participation in the National Flood Insurance Program (NFIP).	City of Eagle River	Staff Time	Dept. Budget / Local Fund	On-going	Medium
26. Continue to work with dam owners to review Emergency Action Plan (EAP) for each significant and high hazard dam.	County EM Dept.	Staff Time	Dept. Budget	On-going	High

INTRODUCTION

Part V of the Vilas County All Hazards Mitigation Plan Update describes the update adoption, implementation, and evaluation and maintenance.

PLAN UPDATE ADOPTION

The adoption of the Vilas County All Hazards Mitigation Plan Update lends itself to serve as a guiding document for all local government officials. It also certifies to program and grant administrators from the FEMA and WEM that the Plan's recommendations have been properly considered and approved by the governing authority and the jurisdiction's citizens. Finally, it helps to ensure the continuity of mitigation programs and policies over time because elected officials, staff, and other community decision-makers can refer to the official document when making decisions about the community's future.

Before adoption of the Plan Update by the incorporated areas, the Plan must be sent to the state and federal level to verify that all DMA2K requirements are met. Once a draft of the Plan Update has been completed, it is submitted to the State Hazard Mitigation Officer (SHMO) at the state level at WEM. Previous drafts of the Plan Update have already been reviewed prior to this submittal. The SHMO will determine if the updated Plan meets requirements. Upon approval of the draft by WEM, the SHMO is responsible for showing the Plan to the FEMA Region V Office for review.

Prior to final approval by WEM and FEMA, the Update must be formally adopted by Vilas County and its incorporated areas by resolution. Incorporated communities that do not adopt the Plan Update cannot apply for mitigation grant funds unless they opt to prepare, adopt, and submit their own Plan. Adoption of the Plan Update gives the jurisdiction a legal basis to enact ordinances, policies, or programs to reduce hazard losses and to implement other mitigation actions.

All general-purpose units of government (i.e. cities, towns) within Vilas County were offered one or more avenues to participate in the development of this Plan Update. Adoption of the Plan Update by a local unit of government certifies their participation. The Vilas County Board has adopted this Plan Update. Resolutions of adoption are contained in APPENDIX B.

PLAN UPDATE IMPLEMENTATION

ADMINISTRATIVE RESPONSIBILITIES

Once the Plan Update has been approved, stakeholders must be informed. The County Emergency Management Director will distribute notice of availability to stakeholders. The County will also make the Plan Update available to the public by linking the report on their web site.

Along with monitoring the progress of the action projects, the County Emergency Management Director and Law Enforcement & Emergency Management Committee should also work to secure funding to implement the Plan. State and federal agencies, nonprofit organizations, and foundations continually make grants available. Emergency Management should research these grant opportunities to determine eligibility for the County and its local units of government.

When implementing this Plan update, innovative ways should be considered to involve active participation from nonprofit organizations, businesses, and citizens to implement the Plan. The relationship between these groups will result in greater exposure of the Plan and provide greater probability of implementation of the action projects listed.

The role of department administrators, elected officials, and local administrators are to ensure that adopted actions from Part IV are considered in their budgets. It is understood that projects may not be carried out as they are scheduled in Part IV due to budget constraints. However, since many of these action projects are considered an investment in safeguarding the publics' health, safety, and property, they should be carefully considered as a priority.

PROMOTE SUCCESS OF IDENTIFIED PROJECTS

Upon implementing a project covered by this Plan Update, it is important to promote the accomplishment to the stakeholders and to the communities. This will help inform people that the Plan is being implemented and is effective.

COMMUNITY DISASTER RESILIENCE

There has been a growing movement in emergency management planning circles toward a "new" buzz word: resilience. There is a wide range of definitions for community resilience and what it entails, but in 2012 the National Academy of Sciences looked at the major federal agencies and independent organizations with work efforts related to resilience and determined that *"resilience is the ability to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events. Enhanced resilience allows better anticipation of disasters and better planning to*

reduce disaster losses—rather than waiting for an event to occur and paying for it afterward."

Many weather experts now expect severe weather events to become increasingly more frequent and intense. Recent events seem to corroborate this condition with multiple "short duration - high volume" rainfalls causing devastating flooding around the state in 2015, 2016, 2017 and 2018. Some of Vilas County's close neighbors to the west, including Ashland and Bayfield counties, experienced significant flooding in each of the past three years. The proximity of these devastating events has led county emergency management to call for a study to determine which areas of Vilas County are most susceptible to this type of flooding, so that mitigation efforts can be focused where needed the most.

It is recommended that the County acknowledge these changing conditions and begin working toward an approach to incorporating a community resilience component into its planning and operations. The Lac du Flambeau Band of Chippewa has recently begun its own community resilience initiative, see Appendix C. The County could coordinate with the Lac du Flambeau on resiliency efforts, as it already does in the area of public health and other programs.

INCORPORATION INTO OTHER LOCAL PLANNING MECHANISMS

FEMA requires a process by which the mitigation plan is incorporated into other planning mechanisms where appropriate. When undergoing any planning process, County departments, local units of government and/or any professional staff assisting them typically review and incorporate any related pre-existing plans as a matter of course.

The most applicable planning process outside of the mitigation plan are the local comprehensive plans for each community. The County's current comprehensive plan was completed in 2023. The 2023 Comprehensive Plan incorporates the previous (2019) mitigation plan as outlined below. In addition, the local comprehensive plan for the City of Eagle was last updated in 2017. The process also incorporated the hazard mitigation plan in a similar fashion as outlined below. The NCWRPC, facilitator of the countywide hazard mitigation plan and updates, also assisted with the county and local comprehensive plan updates and works to integrate both plans as part of its standard planning process.

The following outlines how the mitigation plan is incorporated into each of the nine elements of these county and local comprehensive plans:

- *Issues and Opportunities Element* – a summary of major hazards local government is vulnerable to, and what is proposed to be done to mitigate future losses from the hazards.

- *Housing Element* – an inventory of the properties that are in the floodplain boundaries, the location of mobile homes, recommendation on building codes, shelter opportunities, and a survey of homeowners that may be interested in a voluntary buyout and relocation program.
- *Utilities and Community Facilities Element* – identify critical facilities such as shelter, schools, medical, water infrastructure, etc. and make recommendations on how to mitigate specific risks factors.
- *Transportation Element* – identify any transportation routes or facilities that are more at-risk during flooding, winter storms, or hazardous material spills.
- *Agricultural, Natural Resources, and Cultural Resources Element* – identify the floodplains and agricultural areas that are at risk to hazardous events. Incorporate recommendations on how to mitigate future losses to agricultural areas.
- *Economic Development Element* – describe the impact past hazards have had on County and municipal business.
- *Intergovernmental Cooperation Element* - identify intergovernmental police, fire, and rescue service sharing agreements that are in effect, or which may merit further investigation, consider cost-sharing and resource pooling on government services and facilities.
- *Land Use Element* - describe how flooding has impacted land uses and what is being done to mitigate negative land use impacts from flooding; map and identify hazard areas such as floodplains, hazardous materials areas, and soils with limitations.
- *Implementation Element* – have action plans from this Plan implemented into comprehensive plans.

Continuing Incorporation of Mitigation Plan into Other Local Planning Mechanisms

To ensure the countywide mitigation plan (previous/current/updates moving forward) will continue to be incorporated into other planning mechanisms, the NCWRPC works with county and local officials and staff to schedule comprehensive plan updates. The County Comprehensive Plan update was just completed in November 2023; so, the next update will be in about 10 years and Eagle River's Comprehensive Plan update is scheduled for 2024. All of these updates have been identified for incorporation of the updated countywide All Hazards Mitigation Plan. County and Regional Planning Commission Staff will also work with county and local community planners to incorporate the mitigation plan into other future planning processes as appropriate.

JURISDICTION CABABILITY ASSESSMENT

Vilas County and the City of Eagle River are relatively small communities in rural Wisconsin with limited resources and funding. However, they each have some capacity to support mitigation strategies. This section describes the existing authorities, policies, programs, funding, and resources that the County and the City of Eagle River have available to support hazard mitigation.

Each jurisdiction has professional staff available to implement and manage mitigation programs. Most directly, Vilas County has an Emergency Management Director whose responsibilities include mitigation. In addition, the County has an Administrative Coordinator and a number of departments including Sheriff, Health, Highway, and Land Services (GIS Mapping, Conservation, and Zoning & Land Use) with expertise that can assist with mitigation. The City of Eagle River has administrative/zoning, police, fire, and public works staff who can assist with mitigation. Mitigation work is often made a part of the annual work plans for many of these departments/individuals.

Another way County and City Staff support mitigation is through involvement in various local planning activities and implementation of projects resulting from those plans. In addition to this countywide All Hazards Plan, the County and City maintain comprehensive plans that guide development and facilities based on risk and hazard areas. Other County plans include the County Emergency Response Plan and the Community Health Assessment and Improvement Plan. Eagle River also maintains emergency operations plans, and some departments such as Public Works develop plans to mitigate potential hazards that may affect their water systems.

Vilas County and the City of Eagle River also have regulatory authority for programs that control development to minimize risk and avoid hazard areas. These regulatory authorities include the comprehensive planning law, zoning ordinances (including shoreland and floodplain regulations), subdivision, and platting ordinances, and building codes.

Funding for mitigation programs comes primarily through taxing authority, annual County and City budgets, and Capital Improvements Programming. However, the County and Cities often rely on federal and state grant programs for any significant expenditures.

Ability to Expand and Improve Mitigation Capabilities

While Vilas County and the City of Eagle River have some fiscal capacity, they are constrained by state-imposed levy limits. As a result, each of the communities is heavily dependent on grant funding. These conditions

limit each jurisdiction's ability to expand or improve on its mitigation capabilities.

Being small, the City of Eagle River has few staff to carry the load, and budget conditions restrict the ability of both jurisdictions to increase staffing levels for mitigation activities.

PLAN UPDATE MONITORING, EVALUATION AND MAINTENANCE

Planning is an ongoing process. Because of this, this document should grow and adapt in order to keep pace with the growth and change of the County and its local jurisdiction. FEMA rules require that local plans be evaluated and updated at least every five years to remain eligible for assistance.

The Plan will be monitored and evaluated on an annual basis as needed by Emergency Management. The County Emergency Management Director will evaluate incoming information against the contents of the Plan to determine possible needs and bring that information to the Local Emergency Planning Committee to discuss the evaluation and potential revisions to the Plan as needed. The Emergency Management Director is encouraged to consult/coordinate with the NCWRPC in the event of any revision.

Local Emergency Planning Committee meetings are always open to the public, and the public can bring questions or comments regarding this Plan to any regular meeting. The final plan document will be available on the Internet until the next draft update is posted for review. The public can continue to submit questions or comments at any time via an email link.

Plan monitoring also includes evaluating and revising following disaster events to determine if the recommended actions are appropriate given the impact of the event. The risk assessment (Part III) should also be reviewed to see if any changes are necessary based on the pattern of disaster damage.

Full updates are required every five years. As a result, every fifth year, the review will be expanded to an overall plan update to meet FEMA requirements. All stakeholders and the public will again be involved in the update process. The County will conduct a survey and open comment meeting. This also provides an opportunity to inform on the progress of any projects.

The Local Emergency Planning Committee and County Board must approve all changes and updates to the Plan.