

Polk County Multi-Hazard Mitigation Plan 2024-2029



Final Draft - 12/20/24



POLK COUNTY MULTI-HAZARD MITIGATION PLAN 2024-2029

PREPARED BY:

Polk County All Hazards Mitigation Plan Steering Committee
Polk County Emergency Management
Polk County communities

WITH ASSISTANCE BY:

West Central Wisconsin Regional Planning Commission

ADOPTED **MONTH XX, 2024**
BY THE POLK COUNTY BOARD OF SUPERVISORS

<INSERT FEMA acceptance letter(s) here once approved>

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<p>Appendices will be numbered in final version once adopting resolutions inserted in Appendix A.</p>
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SECTION I. INTRODUCTION

A. PURPOSE OF THE PLAN

The *Polk County Multi-Hazard Mitigation Plan* has been prepared with financial support due to the County's application for, and award of, Hazard Mitigation Grant Program (HMGP) mitigation planning funds (FEMA-DR-4520-WI). These funds are disbursed by the Federal Emergency Management Agency (FEMA) through Wisconsin Emergency Management (WEM).

Mitigation is a long-term action that minimizes or prevents losses or damage due to a significant risk. The primary purpose of this plan is to evaluate the County's risks, vulnerabilities, and capabilities related to natural disasters and identify appropriate mitigation strategies. After evaluating the disaster threats facing Polk County, the Steering Committee for this plan update decided to expand the scope of the planning effort to also include some select non-natural hazards. This plan also includes some discussion of preparedness capabilities and recommendations.

The Code of Federal Regulations states...

"The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards."

(44 CFR Part 201.6, pp 8851)

Completion and approval of this plan will continue to make Polk County and participating jurisdictions eligible to apply for future FEMA hazard mitigation project funds for a five-year period until the next full hazard mitigation plan update.

The Polk County Emergency Manager is the primary contact regarding this mitigation plan.

B. PLANNING PROCESS

Polk County contracted with West Central Wisconsin Regional Planning Commission (WCWRPC) to facilitate this update to the County's hazards mitigation plan previously approved by FEMA in September 2017 and adopted by the County Board in November 2017. This previous plan will be referred to as the 2017 Plan in this update, which will be referred to as the 2024 Plan.

Update of the *Polk County Multi-Hazard Mitigation Plan* (the "2024 Plan") meets the planning requirements and guidance provided by the Federal Emergency Management Agency (FEMA)¹ and the Wisconsin Department of Military Affairs, Wisconsin Emergency Management.² As such, the 2024 Plan meets the requirements of the Disaster Mitigation Act of 2000. The 2024 Plan's scope is

¹ Federal Emergency Management Agency, Local Mitigation Planning Policy Guide. FP 206-21-0002, April 19, 2022.

² Wisconsin Emergency Management, Resource Guide to All Hazards Mitigation Planning in Wisconsin. April 2003. and WEM Local Mitigation Planning Handbook. February 7, 2023.

inclusive of all of Polk County and is considered a multi-jurisdictional plan under Federal guidelines, with the exception of the Village of Turtle Lake. For this plan update, public educational institutions with facilities within Polk County were also invited to be full participants, which is discussed in Section I.C.

To guide the plan's update, Polk County created an ad hoc Mitigation Plan Steering Committee representing a broad range of public, private, and non-profit stakeholder organizations shown in **Table 1**. In addition to bringing insight on their respective roles, the Committee members also are very knowledgeable of the issues and concerns of the County's residents, vulnerable populations, community lifelines, industry, and response agencies. The Committee provided input on the planning process, reviewed information and materials, discussed capabilities and related plans, set plan goals, and prioritized hazard risks and mitigation strategies.

Table 1. Polk County Hazard Mitigation Plan Steering Committee

Name	Representative of:
Lisa McMahon	County Emergency Management
Emil Norby	County Highway Commissioner
Laura Wagner	Aging & Disability Resource Center (ADRC)
Terry Hauer	County Economic Development Corporation
Mark Nelson	Local Veterinarian
Eric Wojchik	County Conservationist
Jesse Seering	Polk-Burnett Electric Cooperative
Nicki Gullickson	Northwestern Emergency Medical Services
Justin Reese	County Highway Department
Darren Van Blaricom	Amery Hospital
Tonya Eichelt	County Community Services
Don Burrows	County Sheriff's Department
JoAnn Agne	Town of Apple River Clerk/Farmer
Jason Everson	Polk-Burnett Electric Cooperative
Kathy Poirier	Retired/Village of Balsam Lake President
Colleen Maxwell	Polk County Information Center
Darren Van Blaricom	Health Partners – Amery Hospital & Clinic
Matt Larson	City of St. Croix Falls
Jim Ulmaniec	Wisconsin DNR Forestry

Update of the plan began in late 2022 following the general stages of plan development shown in **Figure 1** at the end of this section. Primary local engagement activities during the planning process are discussed in Section I.C. and I.D. A summary of plan changes since the 2017 Plan is provided in **Appendix J**, and includes a brief synopsis of how the Steering Committee reviewed and analyzed each section of the plan.

With consideration of National Weather Service historical data, recent hazard events, and the scope of the 2017 Plan, the Steering Committee agreed that the 2024 Plan should continue to focus on the same natural hazards, except:

- The risk assessment for wind storms was combined with tornados due to the very similar

vulnerabilities and the frequent inability to distinguish between the two event types at the local level (e.g., local debate on whether a passing storm was a tornado vs. straight-line wind).

- Extreme heat was added to the scope as a growing significant risk.
- A full analysis of invasive species is not included, since this is better classified as a continuing challenge and concern, rather than a hazard or disaster threat.

The Steering Committee agreed that the plan should be expanded to include the following non-natural hazards of significant risks: hazardous materials spills, active shooter/active threats, and cyber-attack. The Committee determined that the following additional hazards are of concern, but are addressed in other plans, so it was inefficient and duplicative to include a full risk assessment in the 2024 Plan update: Zoonotic and Communicable Diseases/Pandemic Flu and Nuclear Power Accident.

In light of the latest FEMA mitigation planning guidance, additional emphasis during the plan update was placed on socially vulnerable populations, nature-based solutions, weather/climate patterns, and community lifelines (formerly critical facilities).

In addition to the Steering Committee meetings, community input during the planning process was gathered through meetings, interviews, surveys, and the review of other pertinent plans as will be discussed later in this section. In October 2024, the full draft plan was released for public review and submitted to Wisconsin Emergency Management (WEM) for pre-review. Copies of adopting resolutions/letters for all plan participants are included in **Appendix A**.

C. PLAN PARTICIPANTS

The *Polk County Multi-Hazard Mitigation Plan* is a multi-jurisdictional plan and encompasses all incorporated and unincorporated jurisdictions within Polk County, with the exception of the Village of Turtle Lake, which is part of the Barron County planning effort. All municipalities in Polk County with 100-year floodplains identified on Flood Insurance Rate Maps (FIRMs) are participants in good standing in the National Flood Insurance Program (NFIP), with the exception of the Village of Clear Lake, which is discussed further in the flood assessment section.

Full plan participants are the following local entities that actively participated in the plan update and have adopted or approved the 2024 Plan:

County Government
Polk County
Cities & Villages (incorporated municipalities)
Village of Balsam Lake
Village of Centuria
Village of Clayton
Village of Clear Lake
Village of Dresser
Village of Frederic

Village of Luck
Village of Milltown
Village of Osceola
City of Amery
City of St. Croix Falls
Public Educational Institutions
School District of Amery
School District of Osceola
Unity School District
Northwood Technical College

For the 2024 Plan update, all public educational institutions serving Polk County were invited to be full participants for the first time, though only two fully participated. Polk-Burnett Electric Cooperative is the primary non-profit electric cooperative serving the County and also actively participated, though other electric cooperatives do provide some service within the County.

All participating jurisdictions in Polk County were actively involved in the planning process through the following means:

- The Steering Committee included representation from different areas in the County and some of the communities previously discussed. The Committee, supplemented by the stakeholder interviews listed in **Appendix B**, was largely responsible for providing the county-level input into the 2024 Plan update.
- An introductory letter and plan update brochure was sent to each city and village to set-up an interview date. WCWRPC, often accompanied by the County Emergency Manager, then conducted an interview meeting with each participating village and city on the planning effort, and input was obtained on changes since the 2017 Plan, including hazard issues/trends, vulnerable populations, community lifelines, progress on 2017 strategies, barriers to implementation, updated plan recommendations, and community engagement. Each city and village were then requested to complete a web-based capabilities assessment survey. This individualized approach allows for unique hazard-related issues or strategies for each community to be identified, while recognizing that each local municipality has the authority to regulate and plan for the development of their community.
- An introductory mailing with a project brochure was sent to each public educational institution. This was followed by a web-based mitigation planning presentation by WCWRPC for interested schools, including an overview of related mitigation grants and potential grant projects. The educational institutions were then invited to complete a web-based mitigation planning survey that assesses risk and capabilities, then identifies mitigation strategies.
- WCWRPC used the city, village, and educational institution input to create draft “sub-plans” for each participant, which are included in Appendices K & L. The draft sub-plans were then distributed to each community for review and input. As discussed in Appendix J, these sub-plans are a new approach to the 2024 Plan update.

Adopting resolutions or approving letters for all of the above jurisdictions are in **Appendix A**.

D. STAKEHOLDER & PUBLIC INVOLVEMENT

The planning process included the following activities to encourage community input and stakeholder involvement:

- **Steering Committee Meetings.** The Steering Committee meetings were open to the public. Agendas and sign-in sheets for the Steering Committee meetings are included in **Appendix B**.
- **Key Stakeholder Interviews.** The key stakeholder interviews obtained input from many local public and private stakeholders who are also community members. A series of key stakeholder interviews, including both public and private sectors, was performed by West Central Wisconsin Regional Planning Commission (WCWRPC) staff to further complement the issue and strategy identification process. This included inviting input from emergency managers from adjacent counties and WEM regional emergency management staff. In addition, a presentation on the 2024 Plan update was given to the Polk County Fire Chief's/Emergency Services group and a brief survey distributed to encourage additional input. Additional supporting data and information were provided by: Wisconsin Department of Natural Resources (WDNR) forestry staff and the regional Dam Safety Engineer; Polk-Burnett Electric Cooperative; and various county departments. The list of these interviews is included in Appendix B.
- **City, Village, & Educational Institution Participation.** The engagement of the other (non-County) plan participants was discussed previously in Section I.C. It should be stressed that these municipal and school/technical college officials are community representatives who are well informed of local hazard risks and probabilities, and are well positioned to determine what mitigation actions are most appropriate and feasible for their respective communities and facilities.
- **Underserved Communities & Vulnerable Populations.** As discussed in Section II.C., ten communities in Polk County are economically vulnerable rural communities. For the 2024 Plan update, participation and consideration of these communities were largely obtained through:
 - City & Village meetings and Town surveys, which represent the underserved communities.
 - Stakeholder interviews with agencies that provide services to and plans for the vulnerable populations, such as Polk County Public Health, the Aging & Disability Resource Center, participating school districts, and the American Red Cross.
 - The recommendations of the St. Croix Chippewa Band's (Tribe) hazard mitigation plan were considered and integrated into this plan, as reflected by multiple mitigation and preparedness recommendations in Sections VI.C. & D.

Compared to the 2017 Plan, the 2024 Plan update placed greater emphasis on identifying and considering underserved and vulnerable populations throughout the planning process. This is reflected by the multiple mitigation and preparedness strategies targeting seniors, oxygen-dependent individuals, and immigrant/ESL households in Sections VI.C. & D.

- **Review of Local Plans.** Local comprehensive plans, ordinances, and other documents were reviewed, discussed, and considered when available and pertinent, keeping in mind that such planning mechanisms were created with public participation. When appropriate, guidance and clarification from these other documents and plans were integrated into this document.

- **Town Government Meetings and Input.** On January 26, 2023, a presentation on the planning effort was made to the Polk County Towns Association, which yielded good discussion and questions regarding mitigation grant funding. This was followed by a brief, customized survey to each town to obtain local input on hazard “hotspots,” vulnerabilities, and potential mitigation strategies.
- **Request for Public and Community Comments.** During previous mitigation planning efforts in Polk County, fewer than ten individuals attended the public informational meetings on the draft plan; the costs of conducting these meetings greatly outweighed the benefits. For this plan update, a public informational press release was issued to newspapers and other media in Polk County announcing the purpose of the plan, the availability of a web-based version of the draft plan for download, and inviting comments. Copies of the press release were also sent to all cities, villages, and towns. A copy of the public informational press release is included in **Appendix C**.
- **Plan Adoption.** Following conditional approval of the plan by Wisconsin Emergency Management, this multi-hazard mitigation plan was adopted via resolution by the Polk County Board and participating communities in duly called and noticed public meetings.

E. INCORPORATION OF RELATED PLANS, STUDIES, REPORTS, AND DATA

This subsection is a companion of Section VI.G., which discusses plan coordination. The 2024 Plan update includes information and incorporates recommendations from a wide variety of sources, not limited to the following primary sources:

- Section II includes statistics from the U.S. Census Bureau, U.S. Department of Agriculture’s Agricultural Census, Wisconsin Department of Revenue tax assessment data, Wisconsin Department of Administration population estimates and projections, and economic data from Lightcast (formerly EMSI). The community profile contains a mix of 2020 and more recent American Community Survey (ACS) U.S. Census data. Though slightly outdated, the 2020 data is often used since the margins of error for ACS sampling can be sizable in less populated rural areas. West Central Wisconsin Regional Planning Commission (WCWRPC) also used EMSI Community Analyst and Lightcast subscription data services for some information in this section.
- The 2024 Plan update considered and incorporated a variety of new or updated State and Federal data tools, including:
 - FEMA Social Vulnerability Index: <https://hazards.fema.gov/nri/social-vulnerability>
 - CDC Social Vulnerability Index: https://www.atsdr.cdc.gov/placeandhealth/svi/interactive_map.html
 - University of Wisconsin Area Deprivation Index: <https://www.neighborhoodatlas.medicine.wisc.edu/>
 - EPA Environmental Justice Mapper: <https://ejscreen.epa.gov/mapper/>
 - National Economic Resilience Data Explorer: <https://www.anl.gov/dis/nerde-economic->

[development-district-dashboard](#)

- National Climate Assessment: <https://nca2018.globalchange.gov/chapter/21/>
 - Wisconsin Initiative on Climate Change Impacts: <https://wicci.wisc.edu/>
 - NOAA Climate Mapping for Resilience and Adaptation: <https://resilience.climate.gov/>
 - WI DHS Climate Vulnerability Indices: <https://www.dhs.wisconsin.gov/climate/wihvi.htm>
 - FEMA National Risk Index: <https://hazards.fema.gov/nri/>
- Section III relies heavily on NOAA National Climatic Data Center storm event data supplemented by interviews and local newspapers. This section also includes data and maps from the *State of Wisconsin Hazard Mitigation Plan* and the *State of Wisconsin Homeland Security Council THIRA & SPR* produced by Wisconsin Emergency Management.
 - Section III includes references to specific studies for various hazard types. For example, the hazardous materials spills subsection included BRRTS data from Wisconsin Department of Natural Resources and references the Multi-County Commodity Flow Study. The cyber-attack and active threats sections rely heavily on FBI and other federal-level data sources. For this plan update, the Wisconsin Department of Natural Resources provided updated wildfire data, most notably a county-level summary report with probability and potential impact data prepared using the NortheastMidwestWildfireRisk.com tool.
 - The GIS maps and GIS-based analysis found in Sections II and III were largely produced by WCWRPC with geo-referenced data primarily from County and Wisconsin Department of Natural Resources. The mapping work as part of the community profile (Section II) and assessment of hazard conditions (Section III) was performed using ESRI-based Geographic Information Systems, allowing greater manipulation and analysis from the use of a consistent base map. Maps included in this plan are for general planning purposes only and do not constitute legal documents or formal surveys. The flood assessment methodology, completed by the Polk County GIS program, is further detailed in Appendix G.
 - Appendix B includes the list of meetings and stakeholder interviews completed during the process. These interviews frequently yielded reports and additional data that were incorporated into this Plan. Polk-Burnett Electric Cooperative provided updated outage data; Public Health provided information regarding contagious disease.
 - Sections III and IV incorporate or reference municipal & County Emergency Operations Plans and the County Public Health Emergency Preparedness Plan as well as various annexes, mutual aid agreements, and partnerships. Threat-specific plans are frequently referenced where applicable, such as Dam Flood Emergency Action Plans, Regional Cyber-Attack Response Teams, and ALICE training in schools. Comprehensive plans and local regulatory policies are also referenced (e.g., floodplain zoning, stormwater management, driveway regulations). Section III.D. iv. provides NFIP program participation information. The city and village sub-plans in **Appendix K** provide similar references to community-specific planning mechanisms, including NFIP program and floodplain management status.

Figure 1. Polk County Multi-Hazard Mitigation Planning Process Diagram

Plan Initiation

scope: local decision to proceed, contract w/ WCWRPC
 County roles: mandate to proceed, establish Steering Committee
 RPC roles: facilitate process and pre-planning
 Cmte roles: initial meeting; discuss process, scope, & new plan reqmts

Community Profiling

scope: data-collection phase (inventory, stats, uses, trends)
 local roles: assist w/ data collection, including existing plans
 RPC roles: data collection, analysis, & compilation
 Cmte roles: review and discuss findings; additional direction if needed
 other issues: identification of critical facilities; initial contacts

Hazard Identification

scope: update data and re-confirm key hazards
 local roles: assist w/ data collection (historical records on events)
 RPC roles: data collection (w/ NOAA data) & facilitation
 Cmte roles: review and confirm key hazards

Risk & Vulnerability Assessment

scope: identify risks (full history & trends), and vulnerabilities (estimate potential losses to assets)
 local roles: identify issues, concerns, and “hotspots; capacity assessment
 RPC roles: data collection, analysis, & facilitation; interview/meetings
 Cmte roles: review and discuss findings; provide addition insights

Mitigation Planning

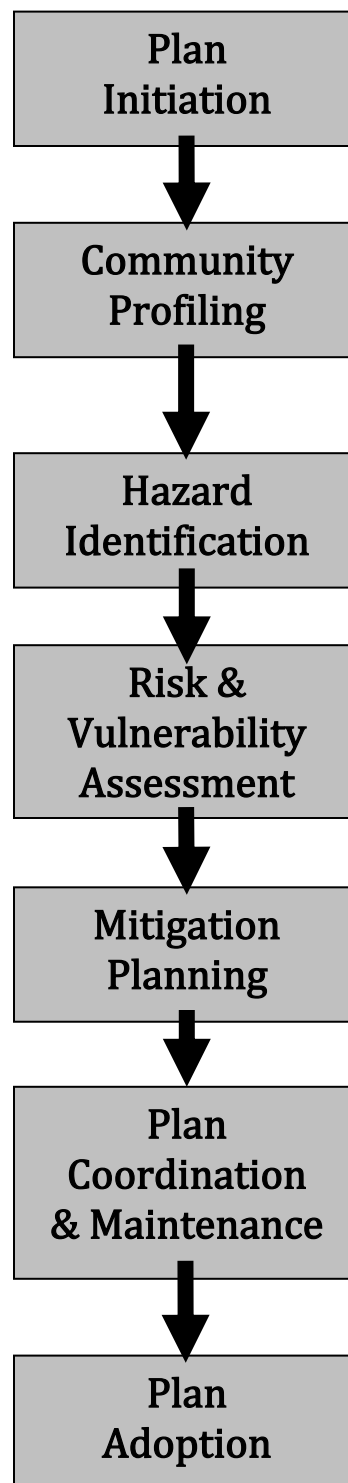
scope: **goals, objectives, strategies, & action plan**
 local roles: identify current activities and progress on 2020 Plan
 RPC roles: facilitation, analysis & guidance on strategies
 Cmte roles: update goals; review and prioritize strategies
 other issues: cost-benefits analysis; resource/action plan

Plan Coordination & Maintenance

scope: relationship to other plans & future plan review/updates
 local roles: help identify links to other plans; vision for reviews
 RPC roles: facilitation & suggestions
 Cmte roles: review & modify/amend recommendations
 other issues: re-assess evaluation process

Plan Adoption

scope: Cmte/local agency review -> public comment period -> Cmte re-consideration if needed -> State pre-review -> County & local adoption-> formal State & FEMA approval
 local roles: facilitate public meetings, notifications, & adoption
 RPC roles: assist with any questions and modifications to plan
 Cmte roles: consider public input & approve draft plan
 other issues: special mailings; media



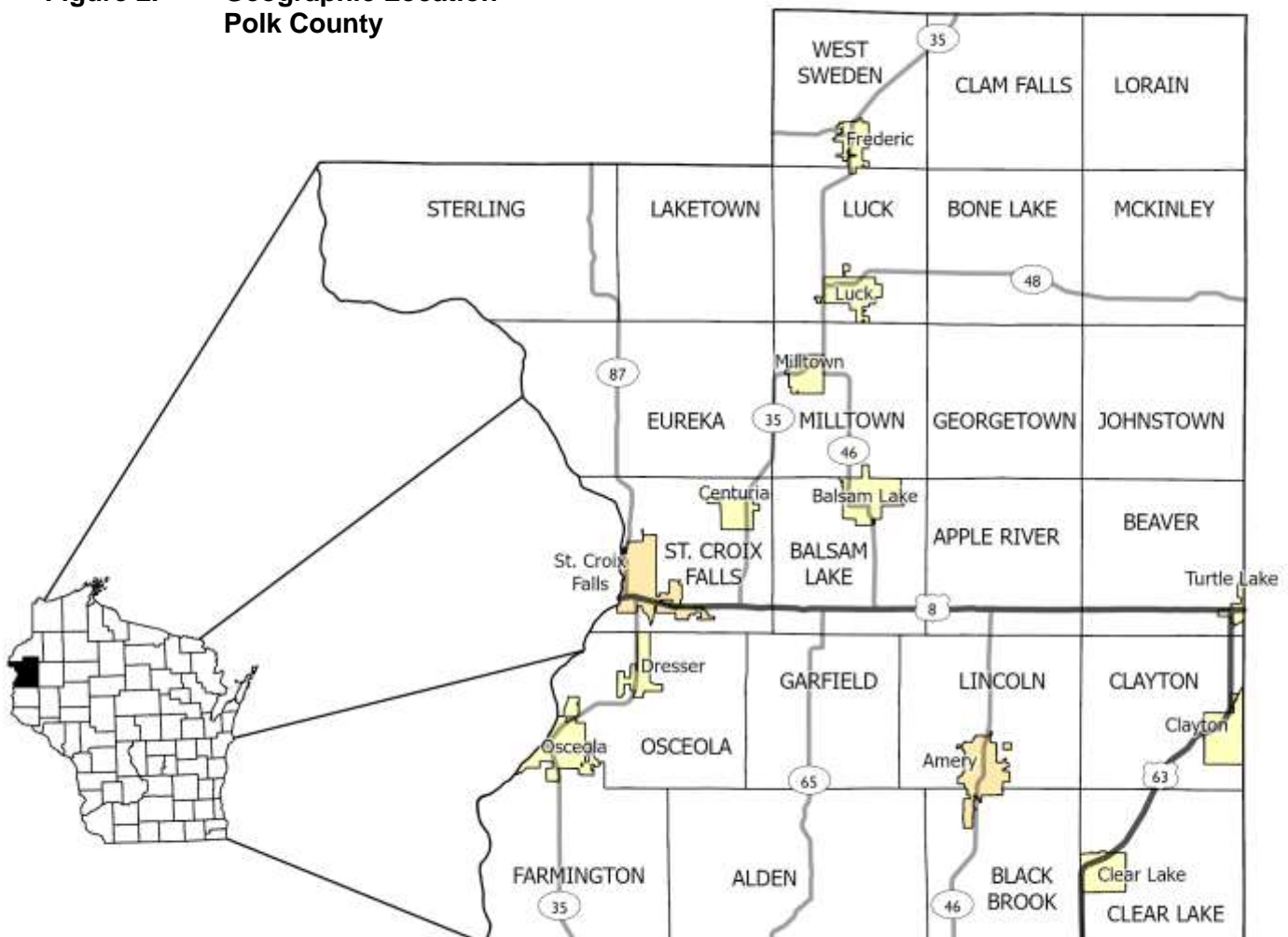
SECTION II. COMMUNITY PROFILE – POLK COUNTY

A. GEOGRAPHIC LOCATION

Polk County is located in west-central Wisconsin along the Minnesota-Wisconsin border (see **Figure 2** below). The County has a total surface area of approximately 956 square miles of combined land and water area. The County is bordered by Burnett County to the north, Barron County to the east, St. Croix County to the south, and the St. Croix River to the west.

The County comprises all or parts of 36 minor civil divisions, which include 24 towns, 10 villages, and 2 cities. The Village of Balsam Lake, population 935 in 2024, is the county seat. Three towns, one village, and both cities have populations over 2,000, with the Town of Osceola being the largest (3,110 in 2024). The Minneapolis/St. Paul Metropolitan Statistical Area borders Polk County to the south and west.

**Figure 2. Geographic Location
Polk County**



B. NATURAL FEATURES AND ENVIRONMENT

The ecological landscape of Polk County is a transitional area between western prairies and southern broadleaf forests to northern mixed forests, referred to as the Forest Transition landscape by the Wisconsin Department of Natural Resources (DNR). The county is located along the Tension Zone, which is an area of heightened ecological diversity due to the varying landscapes. The climate is more consistent with northern Wisconsin, while it is a viable climate for agricultural purposes, can have a shorter growing season than southern counties. The DNR provides a full summary of the Forest Transition landscape and its features in a book titled “Ecological Landscapes of Wisconsin”.



Surface features in the County have been formed or modified by two distinct periods of glaciation. Pitted glacial outwash covers much of the County, resulting in many lakes, wetlands, and areas of uneven topography. A series of glacial end moraines traverse the County from southwest to northeast. The area between the moraines is quite level and much of the County’s best agricultural land is found here.

i. Watersheds

A watershed is an area of land that drains or “sheds” its water to a lake, river, stream, or wetland. Some watersheds encompass several hundred square miles and multiple counties, while others may be small, covering only a few square miles that drain into a lake. This is important to understand since the effects of natural and man-made activities in one area can have a direct impact on other areas. For example, run-off from heavy rainfall upstream in a watershed will eventually reach the downstream part of the watershed. Polk County drains into the St. Croix River, except for a small part of the southeast corner of the County lying within the Chippewa River Basin. **Figure 3** shows the locations of the watersheds within Polk County at the ten-digit hydrologic unit code (HUC).

ii. Surface Waters, Floodplains, and Wetlands

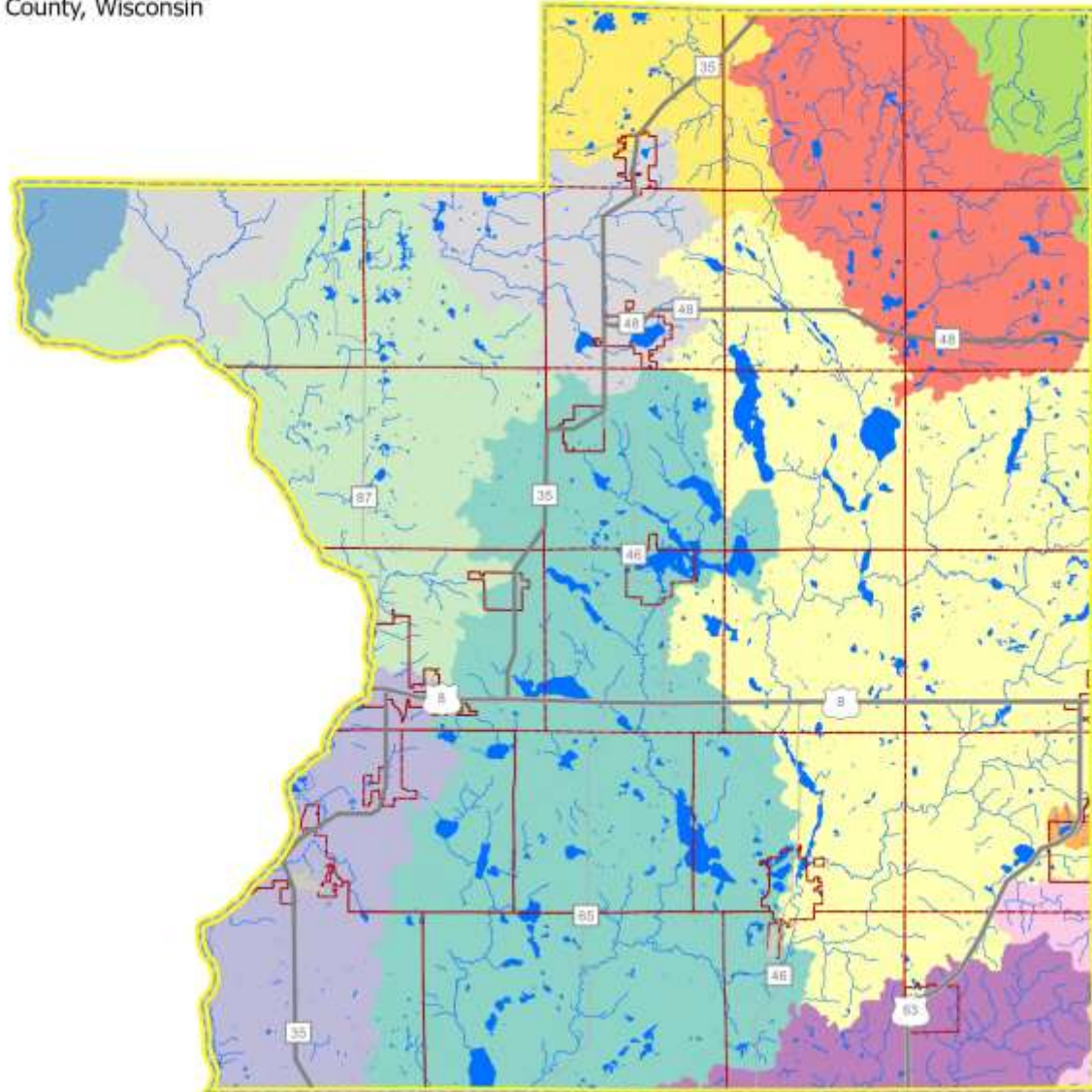
Polk County is rich in surface waters with about 22,997 acres consisting of 437 lakes (20,900 acres) and about 200 miles of rivers and streams as shown **Figure 4**. At 1,901 acres, Balsam Lake in the center of Polk County is the largest inland surface water within the County. Other lakes of considerable size include Bone Lake (1,667 acres), Big Round Lake (1,014 acres), Wapogasset Lake (1,189 acres), and Deer Lake (786 acres).

Figure 4 also shows that Polk County also has many areas of floodplains and wetlands, which provide important nature-based mitigation roles given their capacity to store and filter pollutants, replenish groundwater supplies, store floodwaters, and/or maintain stream flows. The floodplain and flood-hazard areas within the County associated with these water bodies are discussed in greater detail within Section III.D.iv. of this report.

Figure 3. Polk County Watersheds

Hydrologic Unit Code (HUC) 10 Watersheds

Polk County, Wisconsin



Legend

- Balsam Branch-Apple River
- Beaver Brook-Apple River
- Big Marine Lake-Saint Croix River
- Clam River
- Goose Creek-Saint Croix River
- Hay River
- North Fork of the Clam River
- South Fork of the Hay River
- Trade River
- Willow River
- Wolf Creek-Saint Croix River
- Wood River

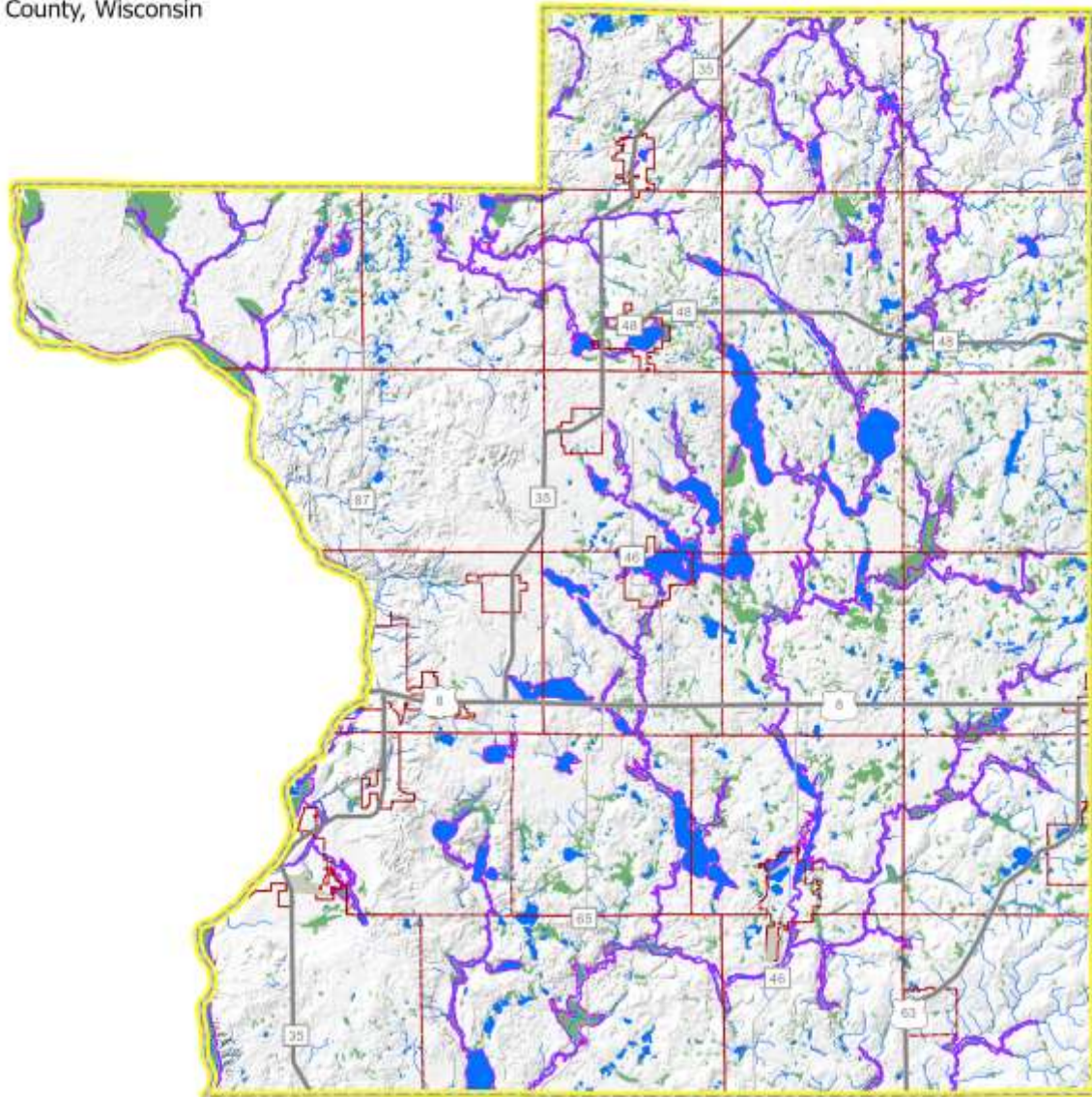
Data Sources (2023):
WisDOT, WisDNR, WisDOA
WCWRPC, Polk County.



Figure 4. Polk County Floodplains & Wetlands

SURFACE WATER, WETLANDS & FLOODPLAINS

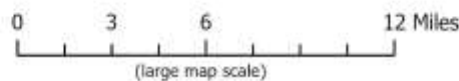
Polk County, Wisconsin



Legend

- Surface Water
- WDNR Wetlands
- 100yr Floodplain
- Municipal Jurisdictions
- Polk County

Data Sources (2023):
WisDOT, WisDNR, WisDOA
WCWRPC, Polk County.



iii. General Climate

The climate of Polk County is classified by the National Oceanic and Atmospheric Administration (NOAA) as moist continental mid-latitude. Warm, humid summers and cold, snowy winters are the main characteristics. The average monthly temperature ranges from 13 degrees Fahrenheit in January to 70 degrees Fahrenheit in July. Annual precipitation averages 39 inches, with the majority falling in May-August, and the seasonal snowfall average is 12 to 75 inches. Polk County is susceptible to a range of natural hazards, including flooding. A description of these natural hazards, along with historical trends and current risks, is included in Section III.D. of this report.

iv. General Land Cover

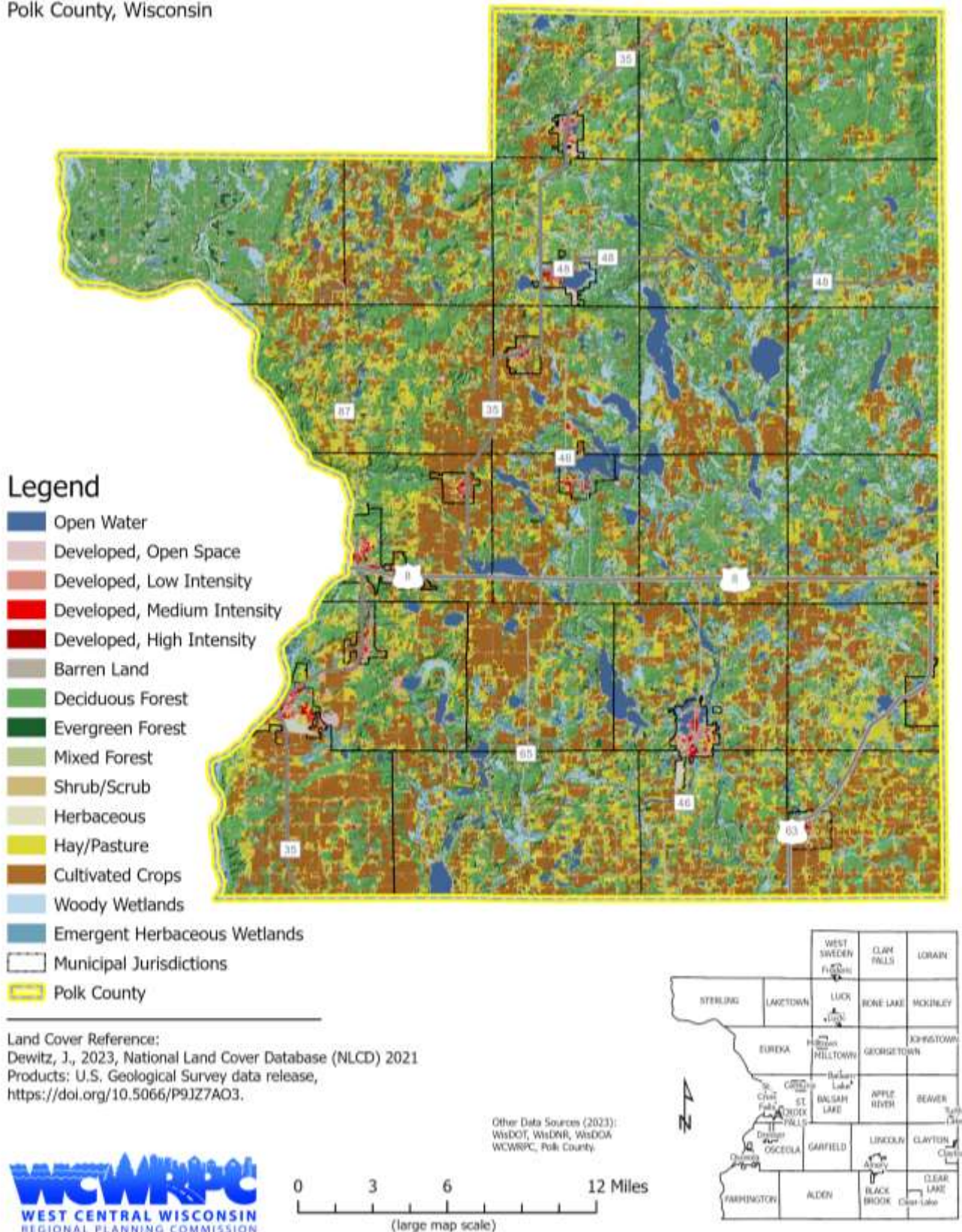
Figure 5 and **Table 2** provide an overview of the predominant land cover types in Polk County based on U.S. Geological Survey aerial imagery from 2021. Both reflect that Polk County is predominantly rural, with the primary land cover being agricultural (38.1%) and forested (36.6%) lands. Furthering this point, agricultural acreage accounted for 44 percent of the County's total assessed acreage in 2022. An additional 28 percent was assessed forest lands (including agricultural forest lands), primarily of mixed deciduous forest species. The County has substantial additional acres of public-owned, non-assessed forests and grasslands. Section II.C.vi. discusses the general development and land use patterns of Polk County in greater detail.

Table 2. Polk County Predominant Land Cover, 2021

Land Cover Type	Acres	Percent
Barren Land	553	0.1%
Cultivated Crops	128,529	21.0%
Deciduous Forest	216,904	35.4%
Developed, High Intensity	1,127	0.2%
Developed, Low Intensity	9,211	1.5%
Developed, Medium Intensity	3,901	0.6%
Developed, Open Space	22,819	3.7%
Emergent Herbaceous Wetlands	22,443	3.7%
Evergreen Forest	7,350	1.2%
Hay/Pasture	104,595	17.1%
Herbaceous	4,796	0.8%
Mixed Forest	24,597	4.0%
Open Water	22,997	3.8%
Shrub/Scrub	1,800	0.3%
Woody Wetlands	40,470	6.6%

Figure 5. Polk County Predominant Land Cover, 2021

Polk County, Wisconsin



C. DEMOGRAPHIC AND ECONOMIC PROFILE

i. Population and Housing

Tables 3, 4, and 5 provide an overview of the demographic and housing conditions in Polk County and its communities. This data provides important insights into the existing and changing community vulnerabilities to disaster events. Highlights from these tables include:

- Polk County has seen double-digit growth in residential development for the last 3 decades (1980-2010).
- The County saw a decrease in the number of housing units over the last decade. Regional trends have reflected a slowing in new units, but a decline exceeds this trend. However, as will be later discussed, there has been an increase in improved residential parcels in recent years.
- Polk County has seen a steady decrease in its population growth since 2000.
- In almost half of towns and villages, populations have decreased. **Figure 6** shows the rate of population change at local levels. Population losses occurred primarily in western Polk County.
- 28% of communities are considered economically rural disadvantaged communities. Those communities receiving this designation include two towns, seven villages and one city.
- Single-family detached housing is the most prevalent housing unit throughout the County, comprising more than 80% of all housing units. The percentages are higher in towns (91%) than in cities (57%).
- The potential vulnerability to hazardous events increases along with residential development and population growth. Continued growth in the County presents a significant concern throughout the mitigation process, as each new unit and resident must be considered when determining vulnerability and projected losses during hazardous events.
- Villages are generally younger and less affluent than towns and cities.
- **Figure 7** shows Polk County's projected population by age group, reflecting the baby boomer generation becoming a larger proportion of the County's population. Between 2010 to 2040, the number of residents ages 65 and over is projected to more than double. This trend has future implications for services, housing, and the labor force.

Table 3. Polk County Housing Unit & Population Change • 1980 to 2020

Year	Number of Housing Units	Numerical Change	Percent Change	Population	Numerical Change	Percent Change
1980	16,228			32,351		
1990	18,562	2,334	14.38%	34,773	2,422	7.49%
2000	21,129	2,567	13.83%	41,319	6,546	18.82%
2010	24,248	3,119	14.76%	44,205	2,886	6.98%
2020	24,129	-119	-0.49%	44,977	772	1.75%

Source: 1980, 1990, 2000, 2010, & 2020 Census

Table 4. Polk County Demographics

Municipality	Census 2010	Census 2020	% Change 2010-2020	Proj. 2027	Per Capita Income	% Persons Below Poverty Line	Median Age	*Economic Disadvantaged
Towns								
Alden	2,786	2,918	4.7	2,935	42,759	4	51.8	
Apple River	1,146	1,173	2.4	1,365	34,207	9	49.4	
Balsam Lake	1,411	1,416	0.4	1,513	40,352	5.1	53	
Beaver	835	798	-4.4	935	32,691	7.8	51.3	
Black Brook	1,325	1,425	7.5	1,364	38,348	2.2	45.4	
Bone Lake	717	686	-4.3	649	35,011	10	56.6	
Clam Falls	596	554	-7	532	28,605	12.2	56.8	
Clayton	975	958	-1.7	1,026	30,221	6.8	41.2	
Clear Lake	899	888	-1.2	909	35,364	2.4	43.1	
Eureka	1,649	1,737	5.3	1,646	34,848	3.2	47.8	
Farmington	1,836	1,904	3.7	1,925	43,926	4.3	46.6	
Garfield	1,692	1,744	3.1	1,780	33,760	8.2	41.8	
Georgetown	977	1,036	6	997	38,943	7.6	43.9	
Johnstown	534	499	-6.6	472	39,657	13.7	47.4	
Laketown	961	1,024	6.6	1,107	36,865	11.7	56.2	
Lincoln	2,208	2,099	-4.9	2,131	40,419	5.9	49.7	
Lorain	284	308	8.5	292	27,833	7.1	33.7	Yes
Luck	930	979	5.3	931	34,310	6.7	44.8	
McKinley	347	340	-2	321	28,135	9.9	54.9	Yes
Milltown	1,226	1,219	-0.6	1,158	33,533	6.2	51.4	
Osceola	2,855	3,023	5.9	2,921	38,947	5.5	42.7	
St Croix Falls	1,165	1,164	-0.1	1,117	38,960	10.7	50	
Sterling	790	724	-8.4	818	34,131	5.7	51	
West Sweden	699	744	6.4	707	35,272	6.2	52.3	
Subtotal:	28,843	29,360	1.8	29,551	37,309	6.3	48.1	
Villages								
Balsam Lake	1,009	934	-7.4	1,018	27,212	17.1	39.3	Yes
Centuria	948	891	-6	902	28,338	18.5	37.1	
Clayton	571	550	-3.7	582	25,151	11.4	41.1	Yes
Clear Lake	1,070	1,099	2.7	1,028	28,488	18.1	38.5	
Dresser	895	935	4.5	885	26,741	6	32.7	Yes
Frederic	1,137	1,154	1.5	1,099	25,195	17.1	42.5	Yes
Luck	1,119	1,093	-2.3	1,048	32,895	9.9	47.3	
Milltown	917	948	3.4	896	23,369	26.6	43.4	Yes
Osceola	2,568	2,765	7.7	2,913	26,989	13.8	37.1	Yes
Turtle Lake (part)	93	78	-16.1	84	13,960	67	20.9	Yes
Subtotal:	10,327	10,447	1.2	10,455	27,157	15.6	39.4	
Cities								
Amery	2,902	2,962	2.1	2,847	28,102	5.2	41.6	Yes
St Croix Falls	2,133	2,208	3.5	2,087	37,117	10.1	50	
Subtotal:	5,035	5,170	2.7	4,934	31,952	7.3	45.2	
Total	44,205	44,977	1.7	44,940	34,335	8.6	45.7	

Sources: 2010 & 2020 US Census, 2017-2021 American Community Survey. Projections by ESRI.

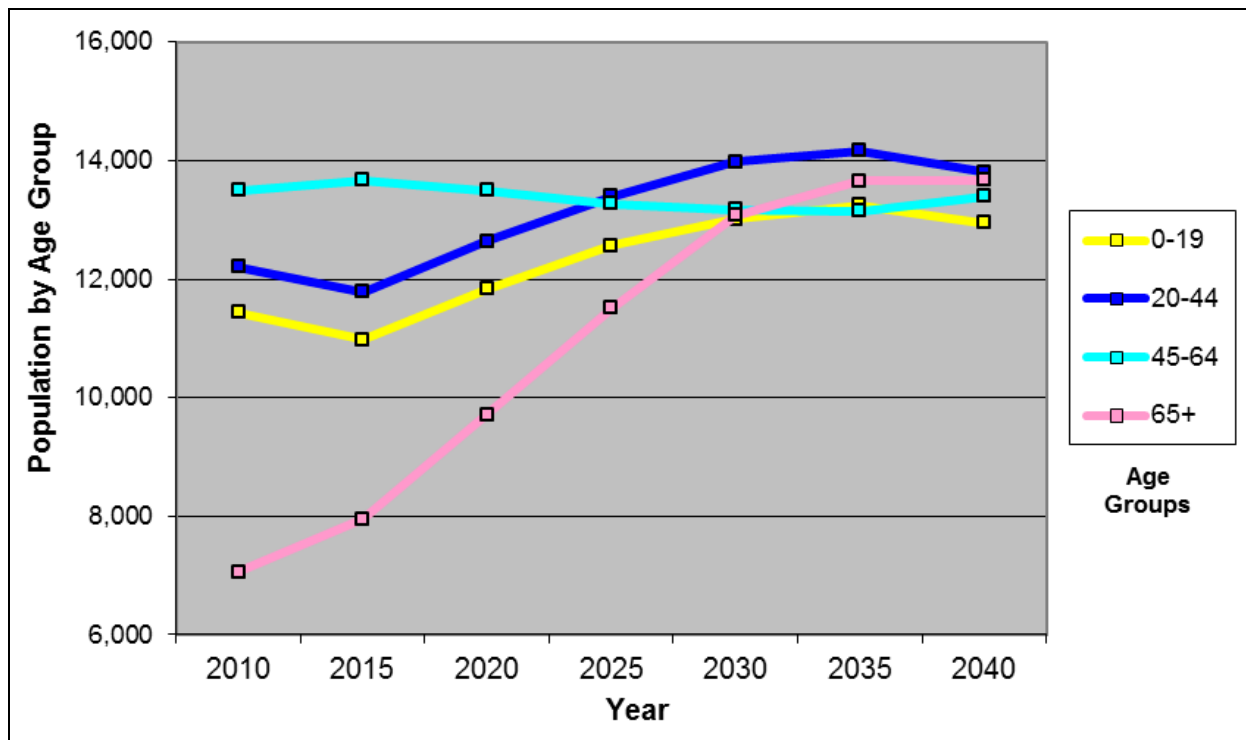
* "Economic disadvantaged" communities defined by population 3,000 or less and average per capita income no more than 80% of national per capita income (\$28,307) based on US Census Data.

Table 5. Polk County Housing Conditions

Municipality	1 Detached	1 Attached	2	3 to 9	10 to 19	20 or more	Mobile Home	Group / Assisted Living	Seasonal, Occasional, Rec Use
Towns									
Alden	1,433	5	9	0	0	0	64	0	255
Apple River	670	0	2	0	0	0	29	0	268
Balsam Lake	1,005	6	11	0	0	0	52	0	428
Beaver	454	9	7	2	0	0	60	0	111
Black Brook	508	10	0	3	0	1	34	0	24
Bone Lake	528	0	0	7	0	0	24	0	216
Clam Falls	275	7	0	0	0	0	45	0	48
Clayton	495	0	6	3	0	2	23	0	105
Clear Lake	314	13	2	0	0	3	27	0	23
Eureka	766	20	0	7	0	0	32	0	64
Farmington	731	16	7	7	0	10	5	3	13
Garfield	858	6	24	0	0	0	87	0	338
Georgetown	1,119	0	0	5	0	0	137	2	822
Johnstown	492	0	0	4	0	0	14	1	247
Laketown	477	0	0	22	0	0	59	0	103
Lincoln	1,016	25	47	5	0	49	108	1	287
Lorain	141	0	0	0	0	0	12	0	21
Luck	428	8	12	0	0	0	15	1	79
McKinley	220	1	0	0	0	0	17	0	111
Milltown	865	18	2	0	0	0	55	2	377
Osceola	1,134	34	29	66	0	0	7	0	145
St Croix Falls	609	3	16	0	0	0	7	0	177
Sterling	405	5	16	0	0	0	61	0	168
West Sweden	321	0	0	0	0	0	29	1	55
Subtotal:	15,264	186	190	131	0	65	1,003	11	4,485
Villages									
Balsam Lake	459	22	0	25	6	0	112	4	218
Centuria	278	29	34	36	19	15	96	2	0
Clayton	128	0	0	18	13	0	18	1	5
Clear Lake	267	29	10	45	14	35	60	3	8
Dresser	267	18	31	17	13	0	18	0	0
Frederic	383	5	17	10	34	29	12	5	18
Luck	421	10	20	41	25	13	44	3	51
Milltown	304	14	8	40	26	53	52	1	15
Osceola	560	60	29	332	33	164	83	9	0
Turtle Lake (part)	12	4	0	17	0	0	0	0	0
Subtotal:	3,079	191	149	581	183	309	495	28	315
Cities									
Amery	800	124	26	77	23	75	157	21	94
St Croix Falls	523	84	59	195	73	56	34	12	64
Subtotal:	1,323	208	85	272	96	131	191	33	158
Total	19,666	585	424	984	279	505	1,689	72	4,958

Sources: 2020 US Census & 2016-2020 American Community Survey. Group/Assisted Living from WI Dept of Health Services provider search. Includes parts of Turtle Lake and New Auburn located in Barron County only.

Figure 7. Polk County Age Group Projections • 2010 to 2040



Source: prepared by WCWRPC based on Wisconsin Department of Administration population projections, 2013.

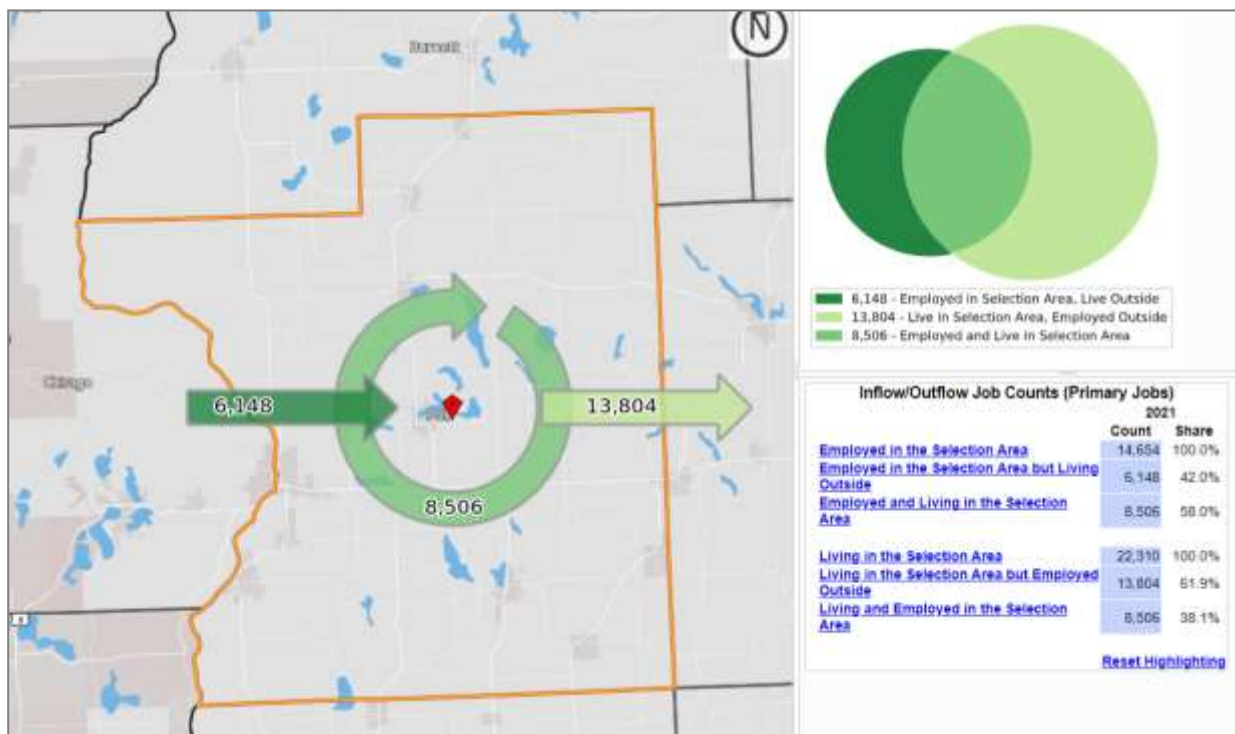
ii. Economic Overview

The economy of a county is an important determining factor driving land use and development as well as hazard vulnerabilities and community resiliency.

- The infographic on the following page provides an overview of Polk County’s economy. The County has low unemployment and a strong manufacturing sector.
- Educational attainment is high, with almost 60% having at least some college education.
- Employment in the County is predominantly white-collar jobs.
- **Table 6** summarizes Polk County’s employment by primary industry sector. In 2022, the County had over 1,200 payrolled business locations, resulting in nearly 16,000 jobs.
- Manufacturing is the County’s largest employment sector with 3,949 jobs (25% of all jobs).
- Health Care and Social Assistance is the third highest employment sector (16%), suggesting a strong healthcare network within the County.
- Agriculture tends to be under-represented in this data.

As shown in **Figure 8**, Polk County’s workforce is mobile, often with significant commuting distances that can be impacted by severe weather or the disruption of community lifelines. According to the U.S. Census Bureau, 8,506 County residents had their primary job within Polk County in 2021, while 13,804 residents commuted outside the County. An additional 8,506 workers lived outside Polk County but commuted into the County for their primary job.

Figure 8. Commuter Inflow/Outflow Analysis by County of Employment, 2021



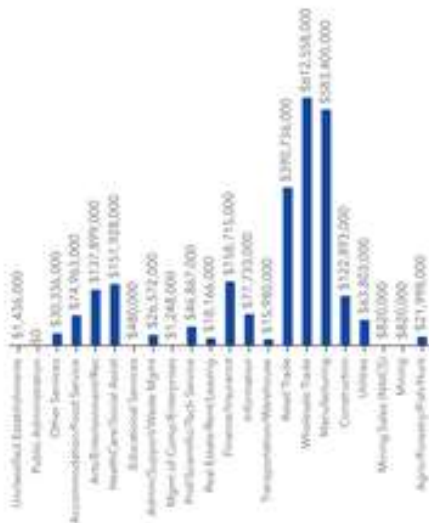
Source: U.S. Census Bureau. OnTheMap.

Economic Profile

Polk County, WI

Geography: County

SALES (2023)



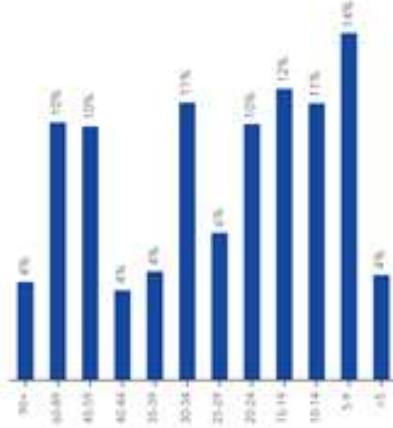
EDUCATION



EMPLOYMENT



COMMUTE TIMES (minutes)



Economic Overview

INTERNET ACCESS (2023)



INCOME



Source: This infographic contains data provided by Esri (2023), Esri Data Atlas (2023), ACS (2017-2021), Esri+RIS-Summons (2023).

Table 6. Polk County Establishments & Employment By Industry Sector

Industry Sector (2-digit NAICS)	2022 Payrolled Business Locations	2012 Jobs	2022 Jobs	2012 - 2022 % Change	2022 Location Quotient
Manufacturing	98	3,321	3,949	19%	390
Government	120	2,611	2,541	(3%)	(102)
Health Care and Social Assistance	167	2,351	2,494	6%	(355)
Retail Trade	143	1,777	2,074	17%	223
Accommodation and Food Services	122	1,038	1,208	16%	25
Construction	134	380	585	54%	60
Administrative and Support and Waste Management and Remediation Services	58	856	566	(34%)	(455)
Professional, Scientific, and Technical Services	71	435	333	(23%)	(247)
Agriculture, Forestry, Fishing and Hunting	39	231	309	34%	64
Wholesale Trade	40	423	279	(34%)	(168)
Finance and Insurance	48	353	256	(27%)	(141)
Other Services (except Public Administration)	66	256	253	(1%)	6
Arts, Entertainment, and Recreation	22	188	249	32%	29
Management of Companies and Enterprises	7	<10	237	NA	233
Transportation and Warehousing	36	146	181	24%	(44)
Information	15	188	144	(24%)	(70)
Utilities	6	107	96	(10%)	(12)
Real Estate and Rental and Leasing	35	48	55	13%	(4)
Educational Services	6	15	52	238%	34
Mining, Quarrying, and Oil and Gas Extraction	3	33	45	34%	21
Unclassified Industry	0	0	<10	NA	6
Totals	1,235	14,761	15,911	8%	(508)

Source: EMSI.

iii. Agricultural Overview

The hazard threats discussed later in this plan can impact parts or all of Polk County's agricultural base and economy. Nearly 45 percent of all assessed (taxable) acreage in the County is agricultural (54% if including agricultural forest land). Polk County continues to have a strong dairy industry, though grain and poultry production are increasing. The following two pages include the Polk County summary from the 2017 U.S. Census of Agriculture, which provides an overview of farming in the County.

While agricultural sales are a small percentage of the County's economy, the indirect impact of agriculture in Polk County is significant. According to UW-Extension's Agriculture Impact Report for Polk County (2019), the County is the 7th largest producer of poultry and eggs in the state, with annual production exceeding \$8.9 million dollars. Compared to other agricultural products, poultry and eggs rank as the 4th highest grossing industry in Polk County. Milk (\$63.1 mil), grain (\$40.6 mil), and cattle (\$12.4 mil) account comprise the top industries in the County. In addition to direct outputs, farming in the County has several indirect and induced impacts:

- Agricultural processing helps support 3,123 jobs.
- The overall economic impact of agricultural production and processing in the County exceeds \$729 million.
- Farms pay \$10.1 million in sales, property, and income taxes annually. This figure does not include all property taxes paid to local schools.

It is very unlikely that any single hazard would endanger all livestock or crops, though large proportions could be at-risk from a prolonged, severe drought or the introduction of a new a pest or disease (e.g., Bovine Spongiform Encephalopathy, or "mad cow disease"). Large-scale impacts to crops or livestock from a hazard can also have devastating impacts on the local economy, related industries (e.g., food processing), and local service providers. The state of the agricultural economy is tenuous for the local farmer, and a hazard event may result in farmers making fewer purchases or getting out of the business altogether. In short, an agricultural and farming sector that is less vulnerable to the impacts of disaster events will greatly contribute to Polk County's resiliency overall.





AGRICULTURE WORKS HARD FOR

► POLK COUNTY

Family-owned farms, food processors and agriculture-related businesses generate thousands of jobs and millions of dollars of economic activity for Polk County, while contributing to local income and tax revenues.

Agriculture's annual impact:



iv. Development Trends

Disaster events can damage buildings and building contents. This sub-section provides insight into the taxable improvements and growth patterns within Polk County, which are important when considering hazard vulnerabilities.

According to the Wisconsin Department of Revenue, the aggregated assessed value for Polk County was over \$5.4 billion.³ **Table 7** summarizes the 2022 Statement of Assessments for the County. This reflects the overall rural nature of Polk County, with a relatively high proportion of the aggregate value in land and a much lower proportion in personal property when compared to urban areas.

From 2017 to 2022, the County's total assessed value of improvements grew by over \$903 million (over 31.5% increase or +6.3% per year). **Table 8** further breaks down the 2022 assessed values by primary land uses. The largest percentage of improvement value is residential, while the relatively low values in commercial and manufacturing reflect the rural nature of Polk County.

**Table 7. Polk County
2022 Assessed
Total Values
(not equalized)**

Land	\$ 1,657,876,550
Improvements	\$ 3,764,308,900
Real Estate	\$ 5,422,185,450
Personal Prop.	\$ 47,995,600
Aggregate	\$ 5,470,181,050

Table 8. Polk County Assessed Value by Land Use • 2022

Use	Number of Parcels	Land Value	Number of Improved Parcels	Value of Improvements	Total
Residential	26,420	\$1,227,304,100	22,106	\$3,202,735,300	\$4,430,039,400
Commercial	1,667	\$79,588,200	1,320	\$335,296,100	\$414,884,300
Manufacturing	105	\$9,153,300	95	\$93,715,900	\$102,869,200
Agricultural	10,239	\$33,571,850	0	0	\$33,571,850
Undeveloped	9,023	\$43,542,400	0	0	\$43,542,400
Forest	5,003	\$194,294,300	0	0	\$194,294,300
Ag Forest	3,727	\$57,280,000	0	0	\$57,280,000
Other	1,186	\$13,142,400	1,182	\$132,561,600	\$145,704,000
Total	57,370	\$1,657,876,550	24,703	\$3,764,308,900	\$5,422,185,450

source: Wisconsin Department of Revenue. 2022 Statement of Assessments.

Not included in the above values are tax-exempt properties. Polk County has over 60,000 acres of public resource lands, mostly forested and wetlands, which are tax exempt. Governmental facilities and schools constitute the largest portion of those existing improvements and structures not included in Tables 7 and 8, though other facilities on tax-exempt lands owned by non-profit institutions (e.g., churches, scouting camps, housing authority structures) are also not included.

³ Wisconsin Department of Revenue, Bureau of Equalization. 2022 Statement of Assessments. Unequalized assessed values are used to best represent the actual value of improvements. Not all assessed values were available for all categories.

The previous land cover map (**Figure 5**) shows the generalized development pattern in Polk County. Cultivated crops and forest dominate the landscape with urban development limited to pockets down the center and western portions of the County. In 2020, the County had an overall population density of 49.2 persons per square mile, which is less than half the State of Wisconsin's density of 108.8 persons per square mile. Based on State official population projections, the County's density is projected to decrease to 47 persons per square mile by 2040. Population growth and development has mostly occurred in the south and west, due in part to the proximity to the Twin Cities.

Between 2017 and 2022, Polk County experienced an increase of 981 improved, assessed parcels, or an average increase of 196.2 parcels per year. Over 98% of these improvements occurred on residential parcels, which suggests an turn-around in the housing market. Over 75 percent of all improved, residential parcels and 92% of residential acreage is located in towns. With most housing units being single-family, detached homes, residential development in towns is typically at low densities within Polk County.

Commercial and manufacturing development is focused primarily in villages in Polk County. They have over 49 percent of all commercial parcels and 63 percent of all manufacturing parcels. The per-acre combined assessed value of commercial land and improvements are 3 to 6 times higher in villages and cities compared to towns and 12 to 20 times higher for manufacturing assessments. This reflects that commercial activity in cities and villages is more intensive, concentrated, and includes commercial uses much larger in scale than in the towns. In general, most commercial and industrial uses tend to be located within incorporated areas or within highway corridors.

The most prevalent land uses in Polk County are agriculture and forest. Agriculture accounts for 44 percent of the assessed land in the County and almost 18 percent is considered forest. An additional 10 percent is considered agricultural forest. Land assessed as "undeveloped" accounts for another 16 percent of the assessed land in the County. In total, over 87 percent of the County's assessed acreage is agricultural, forest, or otherwise undeveloped.

v. Underserved Communities & Socially Vulnerable Populations

Social Vulnerability is defined as the potential for loss within 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. **Underserved Communities** are defined as populations sharing a particular characteristic, as well as geographic communities, that have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life.

During the planning process, the Plan Steering Committee and communities identified the following primary socially vulnerable populations and underserved communities:

- Seniors (and an aging population)
- Low-income households

- Growing migrant & transient populations, including English as a Second Language (ESL) households
- Persons living in manufactured/mobile homes due to high winds, tornado, & extreme temperature risks
- Households with mental health, alcohol and other substance abuse challenges
- American Indian (St. Croix Chippewa) community

Further, much of Polk County is rural, often with significant distances to advanced medical care and other services should a disaster event occur. The August 2023 Salvation Army’s biannual point-in-time count found no unsheltered homeless individuals in Polk County, though there have been anecdotal reports of homeless individuals at public campgrounds and parks in the past.

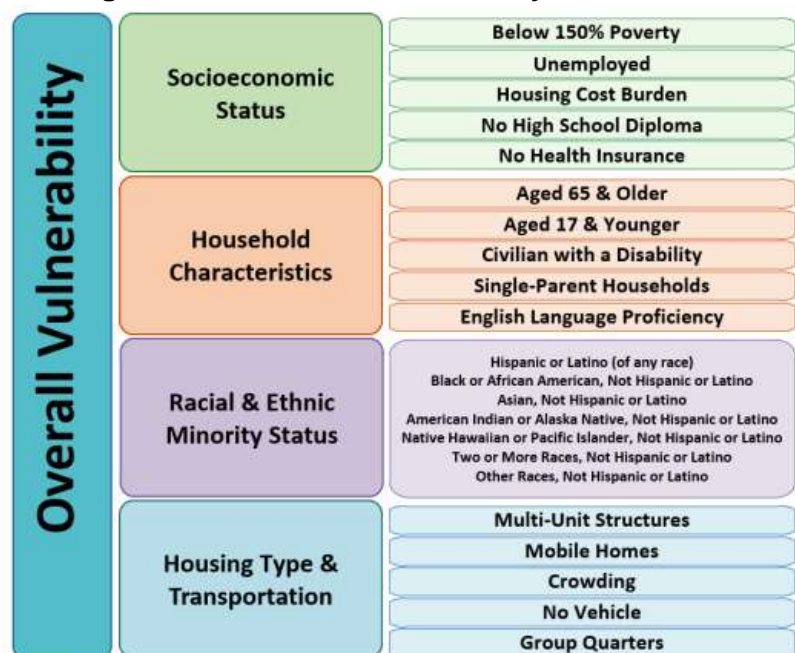
To further analyze the County’s vulnerabilities to hazard events in the context of underserved communities and socially vulnerable populations, this plan considered two indices: the CDC’s Social Vulnerability Index (SVI.) and University of Wisconsin’s Area Deprivation Index (ADI).

CDC Social Vulnerability Index

The US Department of Health, through its Centers for Disease Control and Agency for Toxic Substances and Disease Registry, developed a Social Vulnerability Index that identifies areas of concern across the country. **Figure 9** identifies the themes and factors used to identify the overall vulnerability of an area. Vulnerabilities are assessed at the census tract level. Percentiles and rankings are provided at the national level only.

Figure 10 shows the overall vulnerability rankings for each of the census tracts in the County, as well as the vulnerability rankings within each theme and the following summarizes findings from the SVI data.

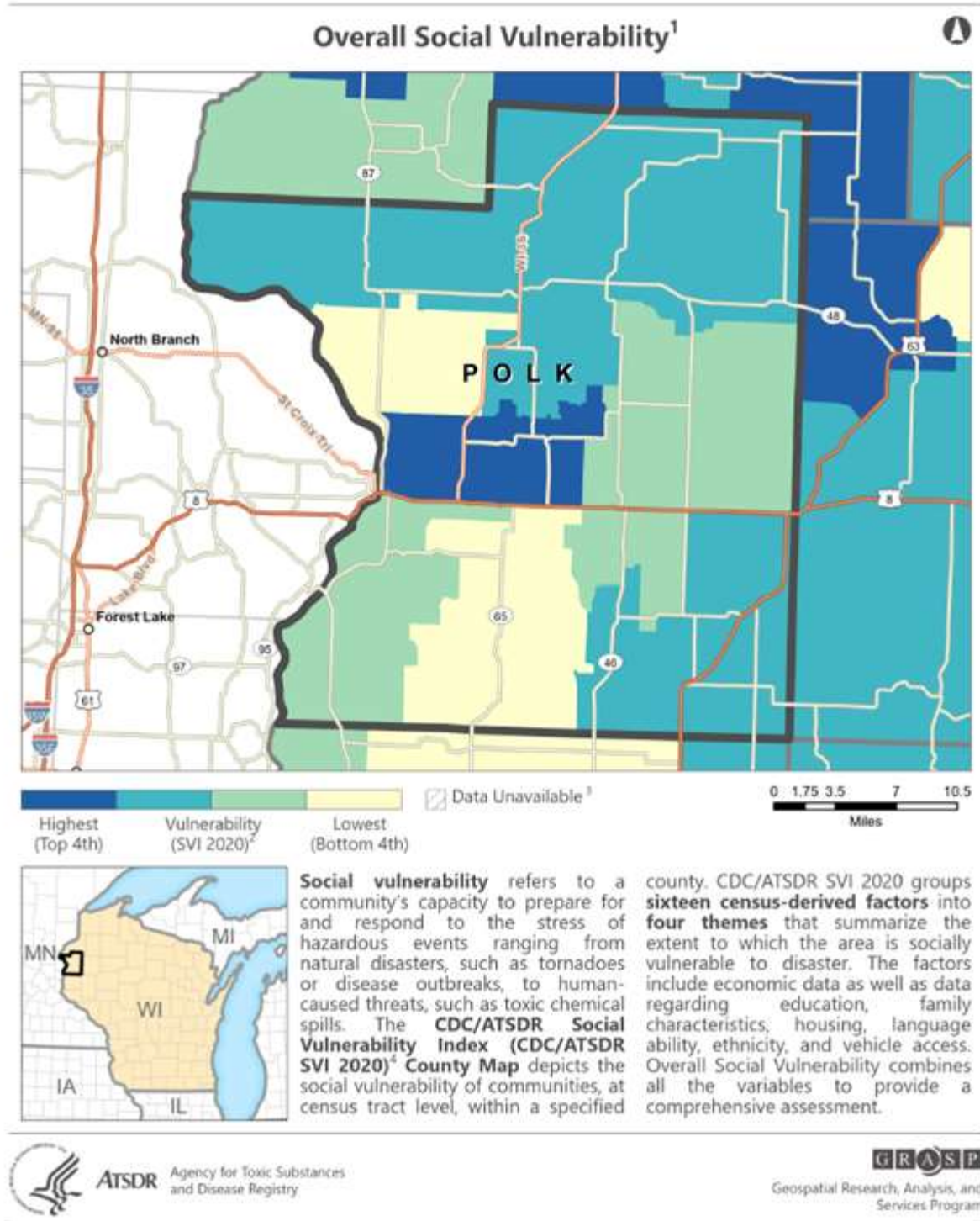
Figure 9. CDC Social Vulnerability Index Factors



Generally, Polk County has “low-medium” social vulnerability with 36% classified as having “medium-high” risk and 43% classified as “low-medium” risk for overall risk (across all themes). The highest vulnerability across the County was in the Housing Type and Transportation Theme. All census tracts ranked above the 65th percentile for the percentage of housing units that are mobile homes. Eleven tracts (79%) ranked in the 60th percentile or above for the percentage of the population aged 65 or older. Overall, the Balsam Lake, Centuria, and St. Croix Falls area had the highest social vulnerability.

Figure 10. CDC Social Vulnerability by Census Tract for Polk County

CDC/ATSDR Social Vulnerability Index 2020
POLK COUNTY, WISCONSIN

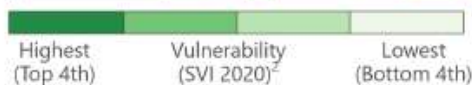
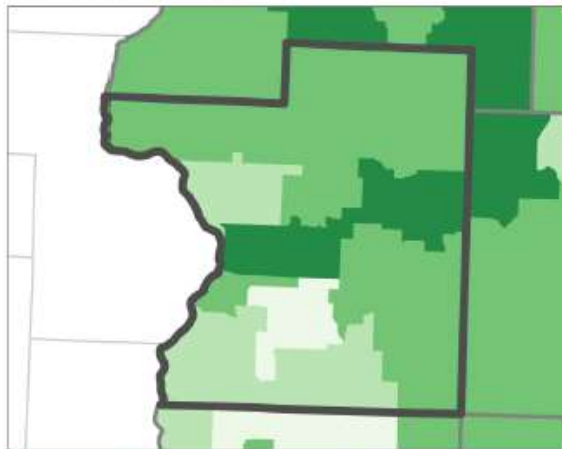




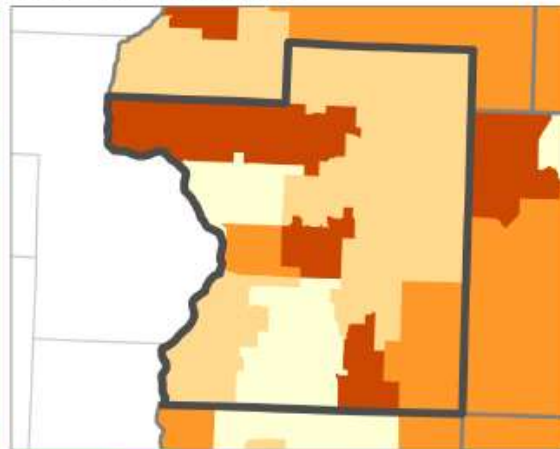
CDC/ATSDR SVI Themes



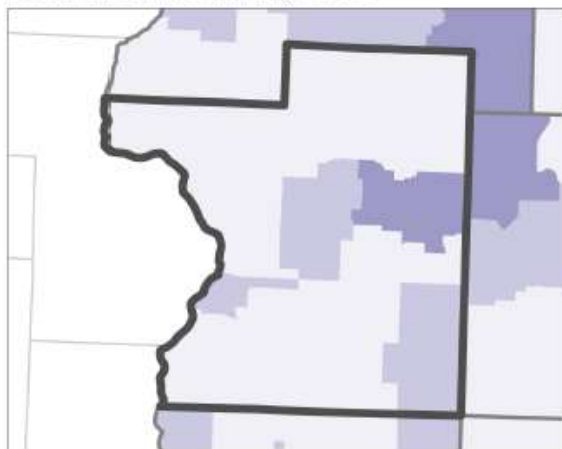
Socioeconomic Status⁵



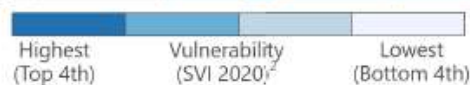
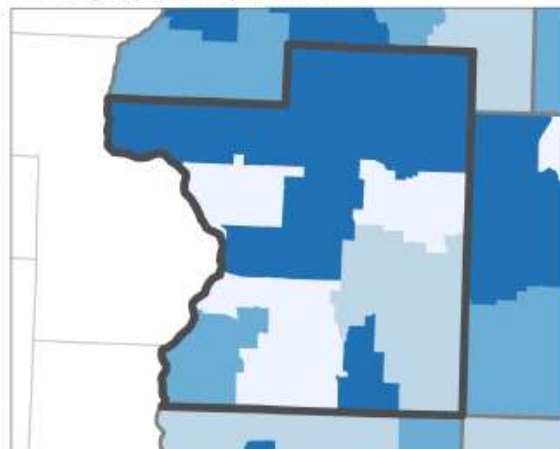
Household Characteristics⁶



Racial and Ethnic Minority Status⁷



Housing Type/Transportation⁸



Data Sources: ²CDC/ATSDR/GRASP, U.S. Census Bureau, Esri® StreetMap™ Premium.

Notes: ¹Overall Social Vulnerability: All 16 variables. ³Census tracts with 0 population. ⁴The CDC/ATSDR SVI combines percentile rankings of US Census American Community Survey (ACS) 2016-2020 variables, for the state, at the census tract level. ⁵Socioeconomic Status: Below 150% Poverty, Unemployed, Housing Costs Burden, No High School Diploma, No Health Insurance. ⁶Household Characteristics: Aged 65 and Older, Aged 17 and Younger, Civilian with a Disability, Single-Parent Household, English Language Proficiency. ⁷Race/Ethnicity: Hispanic or Latino (of any race); Black and African American, Not Hispanic or Latino; American Indian and Alaska Native, Not Hispanic or Latino; Asian, Not Hispanic or Latino; Native Hawaiian and Other Pacific Islander, Not Hispanic or Latino; Two or More Races, Not Hispanic or Latino; Other Races, Not Hispanic or Latino. ⁸Housing Type/Transportation: Multi-Unit Structures, Mobile Homes, Crowding, No Vehicle, Group Quarters.

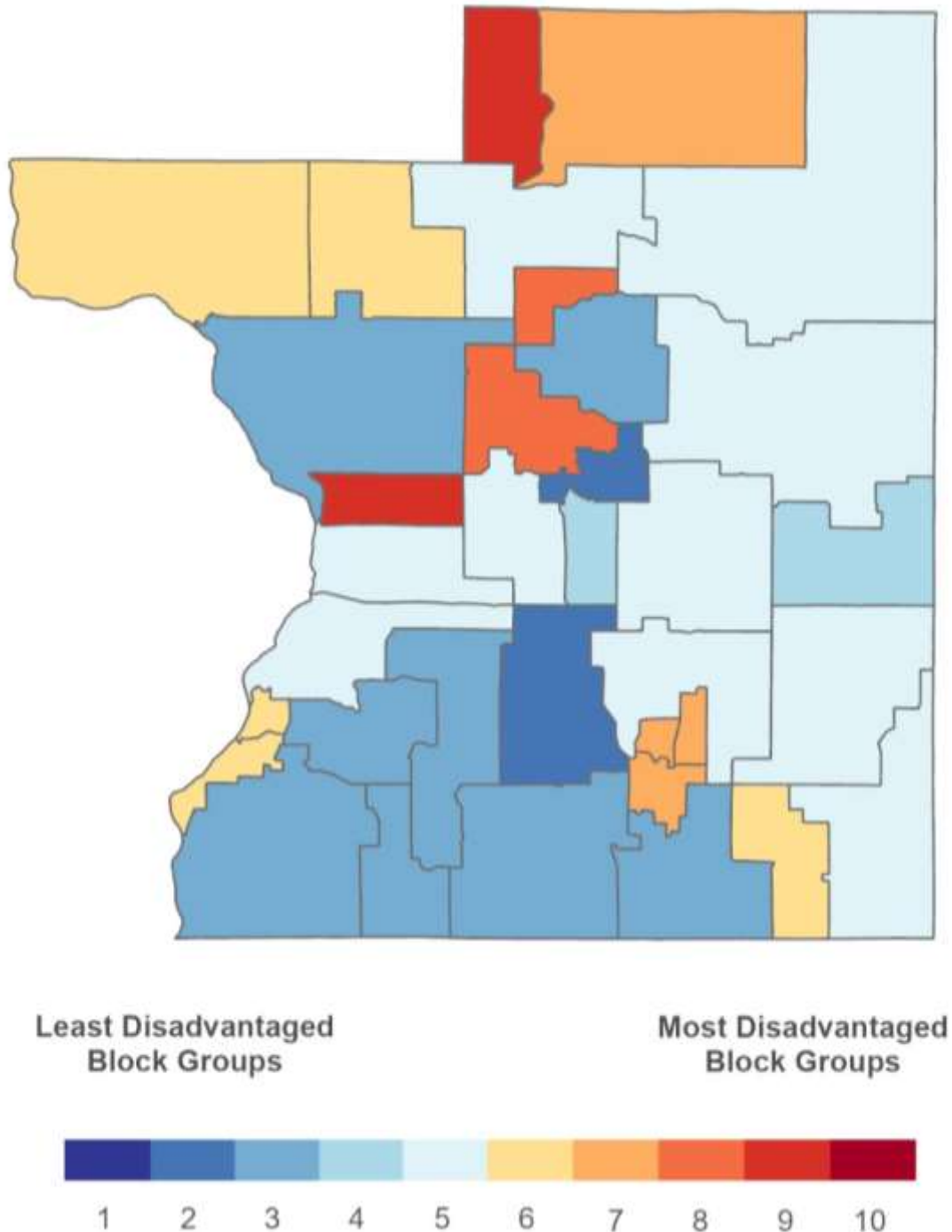
Projection: NAD 1983 Wisconsin TM US Ft.

References: Flanagan, B.E., et al., A Social Vulnerability Index for Disaster Management. *Journal of Homeland Security and Emergency Management*, 2011. 8(1).
 CDC/ATSDR SVI web page: <https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>.

UW Center for Health Disparities Research Area Deprivation Index

The Area Deprivation Index (ADI) utilized American Community Survey Census data from a 5-year average sample to identify socioeconomic disadvantaged Census block groups in terms of income, education, employment, and housing quality. **Figure 11** below shows the ADI results for Polk County. Similar to the SVI map, the results reiterate the vulnerabilities in the north. There are pockets of increased disadvantaged populations,

Figure 11. Area Deprivation Index for Polk County



D. COMMUNITY LIFELINES

Community lifelines are services and facilities that are fundamental to all aspects of society. FEMA encourages communities to mitigate the potential hazard impacts to community lifelines and give priority to stabilizing community lifelines during initial response. Polk County’s principal community lifelines are summarized in **Table 9** on the following page. The fifth column identifies the data source(s) for each lifeline:

HAZUS	FEMA Hazard Program
WDPI	Wisconsin Department of Public Instruction
WCWRPC	West Central Wisconsin Regional Planning Commission
WDNR	Wisconsin Department of Natural Resources
WDHS	Wisconsin Department of Health Services
HIFLD	Homeland Infrastructure Foundation-Level Data
WPSC	Wisconsin Public Service Commission
FCC	Federal Communications Commission
WISLR	Wisconsin Information System for Local Roads

During the planning process, it was noted that:

- The data for some lifelines is incomplete and some subcomponents have not been locally confirmed or mapped. Table 9 should be considered a starting point that can be built upon and improved for future mitigation plan updates.
- Limited hotel space availability has been a challenge in the region during long-term power outages when electric crews are brought in from outside the region to assist.
- A complete breakdown of spill response resources was not available. Type III HazMat Response Teams are available from Menomonie and Rice Lake with a Type I Team in Eau Claire/Chippewa Falls. Wakota Caer is available to assist with Haz Mat river spills.
- Polk County is extremely limited in morgue facilities for a mass casualty incident. As a county, there is no storage/cooling system that is not owned by a funeral home.

Appendix D includes a series of heat maps showing the distribution of most of the community lifelines in Polk County; the lifelines are not individually listed or mapped for security reasons. Those lifelines that are included in the heat maps are indicated in the final column of Table 9. Accurate location data for some lifelines is not yet available, while some other lifelines are not included in the heat maps since they are linear features, such as highways and utility lines.

Unsurprisingly, the heat maps in Appendix D show that Polk County’s community lifelines are concentrated in the cities and villages.

Appendix F evaluates the potential vulnerabilities for each category of community lifeline in Polk County for those hazards of significant risk, as will be further discussed in Section III.D. Cities and villages, as part of their sub-plans in **Appendix K**, also frequently identify vulnerabilities, partnerships, or strategies related to these lifelines. For reference, **Figures 12, 13, & 14** provide the service areas for three safety lifelines—Fire Districts, First Responder, and Ambulance service areas. The fire departments in particular are important to the wildfire risk assessment and strategies.

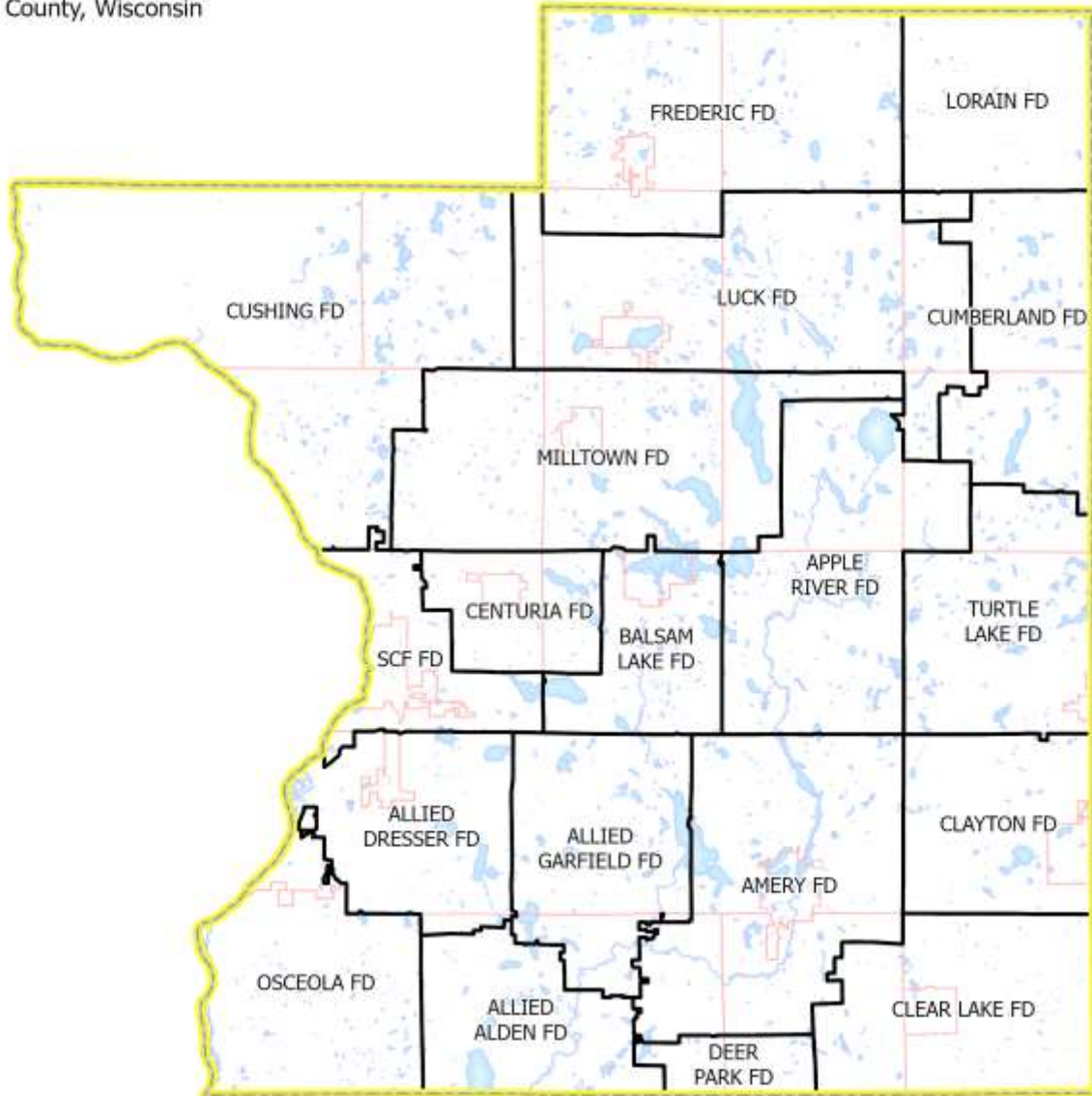
Table 9. Summary of Polk County Community Lifelines

Lifeline	Component	Subcomponent	Count	Source/Date	Mapped
SAFETY & SECURITY					
	Law Enforcement/Security	Police Stations & Law Enforcement Agencies	12	HAZUS 2023	Y
		Correctional Facilities	1	WCWRPC 2023	Y
	Fire & EMS Service	Fire/EMS Stations	16	HAZUS 2023	Y
		Other Firefighting Resources	none identified		
	Search & Rescue	Local Search & Rescue, if separate than above	none identified		
	Government Service	Government Centers & Municipal Buildings (essential services)	52	HAZUS 2023	Y
		Emergency Operations Centers (may also be within the above)	1	HAZUS 2023	Y
		Public K-12 Schools	26	WDPI 2023	Y
		Private K-12 Schools	1	WDPI 2023	Y
		Colleges & Post-Secondary Educational Institutions	1	HAZUS 2023	Y
		Public Libraries	10	WCWRPC 2023	Y
	Community Safety	All Dams	94	WDNR 2023	N
Dams (significant to high hazard potential)		9	WDNR 2023	Y	
Emergency Shelters, Heating/Cooling Shelters, & Safe Rooms		12	WCWRPC 2023	N	
VOADS & Other Community Support Agencies		not inventoried			
FOOD, HYDRATION, SHELTER					
	Food	Commercial Food Distribution (e.g., retail, market, school)	408	WCWRPC 2023	Y
		Commercial Food Supply Chain	not inventoried		
	Hydration	Food Distribution Programs (i.e., food banks)	9	WCWRPC 2023	Y
		Bottled water distribution	not inventoried		
		see Water Systems lifeline for potable water systems			
	Shelter	Assisted Living Facilities & Nursing Homes	21	WDHS 2023	Y
		Homeless Shelters & Other Group Homes	5	WCWRPC 2023	N
		Adult Day Care, Alcohol, Drug, Mental Health Treatment Centers	32	WDHS 2023	Y
Agriculture	Hotels or Other Commercial Housing Facilities	40	HAZUS 2023	Y	
	see Section II.C.1				
HEALTH & MEDICAL					
	Medical Care	Hospitals	4	HAZUS 2023	Y
		Dialysis Clinics	3	WDHS 2023	N
		Pharmacies	9	HIFLD 2023	N
		Veteran's Affairs Health System	none identified		
		Veterinary Services	not inventoried		
	Public Health	Public Health Office or Department	1	WDHS 2023	Y
		Other Health Clinics or Treatment Centers	42	HAZUS 2023	Y
	Patient Movement	Clinical Laboratories	45	WDHS 2023	Y
		Ambulance Service Districts	16	POLK COUNTY 2023	N
		Air Ambulance/Heli-Pad	3	WDHS 2023	Y
Fatality Management	Funeral Homes/Morgue Spaces/Crematories	5 / 13-14 spaces / 2	POLK COUNTY 2024	N	
ENERGY					
	Electrical Power Grid	Power Plants & Generation Systems, incl. hydroelectric & natural gas	4	HIFLD 2023	Y
		Electric Transmission Systems	224 Miles	WPSC 2011	N
	Natural Gas, LP, & Other Fuels (None also qualify as market driven)	Distribution Systems	not inventoried		
		Refineries/Fuel Processing	none identified		
	Fuel Storage Facilities & "Tank Farms"	multiple, not inventoried			
	Natural Gas Pipelines	97 Miles	WPSC 2011	N	
COMMUNICATIONS					
	Infrastructure	Towers & Fixed Wireless	53	HIFLD 2023	Y
		Cable Systems & Wireline	not inventoried		
		Broadcast Facilities (TV & Radio)	6	HIFLD 2023	Y
		Data Centers	not inventoried		
	Responder Communications	ARES/RACES Base or Infrastructure	not inventoried		
	Alerts, Warnings & Messages	Emergency/Storm Sirens	19	POLK COUNTY 2013	Y
	Finance	Banks & Credit Unions	14	HIFLD 2023	Y
911 & Dispatch	Dispatch & Public Safety Answering Points (PSAP)	1	FCC 2023	N	
TRANSPORTATION					
	Highway/Roadway/Motor Vehicle	Roads	1,820 Miles	WISLR 2023	N
		Bridges	72	HIFLD 2023	Y
	Mass Transit	Bus	none identified		
		Rail	not identified		
	Railway	Freight	14 Miles	HIFLD 2023	N
		Passenger	none identified		
	Aviation	Commercial (cargo/passenger)	6	HIFLD 2023	Y
General		2	HIFLD 2023	Y	
HAZARDOUS MATERIAL					
	Facilities	HAZMAT-EPCRA Tier 1 EHS Planning Facilities	11	POLK CO EMGY MGMT 2023	Y
		HAZMAT-EPCRA Tier 2 Reporting Facilities	61	POLK CO EMGY MGMT 2023	N
	Other HAZMAT storage, recycling, etc.	not identified			
Spill Response	Spill Response Agencies or Resources, excluding fire depts	not identified			
WATER SYSTEMS					
	Potable Water Infrastructure	Wellhead Protection Areas	116	WDNR 2023	Y
		Community Wells, Towers, & Distribution Systems		WDNR 2023	Y
		Private High Capacity Wells		WDNR 2023	Y
		Water Bottling Facilities	not identified		
	Wastewater Management	Community Wastewater Treatment Plants & Systems	8	HIFLD 2023	Y

Figure 12. Polk County Fire Districts

FIRE DEPARTMENT SERVICE AREAS

Polk County, Wisconsin



Legend

- Fire Emergency Service Zone
- Municipal Jurisdictions

Data Sources (2023):
WisDOT, WisDNR, WisDOA
WCWRPC, Polk County.

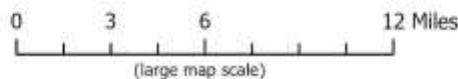
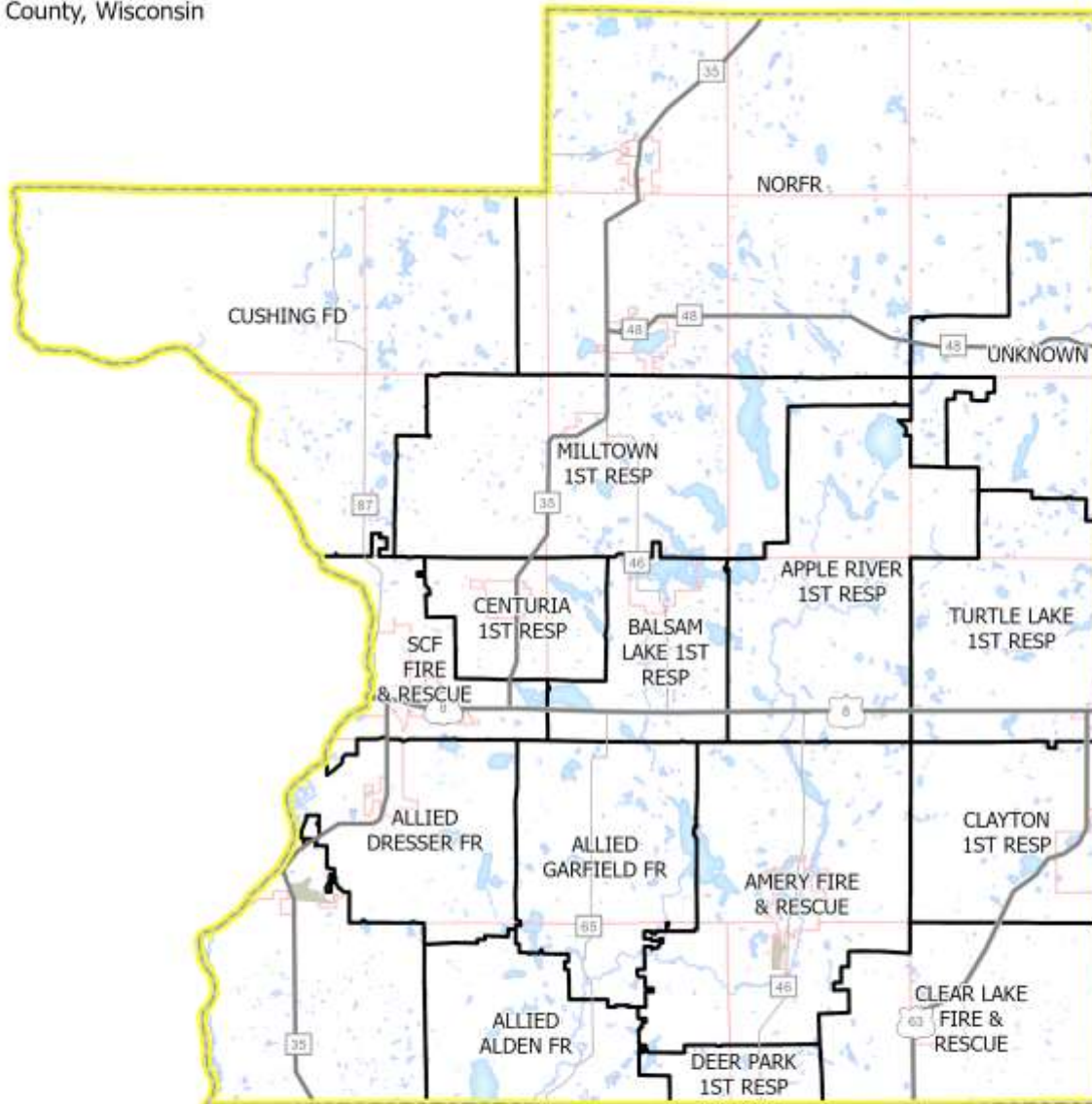


Figure 14. Polk County First Responder Service Areas

EMS/FIRST RESPONDER SERVICE AREAS

Polk County, Wisconsin



Legend

- Municipal Jurisdictions
- EMS/First Responder Emergency Service Zone
- Polk County
- Surface Water

Data Sources (2023):
WisDOT, WisDNR, WisDOA
WCWRPC, Polk County.

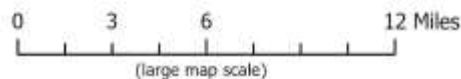
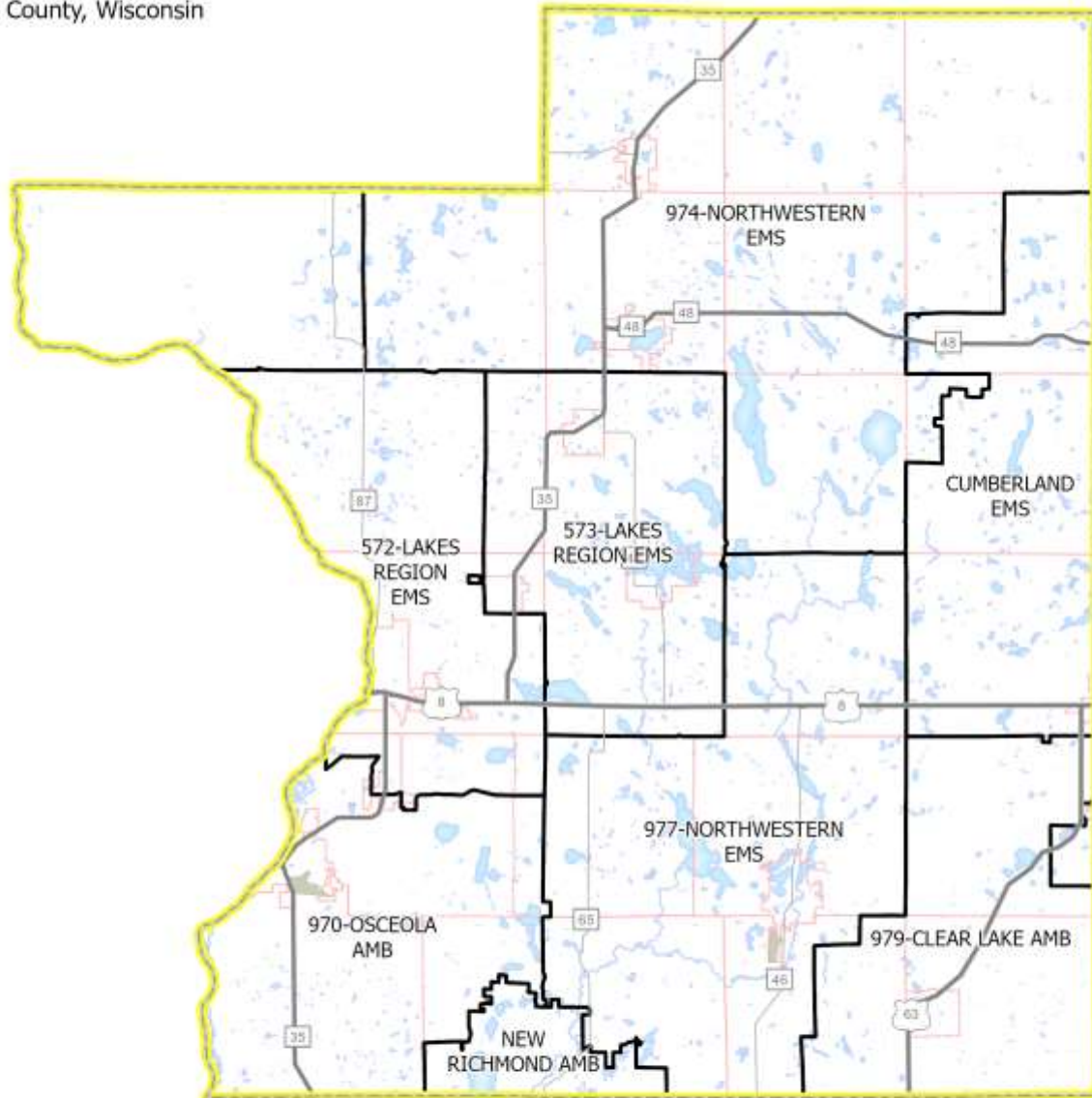


Figure 14. Polk County Ambulance Service Areas

AMBULANCE SERVICE AREAS

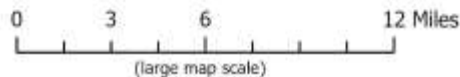
Polk County, Wisconsin



Legend

- Municipal Jurisdictions
- Medical Emergency Service Zones
- Polk County
- Surface Water

Data Sources (2023):
WisDOT, WisDNR, WisDOA
WCWRPC, Polk County



E. TRANSPORTATION SYSTEMS

Transportation is one of the community lifelines, and roads and rail lines are frequently mentioned in later sections of this plan due to related vulnerabilities (e.g., winter storms, HazMat spills). Providing an uninterrupted transportation network is critical to Polk County, given the County's rural nature. As **Figure 15** shows, residents and goods often travel significant distances for services, critical facilities, and employment.

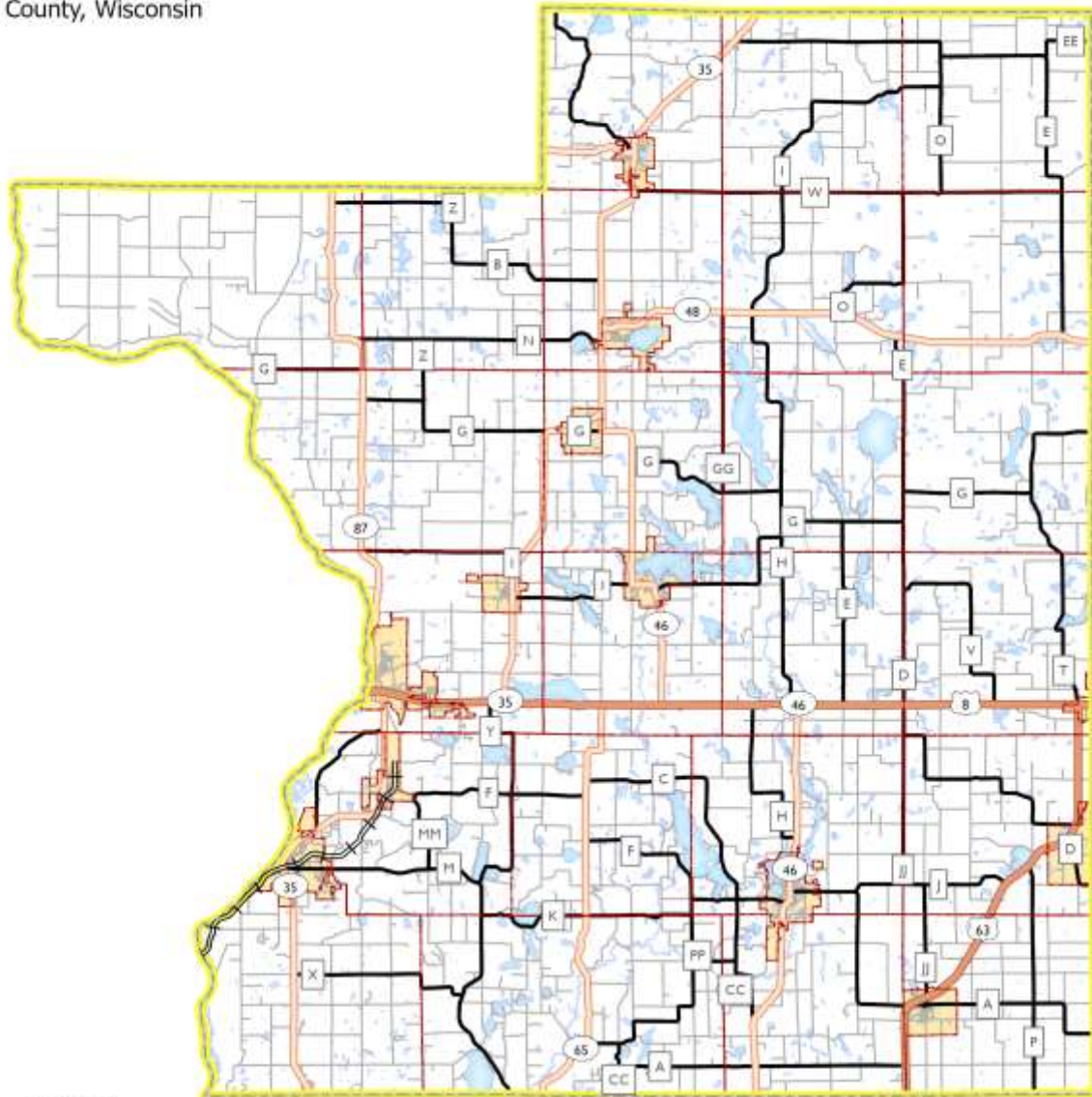
The County's size and road miles can be a challenge for road crews and emergency personnel during and after a natural hazard event (e.g., snow removal, downed trees, culvert washouts). Polk County maintains over 331 miles of county trunk highway, reflecting the largely rural nature of much of the County. Only 159.2 miles of highways with State jurisdiction exist in the County. The County also has 72 bridges, 21 of which are owned by the County and 13 owned by the State of Wisconsin.

Rail service in the County has diminished over the past century, with current service limited to Osceola and Dresser through a Canadian National line. The two public airports in Amery and Osceola have no scheduled passenger service, and the Minneapolis-St. Paul International Airport is expected to continue to provide the primary commercial air service for Polk County residents and businesses. While rail service has decreased, recreational transportation systems have increased. Polk County boasts over 360 miles of snowmobile trails, 31 miles of ATV/trail bike trails, almost 70 miles of cross-country ski trails, a 30-mile horseback trail, and over 131 miles of hiking and walking trails, not including snowmobile club trails, bicycle paths/routes, city and village trails, and private trails.

Figure 15. Polk County Transportation System

TRANSPORTATION NETWORK

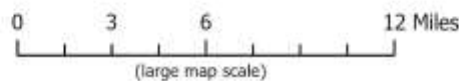
Polk County, Wisconsin



Legend

- | | |
|----------------------------|---------------|
| Road Classification | —+— Railroad |
| Interstate | Polk County |
| US Highway | City/Village |
| State Highway | Town |
| County Highway | Surface Water |
| Local Road | |

Data Sources (2023):
WisDOT, WisDMR, WisDOA
WCWRPC, Polk County.



F. HISTORIC PROPERTIES AND DISTRICTS

Historic structures, sites, and districts are sometimes targeted for hazard mitigation strategies due to their unique, often irreplaceable, social value. **Table 10** lists the formally recognized locations or structures of historical significance in Polk County according to the National Register of Historic Places.⁴

Table 10. Polk County Historic Properties

#	Historic Site	Address	City	Listed
1	Polk County Courthouse	Main Street	Balsam Lake	1982
2	Frederic Depot	210 Oak Street W.	Frederic	2003
3	Seven Pines Lodge	SE of Lewis	Lewis	1978
4	First Baptist Church	201 3 rd Avenue	Osceola	2008
5	Geiger Building (old courthouse)	201 Cascade Street	Osceola	1985
6	Alan A. Heald House	202 Sixth Avenue	Osceola	1985
7	Minneapolis, St. Paul, & Sault Saint Marie Railway Depot	114 Depot Road	Osceola	2000
8	Osceola Commercial Historic District	downtown Osceola	Osceola	2000
9	Cushing Land Agency Building	106 S. Washington St.	St. Croix Falls	2005
10	Dalles Bluff Site	restricted ⁵	St. Croix Falls	1981
11	Lamar Community Center	NE of St. Croix Falls	St. Croix Falls	1982
12	St. Croix Falls Auditorium	201 N. Washington St.	St. Croix Falls	2007
13	Thomas Henry Thompson House	205 South Adams St.	St. Croix Falls	1984

During the mitigation planning effort, there were no hazards events mentioned that have substantially impacted any of the above historic properties. Most of the historic buildings are very well constructed, and they continue to serve as an important vestige of Polk County's past.

The above list is not inclusive of all sites of historic and cultural significance, however. Additional structures undoubtedly qualify as National Register candidates. The Wisconsin Architecture & History Inventory (AHI) identifies 162 buildings, structures, or objects in Polk County that illustrate Wisconsin's unique history. Such sites are quite varied and include churches, cemeteries, and barns as well as additional archeological sites such as Prairie Lake Mounds. A detailed assessment of the vulnerability of each of these sites to hazard events is not available.

⁴ National Park Service. National Register of Historic Places database. December 29, 2023.

⁵ Restricted to protect this unique site of archeological significance.

SECTION III.

ASSESSMENT OF HAZARD CONDITIONS

In order to more effectively evaluate potential hazard mitigation alternatives and develop feasible strategies to address the risks associated with the identified hazards, the County must:

- identify the hazards that pose a significant risk to Polk County;
- profile the extent and severity of past hazard events that have affected the County and the probability of recurrence; and
- assess the vulnerability of the community to the threat of future hazard events.

A. HAZARD IDENTIFICATION

Although Polk County could potentially be at risk from a variety of hazards, this plan will attempt to narrow the scope of the hazards that will be addressed to those hazards that pose a significant risk.

i. Disaster and Emergency Declarations

Since 1953, there have been six Presidential Declarations for a Major Disaster for which Polk County was a primary county impacted:

Month & Year	Event Summary for Polk County	Public Assistance	Individual Assistance
April 1965	Tornadoes, severe storms, and flooding in Wisconsin (specifics for Polk County not available).	x	x
June 2000	Severe Storms, Tornadoes, and flash flooding from heavy rains resulted in stormwater damage, road washouts, etc.	x	
July 2001	Flash and stormwater flooding from heavy rains similar to the June 2000 event. Significant washouts of roads, culverts, shoulder, and bridge abutments.	x	
September 2002	Similar flash flooding to the 2000 and 2001 events, plus high winds. Largely overshadowed due to the Ladysmith tornado, which was part of the same storm.	x	x
July 2019	High winds and an EF1 tornado struck Barron and Polk counties breaking, uprooting, and downing thousands of trees, damaging/destroying buildings, and causing widespread power loss. Earlier in 2019, Polk County was contiguous to a disaster declared area for a severe winter storm, high winds, and flooding in March-April.	x	
April 2020	COVID-19 was declared a nationwide disaster on April 4, 2020.	x	x

While the above catastrophic events were of sufficient severity to warrant major Federal assistance, there have been at least 11 additional State or Federal Emergency Declarations involving Polk County:

Month & Year	State or Federal	Event Type
June 1976	Federal	Drought
Oct 1977	Federal	Winds, Hail, & Rain
Aug 2003	State	Drought
July 2005	State	Drought
Sept 2005	Federal	Hurricane Katrina Evacuation
July 2006	State	Drought
Aug 2007	State/USDA	Drought/Agricultural Drought
Aug 2009	State	Drought
July 2012	State	Drought
Jan-May 2019	Federal	Severe Winterkill cause by rain, freezing rain, extreme cold, & snow. (contiguous county)
Mar 2020	State	Public Health Emergency for COVID-19
Mar 2020	Federal	COVID-19
Nov-Dec 2022	Federal	Drought (contiguous county)
Summer 2023	Federal	Drought (primary & contiguous county)

During an emergency or major disaster declaration, Federal assistance will supplement State and local efforts. A State Emergency Declaration is declared by the Governor and puts into motion State assistance programs. Emergency declarations are typically more limited in scope and without long-term federal assistance.

Relying on Federal emergency and disaster declarations as a measure of risk can be misleading. While significant damage occurs during a declared disaster or emergency, the declaration area typically involves multiple counties and a sizable percentage of the damage can also be limited to a certain area. Further, disaster events do occur that can be deadly and cause severe damage; but the total damage does not rise to the thresholds to qualify for Federal funding. The Winter 2014 Polar Vortex is one such event that caused major damage to water lines for many communities in Polk County, but this disaster was not declared. Such events can be especially hard on small communities when Federal assistance is not available.

To assist in determining what hazards should be evaluated in the plan, National Climatic Data Center (NCDC) information from the National Weather Service (NWS) was used. This data describes past, reported weather events and the resulting deaths, injuries, and damages associated with each of these events. Data for a wide variety of events has been maintained, while some older data is only available for tornado and thunderstorm-related events.



During the period from January 1, 1993, through December 31, 2023, Polk County experienced 400 extreme weather hazard events on 247 different dates reported to the National Climatic Data Center as summarized in **Appendix E**. These events included:

- No deaths and 1 injury (the injury occurred during a 2010 tornado near Luck).

- Over \$7.5 million in property damage was reported (unadjusted for inflation) due to tornados, high winds, hail, and flash flooding.
- Thunderstorm Wind/High Winds were the most frequently reported natural hazard event with 156 reports and caused the most damage overall. There were 20 tornado reports during the period, with none greater than EF1. 11 flood events were reported.
- Winter Storms and Heavy Snows are fairly common with 90 reports. While 10 extreme cold and wind chill events were reported, no true Blizzards occurred.

ii. Polk County Overall Risk Assessment

During the update of the 2024 *Polk County Multi-Hazard Mitigation Plan*, Steering Committee members discussed natural hazard trends and concerns. This included reviewing the National Risk Index data for Polk County, the 2022 Health Vulnerability Assessment results (HVA) completed by the Northwest Wisconsin Healthcare Emergency Readiness Coalition, and the hazards included in the 2017 Plan.

Based on this discussion and each member’s personal experiences, each Committee member rated the probability of a natural hazard event occurring and the vulnerability or impacts if such an event should occur. Identification of the hazards for inclusion in this risk and vulnerabilities survey was based on the hazards identified in the *Resource Guide to All Hazards Mitigation Planning in Wisconsin* prepared by Wisconsin Emergency Management.

For each hazard type, each Committee member was asked to assign ratings of 0 to 5 (0-no probability or vulnerability, 1-low, 3-moderate, 5-high) to reflect their opinion of which hazards pose the greatest concerns for Polk County. A composite overall average risk rating for each hazard was then calculated by totaling the average risk rating from each respondent and divided by the total

PROBABILITY VS. VULNERABILITY

For purposes of this plan, the following definitions are used:

PROBABILITY: *Likelihood and frequency of occurrence in the future.*

VULNERABILITY: *If the event occurs, what are the impacts?*

The compiled results of the updated survey are shown in **Table 11**. An additional column is included in Table 11 identifying those hazards that the Committee recommended should be addressed as part of the 2024 Plan update and how best to organize those hazards in Section III.D.

As reflected in Table 11, the Steering Committee felt that the scope of the 2024 hazard mitigation plan update should be modified when compared to the previous 2017 Plan:

- High winds are discussed with tornados due to similar vulnerabilities and impacts.
- Extreme heat is considered a significant risk for the first time compared to previous plans.
- The plan scope was expanded for the first time to include certain non-natural hazards not

addressed in other plans—Active Threats, Cyberattack, and Hazardous Materials Spills.

The Steering Committee discussed how best to approach zoonotic and communicable disease in light of the COVID-19 pandemic, and agreed that the 2024 Plan update should refer to and support, but not duplicate or supplant, the Public Health Emergency Preparedness Plan. As such, pandemics/zoonotic disease is included in Section III.B., with other hazards of concern addressed in other plans.

Of the above hazards, only flooding, wildfire, and, to a less extent, long-term power loss and hazardous materials spills, have geographic areas or locations of higher risk, as will be identified later in Section III.D.

FEMA National Risk Index

FEMA utilizes the CDC’s Social Vulnerability Index, forecasted annual losses, and community resilience factors to produce their National Risk Index (NRI). NRI rankings are available at the state and national level. Some key findings from the NRI data are:

- Overall, Polk County ranks in the 57-59th percentiles for National and State for risks, suggesting it has a relatively low hazard risk in comparison to the rest of the State and Nation.
- **Figure 16** shows the risk index classification for each census tract. Three census tracts have a slightly elevated risks. In the St. Croix Falls area, the risk is elevated due to social vulnerabilities, such as incomes and an aging population. Risks are elevated in the Amery and Osceola areas due to expected annual losses, which are influenced by past extreme weather events.
- All tracts are classified as being relatively moderate in community resiliency.
- Expected Annual Losses for the County are highest for Cold Waves (92 out of 100) and Strong Winds (91.8). It is notable that Polk County has a much lower hail risk compared to Barron County to the east, for which there has been much more hail damage report since 1993 according to the National Climate Data Center’s storm events database.

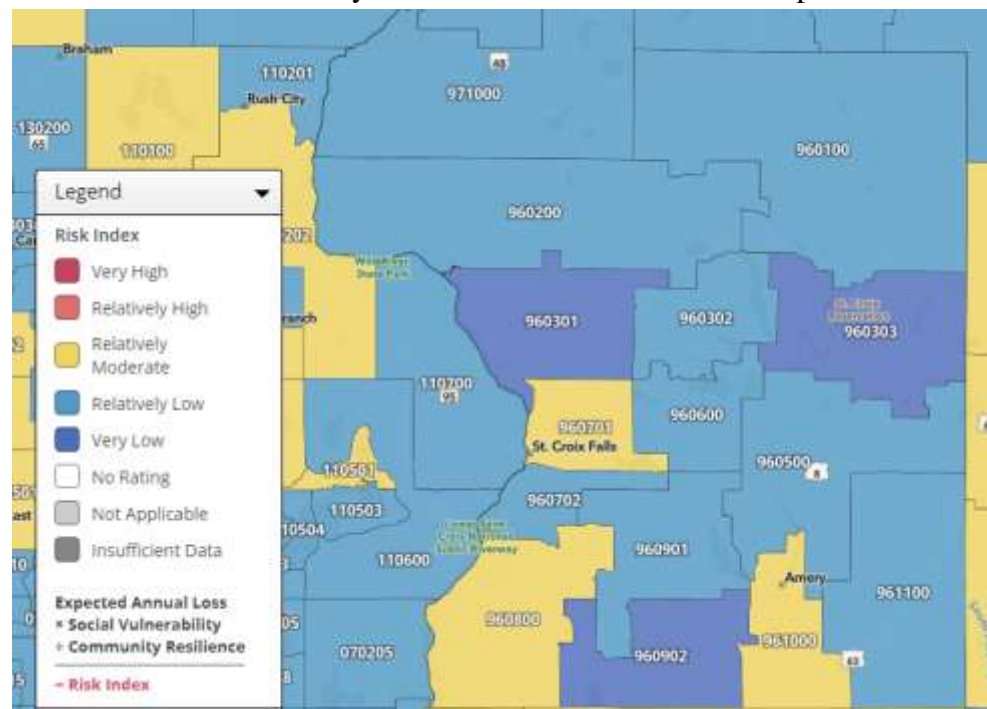


Figure 16. National Risk Index Scores for Polk County Census Tracts

Table 11. Polk County Hazards Probability & Vulnerabilities Survey Results (February 2023)

0 -- none; extremely low	3 – moderate; substantial
1 -- low; minimal	4 -- high; serious
2 – some; of concern	5 -- very high; extreme

Hazard	Probability	Vulnerability	Combined Threat	Ntnl Risk Index	NWHERC HVA relative threat	section of the 2024 Plan update
Natural Hazards						
Riverine or Overbank Flooding	1.9	2.2	2.0	V. Low	59-61%	Flooding
Overland or Stormwater Flooding	2.0	2.3	2.2			
Heavy Snow Storm and Blizzards	2.9	2.8	2.8	Low	33-55%	Winter Storms & Extreme Cold
Ice Storms and Sleet	2.6	2.9	2.8	Low	50-53%	
Winter Kill of Crops	1.6	1.9	1.8			
Extreme Cold/Cold Wave	3.0	2.9	3.0	High	56%	
Forest or Wild Fire	2.2	3.0	2.6	V. Low	38%	Wildfire
Tornadoes	2.6	3.2	2.9	Low	48%	Tornadoes
High Winds	2.7	2.8	2.8	Mod.		Thunderstorms
Thunderstorms, Lightning, Hail, etc.	2.8	2.3	2.5	Low	35%	
Extreme Heat/Heat Wave	1.7	2.0	1.8	Low	56%	Extreme Heat
Drought	2.4	2.5	2.5	Low	32%	Drought
Landslides or Sinkholes	0.8	1.5	1.1	Low	37%	exclude
Earthquakes	0.1	1.5	0.8	V. Low	24%	exclude
Fog	1.1	1.2	1.2			exclude
Technological Hazards						
Haz Mat Incident - Fixed	1.6	2.4	2.0		36%	Hazardous Materials Spills
Haz Mat Incident - Transportation	1.9	2.4	2.2		55%	
Groundwater Contamination	2.2	3.1	2.7		56%	
Animal Waste Management	1.9	2.4	2.2			
Long-Term Power Outage	1.8	3.3	2.6		25-65%	LTPO section
Nuclear Power Plant Incident	0.5	2.1	1.3		22%	Reference plans
Dam Failure Flooding	1.5	2.9	2.2			Flooding
Aircraft Accident	1.2	1.6	1.4			exclude
Railroad Accident	0.6	1.4	1.0		37%	exclude
Manmade/Intentional & Other Hazards						
Pandemics/Zoonotic Disease	2.3	3.6	2.9		65%	Reference to PPP & other plans
Agri/Livestock Pests and Diseases	2.3	2.8	2.6			
Invasive Species	2.5	2.6	2.6			exclude
Active Shooter/Active Threats	2.0	3.5	2.8		67%	Active Threats
Terrorism, Domestic (all)	1.8	3.1	2.5		29%	
Terrorism, International (all)	1.5	3.0	2.3			
Terrorism – Critical Infrastructure	1.8	3.5	2.7			
Cyber Attacks	2.2	3.4	2.8		49-64%	Cyber Attacks
Civil Unrest or Institutional Riot	1.5	2.8	2.1		58%	exclude

The **National Risk Index** compares Polk County to rest of U.S. based on expected annual losses, social vulnerability, and community resilience for each hazard. The **NWHERC Hazard Vulnerability Assessment** is the relative risk and vulnerability for each threat in the region from a public health perspective.

iii. Natural Hazards of No Significant Risk

There are very few or no NOAA records of the following natural hazard events occurring in Polk County, or the local impacts were very low when events have occurred. In order to meet the comprehensive requirements for developing an all hazards mitigation plan, these other hazards are identified and described below. It is important to note that these hazard events may still pose some threat to the community, but they were considered by the Steering Committee to either have a minimal chance of occurring, pose a minimal widespread vulnerability to residents or communities, or offer very limited mitigation options.

Landslides & Land Subsidence

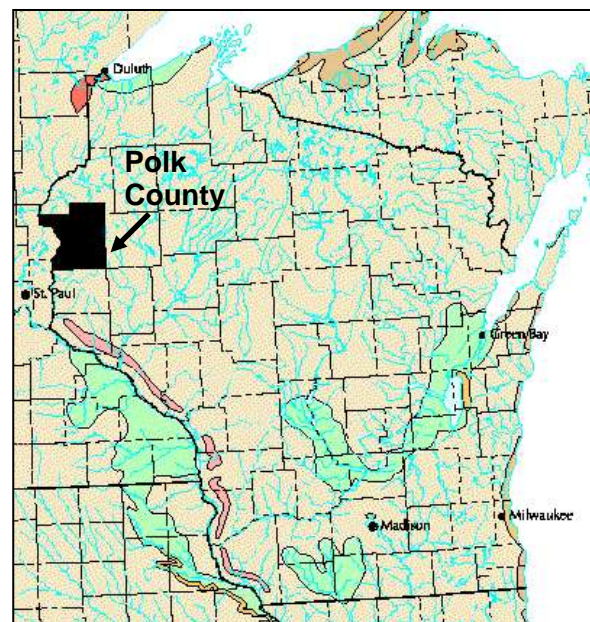
The term landslide includes a wide range of ground movement, such as rock falls, deep failure of slopes, and shallow debris flows. Although gravity acting on a steep slope is the primary reason for a landslide, there can be other contributing factors. Erosion by surface waters or excess weight from rain, snow or man-made structures may stress weak slopes to failure. Slope material that becomes saturated with water may develop a debris flow or mudflow.

The USGS *Landslide Overview Map of the Conterminous United States*⁶ (excerpt for Wisconsin in **Figure 17**) identifies no large-scale landslide risks for the Polk County area.

According to the USGS topographic maps and U.S. Natural Resources Conservation Service soil maps for Polk County, there are 95,661 acres that potentially have a slope over 12% representing 16.3% of the total Polk County land base. Of this, 31,105 acres (5.3% of Polk County) have slopes greater than 20 percent. The majority of these steep slopes are located in the far western and far northern and far southern portions of the County. Additional localized and site-specific variations in topography and slope may exist. Past glacial activity has created some topography in Polk County that is scenic, but may also be very sensitive to development.

While there are steeper areas, the area's soils pose more of a gradual erosion risk, rather than the sudden, large-scale movement of ground associated with landslide hazards. Stormwater runoff, along with river flow, ice build-up, and normal temperature fluctuations, has created serious riverbank erosion and washouts concerns for some locations, such as along the east

Figure 17. Landslide Hazards in Wisconsin



source: U.S. Geologic Service. *Landslide Overview Map of the Conterminous United States*. <http://landslides.usgs.gov/html_files/landslides/nationalmap/national.html>.

⁶ U.S. Geological Survey. *Landslide Overview Map of the Conterminous United States*. <http://landslides.usgs.gov/html_files/landslides/nationalmap/national.html>

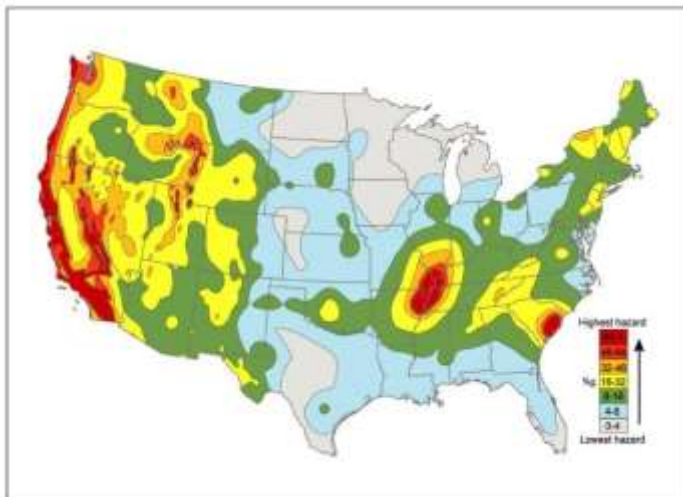
banks of the St. Croix River in the Osceola area, which will be discussed in the flooding assessment section.

Land subsidence is an event in which a portion of the land surface collapses or settles. Common locations of subsidence are in areas having karst topography or in areas in which large quantities of groundwater have been withdrawn. Polk County is not an area of significant karst topography which could contribute to land subsidence. There are no records of substantial damage or injury from large landslides or land subsidence within Polk County.

Earthquakes

According to the U.S. Geological Survey, there have been 19 earthquake events in Wisconsin, with none noted for west-central Wisconsin. Where readings are available, these events were relatively small, most being 3.0-3.8 on the Richter Scale in size and the largest being an intensity of 5, which may be strong enough to crack some plaster, but not cause serious damage. Due to the lack of recent events, some geologists question whether many of these events were true earthquakes, but rather quarry collapses, blasts, etc.

Figure 18. U.S. Geological Survey Earthquake Hazard-Shaking Map



source: U.S. Geological Survey. *Earthquake Hazard in the Heart of the Homeland*. <<http://pubs.usgs.gov/fs/fs-131-02/CUSazard.html>>.

The nearest active earthquake fault outside of Wisconsin is the New Madrid Fault which has a seismic zone that stretches from northeast Arkansas to southern Illinois.

As **Figure 18** shows, the Polk County area falls within the lowest earthquake hazard-shaking area, with the different colors representing the levels of horizontal shaking that have a 1-in-50 chance of being exceeded in a 50-year period. Similarly, Polk County falls within a 0%g peak ground acceleration (PGA) zone as shown on the USGS PGA values map for the United States with a 10 percent chance of being exceeded over 50 years; Polk County is a non-affected area.⁷ The earthquake threat to Polk County is considered very low.

Fog

Fog is low-level moisture that can reduce visibility. It can occur in isolated low-lying areas or be a widespread event that can cover several counties. In general, fog is often hazardous when the visibility is reduced to 1/4 mile or less. Thick fog reduces visibility, creating a hazard to motorists as well as to air traffic. Airports may close because of heavy fog. The intensity and duration of fog varies with the

⁷ U.S. Geologic Service. *Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years*. map. <<http://geohazards.cr.usgs.gov/eq/pubmaps/US.pga.050.map.gif>> November 1996.

location and type of fog. Generally, strong winds tend to prevent fog formation. In Polk County, dense fog occurs infrequently and is typically a short-term weather event lasting only for portions of a day. The NCDC database only includes one dense fog record from November 19-20, 2007.

Coastal Hazards (Hurricanes, Tsunamis, Tidalwaves, Waterspouts, etc.)

Coastal hazards can cause increases in tidal elevations (storm surges), high winds, and erosion caused by tropical cyclones (such as hurricanes) or the sudden displacement of water (such as tsunamis from earthquakes). Polk County is located in the upper Midwest, approximately 1,000 miles from the Atlantic Ocean, 1,200 miles from the Gulf of Mexico, and 2,000 miles from the Pacific Ocean. Polk County also has no large inland lakes within its boundaries. Such coastal hazards have no direct impact on Polk County, and only occasionally indirectly impact the county in the form of thunderstorms, which are discussed separately.

B. HAZARDS OF CONCERN ADDRESSED IN OTHER PLANS

The three hazards briefly described in this sub-section pose a risk for Polk County. The Steering Committee desired to bring attention to these hazards by their inclusion here, but decided to not include a full risk and vulnerability assessment within this plan update for one or more of the following reasons:

- They are not typically considered to be natural hazards (i.e., a disaster isn't declared) and are not typically included in a county-level mitigation plan.
- Most are largely addressed through other intensive planning and preparedness efforts for which Polk County Emergency Management does not have a lead role. Instead of duplicating and repeating these planning activities within this Mitigation Plan, this sub-section recognizes that these risks exist and refers to other existing plans and programming to mitigate these risks.
- For nuclear plant accident, the probability and likely impacts for Polk County are low.

This approach does not diminish the importance or the efforts to prepare for these other risks.

i. Communicable Diseases

Definitions

Infectious diseases are illnesses caused by germs (such as bacteria, viruses, and fungi) that enter the body, multiply, and can cause an infection, though not all infectious diseases are contagious (or communicable). According to the Federal Center for Disease Control, a **communicable disease** is an illness caused by an infectious agent or its toxins that occurs through the direct or indirect transmission of the infectious agent or its products from an infected individual or via an animal, vector or the inanimate environment to a susceptible animal or human host. **Zoonotic diseases** are diseases that are spread between people and animals. An **epidemic** occurs when a disease affects a greater number of people than is usual. A **pandemic** is a global disease epidemic.

Infectious Disease Probability, Vulnerability, and Capabilities

The 2022 Health Vulnerability Assessment (HVA) prepared by the Northwest Wisconsin Healthcare Emergency Readiness Coalition (NWW-HERC), of which Polk County Public Health is a member, evaluated the potential for a global/major and local/regional infectious disease outbreak:

	Global/Major Outbreak	Local/Regional Outbreak
Probability of Future Occurrence		
Probability	High; 4+ events/30years	High; 4+ events/30years
Potential Impacts/Vulnerabilities		
Human/Population	High; >10% pop injured or dead	High; >10% pop injured or dead
Healthcare Services	High; >10% of services impacted	High; >10% of services impacted
Community Impact	High; >10% affected	High; >10% affected
Public Health Services	High; >10% of services impacted	High; >10% of services impacted
Property	not applicable	not applicable
Business	High; >10% affected	High; >10% affected

Capabilities/Capacity of Region/State to Manage the Events (Note: Respondents generally felt that they were locally better prepared to manage vs. region/state).		
Mitigation	Moderate	Moderate
Preparedness	Moderate	Moderate
Response	Moderate	Moderate
Recovery	Moderate	Moderate

Overall, global and local/regional outbreaks were equal in terms of probability, potential impacts, and probability. Of the 51 different hazard types in the HVA, the participating public health officials rated infectious disease outbreaks as the sixth highest hazard threat facing our region, tied with loss of normal electrical power. It is notable that the while assessment for an outbreak had not changed since 2022, its relatively ranking dropped from third among all hazards.

Notable Events

An **influenza pandemic (or pandemic flu)** occurs when a new influenza virus emerges for which there is little or no immunity in the human population, begins to cause serious illness, and then easily spreads person-to-person worldwide. The potential risk of transmission, vulnerabilities, and impacts can vary widely by type of virus and availability of vaccines. Viruses can also mutate and increase in deadliness and spread more easily.

Historically, the 20th century saw three large pandemics of influenza impacting the United States:

- 1918 influenza pandemic caused at least 675,000 U.S. deaths and up to 50 million deaths worldwide.
- 1957 influenza pandemic caused at least 70,000 U.S. deaths and 1-2 million deaths worldwide.
- 1968 influenza pandemic caused about 34,000 U.S. deaths and 700,000 deaths worldwide.

Beginning in 2009, there was significantly increased attention to pandemic flu at the state and regional level due to **zoonotic diseases** capable of being transmitted between animals and humans. **Swine Flu (H1N1)** was declared a pandemic by the World Health Organization (WHO) in June 2009 and resulted in about 17,000 deaths worldwide before the pandemic was declared over in August 2010. During the H1N1 outbreak from April 2009 through March 2010, an estimated 43-88 million H1N1 cases and 192,000-398,000 H1N1-related hospitalizations were estimated to have occurred in the United



States according to the Center for Disease Control (CDC).⁸ The CDC further estimated that 8,720 to 18,050 H1N1-related deaths occurred during the same timeframe. H1N1 continues to spread and there is some concern about the long-term effectiveness of current vaccines. During the 2010-2011 influenza season, five cases of Novel Influenza A viruses were reported in the United States, including one in Wisconsin and two in Minnesota; all patients fully recovered from their illness.

More recently, a **highly pathogenic avian influenza outbreak (H5N2)** struck the United States in April 2015. In adjacent Barron County, 650,000 turkeys were euthanized as a result. A milder, low pathogenic strain of H5N2 would occur in March 2017 requiring quarantine and monitoring of poultry operations in the region. An outbreak of a different highly pathogenic strain called EA H5N1 would



hit domestic flocks and wild birds throughout much of North America in 2021-2022, including poultry in the region. The outbreak would lull for about a year before hitting area County poultry producers especially hard; the seasonal re-emergence was partially attributed to migrating waterfowl. Three poultry flocks in Polk County were impacted totaling over 22,000 birds (mostly turkeys). Barron County was hit especially hard. As of December 2023, over 70,000 turkeys in Barron County were depopulated and strong biosecurity measures were advised. The U.S. Department of Agriculture recently reported a decline in avian flu cases among wild birds, offering

a glimmer of hope to the poultry industry which has lost 76.9 million birds since 2022.⁹

In March 2024, avian flu was confirmed as spreading to dairy cattle and several human cases have been reported. According to the CDC, as of August 2024 since 2022 in the United States:

- H5 Avian Flu has been detected in 9,725 wild birds and is believed to be in wild birds worldwide.
- 100,712,371 poultry have been affected in 48 states.
- 191 dairy herd have been affected in 13 states. including the surrounding states of Minnesota, Iowa, and Michigan; no cases have yet been reported in Wisconsin.

⁸ U.S. Center for Disease Control. CDC Estimates of 2009 H1N1 Influenza Cases, Hospitalizations, and Deaths in the United States, April 2009-March 13, 2010. http://www.cdc.gov/h1n1flu/estimates/April_March_13.htm

⁹ <https://www.poultryproducer.com/u-s-sees-diminishing-avian-flu-cases-in-wild-birds-a-potential-silver-lining-for-poultry-sector/>

- 14 Avian Flu (H5) human cases have been reported among dairy and poultry workers for which 9 have been confirmed as H5N1.

As of August 2024, the CDC considered Avian Flu to be a low public health risk but is actively monitoring individuals with animal exposure. The H5N1 virus usually does not infect people, though there is no human immunity, and no commercial vaccine is available. One study showed that it is possible for avian flu viruses (and bacteria like Salmonella) to enter groundwater from a large source of poultry fecal waste, though the risk of virus transmission from groundwater to people is not known.¹⁰ And some avian flu variants have undergone mutations, which could impact the vulnerability to humans.

As of August 2019, the CDC stated that it is impossible to predict when the next pandemic will occur or how bad a future pandemic will be, so advanced planning is needed. A great variety of mitigation and planning measures for pandemics has been undertaken over past two decades since the SARS epidemic in 2002-2003. The Avian Flu (H5N1, H5N2) and Swine Flu (H1N1) outbreaks have further increased awareness, cooperation, monitoring, and planning for large-scale disease or viral outbreak. But it would be less than a year later when these preparedness efforts would be truly tested.

The **coronavirus disease 2019 (COVID-19)** pandemic is a global outbreak of coronavirus – an infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Cases of novel coronavirus (nCoV) were first detected in China in December 2019, with the virus spreading rapidly to other countries across the world. Since January 1, 2020, there have been nearly 1.1 million deaths in the United States attributed to COVID-19. As of 3/10/23, there were over 15,100 confirmed COVID-19 cases in Polk County and 132 deaths. In addition, according to the CDC website, up to 41% of non-hospitalized adults in the United States who have had COVID-19 also experience a wide range of ongoing respiratory, neurologic, cardiovascular, and other symptoms that can last for weeks, months, or years (a/k/a Long Covid).¹¹



The COVID-19 Federal Public Health Emergency expired on May 11, 2023. And while it may seem that the pandemic has passed, the threat still exists. As of July 25, 2024, statewide average SARS-CoV-2 levels in municipal wastewater sampling were very high or high among 54% of the 44 locations being monitored and Wisconsin experienced over 128 new hospitalizations during the past seven days due to COVID-19 related illness.

¹⁰ Borhardt, Mark A. et. al. *Avian Influenza Virus RNA in Groundwater Wells Supplying Poultry Farms Affected by the 2015 Influenza Outbreak*. Environmental Science & Technology Letters. 2017, 4, p268-272.

¹¹ [https://www.cdc.gov/mmwr/volumes/72/wr/mm7232a3.htm#:~:text=Long%20COVID%20includes%20a%20wide%20range%20of%20ongoing%20respiratory%2C%20neurologic.to%2041%25%20\(1\).](https://www.cdc.gov/mmwr/volumes/72/wr/mm7232a3.htm#:~:text=Long%20COVID%20includes%20a%20wide%20range%20of%20ongoing%20respiratory%2C%20neurologic.to%2041%25%20(1).)

The COVID-19 pandemic had great (and often long-lasting) impacts on the economy, health care services, educational systems, and governmental services. During the 2024 mitigation plan update, local officials and stakeholders were asked about their experiences and lessons learned during the pandemic. Some highlights were:

- Most cities and villages stated that their operations did not significantly change, though they did temporarily practice social distancing and most did require masks during meetings for a time. The County noted that the pandemic did open the door to greater sharing of resources and services.
- Multiple communities found that the practice of remote or virtual meetings to be useful, once the initial technological logistics were overcome. Some communities are continuing with this option and/or are even preferring it for some meetings. However, for some rural areas, poor or non-existent broadband connectivity was a barrier.
- Some communities initially struggled with determining who was an essential worker.
- More than one community mentioned how hard the pandemic was on older residents, nursing homes, and assisted living facilities, including staff and family members.
- There was some confusion among the public and mixed messages from the Federal government, contributing to some residents and entities not doing what they should have been doing. This also contributed to a deterioration of trust with public health officials and lower immunization rates.

The Center for Disease Control continues to monitor other communicable disease threats and issue related travel health notices. Mosquito-borne illnesses, such as Yellow Fever, Malaria, and the Zika virus are among the most common concerns over the past decade. **Zika virus** in particular has received increased attention due to the risk of severe birth defects and the potential to transmit the disease through sex. Mosquitoes carrying the Zika virus have been reported in a large portion of the world, including most of Mexico, Central America, South America, the Caribbean, and large parts of Africa and Southeast Asia. Cases of Zika spread by local mosquitoes were reported in Florida and Texas in 2015-2016, but there have been no reports of locally acquired Zika cases in the U.S. since 2017.

In 2018, the Eastern Democratic Republic of the Congo experienced an outbreak of **Ebola Virus Disease** (EVD), which is the second largest outbreak since the virus was discovered in 1976. According to the CDC, 3,470 cases were confirmed with a 66% fatality rate.¹² Additional cases were reported in the Congo Republic, Uganda, and Guinea in 2020-2022, but none since then. EVD is a rare, but often fatal, zoonotic disease that can be spread through contact with an infected fruit bat or nonhuman primate, but can also spread from person to person through direct contact with bodily fluids. There have been no reported Ebola cases in the United States since 2014. Diagnosing EVD is difficult since symptoms require 8-10 days on average to manifest. Currently, there is no approved vaccine or treatment for EVD.

¹² <https://www.cdc.gov/ebola/outbreaks/index.html>

In August 2024, the World Health Organization (WHO) declared a public health emergency of international concern due to an outbreak of **mpox**. Mpox (previously called monkeypox) is a viral, zoonotic disease that can cause scarring, blindness, and other infections, but rarely leads to death. An mpox vaccine is used to help prevent infection. Mpox was first detected in humans in 1970 and is endemic to parts of Africa. There was a worldwide outbreak of mpox in 2022 with 122 countries reporting nearly 100,000 cases and 207 deaths.¹³ The United States had the highest number of reported cases and death with 33,435 cases and 60 deaths. While mpox cases went down in 2023, a mpox variant is now surging in Africa; the Democratic Republic of Congo reporting more than 14,000 cases and 524 deaths since the start of 2024, which has triggered the WHO declaration.

There has been a confirmed case of measles reported in Wisconsin



Measles is so contagious that 9 out of 10 unvaccinated people near one contagious person will get the measles.

Protect yourself by making sure you are up to date on your measles vaccine!



**WISCONSIN DEPARTMENT
of HEALTH SERVICES**

**April 2024 Wisconsin Dept of Health Services
Facebook post**

Immunizations (or vaccinations) for more common or preventable viruses and diseases, such as **Whooping Cough (Pertussis), Polio, Diphtheria, Measles, and Mumps**, have been in the news in recent years. Measles was nearly eliminated in the United States in 2000, but there has been 13 outbreaks and 188 cases during the first six months of 2024, including in Wisconsin.

Some members of the public choose to delay, skip, or reject vaccinations for themselves and/or their family. But avoiding vaccinations puts family members, friends, and the community at risk. From January-July 2019, over 1,150 individual cases of measles were confirmed in the United States, the greatest number since 1992 and since measles was declared eliminated in 2000. Most cases were among persons who were not vaccinated. According to the Wisconsin Environmental Public Health Tracking Program, 59% of two-year old residents in Polk County in 2021 were immunized, which is a slight increase

from 57.2% in 2013.¹⁴ These percentages are relatively low compared to many Wisconsin counties and below the 2021 statewide average of 68.9%.

Some Public Health offices in the region have also been seeing increased cases of **Tuberculosis (TB), Hepatitis B & C, and Sexually Transmitted Diseases (STDs)**; there is currently no vaccine for Hep C and many of the most common STDs.

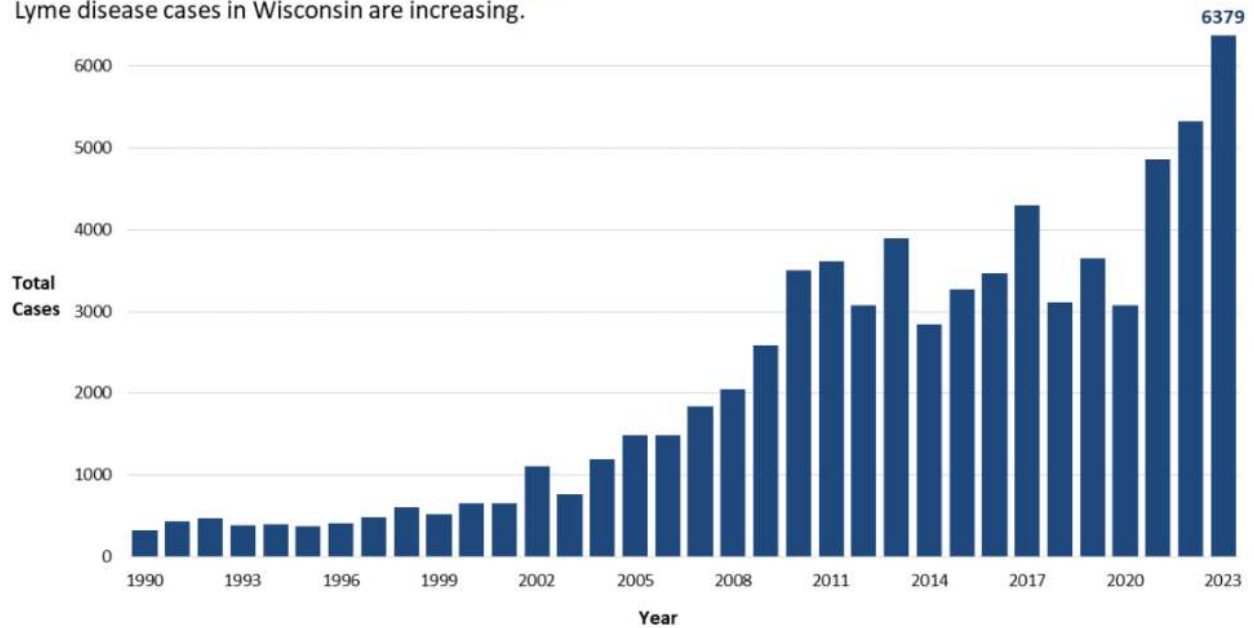
¹³ <https://www.cdc.gov/poxvirus/mpox/response/2022/index.html>

¹⁴ <https://dhsgis.wi.gov/DHS/EPHTracker/#/map>

Concerns related to **tick-borne diseases**, such as **Lyme (Borrelia)** and **Babesiosis**, were also mentioned a number of times during the planning process. Though Lyme disease is native to Wisconsin, the number of reported cases have increased dramatically over the past three decades, with over 6,300 cases reported in Wisconsin in 2023. In 2022, there were 85 cases reported for Polk County. It is believed that many cases of Lyme Disease are not reported. Ticks have been expanding their ranges northward and the EPA is using the rapid expansion of Lyme disease as a climate change indicator.

Lyme Disease (*B. burgdorferi*) Cases in Wisconsin

Lyme disease cases in Wisconsin are increasing.



Data Source: Wisconsin Department of Health Services

Polk County
Wisconsin Department of Health Services

April 7, 2022.

Help Prevent Tickborne Diseases

3 Common Diseases:

- Lyme
- Anaplasmosis
- Ehrlichiosis

Wear insect repellent

Wear appropriate clothing

Do daily checks

#FightTheBite

Tick Bite Prevention | Wisconsin Department of Health Services

Communicable Disease Prevention and Control

Within Polk County, the County Public Health Department has been the primary coordinating entity on communicable disease and pandemic flu, working in conjunction with many partners (e.g., County Emergency Management, NWW-HERC, area health care providers, State agencies). The following are some key points and activities:

- Polk County Public Health maintains a Public Health Emergency Preparedness Plan (PHEPP) specific to the County, which covers 15 public health preparedness capabilities:

Public health preparedness capabilities. CDC identified the following 15 public health preparedness capabilities (shown in their corresponding domains) as the basis for state and local public health preparedness:

Biosurveillance

- Public Health Laboratory Testing
- Public Health Surveillance and Epidemiological Investigation

Community Resilience

- Community Preparedness
- Community Recovery

Countermeasures and Mitigation

- Medical Countermeasure Dispensing
- Medical Materiel Management and Distribution
- Non-Pharmaceutical Interventions
- Responder Safety and Health

Incident Management

- Emergency Operations Coordination

Information Management

- Emergency Public Information and Warning
- Information Sharing

Surge Management

- Fatality Management
- Mass Care
- Medical Surge
- Volunteer Management

- The PHEPP serves as a core resource among local health departments and is a focal point within the NWW-HERC, which can provide mutual aid if needed. The PHEPP includes situational-specific components (e.g., Mass Clinic Plan, Pandemic Flu Plan) as well as general education, monitoring, and response procedures under an “all hazards approach” not specific to pandemic flu or other specific threat. Review and update of these sub-plans is a continuing process. COVID-19 demonstrated that it is important that the PHEPP be flexible to accommodate different challenges and opportunities. The PHEPP is periodically tested, in cooperation with partners, through drills and exercises. There is a high degree of necessary coordination between the County’s Emergency Operations Plan maintained by Emergency Management and the PHEPP. County Public Health has been restructuring the PHEPP based on NWW-HERC’s updated template.
- The PHEP includes an educational component with emphasis on prevention and control (e.g., recognizing symptoms, vaccinations, and personal preparedness).
- The PHEP also includes an At-Risk Populations component, including exploring strategies related to identifying and locating persons who are at greater risk during times of emergencies. At-risk populations include seniors and any person with a disability, especially when living alone without a caregiver. Emergency contacts are obtained by County Public Health during client intake and Public Health will often check-on at risk clients during or following an emergency or disaster event, such as during extreme heat. Migrant populations within the County has been slowly increasing and language can be a barrier as many are native Spanish speakers. It was noted that migrant workers are crucial employees for the local agriculture sector (e.g., dairy farms, poultry farms, vegetables/Seneca Foods in Cumberland).

- County and local agencies and health care facilities have a very strong partnership as reflected by periodic meetings to review and/or develop public health preparedness plans. These partners continue to share information, plans, resources, and policies. Many key staff and partners have ICS/NIMS training and are informed of emerging trends. County Public Health and ADRC staff have also proactively contacted and offered support to home health care operators receiving Medicare or Medicaid funding in their efforts to meet Federal emergency preparedness requirements.
- Public Health has a good volunteer pool and recently activated a volunteer reception center, which worked well albeit with low participation. Strengthening partnerships with other organizations continues to be a goal. However, some volunteer organizations active in disasters (VOADs) and other partners, including some local fire and EMS departments, are struggling to attract volunteers.
- Recent tornados, high wind, and flash flooding events in the region have increased awareness of the post-disaster impacts among communities and responders. County Public Health advocates for the inclusion of mental health support as part of disaster recovery plans.
- Public panic could ensue should a public health emergency occur, such as a pandemic flu outbreak. Getting the word out quickly and providing accurate information from a trusted source is critical. Security and related enforcement could become a major issue at pharmaceutical distribution sites, area hospitals, and at other such locations.
- As a rural county, transportation and access to medical and hospital care is a challenge for some residents. The pandemic further showed that there is a significant shortage of health care workers, such as CNAs and nursing home workers. This need will only increase as the County's population ages.
- In addition to monitoring and preparing for communicable diseases, Polk County Public Health continues to work cooperatively with County Emergency Management on general public emergency and disaster preparedness education and can be a vital partner during any such educational initiatives recommended in this Mitigation Plan update. County Public Health resources and additional educational materials are available at their webpage and at their offices.

ii. Invasive Species

Most invasive species are spread due to the introduction and actions of humans, and this threat is growing. Invasive species disrupt natural communities and ecological processes. They can destroy habitat, drive out/kill native species, and be vectors for the introduction of diseases. Over 40 percent of the species on the Federal Threatened or Endangered species lists are at risk primarily because of invasive species. Many invasives lack a native predator, which allows them to aggressively invade, spread, and dominate natural areas and waterways. And some invasives can cause health problems, such as Wild Parsnip that burns skin or animal species that spread disease.

Historically, Aquatic Invasive Species (AIS) have received the greatest attention in Polk County due to the many lakes. Various AIS have been documented in the waters the County, including Chinese Mystery Snail, Curly-Leaf Pondweed, Eurasian Water-Milfoil, Purple Loosestrife, Zebra Mussel, and Rusty Crayfish.

There is growing attention in the region to the terrestrial invasive species threats. Buckthorn is very serious threat to the forests of Polk County due to its ability to outcompete native tree growth and form large, dense thickets with little habitat, recreational, or timber value. Japanese Knotweed is another growth threat; its roots have the ability to damage pavement and penetrate building foundations. Wild Parsnip has become widespread along highway corridors, choking out native plants and having the potential to cause serious burns/boils to exposed skin. These are just three of a growing list of such threats, which also includes: Exotic Bush Honeysuckle, Spotted Knapweed, Oriental Bittersweet, Leafy Spurge, Purple Loosestrife, Wild Chervil, and Garlic Mustard.


Polk County Land & Water Resources has been very active to help mitigate the impacts and spread of invasives, such as:

- Invasives are addressed as part of the Polk County Land & Water Resources Management Plan.
- Educational web pages, including an Aquatic Invasives Species Story Map
- Maintaining invasive species maps and tracking location information
- Receipt of grant funding for projects and offering technical assistance to landowners for control
- Providing training and support to lake groups and shoreland owners to pursue and implement Clean Boats, Clean Waters projects



Polk County is also a member of the St. Croix-Red Cedar Cooperative Weed Management Area (CWMA) which is dedicated to fostering multi-generational awareness of invasive species and using partnerships to prevent and limit the intrusive impacts of those species. The CWMA implements programs guided by their Strategic Management Plan and offers Invasive Species Equipment Trailer for rent to manage invasive species.

There are many public and non-profit partners collaborating to address these threats and according to the Wisconsin Sea Grant Program, over \$5 million is spent annually in Wisconsin on AIS management alone. The WDNR requires that any person seeking to bring a non-native fish or wild animal for introduction into Wisconsin obtain a permit. Local communities can help combat exotic plant species by educating residents about non-native species, encouraging residents to use native plants in landscaping, discouraging the transport of firewood from outside the area, and reporting such species like Purple Loosestrife or Buckthorn to the WDNR.

A story map  Polk County Wisconsin

Aquatic Invasive Species in Polk County


Curly leaf pondweed

Curly leaf pondweed is a submerged aquatic invasive plant. The leaves of curly leaf pondweed are easily distinguished by their rounded tip, prominent mid-vein, finely toothed edges, and wavy or crimped [appearance](#).

Curly leaf pondweed is found in a wide variety of habitats, although it prefers alkaline and high nutrient waterbodies and typically grows in less than 3 meters of water.

In late fall and early winter, curly leaf pondweed sprouts from rhizomes and [turions](#) (overwintering buds) allowing the plant to outcompete native species through rapid spring growth. Curly leaf pondweed can form large, dense [mats](#) on the surface of waterbodies inhibiting the light necessary for native plant growth and interfering with navigation and recreational activities such as fishing, boating, and swimming.

Curly leaf pondweed was first discovered in Polk County in the Apple River Flowage in 1977 and is currently documented in 72 [waterbodies](#).



iii. Nuclear Power Plant Accident

A nuclear accident (or radiological hazard) is the uncontrolled release of a radioactive material from a fixed nuclear facility that can harm people or damage the environment.

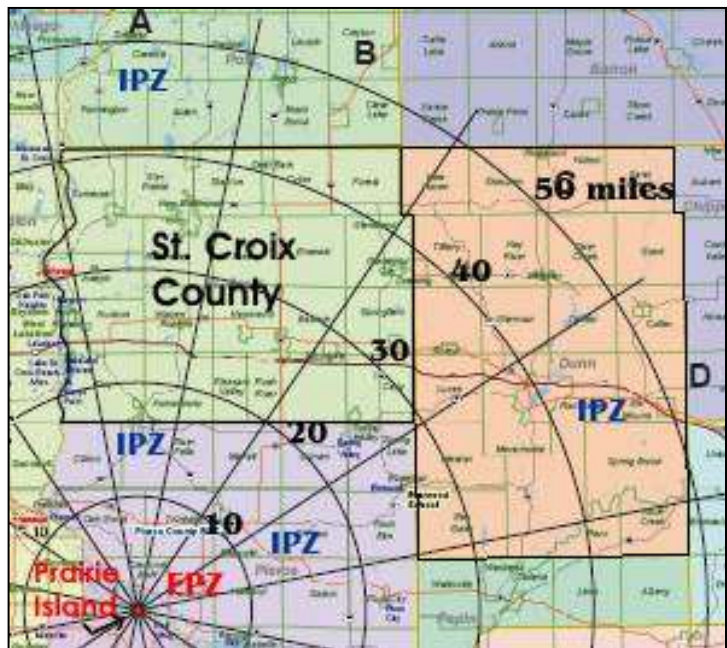
Polk County has no fixed nuclear power generating or nuclear-related storage facilities within its boundaries. There is no known regular transport of nuclear materials or waste through the County.

However, the southern portion of Polk County is within the Ingestion Pathway Zone (IPZ) for the Prairie Island Nuclear Generating Plant near Red Wing, MN (see **Figure 19**). The *Ingestion Pathway Zone* (IPZ) (or *ingestion exposure pathway*) is the potential pathway of radioactive materials to the public through consumption of radiologically contaminated water, food crops, or dairy products. This is also known as the area within a 50-mile radius of a nuclear power plant in which people may be indirectly exposed to radiation by eating or drinking contaminated food, milk and water.

Should an accidental release occur, direct radiation exposure or inhalation for persons in Polk County is very unlikely; such exposure would largely be limited to a 10-mile radius of the facility under most, if not all, circumstances. The primary and most likely vulnerability would be the transport of radioactively contaminated crops or dairy products from areas closer to the facility to processing facilities within the IPZ.



Figure 19. Prairie Island Nuclear Generating Facility EPZ & IPZ



base map from State of Minnesota – Division of Homeland Security and Emergency Management

A much less likely scenario is for the airborne contamination of soils and vegetation in Polk County, if weather and other conditions allow. Under such circumstances, a general health advisory could be issued regarding food preparation practices or, in a worse case, a temporary agricultural hold may be placed on producers and/or processors of certain agricultural and/or food products.

If an event should occur, even if it is a site emergency not anticipated to directly impact Polk County, misinformation and panic could ensue among the general public. In such a case, Polk County may experience an influx of relocated residents from areas closer

to the facility (e.g., St. Croix County) as well as the regional economic repercussions, especially to the agricultural sector.

A release of radiological materials from a nuclear power plant has never occurred in Wisconsin or the region. The Plant is highly regulated and is designed with a series of barriers and safety systems and Polk County Emergency Management continues to participate in related emergency planning and exercises. As shown in the previous Hazard Probability & Vulnerability Survey results (Table 11), the steering committee believes that nuclear accident has the lowest probability of any of the listed threats with a very limited vulnerability (impact) for Polk County should an accident occur.

As an IPZ county, Polk County Emergency Management participates in required exercises conducted for a possible nuclear accident at Prairie Island. County Public Health may benefit from periodically participating in exercises or related training to gain insights into likely implicants and how testing from fallout will be performed.

C. CLIMATE CHANGE AND NATURAL HAZARD RISK

Projecting future hazard risks and vulnerabilities is subject to the influence of possible large-scale, longer-term climatic changes.

How the Region's Climate is Changing

There is ongoing debate over the existence, causes, severity, and impacts of global climatic changes, such as global warming. According to the U.S. Environmental Protection Agency:

“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 new and stronger evidence that most of the warming over the last 50 years is attributable to human activities.... Rising global temperatures are expected to raise sea level, and change precipitation and other local climate conditions. 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.”¹⁵

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, and by 2100 the summer climate will generally resemble that of current-day Arkansas, and the winter will feel much like current-day Iowa. And a University of Maryland model suggests that by 2080, the climate of St. Croix Falls will be similar to that of Kiowa, Kansas today.¹⁶

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. The following are key takeaways from the WICCI 2021 Assessment Report:

- Wisconsin's average daily temperature has become three degrees Fahrenheit warmer since the 1950's.
- The last two decades have been the warmest on record, and the past decade has been the wettest.
- Wisconsin has become wetter – average precipitation has increased 17 percent (about 5 inches) since 1950.
- Warming is happening fastest in the winter and at night.
- Southern Wisconsin has experienced the highest increase in precipitation.
- Very extreme precipitation events will increase in the future.

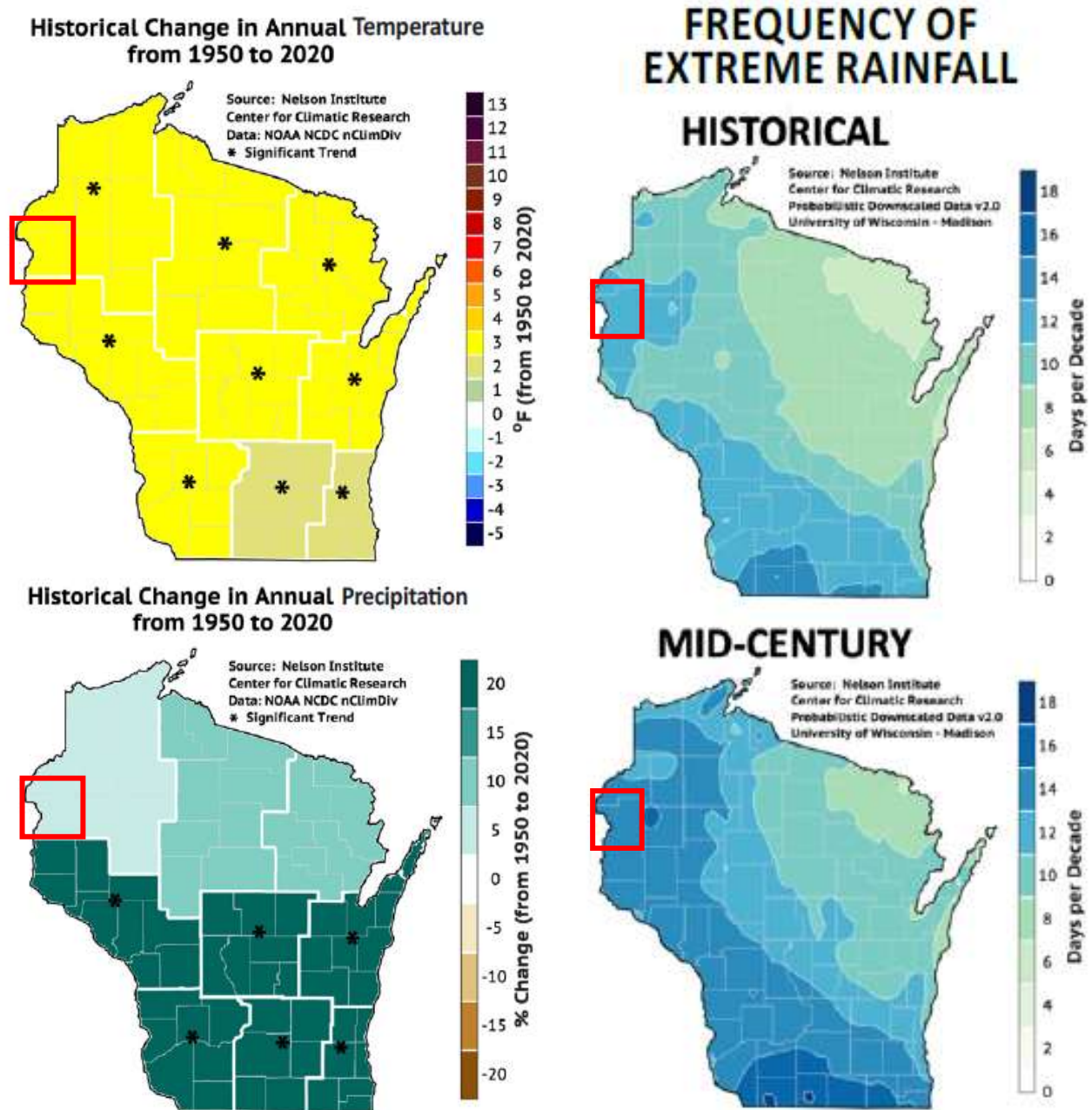
¹⁵ U.S. Environmental Protection Agency. <http://yosemite.epa.gov/oar/globalwarming.nsf/content/impacts.html>

¹⁶ <https://www.umces.edu/futureurbanclimates>

- Extreme events are already causing immense impacts across Wisconsin, and the frequency of those events will generally increase.

These findings are consistent with data for Polk County. Figure 21 below includes maps from the 2021 Assessment Report indicating State climate trends for the area with Polk County outlined. Temperatures and annual precipitation have increased at a rate slightly lower than the State average. The County should anticipate increased extreme precipitation events annually, as well as greater severity within individual events.

Figure 21. Selected Maps from the 2021 WICCI Report



Potential Climate Change Impacts on Natural Hazard Risk

The following summarizes the primary, potential impacts of climate change for those natural hazards of significant risk to Polk County.

Tornados, Thunderstorms, and High Winds

The link between climate change and tornadoes, high winds, and thunderstorms is unclear. While extreme storm events are increasing, scientists are uncertain what role climate change has, if any.¹⁷ However, warmer temperatures will increase the number of weeks that Polk County experiences severe thunderstorms and tornadoes. And during the 2024 plan update process, some local officials expressed concern with a perceived increase in the frequency of high wind events over the past decade. The County needs to be prepared for an increase in tornados, severe thunderstorms, and episodes of high winds that are associated with strong storms.

Flooding

From 1958-2012, extreme rainfall events increased 37% in the Midwest.¹⁸ The WICCI report projects that the frequency of extreme rainfall events (2+” within 24 hours) will increase from about 10 per decade to 16-18 per decade. The report details that Polk County is already experiencing an increase in 100-year rainfall events, with such events ranging from 6” to 6.25” in magnitude. Increased precipitation and heavy precipitation events is resulting in more flooding. Extreme rainfall events in particular have the potential to increase overland (stormwater) and flash flooding with severe consequences (e.g., road/culvert/bridge washouts, building damages, bank erosion, habitat destruction) if infrastructure is not able to manage such increased flows. The majority of existing flood mapping is becoming incorrect and, in some cases, unusable, due to the increase in the number of floods and the increase in the severity of floods. An increase in flooding will not only impact the built environment, but it will also impact the natural environment. Riparian areas will be more vulnerable to damage with increases of flooding intensity. In addition, more opportunities will exist for debris to enter water bodies. This is consistent with the comments of many local officials during the plan update process, who felt that there has been an increase in heavy rainfall events, which has been contributing to localized flash or stormwater flooding.

Winter Storms, Ice Storms, and Extreme Cold

Per the WICCI report, winter precipitation has increased more than 20% and winter nights have been 7° F warmer in Polk County since 1950, and these trends are projected to continue. By 2050, Polk County will experience 10% more winter and spring precipitation. More precipitation during the winter months increases the potential for heavy snow and ice storms and possibly flooding due to a large snow melt. Since winters may be warmer overall, ice storms could be a greater concern. Some scientists suggest that climate change may contribute to an increase in extreme temperature events (both hot and cold).¹⁹ However, the WICCI report suggests that extreme cold reports should decrease

¹⁷ <http://blogs.ei.columbia.edu/2016/12/01/increasing-tornado-outbreaks-is-climate-change-responsible/>

¹⁸ <https://nca2014.globalchange.gov/highlights/regions/midwest#statement-16934>

¹⁹ <https://www.climaterealityproject.org/blog/perfect-storm-extreme-winter-weather-bitter-cold-and-climate-change>

in frequency. Such changes in climate could have some positive natural hazard impacts. For instance, the winter season would be shorter overall with fewer days of sub-freezing temperatures. But other problems may also be exacerbated, such as plant and animal diseases and infestations, Lyme’s disease, air quality changes, change/impact natural habitats, and impacts to water quantity. During the 2024 Plan update, the plan update steering committee discussed the potential for increased ice storm events with high winds, which exacerbates the potential for power loss during periods of low temperatures or extreme cold. The need for warming shelters with emergency power received significantly greater attention during this Plan update.

Extreme Heat

The number of extreme heat event days is projected to continue to increase. By 2050, the WICCI report projects that the number of extreme heat days in Polk County will grow from about 15 to 25 per year. An increase in extreme heat occurrences and higher summer temperatures will have a significant impact on the elderly and other vulnerable populations. The majority of deaths and emergency room visits during heat waves are from persons over 65 years old. As Polk County continues to experience warmer temperatures and the number of individuals over 65 years old continues to increase, additional attention may be needed to address extreme heat and vulnerable populations.

High temperatures will result in increased evapotranspiration and longer growing seasons. Over time, these trends have the potential to impact surface and groundwater as well as increase the risks of drought and wildfire. In addition, hotter temperatures and longer extreme heat episodes will increase stress on public infrastructure like road surfaces. During the 2024 Plan update, there was growing concern over recent increases in extreme heat events, which contributed to greater attention regarding the need for designated cooling shelters with emergency power.

Drought, Wildfire, and Forest Resilience

Projecting the impact of climate change on drought and wildfire is complicated. While precipitation is projected to increase, this will be offset by higher evapotranspiration and longer growing seasons. When and how this precipitation occurs is also important. Heavy rainfall events and fast snow melts can result in increased runoff and less soil infiltration, especially if the ground is frozen. Climate impacts on other aspects of weather can also influence wildfire potential and forest health. For example, the 2019 straight-line winds toppled thousands of acres of trees, which is now a source of fuel for wildfire.

Human Health

According to the Wisconsin Department of Health Services—Climate & Health Program²⁰, it is also important that we keep in mind the potential impacts of climate change on human health as summarized by the graphic to the right and list below:

- **flooding risks** – stress & mental health disorders, flood-related food and waterborne illnesses, injuries, and drowning.

²⁰ <https://www.dhs.wisconsin.gov/climate/index.htm>

- **extreme heat risks** – increased loss of life, especially among elderly and socially isolated individuals, air quality degradation and increases in pollen resulting in respiratory distress and allergic reactions
- **drought risks** – reduced drinking water, food insecurity, and respiratory distress from dust, pollen, and airborne particulates
- **winter weather risks** – traffic accidents, injuries, and deaths, power loss that place chronically ill patients on medical devices at higher risk
- **disease vectors** – a wetter, warmer climate could be more favorable to mosquito- and tick-borne diseases (e.g., West Nile, Lyme)
- **surface water risks** – see flooding risks, contamination of water supplies, toxic algae blooms
- **groundwater risks** – reduced availability, contamination of water supplies

CONNECTING CLIMATE TO HEALTH OUTCOMES



Everyone reacts differently to a disaster. The stress and losses from any disaster can cause serious mental or emotional distress not only to those living through the event, but also emergency responders and those from other supporting agencies. These individuals may develop or experience exacerbation of existing mental health or substance use problems, including for example, post-traumatic stress disorder. It is important that local disaster recovery integrate public health principals, including providing mental health support and treatment when needed.

Climate Adaptation as a Natural Hazard Mitigation Strategy

These climatic changes can have serious natural hazard implications. Most of our existing best practices and infrastructure are based on historic events and do not fully accommodate these climatic trends. Below are examples of what some other communities are doing to address climatic trends, and will be considered as Polk County and other participating jurisdictions identify and prioritize their mitigation strategy recommendations. Many of these adaptation strategies are not new mitigation tools (e.g., safe rooms, burying power lines, cooling shelters), but with climate change there may be an increasing need to expand the use of these tools and best practices. Some of these strategies may be more applicable to urban areas and not the rural, less developed areas of Polk County.

Tornados, Thunderstorms, and High Winds

- Construct community safe rooms in developments that do not have basements.
- Work with electric utilities to make sure that powerlines do not have the ability to be impacted by fallen trees and branches through selective cutting/trimming, burying power lines.
- Make sure that electrical grids are resilient to power loss.
- Invest in generators for backup power, specifically at critical facilities (e.g., city buildings/facilities, hospitals, nursing homes).

Flooding

- Map areas where flooding is predicted to happen in the future and use those maps for land use decisions.
- Create outreach programs to educate the public on the need for flood insurance.
- Implement land-use policies that prohibit building in areas that are predicted to be susceptible to future flooding, including beyond the current 100-year floodplain.
- Acquire property that is in future flood prone areas.
- Reevaluate all water-related infrastructure (e.g., bridges, levees, dams, culverts, stormwater system) for structural integrity.
- Promote nature-based solutions and low impact development policies to reduce stormwater runoff and encourage flood/stormwater storage. Incorporate permeable surfaces in new and existing development, including pavement systems and green roofs. Encourage rain barrels, bioswales, and rain gardens. Install, preserve, and maintain wetlands, natural flood retention areas, and stormwater basins.
- Increase focus and effort on eliminating debris from entering the water bodies (e.g., increase street cleaning operations, expand promotion of Rain-To-Rivers programming, provide community lawn waste pickup).
- Complete riparian/stream restoration plans and projects.

Winter Storms, Ice Storms, and Extreme Cold

- Research best management practices to deal with the potential increasing frequency of ice storms.
- Designate community warming shelters with emergency power.
- Implement smart salting/sanding best management practices.

Extreme Heat

- Create programs to check on and communicate with vulnerable populations during extreme heat occurrences.
- Start a public outreach program to educate the public how to deal with extreme heat
- Designate community cooling shelters with emergency power.
- Implement smart-grid technologies that allow electric providers to access real-time data during high electric use times.

- Incorporate energy conservation techniques (e.g., technology, urban form, landscape, trees) to help reduce energy use.
- Implement repaving strategies (e.g., material, color) that reduce heat-related damage to streets.
- Shade asphalt and tops of buildings to reduce the urban heat island effect, which is most apparent in larger urban areas.
- Incorporate policy that reduces street pavement widths.

Drought, Wildfire, and Water Conservation

- Implement good forest and soil health best management practices and drought-tolerant plant varieties or types of crops that help offset some impacts from climate change.
- Encourage rural and urban water conservation.
- Promote integrated water management by planning water use in a manner that: (i.) considers natural systems (e.g., watersheds, the entire water cycle) as well as site-specific vulnerabilities; (ii.) are based on long-term projections of supply and demand that reflect recent trends; and (iii.) by tying water use, management, and related policy to land use and economic growth forecasts.
- Incorporate new best management practices for forested areas and developed lots in close proximity to areas that will be susceptible to wildfires in the future. This includes forest management practices to eliminate dead bio-fuel that adds to the intensity of wildfires, eliminate vegetation that will succumb to invasive insects, and increase wildfire buffer areas for developed areas.
- Create a comprehensive tree inventory in urban areas and public forests and parks to identify trees that are vulnerable to invasive insects. Increase awareness of forest and tree best management practices and encourage plantings that are native, diverse, and resilient.

Conclusion

Given the ongoing debate in the scientific community, this plan does not debate the causes of climate change within this document. Regardless of the cause, it is important that local officials and residents remain aware that the hazard trends presented in this report will mostly likely change in the future; and, in some cases, the frequency and magnitudes of disaster events will most likely intensify. Many of these changes will increase the chance of loss of life and damage to infrastructure. **Further, consideration of climate trends and impacts is receiving increased attention as part of Federal grant applications and can increase an application's competitiveness, including for FEMA mitigation grant funding.**

It is important that communities and residents keep informed on climate change research and use their best judgment as to the most appropriate action and response. The WICCI webpage www.wicci.wisc.edu (www.wicci.wisc.edu) includes suggestions on how communities may prepare for and adapt to such changes. The Wisconsin Department of Health Services has additional materials on the relationship between climate and health at their webpage, including a community engagement toolkit: <https://www.dhs.wisconsin.gov/climate/index.htm>
<https://www.dhs.wisconsin.gov/climate/index.htm>

D. RISK AND VULNERABILITY ASSESSMENT

This section is organized by those hazards identified previously as having the highest overall disaster threat to Polk County. For purposes of this plan, some hazards have been grouped due to the potential to occur as part of the same event/storm system or similar vulnerabilities/impacts, such as tornadoes & high winds, winter storms & extreme cold, flooding (all types) & dam failure. The assessment for each hazard is generally structured into the following sections, which are consistent with FEMA planning guidance, though there are some differences for the non-natural hazards:

- **Defining the Hazard** – Describes the hazard, including related definitions.
- **Hazard Location** – Describes the geographic extent or unique boundaries that may be affected by the hazard type. This may include or reference county, state, or other maps illustrating the geographic extent of any hazard areas. For most hazards in Section III.D., there is no geographic area uniquely at risk; most hazard events facing County residents often affect large areas, or are even county-wide, such as a drought, active shooter, cyber-attack, or an ice storm.
- **Hazard Extent (Potential Intensities)** – Identifies the range of anticipated intensities that can occur within Polk County (e.g., how “bad” can it get). This is often expressed through a relative scale based on the intensity of hazard (e.g., wind speed, hail size) and/or the hazard’s potential impacts (e.g., damage to property, potential for injury). A commonly accepted hazard extent or scientific scale is not available for all hazard types.

Event History –The organization of this section for non-natural hazards may differ.

- **National Climate Data Center Event Summary** – This is a summary table of the available NCDC data provided in **Appendix E** for certain natural hazards.
- **Significant Polk County (or Regional) Events** – Highlights any significant or notable events that are particularly important for assessing capabilities or exploring mitigation alternatives. There may be some redundancy with Appendix E for natural hazard events.

Hazard Probability – Discusses and, if possible, estimates the probability of the hazard occurring or reoccurring in the future. FEMA guidelines require that probability must consider the impacts of climate change.

Vulnerability Assessment – Summarizes the highest vulnerabilities identified in **Appendix F** for the hazard type, though the format of this section may vary significantly for some hazards.

- **Potential Loss Estimates** – When possible, potential loss estimates are quantified.
- **Other Factors Influencing Losses** – Briefly describes and considers other factors that may influence hazard probability and impacts, such as development trends and climate changes.

Risk for Individual Plan Participants – The event history, probability, vulnerability, capability, and mitigation strategies for each participating city, village, and public educational institution is included in **Appendices K & L**. This section summarizes any key or commonly shared findings from these two appendices for the other plan participants.

i. TORNADOES & HIGH WINDS

Tornadoes are typically linked with severe thunderstorm events. It is sometimes difficult to determine the difference between the impacts of a tornado versus very high winds. As such, the different components of thunderstorms have been split in to their associated sub-sections. This sub-section discusses both tornado related information and the effects of winds during thunderstorm events.

Defining the Hazard – Tornadoes & High Winds

Tornadoes are relatively short-lived local storms 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; however, some tornadoes may have winds exceeding 300 miles per hour.

For reference, the following are the National Weather Service definitions of a tornado, funnel cloud, high winds/ thunderstorm winds, and downbursts (straight-line winds):

Tornado – A violently rotating column of air that is touching the ground.

Funnel Cloud – A rapidly rotating column of air that does not touch the ground.

High winds or Thunderstorm Winds – Winds of 58 miles per hour or greater.

Downbursts (straight-line winds) – A downburst is a strong, violent downdraft, initiated by rapidly descending rain and/or rain-cooled air beneath a thunderstorm.

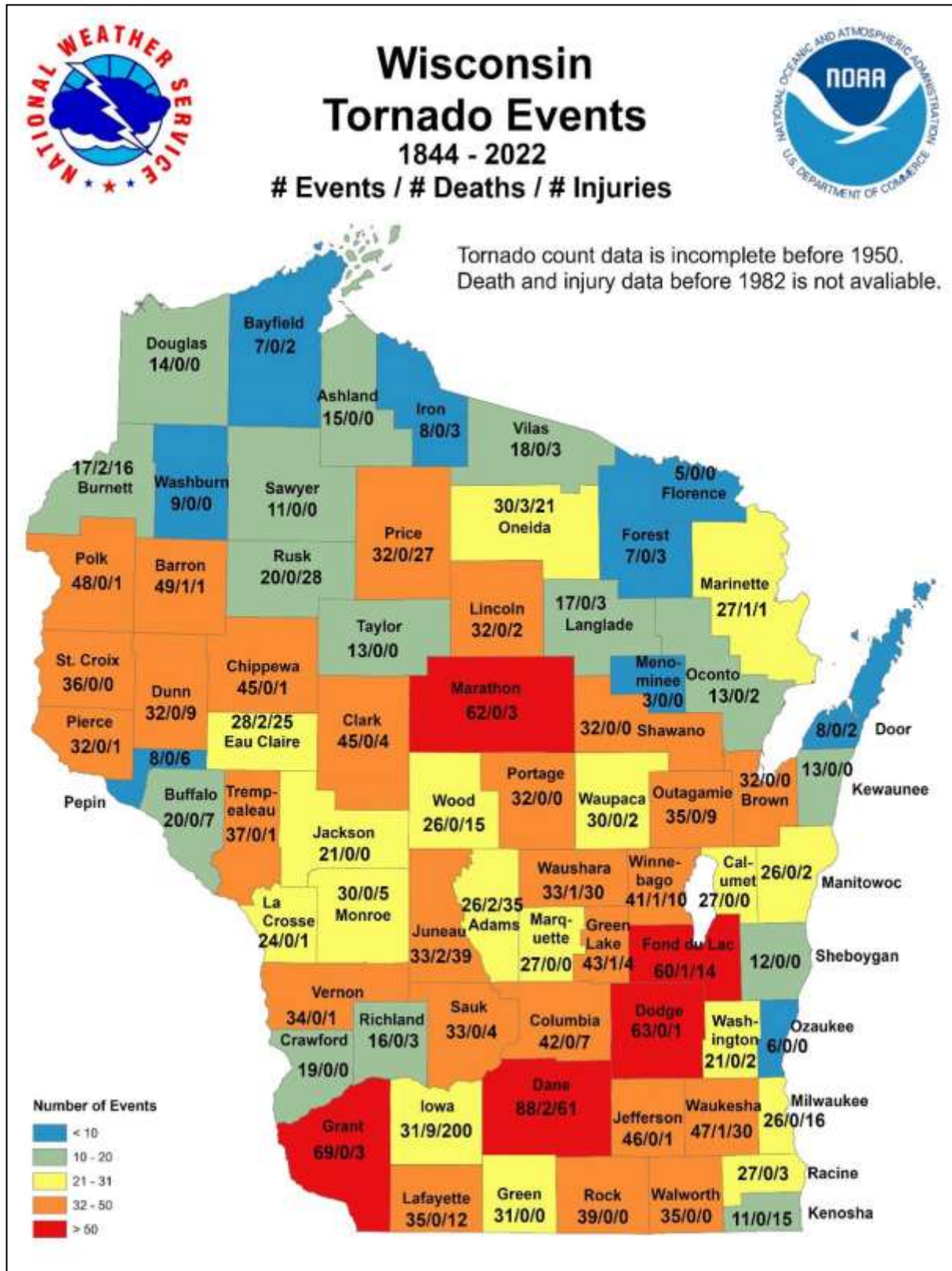
High winds can affect much larger areas than a tornado and occur for a longer period of time. More intense types of high winds are downbursts or straight-line winds. Straight-line winds are often responsible for most of the wind damage associated with a thunderstorm. These winds are often confused with tornadoes because of similar damage and wind speeds. However, the strong and gusty winds associated with straight-line winds blow roughly in a straight line unlike the rotating winds of a tornado.

Hazard Location

Tornadoes and high winds are capable of killing or injuring residents and damaging or destroying homes, businesses, public buildings, and infrastructure throughout Polk County. There are no geographic boundaries or locations within Polk County uniquely affected by tornadoes or high wind events. As shown in **Figure 20**, tornadoes and high winds occur throughout the State of Wisconsin. All Polk County jurisdictions are equally at risk of experiencing a tornado or high wind event.

Tornadoes and high winds can impact assets outside the area struck by the hazard. For example, these events can uproot trees and topple power lines, impacting the regional supply of electrical service to homes, businesses, and services. Roadways can also be blocked by debris, impacting regional transportation networks, and debris can accumulate in rivers or stormwater systems and contribute to washouts or flooding.

Figure 20. Wisconsin Tornado Events



Hazard Extent (Potential Intensities)

Tornadoes are generally associated with severe storm systems, which are often accompanied by high winds, hail, torrential rain, flooding, and intense lightning. High winds are discussed with tornadoes within this subsection given that high wind damage can be difficult to distinguish from tornado damage. It is not uncommon for local residents to debate whether the damage from an area storm event was the result of high, straight-line winds (as officially recorded) or a tornado. Further, tornado and thunderstorm/high wind events are very often part of the same storm cell.

Shown in **Table 12** is the Enhanced Fujita (EF) Scale, recognized as the accepted tornado magnitude measurement rating and is based on damage estimates for a 3-second wind gust. The EF scale replaced the original Fujita scale in 2006 and considers 28 different damage indicators for a more accurate indication of tornado strength.²¹ The new EF scale does have higher wind speed thresholds, and a larger percentage of reported tornadoes will likely fall within the EF0 category. The destructive power of the tornado results primarily from its high wind velocities and sudden changes in pressure. Wind and pressure differentials probably account for 90 percent of tornado-caused damage.

**Table 12. Tornado Magnitude Measurement
Enhanced Fujita (EF) Scale**

Operational EF-Scale	Wind Speed (miles per hour)	Character of Damage	Relative Frequency (percent)
EF0 (GALE)	65-85	Minor or No Damage	53.5
EF1 (WEAK)	86-110	Moderate Damage	31.6
EF2 (STRONG)	111-135	Considerable Damage	10.7
EF3 (SEVERE)	136-165	Severe Damage	3.4
EF4 (DEVASTATING)	166-200	Devastating damage	0.7
EF5 (INCREDIBLE)	Over 200	Extreme damage	<0.1

Source: National Oceanic Atmospheric Administration (NOAA)

The following types of damage could be expected for each EF-Scale tornado:

- EF0** Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees.
- EF1** Peels surface off roofs; mobile homes badly damaged or overturned; moving autos pushed off roads; attached garages may be destroyed.
- EF2** Roofs torn off well-constructed homes; mobile homes demolished; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
- EF3** Entire stories of well-constructed homes destroyed; trains overturned; trees debarked.
- EF4** Well-constructed houses leveled; cars thrown and large missiles generated.
- EF5** Strong frame houses lifted off foundations and carried considerable distances; automobile-sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.

²¹ None of the tornadoes recorded on or before January 31, 2007, will be re-categorized from F to EF.

Table 13 provides a straight-line wind gust estimating guide with definitions that is frequently used by SkyWarn Weather Spotters, which shows the range of potential intensities of such events.

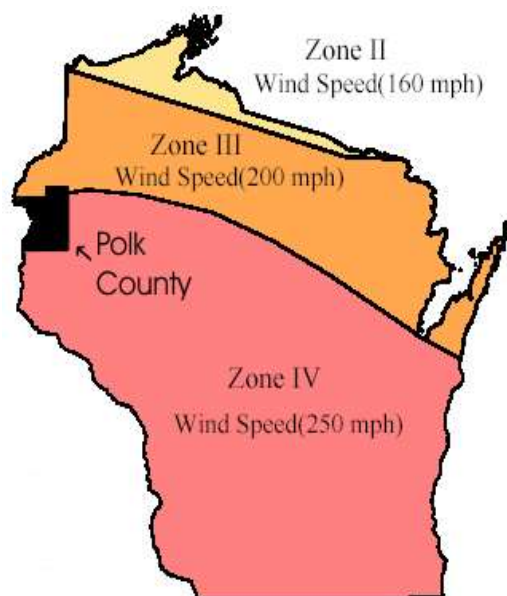
Table 13. Straight-Line Wind Gust Estimates

45-57 mph (39-49 kts)	Non Severe - Large trees bend; twigs, small limbs break, and a few larger dead or weak branches may break. Old/weak structures (e.g., sheds, barns) may sustain minor damage (roof, doors). Some loose shingles may be removed from houses.
58-75 mph (50-64 kts)	Severe - Large limbs break; shallow rooted trees pushed over. Semi-trucks overturned. More significant damage to old/weak structures. Shingles, awnings removed from houses; damage to chimneys and antennas; mobile homes, carports incur minor structural damage; large billboard signs may be toppled.
75-89 mph (65-77 kts)	Hurricane Force - Widespread tree damage (trees either broken or uprooted). Mobile homes may incur more significant structural damage; be pushed off foundations or overturned. Roofs may be partially peeled off industrial/commercial/warehouse buildings. Some minor roof damage to homes. Weak or open structures (e.g. farm buildings, airplane hangars) may be severely damaged.
90+ mph (78+ kts)	Significant Severe - Groves of trees flattened. Mobile homes severely damaged; moderate roof damage to homes. Roofs partially peeled off homes and buildings. Barns and sheds completely demolished.

The United States has been divided into four zones that geographically reflect the number and strength of extreme windstorms. Zone IV has experienced the most frequent and strongest tornado activity, with wind speeds of up to 250 mph, and includes most of Polk County (see **Figure 21**).

Wisconsin lies along the northern edge of the nation's maximum frequency belt for tornadoes (known as "tornado alley"), which extends northeastward from Oklahoma into Iowa and then across to Michigan and Ohio. Generally, the frequency and severity of tornado events decreases as one travels north, though EF5 tornados with 200+ mph winds could occur in Polk County.

Figure 21. Design Wind Speed Map of Wisconsin



adapted from "Design Wind Speed" map from FEMA's "Taking Shelter from the Storms: Building a Saferoom in Your House"

Event History – Tornadoes & High Winds

Regional tornado trends are summarized in **Appendix E**, which notes:

- Tornadoes can occur in any month of the year though they are more frequent in the months of April through September.
- Our region has experienced some of the most destructive tornadoes in state history including the 2001 F3 Siren tornado, 2002 F3 Ladysmith tornado, 1958 F5 Colfax tornado, and the 1899 F5 New Richmond tornado, which is the ninth deadliest in US history.

National Climate Data Center (NCDC) Event Summary

Appendix E also includes NCDC severe storm reports for tornadoes and high winds impacting Polk County. Tornadoes have been well documented since 1950, allowing for the review of a larger time horizon (73 years). Since high winds and thunderstorm winds have only been tracked regularly since 1993, the table below represents a shorter time horizon. All other hazards, other than tornadoes will only represent data from January 1993 to December of 2022.

Tornado Events Summary <i>(1/1/1950 to 12/31/2022)</i>	
Total Events: 41	Number of Events Per Year: 0.57 (0.66/year from 1993-2022)
Total Event Days: 34	Number of Event Days Per Year: 0.47
Total Injuries: 41	Total Deaths: 1 <i>(majority of injuries & death from 5/16/17 event)</i>
Total Event Days with Property Damage: 9	
Property Damage (from NCDC): \$12.395M <i>(\$10.1 mil. from the 5/16/17 event)</i>	
Property Damage (adjusted for inflation): \$16,143,982	
Funnel Cloud Reports: 12 reports on 8 event days between 1995-2020	

Note: Tornadoes were reported less consistently prior to 1993. Since 1993, there were 19 tornado reports on 17 event days for an average of 0.66 events per year.

High Wind & Thunderstorm Wind Events Summary <i>(1/1/1993 to 12/31/2022)</i>	
Total Events: 126	Number of Events Per Year: 4.2
Total Event Days: 69	Number of Event Days Per Year: 2.3
Total Injuries: 9 <i>(8 of which occurred in a single event)</i>	Total Deaths: 0
Total Event Days with Property Damage: 13	
Property Damage (from NCDC): \$4.51 Million	
Property Damage (adjusted for inflation): \$6,656,479.52	

Reporting for recent events to the NCDC can lag behind and some of the reports may not be complete. More recent, significant events are discussed in the next subsection.

Significant Polk County Events



NWS-Duluth

Siren, WI - June 2001 Tornado

The potential destructiveness of tornadoes remains fairly fresh in the minds of many Polk County residents due to two fairly recent and substantial tornado events in the region. On June 18, 2001, an F3 tornado with a 27-mile path hit the Village of Siren approximately five miles to the north, resulting in three deaths, 16 injuries, 167 destroyed homes, and 280 damaged homes. More recently, about 50 miles east of Polk County, an F3 tornado hit the City of Ladysmith on September 2, 2002, injuring 37 and resulting in over \$20 million in damage. Many long-time residents of the region also recall the devastating Colfax Tornado of 1958 which had a 32-mile path, caused at least 19 deaths, and resulted in severe damage.

However, such events were mentioned much less frequently during the update of this plan compared to similar planning efforts in the region in 2005, demonstrating that past events can quickly fade from memory.

Fewer Polk County residents are likely aware that the deadliest tornado in Wisconsin history (and 9th deadliest in U.S. history) occurred about five miles south of the county line. On June 12, 1899, a strong storm with heavy rain and hail hit the City of New Richmond in St. Croix County. Hundreds of visitors were in town that day for the circus which ended around 4:30 pm, just when the storm began. A powerful tornado struck close to 6 pm. Passing through the very center of town, the tornado leveled buildings and sent debris flying. Half of the city was destroyed and 117 people were killed. This tornado originated on Lake St. Croix, about five miles south of Hudson. The tornado moved to the northeast, east of Hudson, in the direction of New Richmond, leveling farms near Burkhardt and Boardman. Over 300 buildings were damaged or



Ruins of the New Richmond Methodist Church,

Over 300 buildings were damaged or

destroyed. The great visibility of the tornado may have prevented an even higher death total. While not a massive tornado, the combination of time and position was unfortunate.

JUNE 11, 2001 HIGH WINDS

This thunderstorm caused damage in a path from the west-central portion of the County to the southeast corner. High winds caused the majority of the storm damage. Total reported damages were approximately \$1.5 million (adjusted for 2023 dollars).

SEPTEMBER 12, 2005 HIGH WINDS

During this event, straight-line winds estimated at 85 MPH struck the Amery area. Minor damage was reported for numerous structures while major damage was reported for one home and twelve businesses. Seven additional business structures in Amery were destroyed. A nearby feed mill and warehouse owned by the local farmers co-op was also destroyed. Moderate damage was also reported to the airport hangars and many trees in the area were severely damaged. State Highway 46 was temporarily closed due to debris. With over \$6.3 million in property damage, this was the most costly high-wind event on record in the NCDC database.

MAY 16, 2017 TORNADO

On the afternoon of May 16th, severe thunderstorms developed along a warm-front in southern Minnesota. During the late-afternoon and evening, storms continued to progress eastward and develop over northwestern Wisconsin. One supercell spawned the tornado over southeastern Polk County about 5 miles south of Clayton near the Polk-Barron county line. The tornado then tracked mostly east-northeast across southern Barron before moving into Rusk County and eventually Price County. In all, the tornado track was 83 miles, making this the longest single tornado track in Wisconsin since records began being kept in 1950. There were also numerous reports of very large hail associated with this storm, up to 3 inches in diameter, which occurred in a long swath from the southwest near Amery (Polk County) to near Cameron (Barron County).

In neighboring Barron County, the tornado hit numerous farmsteads, devastating barns and other outbuildings. The hardest hit area in Barron County was located between Chetek and Cameron, where the high-end EF3 damage was found with estimated 140 mph winds. The tornado touched down in this area just after 5:30 PM and demolished several homes in the Prairie Lake Estates Mobile Home Park; this is where the one fatality and at least 25 of the injuries occurred. After that, several turkey barns were leveled, and then multiple homes were hit hard near Prairie Lake, especially those on the eastern shore. Damages in Barron County included:



- 160 residential homes were affected. 75 had minor damage, 45 had major damage, and 40 were destroyed. Total estimated home damage was \$5.1 million.

- 6 businesses were affected. Of those, 2 had minor damage and 4 were destroyed. This included six barns at a Jennie-O turkey farm (approximately 25,000 birds were lost) and damages to recreational/resort properties. The storm also damaged additional outbuildings on farmsteads. The total estimated damage to businesses was \$5 million.

The devastation, limited access, number of responders, and darkness all contributed to significant initial challenges at the mobile home park for providing services to survivors, coordinating response efforts, and centralizing command. The event also prompted a very a very strong response from the public of donations and volunteers, which was very beneficial and appreciated, but not without its own challenges.

JULY 19, 2019 TORNADO & STRAIGHT-LINE WINDS

In July 2019, a 490-mile long derecho caused widespread regional damage in Minnesota, Wisconsin, and Michigan. Many outbuildings were destroyed, and roofs damaged by wind and large hail. The storm spawned an F1 tornado which broke, uprooted, and downed thousands of trees and caused widespread power loss along its 14-mile path in eastern Polk and western Barron counties generally north of Highway 8. A smaller F0 tornado also touched down in the area. As a result of this event, thousands of customers lost power throughout the two counties. Many customers did not have power

for 2-3 days, while it took 6-7 days to restore power to everyone. In Turtle Lake, the school opened its doors to provide a place for area residents to shower. In addition to causing widespread power loss, many homes, buildings, and vehicles were damaged by the falling trees. During the event, Polk County activated a volunteer reception center that worked well, but participation was low. Polk-Burnett Electric Cooperative noted that local hotel space for mutual aid electric crews was difficult to find, in part since some families had also temporarily been displaced from their homes due to lack of power.



Both Barron and Polk counties were among a number of Wisconsin counties for which a Federal Disaster Declaration (FEMA-4459-DR) was declared as a result of this event. Polk County, the Polk-Burnett Electric Cooperative, Village of Clayton, Village of Luck, and the following towns received FEMA funding due to storm damage: Apple River, Balsam Lake, Beaver, Bone Lake, Clayton, Georgetown, Johnstown, Luck, and Milltown. Surprisingly, the NCDC database includes no damages for this event, but total losses and clean-up costs, especially if forest crop is considered, may have exceeded the damages from the 2005 high wind event.

SPRING 2024 TORNADO & HIGH WIND EVENTS

It was previously noted that records for recent hazard events are often incomplete in the NCDC database since it requires time for reporting of events and impacts. As of September 2024, the NCDC database since 2022 included an additional 7 strong/thunderstorm wind event reports on four dates with only \$5,000 in damages and no injuries or deaths; no tornados were reported.

The most significant Polk County event since 2022 is not yet included in the NCDC database. On the evening of June 18, 2024, a 5-mile long, EF1 tornado accompanied by high winds and heavy rains struck southwestern Polk County. The tornado's maximum winds were estimated at about 90 mph and its path was about 5 miles in length from east of Dresser (Trollhaugen area) to south of Centuria north of Highway 8. High wind/downburst damage also occurred in the larger area. One home was destroyed with damage to several other homes, farms, and outbuildings. Hundreds of trees were uprooted. Heavy rains also caused localized flash flooding, including several culvert washouts in Clam Falls and the Cascade Falls landslide/washout in Osceola; both applied for State disaster funding.



Photo from: Polk County Emergency Management

Hazard Probability – Tornadoes & High Winds

The Plan Steering Committee rated tornadoes and high winds as being a moderate threat to Polk County, but less of a threat when compared to Extreme Cold and Heavy Snow Storms (see Table 11). Tornadoes were rated as the highest natural hazard vulnerability (potential impacts) should an event occur, while high winds had a slightly lower vulnerability. **Based on tornado events since 1993, it is probable that a tornado will continue to touch down and be reported for Polk County once every 1 to 2 years. High winds are expected to occur much more frequently with 2-3 days per year experiencing a high wind event.** Anecdotally, local officials suggested a severe high wind event resulting in serious damage has been occurring about once every five years and the frequency has been increasing.

Although the improvement of technology has enabled meteorologists to better identify and predict the conditions that are favorable for tornado development, there is no precise way to predict the formation, location, and magnitude of a tornado or straight-line wind events. And, there is no predictable pattern that can be used to accurately predict future tornado events. However, the May 2017 event that hit hard in Barron County suggests that sufficient time is often available for residents to find adequate safe shelter in order to mitigate deaths and injuries.

A recent study, published in January 2023, modeled several potential effects of climate change on the frequency, intensity, and location of supercell thunderstorms in the continental United States. It is these supercell thunderstorms that account for nearly all tornados. The models, based on emission scenarios and historical data, indicated that within the Midwest, the evening time would see an increase in supercell storms. While the areas within this plan were not specifically discussed,

modelling suggests that the west central Wisconsin area is likely to see some of the largest increases in these severe events, outside the Southern Mississippi River Valley.

Vulnerability Assessment—Tornadoes & High Winds

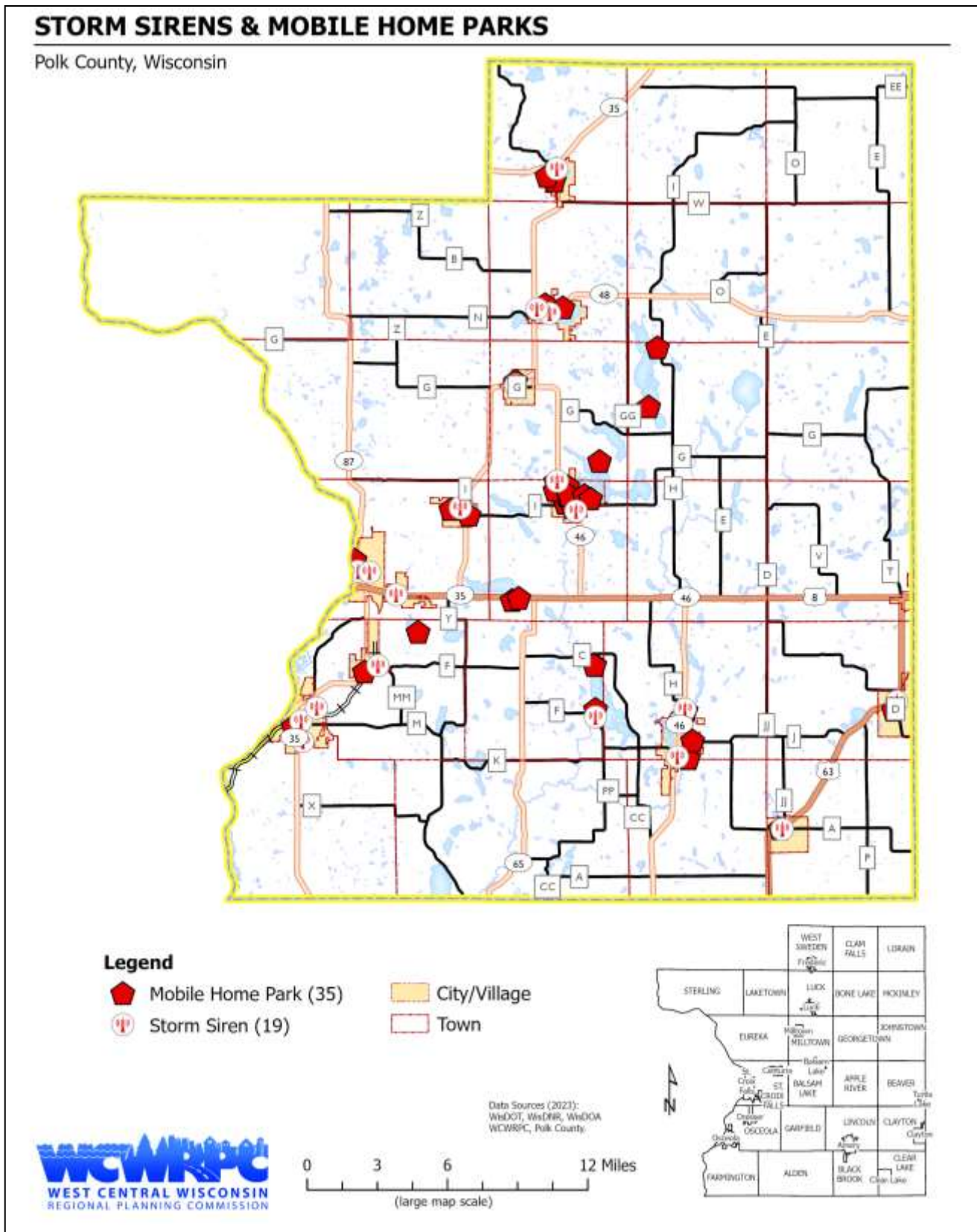
Appendix F provides the following regarding the potential impacts of tornado and high wind events for Polk County as a whole:

- a description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- a description of the vulnerability of each community lifeline for this hazard
- the potential consequences or impacts to the above assets and community lifelines.

In summary, all Polk County populations and above-ground assets are vulnerable to tornado and high wind events. During the planning process, the following assets were identified as having the greatest vulnerability:

- **Residents in mobile homes or slab-on-grade structures** without access to a safe-room or storm shelter were the most frequently identified tornado/high wind vulnerability during the planning process. Most new homes have basements, though there has been increasing slab-on-grade within or near some cities and villages. Polk County has about 1,689 mobile homes and 10 licensed manufactured housing/mobile home parks. **Figure 22** shows the location of mobile home parks in Polk County. Most of these parks are located within the cities and villages, but not all. For example, the Town of Balsam Lake identified the residents of mobile homes on the east end of Deer Lake has a tornado/high wind vulnerability given the lack of protection from severe weather.
- **Senior living facilities and group homes** were the second most-frequently identified vulnerability during the planning process. These are typically slab-on-grade structures serving a vulnerable population that may have mobility challenges. Polk County has 6 nursing homes and 15 licensed assisted living facilities (3 adult family homes, 10 community based residential facilities, and 2 residential care apartment complexes).
- **Visitors and staff of campgrounds and resort properties** were occasionally mentioned as a unique vulnerability since most of these facilities lack safe rooms or storm shelters, and out of town visitors may not have access to an alternative. And these vulnerabilities appear to be growing. For example, the Town of Laketown identified a large RV park off of County Highway “N” as a unique vulnerability and noted that this RV park has been growing. The Town of St. Croix Falls stated a new campground on Highway 87 (Big Rock Creek Campground) recently opened and the owners have intentions of growing, though there is a storm shelter on site. Most County Parks have vault-style restrooms, which affords some protection from severe weather, and trees within general public areas deemed to be hazards are trimmed or removed. Improvements are planned at a number of campgrounds that could potentially incorporate a safe room if grant funding would be available.

Figure 22. Storm Sirens & Licensed Mobile Home Parks in Polk County



- **Above-ground power lines**, especially in wooded areas, were the most frequently identified infrastructure vulnerability. This vulnerability is further explored in the *Long-Term Power Outage* threat sub-section. Above-ground communications infrastructure is also vulnerable and high winds in August 2010 twisted one of the County's radio communications towers.
- **Schools and school gyms** were also identified since these facilities serve a vulnerable population (children) and can host large events. Traditionally designed gyms can be especially vulnerable to high winds.
- **Large public gatherings, especially the Polk County Fairgrounds.** The Fairgrounds was frequently mentioned as a unique vulnerability during the planning process. Community members noted that the Fairgrounds has to be regularly evacuated due to severe weather, as recently as July 2023. The Fairgrounds lacks a storm shelter or safe room on site and communications can also be an issue; loudspeakers cannot be heard in all areas of the fairgrounds. Following heavy rains, some areas of the grounds can be temporarily flooded with stormwater. During the planning process, it was also recommended that emergency plans should also consider the management of livestock that are onsite during the County Fair and other events.
- The following additional vulnerabilities were also mentioned:
 - Polk County's three **hospitals** (serves a vulnerable population that may have mobility challenges).
 - **Arnell Memorial Humane Society** in Amery. The 2024 mitigation plan steering committee spent considerable time discussing the vulnerabilities of this important community lifeline (e.g., animals, staff, veterinary medicine/supplies) to tornados, high winds, and power loss, especially during periods of extreme temperature. The Humane Society lacks a community safe room or storm shelter space and generator. If air handling is lost, air quality could quickly become a health hazard for humans and animals alike.

2006 PETS Act

During the 2024 Mitigation Plan update, the plan steering committee discussed the emergency planning responsibilities required by the 2006 PETS Act.

Congress adopted the Pets Evacuation & Transportation Standards (PETS) Act in 2006. The PETS Act requires state and local planners to plan for the mass care of household pets and service animals during mass sheltering and evacuation operations, including the provision of veterinary care.

And during a biological incident, emergency managers must also consider planning scenarios in which the pathogen causing the biological incident may be transmissible from animal to person, from animal to animal, and/or from person to animal.

The PETS Act is operational when a federal disaster declaration has been made. The declaration serves as a "trigger" that provides for Federal reimbursement for expenses related to the rescue, care, shelter, and essential needs of household pets and service animals during the disaster event.

- **Other buildings with large spans** (e.g., airport hangars, pole barns, factories).
- **Homes, campgrounds, & resorts in areas that are wooded or may have access/egress challenges.** Such sites include buildings on islands in the Balsam Lake area and homes/resorts near lakes that may have long dead-end roads or drives. The elevated vulnerability is not specific to the structures themselves, but reflects that evacuation and emergency vehicle access could be a challenge during an emergency situation and/or due to storm damage.
- **Sites/buildings storing large quantities of hazardous materials** above ground.

Projected Loss Estimates

Estimated Future Losses

Table 14 provides tornado and high-wind loss estimates for Polk County. Compared to the County’s 2017 Mitigation Plan, the annual probability of tornado events increased slightly. Given that this Plan update included inflation in the damages, the estimated future annual losses for tornadoes increased dramatically (about 3x higher). The high wind events, probability, and losses cannot be compared to the 2017 Plan, which used the number of reported events (not event days); event days better reflects the number of storms since multiple high wind events are often reported for a single storm.

The methodology used to develop the tornado and high wind loss estimates in Table 14 is based on the approach used by Wisconsin Emergency Management for its mitigation planning efforts. The number of events, damage per event, event probability and past losses are all based on the NCDC storm event data previously summarized, including inflation for damages. On average, each injury during the time period was given a monetary value of \$288,000 per injury, while deaths were given a monetary value of \$6.9 million per death based on FEMA guidance for benefit-cost calculations.

Table 14. Polk County Tornado & High Wind Loss Estimates

Tornado Loss Estimates per Event			
Avg. Damage per Tornado (1950-2022)	Annual Probability	Estimated Future Annual Loss (property)	Estimated Future Annual Loss (injury, death, & property)
\$2,332,330 (33 events)	0.46	\$1,072,872	\$1,333,636
Thunderstorm High Wind Loss Estimates per Event Day			
Avg. Damage per T-Storm Wind (1993-2022)	Annual Probability	Estimated Future Annual Loss (property)	Estimated Future Annual Loss (injury, death, & property)
\$129,367 (73 event days)	2.52	\$326,005	\$370,967

Source: National Climatic Data Center (NCDC) & West Central Wisconsin Regional Planning Commission (WCWRPC).

Again, the estimates in Table 14 are only based on those events reported to the NCDC during those time periods. Events and data prior to 1993 were not consistently reported, especially for minor

damages and injuries. And, as noted, previously, the damages from many events were greatly under-reported and some significant events not reported at all.

FEMA National Risk Index (NRI) Estimated Annual Losses

FEMA's NRI provides an alternative source of estimated annual losses (EALs), which yields significantly higher totals when compared to the previous NCDC-based estimates:

Risk Factor	Tornado	Strong Wind
EAL Rate – Population	1 per 372,410	1 per 883,460
EAL Rate – Buildings	\$1 per \$8.41k	\$1 per \$9.55k
EAL Rate – Agriculture	\$1 per \$49.00k	\$1 per \$29.48k
Total EAL	\$2,917,255	\$1,927,785
Exposure	\$534.4 billion	\$534.4 billion
Events per year	0.5	3.4
Historic loss ratio	Relatively Moderate	Relatively Moderate
Overall Loss Score	78.6 (Relatively Moderate)	92.3 (Relatively High)

According to the NRI data, tornadoes have the highest estimated annual losses of any natural hazard event (\$2.9 million) followed by strong wind (\$1.9 million). A large part of the difference between the NRI and NCDC-based loss estimates is the inclusion of agricultural impacts in the NRI estimates. Based on the County's 2020 population (44,977) and 2022 assessed value of building improvements (\$3.76 billion) documented in Section II.C., the above EAL rates suggest that Polk County will experience on average:

- one serious injury or death to a resident due to tornadoes about once every 8 years and due to strong winds about once every 20 years, and,
- \$447,087 in building damage due to tornadoes each year and \$393,717 in high wind damage to buildings each year, not including tax-exempt structures. It is notable that the NCDC-based tornado loss estimates for property is much higher.

Other Factors Influencing Future Losses

1. Population Growth & New Development. As noted previously, Polk County continues to grow, which increases the exposure to tornado and high wind events.
2. Climate Change. The annual probability of tornado and high wind events will likely increase due to climate change, but we are unable to confidently quantify the extent of this increase at this time. While initial studies suggest that climate changes may result in an increase in tornado and high wind events on a national level, it is not clear how the future probability of such events will change locally. See **Section III.C.** for additional discussion on the related effects of climate change.
3. Preparedness & Mitigation. Potential losses can be reduced through mitigation actions, such as the warning systems, use of safe rooms, anchoring of mobile homes and personal property, burying of overhead utilities, and public education initiatives.

Risks for Individual Plan Participants - Tornadoes & High Winds

All individual plan participants in Polk County (i.e., villages, cities, educational institutions, electric cooperatives) are equally at risk of experiencing a tornado or high wind event.

The Village of Centuria has the most significant tornado history when a June 1952 tornado destroyed a dozen homes and caused serious damage throughout much of the community. A May 1953 tornado caused significant damage within the City of Amery. And a July 2010 tornado resulted in significant damage in the Village of Balsam Lake, including downed trees, roof damage, and severe damage to one home and a garage. Other communities noted that there have been tornado touchdowns in close proximity, but the events have missed most incorporated areas.

The cities and villages reported that high straight-line winds are much more common than tornado events. Downed trees, roof damage, and scattered debris are the most commonly noted types of wind damage. Power loss due to downed trees is also fairly common in some of the older neighborhoods, though no long-term power loss events (3+ days) were reported.

Two unique vulnerabilities were identified:

- The Village of Dresser identified Trollhaugen as a unique vulnerability given that events can attract over 1,000 attendees and camping is provided on site.
- The City of St. Croix Falls identified the County Fairgrounds as a unique vulnerability as previously discussed.

As mentioned previously, the majority of mobile home parks and critical facilities lie within the cities and villages. Most communities commented that many of the newer homes and senior living facilities were slab on grade without basements for shelter. The same can be said of many manufacturing and commercial buildings, which are also sometimes large-span buildings and have an elevated vulnerability to tornadoes and high winds. Centuria and Amery noted that some multi-family residential buildings are also slab-on-grade without basements.

from *The Rhinelander Daily News*,
June 24, 1952

Dozen Homes Demolished in Village of Centuria

By The Associated Press

A tornado slashed across Wisconsin's Indianhead county last night in the wake of violent electrical storms, killing at least two persons in Polk County when it smashed at the village of Centuria.

The dead

Irvin Koshatka, 36, killed in the basement of his father's home when the tornado lifted the house from its foundation and drove it against a tree.

Martin Walker, 62, killed while sitting in his living room when the tornado blasted his house to fragments.

At least three other persons were injured critically. They were 2-months-old Marjorie Kashatka, a niece of Irvin's, visiting with her family from Cass Lake, Minn.; Mrs. Martin Walker and Frank Sonderlik, 80, who was struck by a falling tree.

A dozen homes in the village were demolished by the tornado, which struck at 9:30 last night and left giant foot steps of destruction across an eight mile path from Centuria to Half-Moon Lake near Milltown. Two resorts were struck at the lake, and at least one vacationing family was left out in the storm when a cabin was destroyed.

Reports of the loss in life and property damage were slow to come in because telephone and utility lines were down all over the area. Centuria was without power overnight until an emergency pump was rigged today.

O. W. Peterson, president of the Centuria State Bank, said the tornado cut a 75-foot swath across the village.

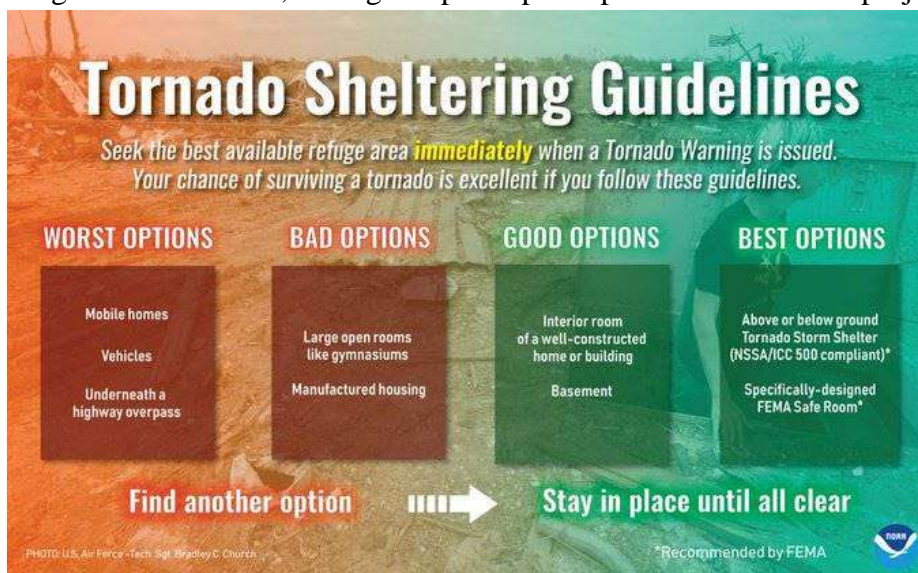
The electrical storms both preceded and followed the tornado elsewhere in the area. At Superior,

Overall, community vulnerability increases with development density, population density, type of development, and value of improvements, so different communities do have varying levels of vulnerability. And, as more growth and development occurs, this vulnerability also increases.

The potential impacts, in general, are also shared, though vulnerability increases with development density, population density, type of development, and value of improvements. Vulnerabilities can also differ based on factors such as socio-economic characteristics and existing mitigation actions (e.g., safe rooms, wind-resistant construction).

Appendix K provides “sub-plans” for each city and village and **Appendix L** provides “sub-plans” for participating educational institutions. These sub-plans identify any tornado and high wind risks and vulnerabilities specific or unique to these individual participants and are supplemental to the previously described event history, probability, and vulnerability assessment for Polk County. For participating electrical cooperatives, event history and vulnerabilities have been integrated into the *Long-Term Power Outage* threat sub-section.

The sub-plans also assess each participant’s capabilities to prepare for and mitigate hazards, including whether safe rooms, emergency/storm sirens, and emergency power generators are available. Security and growing liability concerns have impacted the availability of some existing structures as public storm shelters. There is growing interest among many of the communities and some school districts to pursue grant funding to construct storm shelters/community safe rooms or for the storm hardening/retrofit of existing structures for the general public, for locations where people gather, or for vulnerable populations (e.g., mobile homes, slab-on-grade residential, campgrounds/resorts). Interest in potential safe room projects as part of public structures is not limited to the incorporated cities and villages. For instance, during the plan update potential safe room projects were discussed for County campgrounds/ATV park, the Fairgrounds, and as part of a new Allied Emergency Service’s fire hall in Wanderoos.



There was also some interest in adding remote unlock technology for existing storm shelters or as part of remodels/retrofits. Electric cooperatives and municipal electric utilities are also continuing to explore opportunities to bury overhead electrical

lines in areas prone to outages and for new development. Increasing public awareness of the County’s emergency notification system and shelter availability was also frequently mentioned during community mitigation planning meetings.

ii. Winter Storms and Extreme Cold (including blizzards and ice storms)

Winter storms occur when cold weather such as snow, sleet, ice, or extreme wind chills impact public safety, transportation, and/or commerce. These storms include widespread and/or heavy snow storms, blizzards, or flash freeze events. Extreme cold events may occur concurrently with or separate from other types of winter storm events.

Defining the Hazard – Winter Storms & Extreme Cold

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.

Winter Storm - The occurrence of heavy snowfall accompanied by significant blowing snow, low wind chills, sleet, or freezing rain.

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 a warm and moist upper layer(s) of the atmosphere to colder and dryer layer(s) at or near the ground, freezes upon contact with the ground, and accumulates on exposed surfaces.

Freezing Drizzle/Rain – The effect of drizzle or rain freezing upon impact on objects that have a temperature of 32° Fahrenheit or below.

Snow Squall - An intense, short-lived burst of heavy snowfall that leads to quick reduction in visibilities and is often accompanied by gusty winds. This hazard is primarily a transportation-related concern; the combination of quick reductions in visibilities and sudden slick conditions on roadways can lead to high-speed collisions and pile-ups.

Extreme Cold - Temperatures lower than historical averages that create a dangerous environment for people, animals, and critical infrastructure or services.

Wind Chill - The apparent temperature that describes the combined effect of wind and air temperatures on exposed skin.

Hazard Location

There are no geographic boundaries or locations within Polk County uniquely affected by winter storms or extreme cold events. These events can occur anywhere in Polk County and such events often occur at a regional scale involving most or all Polk County communities as well as neighboring counties or even states when they occur.

Hazard Extent (Potential Intensities)

Winter weather events are significant due to their scope and prolonged effects. Heavy snow, freezing temperatures, and ice can burst pipes, fell power lines, create dangerous travel conditions, and onset frostbite and/or hypothermia. Winter storm events and extreme cold can last for days as temperatures remain frigid. These events impact large contiguous areas, which limits the ability to seek emergency response or resources from nearby areas. **Figure 23** identifies the potential impacts of varying intensities of **winter storm events** on an area as they increase in severity.

NOAA's National Centers for Environmental Information (NCEI) has produced a **Regional Snowfall Index (RSI)** that is used to rank snowstorm impacts, similar to the EF scale for tornadoes:

Category	RSI Value	Description
1	1-3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	18+	Extreme

The RSI includes population and considers societal impacts and allows for the description and comparison of historical snowfall events. As will be later discussed, RSI Category 5 events have occurred in the region.

The **Sperry-Piltz Ice Accumulation (SPIA) Index** in **Figure 24** provides five impact categories based on precipitation totals, temperature, wind speed and wind direction; wind is an included factor since ice accumulation on trees, utility lines, etc., is much more prone to causing damage due to the added stress of high winds. The SPIA index is used to predict and communicate the potential impacts of ice storm events, including the potential for long-term power loss.

Figure 23. Winter Storm Impact Scale

Potential Winter Storm Impacts	
	Winter Weather Area Expect Winter Weather. • Winter driving conditions. Drive carefully.
	Minor Impacts Expect a few inconveniences to daily life. • Winter driving conditions. Use caution while driving.
	Moderate Impacts Expect disruptions to daily life. • Hazardous driving conditions. Use extra caution while driving. • Closures and disruptions to infrastructure may occur.
	Major Impacts Expect considerable disruptions to daily life. • Dangerous or impossible driving conditions. Avoid travel if possible. • Widespread closures and disruptions to infrastructure may occur.
	Extreme Impacts Expect substantial disruptions to daily life. • Extremely dangerous or impossible driving conditions. Travel is not advised. • Extensive and widespread closures and disruptions to infrastructure may occur. • Life-saving actions may be needed.

Figure 24. Ice Storm Damage Index

ICE DAMAGE INDEX	DAMAGE AND IMPACT DESCRIPTIONS
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
4	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

Cold temperatures can be deadly, especially when accompanied by high winds. The combination of cold temperature and wind creates a perceived temperature known as “wind chill.” When wind blows across the skin, it removes the insulating layer of warm air adjacent to the skin. When all factors are the same, greater heat loss and a colder feeling is experienced as wind speed increases. 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. Shown in **Table 15** are the calculated **wind chill temperatures** as a result of specified air temperatures and wind speed.

Table 15. Wind Chill Table (in Degrees Fahrenheit)

Temperature (°F)	Wind Speed (MPH)								
	5	10	15	20	25	30	35	40	45
30	25	21	19	17	16	15	14	13	12
25	19	15	13	11	9	8	7	6	5
20	13	9	6	4	3	1	0	-1	-2
15	7	3	0	-2	-4	-5	-7	-8	-9
10	1	-4	-7	-9	-11	-12	-14	-15	-16
5	-5	-10	-13	-15	-17	-19	-21	-22	-23
0	-11	-16	-19	-22	-24	-26	-27	-29	-30
-5	-16	-22	-26	-29	-31	-33	-34	-36	-37
-10	-22	-28	-32	-35	-37	-39	-41	-43	-44
-15	-28	-35	-39	-42	-44	-46	-48	-50	-51
-20	-34	-41	-45	-48	-51	-53	-55	-57	-58

Source: National Weather Service

The potential and intensity of winter storms and extreme cold/wind chill events is publicly shared through NOAA’s weather alert systems. The table below outlines NOAA’s definitions and criteria for each of the primary winter weather-related alerts.

<p>Watch - Generally issued in the 24 to 72 hour forecast time frame when the risk of a hazardous winter weather event has increased (50 to 80% certainty that warning thresholds will be met). It is intended to provide enough lead time so those who need to set their plans in motion can do so.</p>	<p>Winter Storm Watch</p>	<p>Conditions are favorable for a winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events) to meet or exceed local winter storm warning criteria in the next 24 to 72 hours. Criteria for snow is 7 inches or more in 12 hours or less; or 9 inches or more in 24 hours covering at least 50 percent of the zone or encompassing most of the population. Criteria for ice is 1/2 inch or more over at least 50 percent of the zone or encompassing most of the population.</p>
	<p>Extreme Cold Watch</p>	<p>Dangerously cold air, with or without wind, is possible. Prior to October 2024, was called a Wind Chill Watch when conditions are favorable for wind chill temperatures to meet or exceed local wind chill warning criteria in the next 24 to 72 hours. Wind chill temperatures may reach or exceed -25°F.</p>
<p>Warning - Issued when a hazardous winter weather event is occurring, is imminent, or has a very high probability of occurrence (generally greater than 80%). A warning is used for conditions posing a threat to life or property.</p>	<p>Blizzard Warning</p>	<p>Blizzard event is imminent or expected in the next 12 to 36 hours. Sustained wind or frequent gusts greater than or equal to 35 mph will accompany falling and/or blowing snow to frequently reduce visibility to less than 1/4 mile for three or more hours.</p>

	Ice Storm Warning	An ice storm event is expected to meet or exceed local ice storm warning criteria in the next 12 to 36 hours. Criteria for ice is 1/2 inch or more over at least 50 percent of the zone or encompassing most of the population
	Winter Storm Warning	A winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events) is expected to meet or exceed local winter storm warning criteria in the next 12 to 36 hours.
	Extreme Cold Warning	Dangerously cold air, with or without wind, is expected. Prior to October 2024, was called a Wind Chill Watch when wind chill temperatures are expected to meet or exceed local wind chill warning criteria in the next 12 to 36 hours. Wind chill temperatures may reach or exceed -25°F.
<p>Advisory - Issued when a hazardous winter weather event is occurring, is imminent, or has a very high probability of occurrence (generally greater than 80%). An advisory is for less serious conditions that cause significant inconvenience and, if caution is not exercised, could lead to situations that may threaten life and/or property.</p> <p>NOTE: The issuance of an “Advisory” is being phased out by the National Weather Service in the near future and will be replaced with a plain language description of the possible hazardous conditions.</p>	Winter Weather Advisory	A winter storm event (sleet, snow, freezing rain, snow and blowing snow, or a combination of events) is expected to meet or exceed local winter weather advisory criteria in the next 12 to 36 hours but stay below warning criteria.
	Cold Weather Advisory	<p>Cold air is expected.</p> <p>Prior to October 2024, was called a Wind Chill Advisory when wind chill temperatures are expected to meet or exceed local wind chill advisory criteria in the next 12 to 36 hours. Wind chill temperatures may reach or exceed -15°F.</p>

Event History – Winter Storms & Extreme Cold

Appendix E includes regional and local winter storm and extreme cold event data, with highlights summarized in this subsection. These winter-season events are typically regional in nature and are not limited to a localized area or Polk County. However, levels of snowfall or ice accumulations can vary significantly over relatively short distances. Much of the snowfall in Wisconsin occurs in small amounts of between one and three inches per occurrence.

National Climate Data Center (NCDC) Event Summary

Appendix E identifies recorded winter events from 1993-2022, which are summarized below:

Winter Storm, Ice, & Extreme Cold Event Summary	
Total Events: 97	Number of Events Per Year: 3.34
Total Event Days: 97	Number of Event Days Per Year: 3.34
Total Injuries: 0	Total Deaths: 0
Total Event Days with Property Damage: 0	
Property Damage (from NCDC): None reported	
Property Damage (adjusted for inflation): None reported	

Since 1993, Polk County has experienced 97 winter weather-event days or 3.34 event days per year. These events were further characterized by 11 heavy snowfall events, 69 winter storm/winter weather events (mix of snow, ice, wind), 6 cold/wind chill events, 9 extreme wind chill or cold, one ice storm/freezing rain events, one early frost/freeze. All events occurred between November and April, except for an August 2004 freeze, winter weather in October 2009, and a May 2013 winter storm.

There were no deaths reported in Polk County as attributed to winter weather events. In neighboring St. Croix County there were two deaths as a result of the December 2010 winter storm event. Neighboring Barron County also had two deaths attributed to winter weather events during the 1993-2022 period. Additional deaths and injuries as a result of traffic accidents, frost bite, etc. associated with these events likely occurred, but were not reported to the National Weather Service.

The previous table denote winter/ice storm and extreme cold events; less intense and more localized snowfall and ice events were impacts are limited or not unique are not included. Salt, sand, and other de-icing and anti-icing agents are required much more frequently than the 3.34 winter event days per year. For example, the County Highway Department reported to the Wisconsin Department of Transportation that Polk County experienced the following winter storm events during recent winters:

- Winter 2020-2021: 42 storms, including 6 freezing rain, 12 ice, & 8 drifting incidents
- Winter 2021-2022: 35 storms, including 4 freezing rain, 19 ice, & 20 drifting incidents
- Winter 2022-2023: 39 storms, including 6 freezing rain, 6 ice, & 7 drifting incidents

Significant Regional and Polk County Events

Much of the snowfall in Wisconsin occurs in small amounts of between one and three inches per occurrence. While true blizzards are rare in Wisconsin, blizzard-like conditions can exist during heavy snowstorms when gusty winds cause the severe blowing and drifting of snow. Heavy snowfalls that produce at least six inches of accumulation occur on average about 10-12 times per winter statewide. Seasonal average snowfalls in Wisconsin vary between approximately 30 inches in extreme southern parts of the State to over 100 inches in the Lake Superior snowbelt. In a typical winter season, there are 3 to 5 freezing rain events; and a major ice storm occurs on a frequency of about once every other year. If a half-inch of rain freezes on trees and utility wires, extensive damage can occur, especially if accompanied by high winds that compound the effects of the added weight of the ice. There are also between three to five instances of glazing (less than 1/4 inch of ice) throughout the State during a normal winter.

According to the Midwest Regional Climate Center, the annual snowfall for Polk County from 1981-2010 has been between 42 to 60 inches. The most severe winter storms in recent decades within the region that potentially included Polk County were:

- **December 27-28, 1904** - Southern / Central - Heavy snow/ice. 26 inches of snow at Neillsville (Clark County).
- **February 12-14, 1923** - Statewide - Blizzard - Heavy snow - severe drifting.
- **February 8-10, 1936** - Statewide - Blizzard - severe drifting.
- **November 6-8, 1943** - Statewide - Heavy snow / ice - 10 to 18 inches of snow. Roads blocked for several days.

- **November 9-10, 1975** – Northern – Major snowstorm – 10 to 14 inches. Edmund Fitzgerald sinks in Lake Superior.
- **January 22-23, 1982** - North half - Blizzard - 10 to 20 inches. Superior had 19 inches.
- **November 30 - December 2, 1985** - Statewide (except southeast corner) - Widespread snows of 10 to 18 inches. Madison had about 10 inches.
- **October 31 - November 2, 1991** – This was an extreme (RSI Category 5) snow storm event, frequently referred to as the Halloween Blizzard. Snow totals ranged from 15 to 30 inches with 6 to 10 foot drifts. 30 inches in Burnett, Douglas, Polk, and St. Croix counties.
- **January 26-27, 1996** - Statewide - Heavy snow - 6 to 18 inches. Localized amounts of 16 to 18 inches fell along a line from La Crosse to Green Bay.
- **March 13-14, 1997** - West Central / Northeast - Snowstorm - 12 to 28 inches. 28 inches at Wautoma in Waushara County.
- **January 21-22, 2005** - Statewide - Blizzard (gusts to 50 mph) - 6 to 15 inches. Although winds gusted up to 50 mph in some areas and visibilities were reduced to less than 1/4 mile due to falling or blowing snow, many areas didn't experience these conditions for 3 hours or more to classify as a full blizzard. Nonetheless, heavy snow and very windy conditions created near white-out conditions especially in the south and east. The heaviest totals occurred near Lake Michigan due to additional lake effect, where some areas ended up near 15 inches.
- **March 18-19, 2005** – West-central – Winter Storm – 18 to 23 inches in a swath from southern Buffalo County to western Jackson County, with 12 to 15.6 inches in La Crosse County. The maximum of 23 inches occurred in northwestern Jackson County.
- **March 13-14, 2006** – West-central to North-central– Winter Storm – 17 to 32 inches from St. Croix County northeast to Iron County. Thundersnow enhanced the accumulations. Very poor visibility resulted from gusty winds around 30 mph and drifting resulted in hundreds of accidents. Locals said it was the worst storm since the 1980s.
- **February 23-26, 2007** – West-central (through southern and eastern Wisconsin) – Blizzard - Two-round storm, with one overnight the 23rd to 24th, and the second round overnight the 24th into the 25th. Leftover snow accumulations continued overnight the 25th into the 26th. In counties surrounding La Crosse, 8 to 15.6 inches (Galesville) fell in round one, while round two produced 6 to 12.5 inches (Sullivan NWS office) over the southern three-fourths of the State. The leftover snow added another 1 to 4 inches, except for 6 to 14 inches from New London into Door County. Many locations totaled 20 to 25 inches for this long-duration two-punch episode from around La Crosse to Port Washington and a small part of Door County. Gusty winds generated snow drifts up to 5 to 7 feet in height.
- **December 8-9, 2009** – Nearly statewide – Winter Storm – Large area experienced 12 inches or more. Madison area had 17 to 20 inches, 15 to 17 inches in the La Crosse area, 14 to 16 inches in the Green Bay area, and 16 to 28 inches in the Lake Superior snow-belt. The greatest amount of around 28 inches occurred in the Hurley, Iron County area
- **Dec 10-12, 2010** – Nearly statewide – Winter Storm/blizzard – Large area of 6 to 23 inches. Maximum amounts of 16 to 23 inches in west-central to central Wisconsin. The 23 inches was measured in southwest Polk County. In the Eau Claire area 18 to 22 inches fell, while accumulations in La Crosse County ranged from 14 to 20.2 inches. Friendship, Adams Co., picked up 19.9 inches. There were reports of thundersnow. Northwest to north winds gusted to 30 to 50 mph with some whiteouts reported in exposed areas. Rain-snow-sleet mix southeast of a Janesville to Port Washington line limited accumulations to 1 to 5 inches in that part of the state.

This storm event hit the region particularly hard. For the Twin Cities, this was the 5th largest snowstorm on record since 1891 and the largest snowstorm to hit the area since the 1991 Halloween Blizzard.

The 2010 storm also affected homeowners and snow loads collapsed some structures. In the City of Eau Claire, a number of carbon monoxide poisonings occurred when heating vents were blocked by accumulating snow. The weight of the snow collapsed the Metrodome's roof in Minneapolis. In neighboring St. Croix County, the roof of a local dog rescue shelter collapsed and an area barn collapsed resulting in livestock deaths.

- **May 2013** – A late, heavy and wet snowfall resulted in snow loads that collapsed about 400 buildings in the County. Many of the collapsed buildings were farm buildings or accessory structures. Some animal deaths did occur. Roof collapses from heavy snow loads and ice damming would again cause damage to many buildings in the County in **February 2014**.

Winter 2017 Polar Vortex

In winter 2014, Wisconsin experienced a polar vortex. That happens when the cold air cell that is usually centralized in the Arctic splits into smaller cells and those cells travel farther south, cooling the northern hemisphere continents more than normal and warming the Arctic. Statewide, it was the fifth coldest December (2013) through February stretch on record with fourteen locations in the state setting new record low average temperatures. Unfortunately, the record cold temperatures also coincided with a propane shortage throughout the Midwest. Many residences in the rural parts of the state rely on propane for heat. When the shortage hit, many people had to move to shelters or stay with friends or relatives. Staying in other places was an option for some, but when home temperatures drop, permanent damage can occur when water pipes freeze and burst. Because of the shortage, propane prices soared; and those without standing contracts spent a lot more than they had budgeted.

In Polk County, the extremely low temperatures and lack of snow cover resulted in frost depths of up to 10 feet in some areas and caused immense damage to infrastructure in all cities and villages except Clayton and Frederic. Table 16 identifies those uninsured damages incurred by Polk County municipalities as reported to Wisconsin Emergency Management in hopes of obtaining a Federal Disaster Declaration and related grant funding. A disaster declaration would not be approved. According to Amery Public Works, when one pipe was cut in May, the line was still frozen.

As Table 16 shows, most of the damage was associated with breaking and thawing out water mains and lines, though some street and other infrastructure damage did occur. **Appendix K** provides additional insight into this event by community. During the mitigation plan update process, municipal officials and public works staff noted that this was an extremely unusual and rare event, and many commented that they had never experienced anything similar in their time residing within the community.

Table 16. Winter 2014 Polar Vortex Damages in Polk County

City or Village	Roads & Bridge Damage	Utility Damage	Total Damage	Frost Depth (Inches)	Community Comments
City of Amery		\$24,000.00	\$24,000.00	108.00	Utility Breaks/Frozen lines - overtime and repair costs.

City of St. Croix Falls	\$6,000.00	\$13,044.55	\$19,044.55	108.00	
Village of Balsam Lake		\$13,261.00	\$13,261.00	120.00	The frost depth ranged from 96 to 144 inches depending on the area. We used the average of the range. The depth of the frost was determined by actual excavation
Village of Centuria		\$29,100.95	\$29,100.95	78.00	I don't have a budget number for main breaks so I figured the excess in comparison to other years for the numbers. Also included is our overtime and our ongoing water tower repairs. I don't have a final cost on the water tower or the insurance payments we may or may not receive. Frost depth was determined by "actual excavation" and the NWS website.
Village of Clear Lake		\$3,781.70	\$3,781.70	78.00	We have extra costs of \$3,256 to an outside contractor for thawing of frozen water lines and overtime costs of \$525.70 for our employees. The depth of the frost was measured at sewer manholes in the streets.
Village of Dresser		\$13,480.40	\$13,480.40	96.00	21 homes and businesses on Temporary/Emergency Water. Rain Water in Areas as needed. 1 Water Main Break on 4/10/14. 8 Inch Sewer Main Located in the Industrial Park froze, affecting multiple businesses. The Village of Dresser determined our frost depth by the depth of the Sewer Main in the Industrial Park that froze. Approximate Depth of Sewer Main 6 1/2 to 7 1/2 feet - approximately 8 feet (96 inches) of frost in order for the main to freeze.
Village of Luck		\$19,689.49	\$19,689.49	96.00	2014 Village of Luck Utility Breaks/Freezes. The depth of the frost was measured at various manholes. Majority of cost was for excavation, replacement of two laterals and road/curb and gutter repair. Added damage amounts on 7/31/2014
Village of Milltown		\$6,616.45	\$6,616.45	102.00	The depth of the frost was measured in the manholes.

Village of Osceola		\$58,339.53	\$73,883.78	96.00	Overtime for public works employees. Cost for contractor to thaw frozen lateral water lines. Cost for material, fitting, hose, and plumber for setting up temporary water to homes. Cost for water distribution of winter water. Cost to treat excess winter water. Water main break repairs, contractor and materials. We determined the frost levels by checking it in the nearest manholes. Added 5/12/2014 - 6th Avenue from Chieftain to Oakey Park - Replace 250 feet of watermain that was frozen and damaged. (Additional \$30,000.00 in costs)
Totals	\$6,000.00	\$181,314.07	\$202,858.32		

- Winter 2022-2023** – Northern Wisconsin experienced record-breaking snow accumulations during Winter 2022-2023. In mid-December 2022, an RSI Category 4 snow storm struck with snow totals of 5”-7” experienced over most of the region, with some localized higher amounts. This was immediately followed by ice-covered and severe drifting roadways as well as high winds with dangerous wind chills of -25° to -35°F and white-out conditions. A number of snow events occurred in January and February, including multiple bands of heavy snow in late February producing over a foot of snow in about 48 hours; according to the Winter Storm Severity Index, considerable disruptions to daily life occurred. A late season RSI Category 1 snow storm in March brought additional snow, but less than what was experienced by counties to the north. Polk County Highway Department reported 136 inches of snow during Winter 2022-2023, including 22 wet snow storms, 10 dry snow storms, 6 freezing rain events, and 1 sleet events that cost the County Highway Department over 4,900 worker hours (38% overtime) and over \$1.5 million in material, equipment, and labor. The County used over 9,200 tons of salt for the 375 highway miles that it maintains.

Winter-Related Accidents & Drifting in Polk County

According to Wisconsin DOT, 53 crashes occurred on Federal highways in Polk County during Winter 2022-2023, which is about average for the number of vehicle miles travelled. The U.S. Highway 8 hill in St. Croix Falls was the most frequently mentioned concern. The hill can be impassible for east-bound traffic when icy or slippery, and semi-trucks have jack-knifed in the past when attempting to ascend the hill during poor conditions. The County Highway Department also noted a unique concern with rock slides along State Highway 243 (east of the bridge across St. Croix River in Osceola) due to freeze-thaw cycles.

Slippery roads and drifting of snow is common during Polk County’s winters when freezing rain, ice, snow, and high winds are present, though drifting has been less of a problem in most recent years due to weather patterns, improved equipment, furrowing, and snow fencing. The following winter-related travel and snow drifting “hotspots” were identified during the planning process:

- CTH “W” in the Town of West Sweden where limited right-of-way hinders snow removal.
- STH 35 west and southwest of Milltown. A hillside adjacent to STH 35 just west of Milltown contributes to drifting and visibility problems.

- US. Highway 63 south of Clear Lake to the county line.
- STH 65 south of USH 8, especially in the Ubet Flats area, has long been a drifting “hotspot”. A recent State reconstruction effort did not attempt to address the issue. In places during the heaviest snow and drifting, there is no where to push the snow and a grade must be used.
- CTH “F” in the Ubet Flats, especially between STH 65 to CTH “Y”. The road level in this area is the same as the surrounding landscape, which contributes substantial drifting.
- CTH “V” and USH 8 east of Range to the county line.
- Osceola to Farmington along STH 35, including the hill near CTH “M” and STH 35 in Osceola and Farmington.
- The Town of Alden noted that while winters in recent years (prior to 2010) have not been severe, there could be many areas which may pose a challenge for local snow removal crews to keep clear.
- The Town of Eureka identified 193rd Avenue at the point it turns north and the intersection of 210th Avenue and 220th Street as being locations especially prone to severe snow drifting.

Local officials report that road crews do a good job of maintaining the highways, roads, and streets in the County and intergovernmental coordination is very good. The Highway Department selectively uses snow fencing in some areas. No further actions regarding drifting or icy roads were noted.

Hazard Probability – Winter Storm & Extreme Cold

As reflected previously in Table 11, the Plan Steering Committee rated heavy snow storms and blizzards as the second highest natural hazard risk (probability) facing Polk County, only behind Extreme Cold which was identified as having the highest potential for occurrence. Extreme cold is the only natural hazard for which Polk County has a high National Risk Index score, reflecting that the region has a relatively higher threat to extreme cold events compared to the rest of the United States.

Based on reported severe winter weather events from 1993-2022, the National Risk Index, and stakeholder/community discussions, it is probable that Polk County will continue to experience:

- **4-5 severe winter storm, winter weather, heavy snow, or ice storm events per year**
- **1-2 extreme cold or wind chill events every year.**
- **1 blizzard event every 25-30 years.**

As discussed previously, not all locally severe winter weather events are reported to the NCDC, so the above probabilities provide a range for event probability to consider these unreported events. Although the improvement of technology has enabled meteorologists to better identify and predict the conditions that are favorable for winter storm development, there is no precise way to predict the formation, location, and magnitude of future events over the long-term. As will be shown later in this section, the National Risk Index (NRI) reports a significantly higher annualized frequency for some of the above events; it is believed that the primary difference is due to the NCDC data being limited to severe storm events, while the NRI data may be including additional reported events regardless of intensity.

The above probabilities are for severe or extreme events; less severe winter-related events occur much more frequently as documented by the previous Highway Department/Wisconsin DOT data, but these events can still be very dangerous for drivers, pedestrians, etc. As discussed previously in Section III.C., Wisconsin and Polk County are predicted to experience warmer, wetter winters. This climate trend and its related implications were discussed by the Steering Committee and other stakeholders during the Plan update. **It was speculated that while extreme cold events may decrease in frequency over time due to climate change, the potential for heavy snow and ice storm events (and related power outages) may increase.** The historic snowfall records of the 2022-2023 winter season, followed by the mild temperatures and low snowfall amounts of November-December 2023, are potential indications that these climate trends are already occurring. But it was also noted by some plan update participants that weather patterns are at times very erratic making it difficult, if not impossible, to predict future annual probabilities for specific event types.

Vulnerability Assessment – Winter Storms & Extreme Cold

Appendix F provides the following regarding the potential impacts of winter weather events for Polk County as a whole:

- a description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- a description of the vulnerability of each community lifeline for this hazard; and
- the potential consequences or impacts to the above assets and community lifelines.

In summary, all Polk County populations and most structures and infrastructure are vulnerable to winter storms, ice, and extreme cold events to varying degrees. During the planning process, the following populations and assets were identified as having the greatest vulnerability:

- **Above-ground power lines**, especially in wooded areas, were the most frequently identified infrastructure vulnerability due to the potential damage from ice and falling tree limbs, especially during high winds. This vulnerability is further explored in the *Long-Term Power Outage* threat sub-section.
- **Road transportation** infrastructure and travelers. The U.S. Highway 8 hill in St. Croix Falls is especially dangerous under slippery conditions. Hazardous road conditions and closures due to ice, snow pack, and drifting snow can result in accidents, injury, and death as well as disrupt a range of services, hinder emergency responders, require school closures, and temporarily interrupt shipping. Roads in shaded, wooded areas can be especially icy and hazardous. As noted previously, winter maintenance costs of roadways can be very expensive and burdensome.
- **Seniors and residents that have mobility or health challenges** were the most frequently identified at-risk populations for winter weather, ice, and cold. Severe winter weather can impact access to goods, services, needed treatments (e.g., dialysis), or needed medicines. Falling on ice or slippery steps and walkways can be life-threatening for the elderly. This vulnerability is also further explored in the *Long-Term Power Outage* threat sub-section. With the County's aging and growing population, this vulnerability will continue to grow.

Cold Impacts: Vulnerable Populations

Everyone is at risk from the dangers of extreme cold, but these groups are more vulnerable than most. Age and certain conditions make the body less able to regulate temperature.

- NEWBORNS**
- ELDERLY**
- CHRONIC ILLNESS**
- OUTDOOR WORKERS**
- UNHOUSED**

Dress in loose layers and cover all exposed skin
 Consume hot foods and warm drinks, but avoid caffeine and alcohol

Limit or avoid time outdoors
 Check on family, friends and neighbors

weather.gov

- **Water and sanitary sewer lines** are vulnerable to freeze-up or breaking, especially when there are very cold temperatures and inadequate insulating snow cover.

The following additional vulnerabilities were also mentioned during the planning process:

- **Buildings with large spans** (e.g., airport hangars, pole barns, factories) have a higher vulnerability to damage or collapse under heavy snow loads, unless reinforced.
- **Residents of poorly insulated or heated structures**, such as some mobile homes or lower-income residents who may have challenges with heating fuel costs.
- **Agricultural livestock and crops**, especially fruit crops from early or late freezes and winter alfalfa if there is inadequate insulating snow cover during low temperatures. The most significant early frost in recent history transpired in September 1974. This severe frost event occurred on multiple nights, included much of northern and western Wisconsin, and stretched as far south as Kansas. It was reported that more than 80 percent of the soybean and corn crops in Polk County were ruined during this event. Combined with the impacts of a summer drought, the soybean and corn losses were near 100 percent in nearby Dunn, Chippewa, and Eau Claire counties. In today's dollars, the total statewide crop losses as a result of the September frost were estimated at more than \$520 million. Alfalfa is especially vulnerable to winter kill, compared to other forage types. In 2002-2003, it was estimated that about 61 percent of the Polk County alfalfa acreage was impacted to varying degrees resulting in a 48 percent reduction in the County's alfalfa yields or about \$5 million in lost value overall. Winter kill was also high in the winter of 2008-2009. To provide an understanding of the potential vulnerability, in 2012 Polk County farmers harvested 46,800 tons of alfalfa (dry) on 20,205 acres planted. The loss of feed for cattle due to winter kill can be a significant hardship on a producer. At about \$1,500 of additional feed per mature cow for a year and with 42,815

head of cattle in the County, feed replacement costs can accumulate quickly. And since alfalfa is a relatively low-value crop, it is typically uninsured.

- **Stormwater systems and culverts** can be prone to ice-damming resulting in localized flooding, which will be further discussed in the *Flooding* threat sub-section.

Projected Loss Estimates

Overall, there is a very low vulnerability to structures in Polk County due to winter storms. Most structures in the County were built to standards that considered snowloads and needed insulation. Some occasional roof damage due to ice damming or bursting of inadequately buried water lines can be expected, but such damage is almost always isolated, not officially reported, and/or remedied by the homeowner with an insurance claim. It is unfeasible to maintain a database accurately detailing the structural condition of all assessed improvements in Polk County to determine which structures may be more vulnerable to the impacts of future winter storm events. And no NCDC winter weather damages were reported on which to reliably project future winter weather loss estimates for severe winter storm events without a more intensive study.

As a substitute, the National Risk Index provides the following expected annual losses (EALs) for Polk County and suggests that the County's winter weather, ice storms, and cold wave events all have similar loss exposure.

Risk Factor	Winter Weather	Ice Storm	Cold Wave
EAL Rate – Population	1 per 5.71m	1 per 1.54m	1 per 638,220
EAL Rate – Buildings	\$1 per \$306.67k	\$1 per \$1.51m	\$1 per \$3.40m
EAL Rate – Agriculture	\$1 per \$145.34k	--	\$1 per \$1.59k
Total EAL	\$134,008	\$347,654	\$920,596
Exposure	\$534.4 billion	\$543.3 billion	\$534.4 billion
Events per year	5.9	0.3	1.7
Historic loss ratio	Relatively Low	Relatively Moderate	Very Low
Overall Loss Score	74.4 (Relatively Moderate)	84.3 (Relatively Moderate)	92.9 (Relatively High)

The above loss estimates further suggest that agriculture is the County's largest winter-related vulnerability financially, though extreme cold events pose a substantial risk to residents. Based on Polk County's 2020 population of 44,977 and the above EAL rate, one County resident will be seriously injured by extreme cold about once every 14 years.

The continuing changes in land-use and development patterns can influence the County's potential for future exposure to winter storms. As discussed in Section II.C., Polk County is continuing to grow and develop. This creates an increasing exposure to the number of residents and properties that could be at risk from future winter storms or extreme cold events.

Risks for Individual Plan Participants—Winter Storms & Extreme Cold

Winter storms pose no risks or vulnerabilities unique to individual jurisdictions. Winter storms and extreme cold events are typically large-area or regional events, occurring countywide. The level of vulnerability increases in areas of higher population, development density, and supportive infrastructure and lifelines as described previously in *Section II. Community Profile*. Vulnerabilities can also differ based on factors such as socio-economic characteristics and existing mitigation actions (e.g., # of seniors, condition of housing stock, construction type).

Appendix K provides “sub-plans” for each city and village and **Appendix L** provides “sub-plans” for participating educational institutions. These sub-plans identify winter storm and extreme cold risks and vulnerabilities specific or unique to these individual participants and are supplemental to the previously described event history, probability, and vulnerability assessment for Polk County.

One difference between participating jurisdictions is the availability of emergency power generators and fuel sources, though significant improvements have been made in many communities since the 2017 Plan. Most communities also lack designated warming shelter with emergency power generators should they be needed. For participating electrical cooperatives, related event history and vulnerabilities have been integrated into the *Long-Term Power Outage* threat sub-section.

The Village of Luck noted that ice build-up and the freeze-thaw cycle is a contributing cause to shoreland erosion problems along the west shore of Big Butternut Lake. Ice damming on the St. Croix River occurs north of the dam in St. Croix Falls about once every 10-12 years and has resulted in damage to a park pier and outside stairs at a home, but no serious damages to date. St. Croix Falls occasionally must close some city streets due to icy conditions on steep hills. Of greater concern is east-bound traffic on U.S. Highway 8 within the City. As east-bound traffic crosses the St. Croix River, it must ascend a steep, long hill. At times, ice or snow conditions are such that travelling up the hill is dangerous, if not impossible, for some vehicles. Such circumstances have led to traffic accidents and the “jack knifing” of semi-trucks in the past.



iii. Thunderstorms, Lightning, & Hail

For this plan, thunderstorms include lightning and hail, and are intricately linked with some of the other hazards, such as tornadoes and flooding. Due to the similarities in impacts, **thunderstorm high winds are discussed as part of the previous *Tornadoes & High Winds* sub-section (III.D.ii.)** and are not repeated here. **Flooding as a result of heavy rains is analyzed as part of the *Flooding* sub-section (III.D.iv.).**

Defining the Hazard – Thunderstorms, Lightning, & Hail

Thunderstorms are severe and violent forms of convection produced when warm, moist air is overrun by dry, cool air. As the warm air rises, thunderheads (cumuli-nimbus clouds) form which cause the strong winds, lightning, thunder, hail and rain associated with these storms. The National Weather Service definition of a severe thunderstorm is a thunderstorm event that produces any of the following: winds of 58 miles per hour or greater (often with gusts of 74 miles per hour or greater), hail 3/4 inch in diameter or greater, or a tornado.

The thunderheads formed may be a towering mass six miles or more across and 40,000 to 50,000 feet high. They may contain as much as 1.5 million tons of water and enormous amounts of energy that often are released in the form of high winds, excessive rains, and three violently destructive natural elements: lightning, hail, and tornadoes.²²

A thunderstorm often lasts no more than 30 minutes, as an individual thunderstorm cell frequently moves between 30 to 50 miles per hour. Strong frontal systems, though, may spawn more than one squall line composed of many individual thunderstorm cells. These fronts can often be tracked from west to east. Because thunderstorms may occur singly, in clusters, or as a portion of large storm lines, it is possible that several thunderstorms may affect a single area in the course of a few hours.

Heavy Rain definitions can vary based on factors such as duration, intensity, and location. For purposes of this plan, a heavy rain event is a 100-year event. According to the *Rainfall Atlas of the United States*, a 100-year rainfall event in Polk County would produce at a single location:

- 2.5” of rain in 1 hour or less,
- 3.5” of rain in 3 hours or less,
- 4” of rain in 6 hours or less
- 4”-5” of rain in twelve hours or less, or
- 5” of rain in 24 hours or less.

However, the above Rainfall Atlas was completed by the U.S. Weather Bureau in May 1961 is very outdated and does not represent more recent climate trends that would likely result in an increase in the rainfall thresholds (i.e., more inches of rain in a given time period to qualify as a heavy rain event).

²² Tornadoes and high wind vulnerabilities (potential impacts) are discussed separately in Section III.B.ii.

Lightning can strike anywhere. Lightning is formed from the build-up of an electrical charge in a cloud. When this charge is big enough, the air ionizes and a discharge occurs with another cloud, the ground, or the best conducting object. The resulting electric charge reaches temperatures higher than 50,000°F. This rapid heating and subsequent cooling cause the air to expand and contract, which results in thunder.

Hail is the accumulation of ice crystals due to warm, moist air rising rapidly into the freezing temperatures of the upper atmosphere. When frozen droplets accumulate enough weight, they fall as precipitation. Hail or sleet occurs when these frozen ice balls do not fully melt upon descent, and they can reach the size of softballs.

Thunderstorms can develop in a variety of ways, with the most common storm types listed below:

Single-Cell Storm	Small, brief, weak storms that grow and die within an hour or so. They are typically driven by heating on a summer afternoon. Single-cell storms may produce brief heavy rain and lightning.
Multi-Cell Storm	A common, garden-variety thunderstorm in which new updrafts form along the leading edge of rain-cooled air (the gust front). Individual cells usually last 30 to 60 minutes, while the system as a whole may last for many hours. Multicell storms may produce hail, strong winds, brief tornadoes, and/or flooding.
Supercell	A long-lived (greater than 1 hour) and highly organized storm feeding off an updraft (a rising current of air) that is tilted and rotating. This rotating updraft can be present as much as 20 to 60 minutes before a tornado forms. The tornado is a very small extension of this larger rotation. Most large and violent tornadoes come from supercells.

Hazard Location

There are no geographic boundaries or locations within Polk County uniquely affected by thunderstorm, heavy rain, lightning, or hail events; all Polk County jurisdictions are equally at risk of experiencing these types of severe weather. The maps included later in this section show that lightning and hail events occur throughout the State of Wisconsin. It is notable that lightning strikes can occur up to 20 miles away from the parent thunderstorm.

Hazard Extent (Potential Intensities)

Heavy rain intensities for 100-year rainfall events for Polk County were previously identified in the definitions.

Lightning strike intensity can be measured in megajoules, length, or the density strikes per storm or over time. For purposes of this plan, exploring a scale for the voltage or heat of lightning strikes is largely irrelevant; any strike can cause serious damage, injury, or death. According to Vaisala's 2023 *Annual Lightning Report*, Polk County experienced 12-16 total lightning events per square kilometer per year from 2016-2022, though the density of cloud-to-ground flash is much lower at 1-2 strokes per square kilometer per year.²³

²³ <https://www.xweather.com/annual-lightning-report>

The Tornado & Storm Research Organisation in the United Kingdom has developed the TORRO **Hailstorm Intensity Scale** in **Table 17** to evaluate and report hail storm intensity and typical damage, which is largely a function of hail diameter. The scale also considers the kinetic energy of the hail stones, which is impacted by wind speed. As the TORRO webpage²⁴ explains, “a fall of walnut-sized hail with little or no wind may scar fruit and sever the stems of crops but would not break vertical glass and so would be ranked H2-3. However, if accompanied by strong winds, the same hail may smash many windows in a house and dent the bodywork of a car, and so be graded an intensity as high as H5.”

Table 17. TORRO Hailstorm Intensity Scale

Scale	Intensity Category	Typical Hail Diameter (mm)*	Probable Kinetic Energy (J m ⁻²)	Typical Damage Impacts
H0	Hard hail	5	0-20	No damage
H1	Potentially damaging	5-15	>20	Slight general damage to plants and crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75		Severe roof damage, risk of serious injuries
H8	Destructive	60-90		(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

NOAA tracks and reports severe thunderstorms using watches and warnings:

Severe Thunderstorm Watch	Severe thunderstorms are possible in and near the watch area. Stay informed and be ready to act if a severe thunderstorm warning is issued. The watch area is typically large, covering numerous counties or even states.
Severe Thunderstorm Warning	Severe weather has been reported by spotters or indicated by radar. Warnings indicate imminent danger to life and property. Take shelter in a substantial building. Get out of mobile homes that can blow over in high winds. Warnings typically encompass a much smaller area (around the size of a city or small county) that may be impacted by a large hail or damaging wind identified by an NWS forecaster on radar or by a trained spotter/law enforcement who is watching the storm.

²⁴ <https://www.torro.org.uk/research/hail/hscale>

Event History – Thunderstorm, Lightning, & Hail

Figures 25 and 26 on the following pages show that lightning and hail events occur statewide. Since 1982, Polk County has experienced a relatively low number of reported lightning events (9). In comparison, the County has experienced significantly more hail events (83).

National Climate Data Center (NCDC) Summary

Thunderstorms are the most common hazard event for Polk County. Shown in the table below is a summary of the thunderstorm events that have been reported to the National Climatic Data Center for Polk County since 1993; the detailed list of these events can be found in **Appendix E**.

Thunderstorm, Heavy Rain, Lightning, & Hail Event Summary	
1/1/1993 - 12/31/2022	
Total Events: 234	Number of Events Per Year: 8.07
Total Event Days: 113	Number of Event Days Per Year: 3.90
Total Injuries: 0	Total Deaths: 0
Total Event Days with Property Damage: 30	
Property Damage (from NCDC): \$ 6.79 M (\$4.12 M from 9/12/05 event)	
Property Damage (adjusted for inflation): \$ 10.24 M	

For the above:

- 234 events were reported on 113 event days, reflecting that many of the events reported in Appendix E are for the same storm cells recorded for different parts of the County. These events include:
 - 1 heavy rain event.
 - 86 hail events (3 per year) on 57 event days with \$833,000 in reported property damage, no reported crop damage, and no associated injuries. For comparison, FEMA's National Risk Index (NRI) states that Polk County experiences 4.4 hail events per year.
 - 147 thunderstorm wind events across 72 event days totaling \$9.24 million in property damage and \$170,000 in crop damage.
 - No separate lightning events or damage are reported in the NCDC database. The NRI estimates that the County experiences 33 lightning events per year and has had relatively high historic losses.
- The damage and impacts of the 147 thunderstorm wind events (not heavy rain, hail, or lightning) were all or nearly all due to associated high winds. As such, these thunderstorm winds are also included in the previous *Tornadoes & High Winds* risk assessment section; this event summary and any probabilities based on this summary overlap with (are not in addition to) the previous *Tornadoes & High Winds* data.
- Appendix E shows that the above thunderstorm events can occur in any month of the year though they are more frequent in the months of April through September.

Figure 25. Wisconsin Lightning Events, 1982-2022

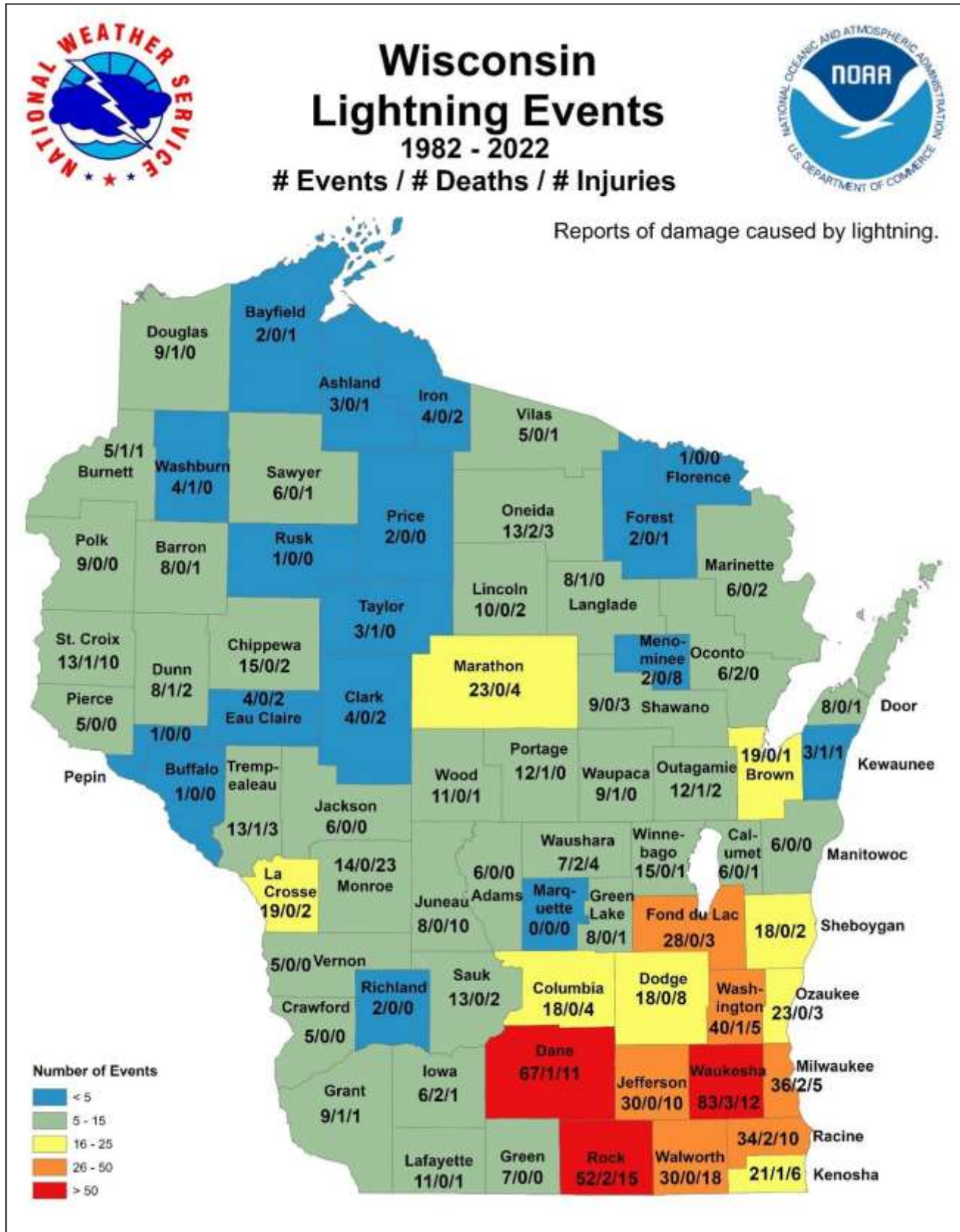
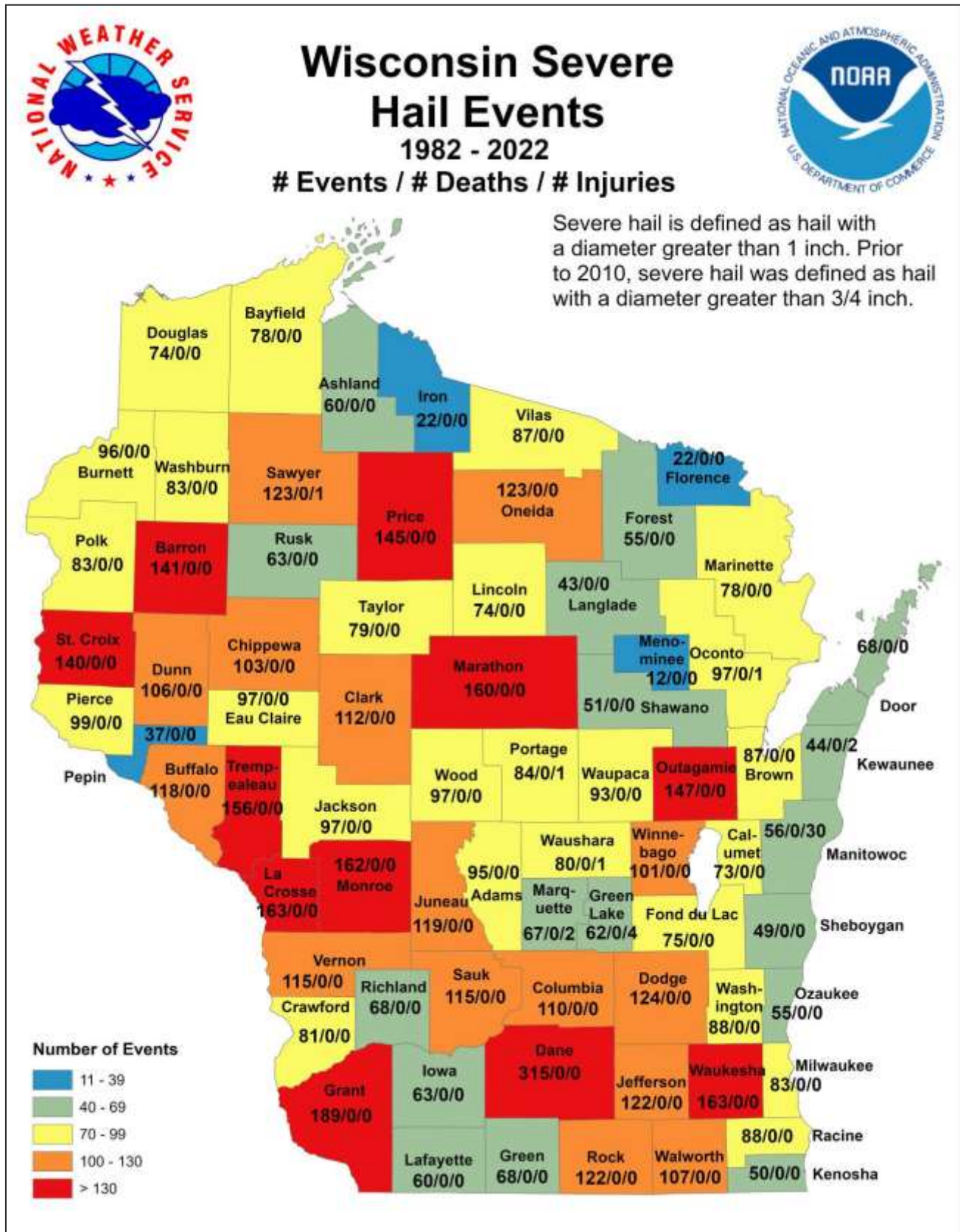


Figure 26. Wisconsin Hail Events, 1982-2022



Significant Polk County Events

Over 90% of the thunderstorm damage reported to the NCDC database is related to high winds. Significant high wind events in recent years were previously highlighted in the Tornado & High Winds assessment previously highlighted the most significant **thunderstorm wind events** in recent history. Flooding as a result of heavy rain is discussed in the flooding section.

Only about 8-10% of all thunderstorm damage in the NCDC database for Polk County can be attributed to hail and over 90% of this hail damage was the result of two storms, both occurring in May:

May 17, 1996 – Hail stones up to 2.5 inches in size resulted in over \$190,000 in reported property damage in the Luch area. No crop damage was reported.

May 16, 2017 – Hail stones up to 2.75 inches in size resulted in over \$609,000 in reported property damage in the Clayton area. No crop damage was reported. This was part of the same storm system that spawned the previously described tornado that destroyed a mobile home park near Chetek in Barron County.

As mentioned previously, no significant lightning events or damages have been reported, but this conflicts with the 29 lightning events per year and relatively high historic loss ratio in the National Risk Index; the storm data used by NRI to estimate these losses is not readily available.

Hazard Probability—Thunderstorms, Lightning, & Hail

The Plan Steering Committee rated thunderstorms, lightning, and hail events as having a moderate probability of occurrence, but the third highest probability of any hazards facing Polk County (see Table 11). The impacts (vulnerability) of such events rated slightly lower (of some concern). In contrast, the *Tornado & High Winds* section discusses the probability of high wind events, which were rated by the Plan Steering Committee as having a similar, moderate probability, but a slightly higher vulnerability (impact).

Based on the thunderstorm events since 1993 and the National Risk Index (NRI), it is probable that Polk County will experience:

- **4-5 thunderstorm event days per year, with high/strong winds accompanying the majority of these events and causing the most damage.**
- **2-5 hail events per year, with serious hail damage being relatively rare (2 serious events every 30 years).**

Due to the lack of NCDC data for lightning events, damage or injury, a probability estimate for lightning events is not included. However, every thunderstorm produces lightning, so the thunderstorm probability above also applies to lightning. The NRI suggests Polk County experiences 33 lightning events per year, making it the most frequent hazard facing the County; it is suspected that multiple reports can be attributed to a single thunderstorm. According to the NOAA, the odds of a person being struck by lightning in a given year are one in 1.2 million and almost 90% of victims live.

Based on stakeholder and local official input, the NCDC data in Appendix E underestimates the frequency of heavy rain events, so a probability for these events is also not estimated here. Instead, it is more important to consider the probability and vulnerability of flooding induced by heavy rain events, which is discussed in *Flooding* threat section.

The *Tornadoes & High Winds* and *Flooding* sections note that the probability of thunderstorm and heavy rain events, with accompanying lightning and hail, will likely increase in the future due to climate trends as discussed in Section III.C.

Vulnerability Assessment—Thunderstorms, Lightning, & Hail

The vulnerabilities related to **thunderstorm wind** events are previously discussed in the *Tornadoes & High Winds* section due to their commonalities and **heavy rain** vulnerabilities are discussed in the *Flooding* section. This section focuses on lightning and hail vulnerabilities.

As shown previously, most thunderstorm events occur with minimal negative impacts and this trend will likely continue. However, severe thunderstorms can cause injury or death from lightning, falling trees, downed power lines, and high-wind impacts. They may cause power outages, disrupt telephone service, and severely affect radio communications and surface/air transportation, which may seriously tax the emergency management capabilities of the affected municipalities.

Appendix F provides the following regarding the potential impacts of lightning and hail events for Polk County as a whole:

- a description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- a description of the vulnerability of each community lifeline for this hazard
- the potential consequences or impacts to the above assets and community lifelines.

In summary, all Polk County populations and above-ground assets are vulnerable to lightning and hail events. During the planning process, the following assets were identified as having the greatest vulnerability:

Lightning

- Festivals, Fairgrounds, & Outdoor Recreation - Large outdoor gatherings pose a unique lightning vulnerability. Persons at the County Fairgrounds' events in St. Croix Falls were identified as having a high vulnerability in Polk County.
- Other Persons outside – There is conflicting information on the number of U.S. lightning deaths each year ranging from 28 to over 300. Unlike a tornado event, lightning does not cause mass casualties, usually claiming one or two victims at a time. Lightning most often strikes people who engage in outdoor recreational activities or work outside. However, one-third of lightning victims are indoors.

- Tall structures and towers. Lightning usually strikes the tallest thing on the landscape. While Polk County does not have any skyscrapers, communication towers, water towers, and above-ground electrical infrastructure are all good lightning targets, including emergency communication towers and sirens.
- Electric infrastructure and systems. See the *Long-Term Power Outage* threat section for related vulnerabilities.
- Farms. The National Board of Fire Underwriters reports that lightning is the top cause of farm fires. Lightning is also responsible for more than 80 percent of all livestock losses due to accidents and millions of dollars in damage to farm buildings and equipment annually. In Wisconsin, insurance records show that one out of every fifty farms are struck by lightning or has a fire that may be caused by lightning each year.
- Forests and development within forested areas. Tall trees, especially on hillsides, are good lightning targets.

Hail

- Buildings, especially siding, windows, and roofs.
- Vehicles.
- Agricultural Crops, especially if mature and close to harvest.
- People and livestock can be injured, though deaths are rare.

Potential Loss Estimates

FEMA's National Risk Index (NRI) suggests that Polk County's losses to lightning are relatively high while hail is relatively low, and provides the following expected annual losses (EALs) for the County:

Risk Factor	Lightning	Hail
EAL Rate – Population	1 per 2.01m	1 per 12.73m
EAL Rate – Buildings	\$1 per \$399.19k	\$1 per \$56.13k
EAL Rate – Agriculture	--	\$1 per \$1.59k
Total EAL	\$290,897	\$367,352
Exposure	\$534.3 billion	\$534.4 billion
Events per year	33	4.4
Historic loss ratio	Relatively High	Relatively Low
Overall Loss Score	80.4 (Relatively Moderate)	78.3 (Relatively Low)

The above table suggests that Polk County is projected to experience annual hail losses 1.25 times greater than lightning losses. Based on \$3.76 billion in assessed improvements, annual hail damage to Polk County's buildings would exceed \$70,000 each year once tax-exempt structures are included. The NRI data also shows that the risk of injury to Polk County's residents from lightning is much higher than that of hail, and a single lightning death would significantly increase the projected total lightning losses.

As discussed in the community profile, Polk County is continuing to grow and develop. This creates an increasing exposure to the number of residents and properties that could be at risk from future thunderstorm, hail, and lightning events.

Risks for Individual Plan Participants—Thunderstorms, Lightning, & Hail

All individual plan participants in Polk County (i.e., villages, cities, educational institutions) are equally at risk of experiencing a thunderstorm, lightning, or hail event. The potential impacts, in general, are also shared, though vulnerability increases with development density, population density, type of development (e.g., height, amount of glass, siding/roof type), and value of improvements.

Outside of high winds and heavy rain, which are discussed elsewhere, the cities and villages did not identify unique risks or vulnerabilities related to thunderstorms, hail, and lightning. Some communities have noted that lightning strikes to infrastructure (e.g., wells, water towers, wastewater plants) have occurred. For electric cooperatives and utilities, lightning and electric storms can also damage equipment and cause outages as discussed in the *Long-Term Power Outage* section. Other than insurance, options to mitigate such lightning strikes are very limited in many cases.

Appendix K provides sub-plans for each city and village and **Appendix L** provides sub-plans for participating educational institutions. These sub-plans identify any thunderstorm-related events or vulnerabilities specific or unique to these individual participants and are supplemental to the previously described event history, probability, and vulnerability assessment for Polk County.

For participating electrical providers, the related event history and vulnerabilities have been integrated into the *Long-Term Power Outage* risk assessment sub-section.



iv. Flooding

This section is organized differently than the previous natural hazard assessments with the flooding assessment followed by an analysis of Polk County's dams.

Defining the Hazard – Flooding

Flooding is defined as a general condition of partial or complete inundation of normally dry land from the overflow of inland waters, or the unusual and rapid accumulation or runoff of surface waters from any source. Often, the amount of damage from flooding is directly related to land use. If the ground is saturated, stripped of vegetation, or paved, the amount of runoff increases and contributes to flooding. Additionally, debris carried by the flood can damage improvements and infrastructure, or can obstruct the flow of water and further add to flooding.

For Polk County, flooding can be further subdivided into three primary types: (1) stormwater or overland flooding, (2) lake or riverine flooding, and (3) flooding resulting from dam failure.

Stormwater Flooding (Overland) and Flash Flooding (Overbank or Overland) - The type of flooding which occurs primarily from surface runoff as a result of intense rainfall is referred to as stormwater flooding or overland flooding. These flooding events tend to strike quickly and end swiftly. If 6" of rain falls on 2,000 square feet of roof and concrete (about the size of a typical roof, driveway, and garage), 1,000 square feet of stormwater will runoff from that single home.

Lake or Riverine Flooding (Overbank) - Major floods in Wisconsin have, for the most part, been confined either to specific streams or to locations which receive intense rainfall in a short period of time. Flooding which occurs in the spring due to snow melt and/or a prolonged period of heavy rain is characterized by a slow buildup of flow and velocity in rivers, streams, or lakes over more than six hours and often over a period of days. This buildup continues until the river, stream, or lake overflows its banks for as long as a week or two, then slowly recedes. Generally, the timing and location of this type of flooding is fairly predictable and allows ample time for evacuation of people and property.

For regulatory purposes, the terms "100-year flood" and "floodplain" are commonly used. A **100-year flood**, often referred to as a **regional flood**, **special flood hazard area**, or **base flood**, is a flood that has a one percent chance of being equaled or exceeded in any given year. This can be misleading as a 100-year flood is not a flood that will occur once every 100 years. The 100-year flood, which is the standard used by most Federal and State agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance.

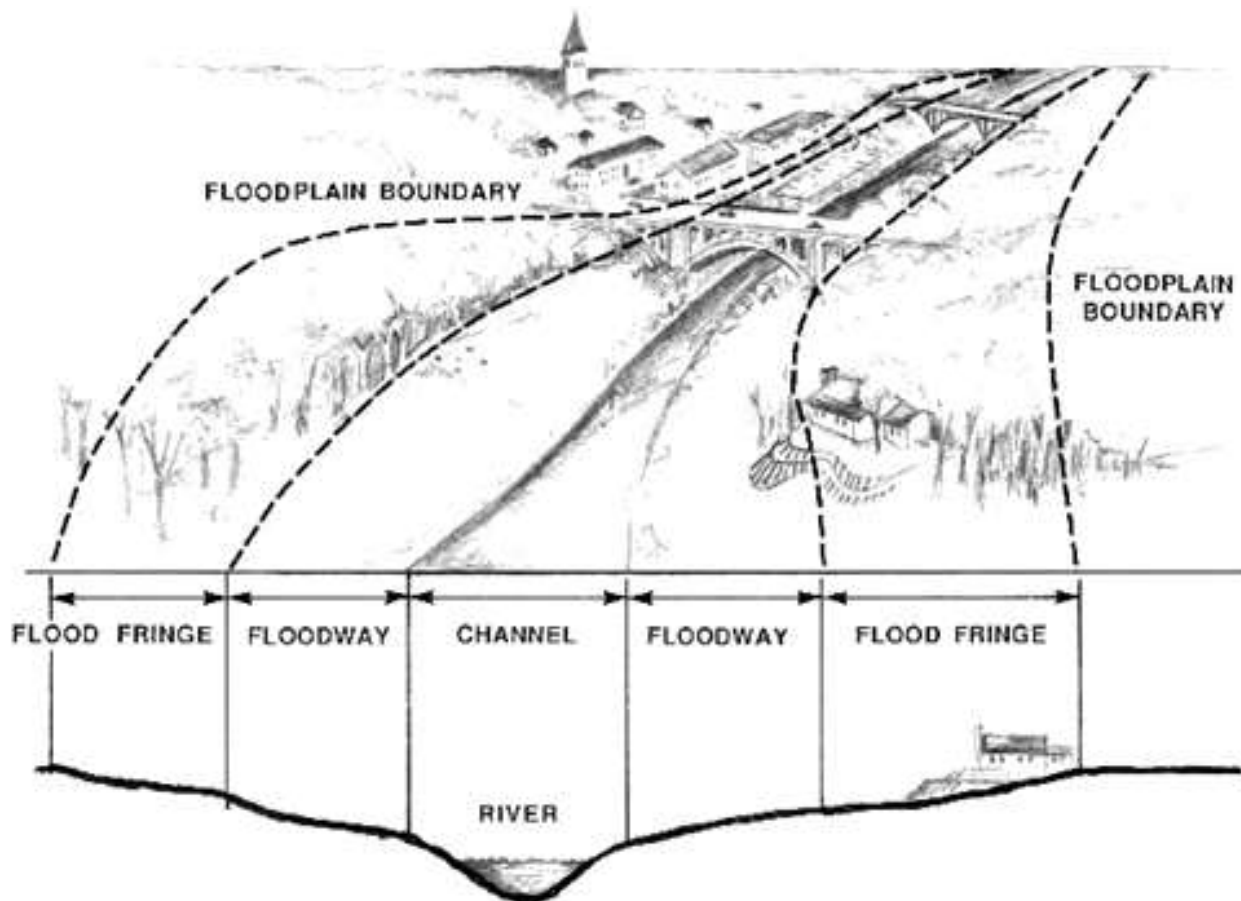
Key Definition

A 100-year flood has a 1% chance of being equaled or exceeded in any given year.

A **floodplain** is land which has been or may be covered by floodwater during a flood event and includes the floodway and flood fringe areas (see **Figure 27**). Often, the term "floodplain" is used inappropriately by assuming that floodplains are limited to the 100-year floodplain boundary that is used for regulatory and insurance purposes. This is not the case, and a floodplain can be identified for a 200-year flood, 500-year flood, or other such level of risk. Floods greater than a 100-year regional

flood event can and do occur. Nationwide, approximately 25 percent of all National Flood Insurance Program (NFIP) claims are for structures outside the 100-year floodplain. This is a surprisingly high number, since many homes or structures outside the 100-year floodplain do not have flood insurance; and flood insurance is typically not required by lending institutions for mortgages on structures not within the 100-year floodplain. But this demonstrates that most properties are at risk of flooding to some degree.

Figure 27. Elements of a Floodplain



Source: Minnesota Department of Natural Resources.

The **floodway** is the channel of a river or stream and those portions of the floodplain adjoining the channel required to carry the regional flood discharge. Since it is associated with moving water, the floodway is the most dangerous part of the floodplain. The **floodfringe** is the portion of the floodplain outside of the floodway, which is covered by flood water during the regional flood and is generally associated with the storage of water rather than flowing water. The floodfringe is also that part of the floodplain in which development may be allowed in some communities, subject to floodplain development standards.

The **regional flood elevation** is the elevation determined to be representative of large floods known to have occurred in Wisconsin or which may be expected to occur on a particular lake, river, or stream at a frequency of one percent during any given year. The **flood protection elevation** is an elevation which is 2 feet above the regional flood elevation as defined by the Wisconsin Department of Natural Resources. Development is sometimes allowed within the floodfringe if the structure is raised above the flood protection elevation. However, development in the flood fringe can decrease important floodwater storage; hydraulic analysis is often needed to ensure that the development will not result in increased flooding in adjacent areas or farther downstream.

Flash flooding is more difficult to distinguish and can, in fact, be either riverine (overbank) or stormwater (overland) flooding. In this plan, flash flooding has been grouped with stormwater flooding due to its often unpredictable nature and the intense, rapid rise and velocity of the water levels. For prediction and warning purposes, floods are classified by the National Weather Service into two types: those that develop and crest over a period of approximately six hours or more, and those that crest more quickly. The former are referred to as "floods" and the latter as "flash floods." Like stormwater flooding, flash flooding is typically the result of intense rainfalls possibly in conjunction with already saturated soils, though very sudden snow melts can also contribute to stormwater or flash flooding.

Flooding from Groundwater Fluctuations – Unique to some areas of Polk County has been repetitive flooding from groundwater fluctuations. These groundwater fluctuations can vary significantly, causing surface water levels at seepage lakes or ponds to increase or decrease 10-15+ feet over a period of 10-20 years. Such fluctuations can also contribute to both overbank or overland flooding, as well as underground seepage into basements. And unique to this phenomena, these fluctuations in water levels often rise or fall very slowly, resulting in flooding or near-flood conditions for years at a time.

Hazard Location

Overbank and overland flooding occur throughout many parts of Polk County. Areas located in a Special Flood Hazard Area (SFHA), also known as ‘100-year floodplain’, are most likely to experience riverine or overbank flooding, while areas prone to overland or stormwater flooding are influenced by a variety of factors (e.g., topography, high water table, stormwater system capacity, land use).

In Polk County, a significant amount of floodplain is assessed as agricultural lands. Flooding of agricultural lands can cause long-term impacts throughout the local economy. Since many floodplains are used for forage, the loss of these crops (e.g. alfalfa) may require farmers to supplement feed for livestock. Due to the low value of forage and high insurance costs, most farmers do not have multi-peril crop insurance for forage crops. Additionally, flooding of agricultural areas can contribute to the failure of older or improperly maintained manure storage facilities. Depending on agricultural practices, heavy rains, flooding, and unexpected snow melt can also result in nutrient run-off into surface waters, resulting in high levels of contaminants and fish kills.

Polk County Flood Insurance Rate Map (100-Year Floodplain Map)

Figure 4 in Section II.B.ii previously showed the locations identified as the 100-year floodplain in Polk County. While these areas are most likely to experience overbank flooding, it is important to note

that the geographic boundaries of these areas are estimated based on various data inputs, which may include topography, hydrology, climatology, and historic records, and that flood inundation can occur in areas not mapped as flood hazard areas

The 100-year floodplain should be considered as Polk County’s high flood-hazard risk area. The 100-year floodplains are shown as the “A” zones on the FEMA Flood Insurance Rate Maps (FIRMs). Nationwide, 26 percent of the 100-year floodplains experience or exceed a 100-year flood event within a typical 30-year mortgage period. The 500-year floodplains (the shaded “X” zones on the FIRM maps) are the medium-risk flood-hazard areas. The remaining unshaded “X” zones on the FIRM maps should be considered the low-risk flood-hazard areas.

Additional high-hazard flood areas can exist that are not shown on the Flood Insurance Rate Maps; other areas prone to flooding are discussed later in this section and in the city/village subplans in **Appendix K**. New and changing floodplains and flood-prone areas can occur with changes in land cover, development, and climate. Municipalities can take the initiative to have new flood risks added to the FIRM maps as a Letter Of Map Change (LOMC) or otherwise consider them during their planning and regulatory processes.

The current Flood Insurance Rate Maps for Polk County were made effective on September 16, 2011, and are available in a digital format (D-FIRMs). The 2011 D-FIRMs were largely created by overlaying the older FIRM maps onto aerial folders. Without accurate, digital topographic data at that time, there were very few adjustments or corrections made. County staff and community officials report that the inaccuracy with the D-FIRMs have been a significant problem for floodplain zoning administration and an update is greatly needed for much of Polk County. This can lead to frustration among the public and local officials, while undermining public trust. County zoning staff also noted that more public awareness is needed on floodplain mapping and insurance, and that the meaning of D-FIRM floodplain boundaries is frequently misunderstood. Many landowners also believe that they have no flood risk, and have no flood insurance, if their home or business is located outside the 100-year floodplain.

Polk County National Flood Insurance Program & Flood Mapping Status	
<i>Initial Flood Hazard Boundary Map:</i>	11/03/78
<i>Date Community First Joined NFIP (Reg-Emer)</i>	06/04/90
<i>Initial Flood Insurance Rate Map (FIRM) Identified:</i>	06/04/90
<i>Current Effective FIRM Date:</i>	09/16/11
<i>NFIP Participation Status (and reason if not participating):</i>	Participant in good standing
<i>Floodplain Regulations w/ NFIP standards:</i>	Adopted
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	County Zoning Administrator

Recognizing the accuracy concerns with Polk County’s D-FIRMs, Wisconsin DNR secured grant funding to conduct a countywide update of the FEMA floodplain maps for Polk County are being updated, including new engineering & delineations for all Zone A, and new delineations for Zone AE using the most recent terrain data. This update process commenced in December 2022 and draft Zone A maps are expected to be released in 2025.

Hazard Extent (Potential Intensities)

The National Flood Insurance Program (NFIP) classifies floods through the use of recurrence intervals.

Table 18. NFIP Flood Recurrence Intervals

Flood Recurrence Interval	Chance of occurrence during any given year
5-year	20%
10-year	10%
50-year	2%
100-year	1%
500-year	.20%

The federal standard for floodplain management under the National Flood Insurance Program (NFIP) is the “100-year floodplain.” This area is chosen using historical data such that in any given year there is a 1% chance of a ‘base flood’ (also known as “100-year flood” or “regulatory flood”). A base flood is one that covers or exceeds the 100-year floodplain.

Event History – Flooding

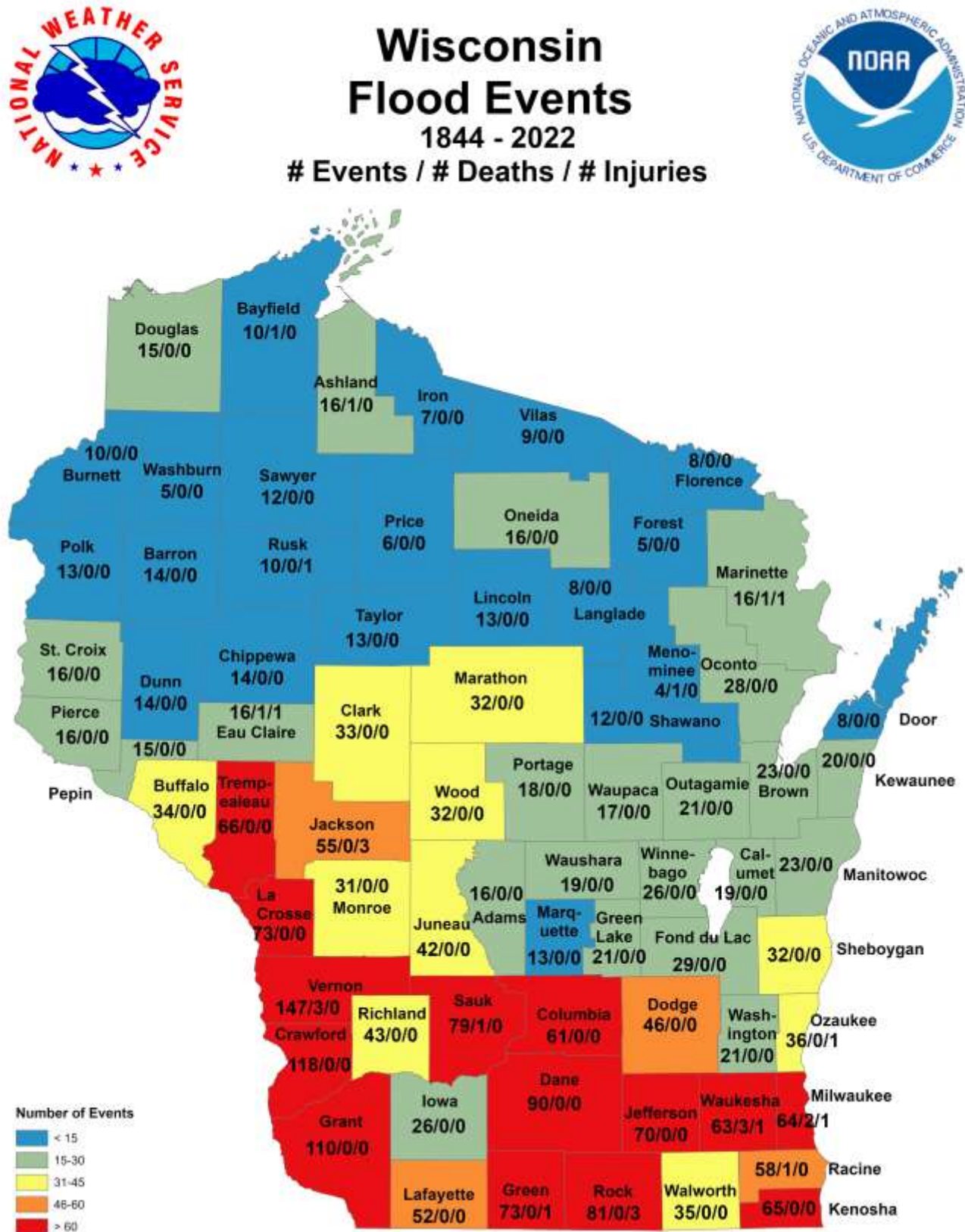
Regional flooding trends are summarized in **Appendix E**, which notes:

- Wisconsin has experienced a significant flooding event at least once every decade since 1880.
- Flood events tend to cause the most widespread damage of all Wisconsin’s natural hazards. Since 1992, flood damages from major events in Wisconsin have exceeded \$2.3 trillion.

Figure 28 shows the county-by-county distribution of flood events across Wisconsin for the period of 1844 to 2022.

Compared to southern Wisconsin, Polk County has had a relatively low number of severe flooding events. Hilly terrain in the Driftless Area of southwestern Wisconsin and the built-up urban areas in the south-southeast are factors that increase the chances of flooding. Even so, very few flood-related injuries and deaths have occurred in Wisconsin.

Figure 28. Reported Flooding Events in Wisconsin by County, 1844 to 2022



National Climate Data Center (NCDC) Summary Table

Appendix E includes NCDC flooding reports impacting Polk County. Data from the National Climatic Data Center for flood events is not available prior to 1993.

Flooding Events Summary (1/1/1993 to 12/31/2022)	
Total Events: 12	Number of Events Per Year: 0.41
Total Event Days: 11	Number of Event Days Per Year: 0.38
Total Injuries: 0	Total Deaths: 0
Total Event Days with Property Damage: 3	
Property Damage (from NCDC): \$ 518 M (\$400 K from 09/01/02 event)	
Property Damage (adjusted for inflation): \$ 807 K	

7 of the 12 reported events from 1993 to 2022 were flash flooding events – three of which occurred in the Village of Clayton.

National Flood Insurance Program (NFIP) Policies & Claims

As of December 31, 2023, there were a total of 48 active National Flood Insurance Program (NFIP) flood insurance policies in Polk County, which is a decrease from 65 policies in 2017:

Community	# of Policies	Total Coverage	Total Premium + Federal Policy Fee
Polk Co. - unincorporated towns	38	\$9,542,000	\$23,978
City of Amery	2	\$372,000	\$1,893
City of St. Croix Falls	2	\$522,000	\$2,485
Village of Balsam Lake	5	\$405,000	\$3,797
Village of Osceola	1	\$50,000	\$267

The decrease in the number of NFIP policies since 2017 may be partially explained by the updated D-FIRMs in 2011. Continued local enforcement of floodplain zoning and stormwater management regulations, which reduces the number of floodprone structures, may also be influencing NFIP participation.

According to data provided by FEMA and Wisconsin Emergency Management, from 1978-2023 there have been around 15 NFIP claims for Polk County with a total paid of about \$325,000. Nearly all of these claims have been in the unincorporated towns, except two claims in the Village of Osceola. Five claims were for properties on Sand Lake in the Town of Osceola between 1983-1985. There have been no repetitive loss properties within Polk County. Repetitive loss properties are those properties participating in the National Flood Insurance Program (NFIP) for which two or more claims of \$1,000 or more in a 10-year period have been paid.



Significant Polk County Events

Most of the County's rivers and lakes stay within their banks during heavy rains or spring run-off. For those areas prone to overbank flooding, precautions have been implemented to mitigate flood damage, such as floodplain zoning and dam controls. The most significant flooding problems over the past decade have occurred when natural or man-made drainage and stormwater systems have been unable to handle heavy rain events, especially in low-lying areas or when the ground is already saturated.

Since 1953, there have been six Federal Major Disaster Declarations that encompassed Polk County, four of which involved flooding in 1965, 2000, 2001, and 2002. The fact that three of these events have occurred since 2000 supports the opinions of many local officials that stormwater and flash flooding problems have been increasing in recent years for many areas of the County.

April 1997 On April 12, the St. Croix River reached a crest about 3.5 inches above flood stage at Stillwater, MN, which was the third highest crest ever measured. Landing Park in Osceola was inundated by flooding. No specific information on the types of flood damages as a result of this event within Polk County is available. This must have been a relatively localized flooding since the event did not make Wisconsin Emergency Management's (WEM's) list of major flooding events in Wisconsin.

June/July 2000 Severe thunderstorms accompanied by heavy rains, high winds, and stormwater flooding struck Polk County. This event was part of a Presidential Disaster Declaration, though it is strangely absent from the NCDC database. Damages in Polk County were estimated at \$592,500 (over \$838,000 in 2017 dollars), the majority of which were due to the washout of roads, shoulders, and culverts. Statewide, flooding damage during this spring and summer period is estimated at \$72 million.

April 2001 Heavy snow fall during the winter largely remained on the ground through March, then rapidly melted. Water quickly began to fill ditches, streams, and rivers. Two significant rainfall events further contributed to the flooding. Kennedy's Mill Dam became clogged with debris causing an adjoining embankment to collapse, but damages were confined to the area just downstream of the dam and no structures (except the dam and a town road downstream) were impacted. Some leaks and erosion also occurred at Woodley's Country Dam, which was privately owned at the time, and the dam came close to failure, but local emergency measures saved the structure. Total damages in the County from this event were estimated at \$1,600,717 (over \$2.2 million today), but are not included in the NCDC database shown in the previous table. Statewide flooding damage was estimated at \$84.2 million in April 2001.

September 2002 This was Polk County's third flood-related Presidential Disaster Declaration in three years with characteristics similar to the June 2000 event with stormwater flooding and high winds as a result of thunderstorms. More than five inches of rain fell within a few hours resulting in documented damages of \$3 million according to WEM records. The Village of Osceola was the hardest hit in the 2002 disaster when a privately owned dam failed and caused damage to a private mobile home park and the Village-owned Mill Pond Park. This dam failure also caused damage to the lower dam which runs under State Highway 35, Wilkes Glen Park, and Cascade Falls on the St. Croix River. But on a regional scale, the damages associated with this event in the Osceola area were overshadowed by the tornado which struck the City of Ladysmith about 85 miles to the east in Rusk County.

During the 2002 flooding, the St. Croix River exceeded the 100-year flood and was the largest flood on historic record. Water rushed down-river at a rate of 62,000 square feet per second or 26.7 million gallons per minute. **However, damage within the St. Croix River floodplain was minimal and limited primarily to parks and landings.**

July 2005 Localized stormwater or flash flooding occurred throughout the region when several inches of rain fell in less than two hours. The City of St. Croix Falls was especially hard hit, and a significant washout occurred at the intersection of Kentucky Street and Adams Street just east of Highway 87.

October 2005 Heavy rains were experienced countywide, especially in northern parts of the County, leading to stormwater/flash flooding. Several roads were flooded. Some driveways were damaged and washouts were reported in and around some culverts. A number of roads in northern portions of the County between Frederic and Lewis remained flooded for multiple days.

August 2010 Several rounds of heavy rainfall led to significant flash flooding throughout parts of west-central Wisconsin. Southern portions of Polk County were particularly affected. An observer in Clayton, Wisconsin, reported basement flooding with approximately two inches of water covering the floor.

Appendix I in Polk County's 2017 hazard mitigation plan lists the FEMA project applications for Polk County as a result of the 2000, 2001, and 2002 disaster events. Altogether, \$3,028,989 (over \$4 million in today's dollars) in applications were submitted, which addressed damages in 18 of the County's 24 towns and five cities and villages. Over one-third of these damages were road, culvert, and shoulder repairs associated with flash flooding.



Recent road washout in the Town of Clam Falls following a heavy rain.

Smaller, but still damage-producing flash and overland flooding events occur more frequently and tend to be a more significant issue for improvements near the smaller streams and drainageways of the County which may not have areas available to retain flood waters. As an example, there have been additional summer thunderstorms that were accompanied by heavy rains that produced localized flash flooding, such as in **July 2019** and **June 2020**. Flood damage from these events were largely limited to the washed-out road shoulders and culverts

In recent years, such flash flood events have been reported regularly in some areas. These events are largely the result of very heavy rains in a short period of time and can be relatively localized in impact. Reported damage to structures has been less than the larger riverine floods, but can place near-constant demands on local municipalities and landowners to maintain and improve local roads and properties to repair damages and mitigate potential future impacts.

Areas Prone to Flooding

During past mitigation plans and this plan update, County staff and local officials identified a number of areas in unincorporated Polk County that are particularly prone to flooding shown in **Figure 29**. Floodprone areas within the villages and cities are individually discussed in the community mitigation subplans in **Appendix K**.

These rural Polk County flooding concerns generally fell into four categories:

- 1) **Road Damage and Closures Due to Stormwater and Flash Flooding, especially in “Low Areas”** – Unless otherwise noted in Figure 29, the flooding “hotspots” identified for the unincorporated towns on the map are primarily associated with over-the-road flooding and potential roadway closures and related damage, rather than damage to buildings and structures. Such flooding events can result in vehicle accidents and deaths, as well as damage to road shoulders, culverts, bridges, etc. The “hotspots” include those identified during the 2006 and 2012 hazard mitigation planning efforts, unless town officials, County Highway staff, or others noted changes.

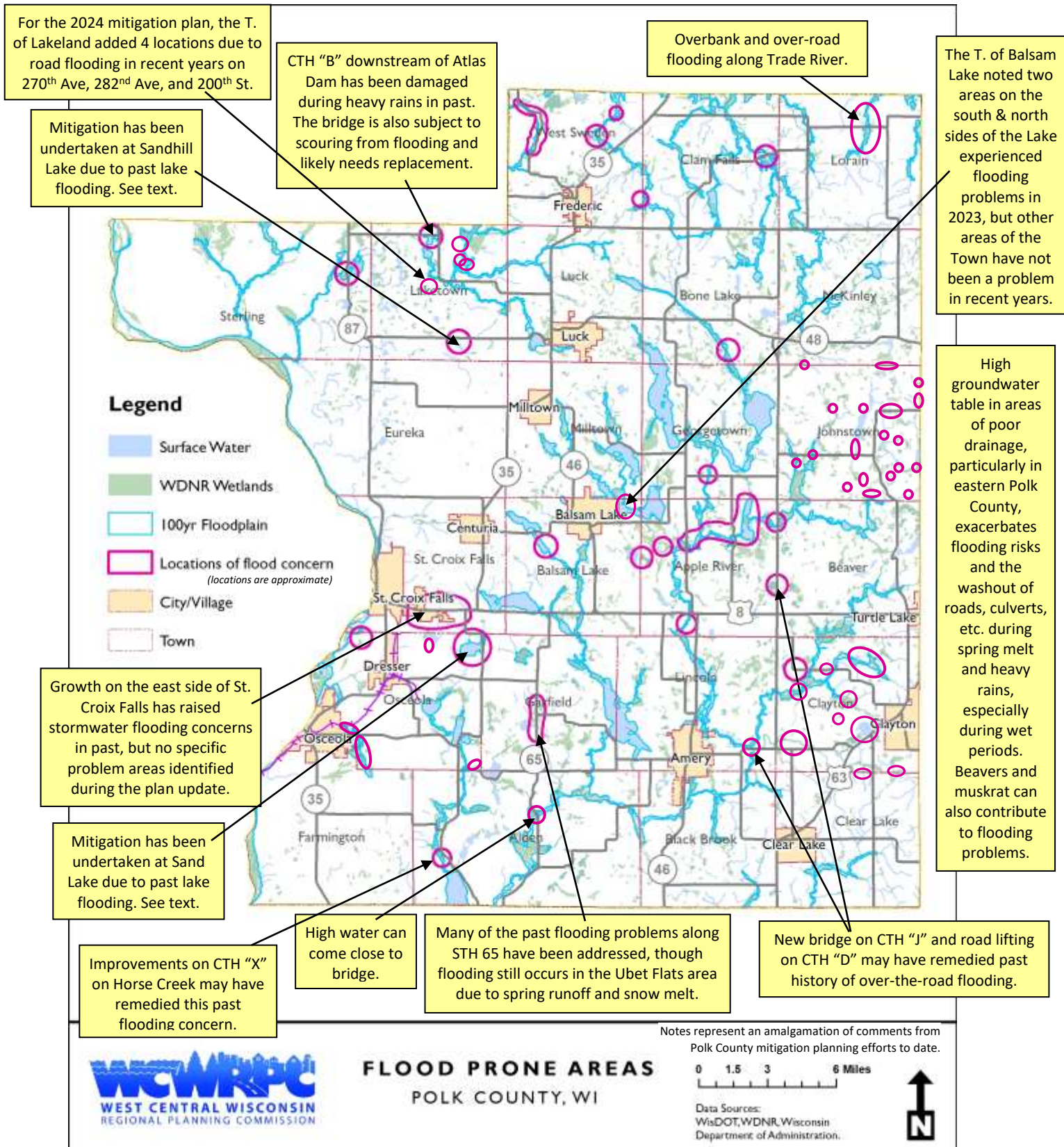
During the 2006 planning process, Town of Alden Chairman Brad Johnson wrote, “The largest hazard, as far as frequency, is heavy rain. We have not experienced heavy flooding in a specific area repeatedly, but it has created problems in various areas.”²⁵ The Town of Alden experience is shared by much of the County, where heavy rains can produce stormwater flooding “hotspots”, but the risk of damage due to repetitive riverine or lake flooding is relatively minimal. This seems representative of the continuing experience in most towns.

One interviewee during the 2012 planning effort noted that heavy rains and flooding seem to have been worse in the northern portion of the County in recent years. Yet Figure 29 shows that flooding problems are located throughout the County in low areas where roads cross or follow streams, wetlands, and areas with high groundwater tables, in particular in the eastern parts of the County. One such area is along CTH “D” north of Range which is frequently underwater and lacks sufficient ditching.

It is notable that numerous flood “hotspots” identified in previous hazard mitigation plans have been mitigated through road, culvert, and/or ditch improvements and were deemed to no longer be flooding “hotspots.” For example, significant roadway improvements have been made along STH “65”, CTH “A”, STH “87”, and USH “8”. Improvements were made to CTH “W” in the Town of West Sweden which has decreased the problem areas from about six in the past down to one or two spots.

²⁵ Johnson, Brad. *Letter to West Central Wisconsin Regional Planning Commission on Local Hazards*. letter dated 12/5/03.

Figure 29. Areas Prone to Flooding (Unincorporated Towns Only)



2) **Fluctuating Seepage Lakes** – Overall, water levels at most lakes in the County have been very stable. But two seepage lakes, in particular, have had past problems with flooding. Seepage lakes are primarily spring-fed with no natural outlet. Due to drought conditions over five of the last seven years, water levels of these seepage lakes have been down and no significant flooding problems have been reported.

The 2006 plan identified two seepage lakes—Sand Lake (Town of Osceola) and Sand/Sandhill Lake (Town of Laketown)—as the only overbank flooding hotspots in unincorporated Polk County which had repetitive problems in the past, could potentially impact a large enough area, and include multiple improved properties to potentially warrant site-specific mitigation activities. Together, properties at these two locations represent six of the fourteen NFIP claims in Polk County to date. Significant development has occurred around both of these lakes. At least 20 lakeshore homes can be found at Sand (or Sandhill) Lake in the Town of Laketown, while over 45 surround Sand Lake in the Town of Osceola.

Mitigation measures have been undertaken at both locations, and no additional damage or problems have occurred in the interim. At Sand Lake in the Town of Laketown, cabins were moved farther back from the lake; and an overflow pipe was installed to help maintain water levels. At Sand Lake in the Town of Osceola, local springs have greatly contributed to the flooding problems in the past, but there has not been reoccurring problems since the recent raising of the adjacent road. Both locations are being monitored and no further action is warranted at this time.

- 3) **Stormwater Run-off in Developing Areas** – Stormwater runoff problems have also been a concern for some residential subdivision and commercial developments. Recently, more attention has been given to stormwater management during the planning and site plan review process by both local governments and builders to address this concern. Those areas experiencing new development are particularly prone to stormwater problems, especially those growth areas of south-west and south-central portions of the County as discussed in the *Community Profile—General Development* section earlier in the Plan. Also prone to stormwater runoff issues are areas at the interface of incorporation boundaries, as stormwater moves from municipality to municipality. A number of cities and villages have had such issues as described in their respective sub-plans in Appendix K.
- 4) **Flooding along the Apple River** – Over the past fifty years, damage from overbank flooding along Polk County rivers has been relatively small. According to the FEMA Flood Insurance Study dated September 16, 2011, “[f]looding problems in Polk County are due primarily to the overflow of the Apple River,” though the study does not identify the extent of these problems. To date, there have only been two National Flooding Insurance Program policy claims for properties on the Apple River. Based on the town hazard surveys, the most significant flooding concerns along the Apple River are concentrated in the Town of Apple River.

It is important to note that of the major flood events since 1997, there have been three instances of significant damage at dam structures. Two of these dams (Woodley and Osceola) have since been removed, while significant improvements have been made to Kennedy’s Mill Dam. However, these

events demonstrate the importance of dam maintenance and monitoring as well as the potential risks downstream within the dam shadow.

Notably absent from Figure 29 and the previous discussion are any concerns with overbank flooding along the St. Croix River. The St. Croix River has been well above flood stage numerous times in the last two decades with minimal damage, though numerous roads and bridges were underwater in 2001. The St. Croix River is a National Wild and Scenic River. This status, combined with local floodplain management, steep banks in some areas, and extensive public-owned lands along the river, has largely mitigated the potential for building and property damage. Flood impacts along the St. Croix are typically limited to recreational areas, such as boat landings. A picnic area within Interstate State Park is frequently flooded in the spring or following severe rain events, which prevents access, but actual damage is relatively minimal.

Agricultural Flooding

Approximately 42 percent of reported damages from Wisconsin floods between 1993 and 2000 were from crop losses. Flooding can have additional agricultural impacts as well. Since many floodplains are used for forage, the loss of these crops (e.g. alfalfa) may require farmers to supplement feed for livestock. Due to the low value of forage and high insurance costs, most farmers do not have multi-peril crop insurance for forage crops. The remaining forage in flooded areas can be lower in quality, reducing milk production and complicating or reducing pregnancies and births. Feed and water quality problems which result in sick animals also increases veterinary costs. Agricultural flooding impacts can also be long-term and more difficult to quantify. The harvesting of crops in wet areas can compact soils, further reducing crop yields for years to come.

Fewer than 1,000 acres of non-forest, cropped agricultural lands fall within the 100-year floodplains of Polk County, which is relatively low compared to some counties. While crop damage due to flooding is occasionally experienced in some areas, statistics regarding crop losses in the past or future vulnerability due to flooding are not readily available. These potential losses can vary depending on the type of crops planted, though it is common practice to often use such floodprone areas for hay, forestry, or pasture. And while prolonged flooded conditions are not common, periods of excessive soil wetness can delay spring planting and indirectly hinder yields by shortening the growing season. Standing water following heavy rains or prolonged wet periods is not limited to floodplains. Denitrification and oxygen depletion of crops can severely reduce yields or result in plant death after prolonged water-logging.

An additional agricultural flood-related threat is associated with non-point pollution, such as manure, nutrient, and pesticide run-off. Heavy rains, flooding, and unexpected snow melt can result in heavy run-off into surface waters, resulting in high levels of nutrient loading and contaminants. Heavy rains and ice damming can also result in the failure of improperly maintained or sited manure storage facilities. Some small fish kills due to run-off have occurred in Polk County in the past. And such non-point pollution can create health concerns for swimming and fishing, thus impacting tourism. Issues related to animal waste and nutrient management are primarily monitored and addressed by local farmers and the Polk County Land and Water Resources Department with partnership support of the Polk County UW-Extension Office and other State and Federal agencies (e.g., DATCP, WDNR, NRCS). However, it is very important to note that many sources of non-point pollution are not

agricultural related, such as urban stormwater, road and parking lot run-off, and soil erosion from new development.

In addition, about 5,800 acres of forest lands and 5,100 acres of forested wetlands are located in floodplains, though past impacts of flooding on forest lands in Polk County are believed to have been minimal. Compared to other agricultural croplands, forested areas are typically less impacted by and more resilient to flooding. The potential flood impacts to these forest lands are considered minimal, overall, though river or lake flooding can cause some trees to topple, especially in areas of steep slopes or within the floodway. New plantings, if covered by floodwaters for an extended time, would be most vulnerable.

Overall, riverine or lake flooding of agricultural and forest lands is largely addressed by the individual landowner with a relatively low vulnerability. Local farmers are very aware of the flood risks and vulnerabilities on their lands and, if needed, most obtain crop insurance to mitigate the impacts of flooding on their farm businesses. But with appropriate nutrient management practices and care in application, the hazard threats to water quality from agricultural practices can be mitigated.

Agricultural flooding does not require additional mitigation action by Polk County or its municipalities within the scope of this plan at this time. County officials note that prevention and best practices are the best way to avoid additional scrutiny and rules which can pose additional hardships to the farmer. Emptying storage facilities on schedule, avoiding spreading prior to rain or heavy snow melt, planting fall cover crops, crop insurance, and following a nutrient management plan are all important steps to mitigating flooding and runoff.

Hazard Probability – Flooding

The Plan Steering Committee rated riverine or overbank flooding as being low to some probability, slightly lower than overland flooding (see Table 11). Vulnerability or impacts were rated similarly. Flooding in Polk County will continue to be a significant risk for residents and improvements. The drought during the previous decade contributed to a reduction of recent, more widespread flood events.

Based on the past decade, it is likely that **Polk County will continue to experience one serious, damage-causing flood event every two years on average, with localized flooding and stormwater ponding occurring annually or even more frequently after heavy rain events.** Riverine and spring snow-melt flooding of some croplands is an annual event in some locations and this is anticipated to continue in the future. Flooding on seepage lakes is very difficult to predict due to the cyclical nature of the groundwater levels and droughts.

Flash flooding due to heavy rains will be the most frequent cause of flood damage in the County and can occur at any time of the year. The increasing frequency of heavy rain events, plus warmer, wetter winters, is anticipated to increase the flooding probability over time. Those areas most prone to the typical annual riverine flooding associated with snow melt are well known and potential damages have been largely mitigated. Appendix L addresses local variances in flood frequency within the cities and villages.

Vulnerability Assessment

Appendix F provides the following regarding the potential impacts of flooding events for Polk County as a whole:

- A description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- A description of the vulnerability of each community lifeline for this hazard; and
- The potential consequences or impacts to the above assets and community lifelines.

In summary, Polk County populations located in or near the 100-year floodplain or near a high-hazard dam, are most vulnerable to flooding events. During the planning process, the following assets were identified as having the greatest vulnerability:

- **Roads and culverts** are often washed out or damaged during flash flooding events, representing the County's largest portion of flood-related damages in recent decades. There have been deaths and injuries to **travelers on flooded roadways** in adjacent counties, but no such recent incidences have occurred in Polk County.
- **Populations and structures in low lying areas or near water bodies are more vulnerable than those in higher elevations or outside the 100-year floodplain.**
- **Campgrounds**, which are often located near a surface water, are at increased risk of being inundated with water during a flood event. There are a few cases of smaller seepage lakes without designated floodplain boundaries that can cause flooding concerns for nearby buildings and infrastructure during periods of high groundwater.
- **Developed areas with large areas of impervious surfaces and hardscape** are more prone to stormwater or flash flooding or the flooding of nearby areas, especially when on or near the base of hills. Such flooding can also infiltrate or overwhelm municipal sanitary or storm sewer systems. Generally, these areas are located within the incorporated cities and villages, and are addressed in Appendix K.
- After a flood event, it is important that the public understands that **private wells** may be contaminated and testing is strongly encouraged. The County's Environmental Health Office has testing kits and other resources available to assist with related outreach.

Other than transportation facilities, no community lifelines were identified as having a high flood vulnerability. Some electrical infrastructure lies within floodplains, though flood impacts have been minimal (e.g., a few transformers).

Projected Loss Estimates

Through the use of current D-FIRM maps and G.I.S. parcel data, those principal structures potentially located within a 100-year floodplain were identified by the Polk County GIS Coordinator. This information is further supplemented through the previously discussed floodprone areas map to guide the development and prioritization of flood-related mitigation strategies. A full description of the flood assessment methodology and related data challenges is included in **Appendix G**.

Figure 30 identifies the 100-year floodplains within Polk County along with the location of all principal structures located partially or wholly within the 100-year floodplains. Principal structures are those buildings located on a parcel within which the main use of the parcel takes place; when distinguishable, out-buildings or accessory structures within the 100-year floodplains are not included.

Figure 30 is followed by **Table 19**, which provides a synopsis of those potentially floodprone principal structures by municipality. The assessed use and estimated value of improvements is based on 2022 tax data for those parcels associated with each of the principal structures identified in Figure 30.

In total there are an estimated 559 parcels in Polk County with one or more principal structures potentially being located within the 100-year floodplain. Of these parcels, 68% are residential constituting 82% of the total assessed improvements possibly located in the floodplain.

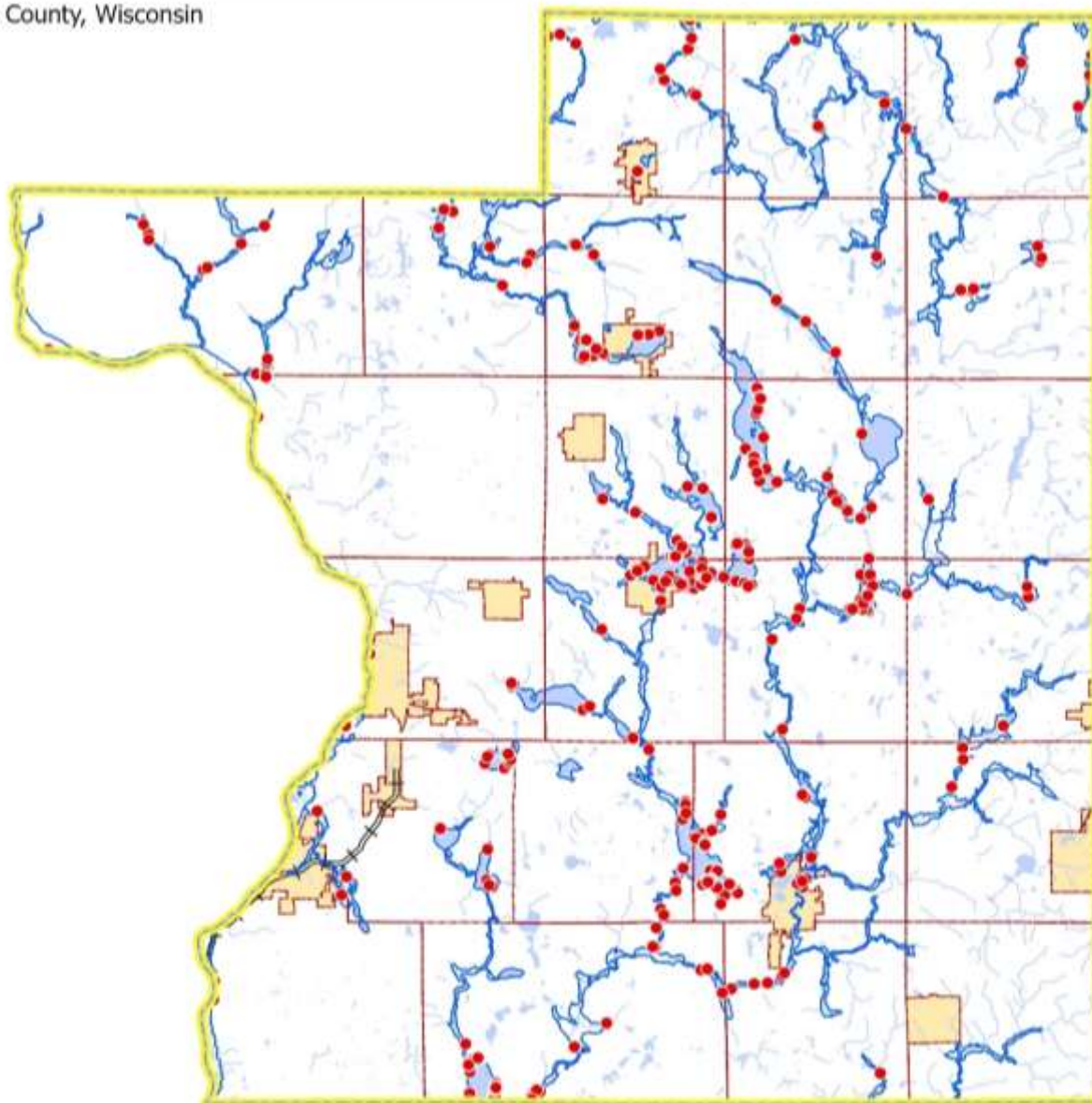
It must be noted that the structures identified in Figure 30 and in Table 19 may not have had flooding problems in the past. To the contrary, the majority of these properties have no history of flooding and may not be vulnerable to flooding in the future. Data for individual structures is not currently available (e.g., number of stories, existence of basements, individual building values, building elevation), so we are unable to confirm if a specific building is elevated above (or below) the base flood elevation, nor can we estimate potential flood damage by individual structure. In some cases, due to topography at the building site or construction methods, the structure may actually be elevated higher than the adjacent 100-year floodplain.

Further, as discussed in Appendix G, for properties with multiple buildings and ancillary structures, the exact use and nature of each structure within the floodplain is not known and tax assessment data is only available at the full parcel level, not for specific structures. And in some cases, an ancillary structure (e.g., barn, shed, boathouse) is located in the floodplain but is not reflected in Figure 30 or Table 19 since the principal structure on that parcel was located outside the delineated floodplain.

Figure 30. Polk County Floodplains & Potential Structures in Floodplain

FLOODPLAINS & POTENTIAL FLOOD STRUCTURES

Polk County, Wisconsin



Legend

- Principal Structure in 100-yr Floodplain
- 100-yr Floodplain
- Surface Water
- City/Village
- Town

Data Sources (2023):
WisDOT, WisDNR, WisDOA
WCWRPC, Polk County

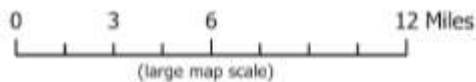


Table 19. Principal Structures potentially in 100-Year Floodplain—2023

MUNICIPALITY	# PCLS W/PRINC STRUCTURES	RESIDENTIAL USE	RESID. IMP VALUE	COMM-ERICAL USE	COMM. IMP VALUE	OTHER USE	OTHER IMP VALUE	TOTAL ASSESSED IMP
ALDEN	62	53	\$9,834,200			9	\$399,100	\$10,233,300
APPLE RIVER	58	41	\$6,474,800			17	\$2,299,500	\$8,774,300
BALSAM LAKE	18	16	\$2,758,800			2	\$0	\$2,758,800
BEAVER	4					4	\$179,200	\$179,200
BLACK BROOK	6	3	\$279,900			3	\$0	\$279,900
BONE LAKE	4	-				4	\$552,500	\$552,500
CLAM FALLS	4	2	\$138,600			2	\$55,400	\$194,000
CLAYTON	3	2	\$336,900			1	\$0	\$336,900
CLEAR LAKE	-							\$0
EUREKA	4					4	\$161,500	\$161,500
FARMINGTON	3					3	\$114,700	\$114,700
GARFIELD	13	8	\$1,619,400			5	\$148,200	\$1,767,600
GEORGETOWN	72	62	\$12,049,000			10	\$2,995,700	\$15,044,700
JOHNSTOWN	1					1	\$0	\$0
LAKETOWN	9	6	\$329,600			3	\$146,300	\$475,900
LINCOLN	88	78	\$8,139,600	6	\$487,700	4	\$0	\$8,627,300
LORAIN	7					7	\$258,300	\$258,300
LUCK	27	22	\$1,950,900			4	\$115,400	\$2,066,300
MCKINLEY	7	5	\$728,600			2	\$0	\$728,600
MILLTOWN	18	17	\$6,152,200			1	\$0	\$6,152,200
OSCEOLA	22	18	\$1,936,800	1	\$191,900	3	\$126,100	\$2,254,800
ST CROIX FALLS	41	2	\$137,700			39	\$0	\$137,700
STERLING*	14	4	\$210,500			10	\$427,600	\$638,100
WEST SWEDEN	10	2	\$130,300			8	\$604,100	\$734,400
V-BALSAM LAKE	39	18	\$2,084,700	15	\$3,291,900	6	\$0	\$5,376,600
V-CENTURIA	-							\$0
V-CLAYTON	-							\$0
V-CLEAR LAKE	-							\$0
V-DRESSER	-							\$0
V-FREDERIC	1			1	\$12,500			\$12,500
V-LUCK	7	6	\$738,000			1	\$205,500	\$943,500
V-MILLTOWN	-							\$0
V-OSCEOLA	2	2	\$322,500					\$322,500
V-TURTLE LAKE	-							\$0
C-AMERY	6	6	\$1,182,200					\$1,182,200
C-ST CROIX FALLS	9	8	\$1,628,800			1	\$0	\$1,628,800
TOTAL	559	381	\$ 59,164,000	23	\$3,984,000	154	\$ 8,789,100	\$ 71,937,100

FEMA National Risk Index (NRI) Estimated Annual Losses

FEMA's NRI provides the following estimated annual losses (EALs) for Polk County, further confirming that the County's riverine flooding hazard is very low.

Risk Factor	Riverine Flooding
EAL Rate – Population	1 per 22.55m
EAL Rate – Buildings	\$1 per \$290,280
EAL Rate – Agriculture	\$1 per \$29,670
Total EAL	\$72,311
Exposure	\$6.2 billion
Events per year	0.4
Historic loss ratio	Very Low
Overall Loss Score	22.0 (Very low)

Based on \$3.76 billion in assessed improvements, annual riverine flooding damage to Polk County's buildings alone would be close to \$13,000 each year, not including tax-exempt structures. The NRI estimates that Polk County has \$1.27 million in agricultural value exposure to riverine flooding, which would equate to less than \$50 in agricultural losses per year. In short, the NRI loss estimates further support the fact that overland flash and stormwater flooding is a more significant concern in Polk County than overbank riverine flooding.

Other Factors Influencing Future Losses

Three primary factors are key to projecting future flood vulnerabilities:

1) **Changes in Precipitation** – Section III.C. previously discussed predicted climate changes for the region, including more precipitation during the winter months and more frequent heavy rainfall events. The projected 36 percent increase in 2" rainfall events per decade would likewise increase flooding potential and may result in additional areas being considered 100-year floodplains in the future. However, with a projected increase in summer drought conditions, surface water levels would likely be lower overall. No detailed modeling on the full impacts of such climate changes on Polk County surface waters has been performed.

2) **Changes in Flood Storage** – Overall, the floodplains and wetlands of Polk County are well protected. Encroachment of wetlands and new development often require the creation of new flood storage areas. Instead, the loss of flood storage will primarily be the accumulated loss or disruption of smaller stormwater storage areas, natural infiltration systems, and natural drainage systems. Polk County is experiencing growth. Every hardscape that is created (e.g., buildings, roads, parking lots), results in a change in potential stormwater or flood storage. This factor can be mitigated through stormwater management planning and mechanisms such as rain gardens, natural swales, rain barrels, pervious surfaces, and the creation and maintenance of flood storage areas.

3) **Floodplain Development** – While demand for shoreland living is high, new floodplain development is well regulated and rarely allowed. Public land ownership and restrictive easements along the St. Croix River further limit potential floodplain development in Polk County. Very little new floodplain development is occurring, so the number of structures in Table 19 should not significantly increase over time unless the physical extent of the 100-year floodplain grows. The overall vulnerability of floodplain development is expected to increase as the market value of these

structures increases and some older, seasonal structures are renovated as year-round retirement homes.

In short, floodplain development vulnerabilities are projected to increase in the future not from new development within the floodplain, but rather from increasing precipitation (and runoff), the increasing market value of existing structures, and the improvement of existing structures. No significant floodplain development is currently planned. Instead, the increasing flood vulnerability in Polk County will likely be from overland stormwater flooding as a result of additional heavy rainfall events and changes in natural stormwater storage and drainage patterns as new development occurs.

Risk for Individual Plan Participants - Flooding

The number and value of structures potentially within the high-hazard floodplains areas of each incorporated community was previously discussed (see Figure 30 and Table 19). **Appendix K** includes hazard mitigation sub-plans for each city and village within Polk County. These sub-plans include for each community:

- a summary and map of current flood-related concerns and mitigation activities in each community
- NFIP participation and floodplain management status
- the status of municipal dams or any dam-related concerns.

For the cities and villages, stormwater or overland flooding is the primary concern, not river/lake flooding, with Osceola also experiencing some bank stabilization damage in the past. Flooding concerns for participating educational institutions are addressed in **Appendix L**.

Polk County Dam Assessment

Defining the Hazard

Dam Failure – According to the FEMA Federal Guidelines for Dam Safety, dam failure is defined as:

“Catastrophic type of failure characterized by the sudden, rapid, and uncontrolled release of impounded water or the likelihood of such an uncontrolled release. It is recognized that there are lesser degrees of failure and that any malfunction or abnormality outside the design assumptions and parameters that adversely affect a dam’s primary function of impounding water is properly considered a failure. These lesser degrees of failure can progressively lead to or heighten the risk of a catastrophic failure. They are, however, normally amenable to corrective action. (FEMA 148).”

Dam failure can occur from structural problems at the dam, hydrologic problems, malfunction of equipment, or human error in the monitoring or release of water. As such, dam failure can occur with little or no warning and on clear days with no rain, unlike the other types of flooding. Technically, dam failure could be considered a man-made hazard and, thus, outside the scope of this hazard mitigation plan. However, given the County’s ownership and management of a number of dams and

the inherent relationship and similarities between dam failure and other types of flooding, a decision was made to include a discussion of this hazard as part of the flooding assessment.

Older dams which have been poorly maintained have a larger potential of dam failure. Hydrologic problems may occur when there is heavy precipitation or snow melt, resulting in more water being impounded than by design or more than the spillway can handle, resulting in adjacent flooding, overtopping, or structural failure. A partial or complete failure of a dam can release great amounts of water, leading to loss of life and substantial damage downstream. A dam failure may lead to additional failures of other downstream dams. And the sudden, prolonged disappearance of an impoundment due to dam failure can also have serious impacts on wildlife habitat, recreation, and tourism.

Hazard Location and Extent

As of February 2024, Polk County had 97 dams listed in the WDNR dam database as summarized in **Appendix H**. The dams of Polk County are shown in **Figure 31**, along with their Wisconsin Department of Natural Resources hazard ratings.

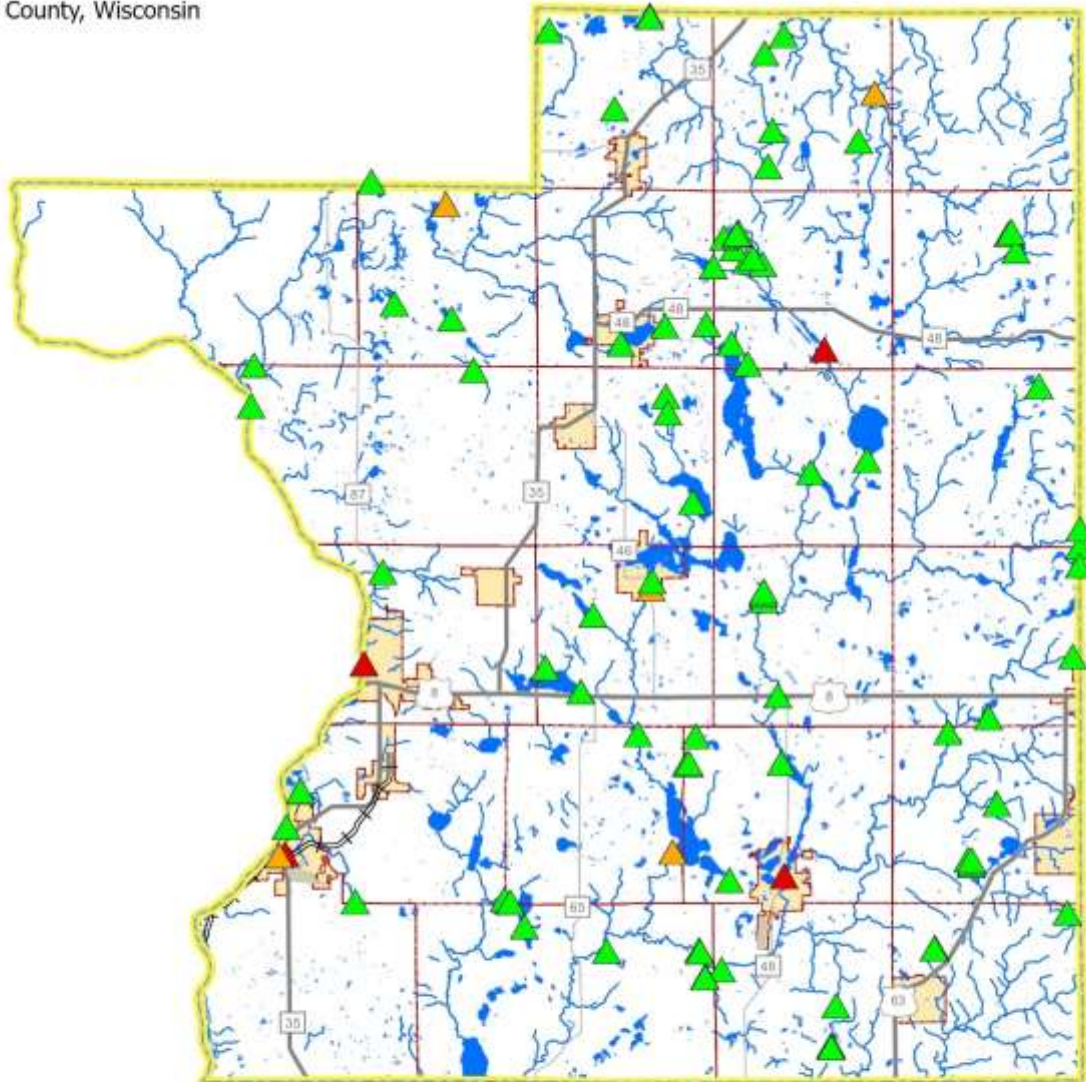
As listed in Appendix H, Polk County has 22 large dams. Sixteen of these large dams are rated or estimated to be low hazard due to lack of vulnerabilities downstream. Three of the large dams have a high-hazard rating and three have significant-hazard ratings. One small dam has a high rating and two small dams have a significant-hazard rating. Of the four high-hazard rated dams, one is a small dam owned by a private individual (Upper Osceola with popular name of S.J. Rauchwarter dam), one is a large dam owned by the City of Amery (Amery Dam), one is a large dam owned by the Town of Bone Lake (Straight River Flowage dba Schilling Dam/Whalen Log dam), and one is a large dam owned by Xcel Energy (Saint Croix Falls dam).

All large dams on navigable waters are required to have a dam failure analysis that shows the hydraulic shadow and structures subject to potential flooding should a failure occur. The geographic scope of this analysis should extend downstream until the dam failure shadow converges with the 100-year floodplain. These analyses are used to determine the hazard rating largely based upon the level of development and regulatory protections in place within the dam shadow downstream. Floodplain zoning controls can then be put into place for the dam shadow. For dams without an analysis, an estimated hazard rating is given by the WDNR Dam Safety Engineer based on development and zoning controls downstream of the dam.

Figure 31. Polk County Dams by Hazard Rating

DAMS BY HAZARD RATING

Polk County, Wisconsin



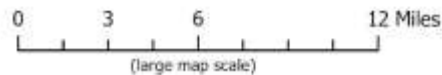
Legend

- Surface Water
(some streams may be intermittent)
- Polk County
- City/Village
- Town

Dam Hazard Rating

- ▲ High (4)
- ▲ Significant (5)
- ▲ Low (88)

Data Sources (2023):
WisDOT, WisDNR, WisDOA
WCWRPC, Polk County



As noted, flooding can also occur as a result of dam failure. Hazard potential and estimated hazard ratings are assigned by the Wisconsin Department of Natural Resources based on the potential for loss of life or property damage should the dam fail. The dam hazard ratings are defined by FEMA as follows:

- Low Hazard** Dams assigned the low hazard potential classification are those where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property. Large low-hazard dams are inspected every ten years by the Wisconsin DNR Dam Safety Engineer, and the spillway must be sized to accommodate a 100-year event.
- Significant Hazard** Dams assigned the significant-hazard potential classification are those dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant-hazard dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure. Large significant-hazard dams must be inspected every five years (5th year private engineer; 10th year WDNR Dam Safety Engineer), and the spillway must be sized to accommodate a 500-year event.
- High Hazard** Dams assigned the high-hazard potential classification are those where failure or mis-operation will probably cause loss of human life. Large, high-hazard dams must be inspected every two years (2nd, 4th, 6th, 8th years private engineer; 10th year WDNR Dam Safety Engineer), and the spillway must be sized to accommodate a 1,000-year event.

Event History – Dam Failure

There have been very few dam failures in Wisconsin that resulted in major damage or loss of life. And many of Wisconsin's approximately 3,800 dams are small logging or milling dams built prior to 1900 and have little or no associated vulnerabilities. Between 1990 and 1995, more than 75 dam failures were documented in Wisconsin. Several of these incidents resulted in injuries and serious property damage, but no loss of life.

A June 1993 flood event included the failure of an embankment associated with the Hatfield Dam on the Black River which contributed to flooding damage downstream in the City of Black River Falls. In June 2008, the Lake Delton Dam broke which resulted in mudslides which washed out a number of homes. Closer to home in 2002, a small privately owned dam in Osceola washed out and caused significant damage to a mobile home park. And in April 2019, the top portion of a small dam in Chippewa County had a major failure that resulted in damage to a campground downstream and washed away a camper.

It is important to note that of the major flood events since 1997, there have been three instances of significant damage at dam structures. Two of these dams (Woodley and Osceola) have since been removed, while significant improvements have been made to Kennedy's Mill Dam. However, these

events demonstrate the important of dam maintenance and monitoring as well as the potential risks downstream within the dam shadow.

Event Probability – Dam Failure

Overall, **the potential of dam failure in Polk County is considered very low**, though the potential for damage and injury is high should failure of a larger dam occur. The Steering Committee rated the probability of a dam failure as low, with a some to moderate vulnerability if a failure should occur.

Polk County and its municipalities continue to work with the Wisconsin Department of Natural Resources to ensure proper maintenance of the dam facilities in the County and to mitigate the potential vulnerabilities should failure occur. **If the dams within Polk County continue to be well maintained, flooding related to dam failure should not occur and is not expected.** In fact, most of the smaller, privately owned dams would cause very minimal or no damage downstream if a failure should occur. The larger dams with significant- or high-hazard ratings were built to strict engineering standards, have related emergency plans, and are closely monitored. Yet the County does have a relatively recent history of damage or washout of dams, so ongoing attention to this risk is needed.

Event Vulnerability – Dam Failure

The primary vulnerability from a dam failure is development downstream within the hydraulic shadow of the dam. The level of development within each dam shadow is reflected by the dam's hazard rating as previously discussed. A dam's hazard rating can also be reduced through repairs/improvements, updating dam failure analysis or emergency planning, or enacting dam shadow zoning to discourage development within the failure area. As shown on Figure 31, Polk County has four high-hazard dams and five significant-hazard dams. A G.I.S. analysis of the dam shadows was not completed as part of this mitigation plan. A future mitigation plan update should consider evaluating existing development in the shadows and comparing the mapped dam failure areas to the 100-year floodplain boundaries; it is suspected that the failure areas do not exceed the 100-year floodplain boundaries in most cases.

High Hazard Dams (4)

Only four dams in Polk County have been given HIGH-hazard ratings:

1) *St. Croix Falls Dam* (owned by Xcel Energy)

In terms of maximum storage feet, this is the second largest dam in Polk County; and it is the largest in term of structure size and height. It is actively used for power generation and is in good repair. A 2022 inspection found some continued seepage for which a permanent fix is recommended. If a sudden dam failure should occur, there would be potential bridge damage on Highway 8 at St. Croix Falls and Highway 243 at Osceola, which would significantly impact travel. However, development within the dam shadow has been limited due to scenic easements, public lands, floodplain zoning, and topography along the St. Croix River. No concerns regarding this dam were noted. An emergency plan for this dam is maintained by Xcel Energy and is on file in the Sheriff's Department and the Polk County Emergency Management Office. Exercises (table-top and functional) for Xcel's dams are ongoing and rotated between its hydro projects annually.

2) *Amery Dam* (owned by City of Amery and Town of Lincoln)

This dam is managed, in part, for flood control. Significant repairs were made to this dam in 1993

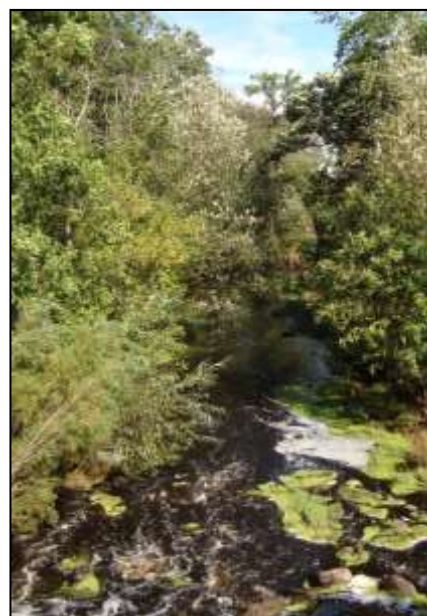
and all new stop logs were installed on the west side in 2016. A 2023 inspection recommended embankment repair and riprap as well as a downstream scour survey.

- 3) ***Straight River Flowage/Schilling/Whalen Log Dam*** (owned by Town of Bone Lake)
No specific concerns regarding this dam were noted. While this dam is officially rated as a high hazard dam, its estimated rating is “low.” With action, such as dam shadow zoning, it may be possible to reduce its official rating.
- 4) ***Upper Osceola*** (owned by James Larue)
This small dam is located along Osceola Creek. No specific concerns regarding this dam were noted.

Significant Hazard Dams (5)

Five additional dams were given SIGNIFICANT-hazard ratings by the WDNR:

- 1) ***Atlas Feed Mill/Long Trade Lake Dam*** (owned by Polk County)
This dam was reconstructed in 1994. An emergency operating plan was recently updated by the County. There is limited development within the dam shadow, including 1-2 homes and a county highway bridge which is in need of reconstruction or replacement according to the County Highway Department. A 2020 inspection recommended some concrete and embankment repair; some minor repairs were completed to the dam in 2023. The Emergency Action Plan for the dam was last updated in 2014.
- 2) ***Lower Osceola Dam*** (owned by Village of Osceola)
This dam is part of the State Highway 35 structure within the Village of Osceola on Osceola Creek. The structure was recently re-built as part of highway improvements. No concerns regarding this dam were noted.
- 3) ***Sucker Lake/Wapogasset Dam*** (owned by Wapogasset Lake Association)
No concerns regarding this dam were noted.
- 4) ***Lower Balsam Lake Dam*** (owned by Village of Balsam Lake)
The hazard rating of this dam was reduced from “high” to “significant” in 2010, following adoption of appropriate floodplain zoning within the hydraulic shadow by the County. The 2022 inspection report recommended some repair, including to the left trailrace channel wall downstream that has failed. The Town of Balsam Lake noted that if this dam breaks, the Town would “have severe flooding through the Balsam Branch basin. All east/west roads would be under water including Highway 8.”
- 5) ***Clam Falls Dam*** (owned by Polk County)
This dam has been leased by Northwestern Electric for hydro-electric power generation. The 2006 hazard mitigation plan noted that the Clam Falls Dam is being topped with significant rainfalls of 1.5 inches or more within a short time; this occurred as recently as 2022. One home and a county



**downstream of
Atlas Feed Mill Dam**

road is located downstream within the dam shadow. The dam structure is built into a highway which results in dangerous conditions and road closures when topped. The 2006 plan states that the dam owner was intending to install steel slide gates to allow easier and safer control of water levels, but no actions or improvements at this dam have been noted in the interim. A failure analysis for the dam has been approved by WDNR. According to WDNR in late 2016, the dam owners have five years to address undersized spillways. In February 2024, Polk County awarded a major rehabilitation contract for the Clam Falls Dam Replacement project, which includes construction of a new spillway, slide gates, rock anchors, concrete walkways, earthwork, and other structural improvements.



Clam Falls Dam and adjacent highway

This is an electric power-producing dam located in the Town of Black Brook. An emergency plan for this dam is maintained by the owner which includes bridge-closing procedures in case of a dam failure. The potentially impacted bridges are all located downstream in the Town of Alden. Copies of the plan are on file with the Sheriff's Department, the Polk County Emergency Management Office, Highway Department, Amery area emergency responders, Amery School District, and the Town of Alden. No action on this dam is currently needed, though it is important to keep the emergency plan updated.

Other Dam Concerns or Notes

1) *Black Brook Dam* (owned by North American Hydro)

This is an electric power-producing dam located in the Town of Black Brook. An emergency plan for this dam is maintained by the owner which includes bridge-closing procedures in case of a dam failure. The potentially impacted bridges are all located downstream in the Town of Alden. Copies of the plan are on file with the Sheriff's Department, the Polk County Emergency Management Office, Highway Department, Amery area emergency responders, Amery School District, and the Town of Alden. No action on this dam is currently needed, though it is important to keep the emergency plan updated.

The previous discussion of the April 2001 flood event described the most recent, significant dam failure in Polk County at the County-owned D.D. Kennedy Dam, which was subsequently rebuilt. This is a low-hazard dam, so the damages were largely limited to the washout of a town road downstream and the dam structure itself. A drawdown at the D.D. Kennedy Dam occurred in Fall 2023 and the dam rebuilt in 2024. In past mitigation plans, the Town of Bone Lake suggested the grant funding could be pursued for the installation of a dam on the Straight River if additional flood control is needed.

It is important to maintain up-to-date EAP Plans and IOM Plans for the large dams and the high- and significant-hazard dams. Emergency Action Plans with current contact information should be on file with County Emergency Support Services Department and its Communications Center. With the availability of LIDAR topographic data, mapping of dam shadows could be revisited for the high- and significant- hazard dams. This information can then be integrated into the County emergency notification systems and considered as part of floodplain zoning and comprehensive planning efforts. All County-owned dams were inspected in 2022 and their EAPs need updating or are in the process of being updated.

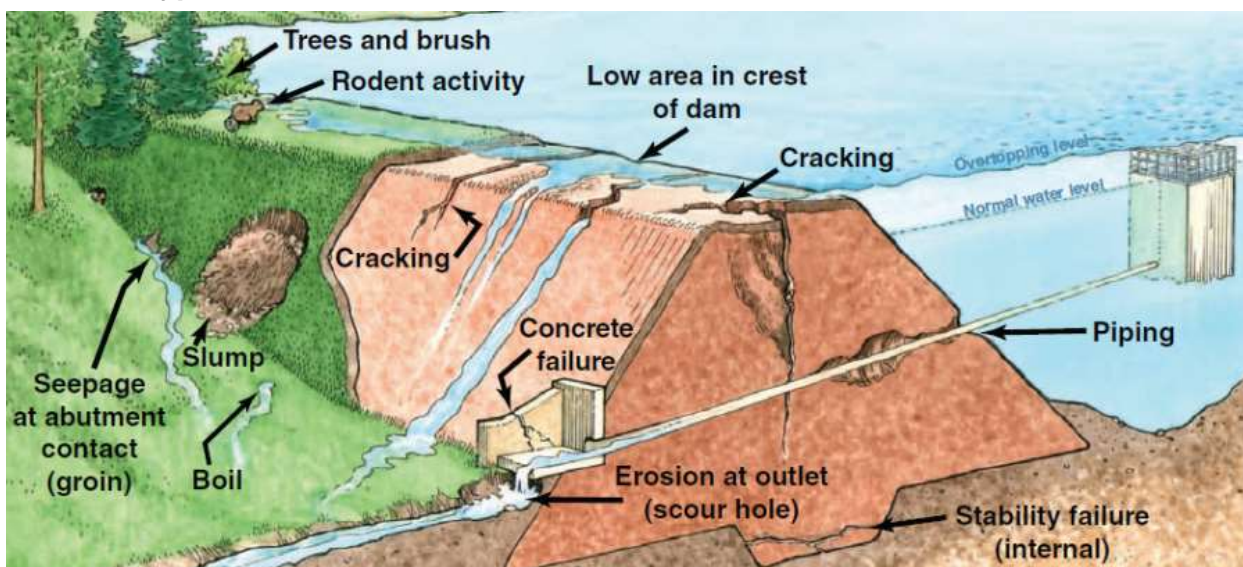
As documented previously, development and population growth in Polk County has been generally highest in those towns with significant surface waters. There continues to be development pressure along the shorelines of the County, including above and below dams. Overall, **the potential of damage-producing dam failure in Polk County is considered quite low**, though the potential for damage and injury is high should failure of a larger dam occur. Polk County and its municipalities continue to work with the Wisconsin Department of Natural Resources to ensure proper maintenance of the dam facilities in the County and mitigate the potential vulnerabilities should failure occur.

In Wisconsin, owners of large dams are required to ensure the safety of their dams by performing regular and frequent inspections. Chapter 31, Wis. Stats., requires owners of large dams to hire professional engineers with experience in dams to inspect their dams once every two to 10 years, depending on the hazard rating:

- high-hazard large dams – every two years
- significant hazard large dams – every three to four years
- low-hazard large dams – every 10 years

Following research and an inspection, the engineer will prepare a dam safety inspection report and supporting documentation will be prepared and sent to WDNR for review. The regional WDNR will then prepare their inspection report with findings and compliance actions with timelines. For private dams, emergency management and zoning staff from the County and/or local unit of government will work with the dam owner to obtain the dam failure analysis and take any needed action regarding dam failure zoning or emergency action planning.

Common Types of Dam Failure Modes



source: Association of State Dam Safety Officials

v. Wildfire

This section relies heavily on analysis tools provided by the Northeast-Midwest State Foresters Alliance and a report generated utilizing these tools on July 25, 2023. The report provides data and maps that identify various factors that contribute to risk, intensity, and impact of wildfires in Polk County. While this section summarizes several of the findings within the report, the full report provides additional depth and detail. The tools provided by the Alliance are updated as factors change and the most current data may be valued over this plan, should a conflict arise. Additional information and resources can be found at <https://northeastmidwestwildfirerisk.com/>.

Defining the Hazard—Wildfire

A **wildfire**, in the context of this plan, is an uncontrollable, unwanted fire in the natural environment spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed, spread quickly, and are usually signaled by dense smoke that may fill the area for miles around. Wildfires can be human-caused through arson, campfires, prescribed burns, or carelessness, or can be caused by natural events such as lightning.

A **forest fire** is defined in Wisconsin State Statutes as “an uncontrolled, wild or running fire burning in forest, marsh, field, cutover, or other lands.” Any wildfire in Wisconsin, no matter what type of vegetation it is burning, is legally termed a “forest fire.” As such, “wildfire” and “forest fire” are often used interchangeably within this plan.



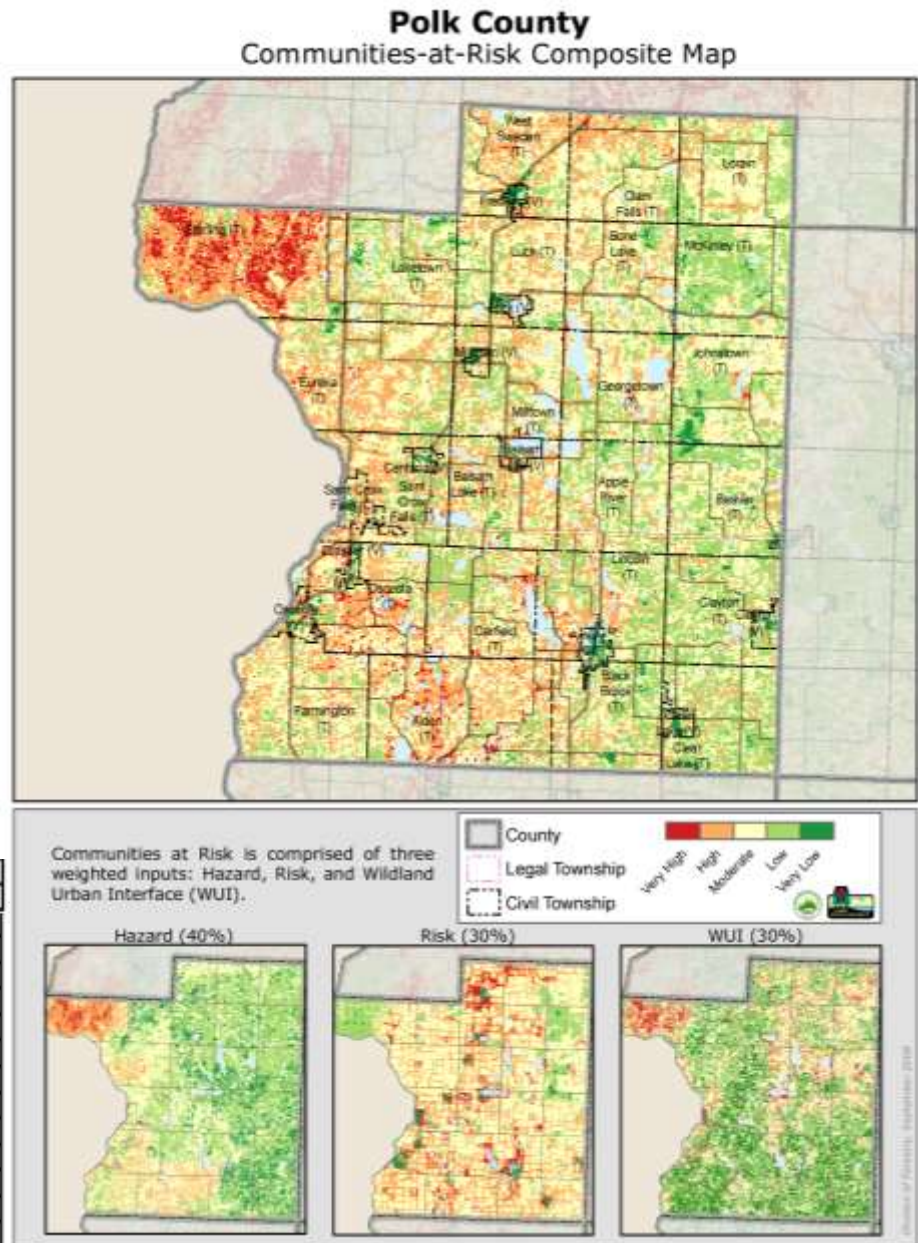
This plan does not attempt to make great distinctions between the different types of wildfires, though more wildfire data is available for the WDNR Intensive Fire Protection area, which has a higher predominance of forest vegetation. It is not uncommon for a large wildfire to include a mix of vegetative types. Grass fires fueled by low-lying vegetation are generally more easily controlled than a wildfire in a forest area, but

also will typically spread quicker. Grass fires can be the most dangerous in terms of safety due to highly variable speed, intensity, and direction. In wooded settings, access is often the biggest challenge. In areas of hardwoods, a wildfire is typically less intense, with the fire being commonly limited to leaf litter. Wildfires in coniferous forest that climb into the top of the tree canopy (crown fires) can be the most difficult to control and can produce spotting when large, burning embers are blown to areas outside of the main fire. Regardless of the fuel types, local topography and weather conditions also influence the characteristics of a wildfire.

Hazard Location

The Wisconsin DNR has also identified fifteen communities in Polk County with an elevated wildfire risk.²⁶ One community (Town of Sterling) has a very high risk. The list of these communities was generated by a WDNR analysis completed in 2008, which considered the hazard (vegetation type), the risk (wildfire history), and the wildland-urban interface (development within forested areas). This 2008 analysis, summarized by **Figure 32** below, is slightly outdated, but still provides important insights into the historical wildfire location for Polk County.

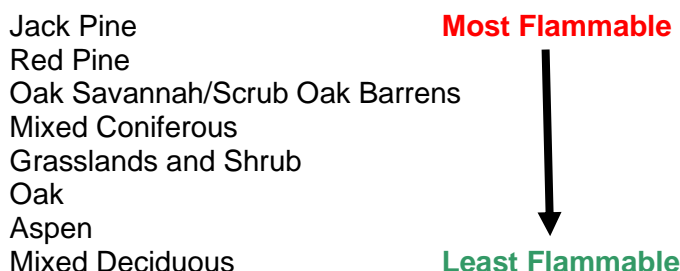
Figure 32.
Polk County Communities at Wildfire Risk (2008)



²⁶ <https://dnr.wisconsin.gov/sites/default/files/topic/ForestFire/communitiesAtRiskWildfire.pdf>

Vegetative Fuels

As reflected by the previous map, the geographic distribution of vegetative cover type is directly related to wildfire risk. The degree of flammability for different vegetative covers is in the general following order:



The above is highly influenced by local soil type. For example, Oak forests on silt loam soils where more moisture is retained in the soil have a lower wildfire risk compared to Scrub Oak Barrens that are typically found on sandier, excessively drained soils.

Approximately 40 percent (about 252,000 acres) of Polk County is forested and 26 percent (about 160,000 acres) is non-agricultural shrub and grasslands. But keep in mind that many forested areas are actively managed for timber production; thus, vegetative characteristics can change from year-to-year as part of the timber growth and harvesting cycle. Deciduous trees (e.g., aspen, oak, maple) are, by far, the predominant forest type. While some significant areas of pine and other coniferous forest exist, the County no longer has the vast expanses of pine forest which were burned in the deadly fires of the late 19th Century. In addition, forest lands in the County have been increasingly fragmented over time, which reduces the chance of a large-scale wildfire event.

Most of the forest lands in the County are privately owned. There are approximately 17,000 acres of County Forest, five county parks, and over 43,000 acres of State and Federal recreational lands and natural areas. Almost 40% of this public land is located in the Town of Sterling. The Town of Sterling also owns approximately 3,000 acres and retains its own forester. Though public forest lands tend to be more actively managed against wildfire risks, not all of these public lands are forested. Of the private forest lands, over one-third (about 75,000 acres) are in Managed Forest Law or Forest Crop Law status.

Forest health also influences the risk of wildfire ignition and can increase the difficulty of fire suppression. Tree damage from storm events, diseases, insect infestation, and exotic species can weaken plants, making them more susceptible to storm damage, or can kill a forest stand outright. The Wisconsin Department of Natural Resources has rated significant portions of Polk County, especially in the north half, as having medium or high levels of risk for experiencing 25% of more tree mortality between 2009 and 2024 due to native and exotic insects and diseases.²⁷ Wisconsin's average annual

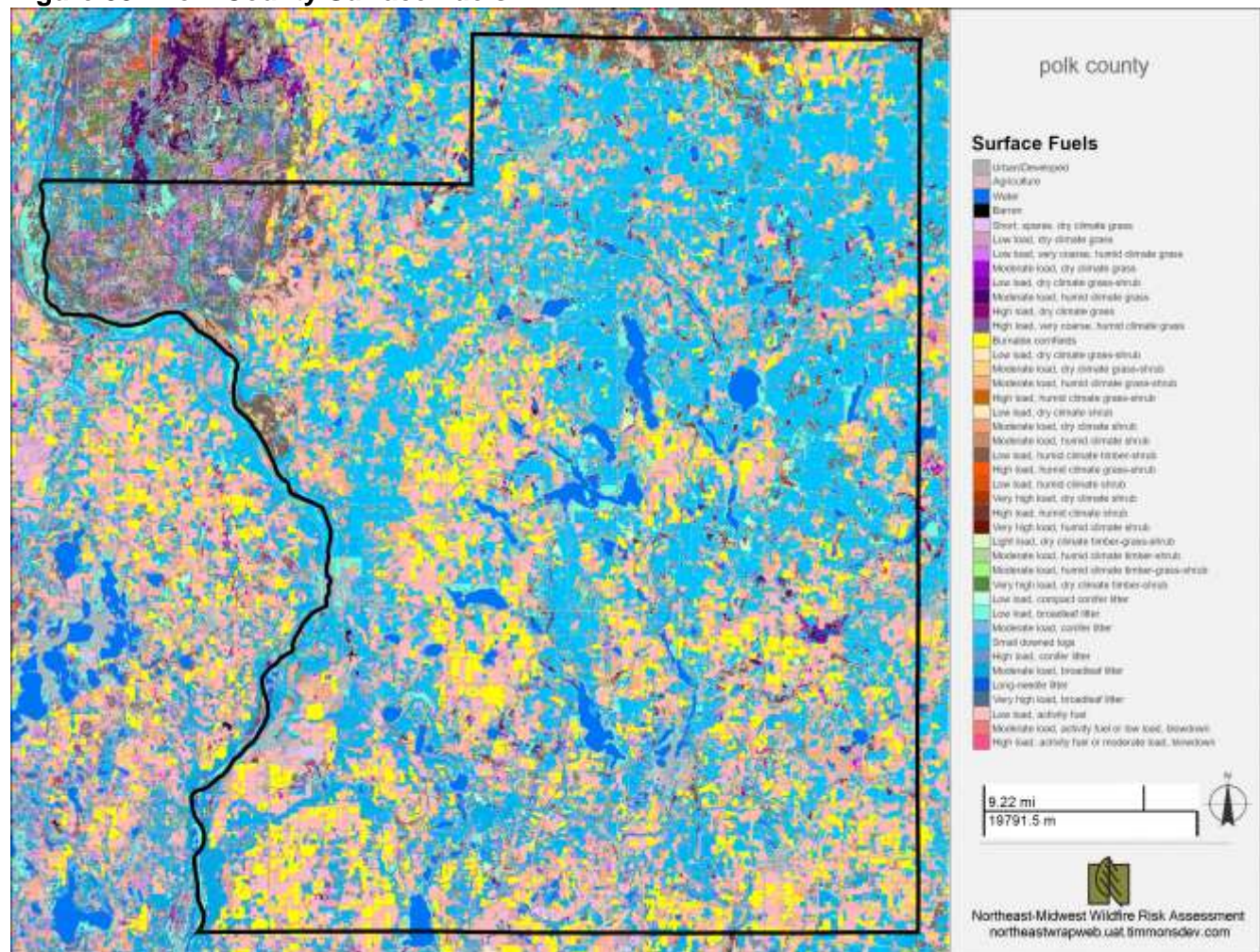
²⁷ Wisconsin Department of Natural Resources. *Wisconsin Statewide Forest Assessment 2010*.

temperature has also been increasing, with shorter winters and recent droughts,²⁸ which not only affects forest health, but also increases the wildfire risk.

Forests have a natural life cycle. Humans can interrupt this cycle by introducing new species or diseases, encouraging certain growth patterns, or through timber harvest practices. Characteristics such as dense stands of unmanaged pine plantation or creating large piles of slash can increase wildfire risks. Creating brush piles and allowing for the accumulation of dead plant litter in home ignition zones or along roadways also increases wildfire risks. Forest management practices can increase wildfire risks or help to mitigate the ignition or spread of wildfires.

Figure 33 provides a county-wide assessment of surface fuels for Polk County. This map identifies the types of surface fuels, but does not indicate the likelihood of fires in these areas. Understanding fuel types and reviewing this map in tandem with others helps to prioritize areas of concern.

Figure 33. Polk County Surface Fuels



²⁸ Ibid.

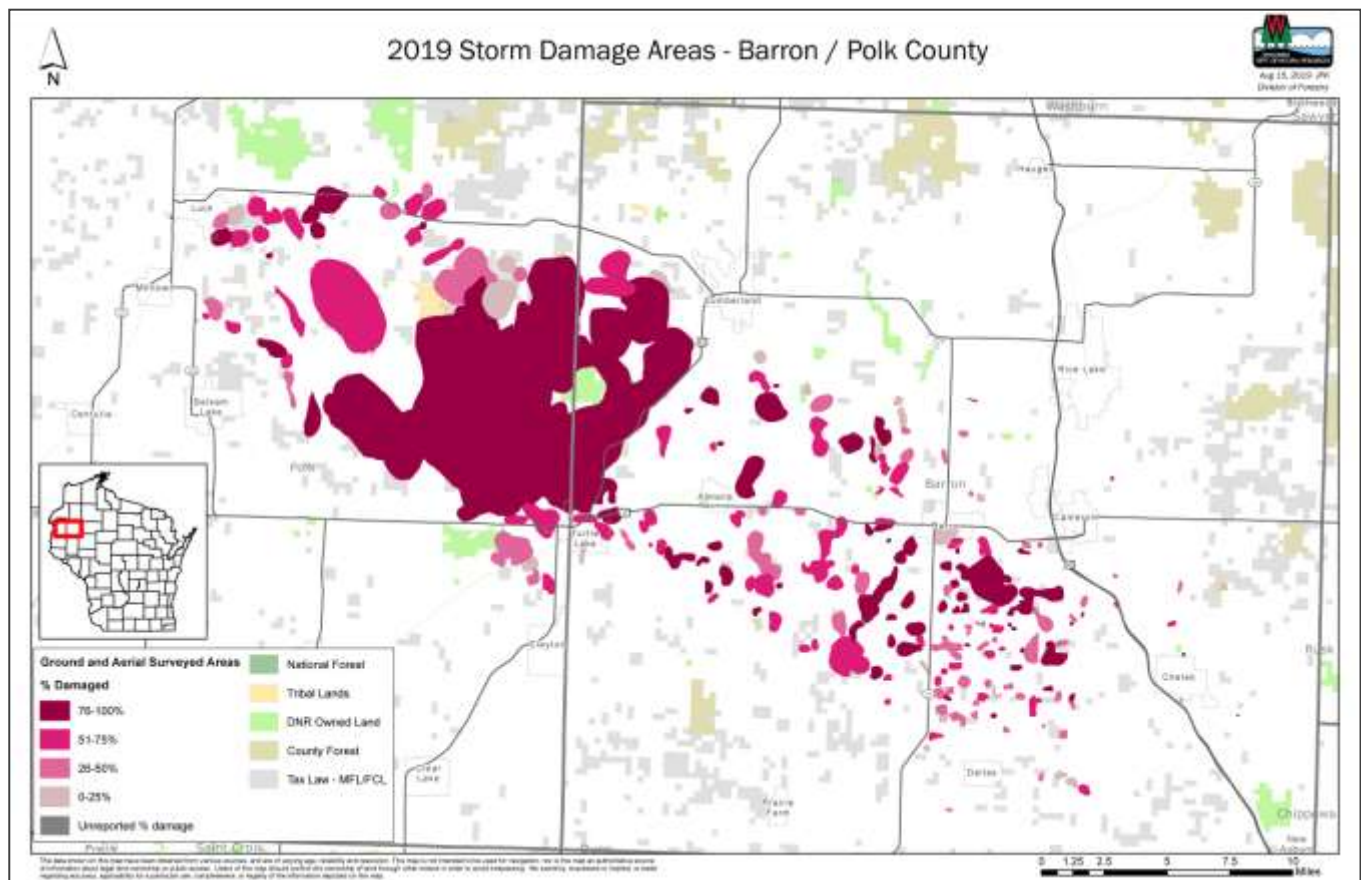
Key takeaways from the above map include:

- Agriculture (14.5%), moderate load humid climate grass-shrub (9.6%), and small-downed logs (29.6%) are the most common surface fuel types within Polk County.
- Concentrations of agricultural surface fuels and downed logs increase the risk of larger wildfires. This finding is reflected in several maps throughout the full report. Specifically, burnable cornfields increase the flame length, rate of spread, and heat unit per area. Fire breaks, removing fuel sources (e.g., downed trees) and other fire suppression efforts built into the landscape may help mitigate the ability of a wildfire to spread.

Elevated Wildfire Risk – 2019 Wind Storm Damage

Not reflected on the previous map are the additional surface fuels as a result of the July 2019 derecho discussed in the Tornadoes & High Winds section. This storm broke, uprooted, or downed tens of thousands of trees were broken, uprooted or downed across several counties. As shown in **Figure 34** below, Polk and Barron Counties were hit the hardest.

Figure 34. 2019 Wind Storm Tree Damage



During this mitigation plan update, multiple stakeholders and community officials, including the Turtle Lake Fire District, noted that the many downed trees are a source of fuel and the risk of a large wildfire

in the above areas is substantially increased. Most of the downed trees on public lands have since been cleaned-up.

Hazard Extent (Potential Intensities)

Wildfires are capable of occurring and impacting large areas. Areas with dense pine and oak vegetation are more likely to experience wildfires. In March 2010 the Wisconsin Department of Natural Resources – Division of Forestry, completed a Wildland Fire Management Program Assessment that included identification of sixteen distinct fire landscapes throughout the State with associated management recommendations.²⁹ The landscapes were determined based on five features:

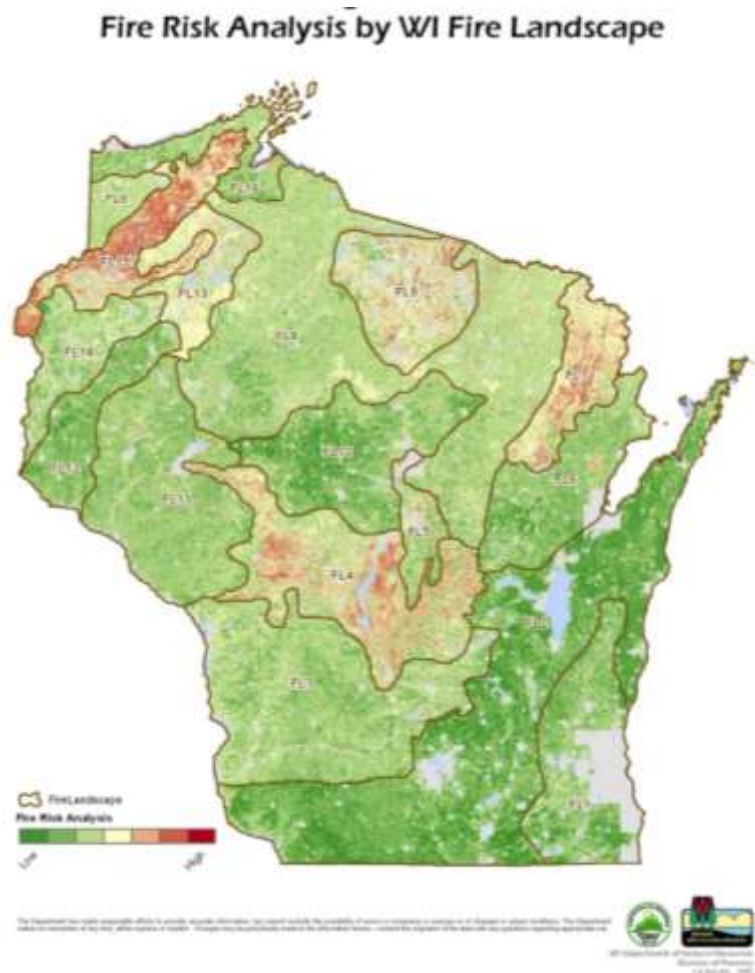
- Vegetation
- Ecological Subsections
- Soils
- Land Parcel Improvements
- Forest Patch Size

Polk County falls within the three different landscapes:

(1) The southeastern portion of the County largely falls into the **Western Prairie fire landscape**, which has limited potential for a fire in excess of 500 acres. The WDNR report recommends minimal wildfire mitigation actions for these two landscapes, primarily limited to general education.

(2) The western half of the Town of Sterling is part of the **Northwest Sands fire landscape**, which has the highest level of wildfire risk in the State. The potential for very large wildfires within this landscape are possible. School fire protection programming, mitigation planning, public relations efforts, and targeted outreach is supported in this area.

(3) The majority of Polk County lies in the **St. Croix Moraines fire landscape**, which has a higher wildfire risk due to development in wooded areas and pockets of sand and conifers, but the potential for a wildfire of 500+ acres is not high. The analysis recommends limited mitigation



²⁹ https://dnr.wisconsin.gov/sites/default/files/topic/ForestFire/fireAssessment_wildlandFireMgmtFinalReport.pdf

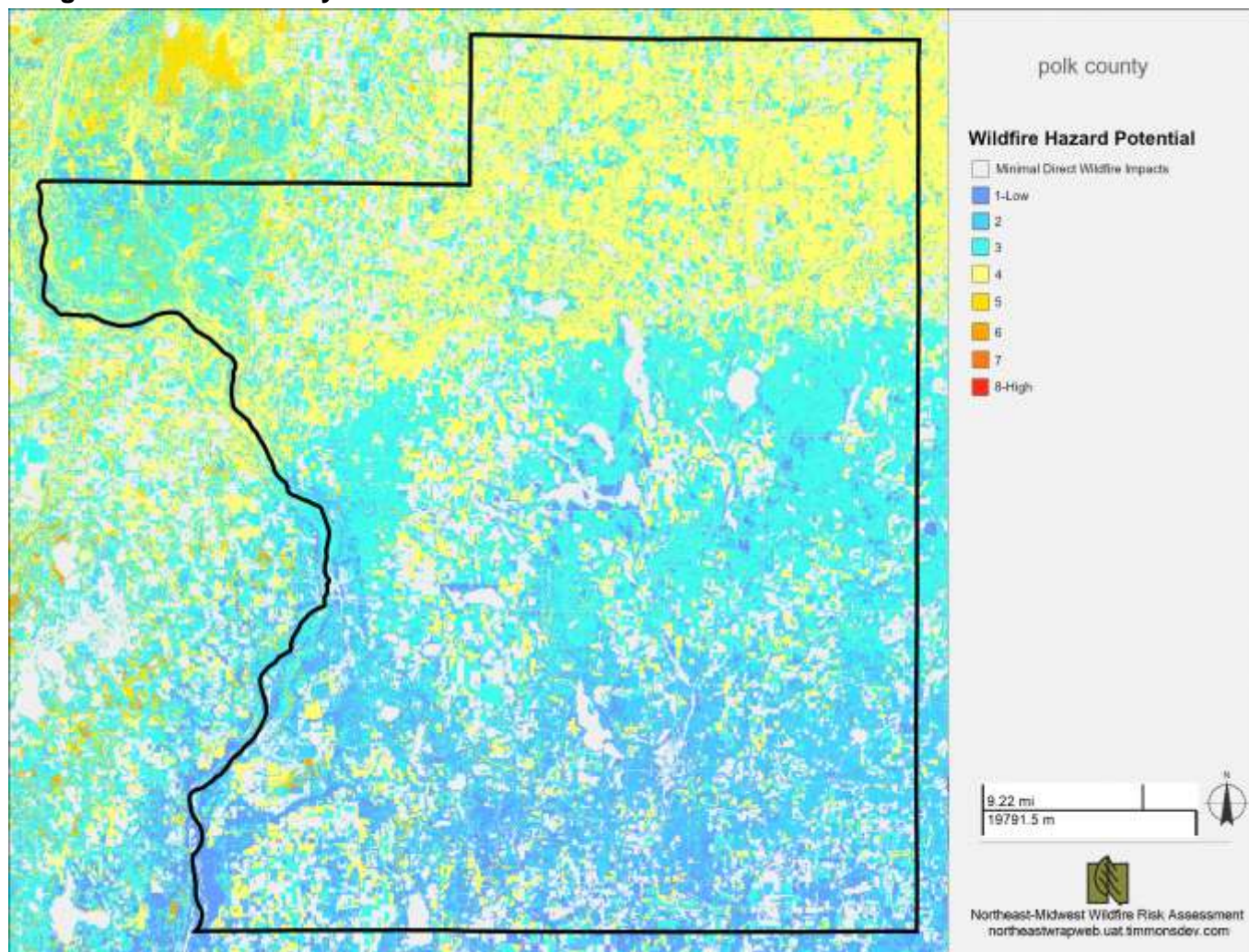
activities for this area that focuses on specific situations or concerns, in addition to possible school fire prevention programming and local public service announcements when the fire danger is elevated.

While the fire landscape approach is valuable for State- and regional-level resource planning, the communities-at-risk, as identified earlier in this section, provides a better understanding of local variations. For instance, the Town of Sterling may have the physical landscape of continuous pine and sandy soils that support the potential of very large wildfires. But there are other areas of the County without extensive pine forest but are also of wildfire concern due to higher levels of development in forested areas. This local variation of wildfire potential is also reflected in the map below.

Wildfire Hazard Potential – Difficulty to Control

The wildfire hazard potential (WHP) dataset represents an index that quantifies the relative potential for wildfire that may be difficult to control. WHP can be used as a measure to help prioritize where fuel treatments may be needed.

Figure 35. Polk County Wildfire Hazard Potential

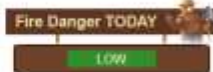






Key takeaways from **Figure 35** include the following:

- There is a consistent trend of wildfires becoming more difficult to control when moving from southwest to northeast. This trend aligns with the overall land cover and accessibility. Forested areas increase when moving in this same direction while road access decreases.
- The overall potential for the County is low. No areas in Polk County exceed a 5 rating. 5,709 acres, the majority of which are located in the northwest corner of the County, are rated at 5.
- The areas rated 3 and 4 account for over half the County (53.1%).
- While forested areas have higher hazard potential, there does not appear to be a direct correlation between developed areas and a lower wildfire hazard potential. This may be associated with the relatively low hazard potential generally for the County, but city and village boundaries are indistinguishable on the map.

Table 20 lists the fire danger rating classifications as defined by the U.S. Forest Service. The “Adjective Ratings” as a public information description of the relative severity of the current fire danger situation in a general area. Since 1974, five rating levels have been used to describe danger levels.³⁰ The Wisconsin Department of Natural Resources uses these same categories to help describe the wildfire risk throughout the State. The Extreme rating is also known as a Red Flag warning.

Table 20. Adjective Class Rating Method under the Wildland Fire Assessment System

Fire Danger Rating and Color Code	
<p>Low (L, Dark Green)</p> <p>Fuels do not ignite readily from small firebrands although a more intense heat source, such as lightning, may start fires in duff or punky wood. Fires in open cured grasslands may burn freely a few hours after rain, but woods fires spread slowly by creeping or smoldering, and burn in irregular fingers. There is little danger of spotting.</p>	
<p>Moderate (M, Light Green or Blue)</p> <p>Fires can start from most accidental causes, but with the exception of lightning fires in some areas, the number of starts is generally low. Fires in open cured grasslands will burn briskly and spread rapidly on windy days. Timber fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel, especially draped fuel, may burn hot. Short-distance spotting may occur, but is not persistent. Fires are not likely to become serious and control is relatively easy.</p>	
<p>High (H, Yellow)</p> <p>All fine dead fuels ignite readily and fires start easily from most causes. Unattended brush and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High-intensity burning may develop on slopes or in concentrations of fine fuels. Fires may become serious and their control difficult unless they are attacked successfully while small.</p>	
<p>Very High (VH, Orange)</p> <p>Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high intensity characteristics such as long-distance spotting and fire whirlwinds when they burn into heavier fuels.</p>	
<p>Extreme (E, Red)</p> <p>Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the very high fire danger class. Direct attack is rarely possible and may be dangerous except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions the only effective and safe control action is on the flanks until the weather changes or the fuel supply lessens.</p>	

³⁰ USDA Forest Service. *Understanding of the National Fire Danger Rating System*. <https://www.fs.usda.gov/detail/r5/fire-aviation/?cid=FSEPRD604105>

WDNR Fire Protection Areas

About 76 percent of Polk County has Cooperative Fire Protection, while the remaining 24 percent has Intensive Fire Protection. These are defined as follows:

Intensive Fire Protection areas are the most heavily forested and contain the most fire hazards and risks in the State. Limited assignment of skilled personnel, specialized equipment, and facilities provide for an adequate degree of forest fire prevention, detection, and suppression efficiency and effectiveness at a minimum cost. Wisconsin Department of Natural Resources (WDNR) equipment is designed to suppress fires that are beyond the capability of the local fire department. The WDNR by statute takes whatever action is necessary to suppress the fires. Fire detection is provided by WDNR aircraft, and there is a strong reliance on public reporting of fires. Burning permits are required whenever the ground is not snow-covered; non-commercial burning permits are issued online through the WDNR website, which includes information on daily burning restrictions and other requirements. WDNR has produced G.I.S.-based structure zone maps for the intensive fire protection area to assist with emergency response and has provided these maps to Polk County for use. No community wildfire protection planning efforts have been completed for Polk County, though WDNR Forestry staff encourage such planning or other Firewise educational efforts within the Towns of Sterling and West Sweden.

Cooperative Forest Fire Protection is aid and counsel from WDNR, upon request, to the town authorities who are legally responsible for forest fire prevention, detection, and suppression activities in territory outside boundaries of established extensive fire control areas. Town Chairmen, by virtue of their office, are fire wardens. Costs of forest fire prevention and suppression incurred by a town chairman, acting in his capacity as town fire warden, are paid by the town. Local municipalities may regulate burning and issue burning permits; WDNR does not regulate burning permits in cooperative protection areas.

Figure 36. Intensive Fire Protection Areas (shaded)



Figure 36 shows the intensive fire protection areas for Polk County. Most or all of the towns of West Sweden, Clam Falls, Lorain, Luck, Bone Lake, and McKinley, fall within the WDNR Webster Fire Response Unit, which is part of the Cumberland Dispatch Group. The majority of the Town of Sterling (from River Road to the west) falls within the WDNR Grantsburg Fire Response Unit, which is also part of the Cumberland Dispatch Group.

Local volunteer fire departments play a very important role in fighting wildfires, and some fire department mutual aid agreements are in place. A number of

fire departments in the County noted that it is becoming increasingly difficult to attract and retain volunteers. Increasing training mandates and decreasing funding for such education is becoming a significant barrier to volunteerism. Some fire departments also expressed concerns over proposed Federal changes to the Fire Bridge Standards that would substantially modify qualifications, training, and equipment requirements that would be very difficult for volunteer departments to attain; there has been significant opposition to the proposed changes.

When surveyed, no fire departments noted specific wildfire equipment needs; Turtle Lake Fire Districts noted a need for confined space equipment and an air rescue boat. The installation of dry hydrants and maintaining an adequate emergency response vehicle envelope along driveways were identified as concerns for some areas in the past. Most, if not all, participate in some level of training with long-term care facilities, public housing, or other such critical facilities in their respective districts.

Other Risk Factors

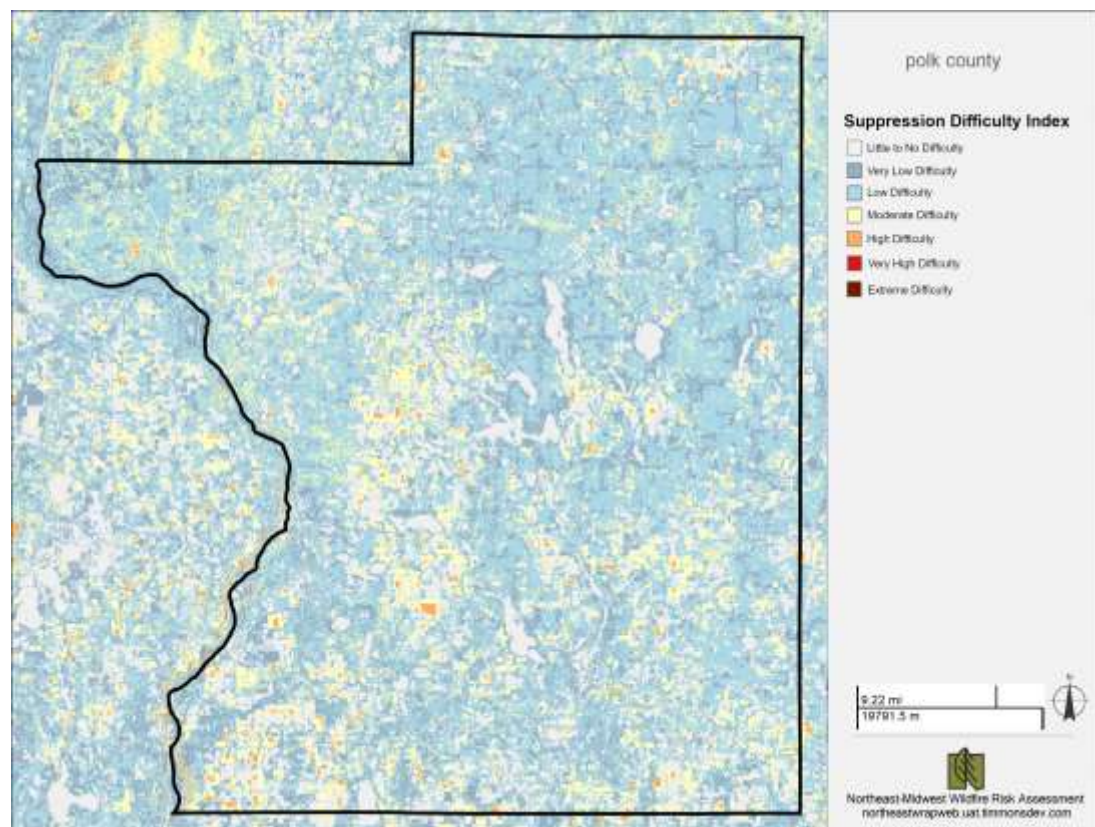
Ignition

Most wildfires are caused by humans, whether accidental or deliberate, though there has been a slight increase recently in fires caused by lightning due in part to extended dry conditions. And areas of higher population within wildlands can be expected to have a higher risk of ignition.

Suppression Difficulty Index

Wildfire Suppression Difficulty Index (SDI) is a quantitative rating of relative difficulty in performing fire control work. SDI factors in topography, fuels, expected fire behavior under severe fire weather conditions, firefighter line production rates in various fuel types, and accessibility (distance from roads/trails) to assess relative suppression difficulty.

Figure 37.
Polk County
Suppression
Difficulty
Index



Key takeaways from the map include the following:

- Overall, most of Polk County has a low or very low suppression difficulty.
- When reviewed against **Figure 37** (surface fuels), there is a correlation between agricultural and grassland surface fuels and suppression difficulty.
- Suppression difficulty is lower in many areas of northern Polk County despite some of these areas having a higher wildfire potential. While fires in some of these areas may be easier to start, and more likely to start, they may also be easier to control.

Event History – Wildfire

Regional Trends

Wildfires are not uncommon for Wisconsin and can occur at any time of the day and during any month of the year, though the peak fire season in Wisconsin is typically from March through November; and the season length and peak months varies from year-to-year. Land use, vegetation, amount of combustible materials present, and weather conditions (e.g., wind, low humidity, lack of precipitation) are the chief factors determining the number of fires and acres burned. Forest fires are more likely when vegetation is dry from a winter with little snow cover, followed by a spring and summer with sparse rainfall.

The most disastrous forest fire in Wisconsin history occurred on October 8, 1871, when more than 1.2 million acres were burned and the communities of Peshtigo and Brussels were obliterated. “All hell rode into town on the back of a wind” one survivor described. In about two hours’ time, a swath of forest ten miles wide and 40 miles long was burned. Though overshadowed by the Great Chicago Fire of the same time period, the Peshtigo fire resulted in 1,152 people killed, 350 missing, and an estimated 3,000 people left homeless.

The April 1977 Five Mile Tower Fire, which started in northern Washburn County, burned 22 square miles at a rate of one mile every 41 minutes and destroyed 64 structures. The book “*Monster Fire at Minong—Wisconsin’s Five Mile Tower Fire of 1977*” by Bill Matthias provides an excellent account of this project fire and its impacts on fire management in its aftermath.

In April 1980, more than 16,000 acres were burned and over 200 buildings were lost in the Ekdall Church and Oak Lake fires. The Ekdall Church fire originated less than 20 miles north of Polk County in the Grantsburg area. The fire started in oak scrub and timber slash, but embers then created spot fires in a nearby pine plantation. Within three hours time, the fire was consuming 1,000 to 1,600 acres an hour. Within eight hour’s time, it had run nine miles and was 2.5 miles in width at its widest point.

The May 5, 2005, Cottonville wildfire began in northern Adams County; and 3,410 acres of grass, pine, and scrub oak burned quickly before the fire was contained eleven hours later. During the fire, over 100 people were evacuated. Nine year-round residences, 21 seasonal homes, and at least 60 outbuildings were completely destroyed. Lack of access (long, narrow driveways) and a lack of defensible spaces around buildings were significant contributing factors to the loss of these structures, offering important lessons to be learned.



The 2013 Germann Road fire consumed 7,499 acres and destroyed 104 structures (23 of them residences) in the Towns of Gordon and Highland in Douglas County and the Town of Barnes in Bayfield County. An estimated 350 structures were saved due to fire control efforts. The fire began around 2:45 p.m. on May 14, 2013, burning a swath nearly 10 miles long and a mile and a half

wide before being declared 100 percent contained on May 15 at 9 p.m. The fire was started unintentionally from a logging crew harvesting timber on industrial timber lands. The Germann Road Fire occurred in the same fire landscape as the Town of Sterling and parts of northern Polk County, which highlights the seriousness of the local wildfire risk.

Wildfire potential is elevated during a drought. A total of 4,144 forest fires and wildfires occurred in Wisconsin during the drought year of 1976, with drought conditions continuing into 1977. Likewise, 1988 was one of the driest years on record, with a total of 3,242 fires occurring and 9,740 acres burned in Wisconsin.

Polk County Events

Forest fire is not a new threat to Polk County. In 1898, an “immense sea of flames” burned over 600 square miles of pine lands in northern Wisconsin and Minnesota.³¹ Just over four years later, a great forest fire again ravaged the region resulting in over 1,000 persons homeless and leaving large portions of the Cumberland and Turtle Lake in ruins and resulted in “heavy loss of farm property” in eastern Polk County.³²

As the pine forests were logged and agriculture came to dominate much of Polk County, the forest fire risk also changed. The potential for a large forest fire was chiefly limited to forested areas less suitable for agriculture and in the “resort areas” typically associated with recreational surface waters.

³¹ The Daily Gazette. Janesville, WI. Number 148 and 149. 9/4/1894 & 9/5/1894.

³² The Daily Northwestern. Oshkosh, WI. 10/3/1898. The Weekly Wisconsin. Milwaukee, WI. 10/8/1898

The Daily Northwestern
Oshkosh, October 3, 1898

MANY ARE HOMELESS.

MUCH DISTRESS AMONG WISCONSIN
FOREST FIRE SUFFERERS.

AID IS SADLY NEEDED.

Adj. Gen. Boardman Has Reported Over
250 Families Left Homeless and in
Need of Assistance—Reported
Loss Will Be Large.

Madison, Wis., Oct. 3.—Adjutant General Boardman who is in the northern part of the state investigating the needs of forest fire sufferers sent the following report from Rice Lake to Governor Scofield: “At Cumberland there are sixty-three families burned out, most of whom have lost everything. At Barron there are twenty-three reported now, fifteen of whom are entirely destitute. The needs of these people are similar to those at Turtle Lake. They are all farmers. At Cumberland shipment should be made to S. H. Waterman, mayor of the city. At Barron, to R. L. Huskins, chairman of relief committee. Will wire you later regarding condition of people in the country tributary to this place. Mr. Wynman is now with me.—C. R. Boardman.”

Cumberland, Wis., Oct. 3.—General Boardman and party, representing the state plan of relief, arrived Sunday morning and after taking a census of the people in the fire district drove to Rice Lake. General Boardman has listed seventy-three destitute families in the town of Cumberland, forty families in the towns of Stanford and Rice Lake, thirty families in the towns of Clinton and Barron, and nineteen families in the city of Cumberland, all of whom need immediate assistance. He has arranged for distribution of relief from Turtle Lake, Cumberland, Rice Lake and Barron and supplies will be forwarded immediately to these points.

The danger is now thought to be over, though it is still unsafe to travel through some of the burned districts in the vicinity of Cumberland. The property loss in this county will aggregate \$400,000, besides the farm buildings and crops. A large amount of stock has been burned and much hardwood timber destroyed. A crew of men was engaged today burning the bodies of animals in the fire district south of here. They were strewn along the highways and through the timbered sections.

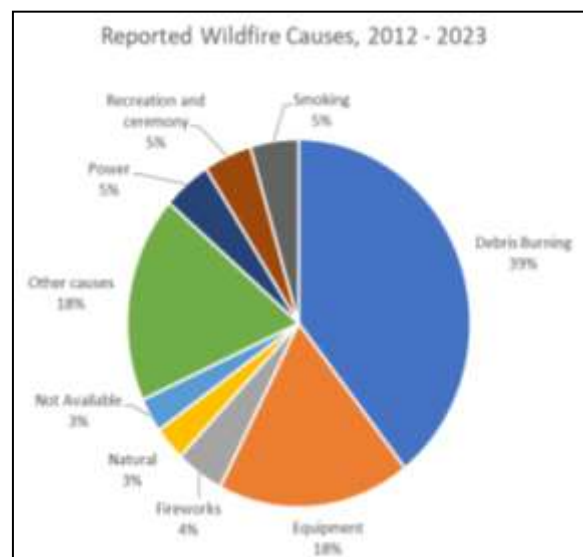
In May 1945, a large fire burned 4,970 acres in the Town of Sterling. This represents the last major wildfire event in Polk County. But this also reflects that there is the potential for a major forest fire in Sterling today.

Figure 38 shows the approximate location of the 66 reported wildfires in Polk County between 2012 and 2023 that are identified in the WDNR database. However, caution should be used when reviewing this map. These wildfire reports are mostly limited to events that involved WDNR response or resources, and are mostly located within the intensive protection area; wildfires do occur in the remaining cooperative protection areas, but are not typically reported to WDNR.

The Town of Sterling had the greatest number of reported wildfires during this period with 17 – just over 25.7% of all fires reported. The Towns of Clam Falls and West Sweden had 28 reported wildfires combined, with 15 and 11 wildfires respectively. From 2012 to 2023, an average of 5.5 wildfire events were reported per year in Polk County within the WDNR database, which is down very slightly from the 2003 to 2016 average of 9 wildfires per year as reported in the 2017 Plan.

Of the 66 reported wildfires from 2012 to 2023, the average acreage of burned land is 3.03 acres with 38 (or 57.6%) of the total fires less than a half-acre in size. Twenty-three fires were greater than one-acre and seven fires were greater than five acres in size. The largest amount of acreage burned is 40 in April of 2012. No wildfires were reported during the months of December, January, or February but were reported in every other month. Only four (6.1%) were reported between the months of November through February. By far, the largest number of wildfires occurred in the months of March through May with 6, 22, and 20 fires respectively (approximately 72.7% of all fires).

The most common source of ignition was debris burning for 36% of all wildfires and an additional 18% of wildfires were caused by equipment. While most of these equipment-related fires are within started within road right-of-way, there is increasing concern over fires started by ATVs along trails. Over 56% of the wildfires were largely in agricultural fields and lawns, even though the data is primarily limited to the more forested intensive protection area. During these wildfires, two private structures and three other structures were lost, while 17 structures were saved. It is also notable 70% of these fires occurred during periods when the fire danger ratings were High (45%), Very High (14%), or Extreme (11%).



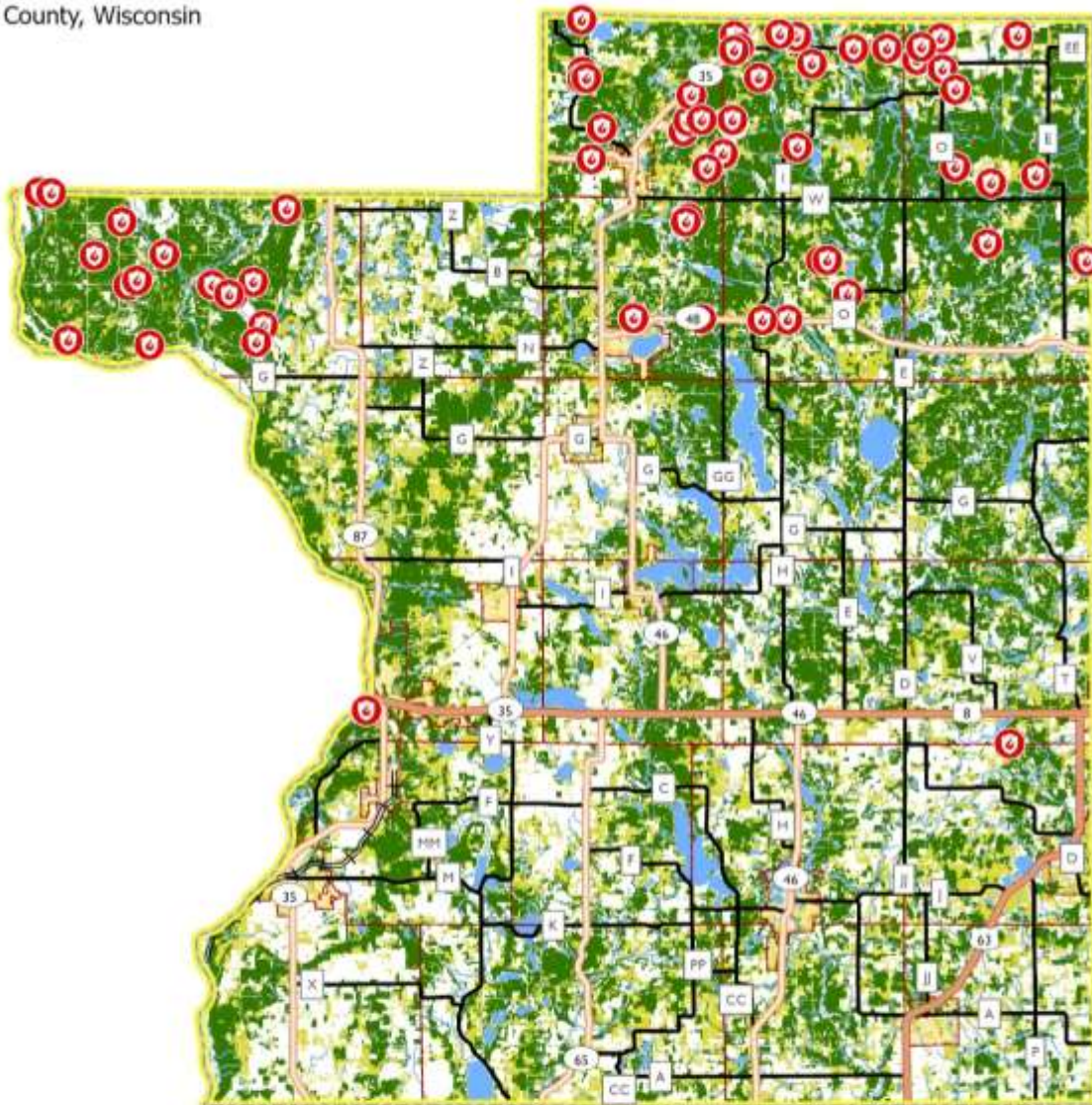
As part of mitigation planning efforts, all towns were sent surveys requesting the identification of any unique natural hazard and emergency management concerns or needs in their communities. During this plan update, no towns identified unique wildfire concerns.

Figure 38. Reported Wildfires in Polk County • 2012 to 2023

Note: **Additional wildfires have occurred that are not shown on the map.** Wildfires that are typically reported to WDNR are either located within the Intensive Fire Protection area or were larger wildfire events potentially requiring WDNR support.

REPORTED WILDFIRES

Polk County, Wisconsin



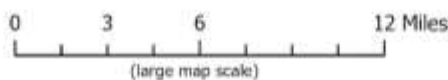
Legend

Historical Wildfires (2012-2023)

Note: Of the 66 wildfires reported during this period, 60 were less than 10 acres in size.

- Forest
- Grassland and Shrub
- Surface Water
- City/Village
- Town

Data Sources (2023):
 WADOT, WisDNR, WisDOA
 WCWRPC, Polk County.



During the 2017 mitigation plan, the Town of Bone Lake noted elevated wildfire concerns in the Straight Lake Park and McKenzie areas. It is notable that lightning struck a tree during a July 2023 storm and the tree continued to burn and smolder for 2-3 days according to the Inter-County Leader. During the 2012 planning effort, the Town of Eureka identified pine plantations in Sections 18 and 19 as a wildfire concern. Also in 2012, the Town of Alden noted that “access for emergency vehicles on private roads is a very serious concern” and that “additional first responders would be great”. More generally, access for emergency vehicles on private roads and driveways was a larger concern among local officials and emergency response personnel than the potential for a large-scale wildfire event.

Hazard Probability – Wildfire

Several factors must be taken into consideration when assessing the probability of a wildfire. A fire can occur anywhere; if it grows and where it spreads is dependent on wind direction, weather, access to fuel sources, and chance. Understanding the factors that support fire growth will help identify areas of risk and vulnerability. The Plan Steering Committee rated the probability of wildfires as low (of some concern), compared to many of the other natural hazards (see Table 11). This is in part due to most of the forest lands being significantly fragmented and having predominantly deciduous vegetation which will help slow and limit the spread of wildfires.

Vegetation fuel types and the fragmented forest landscape combine to make the fast-spreading, regional fires of the late 1800s very unlikely within Polk County for the foreseeable future. **In the near term, it can be expected that Polk County will continue to experience 6 to 8 wildfires per year on average within the intensive fire protection area**, and perhaps greater if drought conditions are in effect. **The far majority of these fires will be small.** Estimates for wildfires in the remaining 76 percent of the County within cooperative fire protection are not currently available.

A number of factors could significantly contribute to an increase in the number and size of wildfires over the long term. Foremost, population increases, development in the wildland-urban interface, and the transition from seasonal to year-round housing has great potential to increase the frequency of wildfires in Polk County. Climate changes, insect infestation, and plant disease are additional factors that may also increase wildfire risks.

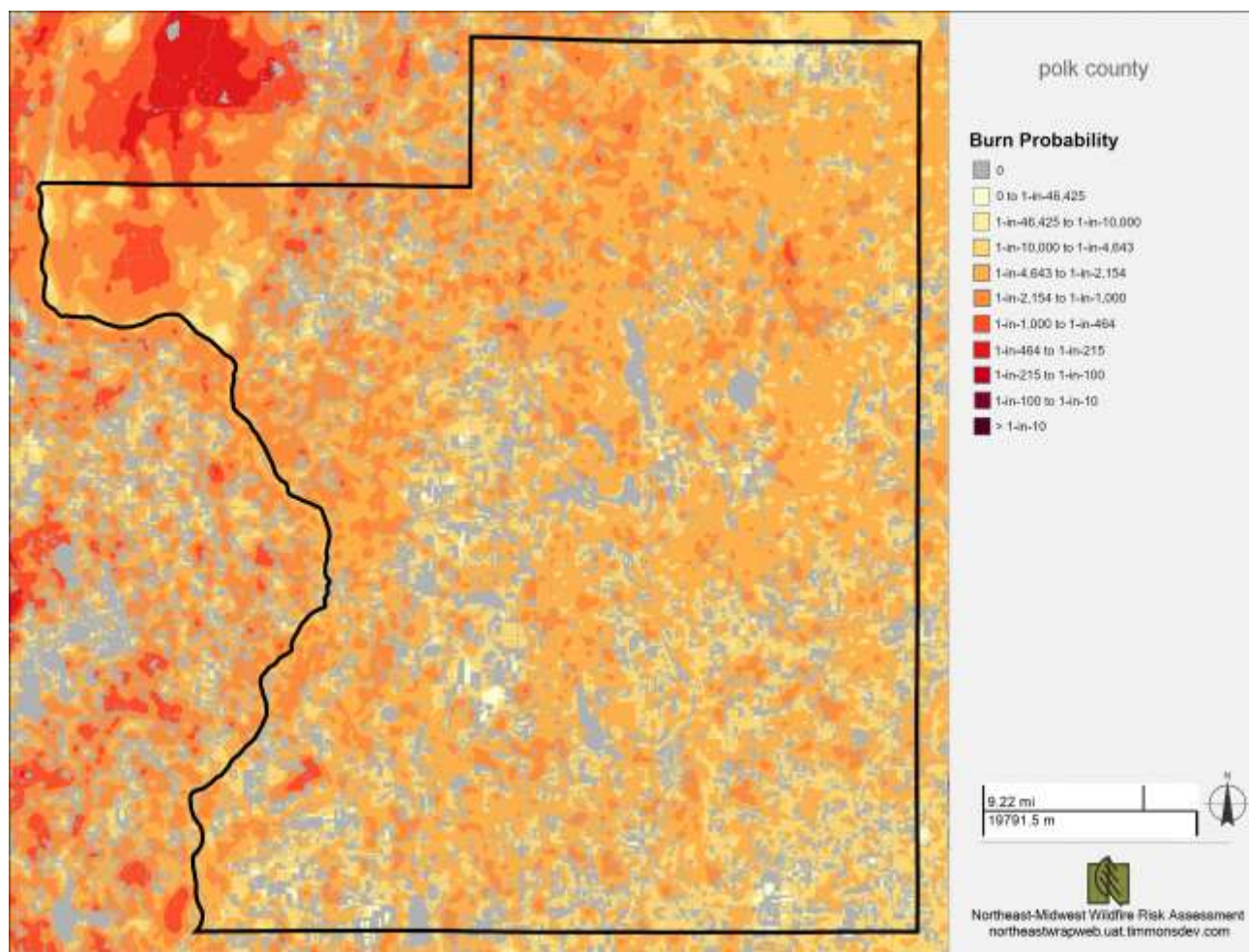
Burn Probability

Taking several factors into account, the burn probability is an assessment of the annual probability of a wildfire burning in a specific location. **Figure 39** identifies the burn probability throughout Polk County.

Key takeaways from the map include the following:

- Both northwestern and northeastern Polk County are heavily wooded. However, the continuous pine landscape and sandy soils in the northwestern part of the County, specifically in the Town of Sterling, have a higher probability of wildfires.
- The overall burn probability in the County is moderate. The highest probability identified is in the “1-in-1,000 to 1-in-464” range. The top 4 ranges are not shown on the map.

Figure 39. Polk County Burn Probability



Vulnerability Assessment – Wildfire

Appendix F provides the following regarding the potential impacts of wildfire events for Polk County as a whole:

- A description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- A description of the vulnerability of each community lifeline for this hazard; and
- The potential consequences or impacts to the above assets and community lifelines.

In summary, Polk County forested areas, grassland, and agricultural areas, are most vulnerable to wildfire events. During the planning process, the following assets were identified as having the greatest vulnerability, especially in areas where more flammable vegetative fuels exist:

- **Residential development and populations within forested areas (wildland urban interface).**

- **Farms and crops** adjacent to grasslands or later in the fall when dry crops are potential fuel.
- **Campgrounds & resort properties.** Polk County has campgrounds, tourism-related cottages, RV parks, and resorts, many of which are located within the at-risk communities and other forested areas of the County. For such facilities, visitors are a potential source of fire ignition (e.g., campfires), may not understand risk factors, and are a vulnerability should a wildfire occur. The new ATV park in the Town of Sterling is a potential additional ignition source.
- **Lake properties.** Homes and cottages located on or near lakes and rivers often have an elevated vulnerability due to location within a wooded area and have limited access/egress. These properties are frequently identified as a concern by emergency responders due to narrow, winding private roads and driveways, sometimes with steep grade/topographical changes.
- **Above ground utilities in wooded or grassland areas, such as electrical poles.** Large wildfires can result in cascading impacts to critical infrastructure, such as destroying communication, equipment, blocking roadways, and causing system failures both with respect to water availability and power distribution.

Populations, farms, property, and infrastructure located within those previously identified communities and areas of higher wildfire risk would be more vulnerable.

Wildfires and the resulting burnt landscape can also damage and contaminate the natural environments, which includes polluting sources of drinking water, destroying habitats, exacerbating erosion and runoff to surface waters, and degrading air quality for miles.

Large wildfires produce a significant amount of polluted smoke that degrades air quality well beyond the boundaries of the fire, posing health risks. An example of this impact is May 2023 air quality advisory that was issued for Polk County as a result of the Canadian wildfires. Wildfire smoke originating from Canada started to move into Wisconsin from the northwest causing reduced air quality.

DNR RECOMMENDS WISCONSINITES LIMIT TIME OUTSIDE DUE TO CANADIAN WILDFIRE SMOKE

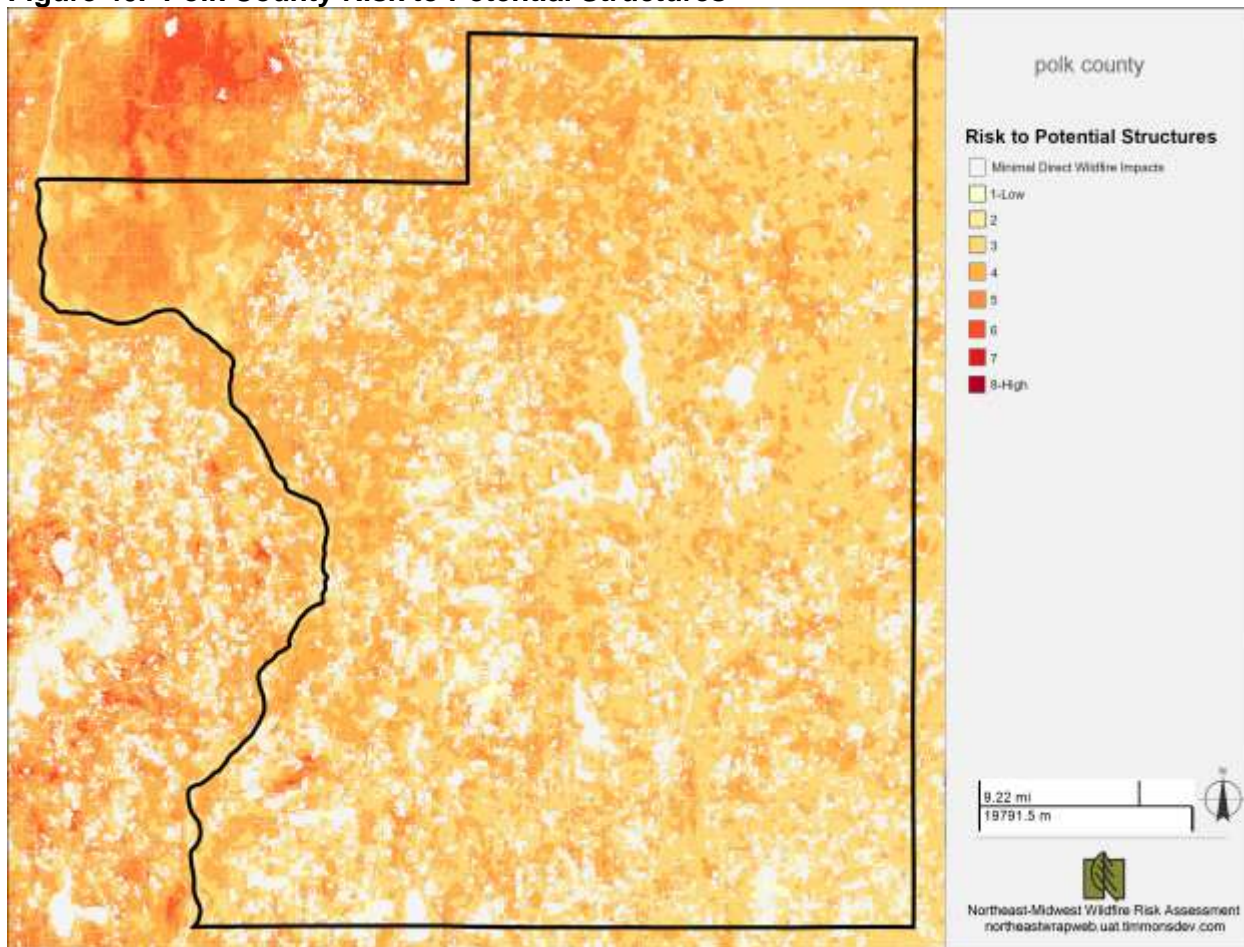


The DNR is advising Wisconsinites to reduce their time outdoors due to ongoing air quality alerts resulting from Canadian wildfire smoke.
Photo credit: Wisconsin DNR

Vulnerability to Structures

Understanding wildfires' impact on the built environment will help the County assess where and how development should occur. As stated earlier in this section, the communities with the most reported fires have been some of the fastest growing as well. **Figure 40** identifies the expected risk to potential structures. It represents a measure that integrates wildfire likelihood and intensity with generalized consequences to a home. This map does not take existing homes into account; it is identifying the overall risk to structures.

Figure 40. Polk County Risk to Potential Structures



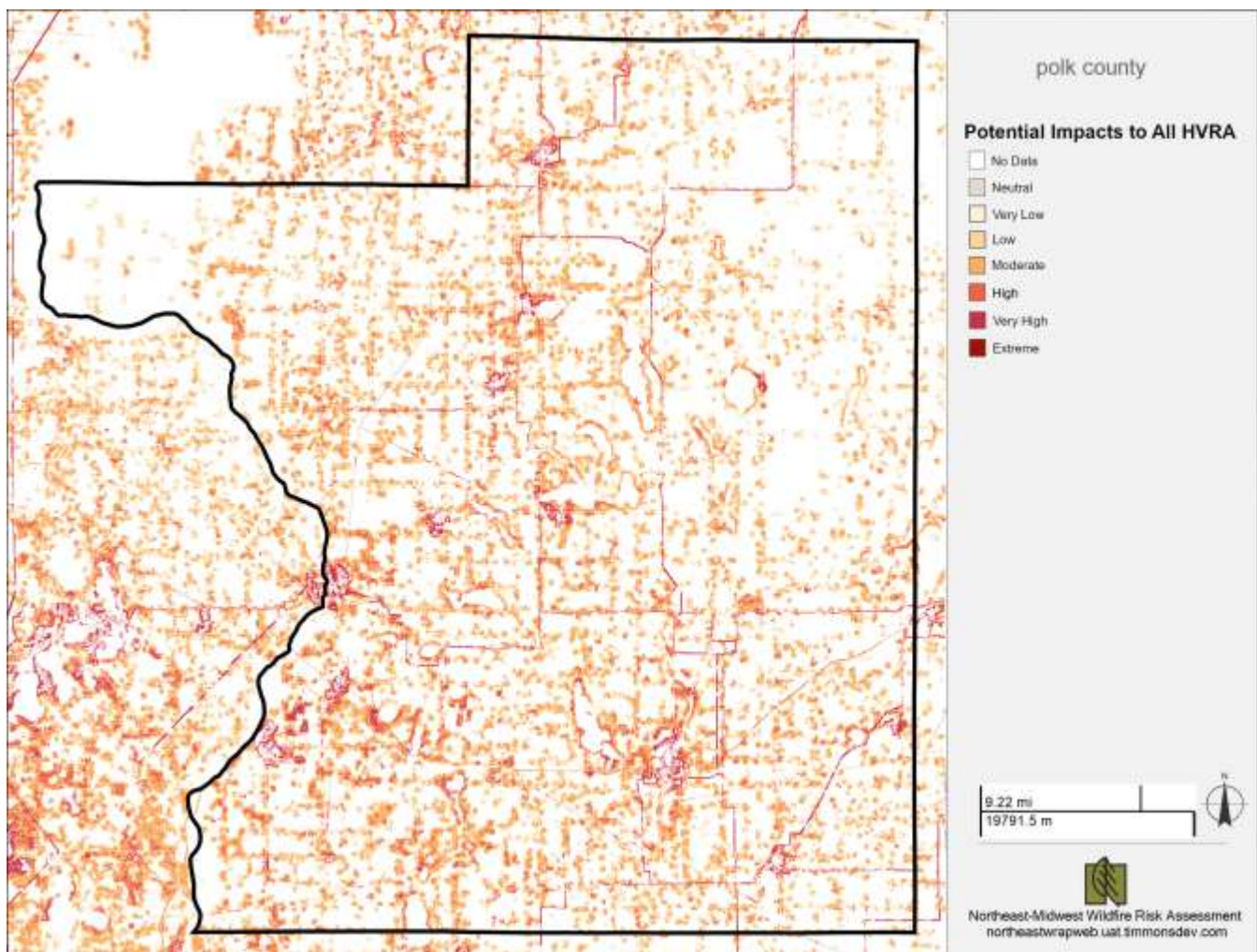
Key takeaways from the map include the following:

- The map parallels Figure 39 (burn probability). The same takeaways from that map apply here.
- Very few areas were rated in the 6-8 categories. The category with the most land area was 3, incorporating 42.4% of the County with 31.2% of the County being classified under risk category 4.
- Risk is distributed across the County, reflecting the need for fire services over a large area rather than in concentrated clusters.

Potential Impacts to All Highly Valued Resources or Assets (HVRA)

The Northeast-Midwest State Foresters Alliance identifies Highly Valued Resources or Assets (HVRA). These resources and assets include three categories: people and property, infrastructure, and cultural resources. The full Wildfire Risk Assessment report provides an impact assessment for each individual category. **Figure 41** is a consolidation of the three individual assessments. This map does not indicate the likelihood of a fire in a given area. If an area is labeled “very high” the impact a wildfire would cause to HVRA in that location would be very high, though the likelihood of a fire occurring there may be very low.

Figure 41. Polk County Potential Impacts to All HVRA



Key takeaways from the map include the following:

- Population centers rate high to extreme. This is to be expected given the density of people and property in these areas. These areas cover a very small percentage of Polk County’s acreage. Although they are dispersed throughout the County, localized fire services can address a significant amount of the above risks within relatively small service areas.

- The County’s rural development pattern can be seen clearly on the map. Low-density single-family homes and farmsteads dot the entirety of the County. Despite 69% of the County being classified as having “no data” or “neutral” impact, fire services must cover a large amount of territory to protect the entire community.

Projected Loss Estimates

Forest fire can cause significant injury, death, damage to property, and loss of natural resources. As shown in **Table 21**, the Town of Sterling (very high risk) and Town of West Sweden (high risk) had over \$129 million in assessed improvements on 1,003 improved parcels and \$761,600 in assessed personal property in 2023 as well as a combined 2020 Census population of about 1,468. Nearly all of these parcels were residential; only 24 parcels were commercial in use and one was manufacturing. The official Wisconsin Department of Administration population projections show that all the Town of Sterling is expected to grow over the next twenty years while the Town of West Sweden is expected to see a slight decrease in population.

The WDNR Intensive Fire Protection area encompasses all or parts of seven of Polk County’s 24 towns. As reflected in Table 21, these seven towns contain about 10 percent of the County’s population, 12 percent of the County’s improved parcels, and 9.5 percent of the County’s total improvement value. While we do not have the wildfire data to state with certainty that these seven towns have a higher wildfire risk than all other towns in Polk County, their intensive fire protection status was based, in part, upon their vegetative fuel types and wildfire risk.

Table 21. Population and Improvements of Towns with Intensive Fire Protection

Town	Population			2023 Assessed Improvements				2023 Assessed Value of Personal Property
	2020 Census	WI DOA Proj. 2040	% Chng. '20-'40	# of Imp. Parcels	# com	# ind	Total Value of Improvements	
Webster Fire Response Unit - Intensive Fire Protection								
T Bone Lake* (70%)	686	905	31.9%	544	2	0	\$69,626,900	\$331,700
T Clam Falls	554	700	26.4%	394	10	0	\$28,960,400	\$201,590
T Lorain	308	265	-14.0%	211	2	0	\$30,160,900	\$224,000
T Luck* (50%)	979	1,005	2.7%	537	14	0	\$61,541,800	\$175,900
T McKinley* (80%)	340	415	22.1%	320	0	0	\$38,338,400	\$334,400
T West Sweden	744	715	-3.9%	460	9	1	\$68,059,200	\$101,400
Grantsburg Fire Response Unit – Intensive Fire Protection								
T Sterling* (75%)	724	930	28.5%	543	15	0	\$61,414,800	\$660,200
Totals	4,335	4,935	13.8%	3,009	52	1	\$358,102,400	\$2,029,190

* These towns are partially within an intensive fire protection area with a rough percentage in parenthesis, though numbers provided are for the entire town.

Local fire personnel also noted that within non-wooded areas and outside the intensive protection areas, wildfires in grasslands and fields have the potential to spread more quickly than fires in wooded areas. Homes, agricultural operations, livestock, crops (especially hay and grains), and travelers on roadways are all potentially vulnerable, depending on proximity to vegetative fuel.

FEMA National Risk Index (NRI) Estimated Annual Losses

FEMA's NRI provides a source of estimated annual losses (EALs) for Polk County with a wildfire hazard.

Risk Factor	Wildfire
EAL Rate – Population	1 per 17.91m
EAL Rate – Buildings	\$1 per \$162.21k
EAL Rate – Agriculture	\$1 per 4.48m
Total EAL	\$107,598
Exposure	\$67.8 billion
Events per year	0.014% chance
Historic loss ratio	Relatively Moderate
Overall Loss Score	65.1 (Relatively Low)

According to the NRI data, wildfire has a relatively low estimated annual loss of natural hazard events (\$107,598) for Polk County. The estimated loss for Wildfire is higher than Riverine Flooding and Drought for the County.

Other Factors Influencing Future Losses

A wide variety of preparedness and mitigation efforts can reduce wildfire losses. Active forest planning and management can reduce fuel and provide fire lanes for responders. Polk County has an active forestry program that implements the County's 15-Year Comprehensive Forest Land Use Plan in collaboration with Wisconsin DNR and communities. The 2021-2025 Forest Land Use Plan emphasizes fuel reduction through the clean-up of fallen trees after the 2019 wind storm and by encouraging forest health through proactive measures such as targeting Oak Wilt, Emerald Ash Borer, and Jack Pine Budworm. Firewise practices, such as maintaining the home ignition zone, fire-resistant building materials, and composting, can target areas most at risk of wildfire. Residents and visitors can all benefit from fire prevention messaging, increased awareness of burning permits, etc. Polk County also restricts trail use and logging within County Forest lands during Extreme (Red Flag warning) wildfire conditions and limits campfires within the County Forest and campgrounds.

During municipal meetings and discussions with Fire Department personnel, **access for emergency vehicles** was a common concern for wildfires and other emergencies, especially on private roads and driveways in lake or resort areas. Some private roads/driveways in the County do not have adequate clearance and/or cannot support larger emergency vehicles. Longer, dead-end roads also exist that can complicate access and evacuation, especially if pull-offs and turn arounds are not adequate for larger equipment.

Many long, privately owned roads and driveways exist near lakes and along rivers, with some of these leading to multiple homes or cabins. And many homes cannot be seen from public roadway due to vegetation. Access can be further complicated by gated driveways or other obstructions and seasonably wet roads that can make access difficult or unwise. All of these conditions, especially if signage is inadequate, can result in slowed emergency response, unsafe working conditions for firefighters, and dangerous conditions during evacuations.



During mitigation planning (current & past plans), a number of fire departments noted potential interest in the installation of additional **dry hydrants** for improved access to water for fire protection: Luck Fire Department (1 @ Bass Lake), St. Croix Fall Fire Department (1 @ Deer Lake), Clayton Fire Department (1 in Town of Clayton; 1 in Town of Vance Creek), Balsam Lake Fire Department (1 at each boat landing on Balsam Lake; 1 at Goose Lake landing), and Osceola Fire Department (1 @ Mill Pond). The City of Amery also identified a potential need for 1-2 dry hydrants on lakes.

Other equipment needs identified by fire departments included emergency power generators, portable scene lighting, and aging larger vehicles. A number of departments have encouraged **more public education** on wildfire and flood risks, as well as the importance of maintaining the visibility of fire/address signs and housing numbers. One department suggested additional **coordinated awareness related to search and rescue** would be valuable for emergency response teams.

Risks for Individual Plan Participants – Wildfire

Overall, the risk of wildfire for the participating cities and villages is low given that most tree-lined street are hardwood and larger stands of forest or large grassland areas do not exist. **Appendix K** compiles Hazard Mitigation Sub-Plans for each city and village within Polk County and includes a summary of current wildfire mitigation activities in each community. These sub-plans identify wildfire vulnerabilities specific or unique to these individual participants and are supplemental to the previously described event history, probability, and vulnerability assessment for Polk County.

All participating cities and villages currently have good well capacity and storage for fire protection, though some noted that an additional water tower may be needed in the future if significant new development or a heavy water user (e.g., food processing manufacturer) occurs.

Only the Village of Frederic and a small portion of the Village of Luck are located within a WDNR intensive fire protection area. A number of municipalities noted residential development in forested areas. The Village of Luck identified that residential development has occurred in wooded areas along the north and south sides of Big Butternut Lake on the east end of community; this risk is heightened due to access being limited to long dead-end streets which could pose evacuation challenges during an event. Balsam Lake also identified an evacuation concern related to development on wooded islands.



vi. Extreme Heat

Defining the Hazard - Extreme Heat

In contrast to other natural hazard events, the occurrence and impacts of extreme heat are often more difficult to recognize. **Extreme heat** is the combination of very high temperatures and exceptionally humid conditions. The probability of exceeding 89°F in any given year is high, but temperatures are not the only determinant of the impacts of heat. Other factors include humidity, duration, and timing of each extreme heat event. The National Weather Service issues the following heat-related announcements and advisory warnings in order of severity:

Extreme Heat Outlook Statement — Issued two to seven days in advance of when Heat Advisory or Excessive Heat Warning conditions are anticipated. Issued as a Hazardous Weather Outlook (HWO). Broadcasted on NOAA Weather Radio All Hazards, and posted on NWS websites (www.weather.gov).

Heat Advisory — Issued six to 24 hours in advance of any 24-hour period in which daytime heat index (HI) values of 100 degrees or more and/or when air temperatures are expected to be 95 degrees or higher. If four consecutive days of these conditions are expected, then the Excessive Heat Warning will be issued.

Excessive Heat Watch — Issued generally 12 to 48 hours in advance of any 24-hour period in which daytime heat index (HI) values are expected to be 105 degrees or higher and nighttime HI values will be 75 degrees or higher.

Excessive Heat Warning — Issued six to 24 hours in advance of any occurrence of a 48-hour period in which daytime heat index (HI) values are expected to be 105 degrees or higher and nighttime HI values will be 75 degrees or higher.

If such conditions persist for a prolonged period of time, it is called a **heat wave**. Excessive or extreme heat is typically a slowly evolving phenomenon that can catch many people by surprise. Unlike tornados or thunderstorms that normally develop and occur more quickly and with more observable characteristics, a heat wave typically builds slowly over time. Because of this creeping effect, it is important for forecasters and officials to be constantly aware of heat and humidity conditions in order to properly warn and protect citizens.

Hazard Location

Extreme Heat is capable of causing health concerns, especially for vulnerable populations. There are no geographic boundaries of locations within Polk County uniquely affected by extreme heat events. All Polk County jurisdictions are equally at risk of experiencing an extreme heat event. Generally, extreme heat events are regional and will not impact assets outside of the heat event, although they will place additional pressure on medical services.

Hazard Extent (Potential Intensities)

Heat waves usually consist of high temperatures and high relative humidity. The combination of high temperatures and high relative humidity makes it difficult for the human body to dissipate heat through the skin and sweat glands. Sweating will not cool the human body unless the water is removed by evaporation. High relative humidity retards evaporation and, thus, inhibits the cooling process. The National Weather Service (NWS) uses the heat index as a measure of the combined effects of high temperatures and high relative humidity, as shown in **Figure 42**.

Figure 42. Heat Index Table

NOAA's National Weather Service

Heat Index

Temperature (°F)

	80	82	84	86	88	90	92	94	96	98	100	102	104	106	118	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	137			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	128	136					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	90	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution
 Extreme Caution
 Danger
 External Danger

Source: National Weather Service

As indicated, the heat index is a function of the actual temperature and the relative humidity. The categories in light orange, dark orange, and red indicate when the heat index values are of concern and precautions should be taken limiting sun exposure and physical activity.

Any time the temperature and humidity combine to produce a heat index that could cause health concerns for humans, the National Weather Service will issue various statements on heat conditions. For example, the NWS issues “Heat Advisories” when it expects the daytime heat index to equal or exceed 105° for 3 hours or more and the nighttime heat index equals or exceeds 80° for any 24-hour period. The NWS issues “Excessive Heat Warnings” when it expects the daytime heat index to equal or exceed 115° for 3 hours or more and the nighttime heat index equals or exceeds 80° for any 24-hour

period. The NWS may issue an "Excessive Heat Watch" 24 to 8 hours in advance of anticipated heat wave conditions.

Event History - Extreme Heat

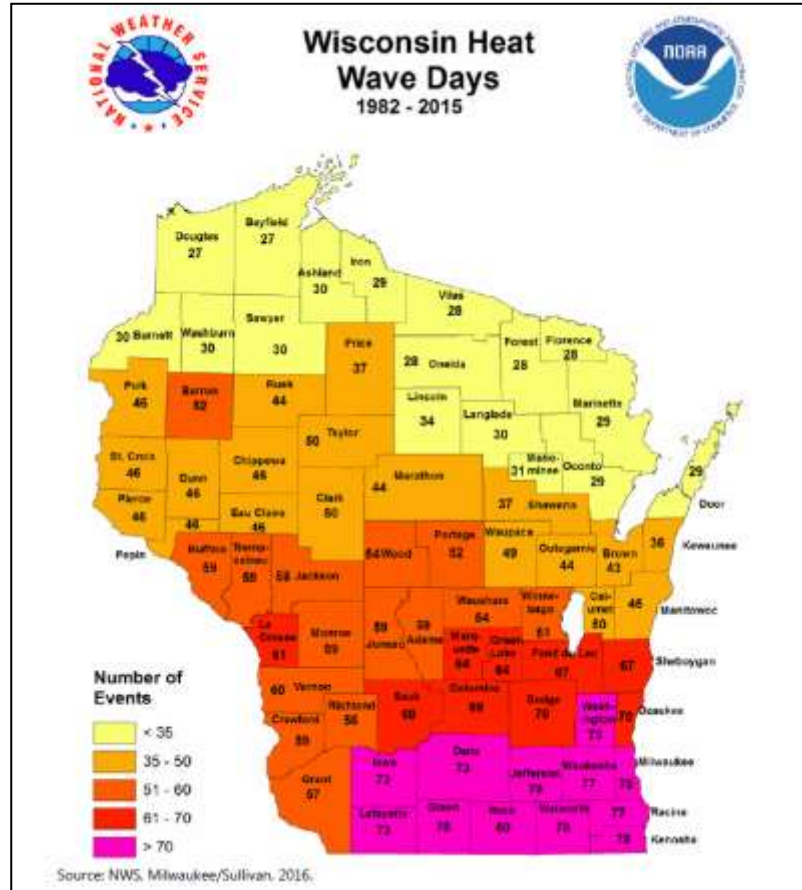
Regional Trends

Heat is the number one weather-related killer in the United States and Wisconsin. From 1979 to 1999, excessive heat exposure caused 8,015 deaths in the United States. During this period, more people died from extreme heat than from hurricanes, lightning, tornados, floods, and earthquakes combined.

Although Wisconsin may not be thought of as a high risk area for deadly heat waves, every year the State of Wisconsin experiences a period or series of periods in which the temperature and humidity produce a heat index which could be harmful to human health. From 1982 to 2015, there were 137 deaths directly attributed to heat in Wisconsin and 102 indirect deaths. A death is considered direct if the medical examiner ruled that heat was the primary cause of death and not just a contributing factor. Department of Health Services identified 22 heat-related deaths from 2016 to 2022 (no breakdown or direct versus indirect). In total from 1982 to 2020, 261 people have died in Wisconsin from heat-related causes. It is likely that this estimate is lower than the actual number given the difficulty of determining and tracking heat-related deaths.

The following are examples of recent heat wave events affecting Wisconsin:

- During the summer of 1995, two heat waves affected most of Wisconsin. Together, they resulted in 154 heat-related deaths and an estimated 300 to 400 heat-related illnesses. This makes the combined 1995 summer heat waves the biggest weather-related killers in Wisconsin for the past 50 years, far exceeding tornado deaths. Nationwide, the heat waves claimed 1,021 lives.
- In 1999, heat waves occurred on in multiple weeks of July. Collectively, these heat waves were directly and indirectly responsible for 21 deaths.
- Several heat waves from mid-July through early August 2001 claimed 15 fatalities across Wisconsin. Additionally, it is



estimated that 300 or more individuals were treated at hospitals for heat-related conditions.

- There were an additional 21 heat-related deaths and likely hundreds of related illnesses in July 2012, with heat indices peaking in the 100° to 115° F range, especially in the southern parts of the Wisconsin.
- In July of 2016, hot temperatures and very high dew point temperatures persisted over southern Wisconsin; the area saw heat index values in the lower to mid-100s. There were 3 heat-related deaths in 2016.

Polk County Trends

From 1993 through 2022, Polk County has experienced eight extreme heat events shown on **Table 22**, though the 1999 and 2001 events could be considered part of a single heat wave lasting multiple days.

Table 22. Polk County Extreme Heat Events – 1993-2022

Date	Type		Deaths	Injuries	Property or Crop Damage
7/23/1999	Heat	0	0	7/23/1999	No damages reported
7/29/1999	Heat	0	0	7/29/1999	
7/31/2001	Heat	0	0	7/31/2001	
8/01/2001	Heat	0	0	8/01/2001	
8/04/2001	Heat	0	0	8/04/2001	
7/31/2006	Heat	0	0	7/31/2006	
7/18/2011	Excessive Heat	0	0	7/18/2011	
7/20/2016	Excessive Heat	0	0	7/20/2016	

source: National Climatic Data Center (NCDC), 2023.

The NCDC database records did not identify any deaths or injuries from excessive heat events within Polk County, though heat-related deaths and injuries often go unreported to the database.

The NCDC data does not reflect recent community and stakeholder perceptions and experiences when it comes to extreme heat events. While still a relatively lower risk compared to the other natural hazards of significant risk, extreme heat is being recognized as a growing concern. Perhaps the most telling is that extreme heat was not identified as a hazard of significant risk for Polk County in the County's previous mitigation plans.

Hazard Probability - Extreme Heat

The Plan Steering Committee rated extreme heat as a low probability in Polk County (see Table 11). While extreme heat is a concern for the residents of Polk County, the Committee rated the vulnerability a little lower given that serious injury or widespread fatalities as a result of extreme heat are rare in the County.

Based on the NCDC data, FEMA's National Risk Index, and the climate trends discussed in Section III.C., it is estimated that **Polk County will experience an extreme heat event once every two years on average, with a single event potentially lasting multiple days.** However, the frequency of these

events is anticipated to increase and this probability estimate should continue to be re-assessed as part of future mitigation plan updates.

Vulnerability Assessment - Extreme Heat

Appendix F provides the following regarding the potential impacts of extreme heat events for Polk County as a whole:

- A description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- A description of the vulnerability of each community lifeline for this hazard; and
- The potential consequences or impacts to the above assets and community lifelines.

The following assets were identified as having the greatest vulnerability in Appendix F:

- **Seniors, people with certain illnesses or medications, and children (especially newborns)** are most vulnerable to extreme heat.
- **Populations residing in older structures and mobile homes** may lack sufficient air conditioning/HVAC systems or insulation. Campers & RVs as well as campgrounds may also lack sufficient air conditioning or cooling stations.
- **Infrastructure**—Certain types of infrastructure can be impacted directly or indirectly by extreme heat. Direct impacts can include disruption of biological processes at wastewater treatment facilities, the “softening” or buckling of roadways, increased mechanical failure, water supply shortages (during times of drought), or the sagging of electrical transmission lines. Indirect impacts can include the power brownouts due to spiking demands for electricity.
- **Agriculture, especially livestock.** In July 2012, Green Bay-area dairy farmers were reporting up to a 33 percent reduction in milk production due to heat; and it can take months before animals recover.³³ Extreme heat can also have long-term livestock reproductive and herd size management issues. Within confined livestock buildings, heat has also resulted in livestock deaths in the region, especially should power be lost. In Polk County, at least one rural fire department has been called out in the past to provide water misting to help keep turkeys cool during the hottest of temperatures. Extreme heat and drought can also result in the build-up of toxic gases within grain silos to lethal levels or result in fires or explosions.
- **Hazardous Materials**—Certain chemicals, gases, and other hazardous materials can be impacted by extreme heat resulting in a release, fire, or explosion. Care must be used to properly store these materials during extreme heat events.

Due to its largely rural development pattern and smaller cities, Polk County is not as vulnerable to urban heat island effect experienced by residents in larger cities and urbanized areas. This was a factor in the large number of heat-related deaths in Milwaukee County in 1995. Concentrations of buildings

³³ <http://www.wbay.com/story/19037284/2012/07/16/milk-production-takes-a-dip-with-extreme-heat>

can disrupt the cooling and moderating influences of winds. And large areas of concrete and asphalt retain heat. Large numbers of heat sources in urban areas are typically a secondary factor. However, other factors also influence a population's vulnerability to extreme heat.

Assessing the Potential Vulnerability & Impacts to County Residents

Temperatures in excess of 90°F pose a risk of heat-related illness and death, especially when humidity levels exceed 35 percent. The risk is highest for individuals who are suffering from chronic illnesses and for those who are not acclimated to these conditions. Most health-related illnesses involve the elderly, especially those residing in urban areas for which temperatures can be further elevated due to the urban heat island effect. However, people on certain medications, isolated individuals who live alone and seldom leave their home, infants and young children, persons with chronic heart or lung problems, overweight people, persons with disabilities, and people who work outside are also at greater risk during extreme heat events. Research findings strongly suggest that heat index values of 90 to 105 make sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity. Heat index values of 105 to 130 degrees make sunstroke, heat cramps, and heat exhaustion likely with prolonged exposure and/or physical activity. Shown in **Table 23** are the potential dangers associated with heat index temperatures.

**Table 23. Apparent Temperature Heat Stress Index
(Dangers Associated with Heat Index Temperatures)**

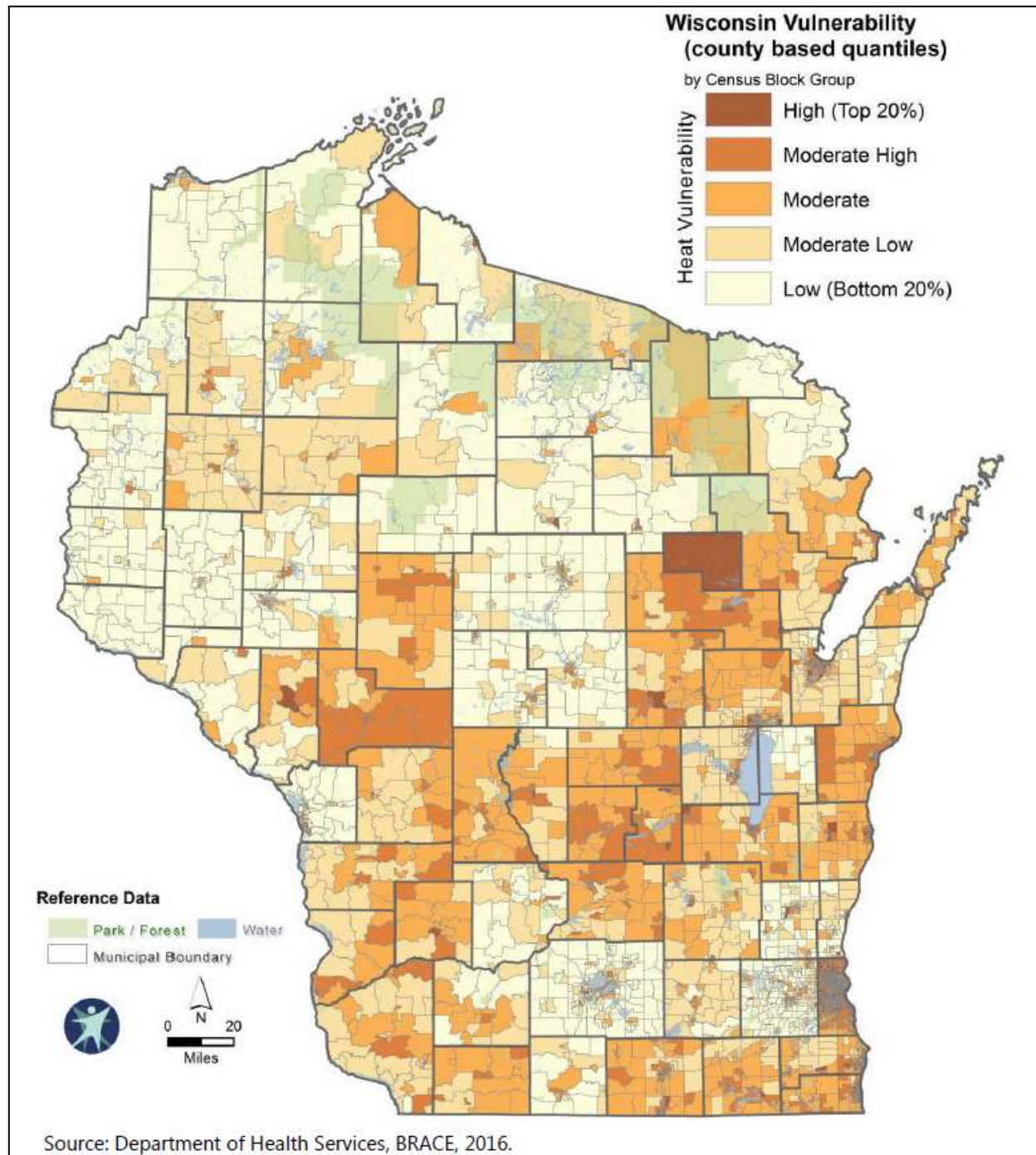
Category	Apparent Temperature (Heat Index - °F)	Associated Dangers
Caution	80-90°F	Exercise more fatiguing than usual.
Extreme Caution	90-105°F	Heat cramps, exhaustion possible.
Danger	105-130°F	Heat exhaustion likely; heatstroke possible.
Extreme Danger	Greater than 130°F	Heatstroke or Sunstroke imminent.

Source: National Weather Service

Heat cramps are muscle spasms from the result of a large amount of salt and water, and generally cease to be a problem after acclimatization. **Heat exhaustion** may cause dizziness, weakness, nausea, or fatigue from the depletion of body fluids, and may be accompanied by slightly to moderately elevated body temperatures. **Heatstroke** is when the body is unable to regulate and prevent a substantial rise in the body's core temperature. It is usually diagnosed when the body's temperature exceeds 105° F due to environmental temperatures. **Sunstroke** is a form of heatstroke brought about by excessive exposure to the sun. Heatstroke or sunstroke are considered medical emergencies and can be fatal. The risk of heat-related injury or death is for individuals who are suffering from chronic illnesses and for those who are not acclimated to these conditions. Most health-related illnesses involve the elderly. However, people on certain medications, isolated individuals who live alone and seldom leave their home, infants and young children, persons with chronic heart or lung problems, overweight people, persons with disabilities, homeless individuals who do not have an air conditioned place to go, and people who work outside are also at greater risk during extreme heat events. Mobile homes, campers, pole buildings, and similar construction, if not air conditioned, can also become dangerous under extreme-heat conditions.

The Building Resilience Against Climate Effects (BRACE) program in the Wisconsin Department of Health Services has compiled a heat vulnerability index map for the State based on a combination of risk factors (population density, health factors, demographic and socioeconomic factors, and the natural and built environment). **Figure 43** shows the heat vulnerability index map for Wisconsin. The vulnerability for most of Polk County was primarily rated low with some areas rated as moderate low and the City of Amery rated as having a moderate vulnerability, likely due to lower average incomes and/or an aging population.

Figure 43. Wisconsin Heat Vulnerability Index



Projected Loss Estimates

FEMA National Risk Index (NRI) Estimated Annual Losses

FEMA's NRI provides a source of estimated annual losses (EALs) for Polk County with a heat wave hazard.

Risk Factor	Heat Wave
EAL Rate – Population	1 per 1.98m
EAL Rate – Buildings	\$1 per \$63.63m
EAL Rate – Agriculture	\$1 per \$29.52k
Total EAL	\$269,003
Exposure	\$534.4 billion
Events per year	0.6
Historic loss ratio	Relatively Low
Overall Loss Score	72.5 (Relatively Moderate)

Out of thirteen NRI hazard types for Polk County, heat wave is the seventh highest in expected annual losses with a value of \$269,003, primarily due to the estimated losses to agriculture. Based on Polk County's 2020 population of 44,977 and the above EAL rate, one County resident will be seriously injured by extreme heat about once every 44 years; this is about three times as rare as an extreme cold wave injury.

Other Factors Influencing Future Losses

1. **Population growth and new development.** As the population increases and ages, it is only natural that the exposure to extreme heat events will also increase. As previously noted, urban areas can experience an urban heat island effect, which would increase as more development and hardscape (e.g. buildings, concrete sidewalks and parking lots, asphalt roads and driveways) occurs. A significant urban heat island effect is not anticipated to occur in Polk County.
2. **Climate Change.** As noted previously, the probability of extreme heat events is projected to increase.
3. **Preparedness & Mitigation.** Section III.C. discusses some potential climate adaptation strategies to mitigate extreme heat. During this plan update, compared to previous County mitigation plans, there was a significant increase in identifying cooling shelters with emergency generators. Stakeholders also discussed the potential of extreme heat events occurring during a period of power outage, which is discussed further in the Long-Term Power Outage section.

Most communities lack such shelters or, in other cases, local officials were unaware if a shelter has been designated. In some cases, a library or other structure was identified as a cooling shelter, but it would only be available during normal hours of operation. And many of the current facilities that would potentially be available as a cooling shelter lack emergency power generation.

Risks for Individual Plan Participants - Extreme Heat

All individual plan participants in Polk County (i.e. villages, cities, educational institutions, electric cooperatives) are equally at risk of experiencing an extreme heat event. The potential impacts, in general, are also shared, though vulnerability increases based on the density of the population, type of development, etc. Vulnerabilities can also differ based on factors such as socio-economic characteristics.

Appendix K compiles Hazard Mitigation Sub-Plans for each city and village and **Appendix L** for the participating educational institutions within Polk County. These subplans identify extreme heat vulnerabilities specific or unique to these individual participants and are supplemental to the previously described event history, probability, and vulnerability assessment for Polk County. It is notable that during meetings with the cities and villages there was increased concern with extreme temperature trends among some communities. Some communities expressed a need for the identification or designation of cooling (and heating) shelters with emergency power generation; in some cases such a shelter is available, but lacks a generator. Overall, to date, there has not been a great demand in Polk County for the activation of heating/cooling shelters in part since a long-term power outage has not occurred during a period of extreme heat or cold.

Heat Impacts: Vulnerable Populations

 <p>PREGNANT</p> <p>Extreme heat events have been associated with adverse birth outcomes such as low birth weight, preterm birth, infant mortality, and congenital cataracts.</p>	 <p>NEWBORNS</p> <p>Newborns are extra sensitive to heat because their ability to regulate body temperature is limited.</p>	 <p>CHILDREN</p> <p>Young children and infants are particularly vulnerable to heat, as their bodies are less able to adapt to heat than adults. Those under four are especially vulnerable.</p>	 <p>ELDERLY</p> <p>Older adults, especially those who have preexisting diseases, take certain medications, live alone or have limited mobility are at higher risk for heat illness.</p>	 <p>CHRONIC ILLNESS</p> <p>People with chronic medical conditions are more likely to have a serious health problem during a heat wave.</p>
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Source:
The Impacts of Climate Change on Human Health in the United States,
A Scientific Assessment (U.S. Global Changes Research Program)

weather.gov 

vii. Drought

Defining the Hazard - Drought

A **drought** is an extended period of unusually dry weather which may be accompanied by extreme heat (temperatures which are ten or more degrees above the normal high temperature for the period). Drought conditions may vary from below normal precipitation for a few weeks to a severe lack of normal precipitation for multiple months.

There are two basic types of drought in Wisconsin—agricultural and hydraulic. **Agricultural drought** is a dry period of sufficient length and intensity that markedly reduces crop yields. **Hydraulic 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. Soil types greatly influence agricultural drought risk. Some sandier, well-drained soils experience drought-like effects almost annually, and can experience the lowest yields when a true drought is declared.

Hazard Location

Droughts can occur in all areas throughout the State, including areas with high and low average precipitation. Healthy soils allow more water to infiltrate and retains more moisture, enabling it to effectively absorb extreme rainfalls as well as support crops during droughts. Soil texture refers to the feel of soil; soils are made up of different amounts of sand, silt, and clay. A loamy soil is one that combines all three of these types of particles.

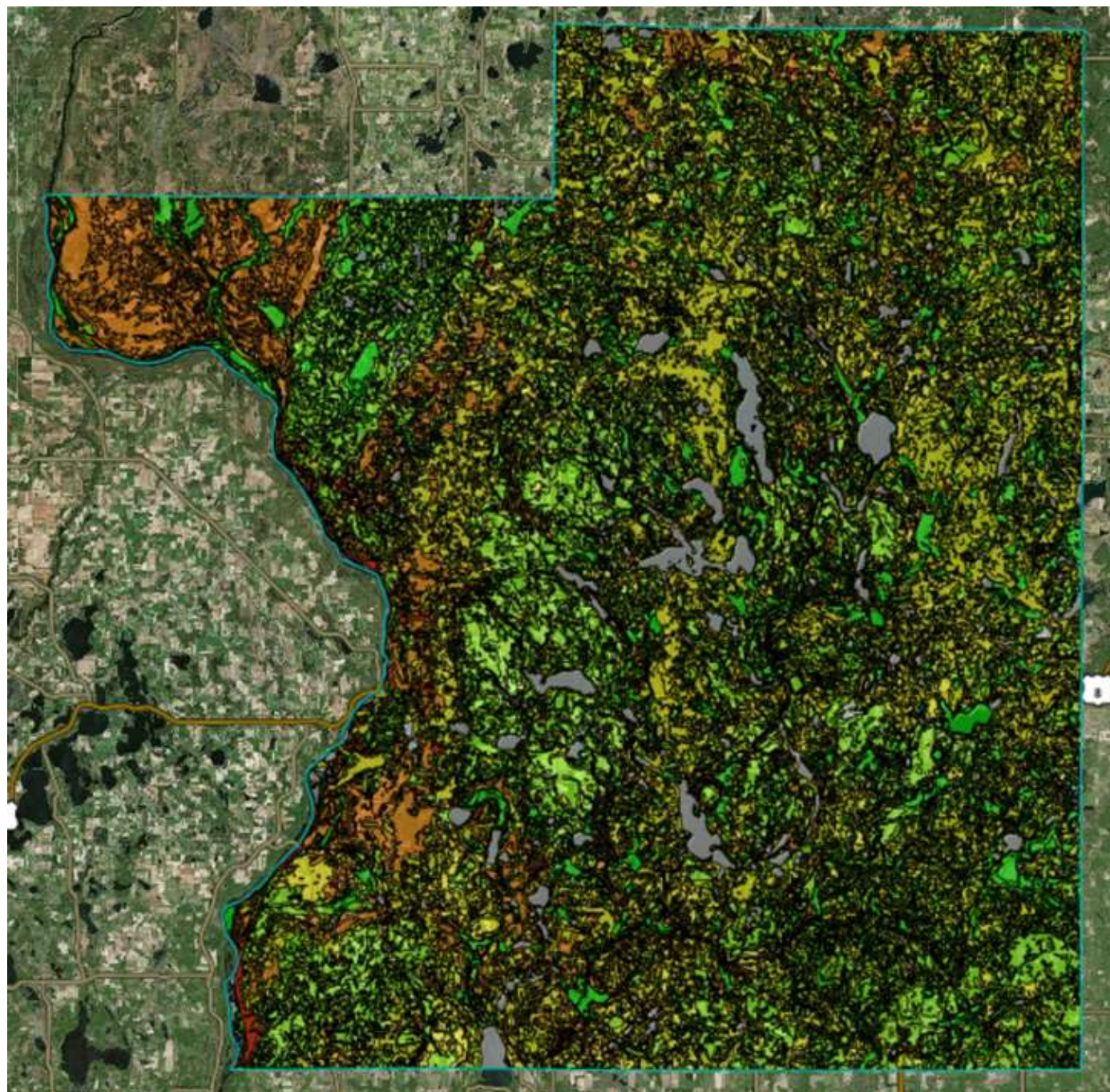
- Sandy soils have the largest particle size, which allows water to drain quickly. This causes water to drain out faster. These soils have low water holding capacity and struggle to retain enough water for good crop growth.
- Silty soils have medium-size particles, providing better water retention than sandy soils. During drought periods, they can retain more water than sandy soils.
- Clay soils have small fine particles and a higher water holding capacity. During extreme heat, clay soils can retain moisture relatively well.

Figure 44 and the table below show that the soils of Polk County have some drought vulnerability, though no soils are severely vulnerable:

Drought Rating	% of Soils	Soil-Drought Characteristics
Slightly vulnerable	11.1%	typically low-lying areas with near-surface water
Somewhat vulnerable	29.4%	annual precipitation generally adequate for plant growth)
Moderately vulnerable	39.3%	some water stress in an average year
Drought vulnerable	14.1%	drought generally occurs every year
Severely vulnerable	0.8%	plants must be very drought tolerant even in normal years
Not rated	5.3%	e.g., lakes, rivers

Comparing this map with the previous *Wildfire* section maps will yield similarities.

Figure 44. Drought Vulnerable Soils - Polk County



Soil Rating Polygons

- Severely drought vulnerable
- Drought vulnerable
- Moderately drought vulnerable
- Somewhat drought vulnerable
- Slightly drought vulnerable
- Not rated or not available

USDA Natural Resources Conservation Service

Web Soil Survey National Cooperative Soil Survey

Hazard Extent (Potential Intensities)

The **Palmer Drought Severity Index (PDSI)** utilizes several factors (i.e., temperature, soil moisture, and precipitation) to calculate the magnitude of the drought conditions. The results of the algorithm range from -4 (extreme drought) to 4 (extremely moist); 0 represents normal historical conditions. Categories of drought are as follows:

- **D0: Abnormally Dry**
 - Going into drought:
 - Short-term dryness slowing planting and growth of crops or pastures
 - Coming out of drought:
 - Some lingering water deficits
 - Pastures or crops not fully recovered
- **D1: Moderate Drought**
 - Some damage to crops and pastures
 - Streams, reservoirs, or wells low, some water shortages developing or imminent
 - Voluntary water-use restrictions requested
- **D2: Severe Drought**
 - Crop or pasture losses likely
 - Water shortages common
 - Water restrictions imposed
- **D3: Extreme Drought**
 - Major crop and pasture losses
 - Widespread water shortages or restrictions
- **D4: Exceptional Drought**
 - Exceptional and widespread crop and pasture losses
 - Shortages of water in reservoirs, streams, and wells creating water emergencies

The index is effective at determining drought over a period of months, but less effective over shorter timeframes. The index for Polk County is provided in **Figure 45** on the following page.

The relative severity and geographic extent of drought impacts on crops can also be described in terms of different State and Federal designations:

- State or Governor Drought Emergency or Disaster Declaration
- USDA Secretarial Disaster Declaration
- Presidential Emergency or Disaster Declaration

The above declarations may be limited to the primary counties affected by the drought or may also include contiguous counties that are less impacted, but may also be eligible for financial assistance.

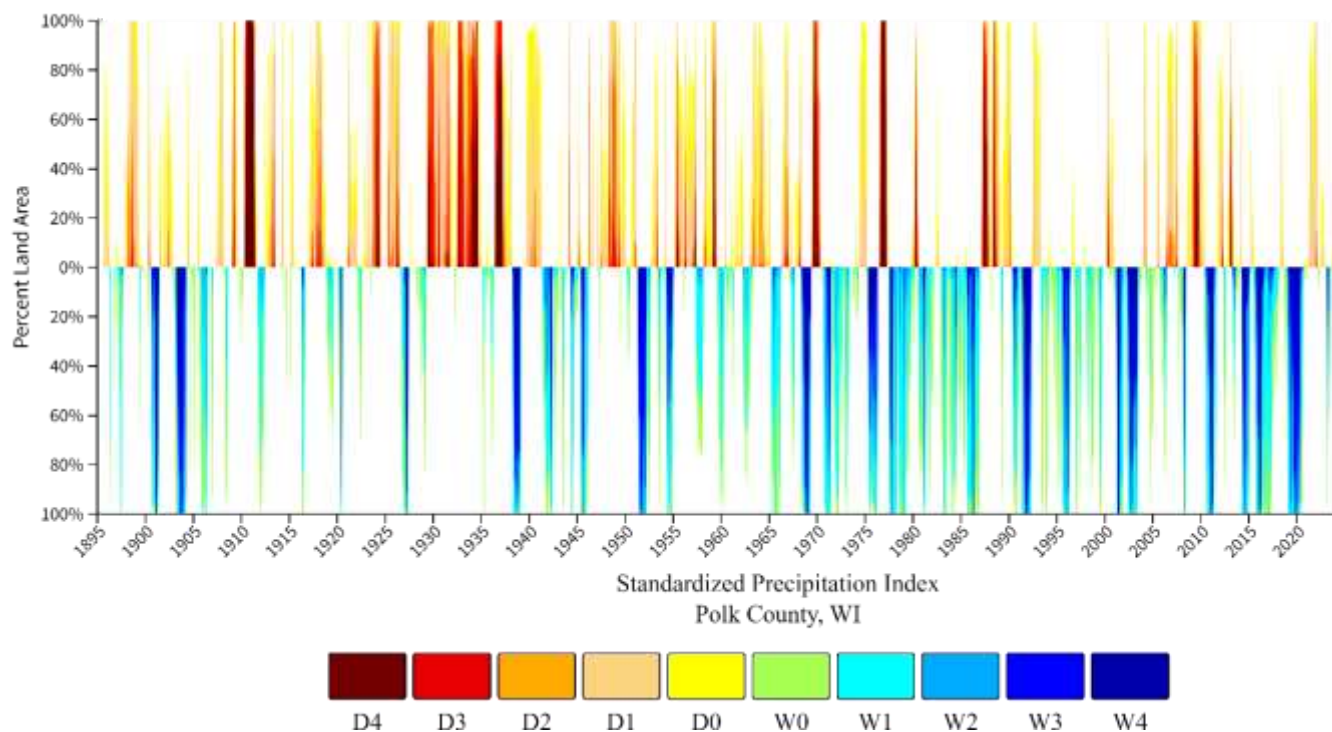
Event History - Drought

Regional and Local Events

Drought is a relatively common phenomenon in Wisconsin and has occurred statewide in 1895, 1910, 1939, 1948-1950, 1955-1959, 1976-77, 1987-1989, 2003, 2005, and 2006-2007. The drought of 1929-1934 (Dust Bowl Years) was probably the most significant in Wisconsin history, given its duration; some of areas of the State experienced drought effects until the early 1940s. Additional information on these historic droughts can be found in the *State of Wisconsin Homeland Security Council Threat & Hazard Identification and Risk Assessment (THIRA)*, most recently amended in 2021.

As shown in Figure 46, recorded years of severe drought for Polk County occurred in 1895, 1910, 1930s, 1939, 1958, 1976, 1977, 1988, 1989, 2003, 2005, 2006, 2007, 2009, and 2012.

Figure 45. Polk County Drought Severity Index (1895-2023)



D4	Exceptional Drought Conditions	W4	Exceptional Wet Conditions
D3	Extreme Drought Conditions	W3	Extreme Wet Conditions
D2	Severe Drought Conditions	W2	Severe Wet Conditions
D1	Moderate Drought Conditions	W1	Moderate Wet Conditions
D0	Abnormally Dry Conditions	W0	Abnormally Wet Conditions

The table below shows the Federal Drought Disaster Declarations involving Polk County for which financial assistance was provided:

Crop Year	Declaration Type
1976	Federal Drought Area Declaration under the Disaster Relief Act
2007	USDA Drought Disaster Declaration
2013	USDA Drought Disaster Declaration (contiguous county)
2022	USDA Drought Disaster Declaration (contiguous county)
2023	USDA Drought Disaster Declaration (primary county)

There have been additional Governor emergency or disaster declarations for drought that have included Polk County that did not meet the threshold for a Federal declaration (e.g., 2003, 2005, 2006, 2009, 2012); in such cases, State assistance may have been available, but not Federal.

1970s-1980s Droughts

A Presidential Emergency Declaration was issued for the statewide drought in 1976, during which agricultural losses in the State were estimated at about \$2.7 billion in today's dollars and some private wells in western Wisconsin dried up. Point wells in certain areas of the region also dried up during the drought of 1988-1989, and agricultural losses in the State were estimated at approximately \$2.6 billion. The 1987-1989 drought not only had below-normal precipitation, but also was characterized by persistent dry air and above-normal temperatures. Heatwaves killed an estimated 5,000 people nationwide and contributed to high livestock loss. An estimated 52% of Wisconsin's 81,000 farms had crop losses of 50% or more, with 14% of farmers suffering losses of 70% or more.

2003-2013 Droughts

Until 2000, drought conditions have been impacting corn and soybean yields to some degree in the County about once in every decade. However, beginning about 2003, northern Wisconsin experienced a lengthy period of drought conditions with serious impacts to agricultural producers and hydraulic levels of surface and ground waters. As shown in the previous table, a number of emergency declarations were issued during this period. Water levels in the County's many seepage lakes dropped precipitously, leaving some docks dry, increasing water temperatures, and exacerbating water quality concerns. Some municipalities instituted municipal water system use restrictions during the summer months. As a result, the Governor issued State of Emergency drought declarations, which included Polk County, during five of the ten years between 2000 and 2010.

Summer 2010 brought some significant relief from the region's drought conditions, as a new record for the average statewide summer rainfall was established (18.65 inches). In June through September 2010, northwest Wisconsin experienced total monthly rainfall amounts of about two inches or more above the mean in each of these four months. Though the rainfall provided relief for agricultural crops, water levels in many surface waters remained below average and monthly rainfall amounts were still below average for six of the months of the year.

However, a nearly statewide drought would again impact Polk County during the 2012 summer and fall seasons, resulting in reduced crop and alfalfa yields. As feed costs rose, some farmers were forced to sell-off some livestock. There were many reports of wells in Wisconsin running dry and some well

depths had to be increased in order to find water. The drought was generated by a large, warm blocking high pressure in the upper levels of the atmosphere which was centered over the middle of the nation in May and June. Part of this high pressure expanded north into the western Great Lakes region in July, forcing storms to stay mostly north of Wisconsin as the summer progressed. The drought started across the southern third of counties in June and steadily expanded north during July and August. Eventually, the southern two-thirds of the state was in severe (D2) to extreme (D3) drought status. The drought continued into December, thanks to a very dry November.

2013 would be another drought year for the region. The U.S. Secretary of Agriculture issued a USDA drought disaster declaration that included St. Croix County; as a contiguous county, Polk County farmers suffering losses were also able to obtain Federal emergency loans.

2022-2024 Drought

While Polk County was less impacted than some areas of the region, a period of drought expanded and intensified in Summer 2023, largely influenced by not only lack of precipitation, but extreme heat and evaporative demand. This drought period was very unusual since Wisconsin experienced the wettest January-April on record, followed by the 4th driest May-August, a wet October, then the 8th driest November on record. These large swings in precipitation was a challenge for crop farmers. The drought period would “break” with above average precipitation in May 2024.

Hazard Probability - Drought

The Plan Steering Committee rated drought probability as being of some (below moderate) concern in Polk County, with moderate vulnerability (see Table 11). **Based on the ten severe drought years since 1970, a severe, countywide or regional drought year can be anticipated once every 5 to 6 years on average, with events often occurring in subsequent years. As the previous soil information notes, some areas of the County can be expected to experience an agricultural drought on an annual or near annual basis.**

As discussed in Section III.C., research from the Wisconsin Initiative on Climate Change Impacts³⁴ (WICCI) shows that annual precipitation in Polk County has been increasing since 1950, though most of these increases have been occurring during the winter months. During the summer months, average precipitation levels have been decreasing over the northern half of the County. Concurrently, Polk County’s average annual temperatures have increased 1.5°F to 2.5°F since 1950. WICCI has projected that Polk County’s climate will continue to become much wetter overall, but drier during the summer months, with significantly higher temperatures. As such, the probability and severity of future droughts may increase, but there is insufficient data available at this time to be definitive.

³⁴ Wisconsin Initiative on Climate Change Impacts website: www.wicci.wisc.edu

Vulnerability Assessment - Drought

Appendix F provides the following regarding the potential impacts of extreme heat events for Polk County as a whole:

- A description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- A description of the vulnerability of each community lifeline for this hazard; and
- The potential consequences or impacts to the above assets and community lifelines.

The following assets were identified as having the greatest vulnerability in Appendix F:

- **Agricultural crops and the agricultural economy** are the greatest drought vulnerabilities in Polk County. As will be later discussed, drought can impact other aspects of farming.
- **Groundwater supply for private and municipal wells can decrease**, though this has not been a recent concern. Private wells dried-up within the region in 1976 and 1988. Under such circumstances, wells may be re-drilled at significant cost; or a farmer whose livestock relied on a pond in the past may have to install a well and pump to provide water for stock. Water use bans during dry periods are still occasionally instituted in some cities and villages with municipal water systems.
- **Surface water levels may decrease, impacting recreation and water quality.** This was a significant concern for some of the County's seepage lakes in the 2000s. Water use bans during dry periods are still occasionally instituted in some cities and villages with municipal water systems. No experiences or concerns with drought-related decreases in surface waters for hydroelectric power or industrial consumption were identified during the process.
- **The potential for wildfire increases dramatically.** Drought conditions can also stress forest vegetation, making it more vulnerable to certain pests and diseases.

Projected Loss Estimates

Overview of Potential Agricultural Losses

Drought can impact parts or all of Polk County's agricultural base. The agricultural overview in Section II.C.iv. discussed and quantified the importance of agriculture to Polk County's economy and the potential market value of the crops at risk.

In general, for Wisconsin, droughts have the greatest impact on agriculture. Even small droughts of limited duration can significantly reduce crop growth and yields, while making crops more susceptible to pests and diseases. More substantial events can decimate croplands and result in total loss. Droughts also greatly increase the risk of forest fires and wildfires because of extreme dryness. The loss of vegetation due to drought can result in flooding, even from an average rainfall.

The vulnerability to agricultural drought is high for Polk County. Crop yields can dramatically decrease; and livestock, especially those kept in close quarters, can experience decreased milk production or even death. Since the severity of drought can vary, determining its financial impacts on crop and livestock operations is difficult.

To gain insight into potential crop losses, the Polk County University of Wisconsin-Extension Office provided total crop cash receipts for the years of two droughts (1977 and 1989), and the receipts for each of the following non-drought years (1978 and 1990). These losses are summarized in **Table 24**. Using the 2016 inflation-adjusted numbers, we see a decrease in receipts of \$5 to \$7 million in drought years, representing a 50% to 75% drop.

Table 24. Estimated Cash Crop Receipts Comparison

Cash Crop Receipts for Polk County Producers	1977	1978	difference	1989	1990	difference
	almost \$2.4 mil.	almost \$4 mil.	approx. \$1.6 mil.	\$4.8 mil.	\$8.6 mil.	\$3.8 mil.
<i>adjusted 2016</i>	\$9.6 mil.	\$15.0 mil.	\$5.4 mil.	\$9.4 mil.	\$16.2 mil.	\$6.8 mil.

Source: Ryan Tichich. Polk County University of Wisconsin-Extension.

Adjusted 2016 estimates based on Consumer Price Index by U.S. Bureau of Labor Statistics

The agricultural drought in 2003 resulted in the following losses according to the USDA-Farm Service Agency County Emergency Board:

alfalfa	32% yield reduction and estimated \$3 million loss
other hay	32% yield reduction and estimated \$200,000 loss
soybeans	46% yield reduction and estimated \$1.67 million loss
corn	26% yield reduction and estimated \$4.1 million loss

These losses are a significant financial hardship, especially for an industry that is struggling overall.



ASSISTANCE FOR FARMERS



ELAP
Emergency Assistance for Livestock, Honeybees, and Farm-raised Fish Program provides assistance for feed losses as well as water hauling and feed transportation expenses.



CRP
Emergency Haying and Grazing of Conservation Reserve Program Acres allows producers to graze livestock on lands enrolled in CRP, except for during primary nesting season.



TAP
Tree Assistance Program provides cost-share assistance to replant or rehabilitate trees, bushes or vines lost during the drought. Provides assistance for trees, bushes or vines not covered by NAP or crop insurance.



ECP/EFRP
Emergency Conservation Program and Emergency Forest Restoration Program provide financial and technical assistance to restore conservation practices like fencing, damaged farmland or forests.



LFP/LIP
Livestock Forage Disaster Program provides benefits for 2021 grazing losses due to drought. It may also be available for loss of grazing acres due to wildfires on federally managed lands.
Livestock Indemnity Program provides benefits for livestock deaths due to wildfires and extreme weather (i.e. extreme heat; based on actual temperature, varies by state), and for death losses caused by anthrax brought on by drought.



EQIP
Environmental Quality Incentives Program provides financial and technical assistance to implement conservation practices. Common practices to help recover from drought include forest management plans, tree/shrub establishment, brush management, prescribed grazing, pasture and hay planting, wildlife habitat, livestock watering systems and cover crops.

A quick look at Polk County’s two biggest cash crops provides insight into the current extent of this vulnerability. In 2016, over 9.1 million bushels of grain corn and 1.77 million bushels of soybeans were produced in Polk County. In March 2017, U.S. grain corn prices averaged \$3.49 per bushel and soybeans averaged \$9.69 per bushel. If we apply these prices to 2016 production, there is over \$48 million in value for these two crops alone.

Typically, farmers will supplement feed before allowing a drop in milk production due to drought. Additional feed purchases could also vary based on drought severity and length, but \$1,500 of additional feed per mature cow is not unrealistic (\$1,500 x 44,000 head of cattle = \$66 million) resulting in many millions in required supplemental feed for Polk County farmers under a typical, single-season drought event.

Drought conditions can also result in the build-up of nitrates in feed and silage to levels that are toxic to cattle. In recent years, there have been a small number of cattle deaths in the region due to nitrate toxicity. Extreme heat and drought can also result in the build-up of toxic gases within grain silos to lethal levels or result in fires or explosions. Extreme heat within large, confined livestock buildings has also been a concern in the past, and some rural fire departments have been called out to provide water misting to help keep turkeys cool during the hottest of temperatures.

The far majority of local farmers understand and practice good management to reduce the vulnerabilities associated with drought conditions, but some knowingly take chances. Most farmers carry some type of crop insurance, especially in drought-prone areas. Most farmers also participate in Farm Service Agency programs which require multi-peril crop insurance and protect losses at average County yields. But such insurance is very expensive, and participation will often increase as the price received for the commodity increases. It is typically not cost-effective to insure low-value crops, such as alfalfa. And for many smaller specialty growers and community-supported agricultural operations, it can be cost-prohibitive to carry crop insurance.

FEMA National Risk Index (NRI) Estimated Annual Losses

FEMA’s NRI provides a source of estimated annual drought losses (EALs) for Polk County:

Risk Factor	Drought
EAL Rate – Population	--
EAL Rate – Buildings	--
EAL Rate – Agriculture	\$1 per \$3.91k
Total EAL	\$40,618
Exposure	\$52 million
Events per year	2.6
Historic loss ratio	Relatively Low
Overall Loss Score	57.3 (Relatively Low)

The NRI table suggests drought impacts in Polk County will largely be limited to agricultural crop losses. The data suggests that two to three drought events will occur annually, reflecting that some soils of Polk County will experience drought on a near annual basis. Overall, the NRI rates the County’s drought vulnerability as relatively low.

Other Factors Influencing Future Losses

- Spring-fed or seepage lakes and ponds with no inlet or outlet have been especially vulnerable to long-term droughts and decreasing groundwater levels within the County. The result is a loss of habitat and recreational value, falling property values in shoreline areas, and potential shoreline encroachment.
- Agricultural irrigation has been increasing in the County due to recent drought events, which does have the potential to further impact groundwater levels in some areas. The sizable aquaculture industry has also increased agricultural groundwater demands. As of Spring 2017, the Wisconsin DNR reports that 95 high-capacity wells have been permitted for Polk County with withdrawals since 2010, of which 27 were used for agricultural irrigation. Regardless of the increased demand, ground quantity in the County is reported as being good overall.
- As surface waters decrease, shoreline areas are more vulnerable to erosion, water temperatures can change, and contaminants and nutrients become concentrated which can further contribute to toxicity, eutrophication, and fish kills.
- Some of the longer-term consequences of rising temperatures and drier summers were discussed previously in Section III.C. on the possible hazard impacts of climate change, such as the loss of cold-water trout streams and further loss of surface waters through increasing evaporation.
- Encouraging agricultural best management practices has the potential to make farmland more resilient to drought.

SOIL HEALTH AS A DROUGHT MITIGATION TOOL

Soil health best management practices, such as cover crops and reduced tillage, can improve soil health and make cropland more resilient to drought. Good soil health allows precipitation to infiltrate, thereby increasing moisture in the soil and helping to recharge groundwater.

The conservation of Polk County's farmland soils is important to current and future generations of farmers. Soils that are physically and biologically healthy can produce higher crop yields with fewer external inputs, which is great for the pocketbook.

Healthy soils are also important to the quality of groundwater and surface waters. As precipitation infiltrates, it naturally filters the water. The soils and nutrients stay in place, rather than run-off. Healthy soils reduce erosion, flooding, and pollutant/nutrient loading to surface waters, while increasing the recharge of the groundwater.

Risks for Individual Plan Participants - Drought

All cities and villages in Polk County are equally at risk of a drought event, though some are located in areas with soils more susceptible to drought. The adequate availability of municipal water for residents, businesses, and fire protection is the primary drought concern for most incorporated communities, though the cities and villages did not identify drought-related concerns as a priority or barrier during mitigation planning meetings. In some cases, additional wells and water system improvements may be required in cities and villages as growth and new development occurs. The

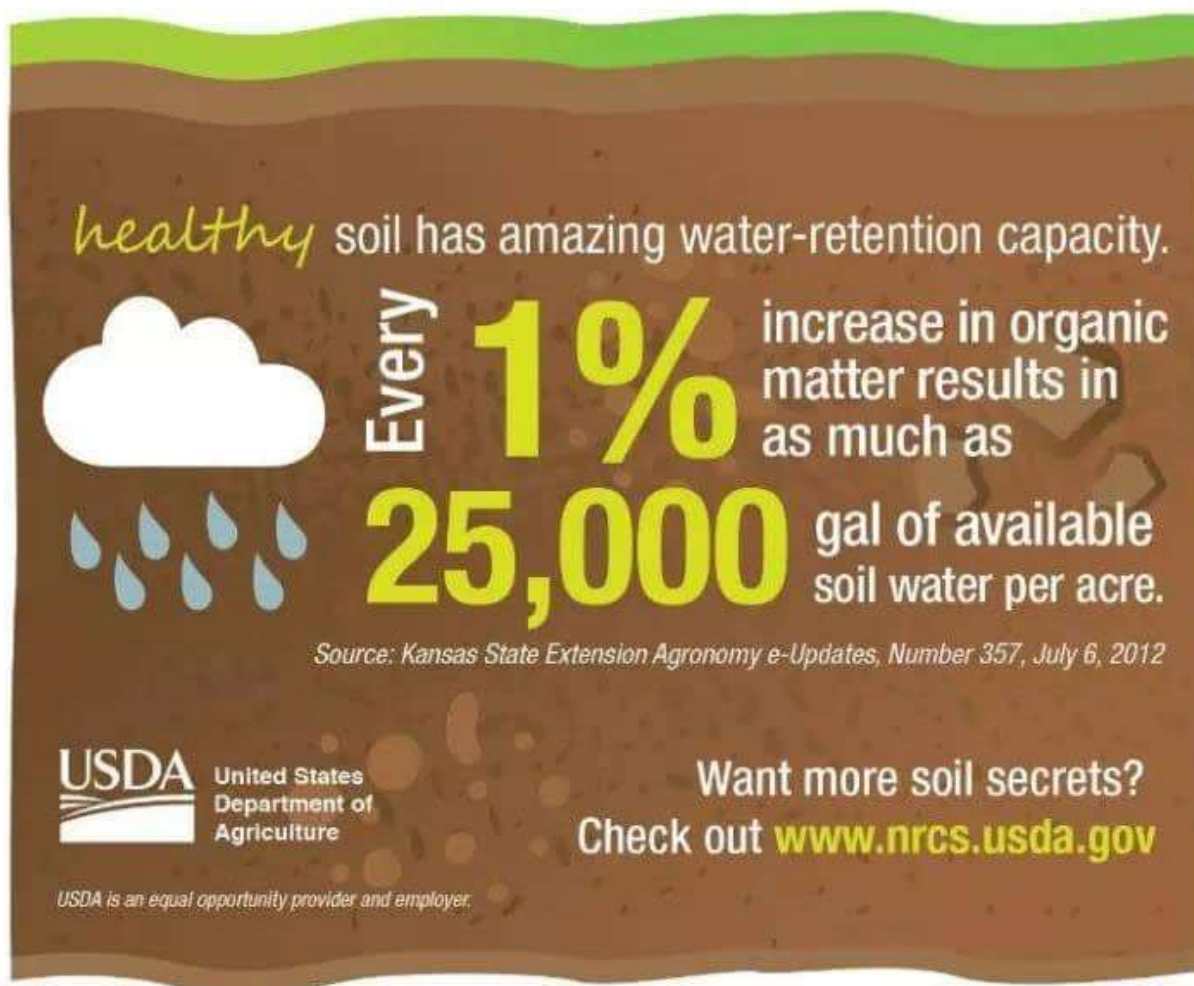
participating electrical cooperatives and educational institutions identified no significant drought vulnerabilities; they primarily rely on municipal water systems.

Appendix K provides the subplans for each city and village and **Appendix L** provides the subplans for participating educational institutions. These sub-plans identify any drought risks and vulnerabilities specific or unique to these individual participants and are supplemental to the previously described event history, probability, and vulnerability assessment for Polk County. The sub-plans also assess each participant's capabilities to prepare for and mitigate hazards.

USDA-NRCS SOIL HEALTH INFOGRAPHIC SERIES #002



what's underneath



viii. Long-Term Power Loss

Long-term power loss in Polk County is mostly likely caused by a natural hazard threat (e.g., winter storms, tornadoes), but can also be the result of an accidental technological failure or purposeful act. The following pages provide a special analysis of the long-term power loss threat for the County. This approach allows additional attention to this critical threat, while avoiding undue repetition with the other natural hazard assessments sub-sections (i.e., winter storms, tornadoes & high winds).

Defining the Hazard – Long-Term Power Outage

An **electric power outage** (also power failure or power loss) is the loss of the electricity supply to a geographic area. There is no standard definition of a “long-term power outage.” For purposes of this Plan, a **long-term power outage (LTPO)** event is an unplanned loss of electrical power lasting more than 48 hours and impacting 500+ customers and/or multiple community lifelines.

A power outage can be described as a blackout if power is lost completely or as a brownout is the voltage level is below the normal minimum level specified for the system. There are varying reasons for a power loss or outage such as a power station defect, damage to a power line, or the overloading of the system. “Load shedding” is a common term for a controlled way of rotating available generation capacity between various districts or customers, thus avoiding total wide area blackouts.

Three natural hazards pose the biggest power loss threat: (1) a large ice storm, possibly in conjunction with heavy/wet snow; (2) the high winds associated with unstable summertime weather patterns; or (3) high winds during a blizzard. A large wildfire may also destroy above ground electric infrastructure. However, it is large ice storms that pose the greatest threats due to the potential to affect entire regions during times of year when the vulnerabilities due to the loss of power are at their highest.



Hazard Location

Long-term power loss is capable of harming residents and damaging homes and infrastructure throughout Polk County. While long-term power loss can occur throughout all of Polk County, wooded areas with nearby overhead power lines are more likely to have a higher risk of producing an outage due to ice, winds, tree damage, etc.

Hazard Extent (Potential Intensities)

Electrical power loss events are typically measured and compared by the number of customers affected and the length of the outage. There is no accepted scale for evaluating the intensity or severity of a long-term power loss event.

Event History – Long-Term Power Loss

Ice Storms

The threat of extended power loss is not limited to large, regional, and multi-state winter storms. Smaller events can still have devastating and costly impacts on multiple counties or more localized areas, such as the March 1962 event which struck the Eau Claire area, leaving many without electric or telephone service.

Since 1993, there have been three major ice storm events reported for Polk County. In **January of 1994 and 1996**, freezing rain produced ice accumulations up to three inches in some areas of the region resulting in scattered power outages that were relatively short in duration. Most recently, a winter storm struck the region in **December 2022** with heavy snow and some ice weighing down trees and power lines.

However, the risk of a long-term event is very real. For example, the March 1976 ice storm was one of the worst natural disasters to hit Wisconsin; Polk County was not one of the 22 counties which were part of this disaster declaration. Ice accumulations of up to five inches were reported, and high winds of 60 mph made the situation worse. Up to 100,000 people were without power at the height of this storm. Serious winter or ice storms in central Wisconsin also occurred in December 1904, February 1922, February 1936, and November 1943, though data on the impacts are limited.

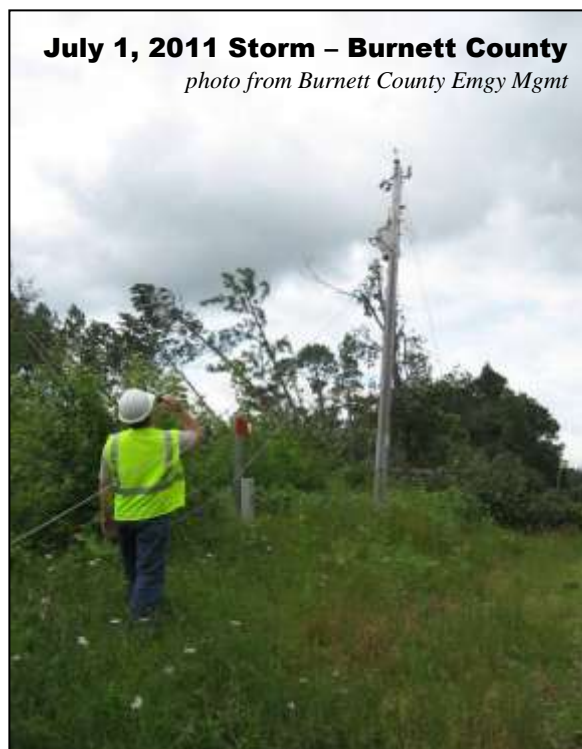
In January 1998, an ice storm hit the Montreal area and left over four million residents without power. Some areas were without power for over three weeks. The January 2009 ice storm which hit Kentucky resulted in \$616 million in damages, 36 fatalities, and 700,000 customers without power at its peak; 50,000 customers were still without power after two weeks, and it took 38 days for full restoration.

Wind Storms

While the focus of power loss is often on ice storms due to their widespread nature and below freezing temperatures, other natural events can also result in a sizable loss of power. In fact, high winds appear to be a more frequent cause of widespread loss of power due to a natural hazard event. In July 1991, a particularly violent and widespread straight-line wind (or derecho)

July 1, 2011 Storm – Burnett County

photo from Burnett County Emgy Mgmt



lasted 17 hours and stretched from South Dakota to western Pennsylvania, including parts of Wisconsin. This event caused over \$100 million in damage and resulted in power loss to nearly one million customers. A similar event in May 1998 which blew through central Wisconsin resulted in at least \$500 million in damage; and over two million people were without electrical power, some for over 10 days. More recently, the 2011 Burnett County straight-line wind left some areas without power for about a week. And in July 2016, severe thunderstorms left about 250,000 Xcel Energy customers in the Twin Cities metropolitan area without power.

The **July 2019** wind storm (derecho) and tornadoes was the largest power outage event in Polk County in the last 20 years. The event resulted in thousands of customers losing power in Barron and Polk counties; many customers did not have power for 2-3 days, while it took 6-7 days to restore power to everyone. Eight substations and 9,500 members were affected, primarily in Barron County. Polk-Burnett Electric Cooperative had about 21,000 customer impacts, with about one-half in Polk County. ROPE mutual aid was activated and crews worked 15-hour days and ten straight days to restore power and make repairs.

Most outages since 2019 have been localized and were due to a variety of natural and other causes. A lightning strike damaged a substation in 2022, but power was lost for only about four hours. Some services were impacted during Winter 2022-2023, including wet, heavy snows in December and April that brought down tree branches, but outages were less than 24 hours.

Other wind events have resulted in localized power losses in Polk County, though the long-term loss of power exceeding 48 hours is quite rare and most events have been limited to a relatively small number of customers in recent history. Fairly widespread outages impacting more than one electric provider have occurred in recent years in Polk County, but for less than twelve hours.

Polk-Burnett Electric Cooperative Events

There are three primary electrical providers in Polk County:

- Polk-Burnett Electric Cooperative (serves approximately 50-55% of the County area)
- Xcel Energy (serves approximately 20-25% of the County area)
- Northwestern Wisconsin Electric Co. (serves approx. 20-25% of the County area).

Polk-Burnett Electric Cooperative provides electric service to the majority of rural, unincorporated areas of Polk County, which includes most customers within wooded areas. A comparison of recent causes of power outages for Polk-Burnett in **Table 25** provides further insight into the potential risk and shows the substantial effect of the 2019 and 2022 storm events on outage numbers.

The table shows that only about 4% of outage hours from 2016-2022 were directly attributed to weather, such as snow, ice, wind, and lightning. However, an additional 44% of outage hours were due to trees falling on power lines, which often occur due to severe weather events (e.g., wind, ice, snow load). Most notable is that about one-third of all outage hours were tree-related in 2019, which is the year of the large wind storm.

Table 25. Polk-Burnett Electric Cooperative Power Outages, 2016-2022

Outage Cause	Number of Outages							
	2016	2017	2018	2019	2020	2021	2022	Total
Animal	71	30	46	36	48	13	30	274
Tree	92	119	55	254	65	48	107	740
Weather	38	52	28	54	26	26	244	468
All Other	1,045	973	1,142	1,267	1,134	1,040	1,299	7,900
Total	1,246	1,174	1,271	1,611	1,273	1,127	1,680	9,382

Outage Cause	Outage Hours							
	2016	2017	2018	2019	2020	2021	2022	Total
Animal	1,075	225	552	238	534	599	110	3,333
Tree	14,475	23,696	2,924	186,755	6,910	3,038	11,271	249,069
Weather	1,112	5,585	1,213	2,107	3,796	274	8,289	22,376
All Other	22,584	31,719	13,437	132,124	62,705	15,407	16,897	294,873
Total	39,246	61,225	18,126	321,224	73,945	19,318	36,567	569,651

Outage Cause	Consumers Affected							
	2016	2017	2018	2019	2020	2021	2022	Total
Animal	1,062	263	426	231	663	375	98	3,118
Tree	5,533	8,957	2,117	11,049	2,782	1,903	5,710	38,051
Weather	490	2,664	679	672	1,078	153	3,016	8,752
All Other	16,309	22,951	12,755	39,151	32,565	12,652	16,118	152,501
Total	23,394	34,835	15,977	51,103	37,088	15,083	24,942	202,422

source: Polk-Burnett Electric Cooperative, 5/31/223

Note: All Other includes equipment issues/failure, maintenance, prearranged, power supply, vehicle accidents, damage from digging, other public impacts, and unknown.

In summary, a widespread, long-term power outage event covering most or all of Polk County would be rare, but the potential does exist. Based on discussions with personnel from area electric providers, it is estimated that only about five or six long-term power outage events have likely impacted the region during the past century, but these have not approached the scale of the 1976 Wisconsin, 1998 Montreal, or 2009 Kentucky outages.

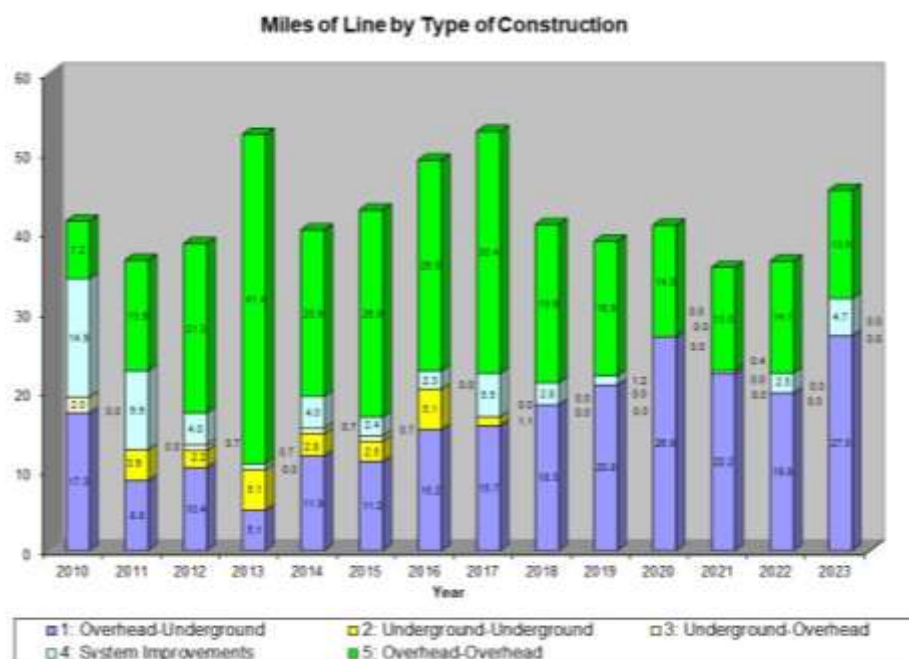
Areas of Elevated Power Outage Risk

All above ground/overhead power lines have a higher risk of producing an outage due to ice, winds, tree damage, etc. Electrical providers in the County have buried some electric lines in at-risk areas, such as near wooded lakes. And some local electric providers have a policy of moving toward all below-ground lines through attrition and as part of annual work plans. For example, the Polk-Burnett Electric Cooperative continues to bury lines in areas prone to outages and as a means of improving redundancy. Over the last ten years, Polk-Burnett has been converting primary overhead line to underground at an average rate of 19 miles per year. In the last five years, Polk-Burnett have averaged over 23 miles of line conversion per year. And since the 2017 mitigation plan, the Cooperative now has more miles of line underground than above.

The loss of power due to falling limbs has been further significantly mitigated through proactive, aggressive tree-trimming programs by the electric providers serving Polk County. But even with such efforts, many wooded and lakeshore areas are still prone to power outages. The Cooperative conducts such tree-trimming on a five-year cycle. But even with such efforts, forests are the dominate land cover in about 41% of the County and overhead lines in such wooded areas are still at higher risk. Such tree trimming also reduces the wildfire ignition risk.

Local municipalities and electric cooperatives were asked to identify areas of higher outage risk or prone to outages. Polk-Burnett Electric Cooperative identified areas around Cedar Lake, Lower Pine Lake, Pine Lake, Swede Lake, Paulsen Lake, Church Pine Lake, Wind Lake, Big Lake, Round Lake, and Horse Lake as being the most susceptible to power loss during high winds. In past plans, Northwestern Electric also confirmed that lake areas posed the largest outage concerns, while also being areas more costly to bury lines, but did not identify any specific areas in Polk County especially prone to outages.

Figure 21: Polk-Burnett Electric Line Replacement, 2010-2023



Hazard Probability – Long-Term Power Loss

The Plan Steering Committee the probability of a long-term power outage event as being of low-to-some (below moderate) probability for Polk County, with a moderate to high/serious vulnerability (impact) should an event occur (see Table 11). Based on the previously described recent events, **Polk County is expected to experience a significant long-term power outage about once every 5-6 years on average.** Nearly all of these events would impact a part of Polk County and affect less than 15,000 customers, with power restored with 2-3 days. While a widespread, longer-term power outage event covering most or all of Polk County would be rare, but the potential does exist.

As discussed in the *Tornadoes & High Winds* and *Winter Storms* sections, the probability of these hazards is likely to increase due to climate change trends. Climate trends with wetter, warmer winters are especially troubling since this may increase the potential for ice storms during periods of cold weather. As such, the probability of long-term power loss events is also likely to increase. In fact, some electric cooperatives within the region have suggested that high wind events resulting in damage to above-ground electrical infrastructure are indeed already increasing in frequency.

It is possible that a widespread, long-term loss of power could also occur as a result of other causes (e.g., terrorism, cyberattack, loss of a power-generating facility). The probability of these other causes resulting in a long-term event are considered extremely rare and unlikely, but this does not discount the importance of protecting against such instances. And as noted in the *Cyber-Attack* section, the frequency of cyber-attacks against utilities has been increasing.

Vulnerability Assessment – Long-Term Power Loss

Many of the natural hazard events facing Polk County have the potential to cause an extended and widespread loss of electrical power. **Appendix F** provides the following regarding the potential impacts of tornado and high wind events for Polk County as a whole:

- a description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- a description of the vulnerability of each community lifeline for this hazard
- the potential consequences or impacts to the above assets and community lifelines.

In summary, all Polk County populations and businesses, are vulnerable to a long-term power outage event. During the planning process, the following assets were identified as having the greatest vulnerability:

- **Above-ground electrical system infrastructure.** In most cases, a long-term power loss event in Polk County will be the result of damage to electrical infrastructure. And, as the past events described, this can necessitate substantial repair costs.
- **Individuals that are oxygen dependent, require electricity to operate medical equipment, or live independently, but have special needs.** A list of residents on Medicare that rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live

independently in their homes is available through the State, but access prior to an emergency event is very limited due to HIPAA confidentiality rules. As of June 2023, 561 residents in Polk County are on the list.

- **Polk County residents and visitors, especially if power loss occurs during a period of extreme cold or extreme heat.** This vulnerability is further explored, including related vulnerable populations, within the *Winter Storms* and *Extreme Heat* sections.
- **Businesses and community lifelines that lack generators and/or access to emergency fuel.** The Steering Committee and stakeholders were particularly concerned about assisted living facilities, nursing homes, municipal utilities, and local emergency operations centers and shelters.

Given experiences elsewhere, it is not unrealistic to imagine a significant portion of the County’s population and facilities could be without power for one to three weeks should a 50- or 100-year ice storm event occur. Following the 2009 Kentucky storm, 37 percent of affected customers were still without power after one week and seven percent were without power after two weeks. Extended power loss in Polk County due to a natural storm event would also likely involve many downed trees and power lines. Downed lines present safety hazards for residents, travelers, and emergency responders. Emergency response can be further hampered by blocked roads from power lines and debris.

Projected Loss Estimates

Exposure estimates for all electrical infrastructure in the County is not available. There are just under 3,500 miles of line in the entire Polk-Burnett Electric Cooperative system, with approximately 1,600 miles (46%) of overhead line and 1,900 miles (54%) of underground line. For comparison, Xcel Energy has at least 408 miles of overhead distribution line and 94 miles of underground line; this does not include transmission lines. Given the above replacement costs, the potential damages to overhead power lines from a severe storm event in Polk County could easily be in the millions.

Replacement costs for lines vary based on physical site conditions and are typically higher in areas around lakes, but 2022 approximate base cost estimates are:

Single Phase – Above Ground/Overhead (rural):	\$55,000/mile
Single Phase – Underground (rural):	\$48,000/mile
Single Phase – Underground (dense):	\$65,000/mile
Three Phase – Above Ground/Overhead (rural):	\$115,000/mile
Three Phase – Underground (rural):	\$95,000/mile

Other Factors Influencing Future Losses

- **Polk County’s aging population** is documented in Section II.C. Seniors living alone in rural areas are especially of special concern and a significant percentage of these residents have physical or mental disabilities. The County also has a significant number of assisted living and nursing facilities as documented in Section II.D.

The Aging and Disability Resource Center (ADRC) of Northwest Wisconsin has been promoting individual emergency planning for senior and special needs clients during client intake and through its monthly newsletter, Facebook page, and informational materials at the 3 congregate/meal sites. Clients are encouraged to create personal preparedness plans with emergency contact information. ADRC is also a very important resource for disaster response and recovery:

- ADRC staff and Meals-on-Wheels volunteers are important resources for monitoring the needs of seniors living independently and providing important information before, during, and after an emergency. This includes knowledge of clients that have special needs (e.g., use oxygen or electric-assisted medical devices, require dialysis). The number of Meals-on-Wheels clients have been increasing and a waiting list exists.
 - ADRC has 2 buses and a van that is ADA accessible with a 3rd “non-ADA” van.
 - ADRC has social workers on staff.
- **Development located in forested areas with overhead electrical lines is particularly at risk of power loss.** Some of the greatest concentrations of these at-risk areas are residential lake properties.
 - **Burying overhead lines is an effective mitigation action.** As noted previously, electrical providers in the County have buried some electric lines in the most at-risk areas. And many electric providers have a policy of moving towards all below-ground power lines through attrition and as part of annual work plans. Polk-Burnett Electric Cooperative expects to continue to rebuild about 14 miles of rural overhead line, convert about 20 miles of overhead line to underground in dense areas, and make system improvements as needed in 2024-2027. The loss of power due to falling limbs has been further significantly mitigated through proactive, aggressive tree-trimming programs by the electric providers serving Polk County.
 - **Improper use of generators.** During the Kentucky event, carbon monoxide from improper generator use was the largest cause of death. But it must be remembered that the potential impacts for Polk County could be much more severe—Kentucky’s temperature warmed well above freezing following their ice storm. In comparison, Polk County’s average January temperature could prove quite deadly should power be lost and transportation systems hindered for an extended time.
 - The availability of **emergency power generators** for utilities, communications, shelters, emergency operations, fuel sources, and critical facilities is crucial to mitigating the potential impacts of a LTPO event. Further, demands may be high on limited fuel sources for response vehicles, electric crews, and power generators. The County’s three hospitals have undertaken actions to be prepared for such an event, and the Northwest Wisconsin Healthcare Coalition can provide some preparedness planning assistance. Communities and electric providers have

mobile generators for use during an outage, but there has not been a complete inventory of availability and if lifeline facilities and fuel supplies have needed hook-ups. In 2023, Polk County Public Health conducted an informal survey of generators at public schools; only Luck and Frederic confirmed they had generators, though Frederic noted their generator is only intended to provide emergency lighting.

- **Preparedness efforts.** Long-term power outage (LTPO) planning has been receiving increased attention in Wisconsin during the past decades. Realizing the seriousness of this threat, Polk County Emergency Management has participated in workshops and exercises on this topic.
- **Increasing extreme heat & electric demand.** Polk-Burnett Electric Cooperative cautioned that with growing periods of high heat combined with increased electrical demands (including smart homes, electric vehicles, and larger campers/RVs), that there is increasing potential for rolling brownouts, though none have occurred in Polk County to date. For example, during 2020 & 2021 July 4th weekends, electric demand has been 20% more than historic peaks. Extreme heat can also damage electric infrastructure, such as blowing transformers.

Risks for Individual Plan Participants – Long-Term Power Loss

All individual plan participants in Polk County (i.e., villages, cities, educational institutions, electric cooperatives) are equally at risk of experiencing the vulnerabilities of long-term power loss events. The potential impacts, in general, are shared, though vulnerability increases in wooded areas near overhead power lines.

Appendix K provides the subplans for each city and village and **Appendix L** provides subplans for participating educational institutions. These sub-plans identify long-term power outage risks and vulnerabilities specific or unique to these individual participants and are supplemental to the previously described threat assessment for Polk County.

Overall, most communities did not have specific areas that are more prone to or at-risk of power loss, nor have they experienced a long-term event lasting three or more days. Power outage concerns for these participants primarily focused on the need for emergency power generators. A growing number of these communities also expressed a need to identify or equip emergency shelters, including heating/cooling shelters, with generators. Since the 2017 Plan, there has been significant improvement in acquiring emergency power generators, though needs still exist. For example, many city, village, and town halls are designated as emergency operations centers, but do not have generators. And many buildings that could potentially serve as heating/cooling shelters also lack emergency power.

Related Preparedness and Response Actions

Cooperation, communication, and planning with power providers and critical facilities are key to preparing for and mitigating the impacts of power loss. Based on discussions with representatives from Xcel Energy, Polk-Burnett Electric Cooperative, and other area electric providers, the following should be considered:

- Involving utility providers in disaster event exercises and incident command system (ICS) training is very important. Advanced notice for such trainings and workshops is required due to the time commitments involved.
- Communication between electric providers and utilities, emergency management personnel, service providers, and local communities can be vital during a power outage event to help protect the safety of responders and residents. This includes notifying electric restoration crews of known road washouts, flooding areas, etc. For a major disaster, utilities may provide a liaison at the County Emergency Operations Center.
- Electric providers have a strong mutual aid network should it be needed, such as the Restoration of Power during an Emergency (ROPE) system for cooperatives. It is important to remember that during a large event, mutual aid support may come from communities throughout North America. Staging, logistics, tracking, and related administration for such efforts can be tremendous challenges. For some past events in the region, a lack of lodging availability has impacted mutual aid support.
- During a disaster or power outage, electric providers can “ping” smart meters to help identify areas with outages, possible downed power lines, etc.
- Utilities and electric providers often maintain lists of critical clients with medical or other unique needs that will be a priority for power restoration. Considering the critical clients of utilities may help the public sector in prioritizing the clearing of roadways from debris, etc. Some have auto-dialer capabilities as part of their outage management systems.
- Public messaging is vitally important during an event. Electric providers and utilities have a key public informational role during an outage. In addition to working with media and social media, many providers have web-based power outage maps.
- A number of new web-based tools have been introduced in recent years for the tracking and management of power outages, including:
 - The Outage Data Initiative Nationwide, with a map of nationwide outages hosted by the U.S. Department of Energy, though only 125 utilities are participating as of January 2024.
 - National Outages & Mutual Aid website, with a map of multi-utility outages
 - Wisconsin Electric Cooperative Association website, with a map of member outages
- It is important that emergency response and public-sector road crews understand the risks of working near downed power lines and how power is restored. Polk-Burnett Electric Cooperative also provides related educational efforts, such as high voltage and electric vehicle demonstrations for school children, emergency responders, law enforcement, and tow truck drivers.

- More public education is encouraged on how safety issues during a power outage, how to get information during an outage (e.g., media, websites, mobile apps), and how power is restored. The websites of area electric providers are a great place to start.

Given its resources and connections to vulnerable populations, it is important to continue to involve ADRC of Northwest Wisconsin in emergency planning and exercises for long-term power outage and other disaster events as well as for the sharing of preparedness messaging. Seniors are also a candidate audience for the distribution of NOAA All Hazards (weather) Radios since many may not have smart phones or reside in an area of poor cell reception.

The lessons learned from past LTPO workshops and exercises have been integrated into a state-level report which is available at the Wisconsin Emergency Management website or from West Central Wisconsin Regional Planning Commission. The recommendations of the State report were considered during this hazard mitigation planning effort and, when appropriate, have been integrated into the mitigation strategies found later in this document.



ix. Active Threats

Defining the Hazard—Active Threats

For the purpose of this plan, an active threat incident occurs when an individual (or group) displays a weapon, having made threats, and shown intent to cause harm or act out violence. A weapon includes any firearm, knife, vehicle, or other instrument that can cause bodily harm, injury, or death. Such incidents can include:

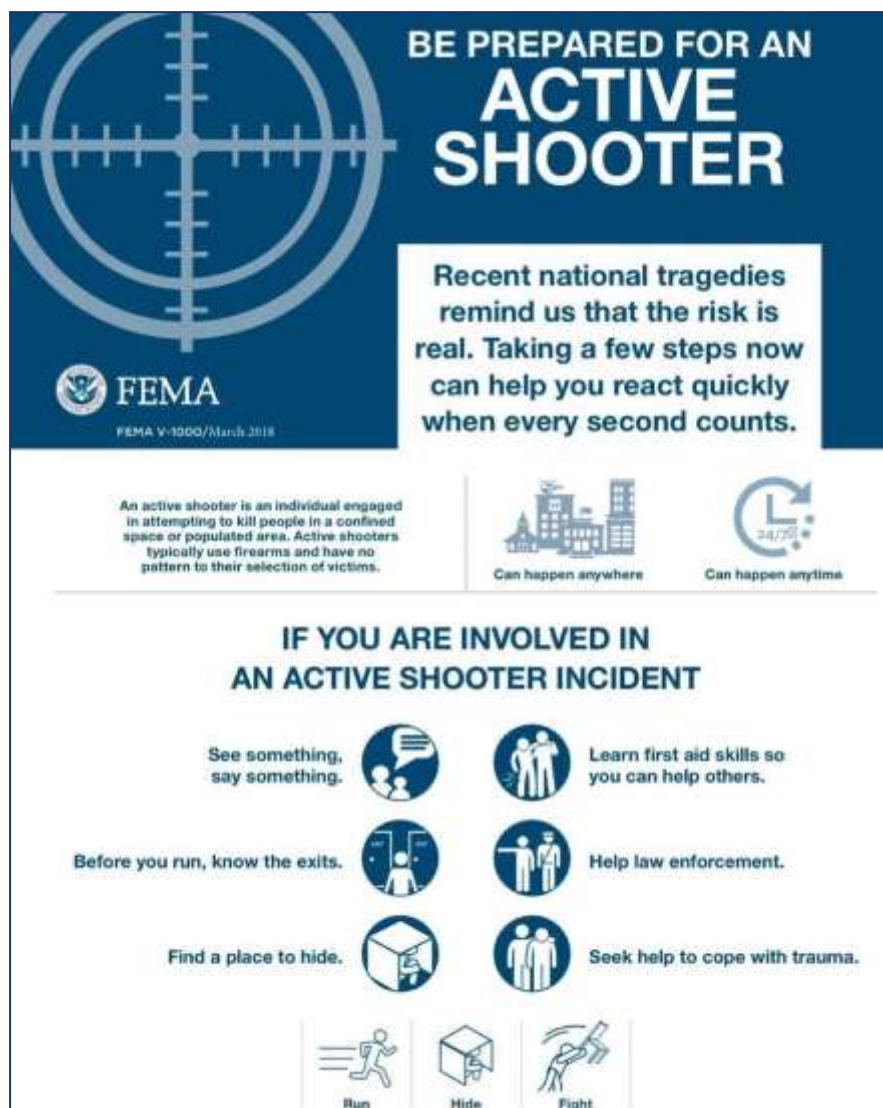
- **Active shooters** – one or more subjects who participate in a random or systematic shooting spree with the intent to continuously harm or kill others.
- **Bombs and/or bomb threats** – any explosive device or bomb or bomb on or near a target, regardless of the method of delivery (e.g., pipe bomb, car bomb) or whether the threat is real or a hoax.
- **Hostage situations** – one or more subjects hold people against their will in order to hold off authorities, often threatening to harm the victims if approached. The hostage-taker(s) may issue demands, often including the release of hostages.

The U.S. Department of Homeland Security defines **active shooter** as “a person or persons actively engaged in killing or attempting to kill people in a confined and populated area.” In most cases, active shooters use a firearm, though they may be using other weapons as well (e.g., explosives, knife), and there is no pattern or method to their selection of victims.

An active shooter incident at a work site can be a type of workplace violence. According to OSHA, **workplace violence** is any act or threat of physical violence, harassment, intimidation, or other threatening disruptive behavior that occurs at the work site. It ranges from threats and verbal abuse to physical assaults and, in the case of an active shooter, even homicide. It can affect and involve employees, clients, customers and visitors. An active shooter incident at an educational institution is a workplace violent event that often referred to as targeted school violence.

Targeted school violence is defined by the U.S. Department of Education as “any incident where a current student or recent former student attacked someone at his or her school with lethal means (e.g. a gun or knife); and, where the student attacker purposely chose his or her school as the location of the attack.”³⁵ The Safe School Initiative examined incidents of “targeted violence” in school settings where the school was deliberately selected as the location for the attack and was not simply a random site of opportunity. The term “targeted violence” evolved from the Secret Service’s five-year study of the behavior of individuals who have carried out, or attempted, lethal attacks on public officials or prominent individuals. For purposes of this report, targeted school violence will include any incidents of targeted violence, as described above, brought forth by anyone whether or not connected with the targeted school and may not be limited to active shooter threats.

³⁵ Combating Targeted School Violence: Inside & Outside Attackers, 2007.



According to the Federal Emergency Management Agency (FEMA), **Civil Disturbance** is defined as a civil unrest activity such as a demonstration, riot, or strike that disrupts a community and requires intervention to maintain public safety. Civil disturbances, like riots, interfere with the normal functioning of a community, can disrupt critical services, and require the actions of law enforcement, emergency services, and/or the military to restore peace. While the vast majority of protest is peaceful, the right of citizens to protest must be balanced against the rights of non-protesting citizens to conduct their own business. Despite the peaceful nature of most protest and civil disobedience, such events are disruptive, can be costly for local governments, and have the potential to degenerate into violence resulting in property damage, injury, and death.

Active threats can include acts of terrorism, but not all active threats are performed for reasons of terrorism. The FBI defines two categories of terrorism:

International terrorism: Perpetrated by individuals and/or groups inspired by or associated with designated foreign terrorist organizations or nations (state-sponsored). For example, the December 2, 2015, shooting in San Bernardino, CA, that killed 14 people and wounded 22 involved a married couple who radicalized for some time prior to the attack and were inspired by multiple extremist ideologies and foreign terrorist organizations.

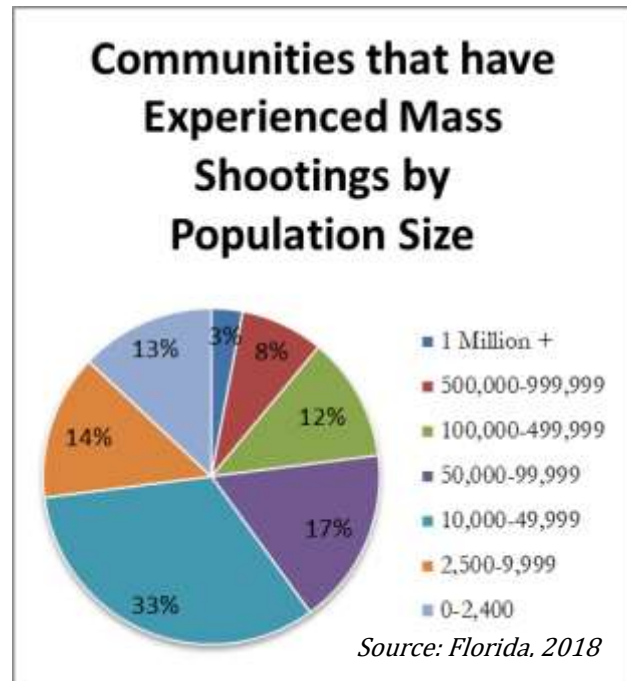
Domestic terrorism: Perpetrated by individuals and/or groups inspired by or associated with primarily U.S.-based movements that espouse extremist ideologies of a political, religious, social, racial, or environmental nature. For example, the June 8, 2014, Las Vegas shooting, during which two police officers inside a restaurant were killed in an ambush-style attack, was committed by a married couple who held anti-government views and who intended to use the shooting to start a revolution.

Further, there are types of terrorist attacks that would not be classified as a traditional active threat, such as cyberattacks, a critical infrastructure attack, vandalism, or intimidation.

Hazard Location

Active threat events can occur anywhere in Polk County. Using Stanford University's data base on Mass Shootings, Patrick Alder at the Martin Prosperity Institute analyzed demographic data of the communities where mass shootings happened from 1971 to 2016.³⁶ The database included 307 mass shootings in 223 places, occurring between 1971 and 2016. Alder's conclusions were that mass shootings were experienced by communities of all sizes, income levels, and racial diversities.

Although mass shootings were spread across communities of different sizes, a plurality of mass shootings, 33 percent of the total 307 mass shootings, happened in communities of 10,000 to 49,000 people. According to 2015 census data, communities of this size comprised 11.7 percent of incorporated municipal governments in the United States, or 2,281 municipal governments total. This means that 4.4 percent of municipalities of this size (101 total) have experienced a mass shooting. At the same time, 27 percent of mass shootings (83 total) took place in communities of less than 10,000 people. There are 16,470 incorporated places of this size and .5 percent have experienced mass shootings from 1971 to 2016.



Three percent of mass shootings have taken place in cities with populations of more than one million people. The cities of Chicago, Illinois, Los Angeles, California, and Phoenix Arizona have each seen five mass shootings. Killeen, Texas, with a population of 127,921 in 2010, has experienced four mass shootings, including Luby's Shooting in 1990 and the Fort Hood Shooting in 2014.

Mass shootings happen in communities across the spectrum of economic circumstances. Only six percent of mass shootings occurred in communities that had mean household incomes of less than \$40,000. In general, mass shootings happened in middle class America. The mean household income for communities which had experienced mass shootings was \$65,900 while the United States mean household income was \$77,866. Seven percent of mass shootings took place in communities with average household incomes of \$130,000 or more. Mass shootings occurred in the least racially diverse communities in America as well as in the most racially diverse communities. However, only 24

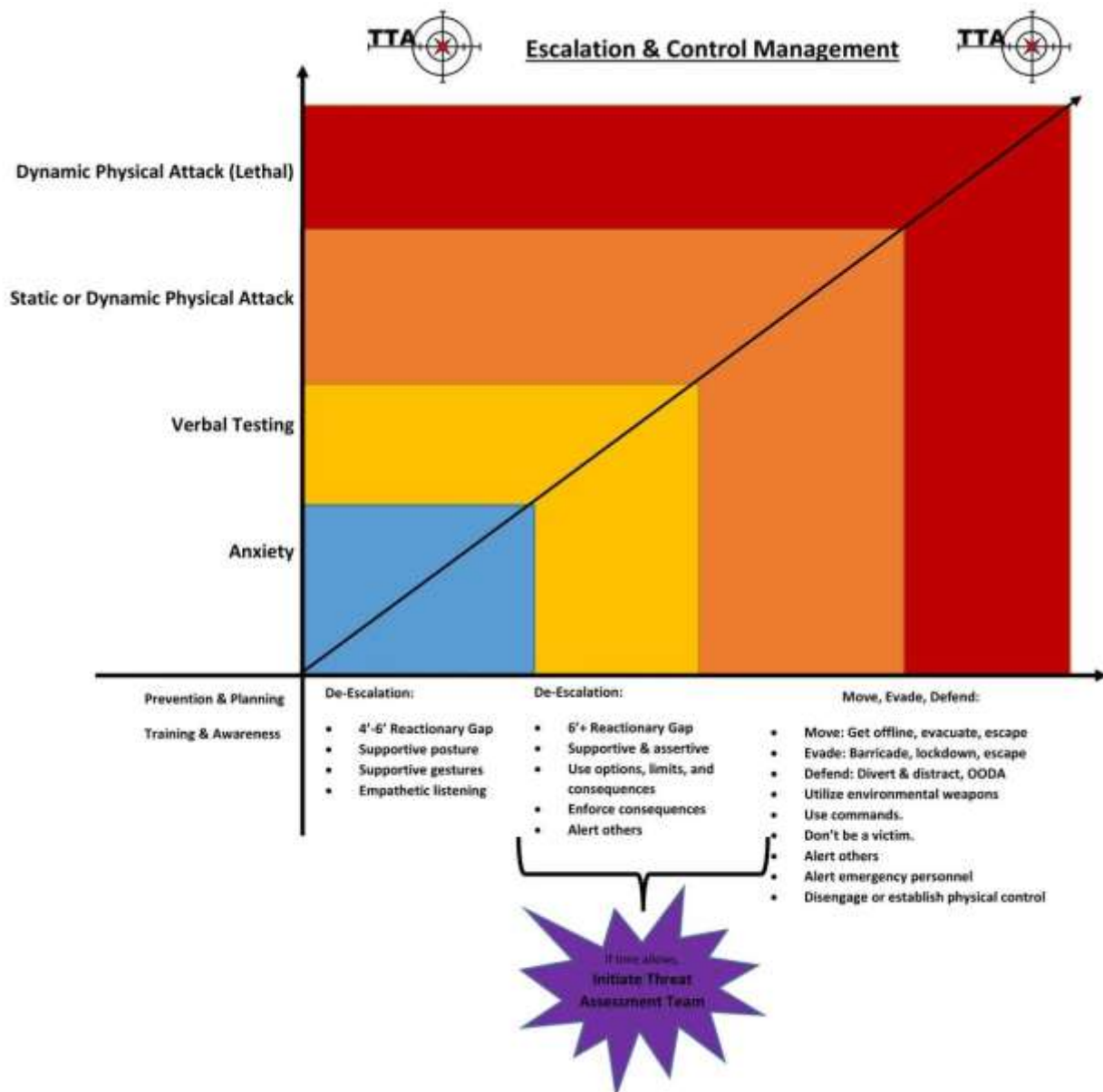
³⁶ Boone, a. (2018, March 1). *Where Do Mass Shootings Take Place?* Retrieved March 3, 2018, from City Lab: <https://www.citylab.com/life/2018/03/where-do-mass-shootings-take-place/554555/>

percent of mass shootings happened in white-minority communities. 76 percent of mass shootings were experienced in communities with majority white populations.

While active threats can occur anywhere, places and events people gather have a higher risk. The communities with larger populations, more businesses, and more critical facilities have slightly higher risks, but no location is immune. In Polk County this would be churches, hospitals, schools, community events, larger employers, and other gathering spaces.

Hazard Extent (Potential Intensities)

There is not a scale to measure and compare active threats intensity. The intensity of active threat events are largely measured by the number of individuals impacted (i.e., killed, injured, otherwise threatened). The Tactical Training Academy, a private agency providing workplace safety training & consulting, has created the following escalation and control management matrix for evaluating the evolution of an active threat event and related actions:



According to OSHA, workplace violence typically falls into one of the following four categories. However, the perpetrator's primary purpose of workplace violence events may not be to harm large numbers of people:

Type I: Criminal Intent. The perpetrator(s) has no legitimate relationship to the business or victims, but the violence is incidental to another crime, such as robbery or terrorism. The vast majority of workplace homicides (85%) are Type I. A workplace may be at a higher risk of Type I violence if the business handles cash or drugs.

Type II: Customer/Client. The violent person(s) has a legitimate relationship with the business, such as a customer, client, patient, student, or inmate. A large portion of the Type II incidents occur in the health care and social services industry, and the victims are often patient caregivers. Less than five percent of all workplace homicides are Type II, though this category accounts for the majority of nonfatal workplace violence incidents.

Type III: Worker-on-Worker. The perpetrator(s) is an employee or past employee that targets another existing or past employee. Type III incidents account for approximately seven percent of all workplace homicides. An employer that is downsizing or reducing their workforce may have a heightened risk of this category.

Type IV: Personal Relationship. The perpetrator(s) usually does not have a relationship with the business but has a personal relationship with the primary intended victim(s). This category includes domestic violence in the workplace and accounts for about five percent of all workplace homicides. Prevention of this type of violence can be very difficult in workplaces that are accessible to the public during business hours, such as retail establishments. A disgruntled partner may not know where their former lover now lives, but they likely knows where he/she works.

Unlike most workplace violence events, other active threats often aim to impact large numbers of people, which is the primary focus of this plan section. In Polk County, there are many different gathering places for which a larger, multi-victim active threat event could occur. And the impact of an active threat event goes beyond those involved with the immediate threat. Those who are not directly impacted by the event may be psychologically impacted through fear, concern for safety, and reduced activity. Services may also be disrupted and economic ramifications could occur.

Event History - Active Threats

National Trends

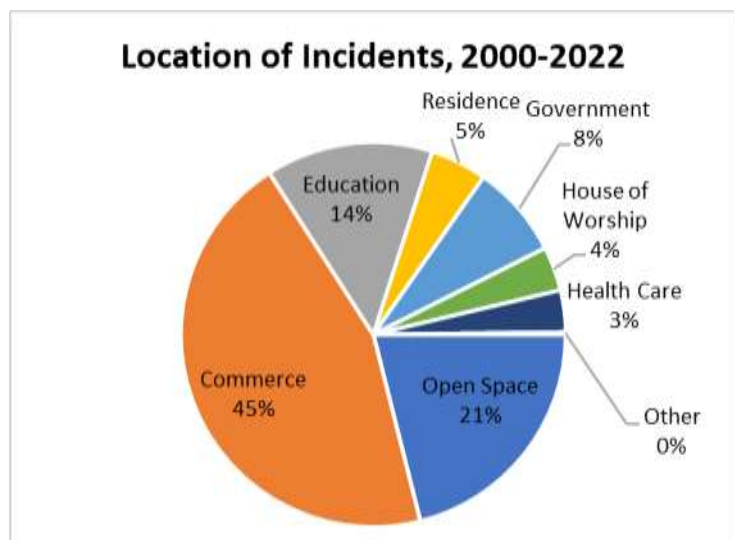
The Federal Bureau of Investigation identified 484 active shooter incidents in the United States between 2000 and 2022. The number of incidents will vary depending on one's definition of active shooter. For example, the FBI does not include gang or drug violence, or individuals who shoot family members in their own homes. Based on the FBI data, the frequency of active shooter events has clearly been increasing, with an average of 10 events per year from 2000 to 2009. And these events have almost tripled to 29 events per year from 2010 to 2022.

The largest majority of these 484 events (45%) occurred at commerce locations, such as retail stores, malls, non-profit organizations, and manufacturing plants. While not technically meeting the Federal active shooter definition of occurring in a "confined space," 102 of the incidents (21%) occurred in

open spaces, such as on public roadways, in parking lots, or involving multiple locations.

Other notable facts regarding active shooter events in the United States from 2000 to 2022 are:

- While they can occur any day of the week, the largest percentage occurs on Saturdays.
- 95% of shooters are male.
- Motivation or intent can vary (e.g., close relationship, notoriety, upset at government, workplace revenue, religious affiliation, mental instability).
- Most shooters generally share one or more common characteristics that can be warning signs (e.g., depression, dramatic personality swings, makes threats, fascination with weapons).



It is important to remember that very few organizations will experience an active shooter incident involving a shooting spree that wounds and kills multiple victims. However, a far greater number will experience other forms of workplace violence [e.g., threats, simple assaults (no weapon), aggravated assaults, robbery, intruder or trespassing, rape].

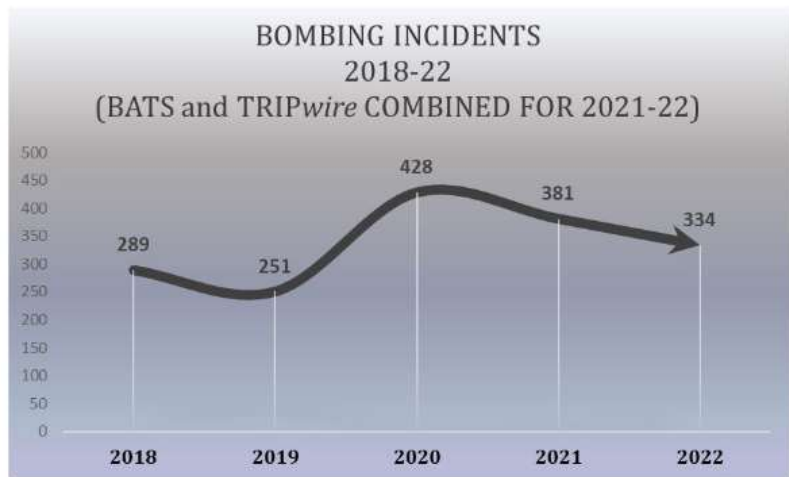
Explosive Incident Trends: The *2016 and 2022 Explosives Incident Report*, prepared by the United States Bomb Data Center, allows an examination of the long-term incident data reported in the *Bomb Arson Tracking System* from 2012 to 2022.³⁷ Explosive incidents refer to bombings, accidental explosions, and undetermined explosions. Additionally, the report inventories bomb recoveries, reports of suspicious packages, bomb threats, and hoaxes. A comparison for the 2016 and 2022 *Explosive Incident Report* data yielded:

- Bombings were about one-third of all reported explosive incidents in the United States in 2022. The graph to the right from the *2022 Explosive Incident Report* shows a spike in bombing incidents in 2020, which has been slowing increasing since then.
- Of the 2022 bombings, 50% were explosive (non-IED), 32% were IED, 4% were over-pressurized devices, and the remaining were other types or not specified.
- Only two of the 2022 bombings occurred in Wisconsin.
- Reported bomb threats more than tripled between 2020-2022 with a total combined number of 2,538 reported incidents. Assembly, education, and office/business locations were the top three targets of bomb threats during 2022. Educational institutions were, by far, the top threat target,

³⁷ United States Bomb Data Center. *2016 and 2022 Explosives Incident Reports*.

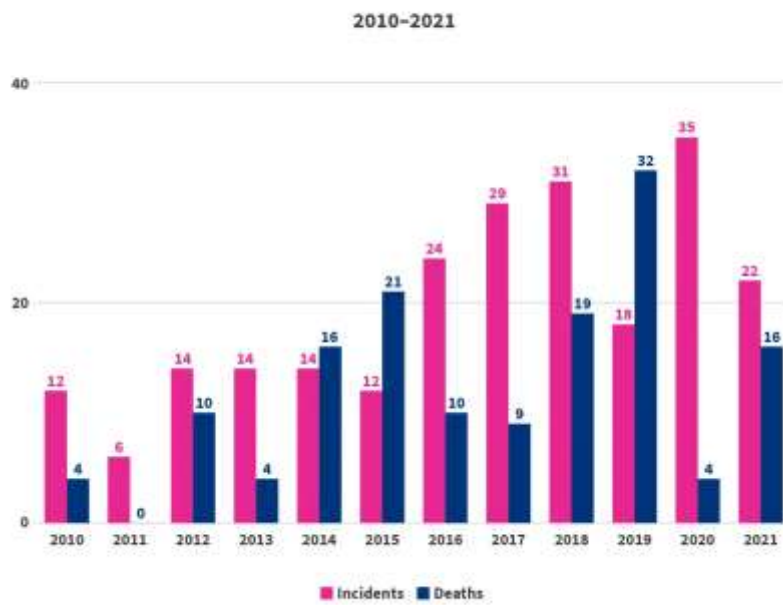
with over half targeting high school/junior high/middle school facilities and about one-third targeting colleges or universities.

- The report did not provide injury and death data specific to bombings. From 2020-2022, there were 88 injuries and 24 fatalities reported each year on average for all explosion incidents. Of these, 7 of the injuries and 0.3 fatalities in an average year were to fire service or law enforcement personnel, while 16.7 injuries and 3 injuries a year were attributed to the suspects.



Terrorism and other Active Threats: Long-term trend data from a single governmental source on terrorism and other types of active threats is limited, and it is likely that some thwarted attacks have

Number of domestic terrorism-related incidents and deaths with known offenders



Source: Government Accountability Office

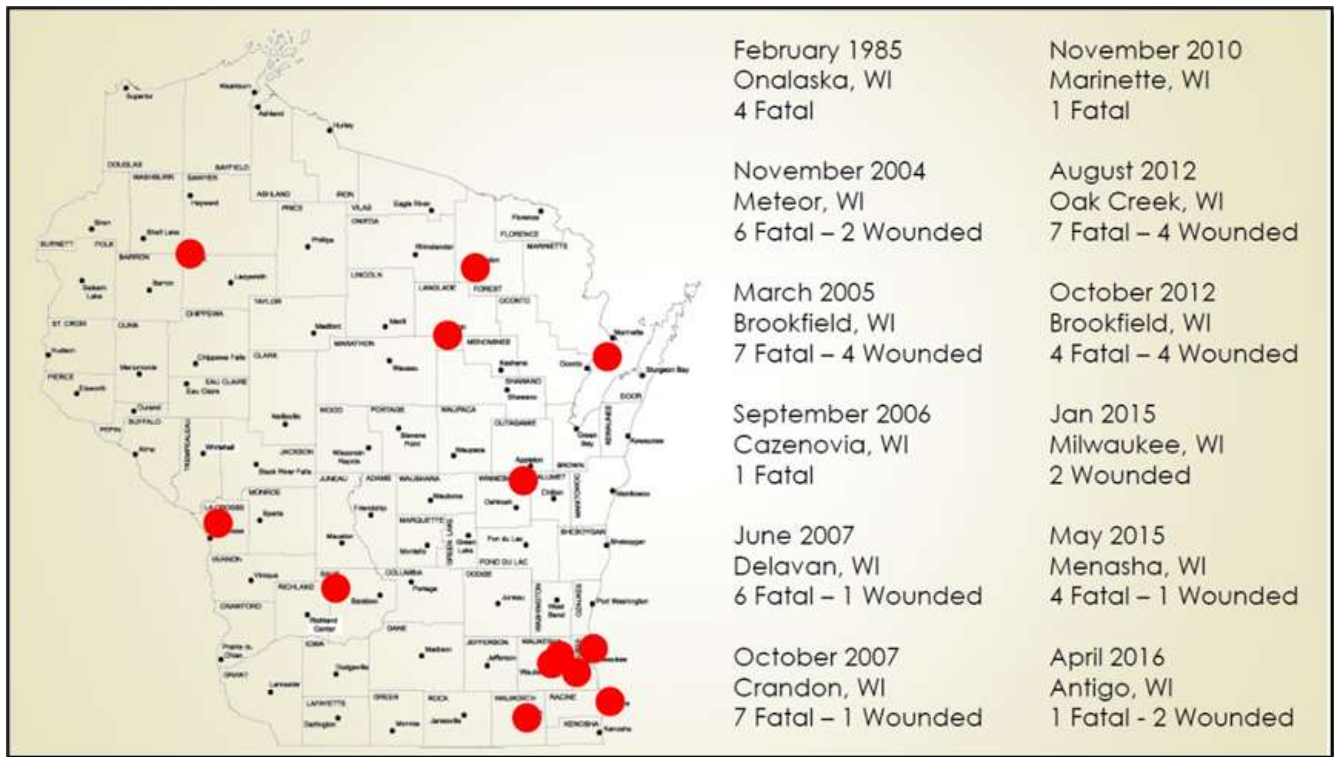
USA FACTS

not been publicly announced. According to one database.³⁸ of 201 incidents between 2008-2016, far-right extremists were behind 115 of the incidents (35% foiled) with nearly a third involving fatalities, while Islamist domestic terrorism resulted in 63 cases (76% foiled) and 13% involving fatalities. Left-wing ideologies, including ecoterrorism and animal rights, were relatively rare with 19 incidents. In recent years, we have also seen the growth of new threats, such as the use of a vehicle as a weapon (e.g., Berlin-December 2016, New York Times Square-May 2017, London Bridge-June 2017, Barcelona-August 2017, New York-October 2017). Such data demonstrates the importance of remaining objective and alert to potential warning signs.

³⁸ <https://apps.revealnews.org/homegrown-terror/>

Significant Polk County Events

To date, there have been no active shooter incidents in Polk County in contemporary history. However, Wisconsin is not immune to this threat. Below is a listing of recent active shooter incidents in Wisconsin provided by Barron County Emergency Management through 2016.



The list does not include more recent mass casualty events in Wisconsin, including:

- March 22, 2017 - Active shooter incident in the Rothschild area that resulted in the deaths of a police officer and four civilians. The suspect was motivated by a domestic incident; and the violent spree involved gunfire at a bank, law office, and apartment building.
- November 20, 2020 – Eight people were hospitalized with non-life-threatening injuries after a person opened fire at the Mayfair Mall in Wauwatosa.
- February 26, 2020 – A former employee shot and killed five people at the Molson Coors Beverage Company campus in Milwaukee, then committed suicide.
- November 21, 2021 - A man with a bipolar disorder drove a SUV through an annual Christmas parade in Waukesha, Wisconsin, killing 6 people and injuring 62 others.

There is no reason to believe that active shooter events in Wisconsin (or Polk County) would significantly differ in character than national trends. The events listed below are quite diverse and, for example ranged from a domestic/home shooting (Delavan, 2007) to a Sikh Temple (Oak Creek, 2012) to a beauty salon (Brookfield, 2012) to a school parking lot (Milwaukee, 2015) to a park/trail (Menasha, 2015). Located east of Polk County, the 2004 Meteor shooting involved a dispute over a hunting stand.

Hazard Probability - Active Threats

The Plan Steering Committee ranked active shooter/active threats as having a relatively low risk of occurring in Polk County (2.0 out of a possible 5.0), but being of some concern (see Table 11). Terrorism, including domestic, international, and to critical infrastructure, were all ranked as having a low/minimal probability. However, the Committee ranked active threat events as one of the highest threat vulnerabilities (potential impacts), with only pandemics/zoonotic disease being slightly higher, facing Polk County. Terrorism vulnerabilities were rated as more moderate with terrorism-critical infrastructure having a higher vulnerability level (substantial) compared to domestic and international terrorism.

Predicting the active threat risk for Polk County (44,977 population) is difficult, if not impossible. In the United States from 2018-2022 each year on average there were:

- 42.2 active shooter incidents with 222.5 casualties (injuries & fatalities)
- 336.6 bombings with 105 casualties

Based on the U.S. population of 332 million, the above active threat incidents are rare. Using these national averages and the County's population, **Polk County has a 5% chance of experiencing an active shooter incident and a 44% chance of experiencing a bombing incident over a ten-year period, keeping in mind that many events occur without casualties.** And based on the Wisconsin and national trends, we can say that rural areas and smaller communities, such as Polk County, are not immune to active shooter events, though the risk is higher in areas of higher population density.

The previous charts also show that risk varies by location and type of facility, though, again, no location is immune and preparedness efforts should not be limited by past trends. Based on national trends, there is a greater chance that an active shooter event will involve a Polk County business. This is not surprising, since there is a greater number of businesses in most communities compared to schools, government buildings, churches, or health care facilities.

There are a few factors that could potentially influence the frequency of active shooter, workplace violence, and targeted school violence incidents, such as:

1. **Social media/internet access and management**—Information is passed to others quickly online and has resulted in copycat behavior (e.g. a bomb threat in a school resulting in a bomb threat in nearby school soon thereafter). Further, the internet provides a plethora of information, including instructions on how to carry out illegal activities as well as social discourse among individuals and groups that are considering potentially violent behavior.
2. **Population trends**—The population of Polk County is increasing and becoming more ethnically diverse. This trend could cause tensions between existing and new residents. It is also not surprising that the number of incidents generally increase as population increases, as reflected by the concentration of Wisconsin events in the southeast corner of the State.
3. **Mental Health programming**—The rate of active shooter incidents can be decreased by improvements in access to mental health programming and the public's acceptance of such services without the social stigmas.

4. **Mitigation and preparedness efforts**—A variety of potential mitigation and preparedness efforts are discussed later in this subsection.
5. **Access to firearms** - The availability and accessibility of firearms can significantly impact the likelihood and severity of active shooter incidents. States with more lenient gun laws typically see more mass shootings and more fatalities.

Vulnerability Assessment— Active Shooter

Appendix F provides the following regarding the potential impacts of active threat events for Polk County as a whole:

- a description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- a description of the vulnerability of each community lifeline for this hazard;
- the potential consequences or impacts to the above assets and community lifelines.

An active shooter incident can have a variety of negative impacts on people and property. The primary vulnerability of an incident is the injury or death of any persons regardless if a primary intended target exists or was event present. This vulnerability includes Polk County residents, employees, students, and the many thousands of visitors who come from outside Polk County.

The incident and response can also cause damage to property and buildings, often resulting in extended or even permanent closures. The victims, their family members, and other witnesses (e.g., facility managers, emergency responders) can be traumatized in the aftermath of these intense, horrific events, resulting in mental and physical stress, memory loss, etc. And the location and community can be stigmatized by the event or experience a loss of reputation that can impact future business or discourage future use. Lawsuits and other financial costs may also result.

As summarized in Appendix G, the following are the primary active threat vulnerable locations in Polk County, the greatest concentration of which are located in the cities and villages:

Educational Facilities – Schools (and their students and staff) were the most-frequently mentioned active threat vulnerability mentioned during the planning process. Details on the active threat vulnerabilities and capabilities for those educational institutions participating in the planning process are included in **Appendix L**.

Places of Commerce - Large employers were the second most-frequently mentioned active threat concern during the 2024 Plan update. The general distribution of businesses by type are described in Section II.C.ii., though non-payrolled locations (self-employed; no other employees) are not included. Not only do these places of commerce vary in type, but they also vary in size.

Hospitals and Health Care Facilities - These facilities not only serve a potentially vulnerable population, but also have a large number of employees. A study published in the Annals of Emergency Medicine in September 2012 found that large hospitals (more than 400 beds) had an incidence rate of 99.8 active shooter events per 1,000 hospitals compared to 6.7 events per 1,000

hospitals among smaller facilities; Polk County's hospitals are smaller facilities. According to the previously referenced study on hospital-related shootings:

- There were no patterns or factors that could help profile vulnerable sites and situations.
- Nearly 60% of shootings happened in the hospital building, with the rest on the grounds or parking structures. 34% of shootings happened in the Emergency Department and 32% in patient rooms.
- 91% of shooters were men.
- Most involved a determined shooter with a specific target. Most shooters were neither current or former patients or employees.
- About 40% could have been prevented using a metal detector, but such a security practice can be difficult and expensive to fully implement.

Governmental Facilities - County and local municipal buildings were also frequently mentioned active threat target during the planning process. **Section II.D** identifies the local government buildings, fire halls, and law enforcement facilities in Polk County. Details on the active threat vulnerabilities and capabilities the cities and villages are included in **Appendix K**.

Houses of Worship - Houses of worship have not experienced active shooter incidents as frequently as the previous locations but remain a top target. The reported events at houses of worship varied in denomination and included retreat centers/camps. It is notable that at least half of these incidents were likely motivated by hate due to the denomination or race of the worshippers.

Projected Loss Estimates

Based on recent national trends, the average active shooter and bombing events result in 222.5 and 105 casualties, respectfully. Given the relative rarity of these events and the lack of past events in Polk County, projected loss estimates are not provided in this plan.

Other Factors Influencing Future Losses

- Population Growth As noted previously, Polk County continues to grow, which increases the exposure to active threats.
- Preparedness & Mitigation Due to the great variety in the type and sizes of these locations, there is no "one size fits all" solution to mitigating active shooter risks. (see subsection on Prevention and Mitigation Alternatives)

Risks for Individual Plan Participants - Active Threats

There are no unique city, village or town risks associated with active shooter events in Polk County. Generally, the communities with larger populations, more businesses, and more critical facilities have slightly higher risks, but no location is immune.

Appendix K provides the sub-plans for each city and village and **Appendix L** provides sub-plans for participating educational institutions within Polk County and includes a summary of current active threats mitigation activities in each community. These sub-plans identify active threat vulnerabilities specific or unique to these individual participants and are supplemental to the previously described event history, probability, and vulnerability assessment for Polk County.

During community meetings, schools, hospitals, and large employers were typically identified by the communities as being the greatest active shooter concern, with governmental buildings, houses of worship, and festivals/parades also sometimes mentioned. Most communities did not have a specific active shooter policy or plan. Some communities have made security hardening improvements since the 2017 Plan. Polk County’s educational institutions, in collaboration with local law enforcement, have been very active in preparing, planning, and exercising for active threat events.

Prevention and Mitigation Alternatives

Due to the great variety in the type and sizes of these locations, there is no “one size fits all” solution to mitigating active shooter risks. It is advisable to take an “all threats” approach rather than focusing on a single type or profile of active threat. Preparedness and mitigation activities generally fall into one of the following categories.

Education and Awareness

Education is important to recognize that Polk County and Wisconsin are not immune to active shooter events and to increase public awareness of warning signs as well as what to expect and what do should an event occur. Without education and preparedness, initial reactions are often disbelief, denial, shock, or failure to act. It is also important for bystanders to know how to act once law enforcement arrives on the scene.

Planning and Exercises

Given that the related risks, vulnerabilities, opportunities, and regulatory requirements can vary greatly by location, most preparedness planning occurs at the business, facility, or school district level. Active shooter preparedness planning can encompass:

- preparedness actions (e.g., education, site assessment, security measures, public announcement systems, related employee assistance or mental health programming);
- incident mitigation and response planning and training (e.g., recognizing and reporting a potential threat, de-escalation and conflict resolution techniques, what do we do when the event occurs, regular exercises and training in ALICE techniques and any location-specific procedures, train-the-trainers efforts); and
- post-event actions (e.g., can be an all-hazards approach, employee/client counseling, legal team, public relations, business continuity).

Various guides and materials are available to assist with above, including materials for the general public and pertinent to most place of employment, with additional preparedness and response guides for specific types of businesses and facilities (e.g., health care, schools, retail establishments). The Disaster Ready Chippewa Valley (DRCV) website has a collection of active shooter and workplace violence guides, pamphlets, and weblinks from sources such as FEMA, OSHA, and others at:

www.disasterreadychippewavalley.org

Site Assessment, Security, and Control

Many of the above guides include ideas and recommendations for security hardening and other control measures. For example, OSHA's *Recommendations for Workplace Violence Prevention Programs for Late-Night Retail Establishments* includes security checklists and workplace control checklists (environmental, engineering, and administrative practices); this guide is available at the above link.

Employee/Client Assistance Programs and Policies

Preventing an incident is always preferred. A robust active shooter strategy for a place of business will include programming and policies regarding access or required referrals to mental health services, encouraging reporting of concerns or suspicious activity in an appropriate manner, tracking/monitoring systems, and other "pre-event" de-escalation techniques (e.g., dealing with a disgruntled client, employee firing). For schools, this includes policies and programming to discourage bullying.

Partnerships and Continued Coordination

Key to all of the above are effective partnerships and repetition. The excellent working relationships between local law enforcement and school administrative staff serve as a model for their entire community. Such training should be extended to other emergency responders, such as fire and EMS as well as any specialized roles (e.g., PIO, 9-1-1 communication, evacuation/sheltering, crowd control). ECHO3 Tactical EMS training for victim evacuation and treatment is being conducted in Polk County. It is important to nurture such relationships and create them before disaster strikes. And equally critical to response (and preventing panic) is repetition in training, exercises, and drills to ensure everyone knows their roles and how to respond.

Wisconsin State Statute 118

Health and Safety

Requirements for Schools

Wisconsin State Statute 118 requires that schools conduct drills in the proper method of evacuation or other appropriate action in case of a **school safety incident** at least twice a year. The public and private school safety drill shall be based on the school safety plan. A school safety plan shall be created with the active participation of appropriate parties and shall include general guidelines specifying procedures for emergency prevention and mitigation, preparedness, response, and recovery. The plan shall also specify the process for reviewing the methods for conducting drills required to comply with the plan.

The school board or governing body of the private school shall determine which persons are required to receive school safety plan training and the frequency of the training. The training shall be based upon the school district's or private school's prioritized needs, risks, and vulnerabilities. Each school board and the governing body of each private school shall review the school safety plan at least once every 3 years after the plan goes into effect.

x. Cyberattack

This hazard is included in order to raise awareness of this growing threat and to guide potential mitigation or preparedness actions at a county or community level. Compared to the previous hazard sections, this cyberattack risk assessment provides an educational overview of threats, trends, and resources. A survey or detailed analysis of cyber-preparedness for Polk County and its community lifelines was not performed.

Defining the Hazard - Cyberattack

For purposes of this report, **cyberattack** is defined as a malicious computer-to-computer attack through cyberspace that undermines the confidentiality, integrity, or availability of a computer (or network), data on that computer, or processes and systems controlled by that computer.



National Security Presidential Directive 54/Homeland Security Presidential Directive 23 (NSPD-54/HSPD23) defines cyberspace as the interdependent network of information technology infrastructures, and includes the Internet, telecommunications networks, computer systems, and embedded processors and controllers in critical industries. Common usage of the term also refers to the virtual environment of information and interaction between people.³⁹

In most cases a cyberattack can be characterized as either being carried out for financial gain, for theft of information, or to further a social or political agenda. An attack for financial gain may directly target financial institutions such as banks or credits unions. An attack may also be directed at a specific business or organization for theft of information. Social or political agenda attacks typically try to gain access to sensitive material that can then be shared publicly to embarrass the target or other political advantage.

Hazard Location

Cyberattacks are capable of occurring in any community. There are no geographic boundaries or locations within Polk County uniquely affected by cyberattacks. All Polk County jurisdictions are equally at risk of experiencing a cyberattack event.

Hazard Extent (Potential Intensities)

The U.S. Cybersecurity & Infrastructure Security Agency (CIS) has created the National Cyber Incident Scoring System to estimate the risk or impacts of a cyberattack incident. This system rates a

³⁹ Cyberspace Policy Review, Assuring a Trusted and Resilient Information and Communications Infrastructure, U.S. White House.

cyber incident or threat on a score between zero and 100 based on a range of weighted factors. A category is then assigned that drives CISA response urgency:

Baseline (No Color) – Unlikely to affect public health, national or economic security, foreign relations, civil liberties, or public confidence. Likely to be immediately resolved.

Minimal (Blue) – Same as baseline but needs further scrutiny and could be escalated.

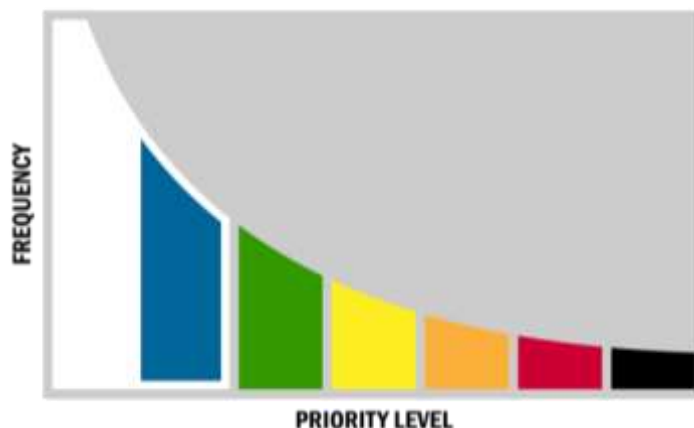
Low (Green) - Unlikely to affect public health, national or economic security, etc.

Medium (Yellow) - May affect public health, national or economic security, etc.

High (Orange) – Likely to result in a demonstrable impact to public health, national or economic security, etc.

Severe (Red) – Serious incident likely to result in significant impact to public health, national or economic security, etc.

Emergency (Black) – Priority incident poses an immediate threat to the provision of wide-scale critical infrastructure services, national government stability, or the lives of U.S. persons.



Not surprisingly, the frequency of events decreases as the priority categories increase. Below is the distribution of FFY2022 Incidents reported the CISA’s Threat Hunting unit:⁴⁰

Partner	Baseline 0-29	Minimal 30-49	Low 50-59	Medium 60-74	High 75-84	Severe 85-94	Emergency 95-100	Total Tickets
Private Sector	53	46	10	4	0	0	0	113
State, Local, Tribal, and Territorial	22	16	9	2	0	0	0	49
Government Facilities	208	250	41	1	0	0	0	500
Totals	283	312	60	7	0	0	0	662

Event History - Cyberattack

National & State Trends

Threats to cyberspace, or cyberattacks, pose one of the most serious economic and national security challenges of the 21st Century for the United States. The December 2008 report by the Commission on Cybersecurity for the 44th Presidency states: “America’s failure to protect cyberspace is one of the

⁴⁰ U.S. Cybersecurity & Infrastructure Security Agency. Theat Hunting – Fiscal Year 2023 Report to Congress. July 13, 2023.

most urgent national security problems facing the new administration.”⁴¹ In a 2017 survey of U.S. executives, cyberattacks was ranked as #2, misuse of technologies #3, and data fraud/theft #5 among the top global risks for doing business in the United States within the next ten years.⁴² For perspective, terrorism ranked #1, natural catastrophes #6, and extreme weather events #10.

There are a growing number of individuals, such as terrorists and international criminal groups that are targeting U.S. critical infrastructure and government. These players have the ability to compromise, steal, change, or completely destroy information.⁴³ As the Director of National Intelligence (DNI) recently testified before Congress, “the growing connectivity between information systems, the Internet, and other infrastructures creates opportunities for attackers to disrupt telecommunications, electrical power, energy pipelines, refineries, financial networks, and other critical infrastructures.”⁴⁴

The 2018 Government Outlook issued by the non-profit Center for Internet Security, Inc. and its Multi-State Information Sharing and Analysis Center⁴⁵ included the following regarding cyberattack threats for the near future:

- Financial gain will remain the most prevalent cybercrime motivation and the majority of cyber incidents affecting local governments will continue to be opportunistic in nature. One area of growth will be in profit maximization per attack, rather than increasing the number of attacks.
- Risks are expanding beyond traditional computer networks to include apps, Internet of Things, social media, public engagement tools, smart cities, cloud computing, mobile devices, point-of-sales systems, etc.
- Third parties are playing an increasing role in local government cybersecurity, and cybersecurity workforce demand is outstripping supply. Use of third-party storage and outsourcing has the potential to increase data breaches.
- There is a growing need for cybersecurity staff to communicate to executives in business (non-technical) terms and have good, soft people skills. Mitigation efforts are moving beyond basic cybersecurity hygiene to more detailed efforts and protocols.
- Cyber threat actors are highly likely to continue using malspam, malvertising, and, while rare, remote desktop protocol attacks as initiation vectors, though tactics can shift.
- Cybercrime is increasing in sophistication and includes well-crafted social targeting and engineering (e.g., more accurate phishing emails and scams).
- Extortion and ransomware attacks will continue to increase.

⁴¹ CSIS Commission on Cybersecurity for the 44th Presidency, *Securing Cyberspace for the 44th Presidency*, December 2008.

⁴² World Economic Forum. <http://reports.weforum.org/global-risks-2018/global-risks-of-highest-concern-for-doing-business-2018/#country/USA>

⁴³ Director of National Intelligence, Annual Threat Assessment of the Intelligence Community for the Senate Armed Services Committee, Statement for the Record, March 10, 2009.

⁴⁴ Director of National Intelligence, Annual Threat Assessment of the Intelligence Community for the Senate Armed Services Committee, Statement for the Record, March 10, 2009.

⁴⁵ <https://www.cisecurity.org/white-papers/2018-slitt-government-outlook/>

- Industrial control systems are a wildcard. Known vulnerabilities exist in some systems, though such systems have not been a major target.
- Health care is a popular target, including for ransomware and extortion attempts.
- The 2018 mid-term elections will re-focus attention on security of election systems.

In March 2018, the U.S. Department of Homeland Security and Federal Bureau of Investigation released an alert that since at least March 2016 Russian government cyber actors targeted government entities and multiple U.S. critical infrastructure sectors, including the energy, nuclear, commercial facilities, water, aviation, and critical manufacturing sectors. In particular, sophisticated attacks were made against power infrastructure (electrical grid) including companies that manage U.S. nuclear facilities. Gaining access to such networks is extremely difficult but does have the potential to cause significant damage and severe disruptions in service. The DHS/FBI alert includes technical recommendations to improve cyber-defense from such attacks.⁴⁶

According to Waterfall Security report, there was a 140% surge in cyberattacks that led to physical consequences in manufacturing and critical industrial infrastructure in 2022, impacting over 150 industrial operations. The report speculated that “at this rate of growth, we expect cyberattacks to shut down 15,000 industrial sites in 2027”.⁴⁷ An Axios article states that the average number of weekly cyberattacks against utilities grew 118% from 2020 to 2022.⁴⁸ And municipal utilities are not immune and have become targets of State actors (cyber-terrorism).

Statewide, a 2023 survey by the Wisconsin Center for Manufacturing & Productivity found that 22% of respondents have been hacked or experienced a data breach. And these cyberattacks are not limited to specific industries or organizations. FBI and CISA speakers at Disaster Ready Chippewa Valley’s July 2022 spring seminar identified the top major cyber threats facing organizations in Wisconsin as Ransomware and Business Email Compromise attacks:

- **Ransomware** is a “huge” and growing problem for Wisconsin and the world” making it important to keep systems and applications up-to-date and to regularly maintain backups offline. Ransomware is a form of malware designed to encrypt files on a device, rendering any files and the systems that rely on them unusable. Malicious actors then demand ransom in exchange for decryption. Ransomware attacks in Wisconsin more than doubled from 2020 to 2021. According to the Wisconsin Office of Attorney General, the FBI received 81 ransomware reports in Wisconsin for 2021 compared to just 30 reports in 2020. The far majority (91%) were



⁴⁶ <https://www.us-cert.gov/ncas/alerts/TA18-074A>; <https://www.cnn.com/2018/03/15/politics/dhs-fbi-russia-power-grid/index.html>; <https://www.symantec.com/blogs/threat-intelligence/dragonfly-energy-sector-cyber-attacks>

⁴⁷ Waterfall Security. *2023 Threat Report*. <https://waterfall-security.com/scada-security/whitepapers/2023-threat-report/>

⁴⁸ <https://www.axios.com/2023/08/03/infrastructure-power-threats>

from the private sector. And of these, 29% were from manufacturing businesses and 14% from financial services. Nationally, there are increasing numbers of ransomware attacks targeting school districts and medium-to-smaller organizations.

- **Business email compromise** is the other most common, major threat. BEC is a form of spoofing or phishing attack where criminals send an email message that appears to come from a known source making a legitimate request. These attacks can be quite sophisticated and can even involve virtual meetings. Be on the look out for requests involving last-minute actions or changes to account/direct deposit information, purchases, or advanced payments. Verify vendor information and email addresses.

Other, more general phishing attacks via email, text messages, or phone calls are also on the rise in the attempt to lure individuals into providing sensitive data, credit card details, passwords, etc. These attacks often attempt to mimic popular brands or capitalize on current events. One study found the number of phishing attacks in the United States rose 61% in 2022.



Some recent notable attacks include:

August 27, 2023 – Hospital Sisters Health System and Prevea Health experienced cyber-attacks that caused system-wide outages, temporarily impacted hospital communications, and took weeks to fully recover from.

September 22-30, 2023 – Rock County, WI experienced a ransomware attack in their Human Services Department. The attack targeted email systems and managed to obtain limited data. The attacker requested \$1.9 million in ransom, but no payments were made.

October 9, 2023 – Kwik Trip identified a cyber-attack on their systems, which disrupted the company’s internal systems and loyalty program. This is an example of a cyberattack largely based elsewhere having regional or even worldwide implications as all Kwik Trip locations were impacted.

November 22, 2023 – Cyber-attacks impacted multiple U.S.-based water and wastewater systems through internet-accessible devices in the systems’ hardware. The attack had the potential to impact energy, food, and healthcare industries as they use the same equipment, identifying a significant vulnerability to essential service providers. These municipal utilities attacks occurred across the U.S., including in smaller communities, when international hackers who exploited a certain piece of equipment to shut down remote monitoring and water pressure regulating equipment.

Polk County Trends

No data source was identified during this Plan update that provides a comprehensive history of attacks, impacts, and losses within Polk County or the region. No major losses to organizations or businesses within Polk County were identified during the planning process. In 2018, a ransomware attack effected one County computer but was managed without significant impacts. A number of local governments in the County have experienced additional, smaller, non-targeted attacks that were contained, such as malware that was acquired through web-surfing or email “phishing”; employee education is key to preventing such attacks.

However, within west-central Wisconsin, a number of communities have experienced cyberattacks in the past, but reports of such incidences among local governments have decreased in recent years, likely in part due to cyber-security improvements:

- For instance, Eau Claire County has been targeted twice. During the second attack in January 2010, overseas hackers acquired credentials through a computer virus which allowed the hackers to attempt to transfer nearly \$800,000 from the County’s accounts. The County’s financial institution helped thwart the robbery attempts in both cases, demonstrating the importance of security partnerships with those providing such services to municipalities. Eau Claire County has taken additional security steps to further help prevent such crimes.
- Within St. Croix County, in 2009, a malicious keylogging software was used to track keystrokes on a City of Glenwood City computer which allowed hackers to gain access to

banking account information; like the Eau Claire County cases, the theft was prevented by the bank.

- The websites for a number of communities in the region have been hacked and temporarily unavailable, but no local computer systems were impacted.

Hazard Probability - Cyberattack

The Plan Steering Committee rated major cyberattacks as of some concern to moderate probability or frequency of future occurrence (see Table 11). These events will continue to occur within or affect Polk County and its communities, businesses, and residents. And based on trends, the probability (and vulnerability) of such incidents is projected to increase as cyber-threat actors increase, become more sophisticated, and diversify in their targets. The probability will also increase as our world becomes increasingly connected and reliant on broadband, smart appliances, etc. However, good cyber-security practices (cyber-hygiene) if very effective at decreasing the probability.

Vulnerability Assessment - Cyberattack

Appendix F provides the following regarding the potential impacts of cyberattack events for Polk County as a whole:

- a description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- a description of the vulnerability of each community lifeline for this hazard;
- the potential consequences or impacts to the above assets and community lifelines.



Any system, organization, or service that utilizes technology has some risk to cyberattacks. As some of the significant events have highlighted, most of the community lifelines identified in this plan are vulnerable to cyberattacks due to their use of internet-accessible systems. All computers, networks, and many other computerized devices share general vulnerabilities to viruses, Trojans, malware, denial of service attacks, and data loss.

While most or all community lifelines are potentially vulnerable, **Table 26** shows the primary cyberattack vulnerabilities discussed during the planning process.

Table 26. Primary Cyberattack Vulnerabilities by Attackee

Type of Attackee	Primary Vulnerabilities of Public Concern
Government	Access to confidential data to possibly steal, alter, or delete information. Website hacking and other disruption of public services or voting systems, including impacts to public confidence. As was the case in Eau Claire County and Glenwood City, hackers may attempt to obtain access to bank accounts, financial information, etc. The protection of voting machines and systems has been receiving increased attention.
Power Grid and Utilities	Ability to remotely take control of critical systems that monitor and control water supplies, wastewater treatment systems, power generating facilities, dams, communications infrastructure, etc. Power outage (see <i>Long-Term Power Outage</i> section). Damage to equipment. Lack of redundancy in systems and shared systems can increase risks and vulnerabilities.
Transportation	Disturbance of traffic signals resulting in confusion, traffic congestion and/or accidents.
Financial Institutions	Access to personal information (bank accounts) resulting in theft and/or identity theft. As more and more banking is performed on-line, financial institutions have been very proactive on cyber-security issues.
Schools Districts	Access to confidential data to possibly steal information or alter/delete it. Disruption of educational services. For public schools, cyber-security issues are frequently addressed in cooperation with CESA. Given that students are increasingly using computers and mobile devices in the classrooms, the risk of viruses, malware, etc., is high.
Health Care Facilities & Social Services	Access to confidential data is protected by HIPAA (Health Insurance Portability and Accountability Act of 1996) rules. Cyberattack is a major threat to such entities and health data is some of the most valuable on the black market (e.g., filing of claims). The average fine or settlement for the loss of confidential patient information is over \$2.5 million.
Seniors	As a socially disadvantaged population, seniors are frequently the target of phishing attacks and scams. ADRC, AARP, and other entities are resources offering education, training, etc.
Other Businesses	For many of the same reasons identified previously, Polk County's businesses and economy can be affected by cyberattack. Elevated vulnerabilities are financial institutions, businesses conducting e-Commerce, and businesses or manufacturers utilizing computer-controlled equipment that may be remotely controlled.

The growing sophistication of cyberattacks could cause serious problems, such as:

- **Failure of critical infrastructures.** The CIA reports malicious activities against information technology systems have caused the disruption of electric power capabilities in many regions overseas, including a case that resulted in a multi-City power outage.⁴⁹ In today's world, broadband technology is a path of attack to utilities and communications. And given that infrastructure often shares systems and grids across large areas, the vulnerability from a single attack is increased.
- **Exploiting global financial services.** In November 2008, payment processors at an international bank were compromised, permitting fraudulent transactions at more than 130 automated teller machines in 49 cities within a 30-minute period.⁵⁰ In another case, a U.S. retailer in 2007 experienced data breaches and loss of personally identifiable information that compromised 45 million credit and debit cards.⁵¹
- **Systemic loss of U.S. economic value.** Industry estimates of losses from intellectual property to data theft in 2008 range as high as \$1 trillion.⁵²

Projected Loss Estimates

Projecting cyber-attack losses for Polk County is not possible, but the potential is very real. The Federal Bureau of Investigation's Internet Crime Complaint Center's 2022 Internet Crime Report provides estimates of the financial impacts due to cyberattacks, including:

- \$10.3 billion dollars were lost to cybercrime. Business Email Compromise and Investment scams were the costliest crimes, accounting for more than 50 percent of losses.
- Wisconsin ranks 19th overall in number of victims per state (7,863) and 23rd overall in victim losses (\$108,909,445). Wisconsin has progressively ranked higher each year in victim losses.
- The average victim in Wisconsin lost \$13,580.88. This is below the national average of \$20,542.09 per victim.
- Wisconsin's financial loss average has increased by almost 219% over the last 3 years.

Risks for Individual Plan Participants - Cyberattack

All individual plan participants in Polk County (i.e., villages, cities, educational institutions, electric cooperatives, businesses) are equally at risk of experiencing a cyberattack event. The level of

⁴⁹ www.sans.org/newsletters/newsbites/newsbites.php?vol=10&issue=5, CIA presentation, SANS SCADA Security Summit, January 16, 2008.

⁵⁰ www.bankinfosecurity.com/article.php?art_id=1197, February 5, 2009.

⁵¹ www.infoworld.com/d/security-central/retailer-tjx/reports-massive-data-breach-952, January 17, 2007.

⁵² www.mcafee.com/us/about/press/corporate/2009/20090129_063500_j.html. See also <http://resources.mcafee.com/content/NAUnsecuredEconomiesReport>, McAfee, "Unsecured Economies: Protecting Vital Information", January 2009. Projection based on survey by Purdue's Center for Education and Research in Information Assurance and Security.

preparedness in terms of both policy and level of protection varies among the governmental entities in Polk County, though overall has improved since the 2017 Plan, including some communities purchasing cyber-insurance and nearly all back-up their data off-site in some form. Some communities have also begun to limit security permissions to municipal utilities (e.g., wastewater SCADA systems) so such systems can only be monitored (not controlled) remotely. In some cases, the COVID-19 pandemic increased attention to cyber-security due to the increase in remote working, teleconferencing, etc.

Appendix K provides sub-plans for each city and village and **Appendix L** provides sub-plans for participating educational institutions. These sub-plans identify cyberattack risks and vulnerabilities specific or unique to these individual participants and are supplemental to the previously described event history, probability, and vulnerability assessment for Polk County. During the planning process, cities and villages were asked about their current policies and protections, which are summarized in Appendix K. This was not a detailed, formal assessment of cyberattack vulnerabilities and level of protection. For reasons of security, specifics are not included in this plan.

As previously described, cooperatives provide electric service to a large part of Polk County. Electric cooperatives have been working with the Department of Energy (DOE), the North American Electric Reliability Corporation (NERC), the Federal Energy Regulatory Commission (FERC), the U. S. Department of Homeland Security, and the electric industry to strengthen cyber-security. In 2011, NERC performed an exercise called “GridEx” to identify any issues of cyber security and to encourage utilities and governments to work together on the issues. The test showed that most utilities have adequate response plans in place but need updated guidelines, more training, and better communication.⁵³

Cyberattack Preparedness and Mitigation

National Level of Preparedness

The Cybersecurity & Infrastructure Security Administration (CISA) has a wide range of preparedness and response resources, including a downloadable cyber essentials starter kit. Nearly every business or organization can fit within the Federal definition of critical infrastructure to receive their support. Two tools in particular are a great starting point with assistance through CISA's State office:

- Cyber Resilience Review - An assessment to evaluate an organization's cybersecurity resilience and practices. This can be self-administered or facilitated.
- Cybersecurity Infrastructure Survey - A 2.5 to 4 hour structured assessment of essential cybersecurity practices focusing on protective measures and threat scenarios, with an on-line dashboard of comparative results.

Additional resources are available through CISA's national team, but may require up to a 2-year wait, including cyberstorm exercises, phishing campaign assessment, vulnerability scanning, and remote

⁵³ Wisconsin Energy Cooperative News, Cyber Security Patrols Electric Co-ops Protecting Security of their Systems. June 2012.



penetration testing. CISA's "Shields Up" campaign is driven by the elevated cybersecurity risks as a result of the Ukraine conflict. CISA also has an on-line catalog of educational tools and videos. And attacks/incidents can also be reported to CISA, which shares such data with the FBI. The CISA office for the Wisconsin district is available to assist businesses and local governments with navigating through these many resources and programs.

The Department of Homeland Security National Cyber Security Division has a program called the Control Systems Security Program (CSSP), which works to reduce industrial control system risks within and across all critical infrastructure and key resource sectors by coordinating efforts among Federal, state, local, and tribal governments as well as industrial control systems owners, operators, and vendors.⁵⁴ The program coordinates activities to reduce the likelihood of a successful cyberattack and attempts to reduce the severity of impacts from a successful cyberattack against critical infrastructure control systems through risk-mitigation activities. Further, the Department of Homeland Security's United States Cyber Emergency Readiness Team (US-CERT) strives to improve the nation's cybersecurity, coordinate information sharing, and manage cyberattack risks.⁵⁵ US-CERT partners with private and public sector critical infrastructure owners and operators to enhance cybersecurity. Cyber-security assessment tools are available through US-CERT and businesses that provide critical infrastructure may be eligible for additional audit and planning support. Given that cyberattack threats are escalating, new programs and resources are continuing to become available. For example, in January 2024 the Department of Energy announced grant funding to support the research, development, and demonstration (RD&D) of next generation tools to protect clean energy delivery infrastructure from cyberattacks.

State of Wisconsin Level of Preparedness

The State of Wisconsin's Cyber Incident Annex "discusses policies, organizations, actions, and responsibilities for a coordinated, multidisciplinary, broad-based approach to prepare for, respond to, and recover from cyber-related incidents."⁵⁶ The Annex describes the framework for Wisconsin State Agencies to support local units of government during a cyber incident response. This support is coordinated with State and Federal agencies. Wisconsin is a home rule state and "the role of any state agency, including the Department of Military Affairs and the division, in an emergency declared under this chapter, is to assist local units of government and local law enforcement agencies in responding to a disaster or the imminent threat of a disaster."⁵⁷

⁵⁴ http://www.us-cert.gov/control_systems/

⁵⁵ <http://www.us-cert.gov/about-us/>

⁵⁶ Cyber Incident Annex—State of Wisconsin, <http://emergencymanagement.wi.gov/planning/WERP/Annex%20Cyber%20Terrorism%20Incident%20RD.pdf>, June 30, 2010.

⁵⁷ Ibid.

The Wisconsin Statewide Intelligence Center (Fusion Center) provides a variety of resources to businesses and organizations, including hosting the Statewide Cyber Response Team to assist businesses and organizations if they experience a cyberattack. The make-up of the Team will vary depending on the nature of the attack and type of organization and there is strong collaboration between the FBI, CISA, and Fusion Center team members. Regional-level cyber-response teams have also been established should a local government or business require support due to a significant data breach.

The State of Wisconsin Department of Administration, Division of Enterprise Technology's Office of Security also provides information to Wisconsin residents, educators, and businesses on cyber risks and ways to stay protected online.

Polk County Government Preparedness

Polk County has an Information Technology (IT) Department that has been very proactive in mitigating cybersecurity threats, including:

- The County has a 8-person IT Team who participates in regular National Association of County (NACo), Infosec Institute, and other training on cybersecurity risks, trends, and actions. Given the potential losses from a cyber-attack, such training is a good value for the County.
- The County recognizes that the end users can be the weakest link in cyber-security (e.g., phishing attacks, clicking on links). Strong emphasis is placed on County employee education, including good cyber-hygiene and simulated phishing.
- Multiple layers of defensive steps, firewall systems, logging systems, and other defensive practices are in place. The County has robust cyber-security policies, including password policies and 2-factor authentication requirements, especially for off-site access. Keeping software up to date is an additional security priority.
- The County engages with third-party partners (e.g., CISA, MS-ISAC) to conduct risk assessment, scanning, and cyber-hygiene testing of the network and individual machines/end users. Additional 24/7 monitoring occurs identify hacking attempts and other digital activities that are out of the norm.
- Polk County actively collaborates with the Wisconsin Cyber Response Team.
- Special attention is given to security systems, permissions, and procedures to ensure confidentiality of certain records, including health and social services records that are subject to HIPPA laws.
- Polk County has a comprehensive data backup system based on industry best practices as well as a cyber-incident response plan, which includes testing and recovery should an attack occur. The County continues to explore opportunities to strengthen its plan, including broadening its focus to include the larger network and data infrastructure (i.e., beyond personal computers) and ensuring that a contingency, second location has adequate technology capacity.
- Data recovery and information technology is an essential service under the County's Continuity of Government Plan, including a damage assessment function, the identification of alternative operational sites, and a service restoration strategy.

Mitigation Strategies

How an entity responds to a cyberattack can limit or increase its liabilities. It can be valuable to have a cyber-response plan with a technical team and a separate executive team, with clear roles and responsibilities for each. Regular exercising of the plan will minimize stress and allow increasing focus on decisions, rather than the process and procedures.



In past mitigation planning efforts, one west-central Wisconsin expert estimated that over 95 percent of potential risks can be avoided if the following measures were taken by county and local governments to keep their computers safe:

- perform daily and a separate weekly data back-up
- keep the firewall on constantly
- set virus and malware detection to automatically update daily
- ensure that the Windows operating system is automatically updated
- migrating to the most current version of Windows

There are additional actions and policies that can be taken to reduce cyberattack risks as discussed at April 2011, May 2017, and June 2022 Disaster Ready Chippewa Valley cyber-security workshops, such as:

- use of hardware firewalls and how web servers are managed
- use multi-factor authentication
- IDS/IPS real-time monitoring in both directions
- data and password encryption, including encrypted tunnels for transport
- password policies and procedures
- policies for the use of computer equipment, Internet, and downloading
- segregation of certain duties
- safeguarding and proper disposal of old equipment, including copiers
- safeguarding and proper disposal of paper reports
- training of staff in risks, guidelines, and security measures
- know what is covered under insurance in term of cyberattack damages and liabilities
- request assistance from law enforcement, State, and Federal government when needed
- if an employee is leaving your firm, especially if disgruntled, it is important to cut them off immediately from access to your systems in order to help prevent insider threats or the theft of intellectual property.
- if you are victim of a cyberattack, immediately contact your financial institution to monitor or request a freeze or recall of funds. Also monitor for irregularities with payroll deposits. And file a complaint with the FBI's Internet Crime Complaint Center (www.ic3.gov). If notified immediately, the FBI may be able assist with freezing funds. In certain instances, the FBI may also open an investigation.

- the FBI issues flash messages, private industry notifications, and advisories, including alerts for specific industries.

Even with the best email filters, some spam and cyber threats will still get through. Employees are an integral part of your cybersecurity system and the last line of defense. Train employees to recognize suspicious emails, web sites, billings, and other identity theft threats. Warning flags include: differences in shipping, billing, and return addresses; similar (but slightly different) business names and web links; and many large orders from new customers. If uncertain, follow-up with phone calls, web searches, etc.

Continuity planning is also important, though most governments in Polk County have not developed such plans. Continuity planning is the identification of strategies for the preservation and/or restoration of critical business functions during or following a disaster or other disruption of service. Not only should data be frequently backed-up off site, but organizations should consider how this data is to be recovered following an event and, should disaster strike, does the recovery location meet the organization's technology needs. Larger municipalities may need a secondary data and operations center and/or a back-up server. These systems should be tested regularly. The business continuity planning template available at the Disaster Ready Chippewa Valley website (www.disasterreadychippewavalley.org) includes a section on data protection, storage, and recovery which may be helpful. Local governments should obtain technical assistance in addressing their risks, if needed.

The Polk County's Mitigation Plan Steering Committee noted that insurance companies, especially those offering cyber-insurance, are great resources for assessing cyber vulnerabilities and identifying security measures. The Committee also noted that the Polk County Economic Development Corporation and school districts are also important partners in raising cyber-security awareness among businesses and the general public.

Basic Cyber Hygiene



Backups: Multiple copies (including offline / offsite), made and tested regularly. Know your time to restore.



Multifactor: Username / password not good enough. Physical token, mobile application, etc. Not bulletproof, but essential.



Updates: Not just your computer, everything with a network connection, as quickly as possible. Automatic preferred*.



Report: It helps protect others. Don't be embarrassed / afraid to ask for extra eyes. (We do all the time!)

xi. Hazardous Materials Spills

Note: This plan only focuses on point sources of contaminants due to an accidental or malicious hazardous materials incident, such as a hazardous materials spill or a release from a leaking tank.

Defining the Hazard – Hazardous Materials Spills

Hazardous materials and substances can present special risks to humans and the environment at the time of disaster as well as pose substantial difficulties and necessitate special precautions for post-disaster clean-up.

There are many definitions and descriptive names being used for the term “hazardous material,” each of which depends on the nature of the problem being addressed. Unfortunately, there is no one list or definition that covers everything. The United States agencies involved, as well as state and local governments, have different purposes for regulating hazardous materials that, under certain circumstances, pose a risk to the public or the environment. The following are some of these Federal definitions.

Hazardous Materials - The United States Department of Transportation (DOT) uses the term “hazardous materials” which covers eight hazard classes, some of which have subcategories called classifications, and a ninth class covering other regulated materials (ORM). The DOT includes in its regulations hazardous substances and hazardous wastes, both of which are regulated by the Environmental Protection Agency (EPA), if their inherent properties would not otherwise be covered.

Hazardous Substances - The EPA uses the term “hazardous substance” for the chemicals which, if released into the environment above a certain amount, must be reported and, depending on the threat to the environment, Federal involvement in handling the incident can be authorized. A list of the hazardous substances is published in 40 CFR Part 302, Table 302.4.

Extremely Hazardous Substances - The EPA uses the term “extremely hazardous substance” for the chemicals which must be reported to the appropriate authorities if released above the threshold reporting quantity. Each substance has a threshold reporting quantity. The list of extremely hazardous substances is identified in Title III of Superfund Amendments and Reauthorization Act (SARA) of 1986 (40 CFR Part 355).

Toxic Chemicals - The EPA uses the term “toxic chemical” for chemicals whose total emissions or releases must be reported annually by owners and operators of certain facilities that manufacture, process, or otherwise use a listed toxic chemical. The list of toxic chemicals is identified in Title III of SARA.

Hazardous Wastes - The EPA uses the term “hazardous wastes” for chemicals that are regulated under the Resource, Conservation and Recovery Act (40 CFR Part 261.33). Hazardous wastes in transportation are regulated by the DOT (49 CFR Parts 170 - 179).

Hazardous Chemicals - The United States Occupational Safety and Health Administration (OSHA) uses the term “hazardous chemical” to denote any chemical which is a physical hazard or a health hazard. Hazardous chemicals cover a broader group of chemicals than the other chemical lists. There is no list of hazardous chemicals, but they are any substance for which OSHA requires a facility to maintain a Material Safety Data Sheet.

Hazardous Substances - OSHA uses the term “hazardous substance” in 29 CFR Part 1910.120, which resulted from Title I of SARA and covers emergency response. OSHA uses the term differently than EPA. Hazardous substances, as used by OSHA, cover every chemical regulated by both DOT and EPA.⁵⁸

Active Reporting Facilities – Sometimes called “Tier Two facilities”, under Section 312 of the Emergency Planning and Community Right-to-Know Act (EPCRA), these facilities must annually share/report to the County Local Emergency Planning Committee any chemical(s) with a physical hazard or health hazard as defined in Federal regulations and any substance for which OSHA requires a facility to maintain a Safety Data Sheet (SDS). Due to OSHA requirements, any owner or operator of a facility is required to submit an SDS for a hazardous chemical into WHOPRS or to WEM for the following:

1. For each hazardous chemical present at a facility at or above 10,000 pounds at any one time, OR
2. For each Extremely Hazardous Substance (EHS) present at a facility at or above 500 pounds or the Threshold Planning Quantity (TPQ), whichever is less, at any one time.

Active Planning Facilities - Sometimes called “EHS facilities”, these facilities have a total amount of an extremely hazardous substance present that equals or exceeds threshold planning quantity for that chemical. These facilities must also annually file Tier Two reports, in addition to submitting emergency plans for its hazardous substances for review by the Local Emergency Planning Committee (LEPC).

1. The chemical is expected to cause significant adverse acute human health effects at concentration levels which are likely to exist beyond the facility site boundaries as a result of a release. Acute (short-term) effects occur rapidly as a result of short-term exposure, usually to high concentrations of a chemical.
2. In humans, the chemicals are expected to cause cancer, birth defects, nervous system effects, gene mutations which can be passed on to the next generation, or other chronic (long-term) health effects associated with repeated exposure to a chemical over a long period of time.
3. The chemical is expected to cause significant and serious adverse effects on the environment due to its toxicity, and/or its persistence (tendency to remain in an unchanged

⁵⁸ Ingham County Emergency Planning Committee, [Hazardous Materials Page](http://www.orcbs.msu.edu/AWARE/pamphlets/hazwaste/HazMatdef.html), <http://www.orcbs.msu.edu/AWARE/pamphlets/hazwaste/HazMatdef.html>, as of Feb 2004.

form, rather than breaking down into smaller chemical parts), and/or its tendency to bioaccumulate (to become increasingly concentrated in plant and animal tissue).

A solid waste may be a "listed hazardous waste" if it appears in one or more U.S. Environmental Protection Agency tables that list hazardous wastes. Other solid wastes are "characteristic hazardous wastes" because they exhibit any of the four hazardous-waste characteristics: corrosiveness, reactivity, toxicity, or ability to ignite. If the waste is hazardous, then it must be managed in compliance with the applicable sections of NR 600-685, Wisconsin Administrative Code (DNR Pub SW-232).

Within this plan, we apply the term "**Hazardous Materials**" broadly to include...

...any substance or combination of substances (including wastes of a solid, liquid, gaseous, or semi-solid form) which, because of its quantity, concentration, physical chemical, or infectious characteristics, may cause or significantly contribute to an increase in mortality, an increase in serious irreversible or incapacitating illness, or pose a potential hazard to human health or the environment.

This definition encompasses the hazardous substances and wastes definitions provided previously, including those chemicals required to be reported under Title III of SARA, otherwise known as the Emergency Planning and Community Right-to-know Act (EPCRA). Companies across a wide range of industries (including chemical, mining, paper, oil and gas industries) that produce more than 25,000 pounds or handle more than 10,000 pounds of a listed toxic chemical must report it to the Toxics Release Inventory.

Given the hazard mitigation and disaster preparedness context of this planning effort, this plan only focuses on point sources of contaminants due to an accidental or malicious **hazardous materials spill or chemical incident**, when a hazardous substance is released and potentially has a significant, negative health, safety, or environmental impact. Risks and impacts from non-point sources or potentially created during normal, permitted activities are not included in the plan scope.

Hazard Location

Hazardous materials are widely used, stored, and transported; a hazardous materials spill incident could take place almost anywhere in Polk County. There are no geographic boundaries or locations within the County uniquely affected by hazardous spills. Based on stakeholder and local official input during the planning process, areas and neighborhoods adjacent to the County's rail lines and major highways, especially U.S. Highway 8, have a higher likelihood of experiencing a hazardous spill event. EHSs may be transported over any local, state, or federal highway for which weight limits are met. Most fixed facilities with large quantities of hazardous chemicals (e.g., industry, commercial businesses, utilities) are located in the incorporated cities and villages.

Hazard Extent (Potential Intensities)

The extent of a hazardous materials spill can be measured by its impacts such as: what has been contaminated, the area of exposure, environmental damage, the number of people injured, any required evacuation (zone size, numbers evacuated, evacuation length), economic losses, and clean-up costs.

The extent of a spill event is unique for each occurrence and there is not a commonly used scale for measuring the size or intensity of most hazardous materials spills.

There are instances in which known or threatened hazardous materials releases are so extensive, posing a serious risk to human health and/or the environment, or the hazardous materials site has been largely abandoned, that Federal assistance is needed. In 1980, Congress established the Comprehensive Environmental Response, Compensation and Liability Act (**CERCLA**) or informally called the **Superfund** Program, which forces the parties responsible for the contamination to either perform cleanups or reimburse the government for EPA-led cleanup work. Those Superfund sites that pose the greatest risks to humans or the environment, and/or require EPA take a more active role during long-term response and clean-up are identified on the Superfund **National Priority List** (NPL). Many of these NPL locations are former mining sites, hazardous/solid waste dumps, chemical/fuel companies, and industrial areas which produced military ammunition.

Not all Superfund sites are on the NPL. Using EPA's Hazard Ranking System (HRS), sites with a score of 28.50 or greater are eligible for placement on the National Priority List. The HRS score is based on a range of factors, including: the likelihood of the release, toxicity and quantity of the waste, people or sensitive environments affected, and the pathways for exposure (e.g., drinking waters, surface water, soils, air).

Event History – Hazardous Materials Spills

State & Regional Events

State and regional hazardous materials spill events and trends are summarized here to provide insight into the potential risks for Polk County. Though current data is not readily available, in the past nearly 58 percent of all spills in Wisconsin are petroleum-related; and 49 percent of all spills occur at industrial-related facilities, automotive-related facilities, or on the roadways.⁵⁹ Spills at private properties account for nearly twelve percent of all spills. More than fourteen percent of spills each year in Wisconsin are contained and/or recovered before they impact the environment. Surface water spills account for more than fifteen percent, while spills to groundwater occur more than seven percent of the time. The vast majority of reported hazardous materials incidents in Wisconsin result from the loading, unloading, and transportation of hazardous materials.

Based on 2014 and 2016 Wisconsin DNR data, Wisconsin averages almost 1,000 hazardous substance spills every year, with more populated areas experiencing more spills. About one-half of all spills in Wisconsin are petroleum-related; and about one-third of spills occur on roadways. Spills at private properties account for about 12% of all spills and commercial properties account for around another 12%. About 5-10% of spills occur at farms. About one-third of spills each year in Wisconsin are contained and/or recovered before they impact the environment. The remaining spills can impact the environment or become a public health concern through the contamination of air, soil, and water. Spills to surface water or storm sewers account for 15-20% percent, while spills to groundwater occur

⁵⁹ Wisconsin Department of Natural Resources. "Hazardous Substance Spills in Wisconsin". July 2014.

5-10% of the time. A majority of reported hazardous materials incidents in Wisconsin result from the loading, unloading, and transportation of hazardous materials.⁶⁰

State & Regional Trends – Hazardous Materials Spills at Fixed Facilities

Under the Emergency Planning and Community Right-to-Know Act (EPCRA), there are thousands of facilities in Wisconsin that plan and report the use/storage of certain potentially hazardous chemicals. The EPCRA Program requires communities to prepare for hazardous chemical releases through emergency planning and by maintaining hazardous chemical information that is submitted to them by the facilities covered under the law. This does not include practices which are exempt from such reporting, such as routine agricultural operations and retail gas stations.

According to the Wisconsin Department of Natural Resources, there are over 11,000 businesses, schools, and government institutions in Wisconsin that generate varying quantities of hazardous wastes each year. Overall, the number of hazardous waste generators and the quantity of hazardous waste that they generate are declining each year as everyone learns how much it costs to generate wastes and manage hazardous wastes according to the strict requirements that apply. The number of largest generators has been decreasing significantly in recent years while the number of very small generators has been increasing slowly. While much of the solvent-type hazardous wastes that are generated in Wisconsin are recycled here, many other hazardous wastes are handled out of state.

Wisconsin has 701 Superfund sites in the EPA database with 37 locations proposed, on, or previously on the National Priority List due to the seriousness of the spill. Wisconsin also is home to approximately twenty-six licensed hazardous waste management facilities, which increased in number from the previous 2017 Plan.⁶¹ Many of these facilities are privately operated, serving the needs of that particular facility's hazardous wastes. The commercial hazardous waste facilities in Wisconsin primarily focus on recycling of hazardous waste solvents and mercury, fuel blending of hazardous wastes for energy recovery, storage of hazardous wastes prior to the treatment at licensed hazardous waste facilities in other states, and treatment of hazardous wastes to facilitate disposal.

The use of chemicals and hazardous materials is part of daily life. As could be expected, the largest site-specific toxic releases in Wisconsin are at heavy industrial facilities, power plants, military installations, and paper/pulp mills. However, non-point pollution of surface and ground waters from agricultural run-off, contaminants in stormwater, and improper disposal of household chemicals (e.g., bleach, used motor oil, paints) can also cause environmental harm.

State & Regional Trends – Hazardous Materials Spills on Transportation Facilities

Recent, detailed information on transportation-related Haz Mat spills was not readily available, but it is expected that past trends are continuing. From 1971 to 2016, Wisconsin has had a total of 10,958 reported hazardous materials transportation incidents. This total is comprised of 10,498 highway incidents (95.8%), 266 rail incidents (2.4%), 188 air incidents (1.7%), 2 other incidents (>0.1%), and 0 water incidents (0.0%). The total cost for all reported incidents is approximately \$57 million dollars.

⁶⁰ Wisconsin Department of Natural Resources. "Hazardous Substance Spills in Wisconsin", July 2014 and August 2016.

⁶¹ Wisconsin Department of Natural Resources, "Wisconsin Hazardous Waste Treatment/Storage/Disposal Facilities. Licensed for Year 2015". April 2, 2015.

These incidents included 175 involving a crash or derailment, 68 causing or contributing to personal injury, 59 causing or contributing to an evacuation, 38 closing a major transportation arterial or facility, and seven causing or contributing to a fatality.



Source: National Transportation Safety Board Report, CHI 96 FR 010, Derailment/Hazardous Material Release, Wisconsin Central, LTD, Weyauwega, Wisconsin, August 16, 1997.

Approximately half of the above reported costs (\$26.6 million) were from the 1996 Weyauwega Train Derailment. In March 1996, a train consisting of two locomotive units, 68 loaded freight cars and 13 empty freight cars derailed at Weyauwega, Wisconsin. The train included sixteen cars with hazardous materials—seven cars of liquid petroleum gas, seven cars of propane, and two cars of sodium hydroxide. A fire engulfed many of the cars themselves as well as an adjacent feed mill. About 3,155 residents were immediately evacuated, with approximately 2,300 residents evacuated for sixteen days due to the fire

and leaking chemicals. Two U.S. highways were also closed as well as several county highways. Additional issues arose when numerous residents illegally began to re-enter the evacuation area to retrieve pets left behind.

Sometimes, hazardous materials spills can be the result of natural hazard events. For instance, on June 7, 1980, a Chicago & Northwestern train derailed in Chippewa County due to a flash flood which washed out the tracks. Three cars of #6 fuel oil were torn open, and 86,000 gallons spilled. Containment dikes were built and most of the oil was recovered.

Polk County Superfund Sites

Wisconsin has 36 active National Priority List sites, 9 deleted/removed National Priority List sites, 1 proposed National Priority List site, and 10 other non-priority Superfund sites; none of these locations are within or immediately adjacent to Polk County. The closest site is the Penta Wood Products site in the Town of Daniels to the north in Burnett County.

While Polk County has no Superfund sites on the National Priority List, it does have three Superfund sites identified in the EPA's Superfund Enterprise Management System (SEMS). These sites are:

- Electrocraft Corp Site (Amery)
- Gale/Duvall Battery Waste Site (Town of New Haven)
- Kroy Inc (St. Croix Falls)

Information in the EPA database regarding the above three locations is very limited and the sites may be on the Superfund list more for testing/monitoring purposes rather than actual contamination.

Other Significant Polk County Events

Bureau for Remediation & Redevelopment Tracking System (BRRTS) Records

The Bureau for Remediation & Redevelopment Tracking System (BRRTS) keeps data on hazardous materials releases and the clean-up of contaminated sites and is maintained by the Wisconsin Department of Natural Resources. The BRRTS system categorizes these events by activity type. As shown in **Table 27**, there are 654 BRRTS records for Polk County from 1978 to 2023, of which 512 (78%) are closed and no further action or monitoring is currently planned.

Table 27. BRRTS Records for Polk County – 1978 thru 2023 report dates⁶²

Activity	1978-1999		2000-2023	
	Count	Percentage	Count	Percentage
Spills	132	35.6%	159	66.8%
Leaking Underground Storage Tanks	134	36.1%	31	13.0%
Environmental Repair (non-LUST)	36	9.7%	27	11.3%
No Action Required Discharge	47	12.7%	45	18.9%
Abandoned Container	5	1.3%	4	1.7%
Off Site	17	4.6%	17	7.1%
Totals	371	100.0%	238	100.0%
Average Reports per Year	16.8		9.9	

Since 1978, about 44% of all BRRTS reports were spills. **Spills** are locations where a clean-up is confirmed by laboratory analysis, generally within 60 to 90 days. The proportion of spills has increased to 66.8 percent of all reports since 2000, largely due to a significant decrease in the proportion of leaking underground storage tank reports in recent years.

There are many properties—often industries or fueling stations—that have multiple reports, typically related to accidental spills. Many of these reports were closed within days, indicating that they were minor spills requiring no significant clean-up or monitoring efforts. Two locations in the County have had 10 or more spill reports; one of which had eighteen spill reports from 1978-2023. While the average number of all reports per year has been decreasing, the number of spills reported has increased dramatically. This trend may be due, in part, to increased compliance with spill reporting requirements.

While most records are associated with spills, two other activity types are particularly important—leaking underground storage tanks (LUSTs) and environmental repair (ERPs) sites. A **LUST** site has soil and/or groundwater contaminated with petroleum, which includes toxic and cancer-causing substances. However, given time, petroleum contamination naturally breaks down in the environment (biodegradation). Some LUST sites may emit potentially explosive vapors. The previous data suggests that the majority of older LUST sites in the County have likely been addressed and this risk will continue to be a small or decreasing proportion of such records in the future.

⁶² Wisconsin Department of Natural Resources, WDNR BRRTS on the Web, <http://dnr.wi.gov/topic/Brownfields/wrrd.html>
The locations and dates of some records are unconfirmed.

ERP sites are sites other than LUSTs that have contaminated soil and/or groundwater. Examples include industrial spills (or dumping) that need long-term investigation, buried containers of hazardous substances, and closed landfills that have caused contamination. The ERP activities include petroleum contamination from above-ground (but not from underground) storage tanks. Unlike spills which are typically reported and cleaned up quickly, LUST and ERP sites many times are undiscovered or go unreported for long periods of time until significant contamination occurs. The number of ER reports in has remained relatively stable over the last several years. For reference, **Figure 46** later in this assessment shows the location of the open LUST and ERP sites in the County.

Other Recent Hazardous Materials Spills

Spills are defined as a discharge of a hazardous substance that may adversely impact, or threaten to impact, public health, welfare, or the environment. Spills are usually cleaned up quickly when reported, though many smaller spills likely go unreported. As discussed in the previous subsection, spills have been an increasing percentage of the hazardous materials incident activities in the County.

Hazard Probability – Hazardous Materials Spills

The Plan Steering Committee rated hazardous materials spills as having a low-to-some risk (frequency), but having a slightly higher or moderate vulnerability (impact) should an event occur (see Table 11). Transportation-related events were of slightly higher risk than spills at fixed sites.

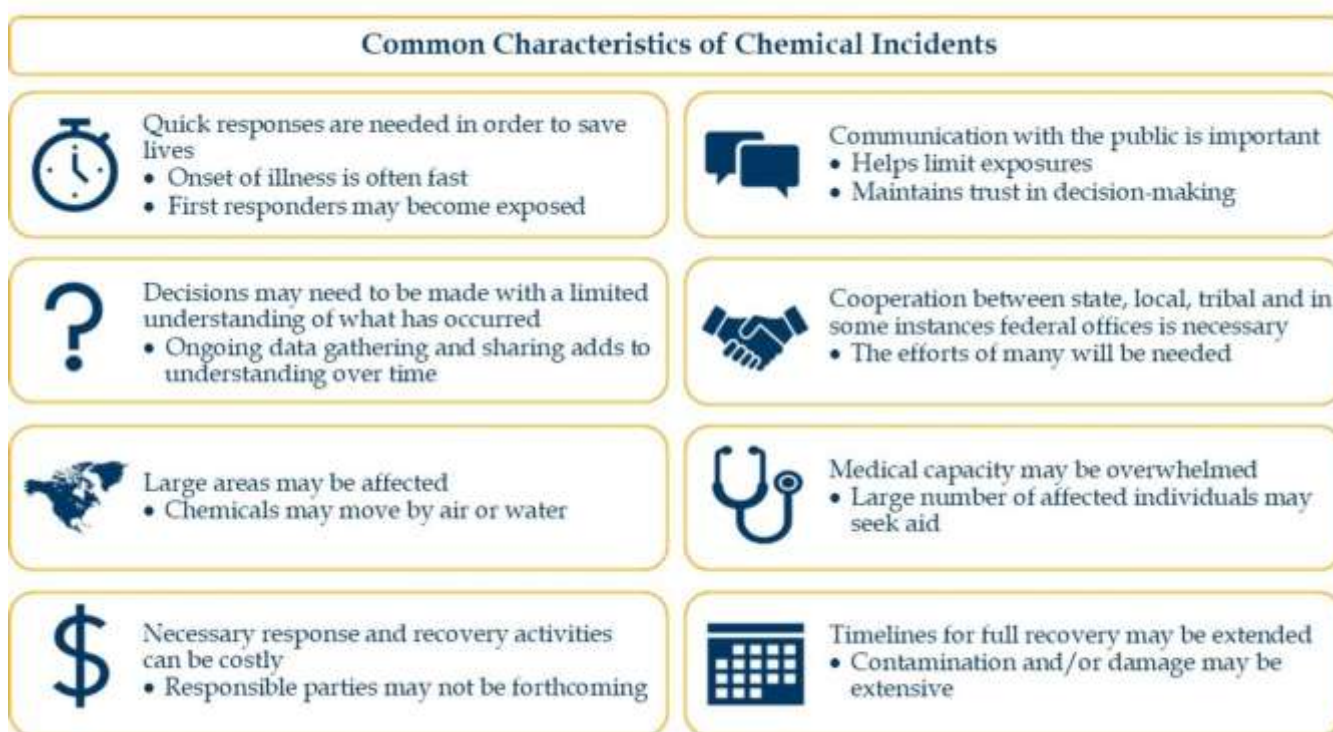
Approximately 8-12 hazardous materials spills or other releases will be reported in any given year in the County based on the BRRTS data since 2000. The largest proportion of these events will be spills, for which the majority are smaller incidents that are cleaned-up with a very short timeframe. Leaking underground storage tanks (LUSTs) are expected to continue to decrease in frequency.

Of greatest concern are the environmental repair projects for contaminated sites, such as illegal dumpsites, closed landfills, buried containers, overturned trucks/rail cars, illegal drug laboratories, or large industrial spills. Such sites have the greatest potential for environmental impact; environmental repair sites have the highest likelihood of requiring a long-term investigation and significant remediation measures. **Based on BRRTS data, new environmental repair sites will be reported for the County at an average of two per year, though not all will require significant remediation activities.**

The level of risk is also influenced by growth in Polk County. As more growth occurs, there is an increase in the potential number of contamination sources. And, as the number of industries increases, there is an increase in the general use of hazardous materials in the County for domestic, institutional, and commercial purposes. Traffic volumes are also rising, which increases the potential for accidents involving vehicles carrying hazardous materials. Further, as additional private wells are installed, more residents are potentially vulnerable to groundwater contamination. It can be expected that the frequency of hazardous materials incidences and spills in the County will slowly increase as the County's population continues to rise and development occurs.

Vulnerability Assessment – Hazardous Materials Spills

Hazardous substances and materials can have a wide variety of harmful impacts to people, property, and the environment. These substances can be in solid, liquid, gaseous, or semi-solid form, which can often be difficult to detect or contain if a release does occur. Impacts may be immediate, as in the case of fire, explosion, or physical harm to bystanders (e.g., fire, inhalation, chemical burns, radioactivity). And some impacts can be longer term, such as degraded water quality, illness among wildlife, corrosion, or increases in health problems (e.g., cancer, birth defects). The magnitude of the vulnerability zone and potential for fire or explosion also varies by substance type (e.g., gas vs. solid) and by environmental conditions (e.g., wind speeds, access to surface or groundwater, temperature). In extreme cases, contamination of buildings and soils can be at such levels as to make a property unusable or uninhabitable for lengthy periods. Evacuation of nearby residents may be needed. Recovery and clean-up costs can also vary widely depending on the type of hazardous material, amount released, and conditions at the site (e.g., soil type, temperature).



Appendix F includes the following regarding the potential impacts of hazardous materials spill events for Polk County as a whole:

- a description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- a description of the vulnerability of each community lifeline for this hazard
- the potential consequences or impacts to the above assets and community lifelines.

All Polk County communities are vulnerable to a Haz Mat spills event. During the planning process, the following assets were identified as having the greatest vulnerability:

- **Residents, businesses, and community lifelines, especially those located near highways, railroads, or facilities utilizing significant quantities of hazardous chemicals.** Incorporated cities and villages have the greatest vulnerabilities given the concentrations of people, businesses, lifelines, and hazardous materials facilities.
- **Wells & Drinking Water Sources.** Wells for potable drinking water are especially vulnerable to groundwater contamination, especially private ones which are typically tested less frequently than their public counterparts and do not have associated wellhead-protection programs. Contamination may be from point sources (a spill or release) or may be more indirect, such as the application of pesticides. These include the municipal systems, with some communities planning to construct new wells in the future to keep up with the pace of growth. As the population increases in the County, the number of new private well permits each year has also been significantly increasing.
- **Travelers, Shipping, and Transportation Systems.** While transportation infrastructure may not be physically impacted by a hazardous materials spill, the use of the infrastructure and nearby land uses can be impacted. A wide variety of chemicals move through and within Polk County via railroad and truck traffic. If a spill should occur, nearby residents, travelers, buildings, water supplies, and ecosystems can be impacted. And as response and clean-up proceeds, these transportation routes may need to be temporarily closed and nearby homes, businesses, and structures evacuated. Extended closures of rail and highway systems can impact local businesses and delay emergency response. Relative to many counties, Polk County has few miles of active rail lines, which are limited to the southwest portion of the County. As traffic volumes increase on U.S. Highway 8 other roadways in the County, the potential for accidental spills of hazardous materials increases. Extended closures of rail and highway systems can impact local businesses and delay emergency response.
- **Business and Services Using Hazardous Substances and their employees.** The County's EHS planning, Tier Two reporting, and Toxic Release Inventory (TRI) facilities have elevated vulnerabilities due to the use or storage of Haz Mat on-site.
- **Emergency responders.** Law enforcement personnel and emergency response providers are also vulnerable to the potential impacts of toxic releases as they respond to an incident or situation. In 1999, two responders in the region did receive respiratory injuries during a transportation-related hazardous materials incident.
- **Agricultural Chemicals -** With contract spraying and local cooperatives, fewer farms are storing large quantities of hazardous materials, but some stakeholders in the region have anecdotally suggested that this trend may be reversing.
- **Other Utilities and Services.** Three interstate natural gas pipelines cross Polk County; these transport substances that are hazardous but are also energy community lifelines. During the planning process, a number of communities identified natural gas lines, transfer stations, and propane tank farms as special hazardous materials risks. Continued planning with tank farm owners is advised to help mitigate risks. Many of these facilities have not been mapped for emergency planning purposes. The number of critical facilities located in proximity to these uses is not known, and some facilities may not have robust emergency plans in place to quickly respond to a hazardous materials release.

Key Areas of Concern

A hazardous materials spill or release can occur virtually anywhere in the County due to transportation accident, illegal dumping, improper handling, leaking storage tank, or other accident. To provide a sense of the number and distribution of potential brownfield and remediation sites in the County due to past hazardous materials dumping, storage tank leaks, or other such contamination requiring action, **Figure 46** identifies past and current sites in the County where contamination has occurred according to the BRRTS database. All of these sites have had some level of contamination to soil, groundwater, or both, to varying degrees, but often limited to the site itself.

Figure 46 also identifies the highways and railroad of Polk County. During the planning process, transportation-related spills were consistently identified as the greatest hazardous materials concern for the following primary reasons:

- Traffic accidents occur with many contributing factors that can be difficult to control or mitigate, including the uncertainty of what materials and quantities being transported.
- Major highways with heavy truck traffic and the rail line pass through residential areas and near schools, hospitals, and other critical facilities.
- Most fixed facilities using hazardous materials have security measures, plans, and procedures in place to monitor, mitigate, and response to spills. For many of these facilities, local emergency response personnel are familiar with the facilities and materials being used.

U.S. Highway 8 was most frequently identified as being of concern due to speeds and the volumes of truck traffic. There are both State and Federal commercial driver's licensing and other rules for the transport of hazardous materials on roadways as summarized at the Wisconsin DOT website.

Deep-Well Casing Areas & Landfills

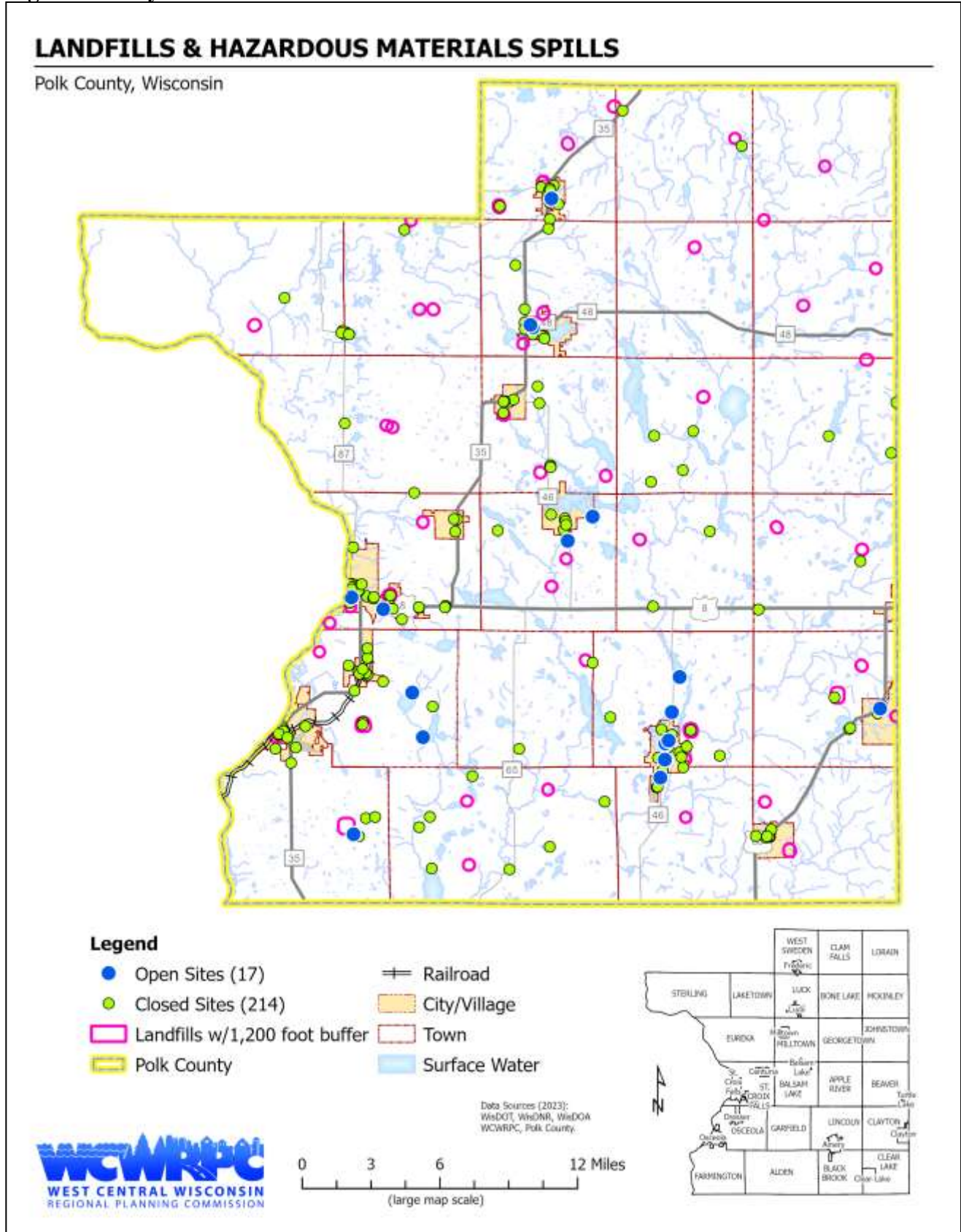
Polk County has no WDNR-designated deep-well casing areas for potable groundwater (wells) due to groundwater contamination. As shown in Figure 46, the County does have numerous landfills for which a special variance approval is needed prior to drilling a potable well within 1,200 feet.

Public Officials Have An ACTIVE ROLE in Pipeline Safety and Security

- Be aware of pipeline facility locations in your area.
- Report suspicious individuals or activities immediately.
- Be aware of signs of leakage (e.g., sight, smells, sounds)
- Watch for and report unauthorized digging along pipeline right-of-way.
- Address pipelines in your emergency response procedures; work with your pipeline company.
- Know that pipeline company employees and contractors carry photo ID and will show it to you upon request.

*source: Pipeline Association
for Public Awareness*

Figure 46. Key Areas of Hazardous Materials Concern



EHS and Tier Two Facilities

According to Polk County Emergency Management, as of September 2024, there were 61 Tier Two Reporting facilities and 11 active Extremely Hazardous Substances (EHS) Planning facilities located within Polk County. These facilities represent significant potential sources for a hazardous materials incident, with the EHS facilities being the greater concern. All of the EHS facilities and most Tier Two facilities are located within the cities and villages within the County. For reasons of security, maps showing the locations of these EHS and Tier Two facilities have not been included within this plan.

Tier II Reports
EPCRA's Hazardous Chemical Inventory

Due March 1

What's In?
You must submit if your facility used or stored:

- 500 lbs of an EHS or the TPO, whichever is less; or
- 10,000 lbs of any other hazardous chemical.

What's Out?
Exemptions include:

- Consumer products, as packaged for use by the public;
- Food, additives, drugs, or cosmetics regulated by the FDA;
- Substances in solid items, with no exposure under normal use;
- Substances used in research labs and medical facilities with proper supervision.

The Chemicals
EHS List: 40 CFR 355 Appendix A
Hazardous chemical: any substance that requires a facility to maintain an SDS
Some states list other chemicals or have lower thresholds

Report Submission
E-Submittal methods vary from state to state
Submit reports to the SERC, LEPC, and local fire department
Check with LEPC and fire dept. for specific reporting requirements

Common Errors
Mixtures: see EPA guidance
Lead-acid batteries: see EPA guidance
Waste products: check with state agency

Sources:
<http://www.BLR.com>
<http://www.epa.gov>

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Twitter, Facebook, LinkedIn, Pinterest

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Tier-Two facility reports are submitted annually, by law (SARA Title III), for any facility that is required to prepare or have available a Material Safety Data Sheet (MSDS) for a hazardous chemical present at the facility. Facilities store and/or use one of over 300 chemicals with extremely toxic properties identified within Title III of SARA. In addition to the MSDS reporting requirements, EHS facilities must cooperate with Polk County Emergency Management and the Local Emergency Planning Committee (LEPC) to develop an emergency response plan.

The MSDS must identify any hazardous chemical present at the facility at or above 10,000 pounds at any given time or for each extremely hazardous substance (EHS) at or above 500 pounds (or the threshold planning quantity, whichever is less) at any given time. There are a number of exemptions from these reporting requirements, including retail gas stations, hazardous wastes regulated under the Resource Conservation and Recovery Act, substances used in routine agricultural operations by the end-user, tobacco products, wood products, food products regulated by the Food & Drug Administration, and hospitals.

It is important to note that these facilities are not limited to industry, but include some public water and wastewater treatment facilities. These facilities have no known unique, inherent characteristics (e.g., location, type of construction) that make them any more vulnerable to the natural hazards covered

within this Plan when compared to other facilities, and thus were not individually analyzed. However, the hazardous nature of the chemicals and substances used or stored at these locations can pose unique vulnerabilities to local residents and the environment.

Toxic Release Inventory (TRI) Sites

Facilities in certain industries which manufacture, process, or use significant amounts of toxic chemicals are required to annually report on their releases of these chemicals. More specifically, facilities with ten or more employees that process more than 25,000 pounds in aggregate, or use greater than 10,000 pounds of any toxic chemical in a given year are required to report releases each year to the Toxic Release Inventory (TRI) database. Releases include any toxic chemicals spilled, discharged, injected or otherwise released into the air, land, water, or underground. **These releases are not accidental hazardous materials spills** but are an indicator of potential risk.

In 2022, Polk County had about 39,900 pounds of on-site releases or off-site disposal of toxic chemicals from four locations. The majority (87%) were disposed of or released off-site; nearly all onsite releases were to the land; only 1 lbs of nitric acid was estimated to have been released to the air. Two facilities—Foremost Farms USA and Wisconsin Whey Protein—accounted for nearly all of the releases. And as a positive, the amount of disposal and releases has been decreasing since 2019 with a larger percentage being treated.

It must be stressed that some type of inappropriate action should not and cannot be insinuated or implied when a facility appears in the TRI database. **In most, if not all, cases, the TRI reported releases are in compliance with applicable regulations and are consistent with the appropriate management plans. The far majority of releases in the TRI database are not accidental spills, but could be considered part of normal business practice under current regulations.** This information is provided to convey a greater sense of the risks of an accidental spill at a location using these substances or during transport. And, again, this only includes reports for facilities releasing 10,000 or more pounds.

Manure Storage and Animal Waste Management Facilities

As documented in Section II.C., Polk County is home to large numbers of livestock. Manure and other animal waste is a natural by-product of the County's agricultural economy. For example, on average, an adult dairy cow produces 20-21 tons of manure per year. Most farms that have livestock also have manure management or storage facilities. If not properly designed and maintained, such facilities can be a source of contaminated runoff to groundwater and surface waters, as discussed previously in the flooding assessment.

Manure and other animal waste is a potential source of nitrates, phosphorus, bacteria, and pathogens that can impact public health with exposure or due to the contamination of drinking water. If not properly managed, animal waste has the potential to contaminate wells, kill fish, and pollute lakes and rivers. Pathogens in manure can make water unsafe to drink or use for recreation. Nitrogen and phosphorus in manure runoff to surface waters can create toxic algae blooms that can block out sunlight, starve the water of oxygen, and destroy habitat. This risk is not limited to spills at fixed sites (barnyards, storage facilities) or transportation spills. For many areas, non-point sources (e.g., landspreading, pasture management, poor nutrient management) are of equal or greater concern.

To date, there have been no large manure spills or large fish kills as a result of nutrient run-off in Polk County. A study of 300 reported manure incidents in Wisconsin showed that forty percent of manure incidents from 2005 to 2009 occurred on the main farmstead, such as the storage pit overflowing or a line break. About thirty percent of manure spills occurred during transportation between the storage facility and application site. Another thirty percent occurred during or after land application, such as movement following a rain event. The study also stated that there is increasing awareness of risks from snowmelt- and precipitation-driven runoff, which appears to have decreased manure applications on frozen soil. Forty-three percent of the incidents had a surface water impact, though manure released to road ditches was included in this category. Four percent of the incidents in this study resulted in a fish kill.

**Check Wisconsin's Online
Runoff Risk Advisory Forecast**

www.manureadvisorysystem.wi.gov



**If it's RED
Don't SPREAD**

Working together to keep manure out of lakes and streams



To discourage spreading in high-risk areas, the Wisconsin DNR provides maps online to landowners showing nutrient management restrictions, winter spreading risk areas, and “safe” manure stacking areas. WDNR also manages the web-based Runoff Risk Advisory Forecast that identifies the daily runoff risk by subwatershed. The Wisconsin Department of Natural Resource (WDNR) has regulatory authority related to nutrient management and water quality and operates a Spill Hotline that dispatches the local Conservation Warden should an event occur. The larger concentrated animal feeding operations are required to have a nutrient management plan and obtain State wastewater discharge permits from Wisconsin DNR prior to operation. The National Resource Conservation Service, Wisconsin Department of Agriculture, Trade, & Consumer Protection (WI DATCP), and UW-Extension provide additional education and support programs regarding nutrient and animal waste management.

Locally, issues related to animal waste and nutrient management are primarily monitored and addressed by WDNR and the Polk County Land and Water Resources with partnership support of the Polk County Extension Agricultural Agent. The Soil and Water Resources Department enforces the *Polk County Manure Storage Ordinance*, provides related educational services, and manages a program to properly abandon facilities that are no longer being used. County staff have also attended manure spill training seminars.

It must be noted that there is ongoing political and legal debate whether manure should be classified as a hazardous material or hazardous waste. As part of a 2015 Wisconsin Supreme Court Case (*Wilson Mutual Insurance Co. v. Falk*), the Court found that “just because manure may be beneficial when

spread on a field, does not mean it is not a pollutant.” This report does not attempt to make such legal and regulatory distinctions.

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)

During the 2024 Plan update, PFAs were identified by Public Health and some local officials as a growing concern. This subsection recognizes these growing concerns, though information regarding PFA contamination is evolving, and the threat comes from many sources, not just Haz Mat spills.

PFAs are a large group of over 6,000 human-made chemicals that have been used in industry and consumer products worldwide since the 1950s. PFAs were widely used, long lasting chemicals. Since their components break down very slowly over time that have been nicknamed “forever chemicals”.

Most PFAS use was discontinued in the early 2000’s, but they continue to impact the environment. PFAS were used in a wide variety of products from non-stick cookware to stain resistant coatings for carpets and furniture. Because they do not decay very quickly, PFAS are able to infiltrate groundwater and water supplies through runoff and absorption. The true effects of PFAS on the environment and on people are not fully known. It has been determined that PFAS, through water infiltration, are being ingested by animals and people where they then collect in the body overtime.

PFAs continue to be studied and related regulations also continue to change. WDNR has created an interactive data viewer to identify testing areas, contamination sites and fish and game consumption advisories. As of Summer 2024, PFAs have not been detected above the WI DHS hazard index in any municipal water system in Polk County, though they have been detected in the municipal water systems of Dresser, St. Croix Falls, Centuria, Milltown, Balsam Lake and Luck. Limited background monitoring of some surface waters have also been positive for PFAs, but there are no PFAs clean-up sites existing or proposed in Polk County.

Potential Groundwater Impacts

Nearly all Polk County residents rely on local groundwater for their source of portable water. Businesses, including agriculture and industry, also rely on groundwater. One of the potential environmental impacts of a hazardous materials release or spill is groundwater contamination. Groundwater collects or flows beneath the Earth's surface, filling the porous spaces in soil, sediment, and rocks, and is the source of water for aquifers, springs, and wells. The degradation or pollution of groundwater quality due to some substance or toxin introduced or spilled onto the soil and making its way to the groundwater can pose health risks for those using the groundwater for drinking and domestic use.

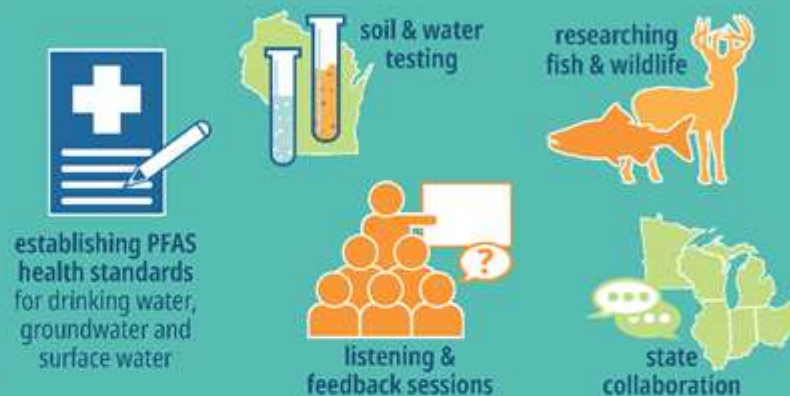
All groundwater is susceptible to contamination. Soils, geology, and depth to water table are characteristics of the natural environment that influence a location’s relative susceptibility to groundwater contamination. **Figure 47** is a generalized picture of how groundwater contamination susceptibility varies in the County. While such information may guide general planning and policy, site-specific variation exists and such information should not be used for making site-specific decisions

What are PFAS?

PFAS are a group of human-made chemicals used for decades in numerous products.



What is Wisconsin Doing About It?



Additional efforts include a **PFAS Action Committee (WisPAC)** and a **PFAS Technical Advisory Group**.

Why Should I Care?

PFAS persist in the environment and the human body for long periods of time. Recent findings indicate that exposure to certain PFAS may have harmful health effects in people.



certain types of cancers



thyroid & heart issues



infertility & low birth weight



developmental delays

What You Can Do...



Test Your Water
dnr.wi.gov/u?q=177



Check State Fish Advisories
dnr.wi.gov/u?q=176



Learn More About PFAS Health Risks
dnr.wi.gov/u?q=175



Visit dnr.wi.gov, search **PFAS**.



RR-114b-E

Projected Loss Estimates

Due to the lack of comprehensive, up-to-date data and related studies, future loss estimates for hazardous materials spills in Polk County are not included. However, basing future losses on historic spill data underestimates the true vulnerability. A very large Haz Mat release is possible in Polk County and would greatly exceed any projected loss estimates based on historic data should there be significant injuries, long-term evacuation/quarantine, and/or environmental damage.

Other Factors Influencing Future Losses

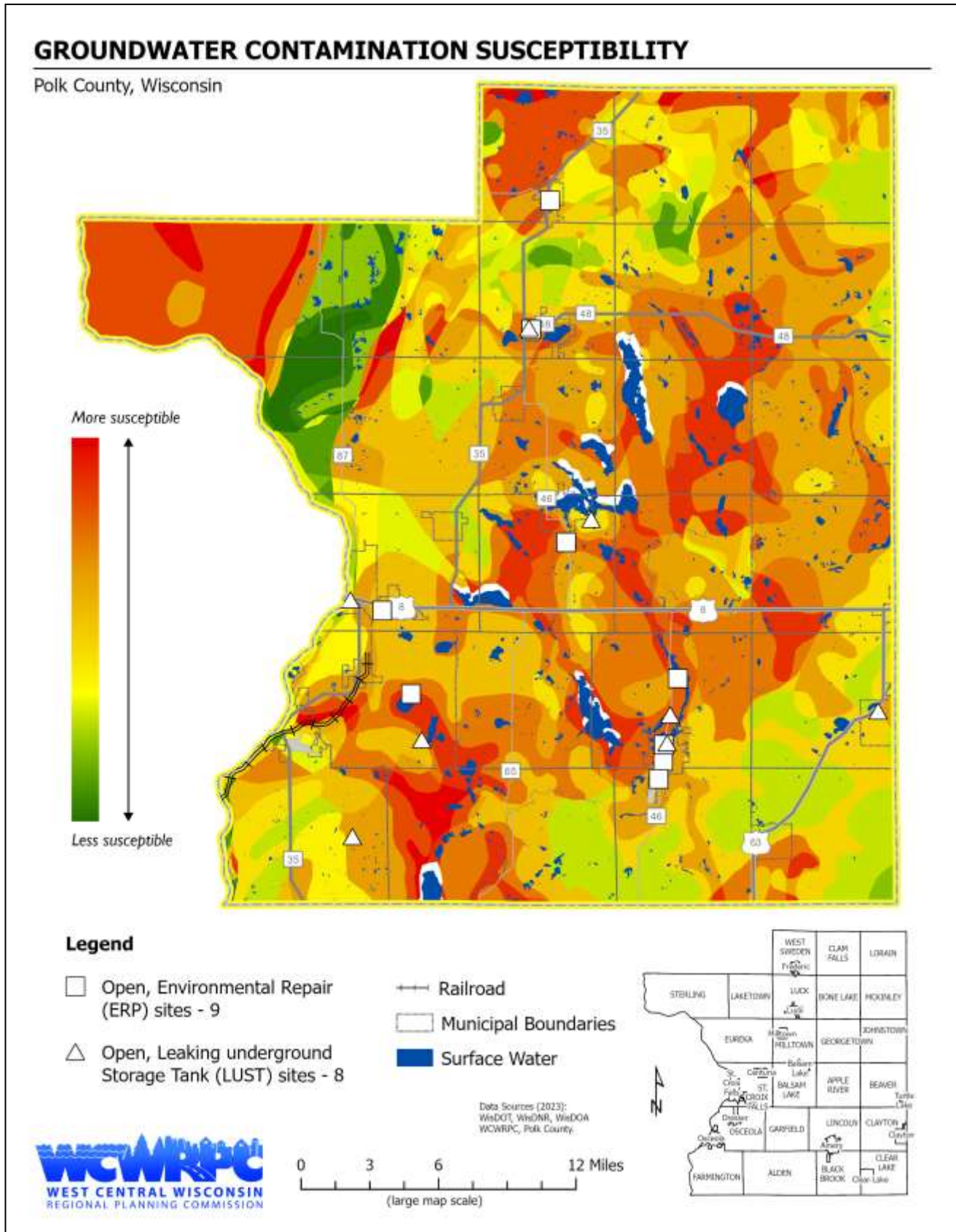
Polk County is growing. As growth occurs, there is an increase in the potential number of contamination sources. And, as the number of industries increases, there is an increase in the general use of hazardous materials in the County for domestic, institutional, and commercial purposes. Traffic volumes are also rising, which increases the potential for accidents involving vehicles carrying hazardous materials. Further, as additional private wells are installed, more residents are potentially vulnerable to groundwater contamination.

Mitigation, preparedness, and response can decrease future losses. Strategies include maintaining or upgrading Haz Mat storage equipment and related security as well as maintaining and implementing facility, emergency response, and other Haz Mat plans, with related training and exercises. All fire departments have had some training at the operations level for hazardous materials response. Polk County does not have a county-level (Type 4) Hazardous Materials Response Team, though it is believed that all fire departments have been trained to the operations level.



photo provided by Polk County Emergency Management

Figure 47. Groundwater Contamination Susceptibility



As needed, the West Central Wisconsin Regional Response Team, based in the Chippewa Falls and the Eau Claire fire departments, can be contacted for additional reconnaissance and research support. This Type I team can also be requested to respond 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 requiring vapor-tight Level A gear with self-contained breathing apparatus. Additional support from the Menomonie Fire Department Type III team may also be available. For larger events, a State-level response team is available with support from a variety of agencies including Wisconsin DNR, Wisconsin Emergency Management, and even Federal support.

Rail lines, utilities, and larger industries often have their own, internal Haz Mat response teams trained and equipped to various levels.



WC WI Regional Response Team Practice Drill

Risks for Individual Plan Participants – Hazardous Materials Spills

All individual plan participants in Polk County (i.e., villages, cities, educational institutions, electric cooperatives) are equally at risk of experiencing the vulnerabilities of hazardous materials spills. The potential impacts, in general, are shared, though vulnerability increases in those communities with larger numbers of EHS and Tier 2 facilities. Most communities were more concerned with the potential spills on highways than from fixed facilities, given that plans are in place and more information available for facilities. It is notable that Turtle Lake Fire District was an exception to this trend and rated fixed sites as a moderate concern, with ag-related and highway/truck spills being a slightly lower concern.

Appendix K provides the sub-plans for each city and village and **Appendix L** provides sub-plans for participating educational institutions. These sub-plans identify Haz Mat spill risks and vulnerabilities specific or unique to these individual participants and are supplemental to the previously described event history, probability, and vulnerability assessment for Polk County.

Polk-Burnett Electric Cooperative has established an internal IT team addressing issues of cybersecurity and staff participate in phishing tests.

SECTION IV. CAPABILITY ASSESSMENT

FEMA Resiliency Rating for Polk County

Overall, FEMA’s National Risk Index (NRI) rates Polk County’s community reliance as having a relatively high ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions when compared to the rest of the United States. However, when compared to the rest of Wisconsin, the County’s community resilience is somewhat lower (i.e., 63.05 national percentile vs. 27.80 state percentile). This community resilience assessment is based on 49 social, economic, environmental, governance, and housing/infrastructure variables.

Overview of Mitigation Actions in Polk County

FEMA’s planning guidance requires that mitigation plans document each jurisdiction’s existing authorities, policies, programs, and resources and its ability (or lack of ability) to expand on and improve these existing policies and programs as they relate to the local hazard mitigation. To address this requirement, this section is arranged as a “checklist” of potential mitigation and preparedness activities indicating whether each activity is being carried out in Polk County; additional notes are provided for each activity, including any opportunities to expand upon or improve local actions.

The focus of this section is on existing policies and programs related to natural hazards, partnerships, and all hazard mitigation and preparedness activities. This capabilities assessment is not comprehensive and evaluates Polk County as a whole. Each participating city, village, and educational institution completed an individualized capabilities assessment as part of their respective sub-plans that are provided in **Appendices K & L**. The results demonstrate a strong tradition of communication and inter-agency cooperation.

Community Planning & Regulatory Activities				
Mitigation Action	Yes	Some	No	Notes & Opportunities
1. Mitigation planning has previously occurred in the County.	x			<ul style="list-style-type: none"> County has previously adopted FEMA-approved mitigation plans 2005, 2012 and 2017. County anticipates updating the mitigation plan by 2029.
2. County and communities have incorporated mitigation strategies into their comprehensive plans.		x		<ul style="list-style-type: none"> Varies by community, primarily limited to floodplain & stormwater management and emergency services. County Comp Plan last updated in 2009. County included assessment and strategies for community lifelines and flood/stormwater management, and emergency services; opportunity to improve with next update.
3. Construction standards mitigate natural and other hazard risks.		x		<ul style="list-style-type: none"> Cities, villages, and towns enforce State Uniform Dwelling & Commercial Building Codes. While these codes include standards appropriate for Wisconsin climate (e.g., design wind & snow loads), State rules limit ability to include some additional mitigation-related standards.

Mitigation Action	Yes	Some	No	Notes & Opportunities
4. Local zoning and subdivision controls mitigate natural and other hazard risks beyond floodplain zoning. (e.g., Are emergency plans or safe rooms required? Long cul-de-sacs avoided? Police or fire consulted during site plan review?)		x		<ul style="list-style-type: none"> County Code of Ordinances covers all unincorporated towns and governs development via land divisions, sanitary sewer systems, livestock siting, and some road standards. Some towns also have their own subdivision ordinances. The majority of towns participate in County general zoning, with three towns having their own zoning and 4 towns are unzoned. Emergency planning/mitigation can be addressed as part of conditional use permitting to extent allowed by law. No safe rooms or emergency plans required for manufactured home parks or campgrounds and most campgrounds/resorts likely lack such plans. A formal process for consultation of police/fire during plan review is not established in most cases.
5. Land information and GIS data is available to accurately delineate hazard risks.		x		<ul style="list-style-type: none"> County GIS and land information coordinated through County Land Information Department. Growing data set. Countywide GIS data for individual structures (e.g., # stories, value/structure, BFEs) not available for detailed hazard assessment. Improving LIDAR and technologies offer opportunities to improve in the future. Web-based mitigation story map being explored by WCWRPC.
6. A Comprehensive Land Use Plan has been adopted to maintain healthy County Forest Lands and mitigate wildfire risks.	x			<ul style="list-style-type: none"> Administered and maintained by the County Land & Water Resources Department.
7. Driveway regulations or other actions are used to encourage adequate design and maintenance for access by emergency vehicles.		x		<ul style="list-style-type: none"> Primarily enforced by city, village, or town; most have basic standards. County has basic standards for private roads/driveways if under county zoning and for subdivision or access to County highways. Some concerns expressed with emergency vehicle access on some driveways due to width, height/tree canopy clearance, condition, or grades, especially in hilly, waterfront, and/or wooded areas. Long, dead end roads and cul-de-sacs can also pose access/egress challenges.
8. Address signage standards have been adopted for consistency of placement, replacement with flag-style signs in towns, and standards for multiple homes on dead-end roads/drives.		x		<ul style="list-style-type: none"> Polk County manages a uniform address signage system and Enhanced 9-1-1 in place. No building permits are issued without first securing a site identification number. Flag-style signs are being phased-in, but not standard countywide. Since driveways are often regulated at the town level, there are no countywide policies for multiple structures on private roads and long, dead-end driveways.
10. Community wildlife protection planning or related wildfire mitigation projects have occurred.		x		<ul style="list-style-type: none"> No intensive wildfire mitigation projects or planning, other than ongoing management of public/County forest lands and limited public education by Fire Depts or WDNR.
Other community planning and regulatory activities or notes:				
<ul style="list-style-type: none"> Building codes are enforced at the city/village/town levels in Polk County. BCEGS participation varies and many local officials were unaware of this program. As part of the 2024 Plan update, more attention on building codes and BCEGS was given, which increased awareness. However, the State of Wisconsin establishes the framework for building codes and limits some mitigation-related opportunities, since Wisconsin has not adopted the most current international code standards, which restricts local municipalities from achieving the highest BCEGS scores. A large variety of Federal, State, and local rules and policies are in place regarding hazardous materials planning, use, and reporting. Additional rules, policies, and plans are in place regarding surface and groundwater quality, manure management, etc.. 				

Flood Mitigation Activities				
Mitigation Action	Yes	Some	No	Notes & Opportunities
1. Floodplain ordinances have been adopted and communities are NFIP participants in good standing.		x		<ul style="list-style-type: none"> • Ordinances consistent with State model have been adopted by County and most communities. County floodplain ordinance applies to all unincorporated towns. • See flood assessment in Section III.D.iv. for County-level status. • Clear Lake is NFIP sanctioned; all other cities and villages participating in good standing; see sub-plans in Appendix K for city and village statuses and any related actions. • Countywide floodplain map review/update is underway.
2. Development is strongly discouraged in 100-year floodplains and dam shadows.	x			<ul style="list-style-type: none"> • County floodplain ordinance enforced based on State model and includes dam shadows for dams where hydraulic shadows have been determined. • All County permit applications reviewed to determine whether proposed building sites are reasonably safe from flooding.
3. Stormwater management planning and regulation occurs.	x			<ul style="list-style-type: none"> • State rules pertaining to stormwater management and construction site erosion controls are in place. • Various stormwater plans and regulations exist at County and local city/village/town levels. See Appendix K for city and village discussion.
4. Stormwater system improvements have been completed.	x			<ul style="list-style-type: none"> • In response to past flooding events, significant improvements made by County and local communities, especially to culverts and drainage systems along county highways and local roads. Some of the flooding “hotspots” identified in previous mitigation plans have been addressed as discussed in the flooding assessment of Section III.D.iv. • See Appendix K for city and village discussion.
5. Flood acquisition, floodproofing, and/or flood elevation projects have been implemented.		x		<ul style="list-style-type: none"> • Many local parks are located in floodplain areas. • FEMA grant dollars were obtained in 2002 for acquisition projects in Osceola and St. Croix Falls.
6. Dams offer flood control, dam shadows are mapped, and dams are in good repair.		x		<ul style="list-style-type: none"> • While existing dams offer some flood control, some larger dams are managed primarily for power generation or recreation/wildlife habitat. • Additional mapping of dam shadows recommended for possible use with CodeRed. • See Flood assessment in Section III.D.iv. for discussion of dam conditions as well as city/village sub-plans.
7. Flood monitoring systems are used.		x		<ul style="list-style-type: none"> • No County dedicated or formal flood monitoring system in place. • NOAA monitor at St. Croix Falls Dam and upstream of County at Grantsburg.
8. Flood emergency planning has occurred.	x			<ul style="list-style-type: none"> • Emergency action plans for high hazard dams on file at the County Emergency Management and Emergency Communications Center. • Emergency plans for County dams reviewed regularly and updated as needed. Inundation/dam failure areas identified for dams with emergency action plans. • Opportunity to “link” these high hazard areas and contact information to the CodeRed system.

Mitigation Action	Yes	Some	No	Notes & Opportunities
9. Public education regarding flood risks and insurance has occurred.		X		<ul style="list-style-type: none"> Largely limited to plan review and permitting processes for new development. Additional public education on NFIP insurance coverage (and what is not covered) could be valuable.
10. Communities participate in the NFIP Community Rating System.			X	<ul style="list-style-type: none"> Due to relatively low number of floodplain structures, costs outweigh benefits for most communities.
11. Other special flood prevention or mitigation activities occur.			X	<ul style="list-style-type: none"> St. Croix River is a National Scenic Riverway, which does provided additional scenic easements and shoreland setbacks, which has limited floodplain development. See city/village subplans.
Other flood mitigation activities or notes:				
<ul style="list-style-type: none"> See sub-plans in Appendix K for the city and village mitigation activities related to flooding. See flood risk and vulnerability assessment in Section III.D.iv. for a broader discussion on flood and dam vulnerabilities. County Zoning Administrator serves NFIP Coordinator for Polk County. The Polk County Land & Water Resource Management Plan includes discussion and recommendations on the importance of soil health, erosion control, stormwater management, and other best land use management practices that can protect water quality and mitigate the impacts of severe weather and climate trends, including flooding. Increasing awareness among the agricultural community that more resiliency is needed due to increasing heavy rain events and drought. 				

Other Physical Mitigation Activities				
Mitigation Action	Yes	Some	No	Notes & Opportunities
1. Community safe rooms have been designated or constructed.		X		<ul style="list-style-type: none"> Some, but growing interest and demand since 2017 Plan. Since 2017 Plan, the Village of Luck has obtained FEMA mitigation grant funding for a safe room as part of a new school gym. See city, village, and educational institution sub-plans.
2. Power lines have been buried in some areas prone to outages.	X			<ul style="list-style-type: none"> Electric providers have buried some lines in wooded areas, but have not used FEMA mitigation grant funding in Polk County to date. Some municipal electric utilities have also buried power lines; see sub-plans.
3. Regular tree trimming near power lines occurs.	X			<ul style="list-style-type: none"> Xcel Energy, municipal utilities, and electric cooperatives do a good job of tree trimming near power lines.
4. Snow fencing, berming, crop rows, or other efforts are used for drifting in prone areas.		X		<ul style="list-style-type: none"> Some snow fencing and “berming” of snow used by County Highway Department. Low farmer participation in the WDOT program to leave rows of standing corn along drift-prone highways; State has not been very responsive on payments.
5. Special traffic calming, traffic controls, and/or notifications system have been installed on highways.			X	<ul style="list-style-type: none"> Need for special signage on USH 8 at St. Croix Falls hill continues to be mentioned during mitigation plan updates.
6. Emergency power generators have been obtained for critical facilities.		X		<ul style="list-style-type: none"> Significantly improved since 2017 Plan, but substantial needs still exist. See sub-plans and Section III.D.viii. for details. No formal inventory of generator needs for key community lifeline facilities.

Mitigation Action	Yes	Some	No	Notes & Opportunities
7. Emergency fuel agreements have been executed for critical facilities.		x		<ul style="list-style-type: none"> Very limited and no formal inventory. Uncertain or doubtful that emergency fuel plans in place for many facilities with generators.
8. Convenient access to water supplies is available for fire protection.	x			<ul style="list-style-type: none"> No significant concerns identified. See sub-plans for city and village discussion. Some additional dry hydrants needed; see Wildfire section.
9. Warming or cooling shelters have been designated.		x		<ul style="list-style-type: none"> No official list of warming/cooling shelters exists. County maintains a list of shelters, but they are not necessarily warming/cooling shelters. Some facilities that have been designated as shelters in the County have limited hours and no generator. Justice Center lobby and libraries (if open) available. Increased interest in cooling/warming shelters since 2017.
Other physical mitigation projects or notes:				
<ul style="list-style-type: none"> County and many municipalities maintain capital improvement or road improvement plans that can incorporate mitigation projects and emergency equipment/facilities. Streets, utility, culvert, and stormwater management projects are common. See sub-plans in Appendix K for a summary of city and village mitigation activities related to the above. 				

Emergency Operations Planning & Training				
Mitigation Action	Yes	Some	No	Notes & Opportunities
1. The County has an Emergency Operations Plan (EOP) with annexes for various hazard events. There is strong coordination between the County's EOP and Public Health Emergency Preparedness Plan (PHEPP).	x			<ul style="list-style-type: none"> PHEPP should maintain a flexible, all hazards approach. County EOP is reviewed and updated annually. Includes key roles and responsibilities. Continuing collaboration between EOP and PHEPP. PHEPP updated in 2023 includes a communicable disease section and is discussed at length in Section III.B.i. County Emergency Management has developed a 3-year Integrated Preparedness Plan (IPP) that incorporates components of the Mitigation Plan.
2. The cities, villages, and towns have updated EOPs or emergency policies.		x		<ul style="list-style-type: none"> Varies, but improved since previous mitigation plans. Most cities and villages have plans, but some require updating; many towns lack current EOPs. See subplans for city and village discussion.
3. The County and municipal EOPs are regularly exercised.		x		<ul style="list-style-type: none"> Regular training is organized by County Emergency Management, but not all municipalities regularly test their emergency plans; many have some type of drills. See subplans for city and village discussion.
4. The County EOC has been activated or exercised in the last 5 years.	x			<ul style="list-style-type: none"> EOC has been tested as part of regular exercises and partially activated during recent storm events.
5. Individuals identified in EOPs, including elected officials, have a minimal level of ICS training suggested for their roles.		x		<ul style="list-style-type: none"> Varies. Most emergency personnel and responders and many public works staff meet minimum standard Minimum NIMS/ICS standards for non-emergency services encouraged in County and many city/village EOPs. Additional training required or suggested depending on role. Federal minimum standard is ICS 100, 200, 700, & 800 for all response and support personnel. During 2024 Plan update, city and village staff and officials were made aware

Mitigation Action	Yes	Some	No	Notes & Opportunities
				<p>of that some of these training opportunities are available online at FEMA website.</p> <ul style="list-style-type: none"> • More training for elected officials suggested by some interviewed and integrated into city/village subplans.
6. Other stakeholder groups participate in exercises.		X		<ul style="list-style-type: none"> • Continued participation by other partners (e.g., County Departments, ARES/RACES, hospitals, nonprofits, utilities) so they understand their potential roles during a disaster. • Industrial facilities and hospitals doing a good job of on-site HazMat exercises and related monitoring. • Related preparedness recommendations in Section VI.D.
7. The County and some municipalities have developed continuity of government plans.		X		<ul style="list-style-type: none"> • County has created a Continuity of Government (COG) plan, and is being updated; considering more resiliency strategies as part of an update. Public Health recommends testing the plan once updated (e.g., badging, operations, IT, essential functions). • Most municipalities do not have a COOP/COG plan, but most have off-site data back-up, and some have other continuity components. • Disaster Ready Chippewa Valley has a basic continuity planning template that could be utilized.
8. Sheltering, evacuation, and access control planning has occurred.	X			<ul style="list-style-type: none"> • List of shelters at County website. • Communities often suggested that no heating/cooling shelters are available or they had no knowledge of. • Evacuation included generally within the County Emergency Operations Plan. • State of Wisconsin (WEM) has been piloting a private-sector credentialing program for evacuation/access. • Evacuation planning required for facilities receiving Medicare/Medicaid. • More discussion/exercises may be needed discussion how to evacuate and shelter seniors and others during a large event (e.g., power outage, wildfire, tornado, haz mat spill), especially from multi-story buildings during power outages if no generator available. How will seniors, residents, and visitors get to shelters? What if livestock need to be evacuated?
9. Debris management sites have been designated.		X		<ul style="list-style-type: none"> • Largely limited to woody debris. Uncertain otherwise. • Municipalities encouraged to begin thinking about as part of 2024 Planning; see subplans for status. Sites may be available for vegetation but have not been assessed for other debris. WDNR may be able to provide guidance.
10. Emergency planning and periodic exercises are required for large festivals, fairs, and gatherings.		X		<ul style="list-style-type: none"> • No unique actions noted. • Other than County Fair, County has few large gatherings or festivals compared to some other counties in the region.
11. Planning for pandemics has occurred.	X			<ul style="list-style-type: none"> • Part of the Public Health Emergency Preparedness Plan. See Section III.B.i. for discussion.
12. Highway and public works department have adopted billing rates for equipment.	X			<ul style="list-style-type: none"> • County Highway Department and some municipalities have adopted rates or State DOT rates. Discussed with cities and villages as part of the 2024 Plan update.

13. Policies and training has been completed for volunteer management.	x			<ul style="list-style-type: none"> • Basic policies and protocols are part of County Emergency Operations Plan and Public Health Emergency Preparedness Plan. • IS-244a EMI course available for additional training. • WDNR's Incident Management Team can also be utilized if needed.
<p>Other emergency operations planning and training activities and notes:</p> <ul style="list-style-type: none"> • See Appendix K for a discussion of city and village emergency planning and training. Generally, there was increased interest in related training for elected officials. • Emergency management and hazard mitigation planning is often a low priority for smaller communities, with the exception of maintaining basic fire, police, fire responder, and ambulance services. Local emergency response plans can quickly fall out of date due to turnover of local government officials and these plans (and associated maps, resident information, etc.) may not be readily available to local officials should a disaster occur. It is also fairly common that hazard mitigation and emergency response issues are not integrated into other local planning and regulatory efforts. The regular update of mitigation plans offers a dedicated opportunity to reassess such capabilities and policies. • Similarly, the turnover in elected officials and staff necessitates continued, periodic outreach to local officials on resources, public safety agencies, mitigation issues, and recent events. During the 2024 Plan update, it was noted that many local officials and key staff were participating in mitigation planning for the first time and others were retiring soon. 				

Emergency Notification & Communication Systems				
Mitigation Action	Yes	Some	No	Notes & Opportunities
1. Emergency communications in the County is centralized.	x			<ul style="list-style-type: none"> • Polk County 911 Emergency Communications is countywide dispatch for emergency services and has an enhanced 9-1-1 system.
2. Gaps or weaknesses in emergency communications and equipment have been addressed.	x			<ul style="list-style-type: none"> • Completed implementation of 2006 study to be full P-25 compliant. Much improved compared to when narrowbanding was originally implemented, though some gaps in mobile service exist, especially for hilly and rural areas or in basements of block buildings.
3. Outdoor storm sirens are used for notification of severe weather warnings. Any coverage, power, procedural, or educational concerns?	x			<ul style="list-style-type: none"> • Warning sirens are activated by individual communities; some communities interested in County taking this role but no clear consensus. • Some interest in additional coverage in populated areas of unincorporated towns, such as near lakes. • See city and village subplans for siren and notification discussion. Some sirens are aging and/or lack battery back-up/emergency power. • Ongoing education is important. Some of public do not understand warning sirens or expect that the sirens will be heard indoors. This may be particularly true for the immigrant (ESL) population and high tourist population.
4. NOAA All Hazard Radios or other notification equipment have been distributed.			x	<ul style="list-style-type: none"> • No formal efforts. Due to mobile technologies, decreasing interest in NOAA radio distribution project, but could still have some value for specific populations (e.g., seniors, mobile home residents, campers). A gap in NOAA radio service exists in southeastern portions of the County. • One of the most discussed strategies during the 2024 Plan update was encouraging CodeRED sign-up as an alternative to weather radios.
5. A reverse-911 or similar GIS-based notification system exists.	x			<ul style="list-style-type: none"> • Polk County has a CodeRED mass notification system with GIS-based capabilities.

Mitigation Action	Yes	Some	No	Notes & Opportunities
6. County has Integrated Public Alert & Warning System (IPAWS) authority and capability.	x			<ul style="list-style-type: none"> Polk County has obtained IPAWS authority for emergency alerts, reducing the need for the public to participate in auto-dialer mass notification systems.
7. Social media and the Internet is used for emergency notification and preparedness education.	x			<ul style="list-style-type: none"> Helpful preparedness information and web links are available at the County Emergency Management and Public Health webpages. Sheriff's Department Facebook page used to share emergency notification and preparedness information.
8. An active ARES/RACES group exists in the County.		x		<ul style="list-style-type: none"> Polk County has an ARES/RACES group, though participation is low. The Town of Osceola suggested that the locations of ham radio operators be shared.
9. The County has an active Skywarn Storm Spotters program.	x			<ul style="list-style-type: none"> Skywarn classes organized by National Weather Service and Polk County Emergency Management.
10. Railroad bridges, crossings, and/or sign posts have been mapped.			x	<ul style="list-style-type: none"> Not completed.

Other Educational, Outreach, & Preparedness Activities				
Mitigation Action	Yes	Some	No	Notes & Opportunities
1. Public education occurs are part of severe weather awareness week and during other seasons.	x			<ul style="list-style-type: none"> Largest outreach via local newspapers during Tornado & Severe Weather Awareness Week in April. Additional press releases during times of elevated risk.
2. Outreach to seniors and special needs populations occurs.		x		<ul style="list-style-type: none"> 2,500-3,000 ADRC newsletters published monthly with preparedness information; provides educational opportunity. When clients join ADRC programs, emergency contact information must be provided that can be valuable during a disaster event. ADRC's 3 senior dining locations and home-delivered meals are an excellent mechanism for outreach and communications as well as combatting social isolation.
3. Outreach and education to area businesses occurs.		x		<ul style="list-style-type: none"> Involve some industry and critical facilities in exercises, depending on the scenario.
4. Outreach to the agricultural community occurs.	x			<ul style="list-style-type: none"> Local UW-Extension staff, Farm Services Agency, NRCS, and County Land Conservation work with area farmers to educate on the mitigation of various hazard threats (e.g. winter kill, drought, manure/chemical storage). Cost sharing available for spill containment and conservation projects. See notes at the end of this subsection for Farm Service Agency risk management assistance programs.
5. Staff from FSA, NRCS, County Land Conservation, and Extension meet periodically to discuss mitigation opportunities, education needs, and damage assessment procedures.		x		<ul style="list-style-type: none"> Strong partnerships, but no formal meetings occur unless needed.
6. Soil health and shoreland best practices are promoted in the County to help mitigate flooding impacts.	x			<ul style="list-style-type: none"> Increasing emphasis on such techniques and best practices by County and State staff. Requiring certain changes in agricultural practices are limited by the availability of cost-sharing funds.

7. Local educational efforts related to forest management and wildfire have occurred.		x	<ul style="list-style-type: none"> Public education primarily limited to burning permits and fire danger signs, with some additional outreach at parks. Some informal outreach or contacts in areas of higher wildfire risk. Forest management required by landowners participating in Managed Forest Law program.
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Other educational, outreach and preparedness activities and notes:

- Injuries often occur during storm clean-up, than from the storm itself. Push public messaging following an event.
- Educating elected officials on roles, responsibilities, and basic ICS is a challenge given turnover. Such education is not on a regular schedule. May be an opportunity to coordinate such with a regular review and, if needed, update of municipal emergency plans.
- ADRC has valuable resources during a disaster. Not only do their drivers and staff have relationships with seniors, but they also have commercial kitchens, meal sites, ADA-equipped vehicles, and a large volunteer network. Including ADRC during training and exercises is an important opportunity.
- For agricultural losses, the USDA’s Farmer Services Agency (FSA) offers Multi-Peril Crop Insurance and the Non-Insured Crop Disaster Assistance Program to assist with crop losses for reasons beyond a farmer’s control. High crop insurance participation is required for certain USDA program eligibility. On the livestock side, FSA has: (i) the Livestock Indemnity Program, which can allow for eligible producers to receive a per head payment on eligible livestock losses due to approved adverse weather events; (ii) the Emergency Livestock Assistance Program, which offers assistance with feed losses and additional feed expenses due to eligible adverse weather events; and (iii) the Livestock Forage Disaster Program, which is available in drought situations, but less commonly used in Wisconsin. Additional information on these and additional less commonly used programs are available at the FSA website.

Polk County Emergency Management uses a variety of methods for emergency and hazard education, including social media, press releases, website, training & exercises, and an e-newsletter (excerpt to right).

EM Your Emergency Connection: From Polk County Emergency Management

Highlights:

- Spring Skywarn Weather Spotter Classes
- Neighborhood Summits
- Dates coming up in 2024
- An eye on the news
- BONUS: Home cyber security online courses!

The National Weather Service - Twin Cities office, in collaboration with Polk County Emergency Management, is thrilled to invite you to two **FREE Skywarn Weather Spotter Training classes!**

Dates:

- April 9th, 6-9pm, Amery Middle School Library/Media Room, 501 Minneapolis Ave S, Amery, WI 54001
- April 10th, 6-9pm, Cushing Community Center, 2510 241st St, Cushing, WI 54006

What's in store for you?

- Learn to safely monitor and report severe weather to the National Weather Service.
- Identify storm structure and intensity.
- Recognize the signs of tornado formation before it develops.
- Understand which storms may produce damaging winds or hail.
- Engaging slides and videos will be used to provide examples of various storms, making the training informative and interesting!

Space is limited so please be sure to register. Registration for both of the courses is online at the following link: <https://forms.office.com/g/mJDEQW8EJb>

Sign up for **CodeRED** emergency and weather alerts! This is the official notification system in Polk County. If you are already signed up, help an older family member get on board too.

**** Now, The City of Amery is offering community notices through CodeRED. You can opt-in for Amery's messages in your online account. ****

Mutual Aid & Other Partnerships				
Mitigation Action	Yes	Some	No	Notes & Opportunities
1. Mutual aid between local law enforcement agencies exists and meet regularly.	x			<ul style="list-style-type: none"> Statewide law enforcement mutual aid is in place. Regular county-level meetings take place.
2. Mutual aid between local fire departments and first responders exist and meet regularly.	x			<ul style="list-style-type: none"> Mutual aid in place, but MABAS not adopted countywide. Regular county-level meetings take place. Wildland mutual aid for Intensive Protection Area adopted and regular wildland training in cooperation with WDNR.
3. Mutual aid between local public works & highway departments exist and meet regularly.		x		<ul style="list-style-type: none"> Some agreements in place, but often limited to utilities. Otherwise, aid are informal (handshake rather than written). No countywide agreements. See Appendix K for city and village discussion.
4. Public health partnerships exist.	x			<ul style="list-style-type: none"> County and local medical facilities participate in the Northwest Wisconsin Healthcare Emergency Readiness Consortium. Good communication between County Public Health and County Emergency Management.
5. Public-private partnering occurs.		x		<ul style="list-style-type: none"> Some businesses are represented on LEPC and participate in exercises. Electric cooperative provides training for Fire Depts and other educational efforts.
6. VOADS are active in the community and participate in preparedness planning and training.	x			<ul style="list-style-type: none"> Very good relationships with local VOADS; participates in exercises and represented on the LEPC. Many VOADS are experiencing decreases in volunteer pools. Local news often focuses on the Twin Cities; the message/experience in Polk County can be very different. Red Cross coordinates recovery shelters; working with Public Health to assess and identify shelters. Volunteers (DAT members) have significantly declined since 2020. Excellent relationship with Humane Society; preparedness and response planning for pets and livestock is occurring.
7. Support is provided for area educational institutions for preparedness planning and training.	x			<ul style="list-style-type: none"> WITC provides required training for emergency responders. County Emergency Management and local law enforcement has partnered for active threat exercises and planning. See school and technical college subplans in Appendix L.
<p>Other mutual aid and partnership activities and notes:</p> <ul style="list-style-type: none"> Housing authorities, community action programs, and long-term care facilities are other important partners, especially when planning for socially vulnerable populations. New Federal CMS rule required additional emergency preparedness for health care providers receiving Medicare and Medicaid, including assisted living and long-term care facilities. Since the 2017 Plan, it is believed that all facilities are now in compliance with these requirements. It is important that the County and emergency response agencies have input into private-sector and local community emergency plans to ensure that plans do not have unrealistic expectations for public support or assistance that may not be available. Some local volunteer EMS and Fire Departments expressed growing concerns with the ability to attract volunteers and have a sufficient number of volunteer responders available during daytime work hours. Increasing training requirements are also making it more difficult to attract and retain volunteer responders. A shortage of health care workers also exists. 				

Barriers & Opportunities

In addition to the above, the mitigation plan update steering committee identified the following primary barriers to capabilities and ways to strengthen, expand upon, or improve the capabilities:

Barriers

- Lack of funding.
- Time for training, planning, and implement mitigation/preparedness strategies.
- Lack of emergency power generators.
- Transportation – how do we move a lot of people & animals?
- Workforce availability.
- Lack of Volunteers; fatigue and burnout.

Ways to Strengthen Capabilities

- Training, exercises, drills and meetings; bring stakeholders together to share understanding of trends, resources, and lessons learned.
- Provide models and templates than can be customized and adopted locally.
- Evacuation planning and exercises.
- Integrate the Mitigation Plan findings and recommendations into other County and community plans.
- Use the Integrated Preparedness Plan; will guide equipment & training needs.
- Advertising, engaging, and empowering volunteers.
- Pursue grant opportunities to supplement limited local funding for the implementation of recommended mitigation projects. Utilize available local resources and partnerships for in-kind cost share contributions when possible.

SECTION V. PROGRESS ON THE 2017 MITIGATION PLAN STRATEGIES

Section V provides a brief status update for the County-level projects requiring significant resources & high-priority actions recommended in the 2017 *Polk County Multi-Hazard Mitigation Plan*. As discussed in the 2017 Plan, the availability of resources and changing priorities affect implementation. The 2017 strategy list was comprehensive, and there was not an expectation that all strategies would be fully addressed within five years' time. The city and village sub-plans in **Appendix K** also note additional mitigation and preparedness actions, including floodplain management and other flood mitigation projects.

Table 28. Progress on 2017 Plan Recommended Projects & Priority Actions

2017 Plan Strategy	Progress
Flood-Related Projects & High-Priority Strategies	
Continue to monitor, study, and address stormwater and flash flooding hotspots in the county as identified in the Flood assessment section of this plan.	Improvements to roads and stormwater managements systems are continuing across the County and many hotspots identified in past plans have been addressed. While FEMA grant funding has been used to mitigate floodprone properties in past, no projects funded since 2017 Plan.
Pursue hazard mitigation grant funding to acquire, relocate, or floodproof structures and properties with a flood history, most at risk of flood damage, and/or following a flood event in which significant damage occurs, if the landowner agrees to participate.	
Pursue opportunities to improve the accuracy of floodplain mapping (D-FIRMS) now that LIDAR data is available.	D-FIRM update project under the Risk MAP Program kicked-off in 2022.
Severe Weather Projects & High-Priority Strategies	
If sufficient funding resources become available, pursue a community safe room project at the Polk County Fairgrounds and, potentially, at the County campgrounds.	Continues to be under discussion; keep in plan update.
Pursue grant funding to make cost-sharing available for the installation of storm shelters at mobile home parks, campgrounds, RV parks, and recreational properties where no existing shelter alternatives exist.	No grant projects pursued. Need exists; keep in plan update.
Work with the State of Wisconsin Department of Transportation to install a digital sign board at the base of the U.S. Highway 8 hill for eastbound traffic so that messaging can provide warnings for icy conditions, accidents, alternative routes, etc.	No action. Keep in plan update.
Work with municipalities and businesses to explore grant funding for community safe rooms and hardening projects for community facilities, long-term care facilities, businesses, and manufacturers, especially if located in a slab-on-grade structure.	No significant action noted, though stronger interest expressed by communities during 2024 Plan update
Other Projects & High-Priority Strategies	
If funding opportunities become available, work with communities to pursue grant dollars for emergency power generators for critical facilities and emergency operations centers in Polk County.	While there has been improvement in availability, this remains a high need. No potential grant sources identified.
Continue to work with local power providers to bury overhead electrical lines in areas prone to outages due to falling trees/limbs or high winds.	Polk-Burnett Electric Cooperative and municipal utilities are continuing to bury lines. Keep in plan.

2017 Plan Strategy	Progress
Work with Towns and permitting agencies to adopt standards and increase public awareness of driveway access, grade, width/clearance, long-dead end roads, and turn-around issues for large emergency vehicles.	No formal initiative undertaken. Still a concern in some areas of the County.
Develop and test procedures regarding the use of the proposed auto-dialer system to notify residents in higher hazard areas, such as dam shadows and near EHS sites. Obtain additional GIS-related data if needed.	Polk County has a CodeRED mass notification system with GIS-based capabilities. Encourage landowners in dam shadows and other at-risk locations to sign-up for the system.

SECTION VI. MITIGATION GOALS AND STRATEGIES

Polk County will continue to proactively protect the health, safety, and welfare of the community by mitigating the negative human, economic, and environmental impacts of hazard and disaster events. This vision will be accomplished through planning, evaluation, communicating with stakeholders, and maintaining a strong, reliable infrastructure. This plan reflects the County's past, current, and ongoing commitment to hazard mitigation.

A. MITIGATION GOALS

The mitigation goals are intended to provide direction to achieve the desired outcomes and are to be used as guidelines by which mitigation activities are identified and impact is evaluated. The goals provide Polk County further direction for determining the future and reflect the needs of the County as identified through the assessment of hazard conditions and community profile.

The mitigation goals for this plan update reflect, and are consistent with, the vision statements and goals found in the current *Polk County Comprehensive Plan* adopted in 2009, including the following, in particular:

Transportation Vision Statement: Safe, convenient transportation for residents and tourists; various transportation infrastructure modes to enhance the residential, commercial, industrial, agricultural, and recreational resources in Polk County.

Utilities and Community Facilities Vision Statement: To provide for future growth while protecting public health and natural resources by maximizing the use of existing infrastructure and distributing facilities to ensure a consistent level of services.

Land Use Vision Statement: Polk County will have the appropriate/minimal amount of restrictions to maintain land owners rights, and have high quality lakes, open spaces, parks, orderly growth with focus on commercial development within cities and villages and take into account the impacts to the environment, economy, agriculture, public use, health and commercial development.

Natural Resources Goal 1: Recognize the environment as an integrated system of land, water, and air resources.

Natural Resources Goal 2: Minimize the potential impacts on natural resources, environmental corridors water resources, and wildlife habitats when evaluating potential residence, communities, industrial/mining, and intensive agricultural uses

Intergovernmental Cooperation Vision: Nurture an environment of divergent viewpoints and responsibilities so that governmental units may work in harmony and cooperation to reduce conflict and duplication of services and increasing efficiencies.

Intergovernmental Cooperation Goal 4: Participate in effective intergovernmental agreements that deal with issues that cover more than one jurisdiction.

The Plan Steering Committee evaluated and significantly updated the goals from the 2017 *Polk County Natural Hazards Mitigation Plan* goals. The updated goals reflect: a greater emphasis on countywide resiliency to all hazards (not just natural hazards), evolving hazard threats, enhancing cooperation, and strengthening the knowledge and capabilities of residents, organizations, and businesses to prepare, respond, and recover from a disaster event. The Committee modified the goals to embrace the entire emergency management cycle recognizing that different parts of the cycle overlap (especially preparedness and mitigation) and that consistency between related plans is important. The Committee also discussed the availability of new technologies, models, and tools to help assess risks and mitigate vulnerabilities.



The following are the 2023 Mitigation Plan goals for the citizens, businesses, and governments of Polk County:

Goal One: Planning and Policy

We will anticipate hazard vulnerabilities and identify appropriate mitigation plans and policies that can be implemented in a cooperative, efficient manner.

Goal Two: Physical Infrastructure

We will create and maintain a safe, resilient, and efficient physical infrastructure that is prepared for and mitigates the negative impacts of hazard events.

Goal Three: Knowledge and Capacity

We are a resilient community with strong emergency management capabilities to adapt to changing hazard threats. We will continue to evaluate gaps and increase awareness of our hazard risks and the ways to mitigate these hazards countywide.

Goal Four: Communication and Coordination

Through robust communications systems, cooperative agreements, and the leveraging of strategic partnerships, we will maintain effective emergency preparedness, response, recovery, and mitigation systems.

B. EVALUATING MITIGATION ALTERNATIVES

i. Evaluating & Prioritizing the Mitigation Alternatives

The Plan Update Steering Committee identified the following criteria for the evaluation and prioritization of the mitigation alternatives, with those in bold being of higher importance:

Relative Need Criteria

- **mitigates an imminent or high-probability threat**
- **local demand for a mitigation action** (e.g., community members want a safe room)
- **protects life, community lifelines, or critical infrastructure**
- benefits a vulnerable or underserved population
- enhances mitigation capacity, continuity of critical functions, or community resiliency

Feasibility Criteria

- technical, engineering, and environmental feasibility
- **capacity, funding, and resource availability**
- **social, legal, and political feasibility (community acceptance, local support)**
- provides a long-term reduction in impacts; not a short-term solution
- **mitigation action is referenced in or supports another plan**

Benefits vs. Costs Criteria

- **financial costs – implementation, maintenance, etc.**
- financial benefits - potential for loss prevention or reduction
- financial benefits – provides multiple benefits or other cost savings
- **mitigation action already in motion or enhances a larger project**
- mitigates multiple risks or vulnerabilities
- **can be implemented at low cost or without significant resource commitments** (e.g., low-hanging fruit)
- incorporates nature-based solutions/enhances natural systems
- opportunity costs – diverts resources from higher priorities
- lack of a mitigation alternative with greater benefits vs. costs

The above criteria are recommended for use by all plan participants (i.e., cities, villages, educational institutions, electric cooperatives) in the selection and prioritization of their mitigation actions.

ii. Identifying & Selecting the Mitigation Actions

Identifying and evaluating the alternatives and selecting the mitigation strategies for inclusion in this plan was a multi-step process generally described here:

- #1 A comprehensive range of alternatives to meet the plan’s vision and goals were considered during the planning process. A variety of alternative mitigation strategies were included in the Mitigation Toolbox in Appendix K of the County’s 2017 Mitigation Plan. The alternatives in FEMA’s *Mitigation Idea* resource guide from January 2013 were also considered.

#2 From this comprehensive list and suggestions identified during the planning process, a range of specific mitigation actions to address the current and future hazard vulnerabilities (Section III.C.) or to strengthen mitigation capacity (Section IV) were identified during the key stakeholder interviews, meetings, and surveys during the plan update process.

#3 County-Level Strategies.

- a. Through discussions and a survey process, the Steering Committee analyzed and prioritized the County-level strategy alternatives using the previous criteria in Section VI.B.i. More specifically, each Committee member was asked:
- Is the strategy a high priority? What timeline do you recommend?
 - Is the strategy feasible or should it be excluded from the plan?
 - Analyze the priority based on the previous criteria; consider the costs vs. benefits.
 - Provide any additional suggestions strategy wording, resources, or responsibilities.
- b. The results of the Steering Committee’s analysis were then incorporated into the draft of Section VI.C. Opportunities to further modify and “fine tune” the recommendations in Section VI.C. were provided as the draft was reviewed during the final Steering Committee meeting as well as made available for comment by County staff, stakeholders, and the general public.

Note:

The priorities for the strategies herein were made in the context of this plan and the hazard threats facing Polk County. There may be other good reasons to implement a recommendation.

A low priority should not necessarily be interpreted as having a lesser importance to Polk County overall.

The exclusion of a beneficial strategy from this plan should not prevent or defer action if the need exists and resources are available.

C. RECOMMENDED MITIGATION ACTIONS

Mitigation actions reduce or prevent the loss of life and property by lessening the impacts of disasters. These strategies are long-term solutions with preventative benefits to people, property, infrastructure, community lifelines, and/or the economy by reducing vulnerabilities. Mitigation actions can include:

- planning & regulations
- structure & infrastructure projects
- natural systems protection
- education & awareness programs
- climate adaptation strategies & nature-based solutions

The recommended strategies are organized by hazard type, then further organized into:

- **Recommended Projects:** Projects are typically larger or more capital-intensive efforts that have a focused, action-oriented outcome that is achievable within a certain time period. Special grant funding or other resources are often needed for the implementation. Strategies involving physical structural or infrastructure changes likely fall into this category. Not all hazard types have a recommended project strategy.
- **Recommended Planning, Policy, and Outreach Actions:** Policies tend to be ongoing, decision-making or programmatic guidance, though they may also include smaller, less costly planning, assessment, collaboration, or educational efforts. In most cases, these strategies can be funded or performed as part of normal operating budgets and do not require the identification of new or special funding or other resources. However, some training, planning, and outreach may require additional funding.

For each recommended mitigation strategy, the following is also provided:

High Priority	High priority strategies are indicated based on the evaluation of mitigation alternatives by the Plan Update Steering Committee using the previously described criteria. These high priorities provide focus and are suggested to assist with plan implementation and monitoring. Also see related discussion in Section VI.F.
Timeframe	<p>The Plan Update Steering Committee was asked to help assign a timeframe for each strategy using the following categories:</p> <p>Short-Range: 0 to 3 years Long-Range: 4+ years As Needed: monitor & implement if conditions worsen or becomes feasible Exclude: there were very few “votes” to exclude; no alternative was excluded</p> <p>The expected timeframe is based on a reasonable expectation of required resources, approvals, etc. The implementation of some strategies is subject to resources that are not controlled by the suggested responsible party, such as grant funding. The actual timeframes may also vary based on changing needs, regulations, community priorities, etc.</p>

Lead Party(s)	This column suggests the position, department, jurisdiction, or entity that will have primary responsibility in initiating or implementing the mitigation action. However, in most cases, mitigation actions will require collaboration. Mitigation strategies involving land or property will in most cases always included the landowner as a lead party.
Funding	Potential and most likely funding sources are identified. FEMA guidance requires the identification of specific funding sources. In some cases, a mitigation action may be funded as part of the government's annual operating budget or a capital improvements plan, with revenue from multiple various sources.
Analysis	The analysis applies the previously described criteria to offer comments on feasibility, costs, benefits, opportunities, barriers to implementation, or additional explanation.

During the planning process, additional preparedness (non-mitigation) strategies were also recommended that are not included in this section, but are provided in Section VI.D.

Severe Weather & Extreme Temperature Mitigation Strategies – Project Alternatives

The following strategies prevent or reduce the vulnerabilities associated with various aspects of severe/extreme weather and climate change including: **tornados, high winds, thunderstorms, winter storms, extreme temperatures, and drought**. They are combined here since some mitigation alternatives mitigate the impacts of multiple hazards.

2024 Plan Strategy Alternative	High Priority?	Timeframe	Lead Party(s)	Funding	Analysis
1. Pursue grant funding to make cost-sharing available for the installation of community safe rooms (storm shelters) at mobile home parks, private and public campgrounds, RV parks, and recreational properties where no existing shelter alternatives exist. Especially target safe room projects at mobile home parks and resort properties where landowners are strongly interested and supportive of such projects.	High		Landowner Communities and county may need to raise awareness of grant options.		<ul style="list-style-type: none"> • \$\$-\$\$\$ • Increasing interest in safe room projects, including at parks. Potential to include safe rooms as part of new community buildings (e.g., Allied Emergency Services Fire Hall). • A safe room meeting FEMA standards provides near-absolute protection for occupants. • A FEMA-funded safe room project has been approved for Luck at the School. • Emergency power generator may be FEMA mitigation grant eligible as part of a safe room project.
2. Work with municipalities and businesses to explore grant funding for community safe rooms and storm hardening (retrofit) projects for community facilities, educational institutions, long-term care facilities, businesses, and manufacturers, especially if located in a slab-on-grade or large-span structure. In cases where an adequate shelter is available, a remote unlock system or operations & maintenance plan may be valuable.	High	Short-range or as needed & opportunities arise	A partnership with a mitigation plan participant (eligible grant applicant) may be required in some cases. WCWRPC can provide direction & grant support with WEM assistance.	FEMA BRIC or HMGP grant funding with local cost share by municipality and/or landowner	<ul style="list-style-type: none"> • If a community safe room will also serve as a heating/cooling shelter, heating/cooling systems, insulation, and related costs may be FEMA mitigation grant-eligible in the future; as of Summer 2024, such costs are not grant eligible. • Community safe room and heating/cooling shelters recommended in the St. Croix Chippewa Tribe's plan. • Safe rooms could be included as part of restroom improvements at County campgrounds (e.g., Apple River and Sterling ATV campgrounds). • Arnell Memorial Humane Society would benefit from a safe room/retrofit with generator, though FEMA grant funding prioritizes human lives.
3. If funding opportunities become available, work with communities to pursue grant dollars for generators and, if needed, the wiring of fueling stations for a generator to provide emergency power for critical facilities, shelters, and emergency operations centers in Polk County.		As needed, but 0-3 years for some facilities	Facility or shelter operator	Limited grant opportunities, unless part of a larger or multi-use facility.	<ul style="list-style-type: none"> • \$\$ • While generator availability continues to improve, it continues to be a significant need. • USDA Rural Development may fund generators in rare cases. • WI PSC Refueling Readiness Grant Program for wiring of fueling stations.

<p>4. Continue to work with local power providers to bury overhead electrical lines in areas prone to outages due to falling trees/limbs or high winds, when cost feasible. Pursue mitigation grant funding when needed and available.</p>	<p>Medium-to-High</p>	<p>0-3 years or as needed; can change based on work plans, road projects, etc.</p>	<p>Electric Provider</p>	<p>Electric Provider typically covers cost, though may be FEMA BRIC or HMGP eligible</p>	<ul style="list-style-type: none"> • \$\$-\$\$\$ • Often buried for newer development or completed in conjunction with street improvement projects. • Cooperatives and municipal utilities may be eligible for FEMA BRIC or HMGP grant funding for projects in areas prone to outages.
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Severe Weather & Extreme Temperature Mitigation Strategies – Planning, Policy, & Outreach Alternatives

2024 Plan Strategy Alternative	High Priority?	Timeframe	Lead Party(s)	Funding	Analysis
<p>1. Explore County ordinance language requiring new or expanding campgrounds, RV parks, and resorts to construct or identify per formal agreement a storm shelter for visitors. Provide model language to cities and villages for consideration.</p>		<p>Long-range</p>	<p>County Zoning & County Board</p>	<p>Existing County operational budget</p>	<ul style="list-style-type: none"> • \$ • Growing risk. A number of towns suggested that some campgrounds are expanding. • Could potentially be handled as part of a conditional use requirement in zoned communities. • Explore if could be part of a Public Health or operational license.
<p>2. Conduct a survey of campgrounds and resorts to determine the status of emergency plans, storm shelter availability, and related resource needs.</p>		<p>Long-range</p>	<p>County Emergency Management</p>	<p>Existing County operational budget</p>	<ul style="list-style-type: none"> • \$ • Could be used to educate on safe rooms & other mitigation opportunities. • Identify strategies based on the survey results. • As an option, this could be included as part of the next hazard mitigation plan update.
<p>3. Encourage farmers to allow the plowing of “berms” in areas prone to drifting. Along State and US Highways, make farmers aware of WisDOT Standing Corn Snow Fence Agreements and the potential for reimbursement, if WisDOT improves their performance regarding this program.</p>		<p>Ongoing, as opportunities allow</p>	<p>Highway Department and towns</p>	<p>WisDOT Standing Corn Snow Fence program</p>	<ul style="list-style-type: none"> • \$ • More feasible than large-scale hill cuts. • Increases traveler safety and emergency vehicle access; reduces snow removal expenses. • Will not work everywhere. • Corn rows worked well, but WisDOT has been slow to pay.
<p>4. Inventory generator and emergency fuel availability among industry, community lifeline facilities, and major employers in the County. Explore the feasibility of joint bidding & purchasing, mutual agreements, and other options to address needs.</p>		<p>Short-to-Long-range as time & resources allow</p>	<p>Industry Safety Group and/or Emergency Management</p>	<p>Existing staff and private-sector volunteers to initiate</p>	<ul style="list-style-type: none"> • \$ to evaluate; \$\$ to implement • No specific solution but, identifies needs & engages in discussion. • WI PSC Refueling Readiness Grant Program may assist with related wiring, transfer switches, etc.

<p>5. Evaluate home oxygen sources, emergency oxygen availability, and potential demand during an extended power outage or when roads are impassible. Coordinate between agencies how oxygen-dependent household lists will be accessed and used during an emergency. Identify strategies to address any gaps.</p>	<p>Medium-to-High</p>	<p>Short-range</p>	<p>County Public Health & Emgy Mgmt to initiate</p>	<p>Existing staff operational budgets</p>	<ul style="list-style-type: none"> • \$ for evaluation/planning • County has some tanks available. • Uncertain of emergency availability. • May need to survey home oxygen suppliers. • Access to State list of Medicare patients using oxygen-assisted devices not available unless there is an emergency. • Could be expanded to include all households with electric-dependent medical devices.
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2024 Plan Strategy Alternative	High Priority?	Timeframe	Lead Party(s)	Funding	Analysis
<p>6. Pursue mitigation grant dollars for an educational campaign on severe weather and flooding threats and related mitigation actions, potentially including the distribution of NOAA All Hazards (Weather) Radios. Such a campaign could potentially prioritize seniors, mobile home residents, and/or critical facilities. This strategy could include the creation of a web-based, story map version of this mitigation plan, so that the key components of the plan are more accessible by the public.</p>		<p>Dependent on interest by communities or stakeholders</p>	<p>County Emergency Management; ADRC; communities</p>	<p>May be eligible for FEMA HMGP grant funding (i.e., a 5% project)</p>	<ul style="list-style-type: none"> • \$ • Interest in weather radios has been waning as smart phones become more common. • Town of Lorrain expressed interest in weather radios and/or warning siren. • NOAA weather radio covered in the County is poor with significant gaps. • Could be implemented in conjunction with other hazard outreach, such as education on stormwater management systems and nature-based solutions.
<p>7. Identify heating and cooling shelters with generators that are available for extended periods and power outages, if needed. Include capacity, policies, and pet options. Integrate such shelters into planned community safe room projects. Increase public awareness of shelter availability. Include community centers in unincorporated areas, such as the Town of Sterling, and in Tribal communities.</p>		<p>0-3 years</p>	<p>County Public Health working with Red Cross</p>	<p>If part of safe room, generator and HVAC costs may be eligible for FEMA BRIC or HMGP funding.</p>	<ul style="list-style-type: none"> • \$-\$\$ • Demand may be slowly increasing as extreme temperatures increase. • Some facilities used as shelters, like libraries, may only be available during limited hours. • Some currently identified shelters lack generators or may not be widely known; see previous generator-related mitigation strategy.
<p>8. Work with Wisconsin DOT to install a digital sign board at the base of the U.S. Highway 8 hill for eastbound traffic so that messaging can provide warnings for icy conditions, heavy snow, flooding, accidents, alternative routes, and general emergency or preparedness messaging.</p>		<p>Long-range</p>	<p>WDOT, MinnDOT, County Highway depts</p>	<p>Likely WDOT & MinnDOT with U.S. DOT funding assistance</p>	<ul style="list-style-type: none"> • \$\$ • Has been recommended in County's previous mitigation plans. • By warning or restricting traffic, could help prevent accidents, injury, etc., thus mitigating severe weather impacts. • Messaging & operations to be determined.

2024 Plan Strategy Alternative	High Priority?	Timeframe	Lead Party(s)	Funding	Analysis
Flood Mitigation Strategies - Project Alternatives					
<p>1. Continue to monitor, study, and address stormwater and flash flooding hotspots in the county as identified in the flood assessment of the hazard mitigation plan. Potential projects include, but are not limited to creation/expansion of flood/stormwater storage areas, the installation or re-sizing of culverts, the creation or improvement of drainageways, and the protection of natural drainage and retention areas.</p> <p>Encourage nature-based solutions, low-impact development practices, and basin-level planning.</p>		<p>As needed.</p> <p>Implementation often occurs at the city, village, & town level, so timeframes and priorities will vary.</p>	<p>County Zoning or Land & Water Resources, County Emergency Management, County Highway, municipalities, landowners</p>	<p>Stormwater utilities, development impact fees, CIPs, and highway/road funding are traditional sources.</p> <p>For larger projects, especially in areas that have experienced flood damage, FEMA, CDBF, & State grant funding may be available.</p>	<ul style="list-style-type: none"> • \$\$ to \$\$\$ • CDBG-Public Facilities, TIF, FEMA Flood Mitigation Grants, WI Pre-Disaster Flood Resiliency Grants, & WI Municipal Flood Control Grants for larger projects. • Increasing frequency & intensity of heavy rain events = more flooding. • Grant funding could mitigate a reoccurring flooding threat/vulnerability. • Often impacts transportation (community lifeline). • Solutions are typically feasible, if funding available • Localized approach that increases drainage can increase flooding downstream. • Poor culvert condition on many local roads. • Increase emphasis on nature-based solutions. • If significant damages, County Emergency Mgmt may provide support. • Potentially related to continued NFIP compliance.
<p>2. When new public construction, subdivision development, and non-flood mitigation projects are being planned, such as community safe rooms, integrate nature-based solutions, if possible, to control stormwater runoff and mitigate flooding.</p>		<p>Ongoing as opportunities and needs allow.</p>	<p>Developer or land owner</p>	<p>Same as above. New development unlikely eligible for mitigation grants unless part of a mitigation project.</p>	<ul style="list-style-type: none"> • \$ to \$\$\$ • Proactive. • If part of a mitigation grant project, may score additional points. • May not be political support to amend ordinances to require or incentivize. • May serve as a model; could use WDNR Health Lakes grant dollars in shoreland areas.
<p>3. Pursue hazard mitigation grant funding to acquire, relocate, or floodproof structures and properties with a flood history, most at risk of flood damage, and/or following a flood event in which significant damage occurs if the landowner agrees to participate.</p>		<p>As needed; city & village subplans suggest some areas to consider</p>	<p>Landowner, County Zoning or municipalities</p>	<p>FEMA Flood Mitigation Grant & WI Municipal Flood Control Grant programs with landowner match contributions</p>	<ul style="list-style-type: none"> • \$\$ to \$\$\$ • No critical/imminent projects identified. • Strong grant potential if a reoccurring or vulnerability. • May mitigate a reoccurring flooding threat/vulnerability. • Solutions are typically feasible, if funding is available and with the landowner's consent. • Potentially related to continued NFIP compliance.

2024 Plan Strategy Alternative	High Priority?	Timeframe	Lead Party(s)	Funding	Analysis
4. Continue to monitor bank erosion and landslide risks along the St. Croix River and explore flood mitigation grant funding if there is an imminent threat to buildings or infrastructure.	Medium-to-High	Will be driven by needs, if imminent threat	Landowner, Municipality	FEMA Flood Mitigation Grant & WI Municipal Flood Control Grant programs with landowner match contributions	<ul style="list-style-type: none"> • \$\$ to \$\$\$ • No critical/imminent projects identified. • Grant potential for a bank stabilization or revetment project is imminent or reoccurring threat with significant vulnerability. • Potentially related to continued NFIP compliance.
Flood Mitigation Strategies - Planning, Policy, & Outreach Alternatives					
<p>1. Continue to advocate for and participate in modelling efforts to improve floodplain map accuracy. Once updated FEMA floodplain map data is available, re-evaluate flooding vulnerabilities.</p> <p>When County remote sensing (LiDAR) data is certified as meeting PM-61 standards, obtain FEMA certification that Polk County may engage in LiDAR-based Letter of Map Amendment (LOMA) approvals, which can save considerable time and expense.</p>		Ongoing; short-range for LIDAR-based LOMA	WDNR, FEMA, County Environmental Services Division	FEMA & WDNR; County projects budget	<ul style="list-style-type: none"> • \$\$ • Poor accuracy of floodplain maps weakens flood vulnerability assessment, creates flood insurance and ordinance compliance challenges, and damages public trust. • FEMA has identified some stream stretches for which new floodplain mapping will be performed, perhaps beginning in 2024. • Light Detection & Ranging (LiDAR) data collected in 2022. • Related to continued NFIP compliance.
2. Continue to maintain dams and dam emergency operating plans. Encourage mapping of hydraulic shadows (dam failure areas) of high- and significant-hazard dams; discourage development in these dam shadows. Encourage residents and businesses within or near dam shadows to sign-up for Polk County's Code Red emergency notification system.	Medium-to-High	Ongoing & as needed; largely supports ongoing activities	varies by Dam Owner; Zoning staff for code enforcement	Funded by dam owners; WDNR Municipal Dam Grant; FEMA High Hazard Potential Dams Grant	<ul style="list-style-type: none"> • \$\$ to \$\$\$ • Proactive; partly preparedness. • No major dam structural concerns or improvement needs identified. • While dam maintenance can be expensive, code enforcement and educational outreach may largely be accomplished with existing resources.
3. Continue to enforce County floodplain regulations to: discourage future floodplain development and the storage of hazardous materials in floodplains; require dry land access for structures; limit development in dam shadows; and maintain natural flood storage areas. Encourage low-impact development and nature-based stormwater solutions for new development projects.	Medium-to-High	Ongoing & as needed; largely supports ongoing activities	County Zoning and County Board	County annual operating budget	<ul style="list-style-type: none"> • \$ • Proactive; strong mitigation strategy. • County has adopted the most recent WDNR floodplain ordinance model. • No additional costs expected unless enforcement/compliance issues arise. • Related to continued NFIP compliance.

2024 Plan Strategy Alternative	High Priority?	Timeframe	Lead Party(s)	Funding	Analysis
<p>4. Continue to educate the public and elected officials of flood risks, including awareness that typical homeowner's insurance does not cover flood damage, that many structures outside the 100-year floodplain are vulnerable to flooding, and the importance of well testing following flood events. Especially target those municipalities with the greatest assessed improvements in or near floodplain areas.</p>		<p>Ongoing; long-range for a more concerted outreach effort</p>	<p>County and local designated floodplain managers County Emergency Management</p>	<p>County and community operational budgets. FEMA mitigation grant funding could be used for an outreach initiative</p>	<ul style="list-style-type: none"> • \$ • Proactive mitigation strategy. • WDNR and WCWRPC may be able to help. • Insurance providers certified to sell flood insurance could be important partners. • No additional costs expected unless enforcement/compliance issues arise. • Related to continued NFIP compliance. • FEMA HMGP or FMA funding could be available.
<p>5. Discourage the placement of farm pipeline systems (e.g., liquid manure pipelines) within public ditches, culverts, and other flood conveyance infrastructure.</p>		<p>Short-range & ongoing</p>	<p>County Land Conservation and/or Zoning; Town governments</p>	<p>Operational budgets</p>	<ul style="list-style-type: none"> • \$ • Such pipelines can reduce flood storage and conveyance capacity, contribute to culvert blockages, and pose a HazMat spill risk that can enter surface waters or wetlands, especially if strong sensor systems are not in use. • Can attempt an educational campaign, but may necessitate related regulations, permitting, and enforcement. • Included in the last mitigation plan.
<p>6. Continue to expand public and community educational efforts and partnerships regarding alternatives to mitigate stormwater and flash flooding run-off, while promoting low-impact development and nature-based solutions, such as rain gardens, permeable pavement systems, bioswales, road salt management, etc. For floodprone areas with a history of flash flooding that are outside the 100-year floodplain, encourage setbacks for new structures.</p>		<p>Ongoing & as needed; largely supports ongoing activities</p>	<p>County Land Conservation, WDNR, local communities</p>	<p>County and community budgets. Some grant funding available for larger initiatives, especially if linked to flood control or water quality.</p>	<ul style="list-style-type: none"> • \$ • Could involve many partners, such as municipalities and lake groups. • Rain to Rivers of Western Wisconsin has some related educational materials. • Some overlap with other mitigation strategies. • Could include model projects, including using Healthy Lakes grant dollars near lakes. • Local governments could explore integrating such standards into site plan review or local ordinances.

2024 Plan Strategy Alternative	High Priority?	Timeframe	Lead Party(s)	Funding	Analysis
Wildfire Mitigation Strategies - Planning, Policy, & Outreach Alternatives					
Larger wildfire mitigation projects and community wildfire protection planning were considered, but the costs of such alternatives outweighed the overall risk, vulnerabilities, and anticipated benefits at this time within Polk County. Instead, it was recommended to continue smaller, often targeted, educational and outreach efforts.					
1. Continue education of residents and local officials in the mitigation of wildfire risks, with an emphasis on defensible spaces around homes and emergency vehicle access on driveways and private roads. Increase resident awareness of burning restrictions, warning signage, and permit contacts. Outreach should especially target areas of highest risk and determine town interest in additional Firewise-style programming	Medium-to-High	Ongoing	Local Fire Depts & Wisconsin DNR Assistance from Town Boards, schools, & County Emgy Mgmt	Largely uses existing staff or volunteer support. Some WDNR resources available.	<ul style="list-style-type: none"> • \$-\$\$ • Highest risks in the Towns of Sterling and West Sweden. • Continuing educational outreach, but could expand into additional programming and planning in highest risk areas. • Could include installation of additional Fire condition warning signage. • Weather patterns and wind/tornado damage are elevating the wildfire risk
2. Discuss the creation of a community wildfire protection plan (CWPP) or other Firewise USA efforts for the Town of Sterling. May pursue similar efforts in other areas of high wildfire risk (e.g., Town of West Sweden) in the future based on need or interest.		Short-range	WDNR, Local Fire Dept, and Town	WDNR Forestry grants	<ul style="list-style-type: none"> • \$ (for planning) • Typically not an extensive planning effort, but does require Town commitment • Increases grant eligibility for FireWise strategies prioritized in the CWPP
3. Perform driveway assessments and home ignition zone assessment in areas of higher wildfire risk. Educate landowners on Firewise mitigation options.		Long-range	Local Fire Depts & Wisconsin DNR	Largely uses existing staff or volunteers. Some WDNR resources possible.	<ul style="list-style-type: none"> • \$-\$\$ • Likely needs local fire department volunteer interest; WDNR can provide training and some Firewise resources. • Requires landowner interest & permission.
4. Pursue grant funds for dry hydrants for fire protection where other water sources are not readily available.		Ongoing; as needed	Local Fire Departments	WDNR Forest Fire Protection Grant program; developer	<ul style="list-style-type: none"> • \$-\$\$ • WDNR FFP Program could cover 50% of costs. • Not a widespread need.
5. Continue to maintain and implement the <i>Polk County 15-Year Comprehensive Forest Land Use Plan</i> and the <i>Polk County Land and Water Resources Conservation Plan</i> to include best management practices to reduce risks related to wildfire, drought, invasive species, and plant diseases.		Ongoing	Polk County Land & Water Resources; landowners	Existing County budget for staffing costs with some State support. Further funding sources vary by project type.	<ul style="list-style-type: none"> • \$-\$\$\$ • This strategy recognizes the importance of the various forest-management actions recommended within these plans to mitigating wildfire risks. • Last updated for 2021-2025 and included strategies to address 2019 storm clean-up.

Other Mitigation Strategies					
The following are multi-hazard mitigation strategy alternatives or potential strategies to address non-natural hazards.					
2024 Plan Strategy Alternative	High Priority?	Timeframe	Lead Party(s)	Funding	Analysis
1. MULTI-HAZARD – Integrate natural hazard risks, climate trends, and hazard mitigation into future updates of the Polk County Comprehensive Plan and other County plans.		complete as plans updated	County Zoning and Planning & Zoning Committee	As part of County operational/program budget for plan update.	<ul style="list-style-type: none"> • \$ • Limited inclusion of mitigation in existing comprehensive plan. • Explore opportunities to integrate mitigation plan priorities into the County Strategic Plan; public safety is one of six priorities under this plan.
2. MULTI-HAZARD – Monitor the County’s increasing ESL and immigrant population. Should it be needed, conduct a public educational outreach initiative that increases knowledge of natural hazard risks, notification systems (CodeRED), insurance programs, and available resources.		Long-range & ongoing	Public Health with partner support	Largely a collaboratively supported initiative, but some grant funding may be available.	<ul style="list-style-type: none"> • \$ • Targets a socially vulnerable population that is crucial to the agricultural sector in particular. • This could also be considered a preparedness activity, but should identify and emphasize reduction of vulnerabilities. • May be eligible for FEMA HMGP grant funding (i.e., a 5% project). • Churches and schools are key partners.
3. MULTI-HAZARD - Conduct a special workshop or outreach initiative that educates local communities on the Building Code Efficiency Grading System (BCEGS) and the relationships between hazard mitigation and local codes/code enforcement (e.g., floodplain & stormwater ordinances, building codes, subdivision design).		Long-range	WCWRPC and/or WI DSPS	May be eligible for FEMA HMGP grant funding	<ul style="list-style-type: none"> • \$ • Minimal local familiarity with options; State rules limit some opportunities. • Could be a regional-level or web-based workshop series targeting local code officials and policy makers. • Very low familiarity with the BCEGS program though it can reduce insurance rates.
4. MULTI-HAZARD – Promote regenerative agriculture and soil health best practices that can help reduce flash flooding and erosion while making cropland more resilient to drought as well as related crop insurance programs.	High	Ongoing	County Land Conservation, NRCS, Extension	Collaborative efforts with <u>many</u> different potential funding sources	<ul style="list-style-type: none"> • \$-\$\$ • Consistent with County’s Land & Water Resource Management Plan. • Supports continuing efforts; these best practices are typically promoted for water quality and economic reasons. • Can incorporate watershed-level planning and producer-led efforts.

2024 Plan Strategy Alternative	High Priority?	Timeframe	Lead Party(s)	Funding	Analysis
5. MULTI-HAZARD - Conduct outreach or specialized workshops with the agricultural community (e.g., farmers, farmland owners, cooperatives, agronomists) on preparedness, mitigation, and continuity planning for ag-related hazard risks, including long-term power loss, avian flu, and radiological release.		Short-to-Long range	County Land Conservation, Emergency Management, NRCS, Extension	Operational budgets	<ul style="list-style-type: none"> • \$-\$\$
6. HAZ MAT SPILLS – Participate in a Commodity Flow Study to identify the types of hazardous materials on the major highways and railroads in Polk County.		Short-to-Long range	County Emergency Management	U.S. DOT HazMat Emergency Planning Grant (WisDOT administers)	<ul style="list-style-type: none"> • \$-\$\$ • Transportation-based spills on highways and by rail were a greater concern than fixed facilities. • Identifying HazMat commodity flow based solely on placards has limitations, but can provide some general insights.
7. HAZ MAT SPILLS – Conduct a functional or full-scale exercise(s) that assesses the risks and response capabilities of a transportation-based HazMat spill, which builds upon lessons learned in previous tabletop exercises conducted in the County.		Short-range, then periodically thereafter	County Emergency Management	Operating budgets; HazMat Emgy Planning Grant	<ul style="list-style-type: none"> • \$-\$\$ • Could building upon a commodity flow study to focus on a common or particularly concerning type of hazardous material. • Concerns with anhydrous expressed by a community during planning process, though farm use, overall, seems to be decreasing. • Include Land Conservation & Public Health during exercises. Consider a large manure spill exercise. • Consider evacuation & shelters of residents, pets, visitors, and livestock.
8. HAZ MAT SPILLS – Evaluate hazardous material and toxic chemical use within the County to determine if less hazardous alternatives exist and are feasible. If opportunities are identified, conduct outreach to encourage use of less toxic alternatives.		Long-range	County Emergency Management and Public Health	Operating budgets; maybe HazMat Emgy Planning Grant	<ul style="list-style-type: none"> • \$ • Uncertain if alternatives exist that are financially or technically feasible. • Could initially focus on industry and/or facilities with chemical use/storage that exceeds EPCRA thresholds. • Prioritize the most commonly used toxic chemicals of greatest threat to health or water quality. • May also emphasize an alternative if it is a lower-cost and is equally effective or “over applied”.

<p>9. ACTIVE THREATS - Continue to conduct active shooter/active threat building assessment, training, and reunification planning for government facilities, area businesses, community lifeline facilities, and other gathering places. Encourage annual exercises at schools as part of their mandatory drills.</p>	<p>Medium-to-High</p>	<p>Ongoing & Short-range</p>	<p>Facility owner County Emgy Mgmt Law Enforcement</p>	<p>County Emgy Mgmt may provide classes or exercises upon request. Occasional Homeland Security Grants.</p>	<ul style="list-style-type: none"> • \$ (\$-\$\$\$, if security hardening) • Continuing, but greater regularity for some facilities recommended. • May reduce vulnerability through recommended security hardening or improved procedures. • Encourage sharing of after-action reports from exercises among law enforcement. • County evaluating security at main door & training.
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2024 Plan Strategy Alternative	High Priority?	Timeframe	Lead Party(s)	Funding	Analysis
<p>10. PANDEMIC/AG DISEASE – Collaborate with the State of Wisconsin and Federal government to provide educational guidance to producers to create plans to mitigate, monitor, report, and respond to potential zoonotic diseases.</p>		<p>Ongoing to some degree; more outreach recommended</p>	<p>WI DATCP and/or USDA</p>	<p>Federally funded</p>	<ul style="list-style-type: none"> • \$ • Avian Flu is a significant threat to the County’s agricultural economy and is a zoonotic disease. • Outbreaks are largely handled by the State & Federal government; there is limited local government engagement on the issue, which leads to questions and uncertainty. • Recommends a top-down educational strategy for producer outreach to develop basic plans with best practices related to bio-security, disease monitoring/reporting, quarantine, workforce practices, and proper disposal.
<p>11. PANDEMIC – Educate and encourage residents to report sick or dead animals for which the cause may be a disease (e.g., West Nile, Avian Flu, CWD) and encourage participation in programs to reduce the spread.</p>		<p>Ongoing</p>	<p>State of Wisconsin County Public Health and partners</p>	<p>Uses existing staff or volunteer support.</p>	<ul style="list-style-type: none"> • \$ • Supports Public Health’s current activities. • Special messaging may target farm workers, households with bird feeders, hunters, etc.
<p>12. CYBERATTACK – Continue efforts to educate the public, businesses, and local governments on good cybersecurity/cyber-hygiene practices to reduce vulnerabilities. For organizations, including related resources and continuity planning (e.g., back-up, restoration). Seniors were identified as a particularly vulnerable population to cyber-attacks and scams.</p>	<p>Medium-to-High</p>	<p>Ongoing & Short-range</p>	<p>Various partners. Economic Development Corp for businesses. ADRC for seniors Schools for children & families.</p>	<p>Uses existing staff or volunteer support.</p>	<ul style="list-style-type: none"> • \$ • ADRC provides related outreach to seniors (socially vulnerable population) via its newsletter. AARP resources and classes available. • Local ISPs may be good partners. • Promote availability of CISA and State Cyber Response team resources. • Cyber-insurance companies can be a good resource. • Perhaps a regional effort spearheaded by the West Central WI Broadband Alliance.

D. RECOMMENDED PREPAREDNESS ACTIONS

While this mitigation plan focuses on long-term solutions and preventative actions that will reduce disaster vulnerabilities (losses), it is only natural that potential preparedness strategies are also identified during the mitigation planning process. Preparedness (vs. mitigation) is focused more on shorter-term effects and responses, which can include:

- planning (e.g., emergency action plans, continuity plans, evacuation plans)
- monitoring, communication systems, & crisis communications
- training, drills, & exercises
- education & awareness programs
- emergency response/recovery tools, supplies, equipment, & resources

There is not a “bright line” between mitigation and preparedness, and preparedness activities can also help to save lives or mitigate losses. As such, the plan update steering committee determined that it was important to include the following recommended preparedness activities within this mitigation plan, which can serve as a guide for programming and integrated preparedness planning. However, since preparedness activities are not required to be included in a mitigation plan, additional implementation details are not provided for each; a variety of organizations and collaborative partnerships would have roles.

It is also very important to note that **the following list of preparedness strategies is not comprehensive and, generally, does not include current plans, programs, and initiatives.** These are potential recommendations in addition to existing County plans and programs, such as the County’s *Emergency Operations Plan* and the *Public Health Emergency Preparedness Plan* as well as the preparedness activities of many other public, private, and nonprofit partners.

Preparedness Strategy Alternatives	Priority
Planning	
1. Update the Polk County Continuity of Government (CoG) Plan for essential services and critical business functions. Identify what services/staff are essential during recovery and a long-term pandemic.	Medium
2. Encourage local businesses and organizations to create preparedness and continuity of operations plans, including efforts to encourage employee preparedness at home.	Medium
3. Assess and inventory equipment, facilities, critical resources, and capabilities needed to stabilize an emergency situation (e.g., What are the barriers to responding to and managing a Haz Mat spill, active shooter event, tornado event, etc.).	Medium-to-High
4. Continue to strengthen communication and coordinate with the St. Croix Chippewa Band on emergency planning and hazard mitigation efforts, including the involvement of Tribal representatives and facilities in exercises.	Medium
5. Encourage local units of government and emergency response agencies to: (1) adopt equipment billing rates or the WDOT rates; (2) ensure that existing mutual aid agreements contain necessary language to qualify for FEMA grant reimbursement, and (3) adopt written mutual aid agreements for public works support. As an alternative to (3), a countywide public works mutual aid agreement could be discussed. Invite St. Croix Chippewa Tribal officials to be part of such discussions.	Medium
6. Review the County Emergency Operations Plan for opportunities to address the needs of individuals with household pets and service animals following a major disaster or emergency as required by the 2006 PETS Act. Distribute related guidance to municipalities for incorporation into their emergency plans. Involve Red Cross in these conversations for sheltering. If a shelter will not accept pets, seniors will often prefer stay home or resist evacuation.	Medium-to-Low

7. Continue to encourage multi-jurisdictional collaboration on emergency planning and disaster mitigation, including the sharing and coordination of resources across county lines.	Very High
8. Review County emergency plans and regulations for the disposal of carcasses during a mass animal casualty event. Identify potential locations of disposal or acceptable characteristics of such locations.	Medium
Communications	
1. Maintain and update pre-made templates and public messaging strategies for crisis communications by public information officer use.	Medium-to-High
2. With various partners and community lifeline facilities, create a coordinated crisis communications infrastructure plan. Include an approach for large-scale public information sharing (i.e., how will County, local responders, etc. provide non-emergency information to the general public?).	Very High
3. Maintain and enhance mass notification systems (e.g., Code Red, I Am Responding).	Very High
4. Continue to address gaps in cellular and broadband coverage, especially for emergency response partners.	High
5. Reassess County and community interest in activating emergency sirens centrally via County Dispatch.	Medium-to-Low
6. Promote private-public partnering for greater community resilience. Explore opportunities to strengthen communications and resource sharing with private-sector businesses during a disaster event, perhaps including a liaison within the County's EOC/ICS structure.	Medium-to-High
7. Provide technical or coordinating support to towns, camps, and lake groups that are interested in the installation of weather/emergency warning sirens. Explore grant opportunities.	Medium
8. Through relationship building activities and frequent, shared communications, work to strengthen public trust in recommended immunizations and Public Health messaging.	Very Low
Education & Outreach	
1. Increase subscriptions to the County's mass notification system. Create a standard "ad" and/or flyer than can be used locally, by the ADRC, etc.	Medium
2. Educate communities and partners on the availability of the CodeRed system for emergency notification and how to request use of this system. Establish related policies as necessary, including the role of County GIS staff.	Medium
3. Increase awareness of and participation in Wisconsin 211.	Medium
4. Foster greater personal and household self-sufficiency. Continue or enhance educational efforts to the general public on hazard risks, severe weather warning systems and sirens, Code Red/related smart phone apps, safe room/storm shelter availability, where to access power outage information, pet preparedness, emergency/disaster supplies kits, etc. Conduct outreach in conjunction with Severe Weather Awareness Month, National Preparedness Month, and community events. During the winter, include education on winter-related risks and driver safety. Provide an "outreach kit" with materials for use by municipalities, schools, and major employers.	Medium-to-High
5. Create and distribute educational materials targeting tourists and seasonal visitors on severe weather warning systems, warning sirens, and Code Red.	Low
6. Working with major employers, schools, and communities, increase public awareness of emergency- or disaster-related volunteer needs (e.g., firefighters, EMS, Red Cross Disaster Action Team, general support) and identify a reliable social media strategy for communicating with potential volunteers during times of disaster.	Medium-to-High
7. In collaboration with Extension, establish an educational outreach program focused hazard awareness, preparedness, and mitigation for the agricultural community.	Medium
8. Encourage large employers to consider becoming a member of the Wisconsin Business Emergency Operations Center (WI BEOC).	Low
9. Conduct an educational initiative to increase the preparedness of campgrounds, RV parks, and resorts to severe weather and wildfire, including promoting use of weather radios, the identification of storm shelters/safe rooms, and making visitors aware of risks and warning systems.	Medium
10. Encourage households with persons having special needs that may be uniquely at risk during a power outage or disaster (e.g., oxygen, dialysis, seniors living alone) to develop an emergency contact plan. Encourage these households to sign-up for Code Red and to notify their electric provider.	Medium-to-High
11. Encourage municipalities to adopt road and driveway design standards with local fire department input. Work with Towns to address non-conforming driveways and street/address signage.	Medium-to-Low
12. Polk County Emergency Management will continue to provide bi-annual presentation(s) to the Towns' Association on available resources and hazard event reporting and offer elected officials training every 2-4 years on NIMS/ICS, responsibilities, reporting, lessons learned, etc.	Medium

13. Collaborate with school districts and youth organizations to engage and educate younger residents on emergency management, preparedness, and mitigation topics. Promote the use of the Student Tools for Emergency Planning (STEP) curriculum.	Medium
14. Continue monitoring, educational, and outreach efforts related to blue-green algae blooms and invasive species, including related health risks and related best practices. Utilize Code Red for public health messaging if a harmful bloom is occurring.	Low
Training & Exercises	
1. Increase awareness of incident command system and public information officer training opportunities for local government officials and school districts, including the relationship of such training to local emergency plans.	Medium
2. Continue to provide training to cities, villages, and towns on emergency action planning, emergency declarations, and post-disaster procedures. Consider regular meetings (every 1-2 years) where municipalities and roads/public works departments can share lessons learned. Include education on debris management, volunteer management, and existing plans for critical facilities as well as clarifying relationships with VOADs and other support agencies.	Medium-to-High
3. Conduct a robust long-term power outage exercise (or exercise series) covering key logistical and critical needs, such as road clean-up, mutual aid and lodging for ROPE crews, public messaging, impacts to communications systems, coordination with road crews (e.g., snow removal, tree/debris clean-up), oxygen-dependent populations, shelter activation, and emergency fuel/generator availability. Prepare an after-action report with strategic priorities. Could potentially include a high voltage emergency training unit demonstration by Polk-Burnett Electric Cooperative.	Medium
4. In partnership with Northwood Technical College, OSHA, and Red Cross, support shared training for businesses, the public sector, and other employers to meet employment or operational requirements.	Medium-to-Low
5. Conduct a tabletop exercise that assesses the damage, implications, and response capabilities of a failure of a high hazard dam (dam break).	Low
6. Invite Volunteer Organizations Active in Disaster (VOADs), such as the Red Cross and Salvation Army, to be part of County emergency exercises and planning.	Medium
Patient Care, Mass Care, & Sheltering	
1. Update, maintain, and share emergency shelter lists, with available basic resources (e.g., power generators, cots, kitchen, AEDs) and operational information (e.g., availability limitations, responsibilities, contacts) for warming and cooling shelters. <i>(see related mitigation strategies)</i>	Medium
2. Update, maintain, and share emergency shelter lists, with available basic resources (e.g., power generators, cots, kitchen, AEDs) and operational information (e.g., availability limitations, responsibilities, contacts) for short-term and long-term shelters.	Medium
3. Plan for emergency transportation options, especially for seniors, should a large-scale evacuation be needed. Include pets in such plans and policies. Test and refine the plan as part of a future exercise scenario and incorporate any lessons learned into the County's emergency operations plan.	High
4. Encourage responders to participate in training for the handling of animals during an emergency. Consider emergency planning related to the management of livestock at the Fairgrounds during a hazard threat or other emergency.	Medium
Other Threat-Specific Preparedness Actions	
1. Active Threats – Initiate a “see-something, say something” campaign that offers systems to report active threat concerns and increases public and private awareness and comfort in reporting such concerns.	Medium-to-Low
2. Fuel Shortage - Assess needs, logistics, and supply chains regarding the availability of emergency fuel supply for essential services during regional fuel shortages. <i>(see related mitigation strategy)</i>	Medium
3. Power Outage - Assess needs, logistics, and supply chains regarding the availability of generators/alternative power supply for essential services during a long-term power outage. <i>(see related mitigation strategy)</i>	High
4. Wildfire - Polk County, municipalities, and fire departments in the Intensive Fire Protection areas should continue to advocate for and participate in WDNR wildland training exercises.	Medium

<p>5. HazMat - Encourage continued local fire department participation in HazMat incident training coordinated by Polk County Emergency Management.</p> <ul style="list-style-type: none"> • Regularly rotate HazMat exercises and training throughout Polk County with a particular focus on those chemicals commonly transported by rail or highways or at fixed facilities within the local host community. • Consider training in more advanced HazMat response techniques and co-training with a contracted HazMat Team. • Include local industry, Public Health, and other response agencies in training. • Invite the Wakota Caer group to share their available resources for river spill events <p>Invite EHS facilities give presentations on their hazardous materials, facilities, and plans at fire chiefs' meetings.</p>	Medium-to-High
<p>6. HazMat - Work with local communities to increase public awareness of available "Clean Sweep" programs and other methods for the proper disposal of hazardous waste. Encourage State legislators to provide additional funding support for such programming. Work toward establishing a continuously available drop-off site.</p>	Medium
<p>7. HazMat – Conduct community education on PFAs and the relationship to water quality. Continue educational efforts on the risks to private wells and the importance of well testing.</p>	Low
<p>8. Agriculture-Related – Conduct a meeting of agricultural disaster assessment team members (i.e., Emergency Management, FSA, NRCS, Extension, Land Conservation) to discuss emergency procedures, plans, responsibilities, and trends. Invite participation from Public Health (e.g., how is Public Health notified if a manure spill potentially impacts a well?). Monitor agricultural threats and activate the team when needed.</p>	Medium-to-Low

E. CITY, VILLAGE, & EDUCATION INSTITUTION SUB-PLANS

Appendices K & L are sub-plans or “mini-plans” for the participating cities, villages, and educational institutions. The sub-plans are part of the County’s overall mitigation plan, including its community profile, hazard assessment, capacity assessment, and mitigation goals. Many of the county-level mitigation and preparedness strategies Sections VI.C & VI.D. are also multi-jurisdictional in nature. However, this sub-plan approach provides each participant with a more focused assessment of the hazard threats and mitigation solutions for their specific community or facilities, which is more convenient and accessible for these communities and schools for monitoring plan implementation and future plan updates.

As described in Section I.C., the cities and villages actively participated in the planning process through: individual meetings with the plan facilitator (WCWRPC) and, often Polk County Emergency Management; completion of a capabilities assessment survey; and review of their draft sub-plans. The participating educational institutions were invited to participate in a web-based mitigation planning virtual webinar and completed a comprehensive, web-based survey that was used to create their draft sub-plans, which were then reviewed and modified as needed.

When identifying the recommended strategies in the sub-plans, the same criteria and general approach were considered as described in Section VI.B., though the method of review and prioritization was at the discretion of each city, village, and educational institution.



In addition to mitigation strategies, each sub-plan includes:

- A recognition of economically disadvantaged rural communities and socially vulnerable populations.
- A risk assessment, including past events and potential vulnerabilities
- A capabilities assessment.
- Any key barriers to plan implementation, which were considered when identifying strategies and resources to overcome or lessen these barriers.
- A plan maintenance, update, and adoption approach.

Each mitigation plan participant is expected to approve and/or adopt the updated mitigation plan as a whole. It is understood that, prior to the next full mitigation plan update, any individual plan participant may modify/amend their own sub-plan without requiring approval/adoption of the full plan by Polk County or any other participant.

F. PLAN IMPLEMENTATION

The mitigation strategies in Section VI.C. and the sub-plans include recommended priorities & timelines, a primary responsible party(s) who would normally take the lead in initiating or implementing each recommendation, and potential funding or other resources for each. The county-wide strategies in Section VI.C. include additional implementation guidance.

Appendix I includes a synopsis of some commonly used hazard mitigation grant funding sources with a focus on natural hazards. Additional information on Federal grant funding can be found at www.cfda.gov. FEMA maintains an informative webpage describing their mitigation grant assistance programs that are key to implementing many of the strategies in this plan update. Some infrastructure improvements may also be funded locally through the establishment of a stormwater utility district or ordinance fee system, tax incremental financing (TIF), general obligation bonds, and developer contributions or exactions. Capital improvements planning can be a valuable tool to assist communities in the planning and prioritizing of major infrastructure investments and identifying the best financing approach.

Additional sources of financial support are also often available following a disaster event, such as U.S. Small Business Administration (SBA) loans for the repair or replacement of property. The U.S. Department of Agriculture, through its local Farm Service Agency office, provides disaster assistance for crop losses and livestock emergencies. Grant funding for additional emergency measures, such as the rehabilitation of flood control works may be available through the U.S. Army Corps of Engineers. Non-natural hazards such as pandemics, school-based terrorism, nuclear accident, and hazardous materials spills typically have their own unique supportive services and funding resources, which are not included in Appendix I. In the event of an impending or recent disaster, municipalities and County

Emergency Management offices are encouraged to contact WEM and the agencies identified in Appendix I for potential assistance, since available resources and related requirements frequently change, and this list is not all-inclusive.

The prioritization of the strategies offers guidance in the implementation of this plan based on available resources and potential to reduce losses. But with these hazard risks and vulnerabilities also come opportunities to form or strengthen strategic partnerships to share and leverage existing resources, which is a primary theme within the plan goals.

Planning and policy strategies can often utilize existing program budgets for implementation, though funding would be required for many of the recommended projects. Some of these policy strategies may involve the amendment of an ordinance or the adoption of new procedures. Further, due to the

This Mitigation Plan is a guide.

- Actions should be prioritized based on need, potential of loss reduction, benefits-costs, and availability of resources (e.g., funding, staff).
- Actions and priorities may change as threats and opportunities change.
- Some recommended actions may require additional feasibility analysis.
- Individual municipalities may have different priorities.
- Partnerships and collaboration are encouraged to leverage resources and maximize results.
- It is recognized that not all strategies will be completed prior to the next plan update in five years.

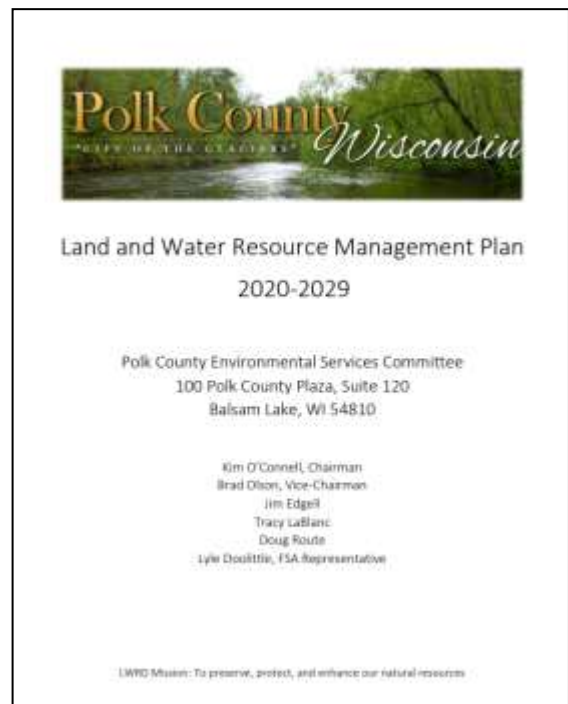
involvement of key officials and County departments during the planning process, the strategy recommendations are known to these stakeholders and can be integrated into, or coordinated with, other work programs and planning efforts.

Like many municipalities, Polk County and its communities are facing fiscal challenges and resources are limited. **The recommended strategies will be implemented as resources (e.g., funding, staffing) and as other priorities allow.** Further, because of such limitations, there is not an expectation that all strategy recommendations will be fully implemented between now and the next update of this plan.

G. PLAN COORDINATION AND INTEGRATION

Section IV summarizes how Polk County and its communities have integrated mitigation actions into other planning tools to date. Further, many of the mitigation and preparedness strategies in Sections VI and the sub-plans specifically reference other planning mechanisms that are vital to successful implementation such as:

- Comprehensive & land use plans Though they vary, most comprehensive plans typically include discussion on related topics, including vulnerable populations, flooding, emergency services, and other community lifelines. The mitigation recommendations in Section VI.C. and many of the sub-plans specifically advocate for integration of this mitigation plan into future comprehensive plan updates. Section VI.C. also recognizes the important roles that the County's *15-Year Comprehensive Forest Land Use Plan* and *Land & Water Resources Plan* have in addressing wildfire, stormwater management/flooding, drought, and invasive species.
- Regulations, agreements, & related procedures This includes floodplain ordinances/management, subdivision ordinances, burning permits, and stormwater management ordinances.
- Local capital improvements plans & other budget documents Most notable are infrastructure projects, such as those related to stormwater systems, water supplies, weather sirens, generators, and communications equipment, which must be considered as part of local budgets. Many of the stormwater and flash flooding hotspots in the previous mitigation plans were addressed by including these projects in the road improvement or capital improvement and stormwater management plans at the County or local level.



- Emergency preparedness & response plans Mitigation and preparedness recommendation reference County, community, and dam Emergency Action Plans, the County’s Public Health Emergency Preparedness Plan, continuity of government planning, and other related efforts. Some local municipalities need to update their emergency operating plans, and Polk County Emergency Management is taking the lead to encourage these updates. County Emergency Management and other County offices will also work cooperatively with stakeholders regarding plans, procedures, and grant applications related to long-term power outage, storm shelters and sirens, highway closures, communications systems, incident command, dams, etc. Polk County Emergency Management has also used the discussions on mitigation and preparedness strategies to guide the County’s Integrated Preparedness Plan (IPP), training considerations, and working planning. The IPP provides the most significant, new way to improvement plan coordination.

To date, integrating the strategies and recommendations found in past hazard mitigation plan into local comprehensive plans has been inconsistent. Some planning consultants working with local communities are unfamiliar with the details of the hazard mitigation plan, and the State comprehensive planning law includes no specific reference to mitigation or resiliency planning, though such a State law is being considered. Further, mitigation planning is on a different schedule than comprehensive planning, with most comprehensive plans likely to be updated no more frequently than once per decade.

As the mitigation plan strategies reflect, WCWRPC and Polk County staff will continue to work with local municipalities to encourage coordination and consistency between the hazard mitigation plan, and other community plans, and provide guidance on how to incorporate mitigation strategies into their comprehensive plans and other planning mechanisms. When made aware of local comprehensive planning efforts and updates, WCWRPC will contact municipalities to encourage them to consider the strategies found within the *Polk County Multi-Hazard Mitigation Plan*.

Continued, active involvement of key county staff, local jurisdictions, and other stakeholders during hazard mitigation plan updates is critical to ensuring incorporation of mitigation strategies into other planning mechanisms.

Since key County staff were actively involved in the development and update of the County mitigation plan, many of the mitigation strategies are based on staff recommendations and provide confidence that a high level of coordination between these various planning efforts will continue.

SECTION VII. PLAN ADOPTION & MAINTENANCE PROCESS

A. PLAN ADOPTION

Each participating municipality and educational institution, including Polk County, considered and adopted this plan. Governmental jurisdictions in Wisconsin are required to take such actions during a properly noticed, public meeting; public and stakeholder attendees are typically provided an opportunity to comment during these meetings. Section I.B. at the beginning of this plan includes additional information on the County's plan adoption process. Polk-Burnett Electric Cooperative also actively participated in and approved the 2024 Mitigation Plan update. Copies of the adopting documents are included in **Appendix A**.

B. PLAN MAINTENANCE & CONTINUED PUBLIC PARTICIPATION

Past reviews of the County's mitigation plan were primarily limited to a periodic internal review by the County Emergency Manager. No special plan reviews or plan amendments were needed. The Steering Committee for this plan update (2024 Mitigation Plan) engaged in a lengthy discussion on plan maintenance and ways in which the public and other stakeholders can actively contribute, which are summarized below.

i. Plan Monitoring and Annual Plan Reviews

Polk County's 2024 Mitigation Plan will be evaluated on an annual basis in order to determine if the plan has become obsolete, if conditions have changed within the County, or if new technologies/approaches to hazard mitigation have become available.

Each year, starting in Fall 2025, Polk County, through its Emergency Manager, will complete an annual review of the Mitigation Plan, unless a plan update is already in progress. This review may be performed concurrently with other work planning, such as Integrated Preparedness Plan (IPP) updates. The annual plan review should consider aspects of the plan, such as the following:

- Progress on mitigation plan recommendations, including the suggested timelines and the pursuit of related mitigation grant funding. Regularly, update the IPP to reflect any changes in needed education, training, and outreach.
- Any significant changes in vulnerabilities, priorities, or trends, including to vulnerable populations, community lifelines, and weather/event patterns.
- Any significant changes in capabilities or barriers to plan implementation.
- Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms).
- Potential new mitigation and preparedness strategies, projects, or grant opportunities.

- Any new mandates, rules, etc. as well as any input received from Wisconsin Emergency Management (WEM) and the Department of Homeland Security--Federal Emergency Management Agency (FEMA) regarding plan implementation.
- Any comments or discussion with the public, partners, or other stakeholders.

During the plan update process, the ad hoc steering committee expressed an interest in continuing to meet as a coordinating and advisory group to the County Emergency Manager on mitigation and preparedness (i.e., a County “mitigation & preparedness committee” or work group). If any critical issues or potential plan amendments are noted during the Emergency Manager’s annual review of the plan, the Emergency Manager will provide a brief report to the “mitigation & preparedness committee”, which would include a diverse representation of community stakeholders. The committee will recommend any revisions to the plan, if necessary, which would be forwarded to the County Board for its consideration and action. The Emergency Manager may also need to follow-up with participating jurisdictions, various County offices, and other stakeholders during this process. West Central Wisconsin Regional Planning Commission (WCWRPC) is available to aid if needed at any time during this process.

Public involvement and comments will be welcomed during this plan maintenance process. The “mitigation & preparedness committee” and County Board meetings are subject to the Wisconsin Open Meeting Law and will be properly noticed as required by State Statute, including at the County’s website. Through these public notices, the public, local communities, and other stakeholder organizations are invited to attend and actively participate.

ii. Special Plan Reviews (Post-Disaster or New Project)

Within three to six months following a significant disaster event, the Emergency Manager, at their discretion, may conduct a special post-disaster review for consistency with the mitigation plan. A municipality or the County Board may also request a special plan review for the consideration of a plan amendment to introduce or modify a mitigation project or strategy that was not included in the original plan, perhaps due to unforeseen circumstances, changes in resources, or a changing hazard risk. The special review may occur concurrently with the annual review described previously.

Information regarding the recent disaster or new project will be collected and considered by the Emergency Manager. If a mitigation plan amendment is potentially needed, this information will be provided to the “mitigation & preparedness committee” for their review and recommendation during a public meeting. As appropriate, recommended changes to the plan will be forwarded to the County Board and potentially the municipal contacts of the participating jurisdictions for their action and consideration.

iii. Plan Updates

Every five years, the hazard mitigation plan will be comprehensively reviewed, current data collected, and updated. It is recommended that the plan update process begin no later than November 2028 to allow for completion and adoption prior to the expiration of the 2024 Mitigation Plan. This plan update effort should be robust and incorporate opportunities for public involvement to meet all requirements of 44 CFR Part 201.6 and/or any applicable planning guidelines, requirements, or

regulations developed or updated in the interim. Overall, the plan update process is expected to be similar to the process used for this mitigation plan update described in Section I, with the “mitigation & preparedness committee” serving as the plan update steering committee.

Each update of Polk County’s mitigation plan has strengthened weaknesses or incorporated opportunities since the previous plan. Some potential changes for the next County mitigation plan update include:

- The 2024 Mitigation Plan was significantly restructured within Sections II.C., III.D, IV, VI.D. and the city/village/school subplans in particular. While this required additional time for this update, this is anticipated to “streamline” and simplify future plan updates.
- Strive to include additional private-sector and Tribal participation on the plan update steering committee. Include lunch or snacks as part of steering committee meetings.
- There was low participation among the school districts and fire chief’s survey for this plan update; additional efforts will be made to increase participation rates, potentially in concert with County Public Health outreach efforts.
- As part of the next plan update, the steering committee will be asked to identify specific sub-group meetings and public outreach activities targeting certain vulnerabilities (e.g., ESL, seniors), threats (e.g., ag/avian flu, cybersecurity), or mitigation measures (e.g., nature-based solutions, low impact development, code enforcement).
- Work with the plan update steering committee to identify additional ways to engage the public, community lifelines, and vulnerable populations as part of the mitigation planning process.
- Increase the use of digital capabilities and web-based tools during the plan update for data analysis, sharing key information, and obtaining public/stakeholder input.

APPENDIX A.

ADOPTING RESOLUTIONS AND ELECTRIC COOPERATIVE LETTER

INSERT ONCE ADOPTED

APPENDIX B.

**STAKEHOLDER INTERVIEWS
AND MEETINGS**

Polk County Multi-Hazard Mitigation Plan Key Stakeholder Interview List

The following constitute the key stakeholders who were interviewed and provided input during the development of the draft plan. Municipalities, the Steering Committee, and other stakeholders also provided additional input during the review of the draft plan strategies and plan adoption process.

Interviewee	Title/Notes	Date
Village of Balsam Lake	3 village attendees	3/14/23
Village of Centuria	3 village attendees	3/7/23
Village of Clayton	3 village attendees	3/31/23
Village of Clear Lake	1 village attendee	3/31/23
Village of Dresser	4 village attendees	3/14/23
Village of Frederic	6 village attendees	3/7/23
Village of Luck	4 village attendees	3/7/23
Village of Milltown	6 village attendees	3/7/23
Village of Osceola	1 village attendee	3/31/23
City of Amery	3 city attendees	3/14/23
City of St. Croix Falls	3 city attendees	3/31/23
Town's Association	meeting + every town sent a follow-up survey	1/26/23
Fire Chief's/EMS	brief presentation & distributed survey	11/11/22
County Steering Cmte	Steering Committee meeting #1	11/10/22
County Steering Cmte	Steering Committee meeting #2	1/25/23
County Steering Cmte	Steering Committee meeting #3	6/15/23
County Steering Cmte	Steering Committee meeting #4	9/11/23
County Steering Cmte	Steering Committee meeting #5	3/26/24
Lisa McMahon	Polk County Emergency Management	various dates
Jason Kjeseth	Zoning Administrator, Polk Co. Zoning	5/18/23
Brad Runeberg	GIS Coordinator, Polk County Land Information + follow-up data & analysis	9/12/23
Justin Reese	Operations Manager, Polk Co. Highway Dept.	6/15/23
Helen Eddy, Jason, Tonya Eichelt	Polk County Public Health	7/14/23
Eric Wojchik	County Conservationist, Polk Co. Land & Water Resources	5/18/23
Don Wortham	Polk County General Government Director	7/14/24
Brent Sisko	Forest Administrator, Polk County	5/18/23
Laura Wagner	Director, Polk Co. Aging/ADRC	9/12/23
Scott Good	Director, Polk County Information Technology	7/17/23
Mike Ninke	Director, Polk County Parks & Trails	5/18/23
Jesse Seering & Jarod Boerst	Polk-Burnett Electric Cooperative + follow-up data	4/27/23
Terry Hauer	Polk County Economic Development Corporation	7/13 & 7/14/23

Jenny Legaspi	American Red Cross	8/7/23
Jacob Druffner	Water Reg. & Zoning Engineer, WisDNR	7/26/23
Benjamin Garrett	WDNR – Forestry Specialist, Spooner Station	7/26/23
Adjacent County Emgy Mgmt and WEM	Emergency Management Directors of adjacent counties were contacted for input as well as Lisa Olson-McDonald at the Regional WEM Office	July 2023
9 Xcel Energy Staff	email exchange on risks, LTPO, dams, etc.	Nov-Dec 2023

Additional Documentation

The following additional documentation is attached for reference:

- agendas and sign-in sheets for Plan Steering Committee meetings
- sign-in sheets for meetings with the municipalities

Most of the above meetings were informal and did not include a quorum of elected officials. As such, official minutes were typically not maintained or later approved. This was also a cost-savings measure since keeping official notes or detailed minutes for every meeting is time consuming.

Instead, the planning consultant would write-in notes and needed corrections directly onto materials used during the meetings. This approach was very effective and efficient because this was a plan update. For instance, during the community meetings, key sections from the previous plan (i.e., list of strategies, current mitigation activities table, hazard risk table, meeting notes) were printed, along with a map of the community with key features shown. Then during the community meetings, the consultant and community discussed the community’s risks, activities, and strategies noted in the previous plan, then made corrections and additions directly to these documents.

**Polk County
Multi-Hazard Mitigation Plan Steering Committee
Meeting #1 – Plan Update Kick-Off Meeting**

**2:00 PM January 26, 2023
Polk County Justice Center Community Room**

AGENDA

- I. Introductions & Sign-In Sheet**
Goals:
 - Committee members share their roles/responsibilities
 - Brainstorm disaster/hazard concerns for Polk County

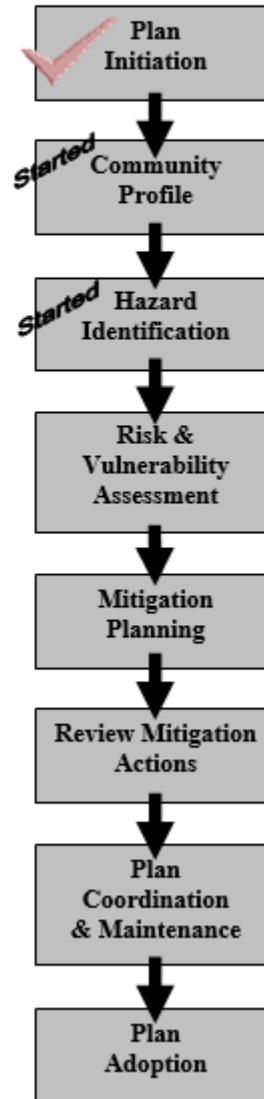
- II. Review Project Scope & Related Brochures**
Goals:
 - Familiarize committee with hazard mitigation planning, why it is important, and related grants
 - Obtain input on the scope of plan update
 - Discuss what is the Integrated Preparedness Plan and its Relationship to capabilities and community lifelines

- III. Planning Process for Polk County**
Goals:
 - Obtain input on tent. project timeline & Committee’s role
 - Obtain input on multi-jurisdictional involvement and public participation; identify any additional stakeholders

- IV. Community Profile**
Goals:
 - Discuss demographic, economic, and land use trends
 - Discuss disadvantaged communities and community lifelines
 - Discuss implications for disaster vulnerability and mitigation

- V. Plan Scope & Risk Prioritization Survey**
Goals:
 - Review hazards in 2017 plan and recent disaster declarations involving Polk County
 - Identify any additional key hazard events or trends since 2017
 - Identify any related plans or plan coordination opportunities
 - Identify any additional issues or opportunities
 - Review risk prioritization survey homework

- VI. Next Steps in the Process**
Goals:
 - Review homework deadline
 - Review key activities for February-April
 - Discuss next Committee meeting date

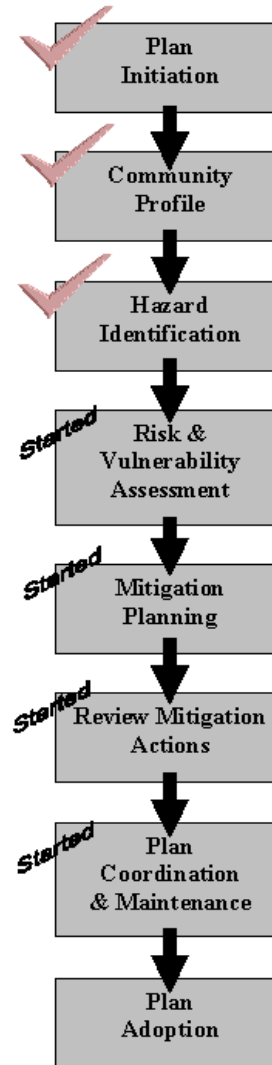


**Polk County
Multi-Hazard Mitigation Plan Steering Committee
Meeting #2**

**11:00 AM June 15, 2023
Polk County Justice Center Community Room**

AGENDA

- I. Introductions & Sign-In Sheet**
- II. Update on Planning Process for Polk County**
Goals:
- Obtain input on progress and project timeline
 - Obtain input on multi-jurisdictional involvement and public participation; identify any additional stakeholders
- III. Review Risk Survey Results & Hazards of Concern**
Goals:
- Briefly review and discuss results of Committee's risk survey
 - Obtain any additional insights into hazard threats or trends
- IV. Highlights from City & Village Meetings / Town Surveys**
Goals:
- Review and discuss key concerns, challenges, trends, preparedness actions, and mitigation strategies from municipalities
 - Discuss any potential multi-jurisdictional mitigation strategies
 - Discuss any potential integrated preparedness, training, or educational actions as well as how "non-mitigation" actions are best addressed in the mitigation plan update
 - Discuss any other related plans, private-public partnerships, or other collaboration opportunities
- V. Review Plan Goals**
Goals:
- Have the 2017 plan goals changed? (see reverse side)
 - Does input to date suggest other goals or priorities?
- VI. Discuss Plan Coordination & Maintenance**
Goals:
- Identify any related plans or planning mechanisms.
 - How can plan coordination be encouraged or improved?
 - How will the County track/monitor and evaluate the plan?
 - How will the public participate in maintaining the plan?
- VII. Next Steps in the Process**
Goals:
- Review things to be completed in June and July
 - Discuss Mitigation Alternatives "Homework" by Committee
 - Discuss next Committee meeting date (August)



**Polk County
Multi-Hazard Mitigation Plan Steering Committee
Meeting #3**

**11:00 AM September 12, 2023
Polk County Justice Center Community Room**

AGENDA

- I. **Introductions & Sign-In Sheet**
- II. **Update on Planning Process for Polk County**
Goals:
 - Obtain input on progress and adjust approach/timeline if necessary
- III. **Review Mitigation Plan Goals**
Goals:
 - Update the goals to reflect an “all hazards” approach
 - Identify issues or trends that impact or influence the goals
 - Have priorities or vision changed since 2009 Comp Plan?
 - How should climate trends be addressed within the plan?
- IV. **Discuss County Capabilities & Plan Coordination**
Goals:
 - Identify any related plans or planning mechanisms.
 - How can plan coordination be encouraged or improved?
 - Identify gaps in capabilities and training needs
 - Discuss any potential integrated preparedness, training, or educational actions as well as how “non-mitigation” actions are best addressed in the mitigation plan update
 - Discuss opportunities to enhance capabilities and resiliency and expand on & improve existing policies and programs
- V. **Plan Maintenance**
Goals:
 - How will the County track/monitor and evaluate the plan?
 - How will the public participate in maintaining the plan?
 - Will process or scope for next plan update be different?
- VI. **Example Safe Room Projects (as time allows)**
- VII. **Next Steps in the Process**
Goals:
 - Review things to be completed in September and October
 - Discuss Mitigation Alternatives “Homework” by Committee
 - Discuss next Committee Meeting #4 meeting (Oct-Nov)



**Polk County
Multi-Hazard Mitigation Plan Steering Committee
Meeting #4**

**1:00 PM March 26, 2024
Polk County Justice Center Community Room**

AGENDA

- I. Introductions & Sign-In Sheet**
- II. Update on Planning Process for Polk County**
Goals:
- Provide an update to the Committee on overall process
- III. Criteria for Prioritizing Mitigation Actions**
Goals:
- Identify criteria for the final selection & prioritizations of alternative mitigation projects and policies
- IV. Mitigation & Preparedness Recommendations**
Goals:
- Review mitigation & preparedness “homework” results
 - Identify any recommendation changes or additional strategies
 - Identify/confirm priorities
 - Discuss resources & timelines for recommendations
- V. Plan Implementation - Example Mitigation Projects**
Goals:
- Provide an overview of the related FEMA mitigation grants
 - Familiarize the Committee with example eligible projects
 - Discuss any additional implications or related plan changes
- VI. Next Steps & Moving Forward**
Goals:
- Review & provide comment on draft plan, especially the recommendations
 - Provide guidance to communities during adoption phase
 - Does the Committee have a continuing role?
 - Thank you!



Appendix B: Stakeholder Interviews & Meetings

DATES	SIGNATURE	TITLE	ACTIVITY
3/7		Village Clerk	Milltown Mtg
3/7		FIRE CHIEF	Milltown Mtg
3/7		Utility Clerk	Milltown Mtg
3/7		Police Chief	Milltown Meeting
3/7		D.P.W.	Milltown
3/7		Public Works	Milltown
<hr/>			
3/7		FIRE CHIEF DPW	Centuria
3/7		CAPT FD Public Works	Centuria
3/7		Clerk/Treasurer	Centuria
<hr/>			
3/7		DPW	Luck
3/7		Clerk	Luck
3/7		Clerk	Luck
3/7		Police Chief	Luck

DATES	SIGNATURE	TITLE	ACTIVITY
3/7			Frederic Mtg
3/7		Police Chief	"
3/7		Deputy Clerk/Treasurer	
3/7		Clerk Treasurer	
3/7		Frederic Fire	"
3/7		Frederic Fire Chief	
3/7		Director of Public Works	"
<hr/>			
3/14		Director of Public Works	Balsam Lake
3/14		Clerk-Treasurer	Balsam Lake
3/14		Village President	Balsam Lake
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3/14		Clerk-Treasurer	Ameny
1		PWD	"
		Administrator	"

DATES	SIGNATURE	TITLE	ACTIVITY
3/1/23		Public Works	Dresser
3/14/23		Public Works	"
3/14/23		Clerk/Treasurer	"
3/14/23		Chief of Police	"
<hr/>			
7/2/23		Cities Administrator	St. Croix Falls
3/20/23		Police Chief	St. Croix Falls
3/23/23		DPW	St. Croix Falls
<hr/>			
3/31		Clerk-Treasurer	Clear Lake
<hr/>			
3/31		DPW	Clayton
3/30		Clerk/Treasurer	
<hr/>			
3/31		Administrator	Osceola

APPENDIX C.

PUBLIC INFORMATIONAL NOTICE

PUBLIC NOTICE

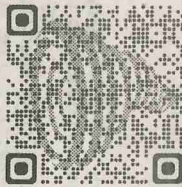
PLEASE TAKE NOTICE that Polk County Emergency Management is inviting comment and input from residents, businesses, area organizations, and communities regarding the draft Polk County Multi-Hazard Mitigation Plan, 2024-2029 and any needed projects to reduce or eliminate hazard risks to residents and property.

Polk County has recently completed a draft update of the County's Multi-Hazard Mitigation Plan, which is a pre-requisite for certain FEMA grant funding. Hazard mitigation actions are essential to creating a disaster-resilient community and breaking the disaster cycle of damage, reconstruction, and repeated damage, thus saving taxpayer dollars. Example mitigation activities include the community safe room (storm shelter) within the Luck High School gym addition but can also include actions such as not building in flood prone areas and burying power lines in areas prone to outages.

A copy of the draft plan is available for review at the County Emergency Management offices within the County Judicial Center (1005 W. Main Street, Balsam Lake) or is available for download at: <https://www.wcwrpc.org/hazard-mitigation-planning>.

The public is invited to provide comment as the draft plan is finalized. Comments may be submitted online at: <https://www.surveymonkey.com/r/PolkCoHazMit> through November 30, 2024. Any questions or written comments on the draft plan may also be directed to Lisa McMahon, Polk County Emergency Management, at 715-485-0064.

Lisa McMahon
Polk County Emergency Management Coordinator



Scan this QR Code with your phone to open the website to view the document and complete the feedback survey.

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Polk County.

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State of Wisconsin

_____ Kimberly Talmadge
being duly sworn, says that she is the _____ Office Manager of
INTER-COUNTY LEADER

_____ which is a weekly newspaper printed and published at

FREDERIC

in said county and state, that a notice, of which the annexed is a printed copy taken from said newspaper, was printed and published in the full regular edition of said newspaper once each week for _____ one _____ successive weeks commencing and the first publication on the _____ day of _____, 20 _____

being _____ one _____ such publications.
_____ Kimberly Talmadge _____ Office Mgr

Subscribed and sworn to before me this _____ day
of _____, 20 _____

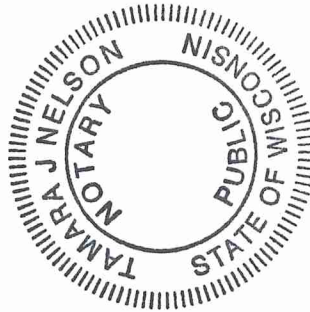
_____ Tamara J. Nelson
Notary Public, Polk County, Wis.

My Commission expires _____
FEES: _____ 2x5 Notice _____ one week at _____ per WK=\$105.00
_____ weeks at _____ per _____

Affidavit \$1.00

_____ \$106.00

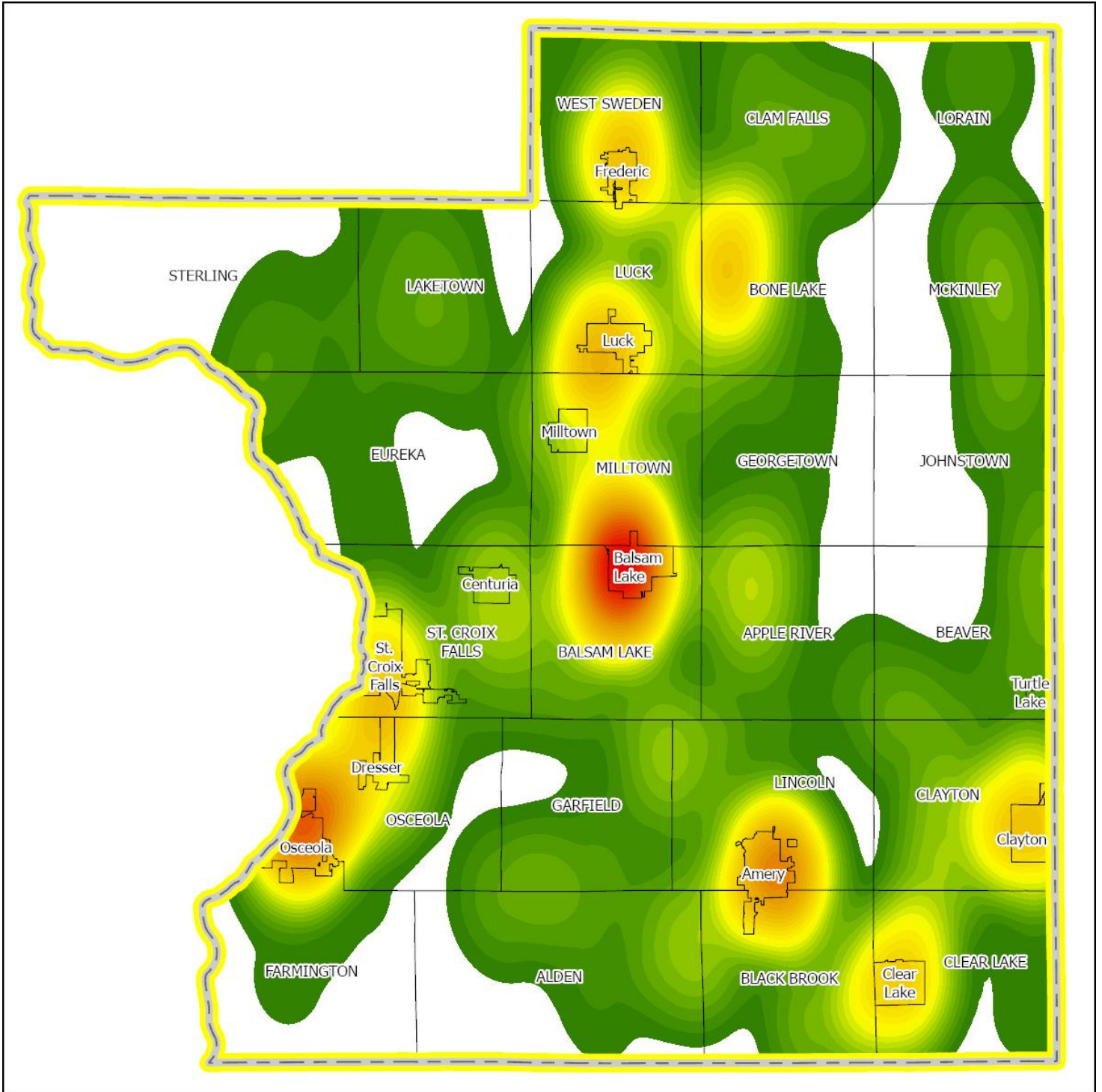
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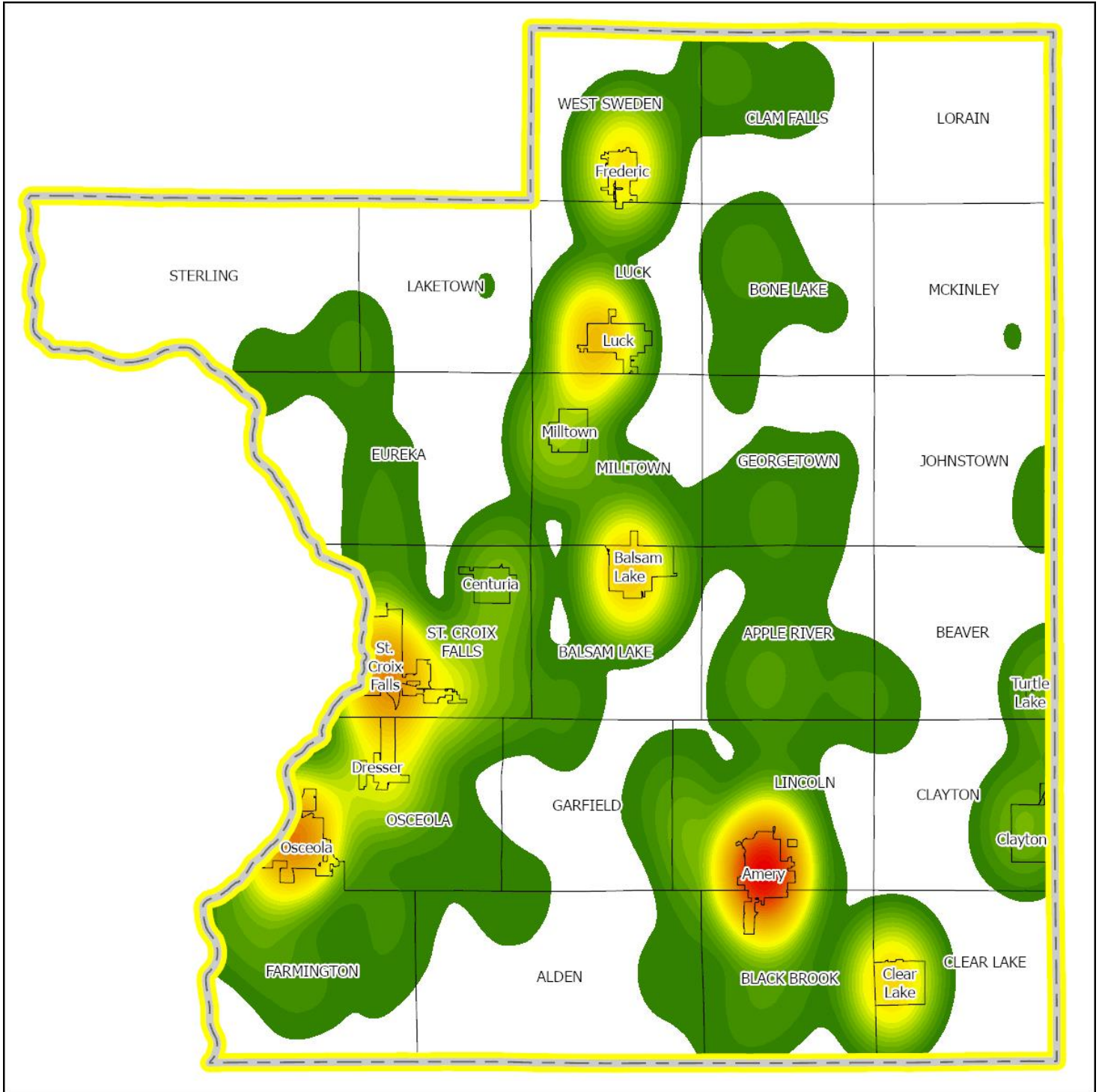
APPENDIX D.

DISTRIBUTION OF COMMUNITY LIFELINES

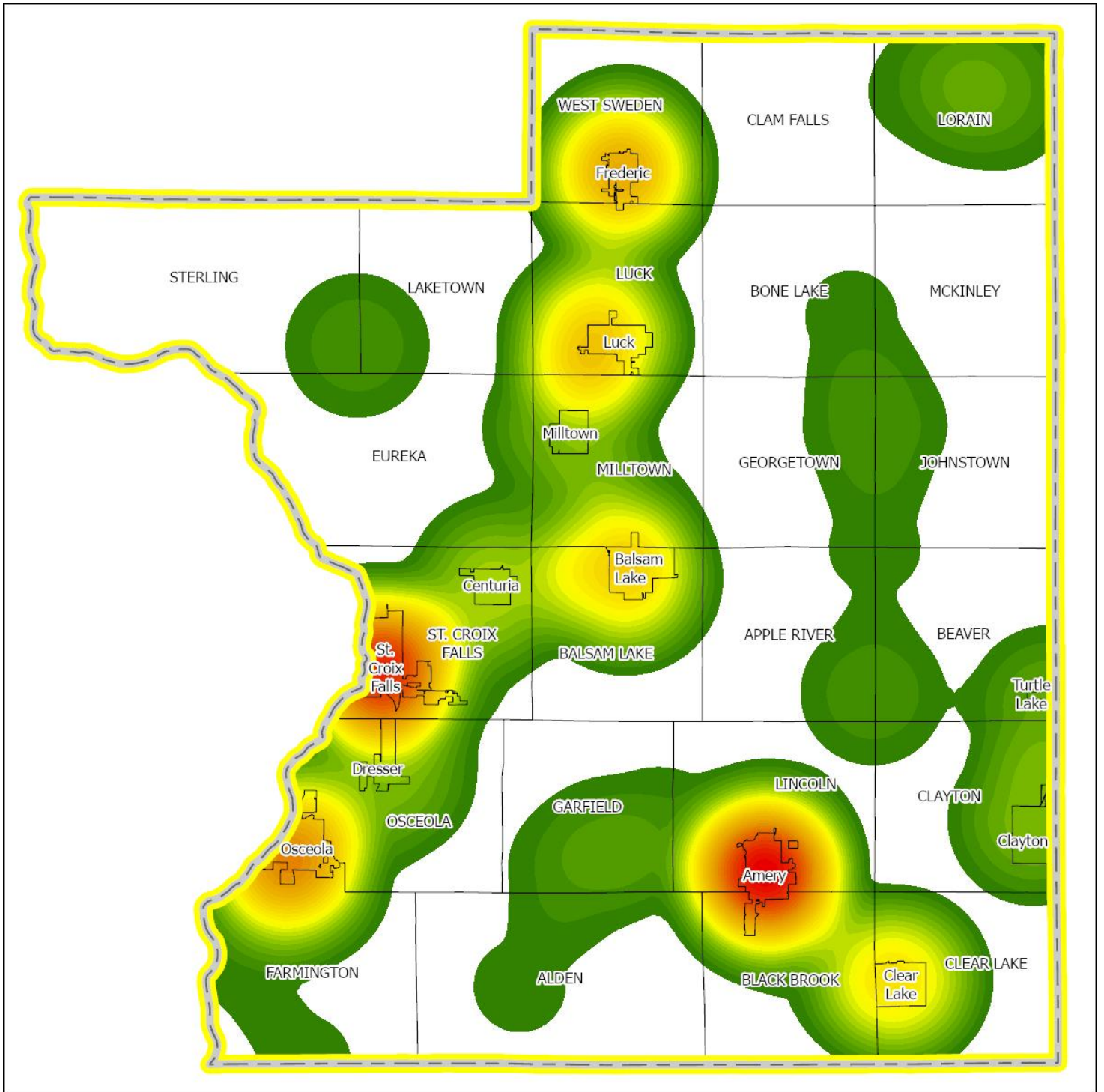
DISTRIBUTION OF SAFETY & SECURITY LIFELINES



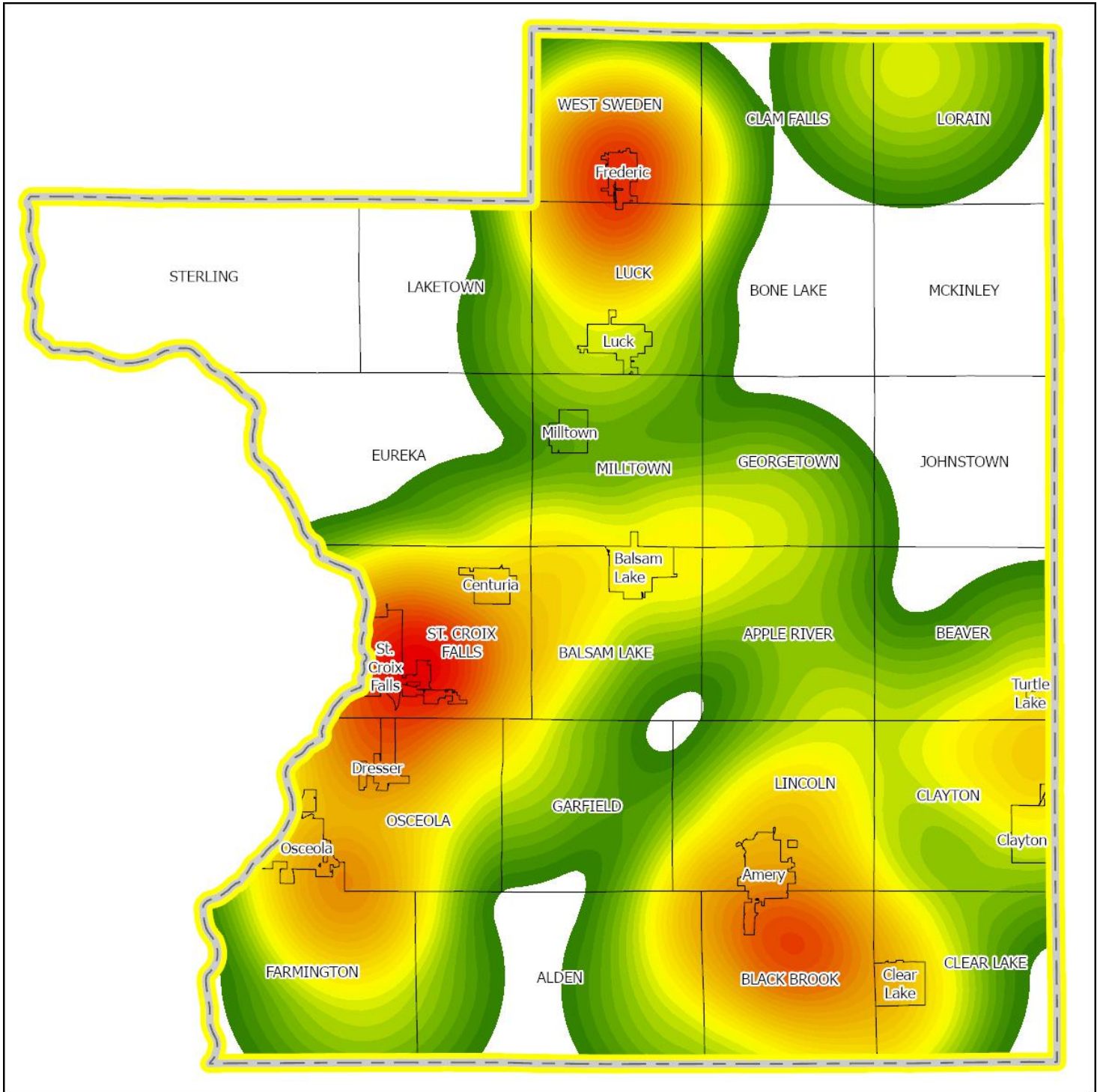
DISTRIBUTION OF FOOD, HYDRATION, & SHELTER LIFELINES



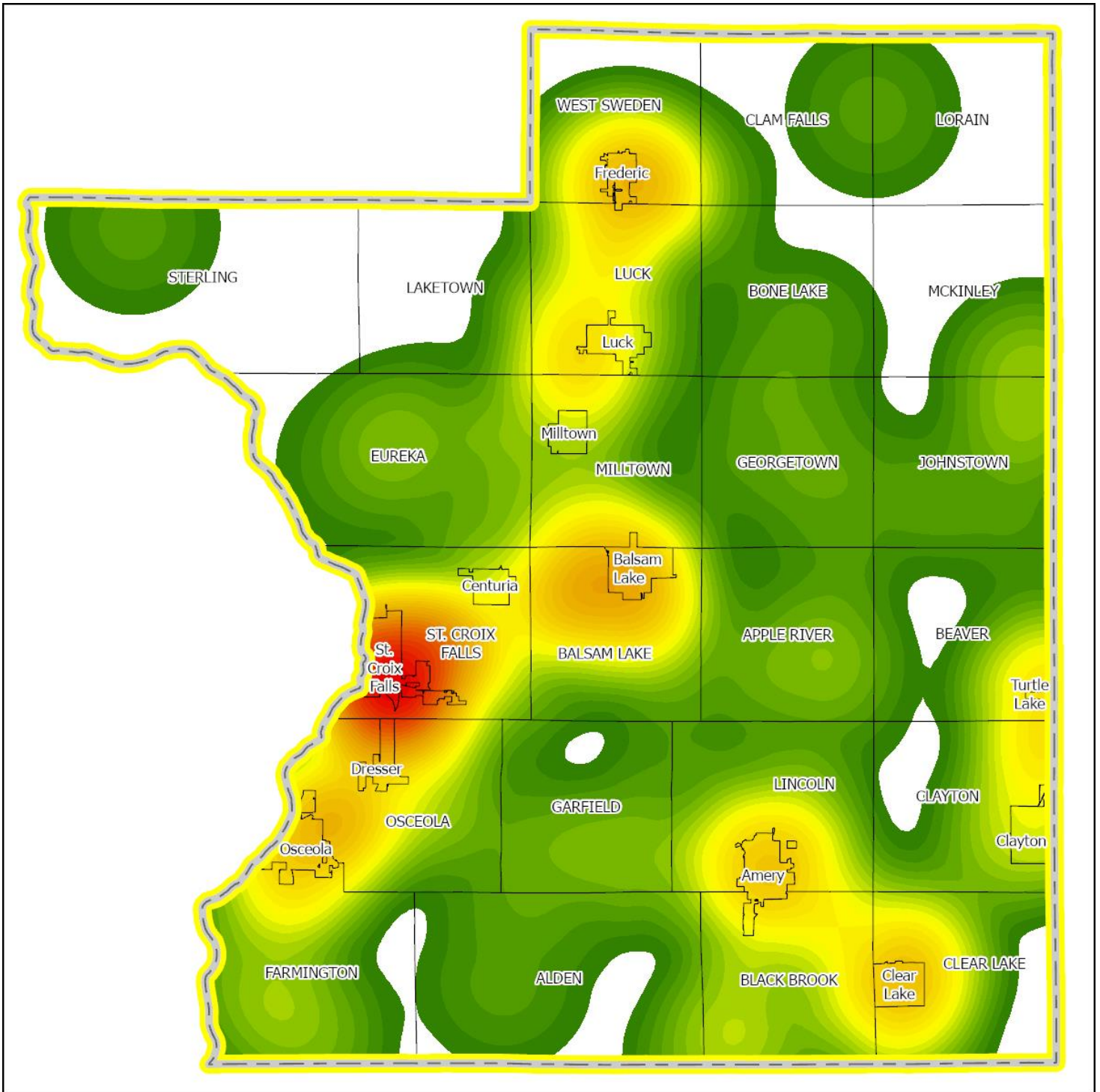
DISTRIBUTION OF HEALTH & MEDICAL LIFELINES



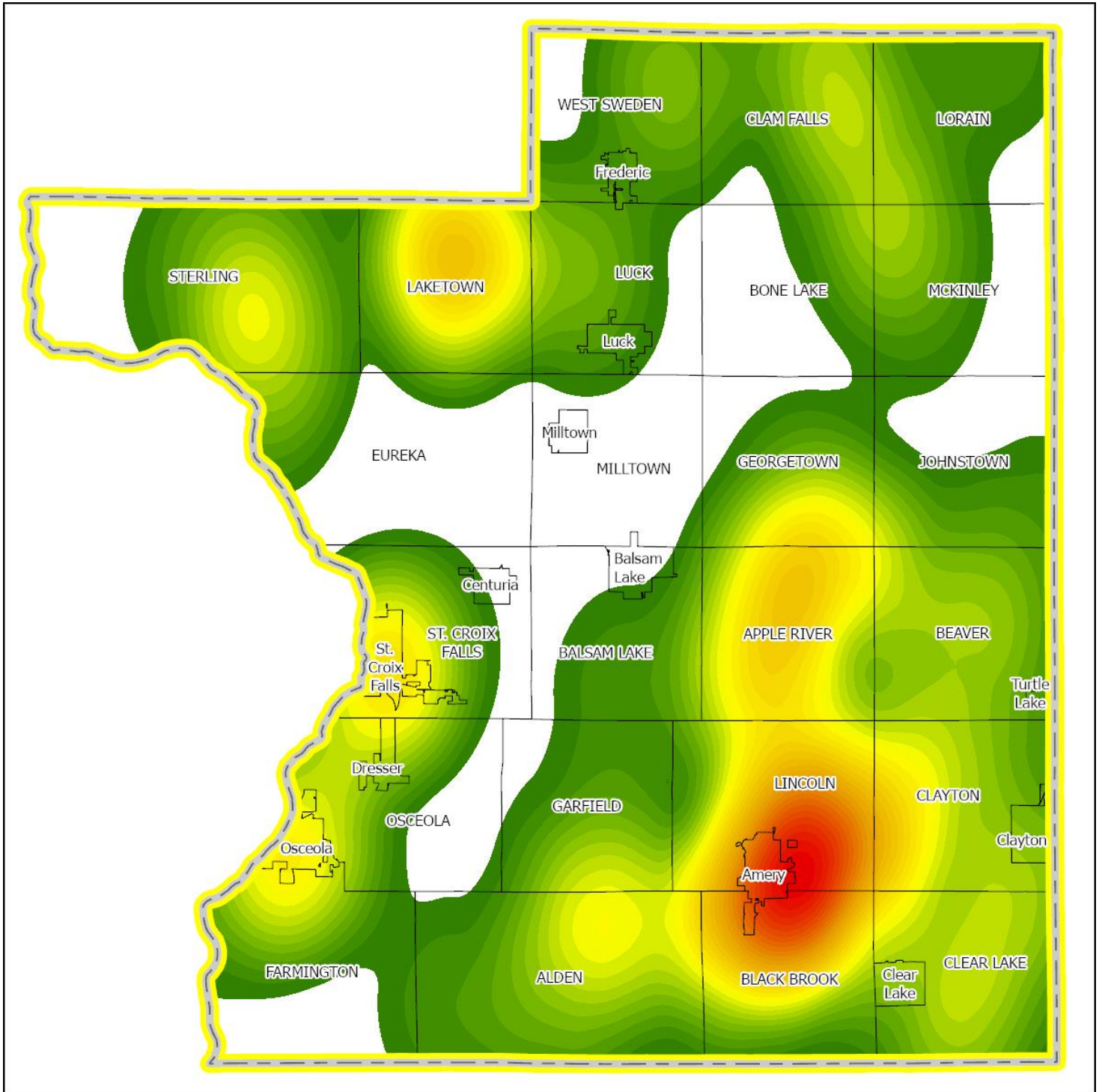
DISTRIBUTION OF ENERGY LIFELINES



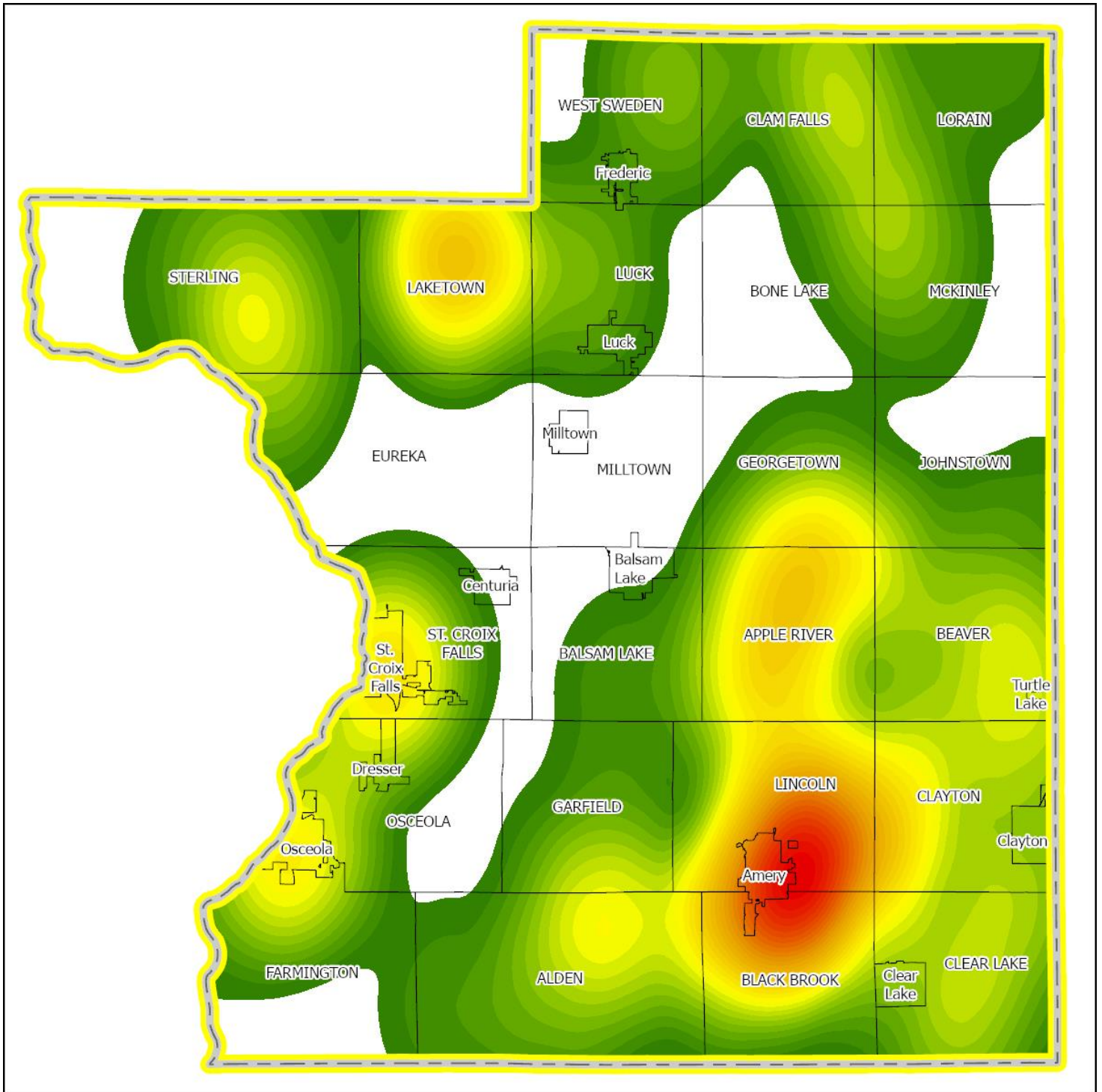
DISTRIBUTION OF COMMUNICATIONS LIFELINES



DISTRIBUTION OF TRANSPORTATION LIFELINES

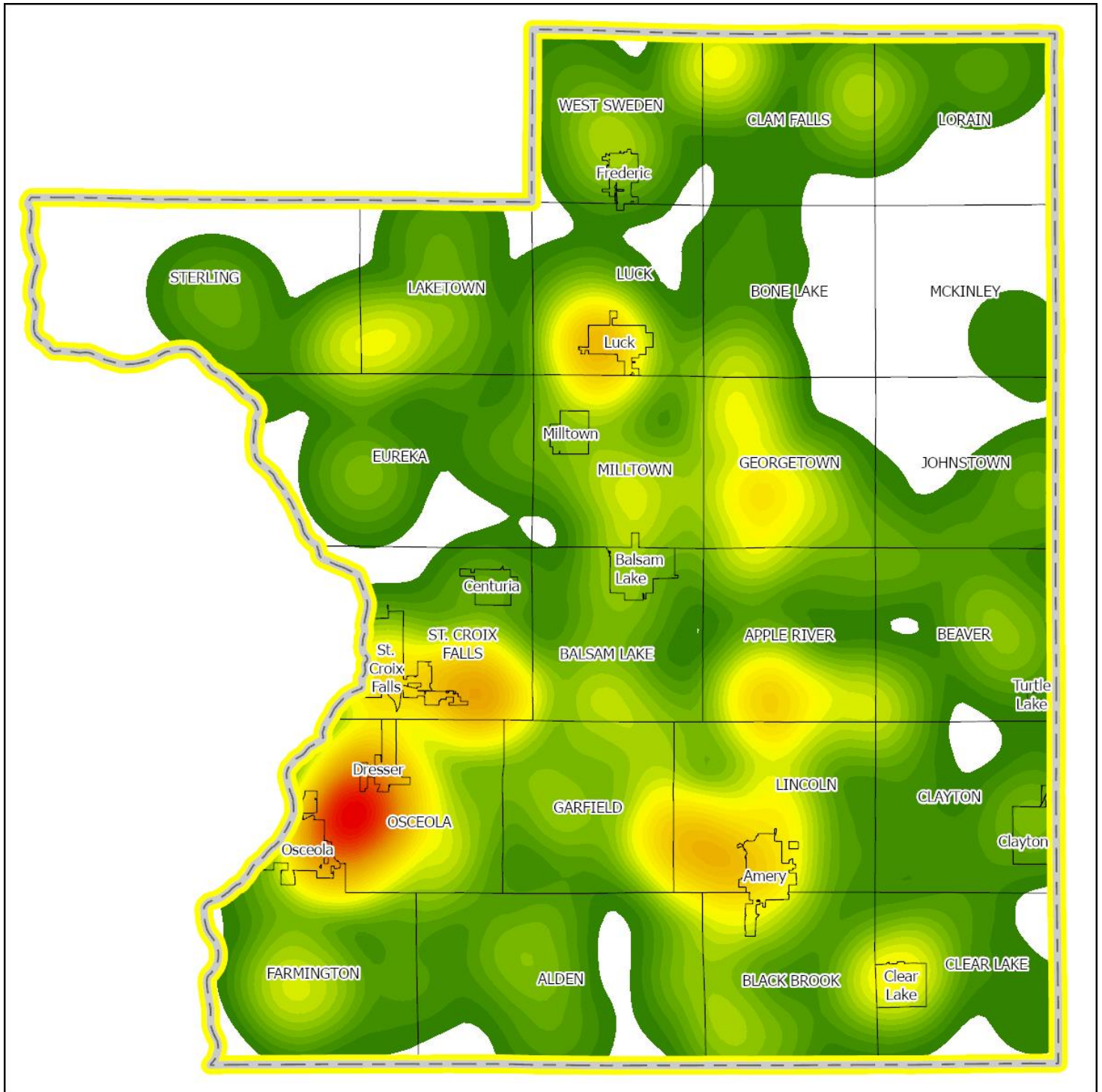


DISTRIBUTION OF HAZARDOUS MATERIALS LIFELINES



DISTRIBUTION OF WATER SYSTEMS LIFELINES

(includes source water protection areas & groundwater withdrawals/high-capacity wells)



APPENDIX E.

NATURAL HAZARD EVENT HISTORY

(INCLUDING NCDC DATA THROUGH DECEMBER 2022)

- 1. Tornado & High Wind Events**
- 2. Winter Storm & Extreme Cold Events**
- 3. Thunderstorm, Heavy Rain, Lightning, & Hail Events**
- 4. Flooding Events**
- 5. Drought & Extreme Heat Events**

Appendix E is largely limited to National Climate Center Data (NCDC) for reported severe weather events posing a significant risk for Polk County, with the exception of tornado events for which there is some additional regional context. Not all severe weather events are reported in the NCDC database. Key events, especially if recent, are further discussed in Section III.

Between January 2023 – March 2024, there were 23 additional storm events reported to the NCDC that are not included in the data tables in Appendix E. These included the following:

- 1 Strong Wind (April) & 6 Thunderstorm Wind events on 4 dates
- 2 Hail events on the same date
- 7 Winter Storm, 3 Winter Weather, & 2 Heavy Snow events on 12 dates
- 2 Excessive Heat events on 2 dates

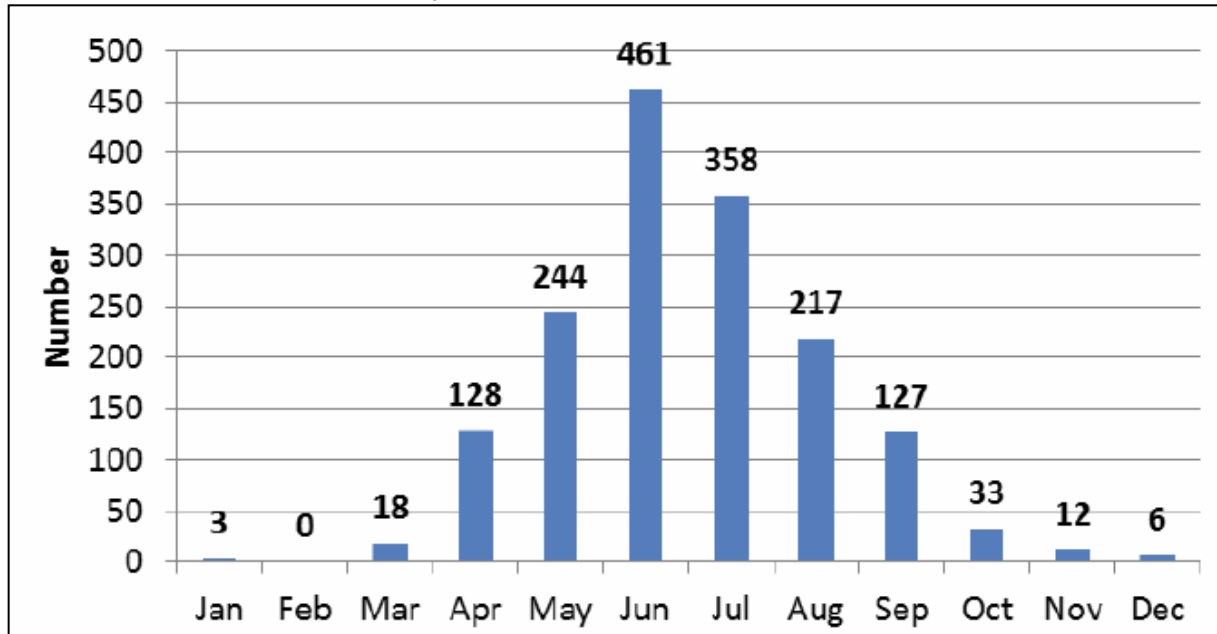
Reporting for recent events can lag behind and some of the reports may not be complete. There were no deaths or injuries reported for the above reports since January 2023 and only \$5,000 in reported damage.

1. Tornado & High Wind Event History

Regional Trends

Wisconsin lies along the northern edge of the nation's maximum frequency belt for tornadoes (known as "tornado alley") which extends northeastward from Oklahoma into Iowa and then across to Michigan and Ohio. Generally, the frequency and severity of tornado events decreases as one travels north. Tornadoes have occurred in Wisconsin in every month except February, as shown in the below:

Wisconsin Tornado Events by Month • 1844 to 2015



SOURCE: WEM THIRA BASED ON NWS, MILWAUKEE/SULLIVAN, 2016

Wisconsin's tornado season runs from the beginning of April through September. The most severe tornadoes typically occur during April, May, and June. Many tornadoes strike in late afternoon or early evening. However, tornadoes have occurred during other times of the day. Personal property damage, deaths, and injuries have and will continue to occur in Wisconsin.

There have been two fairly recent and substantial tornado events in the region outside of Polk County. On June 18, 2001, an F3 tornado with a 27-mile path hit the Village of Siren approximately five miles to the north, resulting in three deaths, 16 injuries, 167 destroyed homes, and 280 damaged homes. More recently, about 50 miles east of Polk County, an F3 tornado hit the City of Ladysmith on September 2, 2002, injuring 37 and resulting in over \$20 million in damage. Many long-time residents of the region also recall the devastating Colfax Tornado of 1958 which had a 32-mile path, caused at least 19 deaths, and resulted in severe damage. However, such events were mentioned much less frequently during the update of this plan compared to similar planning efforts in the region two to three years ago, demonstrating that past events can quickly fade from memory.

Fewer Polk County residents are likely aware that the deadliest tornado in Wisconsin history (and 9th deadliest in U.S. history) occurred about five miles south of the county line. On June 12, 1899, a strong storm with heavy rain and hail hit the City of New Richmond in St. Croix County. Hundreds of

visitors were in town that day for the circus, which ended around 4:30 pm, just when the storm began. A powerful tornado struck close to 6 pm. Passing through the very center of town, the tornado leveled buildings and sent debris flying. Half of the town was destroyed and 117 people were killed. This tornado originated on Lake St. Croix, about five miles south of Hudson. The tornado moved to the northeast, east of Hudson, in the direction of New Richmond, leveling farms near Burkhardt and Boardman. Over 300 buildings were damaged or destroyed. The great visibility of the tornado may have prevented an even higher death total. While not a massive tornado, the combination of time and location was unfortunate.

Local Events

Shown in the following tables are the tornado and high wind events reported for Polk County in the National Climate Data Center (NCDC) database from 1952 through 2022 for tornadoes and 1993-2022 for high wind events. All of the tornadoes occurred during the months of April through October. The majority of the events occurred between the hours of 2:30 PM and 10:00 PM. Similarly, most high wind events also occurred during the spring and summer months.

The type of damage from each event can vary greatly. Most events occur with minimal damage to structures and no deaths or injuries. But impacts can also be devastating. The May 2017 storm produced several tornadoes. While Polk County was mostly spared of damage, neighboring Barron County reported over 160 structures damaged or destroyed. However, damage is often under-reported. For example, the July 2019 tornado and high wind event caused extensive damage throughout Polk County, but no damage is included in the NCDC database.

We have to go back into historical records to find documentation of any tornado-related deaths in Polk County. A record search yielded two different “killer tornadoes” which included Polk County in their paths. The most recent was the May 10, 1953 tornado which caused over \$27 million in damage (in 2023 dollars) and resulted in at least two deaths in the County. No crop damage for tornado events is included for Polk County in the NCDC database.

Polk County Tornado Events (1952 – 2022)

Location	Date	Time	Type	Mag	Deaths	Inj.	Property Damage (\$)
Polk County	6/23/1952	9:30 PM	Tornado	F3	2	6	\$28,248,544
Polk County	5/10/1953	7:10 PM		F2	2	9	\$27,713,534
Polk County	7/10/1966	7:00 PM		F2	0	2	\$2,315,308
Polk County	6/12/1967	8:45 AM		F2	0	0	\$225,814
Polk County	7/30/1968	9:00 PM		F1	0	0	\$2,190,531
Polk County	7/26/1969	8:00 PM		F1	0	0	\$209,638
Polk County	8/8/1973	5:00 PM		F1	0	0	\$1,741,994
Polk County	10/9/1973	1:00 AM		F1	0	0	\$172,964
Polk County	7/30/1977	5:28 PM		F3	0	0	\$12,813,263
Polk County	5/9/1980	1:30 PM		F0	0	0	\$10,233
Polk County	8/3/1981	2:30 PM		F0	0	0	\$87,832
Polk County	8/3/1981	2:35 PM		F0	0	0	\$87,832
Polk County	4/26/1984	9:25 PM		F1	0	0	\$742,026
Centuria	7/9/1999	11:41 AM		F0	0	0	-
Balsam Lake	7/9/1999	11:52 AM		F0	0	0	-
Clam Falls	7/8/2000	5:40 PM		F0	0	0	-
Luck	8/14/2000	7:35 PM		F0	0	0	-
Clear Lake	6/11/2005	1:40 PM		F0	0	0	-
Milltown	5/26/2007	3:44 PM		EF0	0	0	-
East Farmington	5/25/2008	4:17 PM		EF0	0	0	-

Appendix E. Natural Hazard Event History

Amery	7/11/2008	7:51 PM		EF0	0	0	-
Balsam Lake	7/27/2010	6:16 PM		EF0	0	0	\$135,897
Turtle Lake	7/27/2010	6:34 PM		EF1	0	0	\$135,897
Luck	8/7/2010	10:37 PM		EF0	0	1	\$135,593
Range	7/19/2011	6:30 PM		EF0	0	0	-
Luck	5/27/2012	7:13 PM		EF0	0	0	-
Little Falls	6/17/2015	4:30 PM		EF0	0	0	-
Clear Lake	5/16/2017	3:42 PM		EF0	0	0	-
Balsam Lake	7/19/2019	4:28 PM		EF1	0	0	-
Range	7/19/2019	4:28 PM		EF0	0	0	-
Luck	7/28/2019	4:31 PM		EF0	0	0	-
Clayton	7/21/2020	4:22 PM		EF0	0	0	-
St Croix Falls	5/9/2022	9:28 AM		EF0	0	0	-
Funnel Cloud Reports							
Range	6/7/2005	3:24 PM	Funnel Cloud		0	0	-
Clayton	6/7/2005	3:53 PM			0	0	-
Amery	6/7/2005	4:26 PM			0	0	-
Clam Falls	5/26/2007	4:13 PM			0	0	-
Range	7/20/2010	5:15 PM			0	0	-
Ubet	7/21/2020	3:20 PM			0	0	-
Clayton	7/21/2020	4:37 PM			0	0	-
TOTALS	31 Days		40 Events		4	18	\$76,966,896

source: National Climatic Data Center (NCDC)

Damage estimates adjusted to 2023 dollars based on U.S. Bureau of Labor Statistics CPI Inflation Calculator

Polk County High Wind Events (1993-2022)

Location	Date	Time	Type	Mag	Property Damage (\$)	Crop Damage (\$)
St Croix Falls	5/30/1994	4:00 PM	Thunderstorm Wind	0 kts	\$101,475	\$1,015
East Farmington	6/25/1994	4:00 PM	Thunderstorm Wind	0 kts	-	\$101,335
Deer Park	6/25/1995	2:45 PM	Thunderstorm Wind	52 kts	-	-
Deer Park	6/25/1995	2:45 PM	Thunderstorm Wind	52 kts	-	-
Caroline	6/25/1995	4:00 PM	Thunderstorm Wind	0 kts	-	-
Balsam Lake	7/14/1995	5:30 PM	Thunderstorm Wind	0 kts	-	-
Balsam Lake	7/14/1995	5:30 PM	Thunderstorm Wind	0 kts	-	-
Osceola	8/12/1995	3:00 AM	Thunderstorm Wind	0 kts	-	-
Osceola	8/13/1995	5:40 PM	Thunderstorm Wind	0 kts	-	-
Osceola	8/13/1995	5:40 PM	Thunderstorm Wind	0 kts	-	-
Frederic	5/18/1996	11:30 PM	Thunderstorm Wind	55 kts	-	-
Centuria	5/19/1996	12:55 AM	Thunderstorm Wind	55 kts	-	-
Balsam Lake	5/19/1996	1:05 AM	Thunderstorm Wind	60 kts	-	-
Balsam Lake	7/1/1997	8:05 PM	Thunderstorm Wind	55 kts	-	-
Frederic	8/3/1997	7:35 PM	Thunderstorm Wind	55 kts	-	-
Luck	8/3/1997	7:35 PM	Thunderstorm Wind	55 kts	-	-
Milltown	8/15/1997	5:50 PM	Thunderstorm Wind	50 kts	-	-
Milltown	7/3/1999	4:50 AM	Thunderstorm Wind	55 kts	-	-
Osceola	7/23/1999	1:02 AM	Thunderstorm Wind	55 kts	-	-
Osceola Munic. Airport	7/23/1999	1:04 AM	Thunderstorm Wind	56 kts	-	-
Centuria	7/23/1999	1:15 AM	Thunderstorm Wind	52 kts	-	-
Luck	7/23/1999	1:35 AM	Thunderstorm Wind	55 kts	-	-
Clayton	7/23/1999	1:45 AM	Thunderstorm Wind	55 kts	-	-
Luck	7/30/1999	4:45 PM	Thunderstorm Wind	52 kts	-	-
Milltown	8/8/2000	5:30 PM	Thunderstorm Wind	50 kts	-	-
Amery	5/15/2001	7:18 PM	Thunderstorm Wind	55 kts	-	-

Appendix E. Natural Hazard Event History

Milltown	6/11/2001	4:20 PM	Thunderstorm Wind	55 kts	\$1,358,027	-
Turtle Lake	6/11/2001	4:38 PM	Thunderstorm Wind	55 kts	-	-
Osceola	7/17/2001	10:35 PM	Thunderstorm Wind	50 kts	\$16,936	-
East Farmington	6/25/2002	7:10 PM	Thunderstorm Wind	60 kts	-	-
Osceola	7/3/2003	12:35 AM	Thunderstorm Wind	52 kts	-	-
Polk County	4/18/2004	1:00 PM	High Wind	52 kts	-	-
Centuria	4/18/2004	4:00 PM	Thunderstorm Wind	55 kts	-	-
Luck	4/18/2004	4:03 PM	Thunderstorm Wind	56 kts	-	-
Balsam Lake	4/18/2004	7:20 PM	Thunderstorm Wind	50 kts	-	-
St Croix Falls	8/2/2004	6:30 AM	Thunderstorm Wind	52 kts	-	-
Amery	8/2/2004	6:52 AM	Thunderstorm Wind	52 kts	-	-
Horse Creek	9/5/2004	5:35 PM	Thunderstorm Wind	50 kts	-	-
Balsam Lake	9/5/2004	5:55 PM	Thunderstorm Wind	50 kts	-	-
Polk County	10/29/2004	6:35 PM	Thunderstorm Wind	55 kts	-	-
Clear Lake	6/11/2005	1:40 PM	Thunderstorm Wind	55 kts	-	-
Clayton	6/11/2005	1:50 PM	Thunderstorm Wind	52 kts	-	-
Polk County	6/20/2005	1:10 PM	Thunderstorm Wind	52 kts	-	-
Osceola	6/27/2005	5:58 PM	Thunderstorm Wind	51 kts	-	-
Polk County	6/27/2005	6:00 PM	Thunderstorm Wind	52 kts	-	-
Polk County	7/23/2005	10:00 AM	Thunderstorm Wind	52 kts	-	-
Amery	9/12/2005	10:45 PM	Thunderstorm Wind	75 kts	\$6,349,333	-
Clear Lake	7/25/2006	3:30 PM	Thunderstorm Wind	55 kts	-	-
East Farmington	7/25/2006	4:40 PM	Thunderstorm Wind	55 kts	-	-
Amery	7/25/2006	4:45 PM	Thunderstorm Wind	52 kts	-	-
Dresser	7/25/2006	4:45 PM	Thunderstorm Wind	55 kts	-	-
Luck	9/16/2006	10:30 PM	Thunderstorm Wind	52 kts	-	-
Amery	9/16/2006	10:40 PM	Thunderstorm Wind	52 kts	-	-
St Croix Falls	9/16/2006	10:45 PM	Thunderstorm Wind	52 kts	-	-
St Croix Falls	5/23/2007	2:30 PM	Thunderstorm Wind	54 kts	-	-
Frederic	5/23/2007	3:00 PM	Thunderstorm Wind	52 kts	-	-
Indian Creek	5/23/2007	3:15 PM	Thunderstorm Wind	52	-	-
Frederic	6/7/2007	5:30 PM	Thunderstorm Wind	55 kts	-	-
Wanderoos	7/3/2007	1:35 PM	Thunderstorm Wind	52 kts	-	-
Amery	7/3/2007	1:40 PM	Thunderstorm Wind	52 kts	-	-
Amery	7/3/2007	1:45 PM	Thunderstorm Wind	52 kts	-	-
Balsam Lake	7/8/2007	2:00 PM	Thunderstorm Wind	52 kts	-	-
Amery	7/8/2007	2:15 PM	Thunderstorm Wind	50 kts	-	-
Wanderoos	7/8/2007	2:15 PM	Thunderstorm Wind	55 kts	-	-
Milltown	7/8/2007	2:20 PM	Thunderstorm Wind	55 kts	-	-
Milltown	8/13/2007	8:25 PM	Thunderstorm Wind	52 kts	-	-
Milltown	9/20/2007	8:32 PM	Thunderstorm Wind	50 kts	-	-
Indian Creek	9/20/2007	8:45 PM	Thunderstorm Wind	50 kts	-	-
Range	9/20/2007	8:50 PM	Thunderstorm Wind	50 kts	-	-
Dresser	9/30/2007	2:15 AM	Thunderstorm Wind	50 kts	-	-
St Croix Falls	9/30/2007	2:20 AM	Thunderstorm Wind	52 kts	-	-
Luck	9/30/2007	2:30 AM	Thunderstorm Wind	50 kts	-	-
Horse Creek	5/25/2008	4:20 PM	Thunderstorm Wind	55 kts	-	-
Clayton	6/14/2008	9:28 PM	Thunderstorm Wind	52 kts	-	-
Osceola Munic. Airport	7/11/2008	7:55 PM	Thunderstorm Wind	55 kts	-	-
Osceola	7/11/2008	7:59 PM	Thunderstorm Wind	55 kts	-	-
Wanderoos	7/11/2008	8:00 PM	Thunderstorm Wind	52 kts	-	-
Amery	7/11/2008	8:20 PM	Thunderstorm Wind	52 kts	-	-
Horse Creek	7/19/2008	2:50 PM	Thunderstorm Wind	56 kts	-	-
Luck	8/3/2008	1:50 PM	Thunderstorm Wind	60 kts	-	-
East Farmington	8/8/2009	7:40 AM	Thunderstorm Wind	50 kts	-	-
Horse Creek	8/8/2009	7:47 AM	Thunderstorm Wind	50 kts	-	-

Appendix E. Natural Hazard Event History

East Farmington	8/8/2009	9:20 PM	Thunderstorm Wind	61 kts	-	-
East Farmington	8/8/2009	9:25 PM	Thunderstorm Wind	61 kts	-	-
Richardson	7/7/2010	4:55 PM	Thunderstorm Wind	52 kts	-	-
Cushing	7/27/2010	6:05 PM	Thunderstorm Wind	83 kts	\$108,717	-
Balsam Lake	7/27/2010	6:18 PM	Thunderstorm Wind	56 kts	\$20,385	-
Range	7/27/2010	6:25 PM	Thunderstorm Wind	52 kts	-	-
Bunyan	7/27/2010	6:27 PM	Thunderstorm Wind	52 kts	-	-
St Croix Falls	8/10/2010	6:00 PM	Thunderstorm Wind	52 kts	-	-
Nye	8/10/2010	6:05 PM	Thunderstorm Wind	52 kts	-	-
Dresser	8/13/2010	3:45 PM	Thunderstorm Wind	52 kts	\$13,559	-
Loraine	8/13/2010	4:15 PM	Thunderstorm Wind	52 kts	-	-
Clayton	9/21/2010	1:35 AM	Thunderstorm Wind	52 kts	-	-
Bunyan	9/21/2010	1:40 AM	Thunderstorm Wind	61 kts	\$33,877	\$67,754
Polk County	10/26/2010	4:00 PM	High Wind	35 kts	\$33,844	-
Osceola Munic. Airport	7/1/2011	6:30 PM	Thunderstorm Wind	59 kts	\$67,119	-
Amery	7/1/2011	6:40 PM	Thunderstorm Wind	50 kts	-	-
Balsam Lake	7/1/2011	8:00 PM	Thunderstorm Wind	56 kts	-	-
Frederic	7/19/2011	6:06 PM	Thunderstorm Wind	56 kts	\$20,136	-
Luck	7/19/2011	6:10 PM	Thunderstorm Wind	52 kts	-	-
Range	7/19/2011	6:28 PM	Thunderstorm Wind	56 kts	-	-
Range	7/19/2011	6:30 PM	Thunderstorm Wind	69 kts	\$671,193	-
Clayton	8/2/2011	3:49 AM	Thunderstorm Wind	52 kts	-	-
Osceola	8/2/2011	8:05 AM	Thunderstorm Wind	56 kts	\$26,811	-
Dresser	8/2/2011	8:08 AM	Thunderstorm Wind	52 kts	\$3,351	-
Luck	8/2/2011	8:13 AM	Thunderstorm Wind	50 kts	-	-
St Croix Falls	5/19/2012	6:35 PM	Thunderstorm Wind	52 kts	\$2,590	-
Luck	5/19/2012	6:48 PM	Thunderstorm Wind	52 kts	\$5,181	-
Frederic	5/27/2012	6:20 PM	Thunderstorm Wind	56 kts	\$25,903	-
Osceola Munic. Airport	6/10/2012	8:35 PM	Thunderstorm Wind	56 kts	\$12,965	-
Centuria	6/10/2012	8:50 PM	Thunderstorm Wind	52 kts	-	-
Osceola Munic. Airport	8/3/2012	10:50 PM	Thunderstorm Wind	52 kts	-	-
Centuria	8/3/2012	10:55 PM	Thunderstorm Wind	52 kts	-	-
Horse Creek	8/3/2012	11:05 PM	Thunderstorm Wind	52 kts	-	-
Little Falls	8/3/2012	11:05 PM	Thunderstorm Wind	52 kts	-	-
Range	8/3/2012	11:25 PM	Thunderstorm Wind	52 kts	-	-
Clear Lake	5/19/2013	5:00 PM	Thunderstorm Wind	50 kts	-	-
Amery	5/19/2013	5:05 PM	Thunderstorm Wind	50 kts	-	-
Clayton	5/19/2013	5:08 PM	Thunderstorm Wind	52 kts	-	-
Cushing	9/3/2014	6:52 PM	Thunderstorm Wind	61 kts	-	-
Luck	9/3/2014	7:05 PM	Thunderstorm Wind	61 kts	-	-
Luck	7/12/2015	9:00 PM	Thunderstorm Wind	52 kts	-	-
Milltown	7/13/2015	2:10 PM	Thunderstorm Wind	52 kts	\$6,142	-
Clear Lake	7/21/2016	3:45 AM	Thunderstorm Wind	61 kts	\$122,627	-
Amery	8/19/2016	2:55 AM	Thunderstorm Wind	52 kts	-	-
Milltown	8/19/2016	2:58 AM	Thunderstorm Wind	52 kts	\$614	-
Osceola Munic. Airport	9/21/2016	5:00 PM	Thunderstorm Wind	56 kts	-	-
Osceola Munic. Airport	6/11/2017	8:20 AM	Thunderstorm Wind	61 kts	\$121,425	-
Frederic	7/6/2017	4:53 AM	Thunderstorm Wind	52 kts	-	-
Lewis	7/6/2017	4:56 AM	Thunderstorm Wind	52 kts	-	-
St Croix Falls	7/12/2017	1:45 AM	Thunderstorm Wind	61 kts	\$121,621	-
Amery	7/12/2017	1:51 AM	Thunderstorm Wind	56 kts	-	-
Centuria	5/29/2018	2:55 PM	Thunderstorm Wind	52 kts	-	-
Osceola Munic.	8/3/2018	11:20 PM	Thunderstorm Wind	52 kts	-	-

Airport						
Atlas	7/19/2019	3:55 PM	Thunderstorm Wind	73 kts	-	-
Cushing	7/19/2019	4:14 PM	Thunderstorm Wind	80 kts	-	-
Milltown	7/19/2019	4:22 PM	Thunderstorm Wind	80 kts	-	-
Horse Creek	7/28/2021	8:21 PM	Thunderstorm Wind	56 kts	\$28,238	-
Cushing	5/9/2022	9:26 AM	Thunderstorm Wind	52 kts	-	-
Cushing	5/9/2022	9:30 AM	Thunderstorm Wind	70 kts	-	-
St Croix Falls	5/9/2022	9:30 AM	Thunderstorm Wind	52 kts	-	-
Balsam Lake	5/9/2022	9:42 AM	Thunderstorm Wind	70 kts	-	-
Cushing	5/9/2022	4:45 PM	Thunderstorm Wind	56 kts	-	-
St Croix Falls	5/9/2022	5:04 PM	Thunderstorm Wind	56 kts	-	-
St Croix Falls	5/11/2022	8:16 PM	Thunderstorm Wind	56 kts	-	-
Amery	5/11/2022	8:17 PM	Thunderstorm Wind	43 kts	\$544	-
Clayton	5/11/2022	8:32 PM	Thunderstorm Wind	43 kts	\$544	-
Frederic	5/11/2022	8:35 PM	Thunderstorm Wind	43 kts	\$544	-
TOTALS	73 Days		149 Events		\$9,273,700	\$170,103

source: National Climatic Data Center (NCDC)

Damage estimates adjusted to 2023 dollars based on U.S. Bureau of Labor Statistics CPI Inflation Calculator

2. Winter Storms and Extreme Cold (including blizzards and ice storms)

From 1993 through 2022, there have been 97 reported winter storm and extreme cold events. Of the reported events, one was an ice storm, 11 were heavy snow, 15 were wind chill events, four were classified as “winter weather”, 65 were for winter storms, and one was a frost / freeze event. Wind chill events include both “cold/wind chill” events and “extreme cold/wind chill” events. No deaths, injuries, or property damage were reported to the NCDC.

Winter storm events occurred generally between the months of November and April. Events were most common between December and March, with 16-21 events occurring. An early frost/freeze in August of 2004 and late winter storm in May of 2013 are the only outliers.

Polk County Winter Storms and Extreme Cold Events (1993 – 2022)

Location	Date	Time	Type	Deaths	Injuries	Property Damage (\$)
Polk County	1/17/1996	9:00 PM	Ice Storm	0	0	-
Polk County	1/18/1996	5:00 AM	Heavy Snow	0	0	-
Polk County	1/31/1996	5:00 AM	Cold/Wind Chill	0	0	-
Polk County	2/1/1996	12:00 AM	Cold/Wind Chill	0	0	-
Polk County	2/8/1996	12:00 AM	Winter Weather	0	0	-
Polk County	3/24/1996	1:00 AM	Heavy Snow	0	0	-
Polk County	11/23/1996	12:00 AM	Heavy Snow	0	0	-
Polk County	12/14/1996	4:00 PM	Heavy Snow	0	0	-
Polk County	12/23/1996	9:00 AM	Heavy Snow	0	0	-
Polk County	1/4/1997	5:00 AM	Heavy Snow	0	0	-
Polk County	1/15/1997	5:00 PM	Cold/Wind Chill	0	0	-
Polk County	3/13/1997	1:00 AM	Winter Storm	0	0	-
Polk County	1/11/1998	10:00 AM	Winter Storm	0	0	-
Polk County	3/8/1999	8:00 AM	Winter Storm	0	0	-
Polk County	12/28/2000	2:00 AM	Winter Storm	0	0	-
Polk County	1/29/2001	7:00 PM	Winter Storm	0	0	-

Appendix E. Natural Hazard Event History

Polk County	3/12/2001	12:00 AM	Heavy Snow	0	0	-
Polk County	11/26/2001	1:00 PM	Winter Storm	0	0	-
Polk County	3/8/2002	6:00 PM	Winter Storm	0	0	-
Polk County	3/14/2002	8:00 AM	Winter Storm	0	0	-
Polk County	2/2/2003	8:00 PM	Winter Storm	0	0	-
Polk County	11/22/2003	6:00 PM	Winter Storm	0	0	-
Polk County	12/9/2003	3:00 AM	Winter Storm	0	0	-
Polk County	2/1/2004	2:00 AM	Winter Storm	0	0	-
Polk County	3/5/2004	12:00 AM	Winter Storm	0	0	-
Polk County	8/21/2004	2:00 AM	Frost/Freeze	0	0	-
Polk County	1/1/2005	2:00 PM	Winter Storm	0	0	-
Polk County	1/21/2005	2:00 PM	Winter Storm	0	0	-
Polk County	3/12/2006	8:00 PM	Winter Storm	0	0	-
Polk County	2/24/2007	7:30 AM	Winter Storm	0	0	-
Polk County	3/1/2007	12:00 AM	Winter Storm	0	0	-
Polk County	12/1/2007	10:00 AM	Winter Storm	0	0	-
Polk County	12/23/2007	2:00 AM	Winter Storm	0	0	-
Polk County	2/10/2008	2:00 AM	Cold/Wind Chill	0	0	-
Polk County	2/19/2008	6:00 PM	Cold/Wind Chill	0	0	-
Polk County	3/17/2008	6:55 AM	Heavy Snow	0	0	-
Polk County	3/31/2008	10:00 AM	Heavy Snow	0	0	-
Polk County	4/1/2008	12:00 AM	Heavy Snow	0	0	-
Polk County	4/10/2008	3:00 PM	Winter Storm	0	0	-
Polk County	12/30/2008	7:15 AM	Winter Storm	0	0	-
Polk County	1/15/2009	12:00 AM	Cold/Wind Chill	0	0	-
Polk County	2/26/2009	12:00 PM	Winter Storm	0	0	-
Polk County	10/12/2009	6:00 AM	Winter Weather	0	0	-
Polk County	12/8/2009	1:00 PM	Winter Storm	0	0	-
Polk County	12/23/2009	8:00 PM	Winter Storm	0	0	-
Polk County	11/13/2010	3:00 AM	Winter Storm	0	0	-
Polk County	12/10/2010	11:00 PM	Winter Storm	0	0	-
Polk County	2/20/2011	12:00 PM	Winter Storm	0	0	-
Polk County	3/22/2011	4:00 PM	Winter Storm	0	0	-
Polk County	12/31/2011	9:00 PM	Winter Weather	0	0	-
Polk County	2/28/2012	5:00 PM	Winter Storm	0	0	-
Polk County	12/9/2012	2:00 AM	Winter Storm	0	0	-
Polk County	1/27/2013	3:00 PM	Winter Storm	0	0	-
Polk County	2/10/2013	5:00 AM	Winter Storm	0	0	-
Polk County	3/4/2013	12:00 PM	Winter Storm	0	0	-
Polk County	4/11/2013	3:00 AM	Winter Storm	0	0	-
Polk County	4/18/2013	11:00 AM	Winter Storm	0	0	-
Polk County	4/22/2013	7:00 PM	Winter Storm	0	0	-
Polk County	5/1/2013	5:00 PM	Winter Storm	0	0	-
Polk County	12/2/2013	6:00 AM	Winter Storm	0	0	-
Polk County	1/5/2014	8:00 PM	Extreme Cold/Wind Chill	0	0	-
Polk County	1/14/2014	5:00 AM	Winter Storm	0	0	-
Polk County	1/23/2014	6:00 AM	Extreme Cold/Wind Chill	0	0	-
Polk County	1/27/2014	2:00 AM	Extreme Cold/Wind Chill	0	0	-
Polk County	1/30/2014	6:00 AM	Winter Storm	0	0	-
Polk County	2/20/2014	10:00 AM	Winter Storm	0	0	-
Polk County	2/27/2014	6:00 AM	Extreme Cold/Wind Chill	0	0	-
Polk County	3/2/2014	3:00 AM	Extreme Cold/Wind Chill	0	0	-

Appendix E. Natural Hazard Event History

Polk County	4/3/2014	2:00 PM	Winter Storm	0	0	-
Polk County	4/16/2014	6:00 AM	Winter Storm	0	0	-
Polk County	11/10/2014	4:00 AM	Winter Storm	0	0	-
Polk County	12/23/2015	9:00 AM	Winter Storm	0	0	-
Polk County	1/17/2016	6:00 AM	Extreme Cold/Wind Chill	0	0	-
Polk County	2/2/2016	12:30 PM	Winter Storm	0	0	-
Polk County	12/18/2016	1:00 AM	Extreme Cold/Wind Chill	0	0	-
Polk County	1/22/2018	10:30 AM	Winter Storm	0	0	-
Polk County	2/24/2018	4:00 PM	Winter Storm	0	0	-
Polk County	3/30/2018	10:30 PM	Winter Storm	0	0	-
Polk County	4/13/2018	3:00 PM	Winter Storm	0	0	-
Polk County	1/29/2019	3:00 PM	Extreme Cold/Wind Chill	0	0	-
Polk County	2/7/2019	8:00 AM	Heavy Snow	0	0	-
Polk County	2/12/2019	12:00 AM	Winter Storm	0	0	-
Polk County	2/20/2019	4:00 AM	Winter Storm	0	0	-
Polk County	3/9/2019	5:00 PM	Winter Storm	0	0	-
Polk County	11/26/2019	10:00 PM	Winter Storm	0	0	-
Polk County	11/30/2019	12:00 AM	Winter Storm	0	0	-
Polk County	12/1/2019	12:00 AM	Winter Storm	0	0	-
Polk County	12/30/2019	6:00 AM	Winter Storm	0	0	-
Polk County	1/17/2020	3:00 PM	Winter Storm	0	0	-
Polk County	11/10/2020	12:00 PM	Winter Storm	0	0	-
Polk County	12/23/2020	2:00 PM	Winter Storm	0	0	-
Polk County	2/14/2021	1:00 AM	Extreme Cold/Wind Chill	0	0	-
Polk County	12/10/2021	2:00 PM	Winter Storm	0	0	-
Polk County	2/22/2022	3:00 AM	Winter Storm	0	0	-
Polk County	11/28/2022	11:00 PM	Winter Storm	0	0	-
Polk County	12/21/2022	11:00 AM	Winter Storm	0	0	-
Polk County	12/23/2022	12:00 PM	Winter Weather	0	0	-
TOTALS	97 Days		97 Events	0	0	-

source: National Climatic Data Center (NCDC)

Damage estimates adjusted to 2023 dollars based on U.S. Bureau of Labor Statistics CPI Inflation Calculator

3. Thunderstorm, Heavy Rain, Lightning, and Hail

Thunderstorm events are the most reported natural hazard storm event in Polk County. When reviewing data for severe storms, it is important to note that a single storm could create multiple hazards. Hail, lightning, heavy rain, and heavy winds could all occur within a single storm cell. Between 1993-2022, there have been 113 days during which storms were reported, which included 234 separately reported events. Of the reported events, 147 were thunderstorm wind events, 86 were hail events, and one was for heavy rain. There were no reported stand-alone lightning events suggesting there were no lightning-related deaths, injuries, or significant damage since 1993. Events occurred generally between the months of May and September. Events were most common between July, with 73 events occurring that month. High winds associated with thunderstorms are included below as “Thunderstorms” as well as being included previously in the High Wind events table and identified as “Thunderstorm-Winds”.

Polk County Thunderstorms & Severe Storm Events (1993 – 2022)

Location	Date	Time	Type	Mag.	Deaths	Inj.	Property Damage (\$)	Crop Damage (\$)
Osceola	4/26/1994	11:35 AM	Hail	0.75 in	0	0	-	-
St Croix Falls	5/30/1994	4:00 PM	Thunderstorm	0 kts	0	0	\$101,475	\$1,015
East Farmington	6/25/1994	4:00 PM	Thunderstorm	0 kts	0	0	-	\$101,335
Deer Park	6/25/1995	2:45 PM	Thunderstorm	52 kts	0	0	-	-
Deer Park	6/25/1995	2:45 PM	Thunderstorm	52 kts	0	0	-	-
Caroline	6/25/1995	4:00 PM	Thunderstorm	0 kts	0	0	-	-
Balsam Lake	7/14/1995	5:30 PM	Thunderstorm	0 kts	0	0	-	-
Balsam Lake	7/14/1995	5:30 PM	Thunderstorm	0 kts	0	0	-	-
Osceola	8/12/1995	3:00 AM	Hail	0. in	0	0	-	-
Osceola	8/12/1995	3:00 AM	Thunderstorm	0 kts	0	0	-	-
Amery	8/12/1995	3:10 AM	Hail	2.5 in	0	0	-	-
Plymouth	8/13/1995	3:22 PM	Hail	1.75 in	0	0	-	-
Osceola	8/13/1995	5:40 PM	Thunderstorm	0 kts	0	0	-	-
Osceola	8/13/1995	5:40 PM	Thunderstorm	0 kts	0	0	-	-
Frederic	5/17/1996	10:27 PM	Hail	1.75 in	0	0	-	-
Luck	5/17/1996	10:30 PM	Hail	2.5 in	0	0	\$190,360	-
Frederic	5/18/1996	10:27 PM	Hail	1.75 in	0	0	-	-
Frederic	5/18/1996	11:30 PM	Thunderstorm	55 kts	0	0	-	-
Centuria	5/19/1996	12:55 AM	Thunderstorm	55 kts	0	0	-	-
Balsam Lake	5/19/1996	1:05 AM	Thunderstorm	60 kts	0	0	-	-
Balsam Lake	7/1/1997	8:05 PM	Thunderstorm	55 kts	0	0	-	-
Frederic	8/3/1997	7:35 PM	Thunderstorm	55 kts	0	0	-	-
Luck	8/3/1997	7:35 PM	Thunderstorm	55 kts	0	0	-	-
Milltown	8/15/1997	5:50 PM	Thunderstorm	50 kts	0	0	-	-
St Croix Falls	8/15/1997	5:50 PM	Hail	1.75 in	0	0	-	-
Frederic	5/30/1998	8:05 PM	Hail	0.75 in	0	0	-	-
Milltown	5/30/1998	8:45 PM	Hail	1. in	0	0	-	-
Dresser	9/25/1998	11:15 PM	Hail	1. in	0	0	-	-
Lewis	9/26/1998	12:10 AM	Hail	1.5 in	0	0	-	-
Luck	6/5/1999	3:50 PM	Hail	1. in	0	0	-	-
Milltown	6/5/1999	3:53 PM	Hail	1.75 in	0	0	-	-
Milltown	7/3/1999	4:50 AM	Thunderstorm	55 kts	0	0	-	-
Eureka Center	7/13/1999	11:00 PM	Hail	0.75 in	0	0	-	-
Osceola	7/23/1999	1:02 AM	Thunderstorm	55 kts	0	0	-	-
Osceola Munic. Airport	7/23/1999	1:04 AM	Thunderstorm	56 kts	0	0	-	-
Centuria	7/23/1999	1:15 AM	Thunderstorm	52 kts	0	0	-	-
Luck	7/23/1999	1:35 AM	Thunderstorm	55 kts	0	0	-	-
Clayton	7/23/1999	1:45 AM	Thunderstorm	55 kts	0	0	-	-
Luck	7/30/1999	4:45 PM	Thunderstorm	52 kts	0	0	-	-
Clam Falls	7/8/2000	6:38 PM	Hail	1.75 in	0	0	-	-
Milltown	8/8/2000	5:30 PM	Thunderstorm	50 kts	0	0	-	-
Frederic	8/8/2000	5:36 PM	Hail	2.75 in	0	0	-	-
Clam Falls	8/8/2000	5:55 PM	Hail	1. in	0	0	-	-
Clear Lake	8/8/2000	6:00 PM	Hail	1. in	0	0	-	-
Frederic	8/14/2000	9:05 PM	Hail	1.75 in	0	0	-	-
St Croix Falls	5/1/2001	5:22 PM	Hail	0.75 in	0	0	-	-
Amery	5/15/2001	7:18 PM	Thunderstorm	55 kts	0	0	-	-
Amery	5/15/2001	7:25 PM	Hail	0.75 in	0	0	-	-
Milltown	6/11/2001	4:20 PM	Thunderstorm	55 kts	0	0	\$1,358,027	-
Turtle Lake	6/11/2001	4:38 PM	Thunderstorm	55 kts	0	0	-	-
Frederic	6/18/2001	5:20 AM	Hail	1.75 in	0	0	-	-
Luck	6/18/2001	5:45 AM	Hail	1.75 in	0	0	-	-

Appendix E. Natural Hazard Event History

Osceola	7/17/2001	10:35 PM	Thunderstorm	50 kts	0	0	\$16,936	-
Clear Lake	7/23/2001	5:30 AM	Hail	2. in	0	0	\$33,872	-
East Farmington	6/25/2002	7:10 PM	Hail	1.75 in	0	0	-	-
East Farmington	6/25/2002	7:10 PM	Thunderstorm	60 kts	0	0	-	-
East Farmington	6/25/2002	7:26 PM	Hail	1.75 in	0	0	-	-
Osceola	7/3/2003	12:35 AM	Thunderstorm	52 kts	0	0	-	-
Centuria	4/18/2004	4:00 PM	Thunderstorm	55 kts	0	0	-	-
Luck	4/18/2004	4:03 PM	Thunderstorm	56 kts	0	0	-	-
Balsam Lake	4/18/2004	7:20 PM	Thunderstorm	50 kts	0	0	-	-
Luck	5/8/2004	12:15 AM	Hail	0.75 in	0	0	-	-
Dresser	5/9/2004	5:15 PM	Hail	0.75 in	0	0	-	-
St Croix Falls	8/2/2004	6:30 AM	Thunderstorm	52 kts	0	0	-	-
Amery	8/2/2004	6:52 AM	Thunderstorm	52 kts	0	0	-	-
Amery	8/8/2004	6:40 PM	Hail	0.75 in	0	0	-	-
Horse Creek	9/5/2004	5:35 PM	Thunderstorm	50 kts	0	0	-	-
Balsam Lake	9/5/2004	5:55 PM	Thunderstorm	50 kts	0	0	-	-
Polk County	10/29/2004	6:35 PM	Thunderstorm	55 kts	0	0	-	-
Balsam Lake	6/7/2005	2:50 PM	Hail	0.75 in	0	0	-	-
Clear Lake	6/11/2005	1:40 PM	Thunderstorm	55 kts	0	0	-	-
Clayton	6/11/2005	1:50 PM	Thunderstorm	52 kts	0	0	-	-
Polk County	6/20/2005	1:10 PM	Thunderstorm	52 kts	0	0	-	-
St Croix Falls	6/20/2005	1:15 PM	Hail	0.75 in	0	0	-	-
Osceola	6/27/2005	5:58 PM	Thunderstorm	51 kts	0	0	-	-
Polk County	6/27/2005	6:00 PM	Thunderstorm	52 kts	0	0	-	-
Polk County	7/23/2005	10:00 AM	Thunderstorm	52 kts	0	0	-	-
Amery	9/12/2005	10:45 PM	Thunderstorm	75 kts	0	0	\$6,349,333	-
Clear Lake	7/25/2006	3:30 PM	Thunderstorm	55 kts	0	0	-	-
East Farmington	7/25/2006	4:40 PM	Thunderstorm	55 kts	0	0	-	-
Amery	7/25/2006	4:45 PM	Thunderstorm	52 kts	0	0	-	-
Dresser	7/25/2006	4:45 PM	Thunderstorm	55 kts	0	0	-	-
Luck	9/16/2006	10:30 PM	Thunderstorm	52 kts	0	0	-	-
Amery	9/16/2006	10:40 PM	Thunderstorm	52 kts	0	0	-	-
St Croix Falls	9/16/2006	10:45 PM	Thunderstorm	52 kts	0	0	-	-
St Croix Falls	5/23/2007	2:30 PM	Thunderstorm	54 kts	0	0	-	-
Frederic	5/23/2007	3:00 PM	Thunderstorm	52 kts	0	0	-	-
Indian Creek	5/23/2007	3:15 PM	Thunderstorm	52 kts	0	0	-	-
Frederic	6/7/2007	5:30 PM	Thunderstorm	55 kts	0	0	-	-
Milltown	6/20/2007	4:25 PM	Hail	0.75 in	0	0	-	-
Milltown	6/20/2007	4:25 PM	Hail	0.75 in	0	0	-	-
Luck	6/20/2007	5:20 PM	Hail	0.75 in	0	0	-	-
Cushing	6/20/2007	5:55 PM	Hail	1.75 in	0	0	-	-
Wanderoos	7/3/2007	1:35 PM	Thunderstorm	52 kts	0	0	-	-
Amery	7/3/2007	1:40 PM	Thunderstorm	52 kts	0	0	-	-
Amery	7/3/2007	1:45 PM	Thunderstorm	52 kts	0	0	-	-
Balsam Lake	7/8/2007	2:00 PM	Thunderstorm	52 kts	0	0	-	-
Turtle Lake	7/8/2007	2:03 PM	Hail	1. in	0	0	-	-
Amery	7/8/2007	2:15 PM	Thunderstorm	50 kts	0	0	-	-
Wanderoos	7/8/2007	2:15 PM	Thunderstorm	55 kts	0	0	-	-
Milltown	7/8/2007	2:20 PM	Thunderstorm	55 kts	0	0	-	-
Clayton	8/11/2007	8:00 PM	Hail	0.75 in	0	0	-	-
Milltown	8/13/2007	8:25 PM	Thunderstorm	52 kts	0	0	-	-
Osceola	8/13/2007	8:31 PM	Hail	0.75 in	0	0	-	-
Milltown	9/20/2007	8:32 PM	Thunderstorm	50 kts	0	0	-	-
Indian Creek	9/20/2007	8:45 PM	Thunderstorm	50 kts	0	0	-	-
Range	9/20/2007	8:50 PM	Thunderstorm	50 kts	0	0	-	-
Dresser	9/30/2007	2:15 AM	Thunderstorm	50 kts	0	0	-	-
St Croix Falls	9/30/2007	2:20 AM	Thunderstorm	52 kts	0	0	-	-

Appendix E. Natural Hazard Event History

Luck	9/30/2007	2:30 AM	Thunderstorm	50 kts	0	0	-	-
Osceola Munic. Airport	5/25/2008	4:16 PM	Hail	0.75 in	0	0	-	-
Horse Creek	5/25/2008	4:20 PM	Thunderstorm	55 kts	0	0	-	-
Lykens	5/25/2008	4:30 PM	Hail	0.75 in	0	0	-	-
Clayton	5/25/2008	4:45 PM	Hail	0.75 in	0	0	-	-
Clayton	5/25/2008	4:45 PM	Hail	0.75 in	0	0	-	-
Clayton	6/14/2008	9:28 PM	Thunderstorm	52 kts	0	0	-	-
Amery Munic. Airport	7/10/2008	5:44 PM	Hail	1.75 in	0	0	-	-
Osceola Munic. Airport	7/11/2008	7:55 PM	Thunderstorm	55 kts	0	0	-	-
Osceola	7/11/2008	7:59 PM	Thunderstorm	55 kts	0	0	-	-
Wanderoos	7/11/2008	8:00 PM	Thunderstorm	52 kts	0	0	-	-
Amery	7/11/2008	8:20 PM	Thunderstorm	52 kts	0	0	-	-
Horse Creek	7/19/2008	2:50 PM	Thunderstorm	56 kts	0	0	-	-
Frederic	7/25/2008	1:20 PM	Hail	0.75 in	0	0	-	-
Luck	8/3/2008	1:50 PM	Thunderstorm	60 kts	0	0	-	-
Clayton	9/26/2008	10:50 PM	Hail	0.75 in	0	0	-	-
Richardson	5/5/2009	2:25 PM	Hail	1. in	0	0	-	-
Cushing	5/5/2009	3:45 PM	Hail	0.75 in	0	0	-	-
Lewis	5/5/2009	3:45 PM	Hail	1. in	0	0	-	-
Clayton	7/22/2009	2:55 PM	Hail	1. in	0	0	-	-
Osceola Munic. Airport	7/24/2009	7:08 AM	Hail	0.75 in	0	0	-	-
East Farmington	8/8/2009	7:40 AM	Thunderstorm	50 kts	0	0	-	-
Horse Creek	8/8/2009	7:47 AM	Thunderstorm	50 kts	0	0	-	-
East Farmington	8/8/2009	9:20 PM	Thunderstorm	61 kts	0	0	-	-
East Farmington	8/8/2009	9:25 PM	Thunderstorm	61 kts	0	0	-	-
Richardson	7/7/2010	4:55 PM	Thunderstorm	52 kts	0	0	-	-
Amery	7/11/2010	3:51 PM	Hail	1. in	0	0	-	-
Loraine	7/14/2010	9:40 AM	Hail	0.75 in	0	0	-	-
Loraine	7/20/2010	1:03 PM	Hail	1.25 in	0	0	-	-
Balsam Lake	7/20/2010	4:50 PM	Hail	1.25 in	0	0	-	-
Range	7/20/2010	5:13 PM	Hail	1.75 in	0	0	-	-
Clayton	7/20/2010	5:31 PM	Hail	0.88 in	0	0	-	-
Cushing	7/27/2010	6:05 PM	Thunderstorm	83 kts	0	0	\$108,717	-
Balsam Lake	7/27/2010	6:18 PM	Thunderstorm	56 kts	0	0	\$20,385	-
Range	7/27/2010	6:25 PM	Thunderstorm	52 kts	0	0	-	-
Bunyan	7/27/2010	6:27 PM	Thunderstorm	52 kts	0	0	-	-
St Croix Falls	8/10/2010	6:00 PM	Thunderstorm	52 kts	0	0	-	-
Nye	8/10/2010	6:05 PM	Thunderstorm	52 kts	0	0	-	-
Clear Lake	8/10/2010	11:00 PM	Heavy Rain		0	0	-	-
Dresser	8/13/2010	3:45 PM	Thunderstorm	52 kts	0	0	\$13,559	-
Loraine	8/13/2010	4:15 PM	Thunderstorm	52 kts	0	0	-	-
Clayton	9/21/2010	1:35 AM	Thunderstorm	52 kts	0	0	-	-
Bunyan	9/21/2010	1:40 AM	Thunderstorm	61 kts	0	0	\$33,877	\$67,754
Horse Creek	5/9/2011	5:45 AM	Hail	0.88 in	0	0	-	-
Ubet	5/30/2011	10:10 AM	Hail	0.75 in	0	0	-	-
Joel	5/30/2011	10:35 AM	Hail	1. in	0	0	-	-
Osceola Munic. Airport	7/1/2011	6:30 PM	Thunderstorm	59 kts	0	0	\$67,119	-
Amery	7/1/2011	6:40 PM	Thunderstorm	50 kts	0	0	-	-
Balsam Lake	7/1/2011	8:00 PM	Thunderstorm	56 kts	0	0	-	-
Frederic	7/19/2011	6:06 PM	Thunderstorm	56 kts	0	0	\$20,136	-
Luck	7/19/2011	6:10 PM	Thunderstorm	52 kts	0	0	-	-
Range	7/19/2011	6:28 PM	Thunderstorm	56 kts	0	0	-	-
Range	7/19/2011	6:30 PM	Thunderstorm	69 kts	0	0	\$671,193	-
Clayton	8/2/2011	3:49 AM	Thunderstorm	52 kts	0	0	-	-
Osceola	8/2/2011	8:05 AM	Thunderstorm	56 kts	0	0	\$26,811	-
Dresser	8/2/2011	8:08 AM	Thunderstorm	52 kts	0	0	\$3,351	-
Luck	8/2/2011	8:13 AM	Thunderstorm	50 kts	0	0	-	-

Appendix E. Natural Hazard Event History

Osceola Munic. Airport	4/15/2012	7:25 PM	Hail	0.75 in	0	0	-	-
St Croix Falls	5/19/2012	6:35 PM	Thunderstorm	52 kts	0	0	\$2,590	-
Luck	5/19/2012	6:48 PM	Thunderstorm	52 kts	0	0	\$5,181	-
Frederic	5/27/2012	6:20 PM	Thunderstorm	56 kts	0	0	\$25,903	-
Frederic	5/27/2012	6:37 PM	Hail	0.88 in	0	0	-	-
Osceola Munic. Airport	6/10/2012	8:35 PM	Thunderstorm	56 kts	0	0	\$12,965	-
Centuria	6/10/2012	8:50 PM	Thunderstorm	52 kts	0	0	-	-
St Croix Falls	6/14/2012	2:05 PM	Hail	0.88 in	0	0	-	-
Osceola Munic. Airport	8/3/2012	10:50 PM	Thunderstorm	52 kts	0	0	-	-
Centuria	8/3/2012	10:55 PM	Thunderstorm	52 kts	0	0	-	-
Horse Creek	8/3/2012	11:05 PM	Thunderstorm	52 kts	0	0	-	-
Little Falls	8/3/2012	11:05 PM	Thunderstorm	52 kts	0	0	-	-
Range	8/3/2012	11:25 PM	Thunderstorm	52 kts	0	0	-	-
Clear Lake	5/19/2013	5:00 PM	Thunderstorm	50 kts	0	0	-	-
Amery	5/19/2013	5:05 PM	Thunderstorm	50 kts	0	0	-	-
Clayton	5/19/2013	5:08 PM	Thunderstorm	52 kts	0	0	-	-
Clayton	5/31/2013	4:25 PM	Hail	0.88 in	0	0	-	-
Horse Creek	6/17/2013	12:25 PM	Hail	0.75 in	0	0	-	-
Horse Creek	6/17/2013	12:27 PM	Hail	0.75 in	0	0	-	-
Horse Creek	6/17/2013	12:36 PM	Hail	0.75 in	0	0	-	-
Lewis	8/6/2013	6:16 PM	Hail	1.25 in	0	0	-	-
McKinley	7/26/2014	7:35 PM	Hail	2.5 in	0	0	-	-
McKinley	7/26/2014	7:43 PM	Hail	2.75 in	0	0	-	-
Cushing	9/3/2014	6:52 PM	Thunderstorm	61 kts	0	0	-	-
Luck	9/3/2014	7:05 PM	Thunderstorm	61 kts	0	0	-	-
Luck	7/12/2015	9:00 PM	Thunderstorm	52 kts	0	0	-	-
Milltown	7/13/2015	2:10 PM	Thunderstorm	52 kts	0	0	\$6,142	-
Milltown	7/13/2015	2:10 PM	Hail	0.88 in	0	0	-	-
Balsam Lake	7/13/2015	3:10 PM	Hail	0.88 in	0	0	-	-
Clear Lake	7/21/2016	3:45 AM	Thunderstorm	61 kts	0	0	\$122,627	-
Amery	8/19/2016	2:55 AM	Thunderstorm	52 kts	0	0	-	-
Milltown	8/19/2016	2:58 AM	Thunderstorm	52 kts	0	0	\$614	-
Osceola Munic. Airport	9/21/2016	5:00 PM	Thunderstorm	56 kts	0	0	-	-
Clayton	5/16/2017	3:20 PM	Hail	2.75 in	0	0	\$609,117	-
Osceola Munic. Airport	6/11/2017	8:20 AM	Thunderstorm	61 kts	0	0	\$121,425	-
Frederic	7/6/2017	4:53 AM	Thunderstorm	52 kts	0	0	-	-
Lewis	7/6/2017	4:56 AM	Thunderstorm	52 kts	0	0	-	-
St Croix Falls	7/12/2017	1:45 AM	Thunderstorm	61 kts	0	0	\$121,621	-
Amery	7/12/2017	1:51 AM	Thunderstorm	56 kts	0	0	-	-
Centuria	5/29/2018	2:55 PM	Thunderstorm	52 kts	0	0	-	-
Milltown	5/29/2018	3:08 PM	Hail	0.88 in	0	0	-	-
Osceola	8/3/2018	11:18 PM	Hail	1. in	0	0	-	-
Osceola Munic. Airport	8/3/2018	11:20 PM	Thunderstorm	52 kts	0	0	-	-
Clear Lake	8/31/2018	2:30 AM	Hail	1.5 in	0	0	-	-
Luck	8/31/2018	5:47 AM	Hail	0.75 in	0	0	-	-
Atlas	7/19/2019	3:55 PM	Thunderstorm	73 kts	0	0	-	-
Cushing	7/19/2019	4:14 PM	Thunderstorm	80 kts	0	0	-	-
Milltown	7/19/2019	4:22 PM	Thunderstorm	80 kts	0	0	-	-
Horse Creek	7/18/2020	5:45 PM	Hail	1.25 in	0	0	-	-
Nye	7/18/2020	5:56 PM	Hail	1. in	0	0	-	-
Osceola Munic. Airport	7/18/2020	5:56 PM	Hail	1.25 in	0	0	-	-
Dresser	9/1/2020	4:18 PM	Hail	1.25 in	0	0	-	-
Deronda	5/15/2021	3:19 PM	Hail	1. in	0	0	-	-
Deronda	5/15/2021	3:29 PM	Hail	1. in	0	0	-	-
Horse Creek	7/28/2021	8:21 PM	Thunderstorm	56 kts	0	0	\$28,238	-
Cushing	5/9/2022	9:26 AM	Thunderstorm	52 kts	0	0	-	-
Cushing	5/9/2022	9:30 AM	Thunderstorm	70 kts	0	0	-	-

Appendix E. Natural Hazard Event History

St Croix Falls	5/9/2022	9:30 AM	Thunderstorm	52 kts	0	0	-	-
Frederic	5/9/2022	9:40 AM	Hail	1.5 in	0	0	-	-
Balsam Lake	5/9/2022	9:42 AM	Thunderstorm	70 kts	0	0	-	-
Clam Falls	5/9/2022	9:53 AM	Hail	1. in	0	0	-	-
Cushing	5/9/2022	4:45 PM	Thunderstorm	56 kts	0	0	-	-
St Croix Falls	5/9/2022	5:04 PM	Thunderstorm	56 kts	0	0	-	-
St Croix Falls	5/11/2022	8:16 PM	Thunderstorm	56 kts	0	0	-	-
Amery	5/11/2022	8:17 PM	Thunderstorm	43 kts	0	0	\$544	-
Clayton	5/11/2022	8:32 PM	Thunderstorm	43 kts	0	0	\$544	-
Frederic	5/11/2022	8:35 PM	Thunderstorm	43 kts	0	0	\$544	-
McKinley	6/27/2022	6:09 PM	Hail	0.88 in	0	0	-	-
TOTALS	113 Days		234 Events		0	0	\$10,073,205	\$170,103

source: National Climatic Data Center (NCDC)

Damage estimates adjusted to 2023 dollars based on U.S. Bureau of Labor Statistics CPI Inflation Calculator

4. Flooding Events

From 1993-2022, there have been 12 reported flooding events for Polk County. Of the reported events, one was for heavy rain, four were flood events, and seven were flash flood events. One flash flood, occurring in September 2022, was the cause of almost all reported property damage since 1993. Events occurred generally between the months of July and October, which suggests that heavy rains and overland flooding are a greater concern than overbank flooding associated with snow melt.

Polk County Flooding Events (1993 – 2022)

Location	Date	Time	Type	Deaths	Injuries	Property Damage (\$)
Polk County	4/6/1997	6:00 AM	Flood	0	0	-
Polk County	4/1/2001	12:00 PM	Flood	0	0	-
Osceola	9/1/2002	1:30 AM	Flash Flood	0	0	\$656,545
St Croix Falls	7/23/2005	10:30 AM	Flash Flood	0	0	-
Polk County	10/4/2005	6:15 PM	Flash Flood	0	0	-
Polk County	10/4/2005	11:00 PM	Flood	0	0	-
Clear Lake	8/10/2010	11:00 PM	Heavy Rain	0	0	-
Clayton	8/11/2010	1:00 AM	Flash Flood	0	0	-
Clayton	7/16/2011	7:00 AM	Flash Flood	0	0	-
Lewis	5/27/2012	10:00 PM	Flash Flood	0	0	\$129,514
Clayton	9/17/2015	7:00 AM	Flash Flood	0	0	-
East Farmington	3/15/2019	12:00 AM	Flood	0	0	\$21,109
TOTALS	11 Days		12 Events	0	0	\$807,168

source: National Climatic Data Center (NCDC)

Damage estimates adjusted to 2023 dollars based on U.S. Bureau of Labor Statistics CPI Inflation Calculator

5. Drought & Extreme Heat Events

Drought reporting to the NCDC is rare in the greater west-central Wisconsin region and none have been reported for Polk County since 1993. However, periods of drought have occurred; see the Drought assessment section for more information.

Eight extreme heat events have been reported from 1993-2022 with three events occurring in 2001 alone. No injuries or deaths were reported in Polk County for the period.

Polk County Heat/Excessive Heat Events (1993 – 2022)

Location	Date	Time	Type
Polk County	7/23/1999	10:00 AM	Heat
Polk County	7/29/1999	3:00 AM	Heat
Polk County	7/31/2001	9:00 AM	Heat
Polk County	8/1/2001	12:00 AM	Heat
Polk County	8/4/2001	12:00 PM	Heat
Polk County	7/31/2006	10:00 AM	Heat
Polk County	7/18/2011	12:00 PM	Excessive Heat
Polk County	7/20/2016	1:00 PM	Excessive Heat
TOTALS	8 Days		8 Events

source: National Climatic Data Center (NCDC)

APPENDIX F.

HAZARD VULNERABILITY ASSESSMENT

- 1. Tornadoes & High Winds**
- 2. Winter Storms & Extreme Cold**
- 2. Lightning & Hail**
- 4. Flooding**
- 5. Wildfire**
- 6. Extreme Heat**
- 6. Drought**
- 7. Long-Term Power Loss**
- 8. Active Threats**
- 9. Cyberattack**
- 10. Hazardous Materials Spills**

For each hazard above, Appendix F is organized by general vulnerabilities applicable to the hazard, the eight community lifeline categories, disadvantaged or socially vulnerable populations (if any), and the vulnerability to future assets.

For more details and numbers regarding the population, demographics, economy, and development, see Section II.C. The number and distribution of community lifeline facilities are identified in Section II.D. and Appendix D. Transportation systems and historical resources are described in Section II.E. & F. Generally, these numbers are not repeated within this appendix.

1. Vulnerability Assessment—Tornadoes & High Winds

General Vulnerabilities	
Above-Ground Structures	<ul style="list-style-type: none"> • \$8.9 million in damages to property from a tornado in 1958 (\$260 million when adjusted for inflation). • Nearly all structures are vulnerable to damage. As of 2023, Polk County has over \$3.7 billion in assessed improvements and personal property, not including tax-exempt buildings, such as city halls, fire stations, churches, and certain utilities. • The total Value of Improvements by jurisdiction type are as follows. <ul style="list-style-type: none"> ○ Towns: \$2,657,083,300 ○ Villages: \$687,866,500 ○ Cities: \$419,359,100 • Damaged buildings may pose additional safety concerns due to structural instability, damage to electrical systems, or gas leaks. • Building with large spans (e.g., airport hangars, pole barns, gyms, factories) have a higher structural vulnerability.
Mobile Homes	<ul style="list-style-type: none"> • Mobile homes, especially those that are unanchored, are the most frequently mentioned vulnerability. It is not known whether older mobile homes are anchored. Most communities do not require mobile homes to be anchored or tied down unless the mobile homes are newer and fall under more recent State installation codes. • According to the National Weather Service, between 1995 and 2022, there were 1,702 tornado fatalities in the United States. Fifty-three percent (53%) of these fatalities occurred in mobile homes, which constitute less than ten percent of the nation’s housing supply. • The County had 1,689 mobile homes in 2020, constituting about 5.7% of the total housing supply, a ratio that has been decreasing over the past several years. • As of January 2023, Polk County had 28 licensed manufactured/mobile home parks, though some of these parks may be used for recreational or seasonal purposes. 22 of the parks are licensed for less than 51 units, while six are licensed for 51-100 units. The majority of these parks are located within cities and villages. • The number of mobile homes as full-time residences and licensed mobile home parks have been slowly decreasing in Polk County. • Nearly all mobile home parks do not offer an on-site safe room. Most communities do not require new mobile home parks or slab-on-grade development to construct or designate a safe room, though this may be possible as part of a conditional use permit.
Slab-on-Grade Construction	<ul style="list-style-type: none"> • Residents in slab-on-grade homes and homes with crawlspaces (elevated and susceptible to lift) have a higher vulnerability than homes with basements. • Some plan participants noted that a high proportion of the new construction occurring in the County is slab-on-grade.
Campgrounds, Cabins, & Resorts	<ul style="list-style-type: none"> • The Summer 2010 wind storm that struck Cumberland’s municipal campground in neighboring Barron County provides an excellent example of this elevated vulnerability. • Polk County owns and operates one campground with no on-site safe room: <ul style="list-style-type: none"> ○ Apple River Park (6.3 miles north of the City of Amery) – 15 camping sites. • Two municipalities have campgrounds with no safe rooms: <ul style="list-style-type: none"> ○ City of Amery (Port Valhalla Campgrounds) – sites not specified ○ Village of Balsam Lake (Pine Park Campground) – 15 sites

Appendix F. Hazard Vulnerability Assessment

	<ul style="list-style-type: none"> ○ <i>See city & village subplans in Appendix K for more information</i> ● Local officials report that there has not been a large increase in the number of private campgrounds and resort properties with cabins in the County, though some expansions have occurred. ● Most public and private campgrounds and resorts do not offer an on-site safe room or have formal emergency plans, though emergency information is typically posted. Block restrooms can offer some protection, but very limited size capacity. ● In most cases, campgrounds or resorts are not required to construct or designate a safe room or develop emergency plans, though this may be possible as part of conditional use permitting in zoned municipalities.
Individuals	<ul style="list-style-type: none"> ● As reflected in the community profile, Polk County’s population (and development) continues to grow quickly, thus increasing overall exposure to tornados and high winds. ● All residents and visitors are at-risk of injury or death from tornado and high wind events, especially those that: (1) are associated with the previously mentioned facilities and (2) lack access to a storm shelter or safe room. ● Volunteer management and storm clean-up poses its own challenges. Injuries have occurred in the region during clean-up.
Local Economy	<ul style="list-style-type: none"> ● Manufacturing, warehousing, and commercial businesses that are large span structures noted as having a higher vulnerability. ● Economic losses can be experienced when a business sustains direct damage from a tornado or high wind event or when supporting infrastructure (e.g., utilities, services) or supply chains are not available for extended periods. ● A business closure may be temporary, but could have large impacts on the local economy and related services, while some smaller or struggling businesses may fail.
Natural, Historic, & Cultural Resources	<ul style="list-style-type: none"> ● There are no natural areas or environmental characteristics within Polk County that are uniquely less or more vulnerable to tornadoes or high winds. ● All above ground historic or cultural structures are vulnerable to tornado and high wind events. These structures have a high social value to the local community, but no unique vulnerabilities or concerns were identified.
Community Lifelines	
Safety & Security	<ul style="list-style-type: none"> ● All above ground structures, including government buildings, EOCs, fire halls, and police departments are vulnerable. ● Many such facilities lack emergency power generators. Not all communities have continuity plans for these services, though mutual aid for emergency services is relatively strong.
Food, Water, Shelter	<ul style="list-style-type: none"> ● All above-ground structures are vulnerable. ● Barns are particularly vulnerable to high wind damage.
Health & Medical	<ul style="list-style-type: none"> ● All above-ground structures are vulnerable. ● The Amery, Osceola, and St. Croix Falls hospitals were identified as being a significant concern due to their potentially vulnerable population, emergency response functions, and importance to the community. ● Hospitals and larger facilities have emergency plans and generators. ● Senior care facilities and group homes are frequently mentioned as having a higher vulnerability. Most of these structures serve a vulnerable population and are single-story, slab-on-grade for ADA accessibility. Polk County has 6 nursing homes and 15 licensed assisted living facilities.

Appendix F. Hazard Vulnerability Assessment

Energy	<ul style="list-style-type: none"> • Above-ground utilities are especially vulnerable in wooded areas due to falling trees or limbs. • See <i>Long-Term Power Outage</i> section.
Communications	<ul style="list-style-type: none"> • All above-ground structures are vulnerable, but no specific concerns noted. • Each individual community or fire department owns, maintains, and activates its warning sirens for tornado and severe weather warnings, though some communities expressed interest in exploring County activation. Appendix K describes the siren status for each city and village. Many sirens lack battery-backup systems, some are in need of replacement, and additional sirens are needed for full coverage in some communities. The purpose and function of the sirens and warning system are sometimes misunderstood by the public, though this seemed to be relatively less of a concern in Polk County compared to some areas of the region. • There may be unincorporated areas with population concentrations and high recreational traffic that would also benefit from siren coverage. For example, the Town of Lorain expressed interest in a warning siren and/or distribution of NOAA radios. • Polk County issues emergency alert notifications and tornado warnings to cell phones and email through a CodeRED system. There is very strong support for additional public awareness to encourage participation in this free service. With the increased use of mobile devices, interest in NOAA all hazards/weather radio distribution has decreased, except perhaps for seniors, campgrounds/resorts, and critical facilities.
Transportation	<ul style="list-style-type: none"> • Amery and Osceola have airports with hangars, structures, and aircraft that can be particularly vulnerable to tornadoes and high winds; it was not confirmed if all aircraft kept on site are tied-down when not in use.
Hazardous Materials	<ul style="list-style-type: none"> • All above-ground structures are vulnerable, but no specific concerns noted.
Educational Institutions	<ul style="list-style-type: none"> • There are 8 public school districts with school facilities in Polk County, in addition to the Northwood Technical College Outreach Center in Balsam Lake. • Often multiple buildings at a single campus. All above-ground structures are vulnerable, especially gyms or theaters if not hardened to withstand high winds. • Public primary and secondary schools are most frequently identified as having a high vulnerability due to the presence of school-age children and concentrations of students and staff. Indoor- and outdoor-event visitors also vulnerable. • Polk County also has one smaller private school in Osceola. • The following public educational institutions chose to be full participants in this mitigation plan update and are anticipated to adopt the plan: the Amery school district and Northwood Technical College. A subiplan for each is included in Appendix L.
Disadvantaged or Socially Vulnerable Populations	
Residents of Mobile Home Parks	<ul style="list-style-type: none"> • Most frequently identified vulnerable population. Most mobile home park residents believed to lack access to safe rooms. • Often lower-income and, sometimes, a higher-than-average proportion of seniors.
Residents of Slab-on-Grade Construction and ESL Residents	<p>In particular, the following if lacking safe room access:</p> <ul style="list-style-type: none"> • Lower-income apartments and facilities/apartments for seniors, including CBRFs and nursing homes, and other group homes • Apartments with a high proportion of ESL residents. These populations may also be less familiar with the extent of local hazard risks, warning systems, resources, and appropriate actions.

Vulnerability to Future Assets	
Population Growth & Development	<p>As reflected in Section II.C. Community Profile, Polk County continues to grow rapidly in terms of population and new development, thus increasing overall exposure to tornados and high winds.</p> <ul style="list-style-type: none"> • All existing and future populations and development in the County are equally at risk of experiencing a tornado or high wind event: • Growth has been greatest in the western half of the county area due to its proximity to the Twin Cities. • A high proportion of recent residential and commercial development is slab-on-grade construction without basements to serve as a safe room. This trend is expected to continue. • Mobile home development has been decreasing, though some campgrounds and resort properties have been growing. • Polk County’s growing immigrant population was discussed throughout the planning process as a unique vulnerable population. The extent of this population is unclear.
Other Assets	<p>During the mitigation planning process, participants and stakeholders were asked to identify any planned or anticipated future assets that may be particularly or uniquely vulnerable to tornado or high wind events. No such future assets were identified.</p>

2. Vulnerability Assessment— Winter Storms & Extreme Cold

General Vulnerabilities	
Above-Ground Utilities	<ul style="list-style-type: none"> • Ice and heavy snow can damage electric infrastructure and topple trees, which can take down power lines. Long-term power outage was the most frequently mentioned winter storm-related vulnerability. • Frost can accumulate on overhead power lines, which can snap or severe lines.
Underground Utilities	<ul style="list-style-type: none"> • Underground utility lines can freeze and / or burst.
Large or Clear Span Structures	<ul style="list-style-type: none"> • Buildings with large spans (e.g., airport hangars, pole barns, gyms, factories) have a higher structural vulnerability during heavy snowfall events. • Roof damage may occur on any roof due to ice damming. However, these events are isolated and typically go unreported, making them difficult to track and quantify.
Individuals	<ul style="list-style-type: none"> • All residents and visitors are at-risk of injury or death from winter storms and extreme cold events, especially those that: (1) are associated with the previously mentioned facilities and (2) lack access to properly insulated and heated homes. • Prolonged exposure to the cold can result in hypothermia, frostbite, or death. • Snow accumulation on roads may cause delays in delivery of medical supplies and / or eliminate access to medical facilities and treatment centers. • Death may occur from over-exertion when clearing or shoveling snow.
Mobile Homes	<ul style="list-style-type: none"> • Section II.C.i. and Section II.D.i. document the number of mobile homes and distribution of mobile home parks. • Mobile homes or temporary structures that may lack adequate insulation or heating systems, making them more vulnerable to extreme cold temperatures and potential damage from heavy snow loads. • Frozen or burst pipes due to prolonged exposure to extreme cold, potentially leading to water damage or water supply issues.

Appendix F. Hazard Vulnerability Assessment

	<ul style="list-style-type: none"> • The number of mobile homes as full-time residences and licensed mobile home parks have been decreasing.
Local Economy	<ul style="list-style-type: none"> • Winter storm events make commercial activity difficult due to travel restrictions.
Natural, Historic, & Cultural Resources	<ul style="list-style-type: none"> • None known.
Community Lifelines	
Safety & Security	<ul style="list-style-type: none"> • Facilities lacking emergency power generators are vulnerable to power outages caused from down power lines. While generator availability has improved since the last mitigation plan, needs still exist. Many government buildings, EOCs, fire halls, and police departments lack emergency power generators. Not all communities have continuity plans for these services, though mutual aid for emergency services is relatively strong. • Emergency response resources could be strained, including medical services, fire departments, and law enforcement, due to increased incidents, accidents, and challenges in access and mobility.
Food, Water, Shelter	<ul style="list-style-type: none"> • Crops and animals are vulnerable to cold temperatures. • Resident populations may be vulnerable to exposure / cold temperatures due to power outages. • Outdated or insufficiently buried watermains can freeze and rupture causing water supply issues. Posing health and safety risks to citizens. 2014 Polar Vortex caused significant damage to water lines and laterals in some communities. • Sewer system backups can occur during extreme cold events due to freezing. Blockages and overflows in the municipal sewer system can impact homes, businesses and public areas. Posing serious health hazards and causing potentially costly repairs and cleanups. • Unexpected early fall/winter and late spring/summer cold weather events can impact crop yields. Winter crops, such as alfalfa, are vulnerable to winter kill during periods of extreme cold without sufficient snow on the ground to help act as an insulator. In 2002-2003, some counties in the region lost 50 percent or more of the hay crop, which drove up costs for producers causing supplemental feed needing to be purchased for livestock. Some amount of winter kill is fairly frequent and can be expected almost annually; more substantial winter kill events can be expected to occur one or two seasons each decade on average (about a 10% to 20% chance per year) based on recent trends. • Polk County has a large amount of grain, poultry, and milk production that play a very important role in the food supply chain and the local economy.
Health & Medical	<ul style="list-style-type: none"> • The County's three hospitals in Amery, Osceola, & St. Croix Falls were identified as being a significant concern due to their potentially vulnerable population, emergency response functions, and importance to the community, but their vulnerability to winter storms, overall, is low given that hospitals and larger facilities have emergency plans and generators. • Hazardous road conditions can also impair the function of these critical facilities if workers are unable to reach their place of work. • Senior care facilities and group homes have a high vulnerability. Most of these structures serve a vulnerable population and would be severely impacted during a power outage and extreme cold event. Some, but not all, have generators and/or fuel agreements. Most are believed to now have emergency plans addressing such circumstances.
Energy	<ul style="list-style-type: none"> • Ice and heavy snow can topple trees and take down power lines and communications infrastructure. See <i>Long-Term Power Outage</i> section.
Communications	<ul style="list-style-type: none"> • Ice and heavy snow can topple trees and take down power lines and communications infrastructure.

Transportation	<ul style="list-style-type: none"> Roadways, bridges, and transportation systems that may be affected by icy conditions, snow accumulation, or reduced visibility, resulting in hazardous driving conditions, accidents, and restricted mobility. This was the second highest winter vulnerability identified during the process. Ice and snow can result in accidents and restrict travel. The U.S. Highway 8 hill in St. Croix Falls was identified as the greatest transportation-related vulnerability; ice and snow can make the hill impassible and trucks have jack-knifed. Amery & Osceola have airports with hangars, structures, and aircraft that can be particularly vulnerable to heavy snow loads and winter storms. Sudden freezing and thawing events can deteriorate roadways.
Hazardous Materials	<ul style="list-style-type: none"> No specific concerns noted.
Educational Institutions	<ul style="list-style-type: none"> During severe winter and extreme cold events, most educational institutions will be cancelled or moved to online due to a decreased amount of mobility. Typically multiple buildings at any single campus. All above-ground structures are vulnerable, especially gyms or theaters. Some of these facilities are identified as possible heating/cooling or recovery shelters. Public primary and secondary schools have a moderate vulnerability due to the presence and transport of school-age children and concentrations of students and staff. Indoor- and outdoor-event visitors are also vulnerable.
Disadvantaged or Socially Vulnerable Populations	
Seniors	<ul style="list-style-type: none"> Prolonged exposure to extreme cold temperatures can result in hypothermia, frostbite, and death. Dangerous travel conditions may limit or prevent access to hospitals, treatment centers, etc. Slipping on ice can cause serious injury or death.
Economically Disadvantaged	<ul style="list-style-type: none"> Excessive cold spells drive up energy expenses, which could be a financial challenge for low-income households and seniors on fixed incomes. Residents of mobile home parks are often economically disadvantaged; see previous mobile home discussion.
Vulnerability to Future Assets	
Population Growth & Development	<ul style="list-style-type: none"> As reflected in Section II.C. Community Profile, Polk County continues to grow in terms of population, new development, and traffic volumes on many roadways, thus increasing overall exposure to winter storm events. Polk County’s population is aging, so the vulnerabilities to this population and community lifelines serving this population are expected to increase.
Other Assets	During the mitigation planning process, participants and stakeholders were asked to identify any planned or anticipated future assets that may be particularly or uniquely vulnerable to winter storm events. No such future assets were identified

3. Vulnerability Assessment— Lightning & Hail

General Vulnerabilities	
Above-Ground Structures	<ul style="list-style-type: none"> Roofs, windows/skylights, and vehicles are all vulnerable to hail damage. Through rare, lighting can damage electrical systems and cause a structural fire.
Campgrounds	<ul style="list-style-type: none"> Limited shelter availability in the event of a thunderstorm or hailstorm.
Individuals	<ul style="list-style-type: none"> On average 28 people die each year in the U.S. from lightning strikes.
Local Economy	<ul style="list-style-type: none"> Power outages may disrupt or shutdown electronic business transactions / communications.
Natural, Historic, & Cultural Resources	<ul style="list-style-type: none"> Lightning strikes can ignite older, wood structures.

	<ul style="list-style-type: none"> • Heavy rains and hail may cause damage to older structures and historic sites.
Community Lifelines	
Safety & Security	<ul style="list-style-type: none"> • Many of these facilities do not have storm shelters or emergency power generation.
Food, Water, Shelter	<ul style="list-style-type: none"> • Lightning strikes and related power surges also pose threats to utilities, lift stations, communications equipment, and airport runway lights. • Hail can cause defoliation of crops and result in financial losses for farmers. • Lightning can trigger wildfires in agricultural areas. See <i>Wildfire</i> section.
Health & Medical	<ul style="list-style-type: none"> • Vulnerability to potential loss of power mitigated through availability of on-site generators at hospitals
Energy	<ul style="list-style-type: none"> • Lightning strikes can cause power outages. • Hail exceeding 1” in diameter has the potential to damage solar panels / arrays.
Communications	<ul style="list-style-type: none"> • Lightning strikes can cause power outages. • Lightning strikes can cause damage to telecommunication equipment.
Transportation	<ul style="list-style-type: none"> • Hail can impact travel conditions and shatter windshields, causing accidents or delays.
Hazardous Materials	<ul style="list-style-type: none"> • None known.
Educational Institutions	<ul style="list-style-type: none"> • None known.
Disadvantaged or Socially Vulnerable Populations	
Unhoused	<ul style="list-style-type: none"> • Lack sufficient shelter during lightning and hail events.
Vulnerability to Future Assets	
Population Growth & Development	<ul style="list-style-type: none"> • Additional structures will increase the property damage impacts of hail events. • Additional development increases the impact of power outages on the community. • Taller and/or metallic structures are more susceptible to lightning strikes.
Other Assets	<ul style="list-style-type: none"> • Outdoor gatherings, including the County Fairgrounds. Just south of Polk County, lightning deaths at the festival grounds in Somerset have occurred in the past.

4. Vulnerability Assessment— Flooding

Note: Except for roads and highways, and occasional infiltration of wastewater systems in some communities, no significant flood history of community lifeline facilities was noted.

General Vulnerabilities	
Underground Structures	<ul style="list-style-type: none"> • No specific concerns noted, but at greater risk of taking on water during flood events. • Prolonged exposure to flood conditions can result in structural defects or other property damage.
Mobile Homes	<ul style="list-style-type: none"> • Unanchored homes are at risk of being swept away during flood events. A mobile home park in Osceola that experienced flooding in the past has been acquired and removed with mitigation grant funding.
Campgrounds, Cabins, & Resorts	<ul style="list-style-type: none"> • Typically located near a water source, these sites are at an increased risk of being inundated with water during a flood event. At least one campground is located within 100-year floodplain and a dam shadow.
Individuals	<ul style="list-style-type: none"> • Individuals in flooded areas may drown or be cut off from critical life-saving services.
Local Economy	<ul style="list-style-type: none"> • Property damage from flood events may cause business closures. No specific concerns from riverine flooding noted, though some communities have reported stormwater flooding problems that can impact access or cause damage.
Natural, Historic, &	<ul style="list-style-type: none"> • Resources located along waterways have a higher risk of damage during flood events.

Cultural Resources	Stormwater flooding resulted in a localized landslide causing damage to Cascade Falls staircase in 2024, which was temporarily closed until repairs were completed.
Community Lifelines	
Safety & Security	<ul style="list-style-type: none"> Personnel are exposed to life-threatening conditions when serving individuals caught in flooded areas.
Food, Water, Shelter	<ul style="list-style-type: none"> Crop failure if fields are under prolonged flood conditions.
Health & Medical	<ul style="list-style-type: none"> Flooded roads may limit access to essential medical services.
Energy	<ul style="list-style-type: none"> Hydroelectric dams are exposed to increased pressures during flood events. Dam failures can be the cause of flood events and may impact additional facilities downstream. See Dam analysis in Section III.D.iv.
Communications	<ul style="list-style-type: none"> None known.
Transportation	<ul style="list-style-type: none"> The washout of roads, culverts, bridge abutments, etc., have been the primary storm-related damage in recent decades. Travelers in the region have died from in recent decades when attempting to cross flooded areas or when encountering an unmarked road washout at night.
Hazardous Materials	<ul style="list-style-type: none"> No specific concerns noted. Flooding in areas with hazardous materials may allow unencapsulated materials to flow downstream or leach into the groundwater.
Educational Institutions	<ul style="list-style-type: none"> See subplans in Appendix L.
Disadvantaged or Socially Vulnerable Populations	
	<ul style="list-style-type: none"> No unique vulnerabilities identified.
Vulnerability to Future Assets	
Population Growth & Development	<ul style="list-style-type: none"> Shoreland zoning and other restrictions prohibit development in floodways or require flood mitigation activities. Populations located in low lying areas or near water bodies are more vulnerable than those in higher elevations or outside the floodplain.
Other Assets	<ul style="list-style-type: none"> During heavy rains, some communities have problems with stormwater entering the wastewater system through manholes, lift stations, or basements. Such problems may increase as additional impervious surface is added with new development. Using the mapped Community Lifelines identified in Section II.D., no facilities appeared to potentially be located in the 100-year floodplain, except for dams and, potentially, associated hydroelectric plant facilities.

5. Vulnerability Assessment— Wildfire

General Vulnerabilities	
Above Ground Structures	<ul style="list-style-type: none"> Development within pine plantation or forested areas (the wildlife-urban interface) are vulnerable to wildfire, especially if a defensible space around structures are not maintained. See the Wildfire assessment for additional information.
Local Economy	<ul style="list-style-type: none"> Wildfires can damage businesses and cause closures or evacuations in nearby areas. The logging and tourism industries would be affected the most within the local economy, were a wildfire to occur. Campgrounds and resort properties are often located in wooded areas that have an elevated wildfire risk and near lakes where emergency access/egress can be challenging. Recreationally, the County Forest supports many businesses in the County. The loss of related tourism would reduce revenues for Polk County campgrounds, parks, and other

Appendix F. Hazard Vulnerability Assessment

	<p>businesses, though no current study on the extent of potential financial impacts is available. Forest landowners would also incur significant costs associated with salvage and restoration following a large forest fire event.</p>
Natural, Historic, & Cultural Resources	<ul style="list-style-type: none"> • Forested areas, grassland, and agricultural areas are important economic assets and are susceptible to wildfires. • Polk County has just under 14,000 acres of County Forest land, a relatively low amount compared to some northern Wisconsin counties. The largest blocks are located in the northwestern and northeaster portions of the County. • Historic, non-masonry structures are vulnerable to fire.
Individuals	<ul style="list-style-type: none"> • All residents and visitors are at-risk of injury or death from wildfire events, especially those that are associated with the previously mentioned facilities and locations.
Community Lifelines	
Safety & Security	<ul style="list-style-type: none"> • Personnel are exposed to hazardous conditions when combating wildfires or assisting residents in wildfire areas. • If a very large wildfire was to occur within the County, fire departments and local EMS could potentially be stretched thin; delayed response times might occur.
Food, Water, Shelter	<ul style="list-style-type: none"> • All above-ground structures are vulnerable. However, structures located in pine plantations, forested areas, or adjacent to grasslands are potentially at risk from wildfires. • Livestock could be at risk if a wildfire starts in a grassland area, however the risk is minimal to food sources. • Large-scale wildfires can impact water quality, but this scenario is of low concern. • Farms and other croplands are at high risk of wildfire ignition and spread.
Health & Medical	<ul style="list-style-type: none"> • Hospitals and other in-patient care facilities may need to be evacuated during wildfire events, but the risk is very low for cities and villages.
Energy	<ul style="list-style-type: none"> • Above-ground utilities are vulnerable in wooded areas; see Long-Term Power Outage section. • Ash and debris from wildfires can damage solar panels / arrays. • Natural gas lines and storage facilities are vulnerable to prolonged heat exposure and combustion.
Communications	<ul style="list-style-type: none"> • All above-ground structures are vulnerable, but no specific concerns noted.
Transportation	<ul style="list-style-type: none"> • Exposure to high amounts of heat from wildfires can melt, crack or otherwise damage road infrastructure. • Chemicals, smoke and airborne debris from wildfires create dangerous travel conditions. • Road closures due to wildfires. • Trains are a growing cause of wildfire ignition. Railway materials (steel beams, wood supports) are susceptible to damage from wildfire.
Hazardous Materials	<ul style="list-style-type: none"> • All above-ground structures are vulnerable, but no specific concerns noted. • Combustion of materials can result in contamination of the environment. • Hazardous materials may be flammable and can be spread through wildfire smoke/winds.
Educational Institutions	<ul style="list-style-type: none"> • None known. Evacuations due to nearby wildfires may be necessary. • Most educational facilities have large, maintained grounds that would protect buildings from being impacted by a wildfire.
Disadvantaged or Socially Vulnerable Populations	
Economically Disadvantaged	<ul style="list-style-type: none"> • May lack community resources / social network to efficiently relocate and rebuild during and after wildfire events.

Vulnerability to Future Assets	
Population Growth & Development	<ul style="list-style-type: none"> As reflected in the community profile and Wildfire assessment, Polk County’s population continues to slowly grow including in some communities with an elevated fire risk, thus increasing overall exposure to wildfires. Forested areas, especially near surface waters, continue to be inviting locations for new development.

6. Vulnerability Assessment— Extreme Heat

General Vulnerabilities	
Mobile Homes	<ul style="list-style-type: none"> Mobile homes can become very hot if there is a lack sufficient air conditioning / HVAC systems.
Campgrounds, Cabins, & Resorts	<ul style="list-style-type: none"> Facilities may lack sufficient cooling stations.
Individuals	<ul style="list-style-type: none"> Prolonged exposure to high temperatures can result in dehydration, heat stroke, and death. The Extreme Heat section (Section III.D.vi) identifies individuals most vulnerable, including seniors, persons on certain medications, pregnant women, children, and outdoor workers.
Local Economy	<ul style="list-style-type: none"> No significant direct impacts identified, though can impact outdoor activities.
Natural, Historic, & Cultural Resources	<ul style="list-style-type: none"> Long periods of extreme heat can stress vegetation and wildlife, and increase wildfire risk.
Community Lifelines	
Safety & Security	<ul style="list-style-type: none"> Personnel face increased health risks while operating under high temperatures.
Food, Water, Shelter	<ul style="list-style-type: none"> No unique vulnerabilities noted.
Health & Medical	<ul style="list-style-type: none"> Increased demand on services during periods of extreme heat due to dehydration, heat stroke, and other related health risks.
Energy	<ul style="list-style-type: none"> Increased demand on services can result in “brown outs” or other power outages. Most communities lack cooling shelters with emergency power generators.
Communications	<ul style="list-style-type: none"> None known.
Transportation	<ul style="list-style-type: none"> Prolonged exposure to extreme heat can cause buckling in pavement.
Hazardous Materials	<ul style="list-style-type: none"> None known.
Educational Institutions	<ul style="list-style-type: none"> None known.
Disadvantaged or Socially Vulnerable Populations	
Unhoused/Homeless	<ul style="list-style-type: none"> Lack access to air-conditioning and shelter.
Economically Disadvantaged	<ul style="list-style-type: none"> Prolonged periods of high temperatures increase energy consumption / costs.
Vulnerability to Future Assets	
Population Growth & Development	<ul style="list-style-type: none"> Exposure / impact from extreme heat is consistent throughout the County, but will grow as the County’s population increases and due to the County’s aging population. Additional development will increase demand on energy and water supply during extreme heat events. Additional development may contribute to a localized “heat island” effect if it increases the amount of paved surfacing and removes green space / canopy.

7. Vulnerability Assessment— Drought

General Vulnerabilities	
Agriculture (Crops)	<ul style="list-style-type: none"> • Drought in Wisconsin has the greatest impact on agriculture. Agriculture plays a critical role in Polk County’s economy, as previously stated in section II. C iv. • Since the severity of drought can vary, determining its financial impacts on crop and livestock operations is difficult. • Even in low drought conditions crop yields can dramatically decrease crops and become more susceptible to pests and disease. More substantial events can decimate croplands and result in total loss. • The loss of vegetation due to drought can result in flooding, even from an average rainfall. • The Drought assessment provides example crop losses.
Agriculture (Livestock)	<ul style="list-style-type: none"> • Livestock, especially those kept in close quarters, can experience decreased milk production or even death. • Typically, farmers will supplement feed before allowing a drop in milk production due to drought. These additional feed purchases can be economically devastating, depending on the drought severity and length. • Drought conditions can also result in the build-up of nitrates in feed and silage to levels that are toxic to cattle. • Extreme heat and drought can also result in the build-up of toxic gases within grain silos to lethal levels or result in fires or explosions. • Some rural fire departments in the region have been called out to provide water misting to help keep turkeys cool during the hottest of temperatures.
Ground Water & Surface Water	<ul style="list-style-type: none"> • Drought lowers groundwater and surface water levels, affecting private wells and ponds, impacting habitat and recreational value, and potentially concentrating contaminants and nutrients in surface waters. • Decreased surface water makes shoreline areas more vulnerable to erosion, water temperatures can change, and contaminants and nutrients become concentrated; contributing to toxicity, eutrophication, and fish kills. • High-capacity wells have the potential to impact groundwater and nearby surface waters, especially during drought periods. As of 2023, Wisconsin DNR database identified 94 active high-capacity wells within Polk County.
Forest & Vegetation	<ul style="list-style-type: none"> • Drought stresses forest vegetation, making it more vulnerable to pests and diseases, while increasing the risk of wildfires due to extreme dryness.
Community Lifelines	
Safety & Security	<ul style="list-style-type: none"> • Drought conditions increase the likelihood of wildfires; leaving the resources strained for fire suppression and emergency response. • When extreme heat events and drought conditions occur at the same time, rural fire departments assisting farmers to keep livestock cool could increase response time and put additional stress on an already over-taxed water system. • Water scarcity during droughts can impact firefighting capabilities and limit the availability of water for other emergency response activities.
Food, Water, Shelter	<ul style="list-style-type: none"> • Drought may cause water shortages, dry-up private wells and ponds, and increase the demand for irrigation. • Drought can lead to crop failures and reduced agricultural production, resulting in food scarcity, increased food prices, and potential food insecurity.

	<ul style="list-style-type: none"> Water scarcity during droughts can impact drinking water supplies, necessitating conservation measures and alternative sources for safe and sufficient water. No municipal water supplies were identified as being significantly vulnerable to drought. Adequate water for fire protection is available in most communities, though some communities may require additional capacity to keep up with growth.
Health & Medical	<ul style="list-style-type: none"> Drought-related conditions, such as heatwaves and poor air quality from wildfires, can have adverse health effects on vulnerable populations, including respiratory issues, heat-related illnesses, and exacerbation of chronic conditions.
Energy	<ul style="list-style-type: none"> A severe, prolonged drought has the potential to impact hydro-electric power generation, though unique concerns or recommended actions were noted during the planning effort.
Communications	<ul style="list-style-type: none"> No unique drought concerns noted.
Transportation	<ul style="list-style-type: none"> Drought conditions can lead to soil instability, increasing the risk of road and highway damage.
Hazardous Materials	<ul style="list-style-type: none"> No drought concerns noted.
Educational Institutions	<ul style="list-style-type: none"> No drought concerns noted.
Disadvantaged or Socially Vulnerable Populations	
	<ul style="list-style-type: none"> No unique vulnerabilities for Polk County noted, though a prolonged drought can be especially hard on small farmers that are many times already finding it challenging to make ends meet.
Vulnerability to Future Assets	
Population Growth & Development	<ul style="list-style-type: none"> No unique vulnerabilities noted.

8. Vulnerability Assessment— Long-Term Power Outage

Long-term power outages (LTPOs) are often the result of ice storms, high winds, and tornado events. Further, the impacts of a LTPO event can be exacerbated during periods of extreme temperatures. As such, the LTPO vulnerabilities described here have significant overlap with many of the other natural hazard events. A current, comprehensive inventory of emergency power (generator) and emergency fuel availability has not been conducted.

General Vulnerabilities	
Above-Ground Utilities	<ul style="list-style-type: none"> Wind, ice, heavy snow, and flooding can damage electric infrastructure and topple trees, which can take down power lines. Power outages can overload the remaining, functioning portions of the power grid.
Homes & Buildings	<ul style="list-style-type: none"> Extended power loss during freezing temperatures can result in the freezing and breaking of water lines and backing-up of sewer lines.
Individuals	<ul style="list-style-type: none"> All residents are vulnerable to a long-term power outage event; normal daily functions are disrupted Foods and medicines that depend on controlled temperatures may be ruined. During extreme heat or freezing temperatures, the loss of power can be deadly to residents and pets; the activation of heating/cooling shelters with generators may be required. Also see disadvantaged or vulnerable populations.
Local Economy	<ul style="list-style-type: none"> Most businesses lack generators. Power loss can result in the loss of supplies or marketable product that rely on refrigeration or heating, the loss of sales, and damage to product. Operations can be disrupted until power is restored.

Appendix F. Hazard Vulnerability Assessment

	<ul style="list-style-type: none"> • Maintenance systems, such as sump pumps and air filtration systems, will fail resulting in additional risks to structures and individuals. • Security and monitoring systems may be inactive.
Natural, Historic, & Cultural Resources	<ul style="list-style-type: none"> • No unique vulnerabilities specific to these resources identified. Forested area with overhead power lines are more prone to outages.
Community Lifelines	
Safety & Security	<ul style="list-style-type: none"> • Facilities lacking emergency power generators are vulnerable to power outages caused from down power lines. Many government buildings, EOCs, fire halls, and police departments lack emergency power generators. Not all communities have continuity plans for these services, though mutual aid for emergency services is relatively strong. • Emergency response resources could be strained, including medical services, fire departments, law enforcement and electric providers, due to increased incidents, accidents, and challenges in access and mobility, especially if the outage is caused by severe weather. Emergency services and support systems may also experience increased demands as vulnerable populations lose access to lifelines that cannot operate due to lack of power. • Criminal activity becomes more difficult to identify and respond to when security systems are inoperable.
Food, Water, Shelter	<ul style="list-style-type: none"> • Livestock are vulnerable to extreme temperatures. Livestock deaths during power outages have occurred in the region. • Pumps and wells will not operate without a backup power system. • Freezing water lines can occur, posing health and safety risks to citizens. HVAC systems will not operate without a backup power system, potentially exposing occupants to extreme weather (heat and cold). • Shelters may be needed for impacted residents as well as electrical crews if mutual aid is activated. Identifying adequate shelters for electrical crews has been a challenge within the region in the past.
Health & Medical	<ul style="list-style-type: none"> • Hospitals and larger facilities have emergency plans and generators. Clinics and smaller offices may not have backup power, limiting their ability to serve the community. In-home and tele-health services may also be limited or unavailable. • Senior care facilities and group homes have a high vulnerability. Most of these structures serve a vulnerable population and would be severely impacted during a power outage and extreme cold event. Some, but not all, have generators and/or fuel agreements. Most are believed to now have emergency plans addressing such circumstances.
Energy	<ul style="list-style-type: none"> • Severe weather can topple trees and take down power lines and communications infrastructure. Extreme temperatures over a long period do have the potential to create peak demand brown-out situations. Cyberattack of electrical grid is a growing concern. See <i>Long-Term Power Outage</i> section.
Communications	<ul style="list-style-type: none"> • Internet and land-line telecommunications systems may be inoperable during the outage. • The long-term loss of power has the potential to impact communications with the general public or facilities that lack generators or rely on television or similarly powered devices.
Transportation	<ul style="list-style-type: none"> • Power outages will impact some signalization.
Hazardous Materials	<ul style="list-style-type: none"> • Extended power loss during periods of extreme heat could increase the potential for a HazMat release of certain substances if an emergency power source is not available. • Monitoring and control systems may be incapacitated, though most facilities with hazardous materials have backup power systems in place.
Educational Institutions	<ul style="list-style-type: none"> • During a long-term power outage event, most educational institutions will be cancelled, though some have generators available.
Disadvantaged or Socially Vulnerable Populations	
Seniors & Persons with Certain Health	<ul style="list-style-type: none"> • Residents dependent on electronic medical devices (e.g., oxygen, ventilator, CPAP, monitoring) are the greatest long-term power outage vulnerability. Deaths in the region have

Challenges	<p>occurred to such individuals during power outage events.</p> <ul style="list-style-type: none"> Seniors living alone was a frequently mentioned vulnerability concern during an extended power outage, especially during periods of extreme temperatures. Also see Extreme Cold and Extreme Heat vulnerabilities.
Economically Disadvantaged	<ul style="list-style-type: none"> The spoilage of food or medication due to a power outage can be a financial challenge for low-income households and seniors on fixed incomes.
Vulnerability to Future Assets	
Population Growth & Development	<ul style="list-style-type: none"> As reflected in Section II.C. Community Profile, Polk County continues to grow in terms of population and new development, thus increasing overall exposure to long-term power outage events. Additional development also increases the demand on energy infrastructure, increasing the potential for "domino-effect" outages as the grid is overextended. Polk County is aging, so the vulnerabilities to this population and the community lifelines serving this population are expected to increase.

9. Vulnerability Assessment— Active Threats

General Vulnerabilities	
Gathering Places, Parades, & Festivals	<ul style="list-style-type: none"> Locations with increased populations and transient populations face have an increased potential for active threat events.
Individuals	<ul style="list-style-type: none"> All individuals are at risk of experiencing active threat events.
Local Economy	<ul style="list-style-type: none"> Active threat events may result in shutdowns or closures.
Natural, Historic, & Cultural Resources	<ul style="list-style-type: none"> None known.
Community Lifelines	
Safety & Security	<ul style="list-style-type: none"> Emergency services and law enforcement personnel are required to respond to active threat events, placing these individuals in harm's way.
Food, Water, Shelter	<ul style="list-style-type: none"> Utility infrastructure is a potential target in threat events. Crops and livestock are potential targets for biological attacks.
Health & Medical	<ul style="list-style-type: none"> Healthcare infrastructure is a potential target in a threat events. See also <i>Cyberattack</i> section.
Energy	<ul style="list-style-type: none"> Utility infrastructure is a potential target in threat events. See also <i>Cyberattack</i> section.
Communications	<ul style="list-style-type: none"> Infrastructure is a potential target in a threat events. See also <i>Cyberattack</i> section.
Transportation	<ul style="list-style-type: none"> Public transit has an increased potential for active threat events. Bridges, roads, and other infrastructure are potential targets in active threat events.
Hazardous Materials	<ul style="list-style-type: none"> Sites containing hazardous materials are potential targets in active threat events.
Educational Institutions	<ul style="list-style-type: none"> Facilities are at an increased risk of active threat events. See also <i>Cyberattack</i> section. Most systems / organizations have increased preparedness to address active threat events.
Disadvantaged or Socially Vulnerable Populations	
	<ul style="list-style-type: none"> No unique vulnerabilities noted.
Vulnerability to Future Assets	
Population Growth & Development	<ul style="list-style-type: none"> Increases in population increase the potential intensity and exposure of active threat events. All people and areas are at an equal risk of experiencing an active threat event. Gathering places or population centers have an increased probability of events occurring.
Other Assets	<ul style="list-style-type: none"> Mental health facilities and services will be strained during and after active threat events. Additional capacity may be needed as the population grows.

10. Vulnerability Assessment— Cyberattack

General Vulnerabilities	
Individuals	<ul style="list-style-type: none"> Any personal electronic device that connects to a network is at risk of a cyber-attack. Almost 8,000 reported events occurred within Wisconsin in 2022. Almost \$109 million was lost to cyber-crime in 2022.
Local Economy	<ul style="list-style-type: none"> Cyber-attacks can cripple networks and shut down businesses at any time.
Natural, Historic, & Cultural Resources	<ul style="list-style-type: none"> None known.
Community Lifelines	
Safety & Security	<ul style="list-style-type: none"> Personal information and records can be accessed in an attack. Criminal records and other law enforcement information are stored digitally. This information is at risk of access and manipulation during a cyber-attack. Most systems are required to follow mandated security controls to prevent breaches.
Food, Water, Shelter	<ul style="list-style-type: none"> Utility infrastructure can be accessed and manipulated in a cyber-attack. There is growing discussion of this vulnerability throughout the planning process as reflected in the main text and the community subplans. Services can be terminated due to an attack.
Health & Medical	<ul style="list-style-type: none"> Networks contain large volumes of personal data that can be targeted in a cyber-attack. HIPPA laws increase the risk and exposure health systems experience with cyber-crime.
Energy	<ul style="list-style-type: none"> Network can be accessed and manipulated in a cyber-attack. Power can be redirected or terminated remotely.
Communications	<ul style="list-style-type: none"> Network can be accessed and manipulated in a cyber-attack.
Transportation	<ul style="list-style-type: none"> Public transit networks can be accessed and manipulated. Traffic control systems can be accessed and manipulated. Delays, outages, or accidents can result from manipulated control systems.
Hazardous Materials	<ul style="list-style-type: none"> Sites managing hazardous material storage systems via remote networks are vulnerable to cyber-attacks. Materials can be released at toxic levels during an attack.
Educational Institutions	<ul style="list-style-type: none"> Networks contain large volumes of personal data that can be targeted in a cyber-attack.
Disadvantaged or Socially Vulnerable Populations	
Elderly	<ul style="list-style-type: none"> The 60+ year old age group experienced the highest percentage of reported cyber-crime in 2022. This trend is consistent with past years.
Vulnerability to Future Assets	
Population Growth & Development	<ul style="list-style-type: none"> There are no areas of higher or lower risk to cyber-attack. As the population in Polk County increases, the probability of a cyber-attack occurring increases.

11. Vulnerability Assessment— Hazardous Material Spills

General Vulnerabilities	
Individuals	<ul style="list-style-type: none"> Exposure to toxic levels of hazardous materials can result in medical ailments and or death.
Local Economy	<ul style="list-style-type: none"> Areas identified as hazardous waste sites are expensive to clean up and difficult to market. Hazardous sites within a community can negatively alter the perceived economic potential throughout the area. Most hazardous material spills occur in warehouses and industrial sites.
Natural, Historic, & Cultural Resources	<ul style="list-style-type: none"> None known.
Community Lifelines	
Safety & Security	<ul style="list-style-type: none"> Special equipment is needed to investigate hazardous material spills. Personnel are at an increased risk of exposure to hazardous chemicals when responding to spills.
Food, Water, Shelter	<ul style="list-style-type: none"> Hazardous material spills can infiltrate groundwater, soils, and livestock that are later used to create products for human consumption. Shelters near hazardous spill sites can increase the risk of exposure to toxic chemicals. Chemical storage at individual farms may be decreasing.
Health & Medical	<ul style="list-style-type: none"> Exposure to hazardous materials can cause medical ailments, potentially increasing demand for healthcare facilities.
Energy	<ul style="list-style-type: none"> Fuel storage facilities, including propane tank refill/distribution sites, are a potential haz mat spill risk, though a local spill or release is unlikely to have significant impacts on energy availability.
Communications	<ul style="list-style-type: none"> None known.
Transportation	<ul style="list-style-type: none"> Railroads and highways are at risk of hazardous material spills Transportation-related spills were of greater concern than spills at fixed sites during the planning process due to the related uncertainties and lack of site-specific plans. Some highways and railroad travel through residential areas.
Hazardous Materials	<ul style="list-style-type: none"> Compounded effects.
Educational Institutions	<ul style="list-style-type: none"> None known.
Disadvantaged or Socially Vulnerable Populations	
	<ul style="list-style-type: none"> No unique vulnerabilities noted.
Vulnerability to Future Assets	
Population Growth & Development	<ul style="list-style-type: none"> Increased industrial development increases the probability of hazardous materials being located in the area, increasing the potential for hazardous material spills.

APPENDIX G.

FLOOD ASSESSMENT METHODOLOGY

Polk County Flood Assessment Methodology

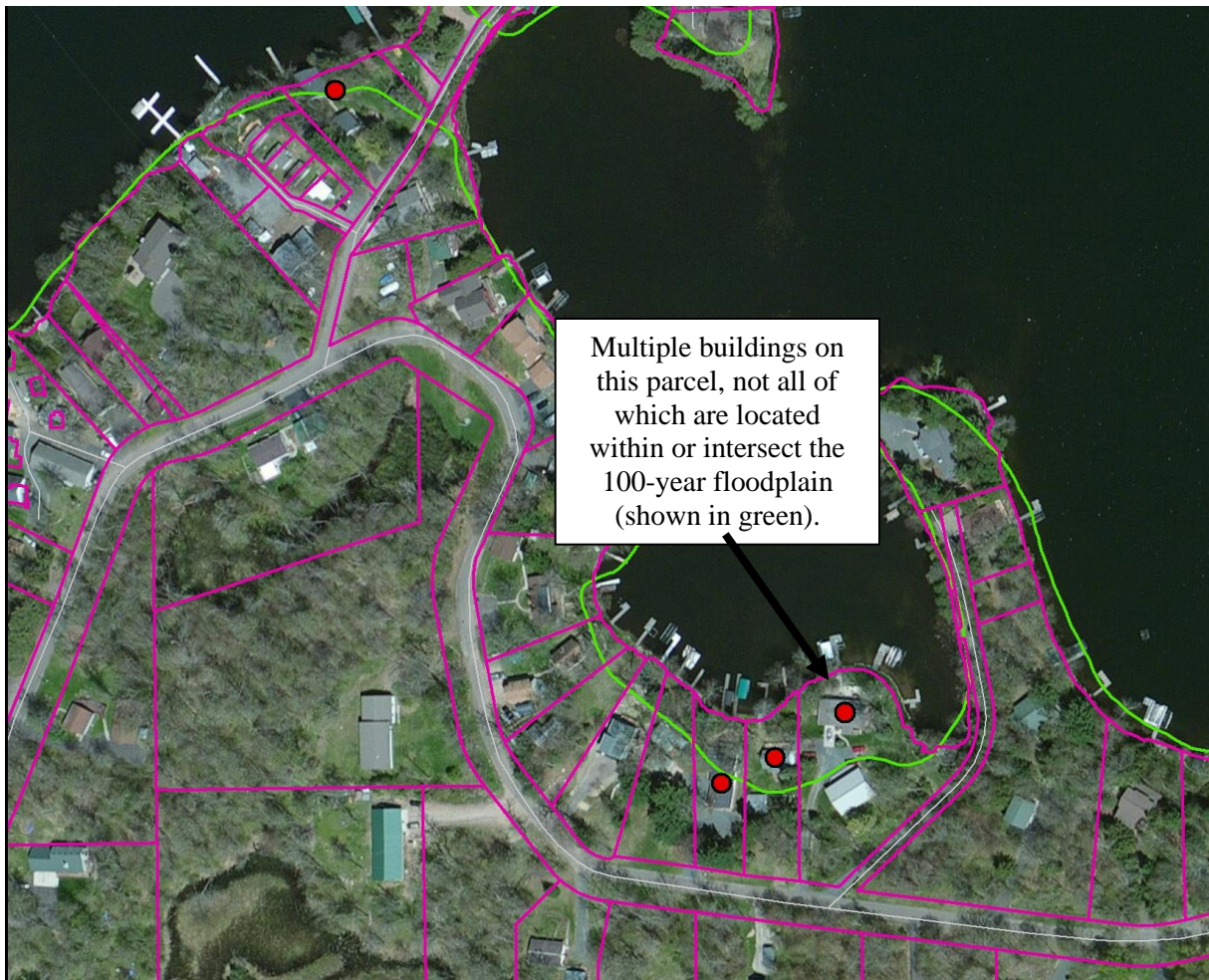
Flood Assessment Data & Related Challenges

1. The Flood Insurance Rate Maps (D-FIRM) for Polk County were updated in 2011 and have been adopted.
2. While Polk County has a countywide geographical information systems (GIS) parcel database, no geographic database exists which identifies the footprint or characteristics of individual improvements and structures (e.g., basements, number of stories, base flood elevation) in the County.

As a result, the flood assessment methodology uses a top-down, “birds-eye” perspective that doesn’t account for site-specific topographic variation. A structure might appear to be located within the 100-year floodplain on a map, but could have been landscaped or otherwise elevated above the base flood elevation.

3. Assessed values for improvements and tax records are linked to the parcel database, but are not linked to the building point data. This helps to identify parcels with buildings that may potentially be located in a 100-year floodplain, but the use and value of each individual building are not available in cases when multiple buildings exist on a single parcel..
4. Parcel and tax data does not include a value of improvements for municipal buildings (e.g., town halls, fire stations), public infrastructure (e.g., wastewater treatment plants, water towers), and other non-taxable structures (e.g., churches, public housing, electric cooperatives, non-profits).
5. During the 2010-2011 floodplain map modernization effort, Polk County did not have county-wide LIDAR on which to base floodplain elevations. As such, there are significant concerns with the accuracy of the 2011 D-FIRMs for many areas of Polk County. However, it is also important to keep in mind that a serious flood could exceed the estimated 100-year limits, as well as be impacted by other factors that may change over time, such as reduced flood storage or increased stormwater runoff. The County’s floodplain maps are being revisited, but updated maps are not yet available.
6. Related to #5, most designated 100-year floodplain areas in Polk County fall within Zone A, which have no base flood elevations (BFEs) established, making it much more difficult to determine the actual vulnerability to individual structures. BFEs were established for a large portion of St. Croix River from just north of St. Croix Falls to the south county line, though encroachment of development on these floodplains are limited by protective easements and steep adjacent slopes in many areas.

7. It is quite common for a single parcel to include multiple buildings, such as in the example below. And as the example shows, there are instances where not all of the buildings within a single parcel are within or intersect the 100-year floodplain.



Flood Assessment Methodology

It is cost prohibitive to perform the detailed survey work of structural characteristics and attaching tax assessment data to the individual structures (versus parcel) necessary to make definitive conclusions in many cases. Structural footprint data was also not available at the time of analysis. However, it is critical to remember that the purpose of this assessment is to identify potential flooding risks to structures during a 100-year flood event for general mitigation planning. The assessment methodology used here is sufficient to identify those structures which may be most at risk of flood damage and those areas which may be a priority for flood mitigation activities.

For the assessment of riverine and lake flooding in Polk County the following methodology was used:

1. The D-FIRM G.I.S. shapefiles were used to identify the 100-year floodplain boundaries (shown as the green line on the previous map).
2. The G.I.S. parcel data provided by Polk County Land Information Department as of January 2023 was linked to 2023 tax assessment data provided by Polk County Treasurer's Department, thus providing information on municipality, land use, and assessed values for all areas in the county.
3. Those improved parcels which were within or intersected the 100-year were identified for guidance (shown as the purple line on the previous map).
4. Once the parcels intersecting the floodplain were identified, site address G.I.S. points were grouped with parcels intersecting the floodplain. The site address layer was provided by Polk County and represents the location of site or service delivery addresses assigned by local governments. These points are assumed geographic locations of address main structures and are useful for distinguishing between a home or business vs. a shed, garage, or outbuilding. Along with the G.I.S. analysis described above, additional methods included visual inspection of orthophotography overlaid with the 100-year floodplain to verify the results and/or include additional principal structures that appeared to intersect the 100-year floodplain. In all instances, accessory structures (e.g., garages, barns, boat houses) were excluded if they were not the principal structure on the parcel.

Together, these two data sources were used to create a G.I.S. data layer of all principal structures, taxable and exempt, which intersect or are contained within the 100-year floodplain (shown as the red dots on the previous map). As the previous map demonstrates, it can be difficult to determine if a building intersects the floodplain or if a building is the principal structure. WCWRPC staff used county data and often best judgment to select main structures that appeared to intersect the floodplain during visual analysis.

5. By overlaying the parcel and building point G.I.S. data, an estimated value of improvements for buildings potentially in the floodplain was identified. However, situations with multiple structures on a single parcel can be a challenge as noted previously. In such cases, the assessed value of all improvements was used, rather than attempting to further assign values to individual structures. In many cases, those ancillary structures on a parcel which are likely outside the 100-year floodplain boundary are still close enough to the boundary to potentially be vulnerable to flooding should a large event occur. For non-taxable parcels, improvement estimates are not available, such as in the case of the Luck School.

Though there are weaknesses identified with this method, the approach provides a good picture of which principal structures may fall within the 100-year floodplain areas of Polk County. However, this should not be relied upon as an accurate indicator of flood depth

or damages during flood events since elevation, flood depth, and assessed value for each individual structure is not currently valued. Many of the structures shown have no flood history and may not have a significant vulnerability to a flood event.

6. Utilizing key informant interviews, discussions with local officials, a survey to each Town Board, and available records (e.g., NFIP flood insurance claims), floodprone areas and hotspots were also identified where infrastructure or improvements may be vulnerable to riverine or lake flooding.

Taken together, this approach provides an understanding of the overall flooding risks and vulnerabilities in Polk County, while providing insight into the distribution of potentially vulnerable structures within the county and the location of past flooding events.

APPENDIX H.

POLK COUNTY DAM INVENTORY

Appendix H. Polk County Dam Inventory

Official Name	Popular Name	Owner Name	Hazard Rating	Size	Normal Storage (Acre Ft)	Max Storage (Acre Ft)
Amery		City of Amery	High	LARGE	639.0	4800.0
Upper Osceola	S.J.Rauchwarter	Larue, James	High	SMALL	3.0	24.0
Straight River Flowage	Schilling Dam/Whalen Log.	Town of Bone Lake	High	LARGE		1199.0
Saint Croix Falls		Xcel Energy	High	LARGE	413.0	27500.0
Atlas Feed Mill	Long Trade Lake	Polk County	Significant	LARGE	153.0	1610.0
Clam Falls		Polk County	Significant	LARGE	127.0	950.0
Lower Balsam Lake		Village of Balsam Lake	Significant	LARGE	2054.0	22300.0
Lower Osceola	Village Of Osceola	Village of Osceola	Significant	SMALL	1.0	10.0
Sucker Lake	Wapogasset Lake	Wapogasset Lake Assoc.	Significant	SMALL	1427.0	7200.0
Big Butternut Lake		not identified in database	Low	SMALL	387.0	4876.5
Reynolds, Neal		not identified in database	Low	SMALL	1.0	4.0
Telschow, Joe		not identified in database	Low	SMALL		5.3
Big Round Lake		not identified in database	Low	UNKNOWN		
Straight Lake #2	Cragwood Inc.	not identified in database	Low	SMALL	25.0	245.0
Aveda Corp		Aveda Corporation	Low	SMALL	.1	.5
Williamson/Bengston		Bengston, Jeremy	Low	SMALL	11.4	83.2
Big Rock Creek Farm	St. Croix Falls	Big Rock Creek Preserve, LLC	Low	LARGE	5.0	50.0
Blake Lake	Blake Lake	Blake Lake Protection & Rehabilitation District	Low	LARGE	302.0	4005.0
Andersen, Elmer Pond No. 1		Bodeau, Geoffrey	Low	SMALL	1.0	5.0
Andersen, Elmer Pond No. 2		Bodeau, Geoffrey	Low	SMALL	1.0	6.0
Jensen		Boisvert, Jerome	Low	LARGE	7.0	72.0
Don Dosch Wildlife Flowage		Booth, Karen	Low	SMALL	11.0	45.0
Cain #1		Cain, Dan	Low	SMALL	.3	.8
Cain #2		Cain, Dan	Low	SMALL	.3	.7
Randy Caudy		Caudy, Randy	Low	SMALL	.2	.8
Chenal Pond 1		Chenal, David	Low	SMALL	.6	2.0
Chenal Pond 2		Chenal, David	Low	SMALL	2.2	9.8
Clausen Pond 1		Clausen, Dave	Low	SMALL	2.2	7.1
Clausen Pond 2		Clausen, Dave	Low	SMALL	2.1	6.3
Deer Lake	Deer Lake Improvement Assoc.	DEER LAKE IMPROVEMENT AS	Low	SMALL	790.0	3160.0
Derosier #1		DeRosier, Dave	Low	SMALL	10.6	29.0
Derosier 2		DeRosier, Dave	Low	SMALL	3.0	9.1
Dietz Wetland		Dietz, Craig	Low	SMALL		8.0
Round Lake	Round Lake	Drill, L	Low	UNKNOWN		
Guidera		Ellen M Guidera Trust	Low	LARGE		168.0
Osceola	Osceola	Elsinger,	Low	UNKNOWN		
Wolf Creek Roller Mills	Wolf Creek Rollar Mills	Emerson Trust, Harney	Low	UNKNOWN	6.0	
Felland		Felland, Maynard	Low	SMALL	18.0	70.0
Foerst		Foerst, Jacob / Paula	Low	LARGE		80.0
Tim Wilson		Green, Eugene	Low	SMALL		49.0
Old Grihms	Old Grihms	Grihm, Carl	Low	UNKNOWN		
Hanson, Byron	Wetland Restoration	Hanson, Byron	Low	SMALL	2.0	3.2
Horseshoe Lake Control	Polk County & Barron County	Horseshoe Lake Control	Low	UNKNOWN	280.0	
Horseshoe Lake Diverson		Horseshoe Lake Improv. District	Low	UNKNOWN		
Jensen, Raymond		Jensen, Raymond	Low	SMALL	4.0	25.0
Scott Jensen #4		Jensen, Scott	Low	SMALL	8.0	14.1
Scott Jensen #2		Jensen, Scott	Low	SMALL	3.0	5.3
Scott Jensen #3		Jensen, Scott	Low	SMALL	1.0	1.3
Scott Jensen #1		Jensen, Scott	Low	SMALL	2.1	3.2
Johnson		Johnson, Gary	Low	SMALL	2.1	9.0
Kemis		Kemis, Rick	Low	SMALL	.3	.8
King Pond 1		King, James	Low	SMALL	1.1	5.5
King Pond 2		King, James	Low	SMALL	1.3	3.5
King Pond 4		King, James	Low	SMALL	2.0	4.6
King Pond 6		King, James	Low	SMALL	2.5	6.4
King Pond 7		King, James	Low	SMALL	1.0	4.5
Lundeen	Lundeen	Lundeen, Richard	Low	UNKNOWN	1.0	
Morel/Gould 1		Morel, Mike	Low	SMALL	6.0	10.0
Morel/Gould 2		Morel, Mike	Low	SMALL	6.0	10.0
Morel/Gould 3		Morel, Mike	Low	SMALL	.5	.8
Lewis	Lewis	Nelson, Scott	Low	LARGE	35.0	300.0
Nevers	Nevers	Northern States Power Co.	Low	UNKNOWN		
Flour Mill	Little Falls	Northern States Power Co.	Low	UNKNOWN	240.0	
Upper Balsam Lake		Northwestern Wisconsin Electric Co.	Low	LARGE	2054.0	24200.0
Peer, Arnold		Peer Inc	Low	SMALL	16.0	50.0
Peterson, Carl		Peterson, Carl	Low	SMALL		28.0
Largon Lake	E.J.Pfluger	Pfluger, E	Low	SMALL	130.0	650.0
Big Lake	Polk Co. Sportsman Club	Polk County Sportsmen's Club	Low	SMALL	245.0	735.0
Ridler	Woodley	Polk County	Low	LARGE	19.0	140.0
Kennedy	Polk County	Polk County	Low	LARGE	7.0	60.4
Horseshoe Lake Canal	Polk And Barron Counties	Polk County	Low	UNKNOWN		
Black Brook		Renewable World Energies	Low	LARGE	98.0	1400.0
Richey		Richey, Walter	Low	SMALL	2.0	6.3
Sherwood Ryan	Shaun Ryan	Ryan, Shaun	Low	LARGE	10.0	50.0
Paul Sokol		Sokol, Paul	Low	SMALL	1.5	4.2
Straight Lake Swa East #1		Straight Lake SWA - Horsebarn	Low	SMALL	.9	2.0
Big Lake Mill		The Church Pine, Round & Big Lake Prot & Rehab District	Low	SMALL	2.0	17.0
Vilstrup		The Richard H Vilstrup Revocable Trust	Low	SMALL	6.0	38.0
Big Bass Lake	Tilton Brothers	Tilton Brothers	Low	SMALL	120.0	430.0
Godfrey Lake		Town of Clam Falls	Low	LARGE	26.0	170.0
Half Moon Lake	Town Of Milltown	Town of Milltown	Low	SMALL	580.0	2250.0
Skinaway Lake		Village of Turtle Lake	Low	LARGE	83.0	690.0
Bohn	Fountain Lake	Wahoo Ranch, LLC	Low	LARGE	24.0	150.0
Woolen Mill	Woolen Mill	Winger,	Low	UNKNOWN		
Beaver Brook (Joel Flowage)		WDNR	Low	LARGE	65.0	370.0
Straight Lake #3		WDNR	Low	SMALL	25.0	108.0
Fish Hatchery		WDNR	Low	UNKNOWN		
Fish Hatchery-Lower		WDNR	Low	UNKNOWN	1.0	
Straight Lake #1		WDNR	Low	SMALL		123.0
John Property Wetlands		WDNR	Low	SMALL	.8	2.2
John Property Wetlands		WDNR	Low	SMALL	.8	1.4
Straight Lake Swa-Horsebarn 3		WDNR	Low	SMALL	.1	.6
Straight Lk.-Swa-Horsebarn P1		WDNR	Low	SMALL	.5	.9
Straight Lk.-Swa-Horsebarn P3		WDNR	Low	SMALL	.4	.8
Straight Lk.-Swa-Horsebarn P4		WDNR	Low	SMALL	.4	1.0
Straight Lake Boy Scout		WDNR	Low	SMALL	197.0	593.0
Joel Marsh WLA		WDNR	Low	LARGE	585.0	3586.0

APPENDIX I.

POTENTIAL STATE AND FEDERAL GRANT PROGRAMS FOR MITIGATION PROJECTS

The following is a list of grant programs that are most commonly available for natural hazard mitigation in Wisconsin. This list was used when identifying potential grant sources for the mitigation projects identified in Section VI.C of this plan as well as the local community/school sub-plans. It is not intended to be comprehensive or all-encompassing, and grant programs, opportunities, and requirements frequently change.

In 2020, the U.S. Department of Energy issued a *Mitigation & Resilience Federal Funding Sources* document as part of the U.S. Climate Resilience Toolkit website. This 11-page document includes additional information on many of these federal programs referenced in this appendix as well as provides additional potential funding sources.

Appendix I. Potential State & Federal Mitigation Grant Programs

Potential Federal and State Grant Programs for Natural Hazard Mitigation

adapted and amended from: Wisconsin Emergency Management. *Resource Guide to All Hazards Mitigation Planning in Wisconsin*. April 2003. p19-20

These programs and requirements are subject to change and new opportunities arise. Contact these agencies or WCWRPC for up-to-date information.

This is a selection of more commonly used grant programs, but is not 100% complete.

	Federal or State Agency & Grant Program	Contact Information	Eligible Activities	Eligibility & Cost Share	Other Notes	Application Deadline
1	Federal Emergency Management Agency, Hazard Mitigation Grant program (HGMP)	Wisconsin Emergency Management P.O. Box 7865 2400 Wright Street Street, Madison, WI 54707-7865	Flood proofing, acquisition and relocation of flood prone properties, elevation of flood prone properties, wind resistant or retrofit, storm water improvements, education and awareness, All Hazards Mitigation Planning efforts	Federal - 75% State - 12.5% Local - 12.5% 90/10 for economic disadvantaged rural communities	Local government must be in compliance with the National Flood Insurance Program to be eligible. Projects must be cost-effective, environmentally sound and solve a problem.	After a Presidential Disaster Declaration
2	Federal Emergency Management Agency, Building Resilient Infrastructure & Communities (BRIC) Program (replaced PDM Program)	Wisconsin Emergency Management P.O. Box 7865 2400 Wright Street Street, Madison, WI 54707-7865	Grants can be used for various mitigation projects, information dissemination, planning, technical assistance, etc.	Federal - 75% Local - 25% 90/10 for economic disadvantaged rural communities	Must have an approved hazard mitigation plan.	Typically, pre-applications due abt. Nov/Dec and application due abt. Jan/Feb
3	Federal Emergency Management Agency, Flood Mitigation Assistance (FMA) Program	Wisconsin Emergency Management P.O. Box 7865 2400 Wright Street Street, Madison, WI 54707-7865	Acquisition, relocation, elevation and flood-proofing of flood-prone insured properties, flood mitigation planning	Federal - 75% Local - 25% 90/10 for economic disadvantaged rural communities	Repetitive loss properties given a high priority. Must have an approved hazard mitigation plan.	Typically, pre-applications due abt. Nov/Dec and application due abt. Jan/Feb
4	Federal Emergency Management Agency, Public Assistance (PA) program	Wisconsin Emergency Management P.O. Box 7865 2400 Wright Street Street, Madison, WI 54707-7865	Repair of infrastructure damaged during a flood that results in a Presidential Disaster declaration. Cost effective mitigation measures may be eligible during the repair of damaged facilities	Federal - 75% State - 12.5% Local - 12.5%		After a Presidential Disaster Declaration
5	Economic Development Administration, Economic Adjustment Program (see CFDA 11.307)	United State Department of Commerce, Economic Development Administration, 111 North Canal Street, Suite 855, Chicago, IL. 60606-7204 312-353-7148	Improvements and reconstruction of public facilities after a disaster or industry closing. Research studies designed to facilitate economic development.	Federal - 50%-70% Local - 30%-50%	Documenting economic distress, job impact and proposing a project that is consistent with a Comprehensive Economic Development Strategy are important funding selection criteria	Anytime
6	Economic Development Administration, Public Works and Development Facilities (see CFDA 11.300)	United State Department of Commerce, Economic Development Administration, 111 North Canal Street, Suite 855, Chicago, IL. 60606-7204 312-353-7148	Water and sewer, industrial access roads, rail spurs, port improvements, technological and related infrastructure.	Federal - 50%-70% Local - 30%-50%	Documenting economic distress, job impact and proposing a project that is consistent with a Comprehensive Economic Development Strategy are important funding selection criteria	Anytime
7	Wisconsin Department of Commerce, Community Development Local Grant, Public Facilities Emergency Program	Wisconsin Department of Commerce, 201 West Washington Avenue, PO Box 7970, Madison, WI 53707-7970 608-266-8934	Repair of water, sewer, street, curb and gutter, police and fire stations	Federal - 75% Local - 25% Must be a LMI community or serve a vulnerable population	Available after a state and/or Presidential Disaster declaration. these funds can be used towards the local match to receive FEMA public assistance and HMGP funds	After a Disaster event
8	Wisconsin Department of Commerce, Community Development Block Grant, Public Facilities Program	Wisconsin Department of Commerce, 201 West Washington Avenue, PO Box 7970, Madison, WI 53707-7970 608-266-8934	Water, sewer, street, curb and gutter, libraries, fire stations and community centers	To receive maximum points \$1.5 of local match to every \$1 of state Community Development Block Grant Must be a LMI community or serve a vulnerable population	A community's economic distress score influences funding determination. These funds can be used as a local match to receive FEMA Public Assistance and HMGP funds.	Anytime
9	Wisconsin Department of Transportation (DOT), Flood Damage Aid	Wisconsin Department of Transportation, 4802 Sheboygan Avenue, Madison, WI 53707 608-267-5254	Replacement and improvement costs for major flood damage to a road or road structure under local jurisdiction. To help defray costs of repairing major flood damage to any public street, alley, or bridge not located on the State Trunk Highway System	State - 75% of replacement costs and 50% of improvement costs, reimbursed by local	Repairs or replacements can include resign to prevent or reduce future flood damage. If Federal Disaster Aid is received, community is ineligible for State Federal Disaster Aid.	Applicant must submit final costs within 2 years following flood damage
10	Wisconsin Department of Transportation (DOT), Transportation Enhancement funds	Wisconsin Department of Transportation, 4802 Sheboygan Avenue, Madison, WI 53707 608-267-5254	Activities that "enhance" the surface transportation infrastructure "above and beyond" basic highway projects, can include: landscaping and scenic beautification, acquisition of scenic easements, and scenic or historic sites.	Federal - 80% Local - 20%	Can provide scenic vista and runoff areas, parking and landscaping along flood-prone riverways. Can acquire flood-prone areas along roads for green corridors. Flood damage reduction potential is not the primary purpose of the program.	Even-numbered years. Application forms available in January. Must be submitted by April. Funds granted competitively.
11	Wisconsin Department of Commerce, Division of Housing and Community Development CDBG - Emergency Assistance Program	Wisconsin Department of Commerce, 201 West Washington Avenue, PO Box 7970, Madison, WI 53707-7970 608-267-3682	Assists local governments in response to a natural or manmade disaster. Can be used to address damage to housing, public infrastructure, businesses, community buildings, etc.	Varies, depending upon whether the community is already an entitlement community for CDBG funding.	Must give preference to households at or below 80% of the county median income.	After a disaster event.

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12	Wisconsin Housing and Economic Development Agency Temporary Housing Grants	WHEDA 201 W. Washington Ave, Ste. 700 Madison WI, 53703 608-266-7884 800-334-6873	WHEDA has provided grant support to communities in the past following a disaster event for housing needs.	contact WHEDA for more information	contact WHEDA for more information	After a disaster event.
13	Wisconsin Department of Natural Resources, Surface Water Grants	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	Cost-sharing grants for a variety of lake and river planning, education, analysis, protection, and restoration projects. Can potentially include some flooding- or bank-related and invasive species projects.	Varies by project type Most planning grants are 67% WDNR Most project/management grants are 75% WDNR	Varies by project type (i.e., \$5,000 - \$200,000) Local gov'ts and non-profit organizations may apply.	Pre-applications on Sept 15 and Full Applications on Nov 15
14	Wisconsin Department of Natural Resources, Knowles-Nelson Stewardship Fund	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	Encompasses 6 sub-programs usually used for outdoor recreation activities. Can include land acquisition, natural/habitat enhancement, stream bank, & urban rivers projects.	State - 50% Local - 50% very competitive	Most projects must be part of an adopted outdoor recreation plan. Local governmental units may apply. Nonprofit conservation orgs are eligible for acquisition projects.	May 1
15	Wisconsin Department of Natural Resources, Municipal Flood Control Project	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	Acquisition, flood proofing, wetland-floodplain restoration, storm water projects, flood insurance studies, and floodplain mapping.	State - 70% Local - 30%	Maximum grant cannot exceed 20% of funding available. Cities, villages, towns, and metropolitan sewer districts are eligible.	15-Mar
16	Wisconsin Emergency Management, Domestic Preparedness Equipment Grant Program	Wisconsin Emergency Management, 2400 Wright Street, Madison, WI 54707-7865 608-242-3232	Some equipment purchased for terrorism readiness may also have valuable emergency response use to mitigate impacts should an event occur.			
17	Wisconsin Department of Natural Resources, Targeted Runoff Management (TRM) Grant Program		Develop stormwater management facilities to control non-point source pollution, primarily in urban or developing areas.	May be able to leverage with Wisconsin DOT funds.		
18	U.S. Army Corp of Engineers Section 14-Emergency Streambank and Shoreline Protection	regional contact: Detroit District 477 Michigan Avenue Detroit, Michigan 48226 313-226-6764	Provide bank protection of highways, bridges, essential public works, and critical facilities endangered by flood-caused erosion.	Federal - 75% Local - 25%	Must meet U.S. Army Corps of Engineers economic feasibility and other criteria Maximum \$500,000 per project.	
19	U.S. Army Corps of Engineers Section 22-Water Resources Planning Assistance to States	regional contact: Detroit District 477 Michigan Avenue Detroit, Michigan 48226 313-226-6764	This program can be used to obtain technical assistance from the Army Corps to study, analyze, and/or plan for a water-related challenge. The Corps will consider using some funds to sub-contract if needed.	Federal - 50% Local - 50%	Must meet U.S. Army Corps of Engineers economic feasibility and other criteria	
20	U.S. Army Corps of Engineers Section 205-Small Flood Control Projects (CFDA 12.106)	regional contact: Detroit District 477 Michigan Avenue Detroit, Michigan 48226 313-226-6764	Provision of specialized services through projects not specifically authorized by Congress.	First \$100,000 is federally funded, with remainder split 50% Federal/50% Local.	Must meet U.S. Army Corps of Engineers economic feasibility and other criteria Maximum \$7 million per project, though this may change.	
21	U.S. Army Corps of Engineers Section 208-Clearing Channels for Flood Prevention (CFDA 12.108)	regional contact: Detroit District 477 Michigan Avenue Detroit, Michigan 48226 313-226-6764	Provision of specialized services. Non-federal sponsor must provide all lands, easements, and rights-of-way.	Federal - 75% Local - 25%	Must meet U.S. Army Corps of Engineers economic feasibility and other criteria Maximum \$500,000 per project.	
22	U.S. Department of Agriculture, Farm Service Agency Emergency Conservation Program (ECP)	contact local Farm Service Agency	Perform emergency conservation measures to control wind erosion on farmlands and rehabilitate farmlands damaged by natural disasters; includes water conservation	Cost-sharing determined by County committees, following USDA guidelines.	Farm operator or landlord/owner in a disaster area or impacted by drought.	following a natural disaster event; eligibility determined by county FSA crnte
23	U.S. Department of Agriculture, Natural Resources Conservation Service, Watershed Protection and Flood Prevention	Wisconsin Natural Resources Conservation Service - NW Area 1304 N. Hillcrest Altoona, WI 54720 715-832-6547	Project grants and technical assistance to protect and utilize land and water resources in small watersheds. Emphasizes interdisciplinary planning teams.	Varies depending on nature of the project. Federal funding may be incorporated within other State Programs; check with WisDNR.	Agricultural related enterprises must account for at least 20% of the total benefits.	
24	U.S. Department of Agriculture, Natural Resources Conservation Service, Emergency Watershed Protect - Floodplain Easement	Wisconsin Natural Resources Conservation Service - NW Area 1304 N. Hillcrest Altoona, WI 54720 715-832-6547	Purchase floodplain easements as an emergency measure in floodplain areas which are impaired or have a history of repetitive flooding	Easement compensation varies by site and location. NRCS pays 100% of restoration costs.	Voluntary program to restore floodplain functions. Easements are permanent. Easement compensation based on offer, rate cap, and area market.	Sign-up period is in March.
25	U.S. Department of Agriculture - Rural Development, Housing & Community Facilities Programs	Rural Development Business & Community Programs 4949 Kirschling Court Stevens Point, WI 54481 Phone: 715-345-7610	Has been used for a wide variety of projects, including early warning systems, sirens, fire equipment, EMS buildings, shelters, radios, etc. Additional USDA programs available for larger projects.	Varies by community size, local household incomes, and funding availability	Counties and small communities; must work with USDA Rural Development officials from project start. One of the great source grants that may fund sirens and generators.	
26	Wisconsin Department of Natural Resources, Forest Fire Protection (FPP) Grant	FFP Grant Manager Department of Natural Resources P.O. Box 7921 Madison, WI 53707-7921 (608) 267-0848	Equipment, training, prevention materials, communication equipment, mapping/rural numbering systems, ATVs, dry hydrants	For individual fire depts: min. \$750; max. \$10,000 For County Fire Assoc: min. \$5,000; max. \$25,000	Fire departments and County Fire Associations	varies; usually May, June or July

Appendix I. Potential State & Federal Mitigation Grant Programs

27	U.S. Homeland Security Assistance to Firefighters Grant Program	U.S. Dept. of Homeland Security 800 K Street NW Washington DC 20472-3620 1-866-274-0960	For Fire Departments and EMS organizations to enhance fire-related capabilities.	Varies by population served, but 5% - 10% for small communities	Applicants serving less than 500,000 population may not receive over \$1 mil in funding.	April or May
28	U.S. Department of Interior Rural Fire Assistance Outreach	U.S. Dept of Interior check up-to-date application materials for contact info.	Training, personal protective equipment, basic gear, limited communications equipment, basic tools, and other activities.	Minimum 10% local match.	Max. award of \$20,000 per fiscal year. Need to serve DOI lands.	April
29	U.S. Department of Homeland Security, Emergency Operations Centers (CFDA 97.052)	Department of Homeland Security 245 Murray Drive, SW. Washington, DC 20528 202-282-8000	Improve local capabilities to respond to emergencies and disasters	Phase 1 for assessment Phase 2 requires a 50% nonfederal cost share.	Local governments can be sub-grantees under the State.	
30	Federal Emergency Management Agency, Interoperable Communications Equipment (CFDA 97.055)		Explore uses of equipment and technologies to increase the interoperability among fire services, law enforcement, and emergency medical services.	Funding is discretionary. Max. Federal share is \$6 million. 25% nonfederal cost-share.	Local governments are nominated by the State to submit an application.	Contact FEMA headquarters.
31	U.S. Department of Transportation Promoting Resilient Operations for Transformative, Efficient, & Cost-Saving Transportation (PROTECT) Program		For planning and implementing projects to improve transportation resiliency, including vulnerability assessments, evacuation, or other infrastructure enhancement	Grant funding is discretionary. In 2023, \$848m available. May also support cooperative agreements with U.S. DOT.	State, Tribal, and local units of government including MPOs and multi-jurisdictional groups.	2023 deadline was Sept 18
32	Wisconsin Emergency Management Pre-Disaster Flood Resilience Grant Program	Wisconsin Emergency Management, 2400 Wright Street, Madison, WI 54707-7865 608-242-3232	Assessment & Infrastructure components to identify flood vulnerabilities, study options to improve resilience, restore hydrology/reduce risks & damages in flood-prone communities	2024 announcement is the first year of funding with \$2 million available; future funding not guaranteed	Units of government; non-profits & consultants may apply on behalf of a govt unit with documentation of commitment	2024 deadline was Nov 30

APPENDIX J.

**SUMMARY OF CHANGES SINCE
THE 2017 PLAN**

The 2024 *Polk County Multi-Hazard Mitigation Plan* was a complete review and update of the 2017 Plan. Changes to the 2024 Plan update were also required to meet FEMA's latest mitigation planning guidance that went into effect in April 2023, though the 2017 Plan met most requirements and some changes were largely semantic. This section highlights some of the major changes since the 2017 Plan by plan section, including a brief description of how the Plan Update Steering Committee reviewed and analyzed each section.

Section I. Introduction

- The project brochure was updated and distributed to encourage participation.
- Stakeholder and community interviews included review of the 2017 Plan recommendations.
- Town surveys were customized for each town and incorporated aspects of the 2017 Plan to encourage input.
- Section I.E. in the 2024 Plan identifies some new data sources that were not available at the time of the previous plan update.
- Like the 2017 Plan, meetings were held with each city and village. A major change in this plan was the creation of sub-plans for each city and village (Appendix K); this makes it easier for the communities to consider their respective risks, vulnerabilities, capabilities, and strategies. This should also make it easier to update the plan in the future.
- New to this plan update was the invitation to public educational institutions to be full participants. Participants participated in a web-based presentation and survey, then a sub-plan was created for each (Appendix L).
- Steering Committee Analysis & Review: The planning process, which is summarized in Section I, was the focus of the first and second plan Steering Committee meetings, including a review of the process used during the 2017 plan and recommended changes for the plan update.

Section II. Community Profile

- Demographics and other data were updated. A new table-based and infographic format was incorporated for many key data points, which is easier to evaluate and will save time for future mitigation plan updates.
- G.I.S. data for critical facilities continues to be improved and the list of critical facilities was expanded and refocused on FEMA's new community lifelines. A corresponding appendix with heat maps showing the distributions of each lifeline was added (Appendix D).
- A new Underserved Communities & Socially Vulnerable Populations section was added, which incorporated national indices.
- Steering Committee Analysis & Review: The highlights of the community profile were reviewed and discussed during the second Steering Committee meeting. Particular attention was paid to identifying socially vulnerable populations and related emergency management implications.

Section III. Assessment of Hazard Conditions

- The largest change to this section and the plan as a whole was Polk County's decision to include non-natural hazards of significant risk; previous County mitigation plans were limited to natural hazards only.
- Throughout this section, NCDC statistics, NFIP participation information, and other data were updated and, for many risks, further supplemented. This includes integrating data and maps available in the *State of Wisconsin Homeland Security Council THIRA & SPR*, which was updated January 2018. It also includes incorporating input from the Steering Committee, stakeholders, newspaper articles, and other plan participants.
- A new appendix (Appendix E) was created, moving the NCDC data for past natural hazard events out of the main text.
- The Steering Committee re-assessed the risks and vulnerabilities facing Polk County. Due to similar impacts/vulnerabilities, high winds were combined with tornadoes.
- Section III.B. was added for Hazards of Concern Addressed in Other Plans to briefly address these other risks and refer to other plans and efforts instead of being unnecessarily redundant in this document. A substantial part of this subsection is a discussion on communicable disease, which includes COVID-19 and the Public Health Emergency Readiness Plan.
- Section III.C. is an expanded discussion on climate change as it relates to natural hazard risk, including mitigation or climate adaptation alternatives.
- Steering Committee Analysis & Review: An overview of hazard trends was briefly discussed by the committee during their second and third meetings. Following the first meeting, committee members completed a survey assessing hazard risks and vulnerabilities. The survey results were discussed at the committee's second meeting and the noted changes in scope were made. The analysis of the key results of the assessment and interview process was the focus of the Steering Committee's second and third meetings.

Section IV. Capabilities Assessment

- This section was amended to consider barriers to implementation and updated to reflect changes in mitigation activities and capabilities.
- Steering Committee Analysis & Review: Current mitigation activities and capabilities were discussed during interviews and the Committee's third and fourth meetings.

Section V. Progress on the 2017 Mitigation Plan Strategies

- During stakeholder interviews, lead parties for each strategy from the 2017 Plan were asked to provide an update on progress, which was integrated into this section.
- Steering Committee Analysis & Review: Progress on 2017 strategies was discussed by the Steering Committee during its third and fourth meetings, including some discussion on potential strategy alternatives.

Section VI. Mitigation Goals and Strategies

- The mitigation strategies were updated to reflect changes in priorities, which are discussed in this section. For example, community safe rooms, heating/cooling shelters, localized flooding, and promoting the County's emergency notification system were high priorities during this plan update. Some strategies also placed greater emphasis on nature-based solutions.
- After discussion with the Steering Committee, mitigation and preparedness strategies are separated in the 2024 Plan update with additional implementation guidance for the mitigation strategies.
- A subsection was added discussing the city, village, and participating school/technical college subplans.
- The plan coordination subsection was moved into Section VI with a greater emphasis on describing how the mitigation plan can/will be integrated into other planning mechanisms.
- The mitigation grant resources list in Appendix I was updated.
- Steering Committee Analysis & Review: Plan goals were reviewed and discussed as part of the second Steering Committee meeting. Mitigation and preparedness strategy alternatives were discussed during the third and fourth Steering Committee meetings as well as identifying criteria on which to evaluate and prioritize strategy alternatives. A strategy alternatives survey was distributed to all Steering Committee members; the survey results yielded relative priority of the mitigation and preparedness alternatives and guided the selection of which strategies would be recommended in the final plan.

Section VII. Plan Adoption & Maintenance Process

- This section was amended to include more emphasis on public participation.
- Section VII.B.iii. identifies some potential changes for the next plan update.
- Steering Committee Analysis & Review: The plan adoption and maintenance process were discussed and determined by the Steering Committee during its third meeting. Committee members were challenged to identify opportunities to continue to engage the public during plan maintenance as well as future plan updates.

APPENDIX K.

CITY & VILLAGE HAZARD MITIGATION SUB-PLANS

VILLAGE OF BALSAM LAKE HAZARD MITIGATION SUB-PLAN

This sub-plan identifies past hazard events, risks, trends, capabilities, and strategies unique to or specific to the community and is part of the overall *Polk County Multi-Hazard Mitigation Plan*. The Polk County mitigation plan provides broader context and contains hazard assessment, capabilities, and strategies that are countywide or multi-jurisdictional.

Primary Contact:	Village Clerk/Treasurer
Planning Meetings:	<ul style="list-style-type: none"> • Primary planning meeting with WCWRPC staff occurred on 3/14/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment in April 2023. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by Village Board at a public meeting. Resolution included in Appendix A.

Community Profile	
<p>This table provides a brief overview of key community characteristics, primarily from the 2020 U.S. Census, which are important to assessing capacity and vulnerabilities. For example, the entire population and all above-ground structures in the community are vulnerable to a tornado event, while mobile homes have an elevated vulnerability.</p>	
Population	934
Median Age	39.3 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors; Mobile home residents; Low-income housing; Large visitor population/vacation homes; Economic disadvantaged community. Has been a homeless population at campground at times.
Assessed Improvements (2023)	Residential: \$106,075,300; Commercial: \$13,268,200; Manuf.: \$3,761,600
# of Housing units	709
# of Mobile Homes	112
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan

Hazard Risk Assessment		
<p>This table describes past hazard events impacting the community and any <u>unique</u> vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the community. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all communities.</p>		
Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	Polk County has a long history of tornados, including some that have occurred nearby. July 27, 2010 tornado in the area downed trees and caused roof damage; 1 house & 1 garage seriously damaged. Occasional high winds, but no unique or significant damage noted.	Mobile home parks, camping, resorts, and condos are the highest vulnerabilities. Justice Center available as shelter (has generator). Legion basement also available. No shelters specifically available for campgrounds and resort properties; those on the east side of the Village are significant distances from the Justice Center.
Hail & Lightning	No unique history noted. Some tree and roof damage from high winds. Have had property damage from large hail.	No unique concerns noted.

Winter Storm, Ice, & Extreme Cold	Winter 2014 Polar Vortex resulted in significant utility breaks and frozen lines; previously had not been a problem. However, 2019 and 2021 have also been problem years for freezing utilities due to cold + limited snow cover.	No unique concerns noted.
Extreme Heat	No unique history noted.	No unique concerns noted.
Long-Term Power Outage	No long-term outages noted and no areas uniquely prone.	No generator at Village Hall/Library, which could serve as a heating/cooling shelter if needed. Fixed generators at wastewater plant and well, plus portable; additional portables would be useful.
Flooding – Riverine or Overbank	No recent history or problems noted. Minimal fluctuation of river and lake levels.	No specific overbank flooding concerns noted.
Flooding – Stormwater or Overland	No unique flooding events in recent history. Past problems in the business park area have been addressed.	No unique concerns noted. Stormwater management planning and improvements have been completed for the business park and for the Park Point Drive area.
Dams	Lower Balsam Lake Dam provides some flood control and is regularly inspected. Overall, the dam is in good repair with some maintenance recommended.	No unique concerns noted. 2022 inspection report recommends emergency and maintenance plan updates (EAP & IOMP) as well as repairs to eroded walkway and left trailrace channel wall; action on some of these may have already been completed.
Drought	No significant impacts within the Village from past droughts. Good well capacity.	No unique concerns noted.
Wildfire	No significant events in community noted.	Restrictions on campfires and no debris burning allowed. Some islands are wooded and emergency evacuation could be challenging.
Hazardous Materials Spills	No significant events in the community.	Highway truck traffic is most significant risk; some hazmat at fixed sites. PFAS detected below hazard index in one or more samples from the municipal water system.
Active Threats	No significant events in the community.	No unique concerns noted. Village and County buildings as potential targets.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted. Noted national trends of utilities as a target.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	Changing water quality standards, including PFAs. Interest in heating/cooling shelter availability (Village Hall not an overnight option)
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing frequency and severity of severe weather systems including downpours, wind events (including tornados) and extreme temperatures. Climate may be influencing these trends, including extending the tornado season into the fall and winter months.

Capabilities Assessment

The following is a general assessment of the community’s resiliency and capabilities to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms. This assessment was completed by the community through the 2023 web-based survey, with some supplemental information from the community meeting and other sources (e.g., fire department survey, NFIP Community Status Book). The list of potential plans, policies, and other actions is not exhaustive, and it is not expected that the community has undertaken all actions listed or will undertake all actions in the future.

Planning Activities

Community Emergency Operations or Response Plan (EOP)	Adopted; does incorporate mitigation or preparedness
Community Evacuation Plan and/or Exercises	Adopted. Islands can be inaccessible at times and pose evacuation challenges. Also some longer dead-end roads and driveway access concerns.
Continuity of Government Plan	Adopted; does incorporate mitigation or preparedness
Comprehensive Plan	Last update in 2009; limited mitigation references
Stormwater Management Plan	Adopted; does incorporate mitigation or preparedness
Historic Preservation Plan or Ordinance	Unknown
Capital Improvements Plan or Similar Budget	Adopted; does incorporate mitigation or preparedness
Involve Fire & Law Enforcement in planning & development plan review	Do this as needed.
Special emergency notification procedures or preparedness plans for vulnerable populations	No

Policies, Codes, & Ordinances

Building Codes	Adopted; does incorporates mitigation or preparedness
Building Code Efficiency Grading Schedule	Unknown
Zoning Ordinance	Adopted; does incorporate mitigation or preparedness
Subdivision Ordinance	Adopted; does incorporate mitigation or preparedness
Site Plan Review Requirements	Unknown
Floodplain Management	
<i>Initial Flood Hazard Boundary Map:</i>	05/03/1974
<i>Initial FIRM Identified:</i>	07/01/1988
<i>Current Effective FIRM Date:</i>	09/16/2011
<i>Date Community First Joined NFIP (Reg-Emer)</i>	07/01/1988
<i>NFIP Participation Status (and reason if not participating):</i>	Participant
<i>Floodplain Regulations w/ NFIP standards:</i>	Adopted
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	Village Administrator; then Plan Commission
<i>Other ongoing floodplain management activities:</i>	As of 2024, FEMA floodplain maps for Polk County are being updated, including new engineering & delineations for all Zone A, and new delineations for Zone AE using the most recent terrain data.
Stormwater Management Ordinance	Adopted; does incorporates mitigation or preparedness
Stormwater Utility	Adopted; does incorporates mitigation or preparedness
Winter Emergency Policies	Adopted; does not incorporates mitigation or preparedness

Mitigation & Preparedness Actions for Facilities

Debris Site identified for storm debris disposal (not just woody debris)	Unknown
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Emergency Operations Center designated with generator/back-up power	Yes
Public Storm Shelter/Community Safe Room designated	Yes. Justice Center available, but distance if short notice is a barrier for some.
Public Heating/Cooling Shelter designated with generator/back-up power	Partially complete. Village Hall/Library has been used in the past, but with limited hours and lacks generator. County Gov't Center also available.
Storm/warning siren on back-up power	Yes. At Village Hall and on north side along Hwy 46.
Storm/warning siren that can be activated remotely	Yes. Police activated.
Active shooter/threat plans and/or security hardening for municipal buildings	Some. Security area at Clerk's office. New security doors for Police & Fire access.
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Yes. Also has a utilities emergency plan.
Individuals in EOP have ICS/NIMS training	No
Public Information Officer designated & trained	No
Municipal officials and staff participate in regular disaster or emergency response exercises	Partially complete
Community-level efforts to improve hazard preparedness among residents	Yes
Adopted billing rates for public works labor & equipment use during emergencies	Yes
Adopted mutual aid agreements for public works equipment/personnel support	"Handshake" agreements with Dresser & St. Croix Falls if need.
Adopted emergency contracting and purchasing policies	Yes
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Unknown
Cyber-security systems and policies for municipal utilities	Yes. Largely monitoring only; limiting remote access/control.
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	No. Poor NOAA radio coverage.
Other Flood Mitigation projects or activities	Continues to make stormwater improvements concurrent with street repairs or to support new development.
Municipal Dam-related planning or actions	No
Barriers to mitigation or preparedness actions	Need to complete FEMA Incident Command and NIMS trainings. Funding to implement projects. Lack of security and oversight for extended shelter availability.
Other:	Some emergency planning and response coordination with Milltown.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the Polk County mitigation plan are shared by all participating communities.

The community will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Sections VI.C. and D. of the Polk County mitigation plan includes additional mitigation and preparedness actions that are intergovernmental in nature and not specific to the community but may suggest coordination and funding opportunities.

The following recommended actions/projects are specific to the community:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
<p>1. Increase public education on severe weather/tornado shelter availability at the Justice Center, including among seasonal visitors and vacation home owners. Explore designation or development of a community safe room (storm shelter) on the east side of the Village, <u>if</u> there is community demand.</p> <p>If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location.</p> <p>For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.</p>	<p>High for public outreach; 1-3 years</p> <p>Medium-to-Low for safe room; 3-5+ years, depending on interest.</p>	<p>Residents should express need; Village Board</p>	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMA)</p> <p>WCWRPC and Wisconsin Emergency Management can provide grant-related guidance</p>
<p>2. Conduct Emergency Operations Center (EOC) training in concert with FEMA Incident Command System (ICS) and National Incident Management System (NIMS) trainings for key municipal officials and staff.</p>	<p>High; 1-3 years</p>	<p>Village staff & officials identified in the Emergency Operations Plan</p>	<p>County Emergency Management can provide assistance & guidance; ICS & NIMS training available at FEMA website</p>
<p>3. As funding allows, install an emergency power generator at the Village Hall and develop a plan so that it may be used as a heating/cooling shelter. Additional 1-2 portables are needed for infrastructure.</p>	<p>High; 2-5+ years as resources allow</p>	<p>Village Board & Public Works</p>	<p>See generator-related recommendations in Section VI.C.</p> <p>School may be an alternative for extended heating/cooling shelter use.</p>
<p>4. Develop an evacuation plan for islands with homes and camping within the Village. Integrate the plan in the community's Emergency Operations Plan and consider a related drill/exercise.</p>	<p>Medium; 2-5 years</p>	<p>Village staff & officials identified in the Emergency Operations Plan</p>	<p>County Emergency Management can provide guidance</p>

<p>5. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) to increase public participation in the countywide mass notification system (CodeRED), awareness of emergency siren use and warning systems, and public preparedness in general. For Balsam Lake, additional emphasis should include visitors/tourism destinations and homeless at the campground.</p>	<p>Medium-to-High; ongoing</p>	<p>Village Clerk & Board; Fire Department</p>	<p>County Emergency Management & partners have educational materials</p> <p>Could implement annually during Severe Weather Awareness Week and/or Preparedness Month using social media, posters, utility bill inserts, etc.</p> <p>211 resources for homeless populations.</p>
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Sub-Plan Coordination and Integration

The previous Capacity Assessment section identifies how this Mitigation Sub-plan has been integrated into or coordinated with other municipal plans or planning mechanisms. During the planning process, the following opportunities were identified to integrate the mitigation strategies into other community planning mechanisms:

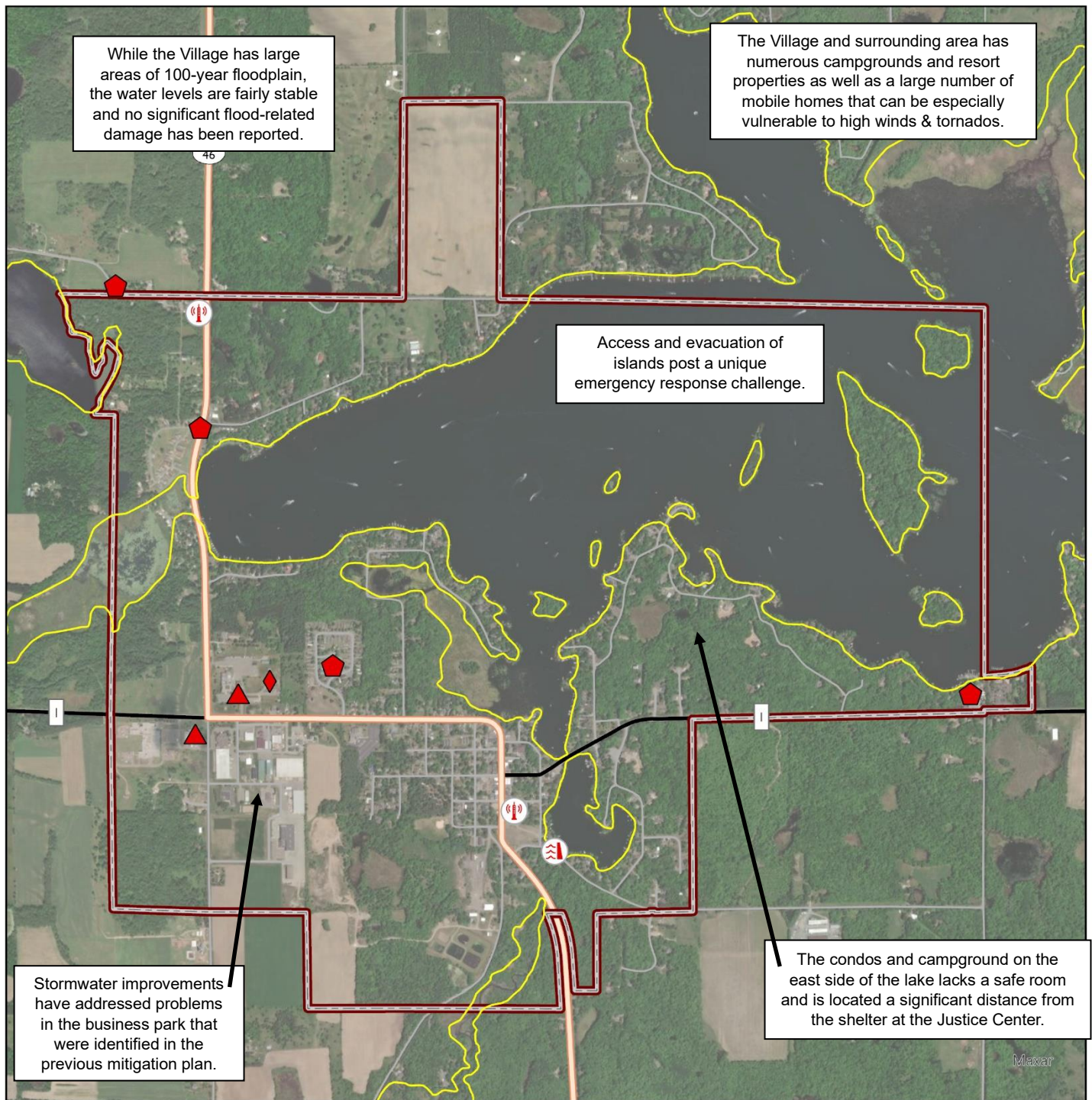
- When the Village next updates its comprehensive plan, this is an opportunity to integrate mitigation strategies, including obtaining public input on the need for a community safe room.
- The Village will continue to require stormwater management planning for significant new development.
- The emergency and maintenance plans (EAP & IOMP) for the Lower Balsam Lake Dam should be updated and maintained.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

Sub-Plan Adoption and Maintenance

<p>Plan Adoption</p>	<p>Once updated, the community’s governing body will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This community-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The community may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>During the second quarter of each year or following a declared disaster event, the primary mitigation plan contact will review this Mitigation Sub-Plan concurrently with (at the same time as) the annual review of the municipal Emergency Operations Plan. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. The community’s planning contact will contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. The community may also request that the County consider changes to the County’s overall mitigation plan. 2. Provide the suggested changes to the community’s emergency planning committee, plan commission, or governing body for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the governing body will adopt the Sub-Plan as noted previously. Such changes will be limited to this community-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The community intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The community will provide opportunities for public participation throughout its mitigation planning processes, including: (1) all governing body or committee actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

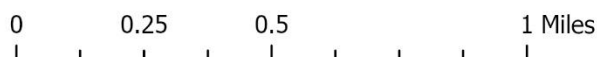
VILLAGE OF BALSAM LAKE - HAZARD ASSESSMENT

Polk County - 2024



Legend

- Municipal Boundary
- 100-yr Floodplain
- ◆ School
- ▲ Assisted Living
- ⬠ Mobile Home Park
- 🚒 Storm Siren
- 🏰 Dam w/High or Significant Hazard Rating



Data Sources:
Polk County, WDHS, WDNR, WisDOT,
WDOA, WCWRPC.



VILLAGE OF CENTURIA HAZARD MITIGATION SUB-PLAN

This sub-plan identifies past hazard events, risks, trends, capabilities, and strategies unique to or specific to the community and is part of the overall *Polk County Multi-Hazard Mitigation Plan*. The Polk County mitigation plan provides broader context and contains hazard assessment, capabilities, and strategies that are countywide or multi-jurisdictional.

Primary Contact:	Village Clerk/Treasurer
Planning Meetings:	<ul style="list-style-type: none"> • Primary planning meeting with WCWRPC staff occurred on 3/7/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment in December 2023. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by Village Board at a public meeting. Resolution included in Appendix A.

Community Profile	
<p>This table provides a brief overview of key community characteristics, primarily from the 2020 U.S. Census, which are important to assessing capacity and vulnerabilities. For example, the entire population and all above-ground structures in the community are vulnerable to a tornado event, while mobile homes have an elevated vulnerability.</p>	
Population	891
Median Age	37.1 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors & mobile home park residents
Assessed Improvements (2023)	Residential: \$30,034,700; Commercial: \$8,310,400; Manuf.: \$1,556,700
# of Housing units	423
# of Mobile Homes	96
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan

Hazard Risk Assessment		
<p>This table describes past hazard events impacting the community and any <u>unique</u> vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the community. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all communities.</p>		
Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	<p>Polk County has a long history of tornados, including some that have occurred nearby. No recent tornado history within the Village. Occasional high winds with tree or roof damage, but no unique or significant damage noted.</p>	<p>Many of the older homes have basements. 2 mobile home parks, 3 assisted living facilities, and a low-income townhome complex are slab-on-grade.</p> <p>No public safe room/storm shelter, but has been some interest among residents.</p>
Hail & Lightning	No unique history noted.	No unique concerns noted.

Winter Storm, Ice, & Extreme Cold	During the Winter 2014 Polar Vortex, many municipal water lines froze and some breaks; the water tower was also damaged. Previously, the Village would, at most, experience only 3-4 water main/line breaks per year.	No unique concerns noted.
Extreme Heat	No unique history noted.	No unique concerns noted.
Long-Term Power Outage	Occasional power line breaks due to ice/snow on trees, but no long-term (3-4+ days) outages in recent memory. No areas uniquely prone.	No unique concerns noted. No generator at Village Hall/Fire Hall/EOC, which also has the siren. Electric power not produced within the community, so subject to impacts on generating and distribution infrastructure outside the community.
Flooding – Riverine or Overbank	No 100-year floodplain or river flooding in the Village.	
Flooding – Stormwater or Overland	No problems or concerns noted.	No unique concerns noted. Past problem areas have largely been addressed.
Dams	No dam or dam shadow in the Village.	
Drought	No significant impacts within the Village from past droughts. Good well capacity for fire protection.	No unique concerns noted.
Wildfire	No significant events in the community.	No unique concerns noted.
Hazardous Materials Spills	No significant events in the community.	Highway truck traffic and propane storage/distribution site are highest vulnerabilities. PFAS detected below hazard index in one or more samples from the municipal water system.
Active Threats	No significant events in the community.	No unique concerns noted.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	None noted.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing frequency and severity of severe weather systems including downpours, wind events (including tornados) and extreme temperatures. Climate may be influencing these trends, including extending the tornado season into the fall and winter months.

Capabilities Assessment

The following is a general assessment of the community’s resiliency and capabilities to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms. This assessment was completed by the community through the 2023 web-based survey, with some supplemental information from the community meeting and other sources (e.g., fire department survey, NFIP Community Status Book). The list of potential plans, policies, and other actions is not exhaustive, and it is not expected that the community has undertaken all actions listed or will undertake all actions in the future.

Planning Activities

Community Emergency Operations or Response Plan (EOP)	Outdated plan; will consider incorporating mitigation or preparedness in update
Community Evacuation Plan and/or Exercises	Outdated plan; will consider incorporating mitigation or preparedness in update
Continuity of Government Plan	Outdated plan; will consider incorporating mitigation or preparedness in update
Comprehensive Plan	Outdated plan (2009); will consider incorporating mitigation or preparedness in update
Stormwater Management Plan	Outdated plan; will consider incorporating mitigation or preparedness in update
Historic Preservation Plan or Ordinance	Outdated plan; will consider incorporating mitigation or preparedness in update
Capital Improvements Plan or Similar Budget	Outdated plan; will consider incorporating mitigation or preparedness in update
Involve Fire & Law Enforcement in planning & development plan review	Do this as needed.
Special emergency notification procedures or preparedness plans for vulnerable populations	No

Policies, Codes, & Ordinances

Building Codes	Adopted; does not incorporate mitigation or preparedness
Building Code Efficiency Grading Schedule	Adopted; does not incorporate mitigation or preparedness
Zoning Ordinance	Adopted; does not incorporate mitigation or preparedness
Subdivision Ordinance	Adopted; does not incorporate mitigation or preparedness
Site Plan Review Requirements	Adopted; does not incorporate mitigation or preparedness
Floodplain Management	No 100-year floodplain within the Village.
<i>Initial Flood Hazard Boundary Map:</i>	
<i>Initial FIRM Identified:</i>	
<i>Current Effective FIRM Date:</i>	
<i>Date Community First Joined NFIP (Reg-Emer)</i>	
<i>NFIP Participation Status (and reason if not participating):</i>	
<i>Floodplain Regulations w/ NFIP standards:</i>	
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	
<i>Other ongoing floodplain management activities:</i>	
Stormwater Management Ordinance	Adopted; does not incorporate mitigation or preparedness
Stormwater Utility	Adopted; does not incorporate mitigation or preparedness
Winter Emergency Policies	Adopted; does not incorporate mitigation or preparedness

Mitigation & Preparedness Actions for Facilities

Debris Site identified for storm debris disposal (not just woody debris)	No
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Emergency Operations Center designated with generator/back-up power	Partially complete
Public Storm Shelter/Community Safe Room designated	No
Public Heating/Cooling Shelter designated with generator/back-up power	Partially complete. Not activated to date. County Gov't Center in Balsam Lake also available.
Storm/warning siren on back-up power	No back-up power. Siren activated for tornados only; some past concerns if sirens activated for severe storms that never arrive and foster a "cry wolf" impression.
Storm/warning siren that can be activated remotely	No. Sometimes, by the time warning is issued, get paged, then physically get to the siren to activate, the storm can be passed.
Active shooter/threat plans and/or security hardening for municipal buildings	No
Other Mitigation & Preparedness Actions	
Review EOP at least annually	No
Individuals in EOP have ICS/NIMS training	Limited to emergency services
Public Information Officer designated & trained	Unknown
Municipal officials and staff participate in regular disaster or emergency response exercises	Only if part of emergency services
Community-level efforts to improve hazard preparedness among residents	No unique activities noted
Adopted billing rates for public works labor & equipment use during emergencies	Unknown
Adopted mutual aid agreements for public works equipment/personnel support	Rural water mutual aid agreement. Otherwise, informal "handshake" agreement with Milltown for general public works mutual aid.
Adopted emergency contracting and purchasing policies	Unknown
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Unknown
Cyber-security systems and policies for municipal utilities	Unknown
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	Unknown
Other Flood Mitigation projects or activities	No
Municipal Dam-related planning or actions	Not applicable
Barriers to mitigation or preparedness actions	Public education and awareness. Lack of funding (grant assistance needed)
Other:	Volunteer shortage for Fire & EMS departments.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the Polk County mitigation plan are shared by all participating communities.

The community will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Sections VI.C. and D. of the Polk County mitigation plan includes additional mitigation and preparedness actions that are intergovernmental in nature and not specific to the community, but may suggest coordination and funding opportunities.

The following recommended actions/projects are specific to the community:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
<p>1. Explore designation or development of a community safe room (storm shelter), perhaps as part of a renovation or new construction of a Fire Hall, Village Hall, or other public works building.</p> <p>If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location.</p> <p>For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.</p> <p>If part of a new facility on the Village's south side, consider the inclusion of a second emergency siren as part of the project.</p>	<p>Medium-to-Low; 3-5 years</p> <p>No public demand for safe room to date.</p>	<p>Residents should express need; Village Board</p>	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMA)</p> <p>WCWRPC and Wisconsin Emergency Management can provide grant-related guidance</p>
<p>2. As funding allows, install emergency power generators and/or electrical hook-ups for generators at the Village Hall/Fire Department/EOC and siren.</p>	<p>High; 1-3+ years as resources allow</p>	<p>Village Board & Public Works</p>	<p>See generator-related recommendations in Section VI.C.</p>
<p>3. Integrate mitigation plan recommendations as part of the next comprehensive plan update.</p>	<p>Medium-to-Low; 1-3 years</p>	<p>Plan Commission and Village Board</p>	<p>CDBG Planning Grant, if income-eligible</p>

<p>4. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) to increase public participation in the countywide mass notification system (CodeRed), awareness of emergency siren use and warning systems, and public preparedness in general.</p>	<p>Medium-to-High; ongoing</p>	<p>Village Clerk & Board; Fire Department</p>	<p>County Emergency Management & partners have educational materials</p> <p>Could implement annually during Severe Weather Awareness Week and/or Preparedness Month using social media, posters, utility bill inserts, etc.</p>
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Sub-Plan Coordination and Integration

The previous Capacity Assessment section identifies how this Mitigation Sub-plan has been integrated into or coordinated with other municipal plans or planning mechanisms. During the planning process, the following opportunities were identified to integrate the mitigation strategies into other community planning mechanisms:

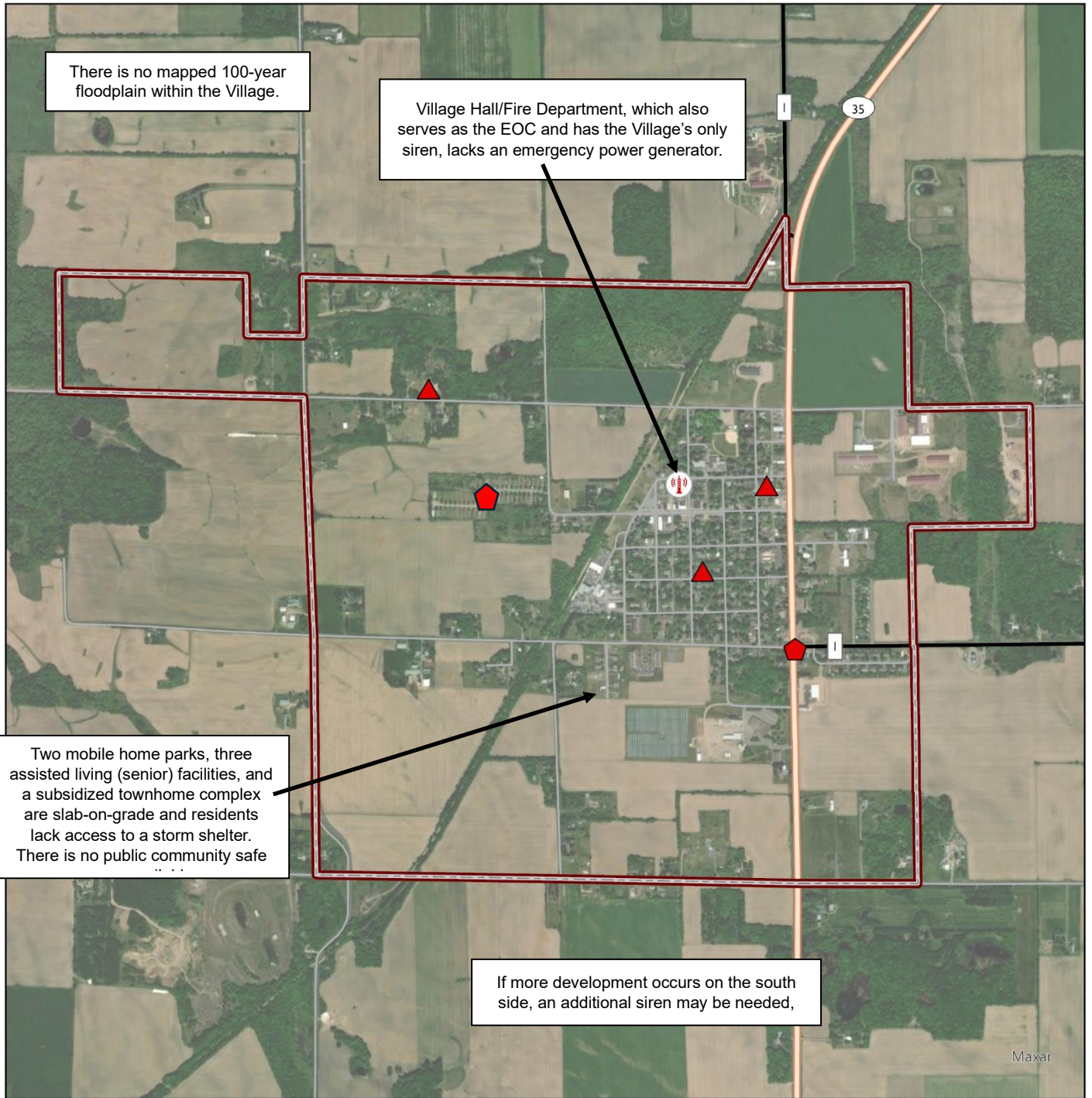
- As the capabilities assessment shows, the Village has a number of outdated plans. Integrating this mitigation sub-plan and other preparedness actions will be considered as part of future updates to the comprehensive plan and other Village planning efforts.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

Sub-Plan Adoption and Maintenance






<p>Plan Adoption</p>	<p>Once updated, the community’s governing body will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This community-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The community may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>During the second quarter of each year or following a declared disaster event, the primary mitigation plan contact will review this Mitigation Sub-Plan concurrently with (at the same time as) the annual review of the municipal Emergency Operations Plan. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. The community’s planning contact will contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. The community may also request that the County consider changes to the County’s overall mitigation plan. 2. Provide the suggested changes to the community’s emergency planning committee, plan commission, or governing body for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the governing body will adopt the Sub-Plan as noted previously. Such changes will be limited to this community-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The community intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The community will provide opportunities for public participation throughout its mitigation planning processes, including: (1) all governing body or committee actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

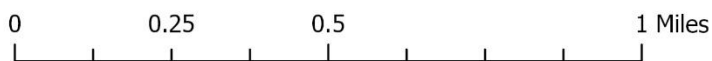
VILLAGE OF CENTURIA - HAZARD ASSESSMENT

Polk County - 2024



Legend

-  Municipal Boundary
-  100-yr Floodplain
-  Assisted Living
-  Mobile Home Park
-  Storm Siren



Data Sources:
Polk County, WDHS, WDNR, WisDOT,
WDOA, WCWRPC.



VILLAGE OF CLEAR LAKE HAZARD MITIGATION SUB-PLAN

This sub-plan identifies past hazard events, risks, trends, capabilities, and strategies unique to or specific to the community and is part of the overall *Polk County Multi-Hazard Mitigation Plan*. The Polk County mitigation plan provides broader context and contains hazard assessment, capabilities, and strategies that are countywide or multi-jurisdictional.

Primary Contact:	Village Clerk/Treasurer
Planning Meetings:	<ul style="list-style-type: none"> • Primary planning meeting with WCWRPC staff occurred on 3/31/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment in December 2023. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by Village Board at a public meeting. Resolution included in Appendix A.

Community Profile

This table provides a brief overview of key community characteristics, primarily from the 2020 U.S. Census, which are important to assessing capacity and vulnerabilities. For example, the entire population and all above-ground structures in the community are vulnerable to a tornado event, while mobile homes have an elevated vulnerability.

Population	1,099
Median Age	38.5 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors
Assessed Improvements (2023)	Residential: \$43,171,100; Commercial: \$12,003,000; Manuf.: \$8,365,600
# of Housing units	518
# of Mobile Homes	60
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan

Hazard Risk Assessment

This table describes past hazard events impacting the community and any unique vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the community. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	Polk County has a long history of tornados, including some that have occurred nearby. Past tornado touchdown on south side of the Village with minimal damage. July 2016 high winds (or tornado) too down many trees; luckily there were no campers at the campground at the time or else injuries may have occurred.	Municipal campground (25 RV & tent sites), mobile home park, and assisted living facility are the largest vulnerabilities. Some other slab-on-grade construction. Village Hall/Police Station/EOC potentially available as a storm shelter, but has capacity limits and lacks generator; community center may be a better shelter location if public demand increases.

Hail & Lightning	Periodic past lightning strikes at the wastewater treatment plant and liftstations, but none in recent years.	No unique concerns noted.
Winter Storm, Ice, & Extreme Cold	Winter 2014 freezing temperatures with lack of snow cover resulted in freezing of many water lines and main/lateral breaks; this was a unique event and sporadic & isolated since. Heavy snows in 2022-2023; one garage collapsed and ran out of places to put snow after removal.	No unique concerns noted.
Extreme Heat	No unique history noted.	No unique concerns noted.
Long-Term Power Outage	No long-term power loss in recent memory. Lost power for about 24 hours due to a snow storm about 2014. No areas uniquely prone.	No unique concerns noted. Electric power not produced within the community, so subject to impacts on generating and distribution infrastructure outside the community. Village Hall and Fire Hall lack generators. Fixed generators at wastewater treatment plant and main well. Portable available for liftstations.
Flooding – Riverine or Overbank	No recent history or problems noted. VERY little 100-year floodplain.	No vulnerabilities noted. Very limited floodplain is protected as conservancy.
Flooding – Stormwater or Overland	Stormwater infiltrates into wastewater system through older manholes and potentially in basements. March 2019 spring melt impacted 25-30 homes (largely basements) when storm sewer was inundated and private-owned cleanouts were unable to handle the runoff.	Village is continuing to address. Drainage through the Village can result in flooding of nearby homes/basements during very heavy rains or snow melt; continued stormwater flooding vulnerability in adjacent areas. See map at end of sub-plan.
Dams	No municipal dam.	
Drought	No significant impacts within the Village from past droughts.	Additional water storage capacity may be needed in future if significant new development or to support a high water business.
Wildfire	No significant events in the community.	No unique concerns noted.
Hazardous Materials Spills	No significant events in the community.	Highway truck traffic is the most significant risk. Some manufacturing. PFAs not detected in municipal water supply.
Active Threats	No significant events in the community.	No unique concerns noted.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	Anticipated growth on the Village’s southwest side related to the Stillwater Bridge.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing frequency and severity of severe weather systems including downpours, wind events (including tornados) and extreme temperatures. Climate may be influencing these trends, including extending the tornado season into the fall and winter months.

Capabilities Assessment

The following is a general assessment of the community's resiliency and capabilities to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms. This assessment was completed by the community through the 2023 web-based survey, with some supplemental information from the community meeting and other sources (e.g., fire department survey, NFIP Community Status Book). The list of potential plans, policies, and other actions is not exhaustive, and it is not expected that the community has undertaken all actions listed or will undertake all actions in the future.

Planning Activities

Community Emergency Operations or Response Plan (EOP)	Adopted; does incorporate mitigation or preparedness
Community Evacuation Plan and/or Exercises	Unknown
Continuity of Government Plan	Unknown
Comprehensive Plan	Outdated plan; will consider mitigation or preparedness when updating
Stormwater Management Plan	Unknown
Historic Preservation Plan or Ordinance	Unknown
Capital Improvements Plan or Similar Budget	Outdated plan; will consider mitigation or preparedness when updating
Involve Fire & Law Enforcement in planning & development plan review	Do this as needed.
Special emergency notification procedures or preparedness plans for vulnerable populations	no

Policies, Codes, & Ordinances

Building Codes	Adopted; does incorporate mitigation or preparedness
Building Code Efficiency Grading Schedule	Adopted; does incorporate mitigation or preparedness
Zoning Ordinance	Adopted; does incorporate mitigation or preparedness
Subdivision Ordinance	Adopted; does incorporate mitigation or preparedness
Site Plan Review Requirements	No
Floodplain Management	
<i>Initial Flood Hazard Boundary Map:</i>	-
<i>Initial FIRM Identified:</i>	-
<i>Current Effective FIRM Date:</i>	-
<i>Date Community First Joined NFIP (Reg-Emer)</i>	-
<i>NFIP Participation Status (and reason if not participating):</i>	Not a Participant, since very minimal 100-year floodplain that is identified as conservancy
<i>Floodplain Regulations w/ NFIP standards:</i>	No
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	Sanctioned 09/16/2012; this can impact FEMA mitigation grant eligibility.
<i>Other ongoing floodplain management activities:</i>	Will reassess NFIP participation as part of upcoming comprehensive plan update. Some manhole rehabilitation and, on the north side, relining of sanitary sewer mains. As of 2024, FEMA floodplain maps for Polk County are being updated, including new engineering & delineations for all Zone A, and new delineations for Zone AE using the most recent terrain data.
Stormwater Management Ordinance	No
Stormwater Utility	No
Winter Emergency Policies	No

Mitigation & Preparedness Actions for Facilities	
Debris Site identified for storm debris disposal (not just woody debris)	Unknown
Emergency Operations Center designated with generator/back-up power	Unknown
Public Storm Shelter/Community Safe Room designated	No form
Public Heating/Cooling Shelter designated with generator/back-up power	Unknown
Storm/warning siren on back-up power	Unknown
Storm/warning siren that can be activated remotely	Yes
Active shooter/threat plans and/or security hardening for municipal buildings	Unknown
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Yes
Individuals in EOP have ICS/NIMS training	Yes
Public Information Officer designated & trained	Yes
Municipal officials and staff participate in regular disaster or emergency response exercises	Yes
Community-level efforts to improve hazard preparedness among residents	No, but plan to consider implementing
Adopted billing rates for public works labor & equipment use during emergencies	Yes
Adopted mutual aid agreements for public works equipment/personnel support	Yes
Adopted emergency contracting and purchasing policies	Yes
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Yes.
Cyber-security systems and policies for municipal utilities	Yes
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	Yes
Other Flood Mitigation projects or activities	No
Municipal Dam-related planning or actions	No
Barriers to mitigation or preparedness actions	Staff resources//time. Limited funding available.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the Polk County mitigation plan are shared by all participating communities.

The community will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Sections VI.C. and D. of the Polk County mitigation plan includes additional mitigation and preparedness actions that are intergovernmental in nature and not specific to the community but may suggest coordination and funding opportunities.

The following recommended actions/projects are specific to the community:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
<p>1. As funding allows, install an emergency power generator the Village Hall/Police Dept/EOC, which also serves as a severe weather shelter and heating/cooling shelter.</p>	<p>High; 2-5+ years as resources allow</p>	<p>Village Board & Public Works</p>	<p>See generator-related recommendations in Section VI.C.</p>
<p>2. Explore the hardening of the Village Hall or Area Community Center to serve as a community safe room.</p> <p>If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location.</p>	<p>Medium-to-Low; 3-5+ years</p> <p>No public demand for safe room to date.</p>	<p>Residents should express need; Village Board</p>	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMA)</p> <p>WCWRPC and Wisconsin Emergency Management can provide grant-related guidance</p>
<p>3. Continue to address stormwater management challenges in the community, including manhole replacement and line rehabilitation to prevent infiltration; collaborating with landowners on system design & maintenance; and planning for new growth within the Village.</p>	<p>High; ongoing</p>	<p>Plan Commission & Public Works</p>	<p>As of 2024, the Village is eligible for CDBG-PF grant funding. Other grant dollars may be available if the project supports job creation or retention. Tax incremental financing may also assist with such costs.</p>
<p>4. Integrate mitigation plan recommendations as part of the next comprehensive plan update, including re-assess stormwater management measures and participation in the NFIP program.</p>	<p>Medium-to-Low; 1-5 years</p>	<p>Plan Commission and Village Board</p>	<p>CDBG Planning Grant, if income-eligible; WDNR for technical support if needed</p>
<p>5. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) to increase public participation in the countywide mass notification system (CodeRED), awareness of emergency siren use and warning systems, and public preparedness in general.</p>	<p>Medium-to-High; ongoing</p>	<p>Village Clerk & Board; Fire Department</p>	<p>County Emergency Management & partners have educational materials</p> <p>Could implement annually during Severe Weather Awareness Week and/or Preparedness Month using social media, posters, utility bill inserts, etc.</p>

Sub-Plan Coordination and Integration

The previous Capacity Assessment section identifies how this Mitigation Sub-plan has been integrated into or coordinated with other municipal plans or planning mechanisms. During the planning process, the following opportunities were identified to integrate the mitigation strategies into other community planning mechanisms:

- The Village anticipates updating its comprehensive plan at some point in the future. This is an opportunity to integrate mitigation strategies, including obtaining public input on the need for a community safe room and re-assessing participation in the NFIP.
- The Village will continue to integrate stormwater management efforts and other mitigation projections into its capital improvements plan (CIP).
- The Village will maintain an emergency action plan (EAP), which provides an opportunities to consider the capabilities assessment and recommendations of this mitigation subplan.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

Sub-Plan Adoption and Maintenance

<p>Plan Adoption</p>	<p>Once updated, the community’s governing body will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This community-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The community may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>During the second quarter of each year or following a declared disaster event, the primary mitigation plan contact will review this Mitigation Sub-Plan concurrently with (at the same time as) the annual review of the municipal Emergency Operations Plan. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. The community’s planning contact will contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. The community may also request that the County consider changes to the County’s overall mitigation plan. 2. Provide the suggested changes to the community’s emergency planning committee, plan commission, or governing body for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the governing body will adopt the Sub-Plan as noted previously. Such changes will be limited to this community-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The community intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The community will provide opportunities for public participation throughout its mitigation planning processes, including: (1) all governing body or committee actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

VILLAGE OF CLAYTON HAZARD MITIGATION SUB-PLAN

This sub-plan identifies past hazard events, risks, trends, capabilities, and strategies unique to or specific to the community and is part of the overall *Polk County Multi-Hazard Mitigation Plan*. The Polk County mitigation plan provides broader context and contains hazard assessment, capabilities, and strategies that are countywide or multi-jurisdictional.

Primary Contact:	Village Clerk/Treasurer
Planning Meetings:	<ul style="list-style-type: none"> • Primary planning meeting with WCWRPC staff occurred on 3/31/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment web-based survey in August 2023. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by Village Board at a public meeting. Resolution included in Appendix A.

Community Profile	
<p>This table provides a brief overview of key community characteristics, primarily from the 2020 U.S. Census, which are important to assessing capacity and vulnerabilities. For example, the entire population and all above-ground structures in the community are vulnerable to a tornado event, while mobile homes have an elevated vulnerability.</p>	
Population	550
Median Age	41.1 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors; Economically disadvantaged community; Mobile home park residents during high winds/tornados; growing ESL population
Assessed Improvements (2023)	Residential: \$11,535,300; Commercial: \$4,522,700; Manuf.: \$1,729,000
# of Housing units	222
# of Mobile Homes	18
Notable Community Lifelines or Critical Facilities	Village Hall, Fire Department, School

Hazard Risk Assessment		
<p>This table describes past hazard events impacting the community and any <u>unique</u> vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the community. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all communities.</p>		
Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	<p>Polk County has a long history of tornados, including some that have occurred nearby, however no touchdowns within the Village to the recollection of community.</p> <p>Occasional high winds, but no unique or significant damage noted. 2019 high winds caused roof damage, toppled trees, and caused power line damage.</p>	<p>Tree damage has been worst along Clayton St. East in the past. One mobile home park; older units likely not anchored. Increasing visitor traffic at Camelia Lake wayside/boat ramp, county trail, school, and Village playground with ballfield. Some slab-on-grade commercial structures.</p> <p>School has been used as a storm shelter in the past, but not built to withstand 250 mph wind loads and no formal use agreement. Not consistently available and many residents likely unaware that it may be available.</p>

		No remote unlock. Concerned with climate trends potentially increasing the frequency and severity of tornado and high wind events.
Hail & Lightning	No unique history noted.	No unique concerns noted. Lightning resistors installed at well.
Winter Storm, Ice, & Extreme Cold	Some freezing of water lines in Winter 2014. No major winter storm events noted. No warming shelter activated in the past.	No unique vulnerabilities noted. Potential for long-term power loss a concern, but not unique to the Village. Public outreach (e.g., dripping) used to help prevent water line freeze-ups.
Extreme Heat	No unique history noted. No cooling shelter activated in the past.	Lack of a cooling shelter within the community. Increasing heat events due to climate trends.
Long-Term Power Outage	Lost power due to storm for 6-8 hours in 2011. As a result of 2019 wind storm, some areas of community lost power for 3 days.	No areas uniquely prone. Most power lines are buried. Wastewater plant has fixed generator and portable for lift station & wells. Fire Hall/Police/EOC, the Village Hall, and School all lack generators. Electric power not produced within the community, so subject to impacts on generating and distribution infrastructure outside the community.
Flooding – Riverine or Overbank	No 100-year floodplain.	No 100-year floodplain.
Flooding – Stormwater or Overland	Stormwater has entered sewer system on north side, some improvements, but heavy rains continuing to impact the treatment plant operations. Ditch on private land east of 10 th Street is continuing to silt-in and needs clearing, but flood damage has been limited to adjacent farm fields to date.	High groundwater and relatively flat topography contribute to stormwater ponding in some areas. Newer culvert and other drainage improvements along 10 th St. have reduced some flooding vulnerabilities.
Dams	None	--
Drought	No significant impacts within the Village from past droughts with adequate municipal water supply.	No unique concerns noted. May ask water users to conserve during drought periods.
Wildfire	No significant events in the community in the past 50+ years.	No unique concerns noted.
Hazardous Materials Spills	No significant events in the community.	Truck traffic on USH 53 is most significant risk. Foremost Farms has substantial amounts of anhydrous ammonia. High groundwater table is an elevated contamination vulnerability. PFAs not detected in municipal water supply.
Active Threats	No significant events in the community.	No unique concerns noted.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted and good security in place. Village limiting capabilities of wastewater SCADA system.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	Stormwater infiltration into wastewater system a continuing problem. Need for a designated storm shelter with emergency power is growing.
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Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing frequency and severity of severe weather systems including downpours, wind events (including tornados) and extreme temperatures. Climate may be influencing these trends, including extending the tornado season into the fall and winter months.
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Capabilities Assessment

The following is a general assessment of the community’s resiliency and capabilities to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms. This assessment was completed by the community through the 2023 web-based survey, with some supplemental information from the community meeting and other sources (e.g., fire department survey, NFIP Community Status Book). The list of potential plans, policies, and other actions is not exhaustive, and it is not expected that the community has undertaken all actions listed or will undertake all actions in the future.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	Outdated plan; will consider incorporating mitigation or preparedness in update
Community Evacuation Plan and/or Exercises	No
Continuity of Government Plan	No
Comprehensive Plan	No
Stormwater Management Plan	No
Historic Preservation Plan or Ordinance	No
Capital Improvements Plan or Similar Budget	Adopted; does not incorporate mitigation or preparedness
Involve Fire & Law Enforcement in planning & development plan review	Doing this as needed.
Special emergency notification procedures or preparedness plans for vulnerable populations	School district has emergency plans and participates in exercises with law enforcement.
Policies, Codes, & Ordinances	
Building Codes	Adopted; does not incorporate mitigation or preparedness
Building Code Efficiency Grading Schedule	Adopted; does not incorporate mitigation or preparedness
Zoning Ordinance	Adopted; does not incorporate mitigation or preparedness
Subdivision Ordinance	Adopted; does not incorporate mitigation or preparedness
Site Plan Review Requirements	Adopted; does not incorporate mitigation or preparedness
Floodplain Management	No 100-year floodplain
<i>Initial Flood Hazard Boundary Map:</i>	-
<i>Initial FIRM Identified:</i>	-
<i>Current Effective FIRM Date:</i>	-
<i>Date Community First Joined NFIP (Reg-Emer)</i>	-
<i>NFIP Participation Status (and reason if not participating):</i>	-
<i>Floodplain Regulations w/ NFIP standards:</i>	-
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	Not applicable, no floodplain
<i>Other ongoing floodplain management activities:</i>	Will reassess NFIP participation as part of upcoming comprehensive plan update.
Stormwater Management Ordinance	Adopted; does not incorporate mitigation or preparedness
Stormwater Utility	Adopted; does not incorporate mitigation or preparedness
Winter Emergency Policies	Adopted; does not incorporate mitigation or preparedness

Mitigation & Preparedness Actions for Facilities	
Debris Site identified for storm debris disposal (not just woody debris)	Unknown or not sure.
Emergency Operations Center designated with generator/back-up power	Fire Hall/Police serves as EOC, but lacks generator.
Public Storm Shelter/Community Safe Room designated	School has been used for such in past, but not built to safe room standards. Current availability not certain or formalized; no generator or remote unlock.
Public Heating/Cooling Shelter designated with generator/back-up power	None designated.
Storm/warning siren on back-up power	Has a siren, but lacks battery back-up. Police use P.A. system to also announce warnings.
Storm/warning siren that can be activated remotely	No.
Active shooter/threat plans and/or security hardening for municipal buildings	None.
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Yes
Individuals in EOP have ICS/NIMS training	Unknown
Public Information Officer designated & trained	Unknown
Municipal officials and staff participate in regular disaster or emergency response exercises	Unknown. Fire Department collaborates with Foremost Farms and County on HazMat planning and training.
Community-level efforts to improve hazard preparedness among residents	Unknown
Adopted billing rates for public works labor & equipment use during emergencies	Unknown
Adopted mutual aid agreements for public works equipment/personnel support	Unknown
Adopted emergency contracting and purchasing policies	Unknown
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Unknown
Cyber-security systems and policies for municipal utilities	Unknown
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	Unknown
Other Flood Mitigation projects or activities	No
Municipal Dam-related planning or actions	No municipal dam.
Barriers to mitigation or preparedness actions	Funding for larger mitigation efforts. Turnover in Village staff requires time to understand and address capabilities, plans, etc. The Village has a relatively new park structure along Church Street partially of block construction that offer some storm shelter protection, but it may not be feasible to retrofit to fully meet FEMA P-361 requirements as a community safe room.
Other:	Xcel Energy has buried most power lines and conducts tree trimming in areas of overhead lines. Significant distance to advanced medical care should injuries occur associated with a hazard event.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the Polk County mitigation plan are shared by all participating communities.

The community will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Sections VI.C. and D. of the Polk County mitigation plan includes additional mitigation and preparedness actions that are intergovernmental in nature and not specific to the community, but may suggest coordination and funding opportunities.

The following recommended actions/projects are specific to the Village:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
1. Update and annually review the Village's Emergency Operations Plan. Explore opportunities to address any gaps identified in the previous capabilities assessment.	High; ongoing	Village Clerk to coordinate with responsible parties	County Emergency Management can provide a template and guidance.
<p>2. Explore formal designation or development of a community safe room (storm shelter), preferably within walking distance from the mobile home park. One option is the expansion of the park shelter on Village property along Church Street as a multi-use structure as a public community safe room and gathering place.</p> <p>If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location.</p> <p>For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.</p> <p>Other related alternatives to consider include: (i) formalizing an agreement for use of a school building as community shelter; (ii) hardening an</p>	High; 1-5 years	Residents should express need; Village Board	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMA)</p> <p>WCWRPC and Wisconsin Emergency Management can provide grant-related guidance</p>

existing school or other building as a shelter; and/or (iii) installing remote unlock at the school or other site to ensure access when needed.			
<p>3. Continue to address stormwater concerns in the community, including:</p> <ul style="list-style-type: none"> Addressing stormwater infiltration into the wastewater system (e.g., system rehab, manhole lining, backflow prevention) Addressing stormwater drainage within the community, including maintaining ditches Enforcing the Village’s Stormwater Management Ordinance. 	Medium-to-High; ongoing	Village Public Works; Village Plan Commission and Board	<p>Primarily funded by Village through tax revenue as guided by capital improvements plan.</p> <p>Tax incremental financing and CDBG funding are two alternative sources.</p> <p>Should repetitive damages occur, FEMA mitigation grants may be available for non-maintenance projects.</p>
4. As funding allows, install emergency power generators and/or electrical hook-ups for generators at the Fire Hall/Police/EOC.	Medium-to-High; 2-5 years if resources allow	Village Board; Fire District	See generator-related recommendations in Section VI.C.
5. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) to increase public participation in the countywide mass notification system (CodeRED), awareness of emergency siren use and warning systems, public storm shelter availability (once confirmed), and public preparedness in general.	Medium-to-High; ongoing	Village Clerk & Board; Fire Department	<p>County Emergency Management & partners have educational materials</p> <p>Could implement annually during Severe Weather Awareness Week and/or Preparedness Month using social media, posters, utility bill inserts, etc.</p>

Sub-Plan Coordination and Integration

The previous Capacity Assessment section identifies how this Mitigation Sub-plan has been integrated into or coordinated with other municipal plans or planning mechanisms. During the planning process, the following opportunities were identified to integrate the mitigation strategies into other community planning mechanisms:

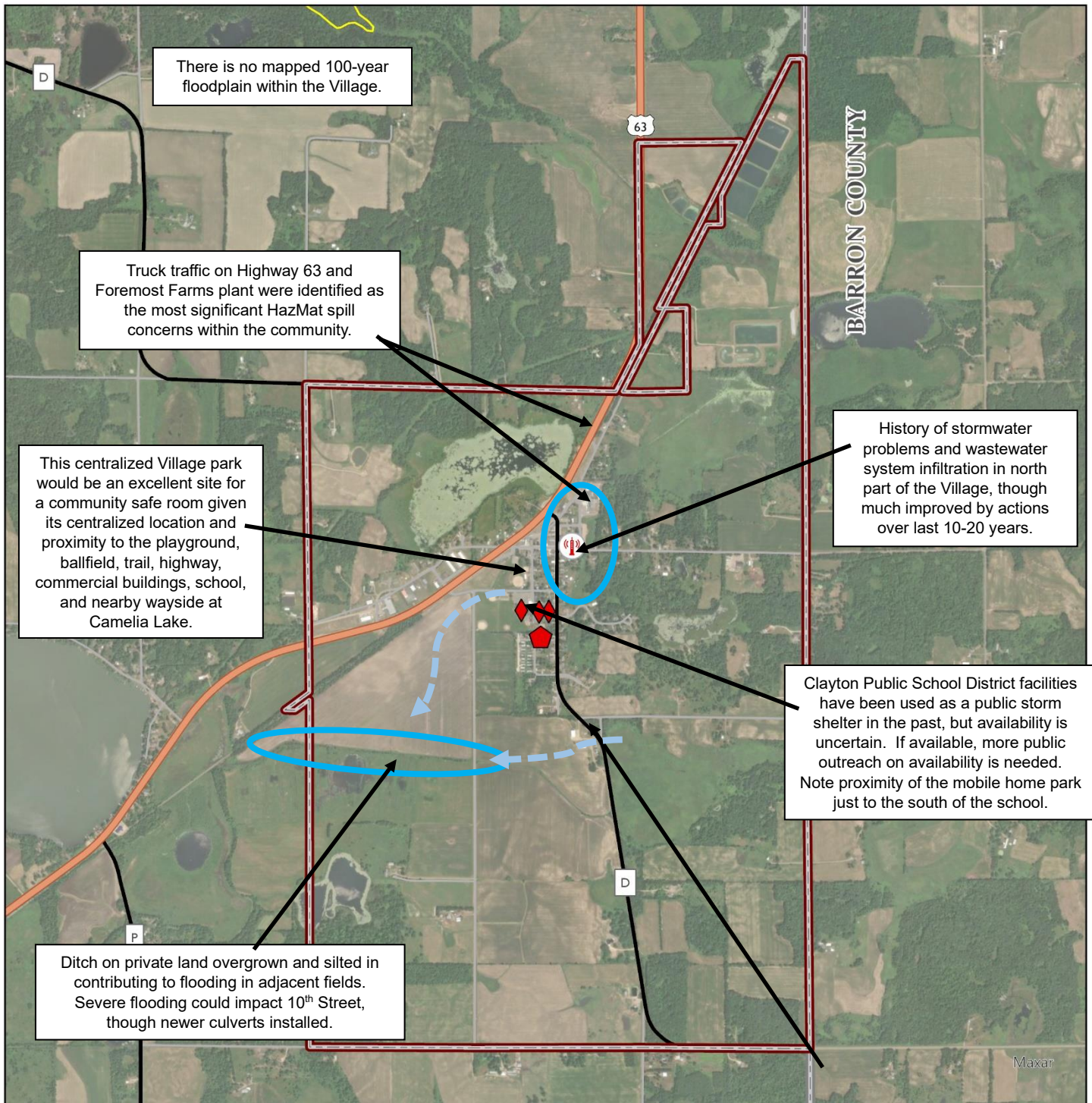
- The Village regularly updates its capital improvements plan, which includes stormwater improvement projects.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

Sub-Plan Adoption and Maintenance

<p>Plan Adoption</p>	<p>Once updated, the community’s governing body will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This community-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The community may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>During the second quarter of each year or following a declared disaster event, the primary mitigation plan contact will review this Mitigation Sub-Plan concurrently with (at the same time as) the annual review of the municipal Emergency Operations Plan. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. The community’s planning contact will contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. The community may also request that the County consider changes to the County’s overall mitigation plan. 2. Provide the suggested changes to the community’s emergency planning committee, plan commission, or governing body for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the governing body will adopt the Sub-Plan as noted previously. Such changes will be limited to this community-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The community intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The community will provide opportunities for public participation throughout its mitigation planning processes, including: (1) all governing body or committee actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

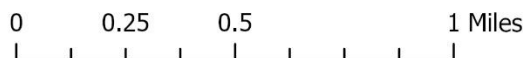
VILLAGE OF CLAYTON - HAZARD ASSESSMENT

Polk County - 2024



Legend

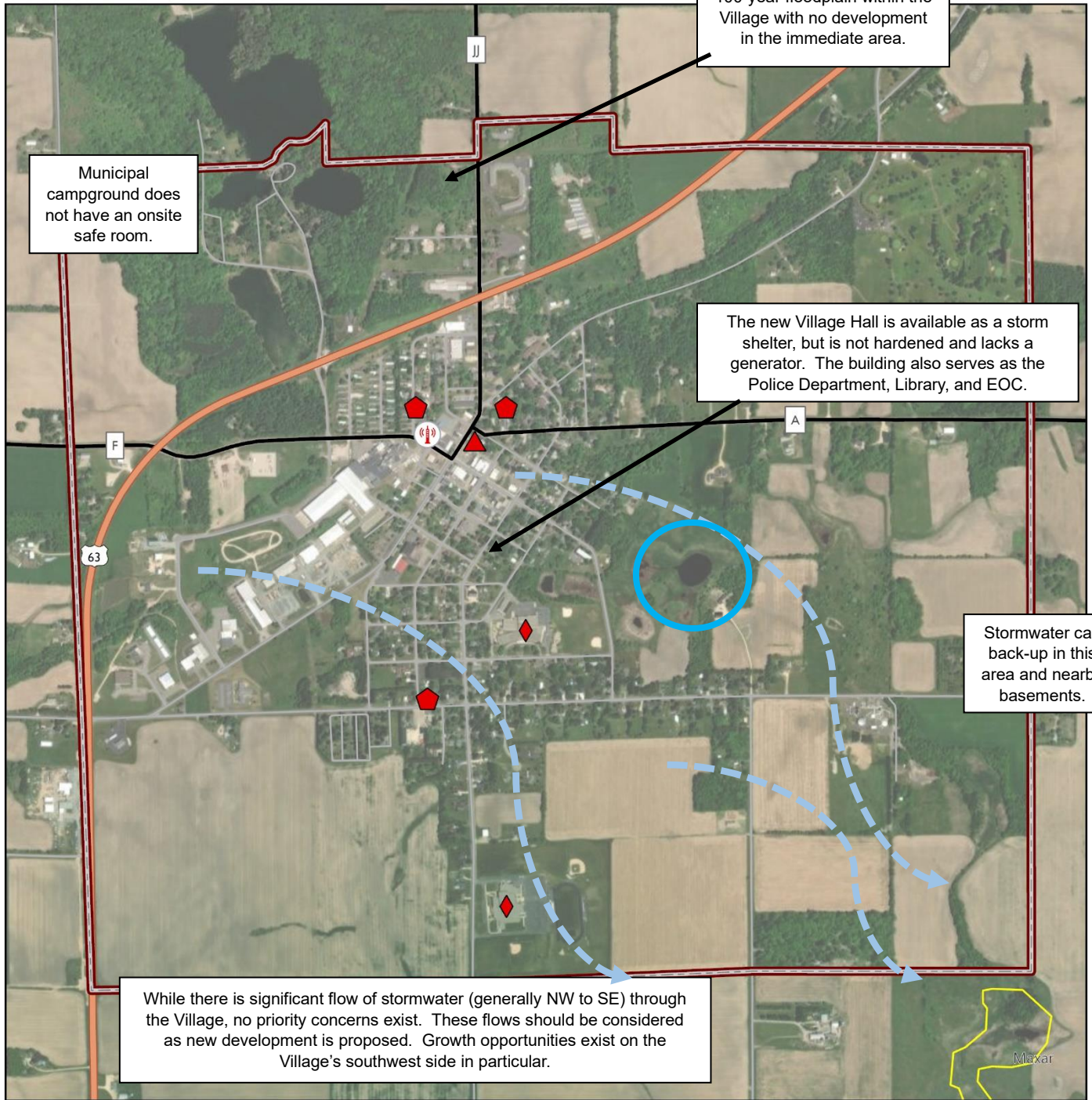
- Municipal Boundary
- 100-yr Floodplain
- School
- Mobile Home Park
- Storm Siren



Data Sources:
Polk County, WDHS, WDNR, WisDOT,
WDOA, WCWRPC.

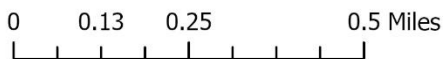
VILLAGE OF CLEAR LAKE - HAZARD ASSESSMENT

Polk County - 2024



Legend

- Municipal Boundary
- 100-yr Floodplain
- ◆ School
- ▲ Assisted Living
- ⬠ Mobile Home Park
- ⚠ Storm Siren



Data Sources:
Polk County, WDHS, WDNR, WisDOT,
WDOA, WCWRPC.



VILLAGE OF DRESSER HAZARD MITIGATION SUB-PLAN

This sub-plan identifies past hazard events, risks, trends, capabilities, and strategies unique to or specific to the community and is part of the overall *Polk County Multi-Hazard Mitigation Plan*. The Polk County mitigation plan provides broader context and contains hazard assessment, capabilities, and strategies that are countywide or multi-jurisdictional.

Primary Contact:	Village Clerk/Treasurer
Planning Meetings:	<ul style="list-style-type: none"> • Primary planning meeting with WCWRPC staff occurred on 3/14/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment in April 2023. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by Village Board at a public meeting. Resolution included in Appendix A.

Community Profile	
<p>This table provides a brief overview of key community characteristics, primarily from the 2020 U.S. Census, which are important to assessing capacity and vulnerabilities. For example, the entire population and all above-ground structures in the community are vulnerable to a tornado event, while mobile homes have an elevated vulnerability.</p>	
Population	935
Median Age	32.7 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors; school children (kindergarten); low-income residents (Housing Authority units); Economic disadvantaged community
Assessed Improvements (2023)	Residential: \$46,801,900; Commercial: \$12,362,400; Manuf.: \$4,157,100
# of Housing units	395
# of Mobile Homes	18
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan

Hazard Risk Assessment		
<p>This table describes past hazard events impacting the community and any <u>unique</u> vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the community. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all communities.</p>		
Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	Polk County has a long history of tornados, including some that have occurred nearby as recently as June 2024, however no tornado history in the Village to recollection of community. Occasional high winds, but no unique or significant damage noted.	Mobile home park and other slab-on-grade construction exists. Trollhaugen events can have 1,000+ visitors and camping. No public safe room/storm shelter; concerns expressed over having someone to operate if made available.
Hail & Lightning	Have had lightning strikes at water towers in past; arrestors have been added to mitigate.	No unique concerns noted.

Winter Storm, Ice, & Extreme Cold	Winter 2014 utility lines froze and some ruptured, including in the industrial park; 21 homes/businesses on temporary emergency water. Such a serious event has only occurred once. No other unique history noted.	No unique concerns noted. Requests residents to allow water faucets to drip during extreme cold without adequate snow cover to prevent freeze-ups.
Extreme Heat	No unique history noted.	Seniors and residents in mobile homes identified has the highest vulnerabilities.
Long-Term Power Outage	No areas uniquely prone. Maximum outages of 4-5 hours in past from trees falling on power lines.	No unique concerns noted. Electric power not produced within the community, so subject to impacts on generating and distribution infrastructure outside the community. One portable generator with gas for about 3 hours used for liftstation and wells. No generator at Village Hall/EOC. Fire Hall now has a generator.
Flooding – Riverine or Overbank	No 100-year floodplain.	No 100-year floodplain, but no history of river-related flood damage or concerns.
Flooding – Stormwater or Overland	Stormwater flooding a concern due to hill to north and east. Past flooding problems near school and on the south and southeast sides of the Village.	Stormwater flooding still a concern in some areas during periods of heavy rain and high groundwater; s see map at end of sub-plan. Significant stormwater improvements near school and southwest side.
Dams	No dam within the Village.	
Drought	No significant impacts within the Village from past droughts.	No unique concerns noted. Good well capacity.
Wildfire	No significant events in the community in the past 50+ years.	No unique concerns noted.
Hazardous Materials Spills	Anhydrous venting spill has occurred at Sweet Editions; no contamination.	Local industry and Truck traffic on USH 35 is most significant risk. Some truck traffic through Village to quarry. PFAs not detected in municipal water supply.
Active Threats	No significant events in the community.	No unique concerns noted.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	While stormwater improvements have been completed, this is still on ongoing challenge in some areas of the Village. The community and area is growing, which potentially increases the demand for additional siren services and shelters (i.e., safe room, heating/cooling).
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing frequency and severity of severe weather systems including downpours, wind events (including tornados) and extreme temperatures. Climate may be influencing these trends, including extending the tornado season into the fall and winter months.

Capabilities Assessment

The following is a general assessment of the community's resiliency and capabilities to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms. This assessment was completed by the community through the 2023 web-based survey, with some supplemental information from the community meeting and other sources (e.g., fire department survey, NFIP Community Status Book). The list of potential plans, policies, and other actions is not exhaustive, and it is not expected that the community has undertaken all actions listed or will undertake all actions in the future.

Planning Activities

Community Emergency Operations or Response Plan (EOP)	Adopted; does not incorporate mitigation strategies
Community Evacuation Plan and/or Exercises	No
Continuity of Government Plan	No
Comprehensive Plan	Adopted; does not incorporate mitigation or preparedness
Stormwater Management Plan	No
Historic Preservation Plan or Ordinance	No
Capital Improvements Plan or Similar Budget	Adopted; does not incorporate mitigation or preparedness
Involve Fire & Law Enforcement in planning & development plan review	Do this as needed.
Special emergency notification procedures or preparedness plans for vulnerable populations	No

Policies, Codes, & Ordinances

Building Codes	Adopted; does not incorporate mitigation or preparedness
Building Code Efficiency Grading Schedule	Adopted; does not incorporate mitigation or preparedness
Zoning Ordinance	Adopted; does not incorporate mitigation or preparedness
Subdivision Ordinance	Adopted; does not incorporate mitigation or preparedness
Site Plan Review Requirements	Adopted; does not incorporate mitigation or preparedness
Floodplain Management	No 100-year floodplain.
<i>Initial Flood Hazard Boundary Map:</i>	
<i>Initial FIRM Identified:</i>	
<i>Current Effective FIRM Date:</i>	
<i>Date Community First Joined NFIP (Reg-Emer)</i>	
<i>NFIP Participation Status (and reason if not participating):</i>	
<i>Floodplain Regulations w/ NFIP standards:</i>	
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	
<i>Other ongoing floodplain management activities:</i>	
Stormwater Management Ordinance	Adopted; does not incorporate mitigation or preparedness
Stormwater Utility	No
Winter Emergency Policies	Adopted; does not incorporate mitigation or preparedness

Mitigation & Preparedness Actions for Facilities

Debris Site identified for storm debris disposal (not just woody debris)	No
Emergency Operations Center designated with generator/back-up power	Village Hall serves as EOC, but no generator.
Public Storm Shelter/Community Safe Room designated	None designated.
Public Heating/Cooling Shelter designated with generator/back-up power	None designated. No community member demand to date.

Storm/warning siren on back-up power	Siren at Fire Hall is on a generator. Additional siren for complete coverage of the Village may be needed, especially as growth occurs. Residents in surrounding unincorporated areas also benefit from the siren in the Village.
Storm/warning siren that can be activated remotely	Not sure. Fire Department activates.
Active shooter/threat plans and/or security hardening for municipal buildings	No
Other Mitigation & Preparedness Actions	
Review EOP at least annually	No
Individuals in EOP have ICS/NIMS training	Unknown.
Public Information Officer designated & trained	No
Municipal officials and staff participate in regular disaster or emergency response exercises	No
Community-level efforts to improve hazard preparedness among residents	No
Adopted billing rates for public works labor & equipment use during emergencies	No
Adopted mutual aid agreements for public works equipment/personnel support	Yes.
Adopted emergency contracting and purchasing policies	Unknown
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Off-site back-up of data.
Cyber-security systems and policies for municipal utilities	No
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	Unknown
Other Flood Mitigation projects or activities	Significant stormwater flooding improvements near school/pond and on southwest side. Additional curb & gutter planned for 1 st & 2 nd Streets.
Municipal Dam-related planning or actions	No dam.
Barriers to mitigation or preparedness actions	Costs of implementing projects and staff time/volunteers to undertake efforts, including providing shelter oversight.
Other:	Tree-trimming occurs as part of Tree City USA.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the overall Polk County mitigation plan are shared by all participating communities.

The community will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Sections VI.C. and D. of the Polk County mitigation plan includes additional mitigation and preparedness actions that are intergovernmental in nature and not specific to the community, but may suggest coordination and funding opportunities.

The following recommended actions/projects are specific to the community:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
<p>1. Continue to address stormwater concerns in the community, such as those on the Village’s south and southwest sides.</p>	<p>Medium-to-High; ongoing</p>	<p>Village Public Works; Village Plan Commission and Board</p>	<p>Primarily funded by Village through tax revenue as guided by capital improvements plan.</p> <p>Tax incremental financing and CDBG funding are two alternative sources.</p> <p>Should repetitive damages occur, FEMA mitigation grants may be available for non-maintenance projects.</p>
<p>2. As funding allows, install an emergency power generator at the Village Hall/EOC.</p>	<p>Medium; 3-5+ years as resources allow</p>	<p>Village Board & Public Works</p>	<p>See generator-related recommendations in Section VI.C. of overall Polk County mitigation plan.</p>
<p>3. Continue to monitor emergency siren coverage within the community with the goal of maintaining adequate coverage to notify residents who are outdoors that severe weather is approaching. If needed, exploring funding options to install battery back-up for the existing siren.</p>	<p>Medium; ongoing</p>	<p>Fire Department & Village Board</p>	<p>Unless part of a larger mitigation project (e.g., safe room), securing grant dollars for a siren is unlikely. Can integrate into Village capital improvements plan and explore private foundation or fundraising options.</p>
<p>4. Explore designation or development of a community safe room (storm shelter), <u>if</u> there is increased community demand.</p> <p>If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location.</p> <p>For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.</p>	<p>Medium; 3-5+ years</p> <p>Limited public demand for safe room to date, but community is growing and more slab-on-grade construction occurring.</p>	<p>Residents should express need; Village Board</p>	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMA)</p> <p>WCWRPC and Wisconsin Emergency Management can provide grant-related guidance</p>

5. Update and annually review the Village’s Emergency Operations Plan. Explore opportunities to address any gaps identified in the previous capabilities assessment.	High; ongoing	Village Clerk to coordinate with responsible parties	County Emergency Management can provide a template and guidance.
6. Integrate mitigation plan recommendations as part of the next comprehensive plan update.	Medium-to-Low; 5+ years	Plan Commission and Village Board	CDBG Planning Grant, if income-eligible; WDNR for technical support if needed
7. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) to increase public participation in the countywide mass notification system (CodeRED), awareness of emergency siren use and warning systems, public storm shelter availability (once confirmed), and public preparedness in general.	Medium-to-High; ongoing	Village Clerk & Board; Fire Department	County Emergency Management & partners have educational materials Could implement annually during Severe Weather Awareness Week and/or Preparedness Month using social media, posters, utility bill inserts, etc.

Sub-Plan Coordination and Integration

The previous Capacity Assessment section identifies how this Mitigation Sub-plan has been integrated into or coordinated with other municipal plans or planning mechanisms. During the planning process, the following opportunities were identified to integrate the mitigation strategies into other community planning mechanisms:

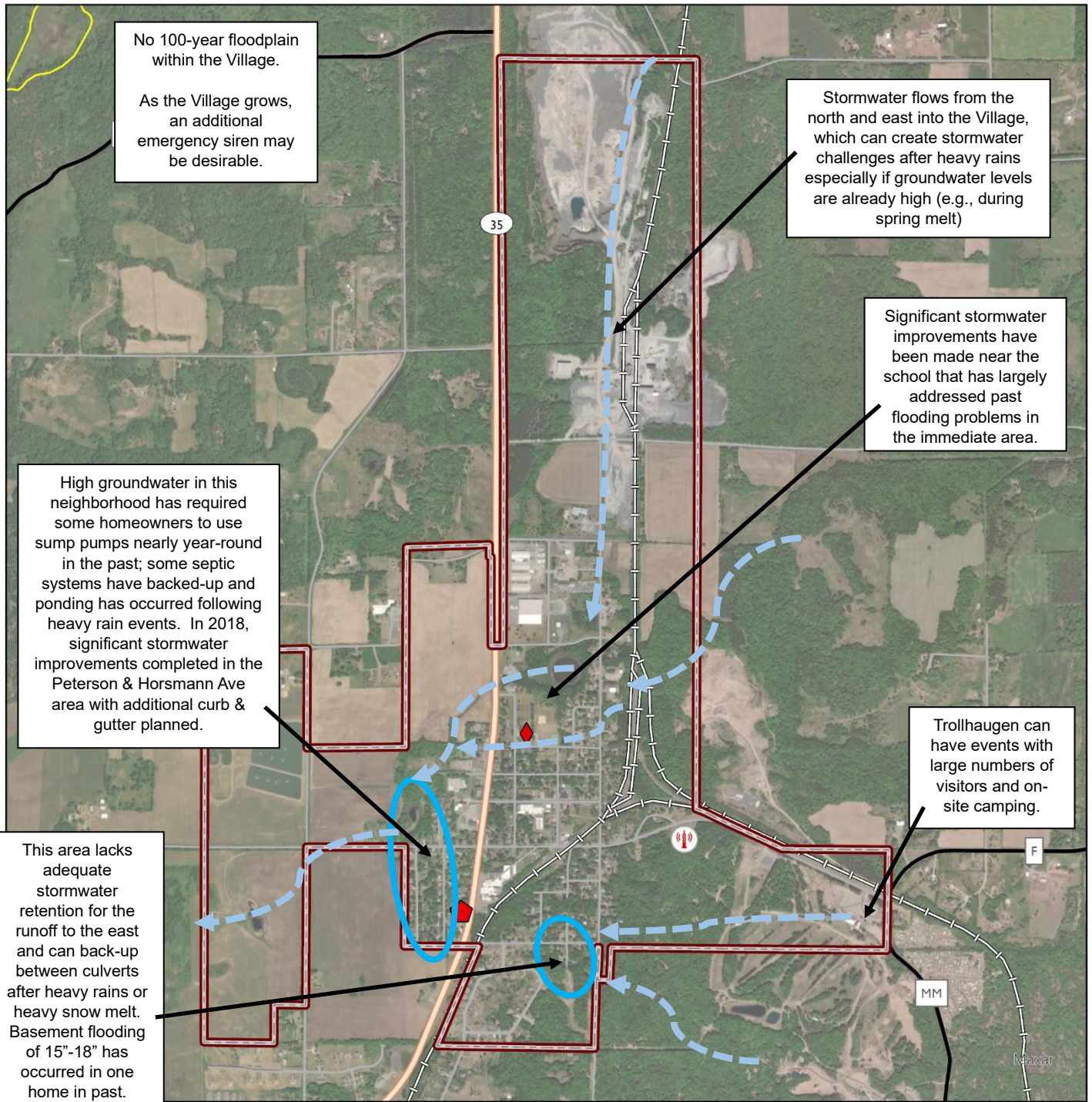
- The Village will integrate and coordinate this mitigation plan with its Emergency Operations Plan and, as needed, projects within its Capital Improvements Plan.
- The Village will consider ways to integrate the mitigation plan assessment and recommendations into the next comprehensive plan update.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

Sub-Plan Adoption and Maintenance

<p>Plan Adoption</p>	<p>Once updated, the community’s governing body will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This community-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The community may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>During the second quarter of each year or following a declared disaster event, the primary mitigation plan contact will review this Mitigation Sub-Plan concurrently with (at the same time as) the annual review of the municipal Emergency Operations Plan. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. The community’s planning contact will contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. The community may also request that the County consider changes to the County’s overall mitigation plan. 2. Provide the suggested changes to the community’s emergency planning committee, plan commission, or governing body for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the governing body will adopt the Sub-Plan as noted previously. Such changes will be limited to this community-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The community intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The community will provide opportunities for public participation throughout its mitigation planning processes, including: (1) all governing body or committee actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

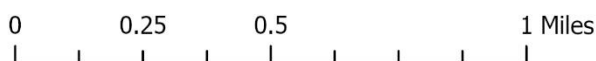
VILLAGE OF DRESSER - HAZARD ASSESSMENT

Polk County - 2024



Legend

- Municipal Boundary
- ◆ School
- ◆ Mobile Home Park
- Storm Siren
- 100-yr Floodplain



Data Sources:
Polk County, WDHS, WDNR, WisDOT,
WDOA, WCWRPC.



VILLAGE OF FREDERIC HAZARD MITIGATION SUB-PLAN

This sub-plan identifies past hazard events, risks, trends, capabilities, and strategies unique to or specific to the community and is part of the overall *Polk County Multi-Hazard Mitigation Plan*. The Polk County mitigation plan provides broader context and contains hazard assessment, capabilities, and strategies that are countywide or multi-jurisdictional.

Primary Contact:	Village Clerk
Planning Meetings:	<ul style="list-style-type: none"> • Planning meeting with WCWRPC staff occurred on 3/7/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • The Village did not participate in the mitigation/preparedness capabilities assessment survey; the capabilities assessment is based on the planning meeting conversation and follow-up review of this draft sub-plan by the community. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by Village Board at a public meeting. Resolution included in Appendix A.

Community Profile

This table provides a brief overview of key community characteristics, primarily from the 2020 U.S. Census, which are important to assessing capacity and vulnerabilities. For example, the entire population and all above-ground structures in the community are vulnerable to a tornado event, while mobile homes have an elevated vulnerability.

Population	1,137
Median Age	42.5 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors and group homes; mobile home park residents; Woolen Mills apartments; Economic disadvantaged community
Assessed Improvements (2023)	Residential: \$27,535,700; Commercial: \$14,876,100; Manuf.: \$924,800
# of Housing units	530
# of Mobile Homes	12
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan

Hazard Risk Assessment

This table describes past hazard events impacting the community and any unique vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the community. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	<p>Polk County has a long history of tornados, including some that have occurred nearby, however no touchdowns within the Village to the recollection of community.</p> <p>No tornado history in area in 25+ years. Occasional high winds, but no unique or significant damage noted.</p>	<p>Two mobile home parks and 4 slab-on-grade apartment complexes, including senior assisted living. Northwest Passage Group Home (about 37 residents + staff) and men’s recovery residence. Amish school.</p> <p>No dedicated public safe room/storm shelter. Can use public school as shelter, if supervised, so not always available.</p>

Hail & Lightning	No unique history noted.	No unique concerns noted.
Winter Storm, Ice, & Extreme Cold	Nothing unique noted. Occasional water line freeze-ups. Snow load damaged business awnings in 2022-23.	No unique concerns noted.
Extreme Heat	No unique history noted.	No unique concerns noted.
Long-Term Power Outage	No long-term events. Maximum outages for 3-4 hours in past. No areas uniquely prone.	No unique concerns noted. Electric power not produced within the community, so subject to impacts on generating and distribution infrastructure outside the community. Fire Hall/EOC has portable generator and portable available for utilities.
Flooding – Riverine or Overbank	No significant history or problems noted. Electric company is in a low area, but no recent flooding history at the site and has elevated equipment to mitigate.	All structures elevated above creek; no concerns by community noted. One seasonal residence potentially within 100-year floodplain, but no history of flood damage or concerns.
Flooding – Stormwater or Overland	Past stormwater flooding concerns in the industrial park, near library, and alley between 2 nd and 3 rd Avenue. In 2010, up to 12” deep in 3-4 times, but not a problem since. See map at end of sub-plan.	Improvements made in 2015 to address past stormwater flooding near library. No recent concerns and no repetitive flooding areas.
Dams	No dams within the Village.	
Drought	No significant impacts within the Village from past droughts.	No unique concerns noted. Good well capacity for fire protection.
Wildfire	No significant events in the community in past 50+ years.	No unique concerns noted. Some driveways can be difficult to access for larger emergency vehicles.
Hazardous Materials Spills	No significant events in the community.	Primary concerns are highway truck traffic, propane storage/distribution, gas stations, and illegal drug production (meth labs). PFAS not detected in the municipal water supply.
Active Threats	No significant events in the community.	No unique concerns noted. Could harden Village Hall a bit more. Law enforcement has met with school and church.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	Increased need for public awareness of hazard risks and CodeRED. Recognition of the potential for a long-term power loss event and the importance of emergency power generators. Decreased concerns with stormwater flooding.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing frequency and severity of severe weather systems including downpours, wind events (including tornados) and extreme temperatures. Climate may be influencing these trends, including extending the tornado season into the fall and winter months. Concern expressed about international tensions and the potential for nuclear attack and international terrorism.

Capabilities Assessment

The following is a general assessment of the community's resiliency and capabilities to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms. This assessment was completed by the community through the 2023 web-based survey, with some supplemental information from the community meeting and other sources (e.g., fire department survey, NFIP Community Status Book). The list of potential plans, policies, and other actions is not exhaustive, and it is not expected that the community has undertaken all actions listed or will undertake all actions in the future.

Planning Activities

Community Emergency Operations or Response Plan (EOP)	Adopted; does incorporate mitigation or preparedness
Community Evacuation Plan and/or Exercises	No
Continuity of Government Plan	No
Comprehensive Plan	Adopted; does not incorporate mitigation or preparedness
Stormwater Management Plan	Adopted; does incorporate mitigation or preparedness and incorporates actions to reduce overland flooding
Historic Preservation Plan or Ordinance	No
Capital Improvements Plan or Similar Budget	Adopted; does incorporate mitigation or preparedness
Involve Fire & Law Enforcement in planning & development plan review	Do this as needed.
Special emergency notification procedures or preparedness plans for vulnerable populations	no

Policies, Codes, & Ordinances

Building Codes	Adopted; does not incorporates mitigation or preparedness
Building Code Efficiency Grading Schedule	Not sure; unknown
Zoning Ordinance	Adopted; does not incorporate mitigation or preparedness
Subdivision Ordinance	Adopted; does not incorporate mitigation or preparedness
Site Plan Review Requirements	Adopted; does not incorporate mitigation or preparedness
Floodplain Management	
<i>Initial Flood Hazard Boundary Map:</i>	5/31/74
<i>Initial FIRM Identified:</i>	9/1/86
<i>Current Effective FIRM Date:</i>	9/16/11
<i>Date Community First Joined NFIP (Reg-Emer)</i>	9/1/86
<i>NFIP Participation Status (and reason if not participating):</i>	Yes; in good standing
<i>Floodplain Regulations w/ NFIP standards:</i>	adopted
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	Planning Commission
<i>Other ongoing floodplain management activities:</i>	As of 2024, FEMA floodplain maps for Polk County are being updated, including new engineering & delineations for all Zone A, and new delineations for Zone AE using the most recent terrain data.
Stormwater Management Ordinance	Adopted; does incorporates mitigation or preparedness
Stormwater Utility	No
Winter Emergency Policies	No

Mitigation & Preparedness Actions for Facilities	
Debris Site identified for storm debris disposal (not just woody debris)	Partially complete
Emergency Operations Center designated with generator/back-up power	Partially complete
Public Storm Shelter/Community Safe Room designated	No, but has interest
Public Heating/Cooling Shelter designated with generator/back-up power	No
Storm/warning siren on back-up power	Yes
Storm/warning siren that can be activated remotely	Yes
Active shooter/threat plans and/or security hardening for municipal buildings	No
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Partially complete
Individuals in EOP have ICS/NIMS training	Partially complete
Public Information Officer designated & trained	No
Municipal officials and staff participate in regular disaster or emergency response exercises	Partially complete
Community-level efforts to improve hazard preparedness among residents	No
Adopted billing rates for public works labor & equipment use during emergencies	No, but plan to consider implementing
Adopted mutual aid agreements for public works equipment/personnel support	No, but plan to consider implementing
Adopted emergency contracting and purchasing policies	No
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Yes
Cyber-security systems and policies for municipal utilities	Yes
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	No
Other Flood Mitigation projects or activities	No
Municipal Dam-related planning or actions	No
Barriers to mitigation or preparedness actions	Funding.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the Polk County mitigation plan are shared by all participating communities.

The community will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Sections VI.C. and D. of the Polk County mitigation plan includes additional mitigation and preparedness actions that are intergovernmental in nature and not specific to the community, but may suggest coordination and funding opportunities.

The following recommended actions/projects are specific to the community:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
<p>1. As funding allows, install fixed emergency power generators at the Village Hall/Police Department, Fire Hall/EOC, and at assisted living and group homes.</p>	<p>High; 2-5+ years as resources allow</p>	<p>Village Board & Public Works</p>	<p>See generator-related recommendations in Section VI.C.</p>
<p>2. Explore designation or development of one or more community safe rooms (storm shelters). This may include a public facility available to all residents, smaller safe rooms to meet the needs of specific sites (e.g., a mobile home park, a group home), or a combination of the above.</p> <p>If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location.</p> <p>For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.</p> <p>In the interim, confirm availability of the school for use as a public storm shelter and related responsibilities. Publicize, if available. As an alternative to a public safe room, hardening and remote unlock options could be explore at the school.</p>	<p>Medium; 3-5 years</p>	<p>Village Board or Housing Development Owner</p>	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMA)</p> <p>WCWRPC and Wisconsin Emergency Management can provide grant-related guidance</p>
<p>3. Update and regularly review the Village's Emergency Operations Plan (EOP).</p> <p>As part of this EOP, confirm storm shelter availability and identify training needs (e.g., basic Incident Command System for elected officials/staff, HazMat awareness level for those who may be first on scene).</p>	<p>High; 1-3 years</p>	<p>Village Board; Village emergency planning committee</p>	<p>County Emergency Management can provide template & support</p>

<p>4. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) to increase public participation in the countywide mass notification system (CodeRED), awareness of emergency siren use and warning systems, and public preparedness in general. Target those disadvantaged and vulnerable populations on the first page of the Village’s subplan in particular.</p> <p>If other communities or the County is interested, pursue grant funding for the distribution of NOAA All Hazards Radios to seniors, mobile home park residents, and other facilities.</p>	<p>Medium-to-High; ongoing</p>	<p>Village Clerk & Board; Fire Department</p>	<p>County Emergency Management & partners have educational materials</p> <p>Could implement annually during Severe Weather Awareness Week and/or Preparedness Month using social media, posters, utility bill inserts, etc.</p> <p>An educational outreach effort that includes weather radio distribution is eligible for FEMA mitigation grant funding.</p>
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Sub-Plan Coordination and Integration

The previous Capacity Assessment section identifies how this Mitigation Sub-plan has been integrated into or coordinated with other municipal plans or planning mechanisms. During the planning process, the following opportunities were identified to integrate the mitigation strategies into other community planning mechanisms:

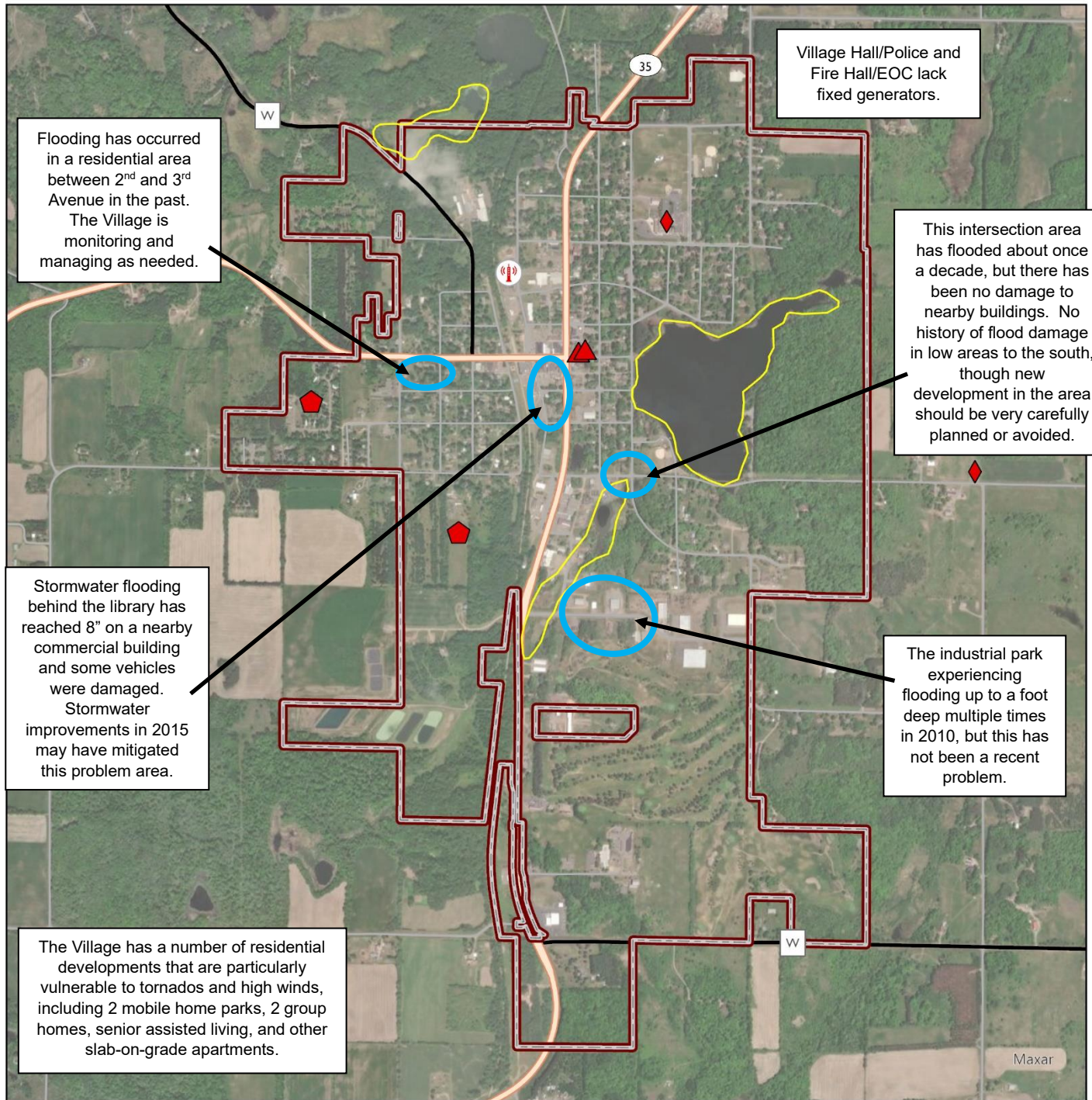
- The Village will be reviewing and updating its Emergency Operations Plan (EOP), which provides an opportunity to consider and integrate the capabilities assessment within this mitigation sub-plan.
- The Village will continue to monitor stormwater flooding problem areas and integrate needed management projects into its capital improvements plan.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

Sub-Plan Adoption and Maintenance

<p>Plan Adoption</p>	<p>Once updated, the community’s governing body will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This community-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The community may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>During the second quarter of each year or following a declared disaster event, the primary mitigation plan contact will review this Mitigation Sub-Plan concurrently with (at the same time as) the annual review of the municipal Emergency Operations Plan. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. The community’s planning contact will contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. The community may also request that the County consider changes to the County’s overall mitigation plan. 2. Provide the suggested changes to the community’s emergency planning committee, plan commission, or governing body for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the governing body will adopt the Sub-Plan as noted previously. Such changes will be limited to this community-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The community intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The community will provide opportunities for public participation throughout its mitigation planning processes, including: (1) all governing body or committee actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

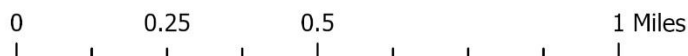
VILLAGE OF FREDERIC - HAZARD ASSESSMENT

Polk County - 2024



Legend

- Municipal Boundary
- 100-yr Floodplain
- ◆ School
- ▲ Assisted Living
- ◆ Mobile Home Park
- Storm Siren



Data Sources:
Polk County, WDHS, WDNr, WisDOT,
WDOA, WCWRPC.



VILLAGE OF LUCK HAZARD MITIGATION SUB-PLAN

This sub-plan identifies past hazard events, risks, trends, capabilities, and strategies unique to or specific to the community and is part of the overall *Polk County Multi-Hazard Mitigation Plan*. The Polk County mitigation plan provides broader context and contains hazard assessment, capabilities, and strategies that are countywide or multi-jurisdictional.

Primary Contact:	Village Clerk
Planning Meetings:	<ul style="list-style-type: none"> • Primary planning meeting with WCWRPC staff occurred on 3/7/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment in December 2023. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by Village Board at a public meeting. Resolution included in Appendix A.

Community Profile	
<p>This table provides a brief overview of key community characteristics, primarily from the 2020 U.S. Census, which are important to assessing capacity and vulnerabilities. For example, the entire population and all above-ground structures in the community are vulnerable to a tornado event, while mobile homes have an elevated vulnerability.</p>	
Population	1,093
Median Age	47.3 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors, growing Hispanic population for which English is a second language
Assessed Improvements (2023)	Residential: \$40,387,200; Commercial: \$8,781,600; Manuf.: \$3,927,000
# of Housing units	569
# of Mobile Homes	44
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan

Hazard Risk Assessment		
<p>This table describes past hazard events impacting the community and any <u>unique</u> vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the community. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all communities.</p>		
Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	Polk County has a long history of tornados, including some that have occurred nearby, however no touchdowns within the Village to the recollection of community. 2-3 times per decade, high straight-line winds cause serious roof and tree damage, including 2013 and 2019.	Mobile home park and some other slab-on-grade residential and commercial. Some large span metal buildings. A large public safe room was constructed with FEMA grant assistance as part of a school gym project; nearly all of the community is within FEMA-defined service area for the facility.
Hail & Lightning	Lightning strikes at water tower & wastewater plant in past. Summer 2010 was bad, but fewer recently.	No unique concerns noted, except past history of lightning strikes to utilities.

Winter Storm, Ice, & Extreme Cold	Winter 2014 utility breaks and frozen lines during the rare Polar Vortex; 44 freeze-ups total. Some lakeshore erosion along west shore of lake due to wind and ice; rip-rap has helped control some.	No unique concerns noted. Uses “dripping” of faucets when needed to help prevent freeze-ups of water lines.
Extreme Heat	No unique history noted.	No unique concerns noted.
Long-Term Power Outage	Prior to 2019, no long-term events; maximum outages in the past have been less than one day. Many trees went down in July 2019 wind storm with some areas of the Village without power for 3-4 days. Wooded areas with overhead lines are more prone; tree trimming used to help mitigate.	No unique concerns noted. Fire Hall/EOC and School/Safe Room have generators. No generator at Village Hall/Police. 1 portable for public works; need additional portable generator for public works. Electric power not produced within the community, so subject to impacts on generating and distribution infrastructure outside the community.
Flooding – Riverine or Overbank	No recent history or problems noted.	Though some structures within 100-year floodplain, no significant concerns. LOMAs have removed some structures from the floodplain maps.
Flooding – Stormwater or Overland	Past runoff problems on north side may have been exacerbated by STH 45 redesign and new curb & gutter; no outlet to lake has contributed to some localized basement flooding in the past as well as some over the road flooding.	North side area being monitored; no recent basement flooding.
Dams	Small dam for Butternut Lake provides limited flood control.	Some residents have questioned whether the outlet to the lake is sufficiently sized, but no action planned.
Drought	No significant impacts within the Village from past droughts. Good well capacity.	No unique concerns noted.
Wildfire	No significant events in the community in the past 50+ years.	Residential within forested areas along south and west side of the lake could be trapped due to long, dead-end roads for access/egress.
Hazardous Materials Spills	No significant events in the community.	Wood factory and highway traffic are largest concerns. PFAS detected below hazard index in one or more samples from the water system.
Active Threats	No significant events in the community.	No unique concerns noted.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	Vulnerability to tornado and high wind events greatly decreased due to School District’s safe room project.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing frequency and severity of severe weather systems including downpours, wind events (including tornados) and extreme temperatures. Climate may be influencing these trends, including extending the tornado season into the fall and winter months.

Capabilities Assessment

The following is a general assessment of the community’s resiliency and capabilities to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms. This assessment was completed by the community through the 2023 web-based survey, with some supplemental information from the community meeting and other sources (e.g., fire department survey, NFIP Community Status Book). The list of potential plans, policies, and other actions is not exhaustive, and it is not expected that the community has undertaken all actions listed or will undertake all actions in the future.

Planning Activities

Community Emergency Operations or Response Plan (EOP)	Adopted
Community Evacuation Plan and/or Exercises	Adopted
Comprehensive Plan	Adopted
Stormwater Management Plan	Adopted
Historic Preservation Plan or Ordinance	None
Capital Improvements Plan or Similar Budget	Adopted, but does not include mitigation or preparedness
Involve Fire & Law Enforcement in planning & development plan review	Yes
Special emergency notification procedures or preparedness plans for vulnerable populations	Yes

Policies, Codes, & Ordinances

Building Codes	Adopted, with mitigation or preparedness
Building Code Efficiency Grading Schedule	Participated
Zoning Ordinance	Adopted, with mitigation or preparedness
Subdivision Ordinance	Adopted, with mitigation or preparedness
Floodplain Management	
<i>Initial Flood Hazard Boundary Map:</i>	05/24/1974
<i>Initial FIRM Identified:</i>	07/02/1987
<i>Current Effective FIRM Date:</i>	09/16/2011
<i>Date Community First Joined NFIP (Reg-Emer)</i>	07/02/1987
<i>NFIP Participation Status (and reason if not participating):</i>	Participant in good standing
<i>Floodplain Regulations w/ NFIP standards:</i>	Adopted
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	Zoning Administrator & Plan Commission
<i>Other ongoing floodplain management activities:</i>	In 2018, replaced an aging metal culvert with a larger box culvert to improve drainage. As of 2024, FEMA floodplain maps for Polk County are being updated, including new engineering & delineations for all Zone A, and new delineations for Zone AE using the most recent terrain data.
Stormwater Management Ordinance	Adopted
Stormwater Utility	Adopted
Winter Emergency Policies	Adopted

Mitigation & Preparedness Actions for Facilities

Debris Site identified for storm debris disposal (not just woody debris)	Yes
Emergency Operations Center designated with generator/back-up power	Yes
Public Storm Shelter/Community Safe Room designated	Yes; safe room as part of new school gym constructed with FEMA mitigation grant funding

Public Heating/Cooling Shelter designated with generator/back-up power	Yes. Library will open if needed, but not officially designated. Gov't Center in Balsam Lake available.
Storm/warning siren on back-up power	Yes
Storm/warning siren that can be activated remotely	2 sirens; both can now be triggered remotely. However, siren coverage on the east side of the Big Butternut Lake can be insufficient during high winds.
Active shooter/threat plans and/or security hardening for municipal buildings	Yes; entrance hardened. Police Dept has also conducted training at local manufacturer.
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Yes
Individuals in EOP have ICS/NIMS training	Yes
Public Information Officer designated & trained	Yes
Municipal officials and staff participate in regular disaster or emergency response exercises	No
Community-level efforts to improve hazard preparedness among residents	Yes
Adopted billing rates for public works labor & equipment use during emergencies	No
Adopted mutual aid agreements for public works equipment/personnel support	Partially completed. Rural Water Agreement + "handshake" for general public works support.
Adopted emergency contracting and purchasing policies	No
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Yes
Cyber-security systems and policies for municipal utilities	No
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	Yes
Other Flood Mitigation projects or activities	2018 box culvert installation previously mentioned.
Municipal Dam-related planning or actions	None noted.
Barriers to mitigation or preparedness actions	Available staff/volunteer time & project costs.
Other:	The Village noted concerns with Phosphorus loading into surface waters and algae blooms in the lakes, but recognizes this is not a "traditional" natural hazard addressed within the scope of a mitigation plan. The Village will continue to work with County Land Conservation on water quality issues.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the Polk County mitigation plan are shared by all participating communities.

The community will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Sections VI.C. and D. of the Polk County mitigation plan includes additional mitigation and preparedness actions that are intergovernmental in nature and not specific to the community but may suggest coordination and funding opportunities.

The following recommended actions/projects are specific to the community:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
<p>1. Continue to regularly review the Village Emergency Operations Plan (EOP) and complete radio replacement. As part of a future EOP update, designate heating & cooling shelters and address responsibilities related to activation, operation, and public awareness. Conduct a tabletop exercise to test the plan, possibly considering evacuation strategies for homes on the east side of the Village.</p>	<p>Medium-to-High; 1-3 years</p>	<p>Village Emergency Planning Committee</p>	<p>County Emergency Management can provide guidance if needed, including assistance with conducting an exercise or drill to “test” the EOP.</p>
<p>2. Consider the installation of a third emergency siren on the far east side of the community with the goal of maintaining adequate coverage to notify residents who are outdoors that severe weather is approaching.</p>	<p>Medium-to-Low; 3-5 years</p>	<p>Village Emergency Planning Committee & Village Board</p>	<p>Unless part of a larger mitigation project (e.g., safe room), securing grant dollars for a siren is unlikely. Can integrate into Village capital improvements plan and explore private foundation or fundraising options.</p>
<p>3. As funding allows, obtain an additional portable generator for public works and install an emergency power generator and/or electrical hook-up for a generator at the Village Hall/Police Dept. and at the treatment plant.</p>	<p>Medium-to-High; 3-5+ years as resources allow</p>	<p>Village Board & Public Works</p>	<p>See generator-related recommendations in Section VI.C.</p>
<p>4. Integrate mitigation plan recommendations as part of the next comprehensive plan update.</p>	<p>Medium-to-Low; 3-5 years</p>	<p>Plan Commission and Village Board</p>	<p>CDBG Planning Grant, if income-eligible; WCWRPC can provide guidance if needed.</p>
<p>5. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) to increase public participation in the countywide mass notification system (CodeRED), awareness of emergency siren use and warning systems, and public preparedness in general.</p>	<p>Medium-to-High; ongoing</p>	<p>Village Clerk & Board; Fire Department</p>	<p>County Emergency Management & partners have educational materials Could implement annually during Severe Weather Awareness Week and/or Preparedness Month using social media, posters, utility bill inserts, etc.</p>

Sub-Plan Coordination and Integration

The previous Capacity Assessment section identifies how this Mitigation Sub-plan has been integrated into or coordinated with other municipal plans or planning mechanisms. During the planning process, the following opportunities were identified to integrate the mitigation strategies into other community planning mechanisms:

- The School District, in partnership with the Village, considered the recommendations in the previous mitigation plan when developing the community safe room project and pursuing FEMA mitigation grant funding.
- The Village will continue to integrate the hazard mitigation plan recommendations into its Emergency Operations Plan (EOP) and consider the mitigation plan when next updating the community's Comprehensive Plan.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

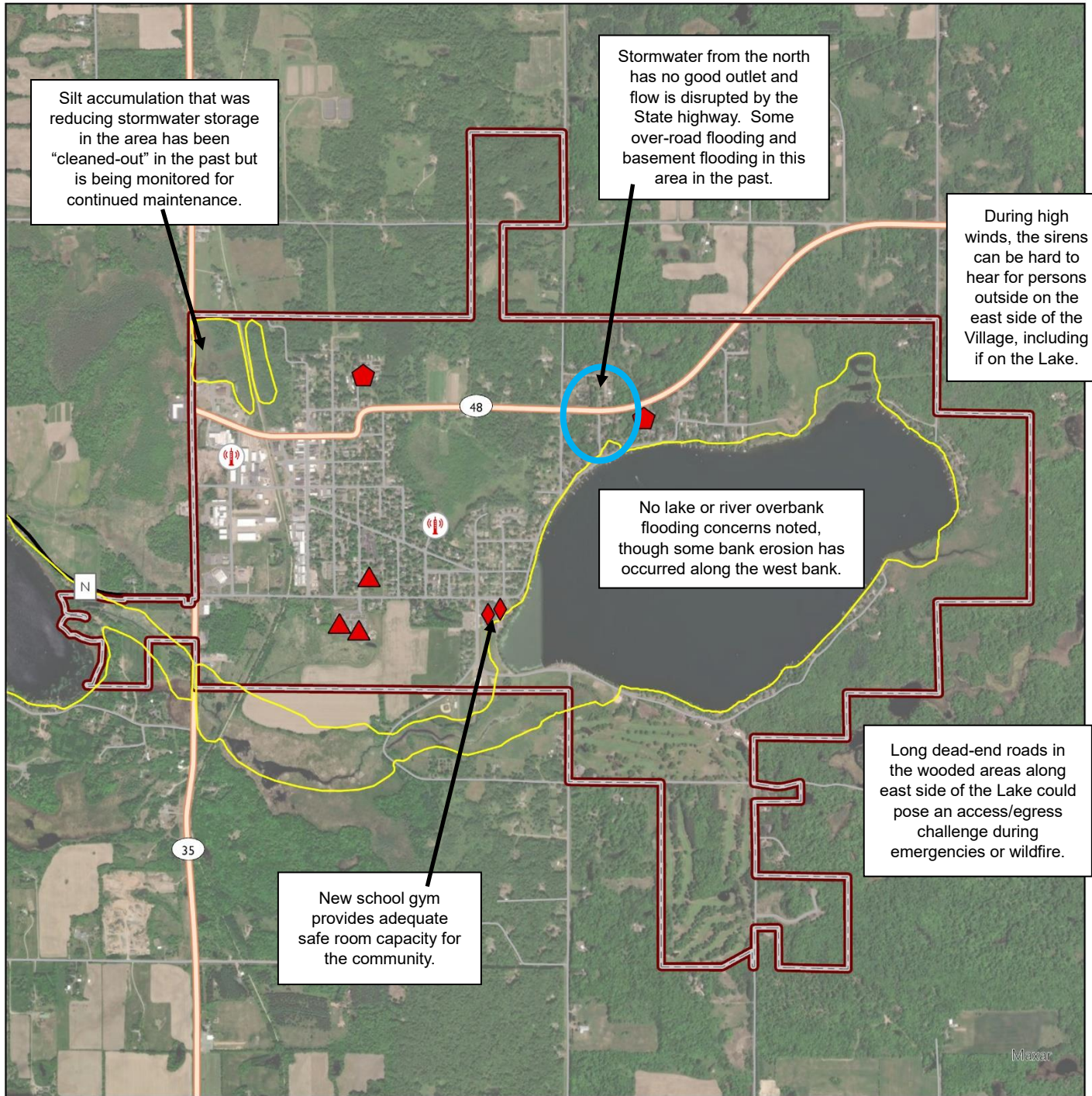
Note: The Village of Luck's partnership with the Luck School District to construct a community safe room with FEMA mitigation funding assistance is a model project; other communities can benefit from this example. The Village and District are encouraged to share their experiences.

Sub-Plan Adoption and Maintenance

<p>Plan Adoption</p>	<p>Once updated, the community’s governing body will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This community-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The community may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>During the second quarter of each year or following a declared disaster event, the primary mitigation plan contact will review this Mitigation Sub-Plan concurrently with (at the same time as) the annual review of the municipal Emergency Operations Plan. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. The community’s planning contact will contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. The community may also request that the County consider changes to the County’s overall mitigation plan. 2. Provide the suggested changes to the community’s emergency planning committee, plan commission, or governing body for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the governing body will adopt the Sub-Plan as noted previously. Such changes will be limited to this community-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The community intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The community will provide opportunities for public participation throughout its mitigation planning processes, including: (1) all governing body or committee actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

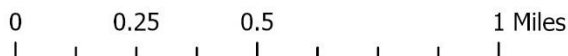
VILLAGE OF LUCK - HAZARD ASSESSMENT

Polk County - 2024



Legend

- Municipal Boundary
- 100-yr Floodplain
- ◆ School
- ▲ Assisted Living
- ⬠ Mobile Home Park
- ⚠ Storm Siren



Data Sources:
Polk County, WDHS, WDNR, WisDOT,
WDOA, WCWRPC.



VILLAGE OF MILLTOWN HAZARD MITIGATION SUB-PLAN

This sub-plan identifies past hazard events, risks, trends, capabilities, and strategies unique to or specific to the community and is part of the overall *Polk County Multi-Hazard Mitigation Plan*. The Polk County mitigation plan provides broader context and contains hazard assessment, capabilities, and strategies that are countywide or multi-jurisdictional.

Primary Contact:	Village Clerk
Planning Meetings:	<ul style="list-style-type: none"> • Primary planning meeting with WCWRPC staff occurred on 3/7/23. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment in March 2023. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by Village Board at a public meeting. Resolution included in Appendix A.

Community Profile	
<p>This table provides a brief overview of key community characteristics, primarily from the 2020 U.S. Census, which are important to assessing capacity and vulnerabilities. For example, the entire population and all above-ground structures in the community are vulnerable to a tornado event, while mobile homes have an elevated vulnerability.</p>	
Population	948
Median Age	43.4 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors; Mobile home park residents (tornado/high winds/extreme temperatures); 2-story assisted living apartment complex; Economic disadvantaged community
Assessed Improvements (2023)	Residential: \$25,835,600; Commercial: \$8,634,600; Manuf.: \$2,208,800
# of Housing units	479
# of Mobile Homes	52
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan

Hazard Risk Assessment		
<p>This table describes past hazard events impacting the community and any <u>unique</u> vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the community. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all communities.</p>		
Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	<p>Polk County has a long history of tornados, including some that have occurred nearby, however no touchdowns within the Village to the recollection of community. High winds cause tree and some roof damage about 3-4 times per decade, but has increased in recent years. Multiple storms caused tree damage in 2015. Summer 2016 tornado & high winds and 2019 straight-line winds in the area resulted in some tree and roof</p>	<p>Mobile home park and slab-on-grade housing are the highest vulnerabilities.</p> <p>No public safe room/storm shelter, but demand (and nearby storm events) has been increasing. Church has been used in past and has ADA-accessible ramp, but not certain of status. The basement at Fire Hall is an alternative, but not ADA accessible. Neither facility has remote unlock.</p>

	damage. Occasional high winds with similar damages to 2016 event, but no unique or significant damage noted.	
Hail & Lightning	No unique history noted.	No unique concerns noted.
Winter Storm, Ice, & Extreme Cold	During Winter 2014-15 Polar Vortex, 62 water line freeze-ups and some breaks; in other years, this has only occurred at the mobile home park. No other unique history noted.	No unique concerns noted. Occasionally will ask some residents to “drip” faucets to prevent freeze-ups. No warming shelter designated or activated.
Extreme Heat	No unique history noted.	No unique concerns noted. No cooling shelter designated or activated.
Long-Term Power Outage	No history of long-term (3+ day) events and areas uniquely prone. Some homes in the area (outside of Milltown) lost power for 4+ days due to Summer 2019 wind storms, but the Village was lucky and avoided the worst of the impacts.	If power is lost or elevator otherwise unavailable, would be difficult to evacuate some less mobile residents from a multi-story apartment building during an emergency. No generator at Village Hall, Police/EOC/Community Center, or the Fire Hall. 1 portable available for utilities; could use an additional portable.
Flooding – Riverine or Overbank	No overbank/flooding issues; no 100-year floodplain.	
Flooding – Stormwater or Overland	Main Street floods 3-5 times per decade (seems to be increasing) with 6”-8” of water and has caused damage to downtown structures. Flooding has entered front doors of multiple buildings on Main Street. Occasional over-the-road flooding on the highway.	Significant stormwater management improvements have been completed over the past 15 years, which have hopefully remedied the most significant flooding problems in the Main Street neighborhood. The performance of these improvements are being monitored for effectiveness. No other unique vulnerabilities or concerns noted.
Dams	No dam.	
Drought	No significant impacts within the Village from past droughts. Good well capacity.	No unique concerns noted.
Wildfire	No significant events in the community in past 50+ years.	No unique concerns noted within the Village. The Fire Department notes that access/egress can be a challenge in some wooded rural areas, especially homes along lakes.
Hazardous Materials Spills	No significant events in the community.	No unique concerns noted. Truck traffic on highway is most significant risk. PFAS detected below hazard index in one or more samples from the water system.
Active Threats	No significant events in the community.	Village Hall lacks security hardening measures.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted. Off-site battery backup of crucial data.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	Stormwater flooding issues, which were the priority of the previous mitigation plans, have hopefully been addressed. Increasing interest in/demand for a community safe room. Increasing active threats at a State & National level
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing frequency and severity of severe weather systems including downpours, wind events (including tornados) and extreme temperatures. The potential for more ice storms and long-term power loss during the winter months. Climate may be influencing these trends, including extending the tornado season into the fall and winter months.

Capabilities Assessment

The following is a general assessment of the community's resiliency and capabilities to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms. This assessment was completed by the community through the 2023 web-based survey, with some supplemental information from the community meeting and other sources (e.g., fire department survey, NFIP Community Status Book). The list of potential plans, policies, and other actions is not exhaustive, and it is not expected that the community has undertaken all actions listed or will undertake all actions in the future.

Planning Activities

Community Emergency Operations or Response Plan (EOP)	Adopted; does incorporate mitigation or preparedness
Community Evacuation Plan and/or Exercises	No
Continuity of Government Plan	No
Comprehensive Plan	Adopted; does not incorporate mitigation or preparedness
Stormwater Management Plan	Adopted; does incorporate mitigation or preparedness and incorporates actions to reduce overland flooding. Past improvements, including catch basins and ball traps/check valves in basements, have helped to mitigate some past stormwater flooding.
Historic Preservation Plan or Ordinance	No
Capital Improvements Plan or Similar Budget	Adopted; does incorporate mitigation or preparedness
Involve Fire & Law Enforcement in planning & development plan review	Do this as needed.
Special emergency notification procedures or preparedness plans for vulnerable populations	no

Policies, Codes, & Ordinances

Building Codes	Adopted; does not incorporates mitigation or preparedness
Building Code Efficiency Grading Schedule	Not sure; unknown
Zoning Ordinance	Adopted; does not incorporate mitigation or preparedness
Subdivision Ordinance	Adopted; does not incorporate mitigation or preparedness
Site Plan Review Requirements	Adopted; does not incorporate mitigation or preparedness
Floodplain Management	No 100-year floodplain.
<i>Initial Flood Hazard Boundary Map:</i>	
<i>Initial FIRM Identified:</i>	

<i>Current Effective FIRM Date:</i>	
<i>Date Community First Joined NFIP (Reg-Emer)</i>	
<i>NFIP Participation Status (and reason if not participating):</i>	
<i>Floodplain Regulations w/ NFIP standards:</i>	
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	
<i>Other ongoing floodplain management activities:</i>	
Stormwater Management Ordinance	Adopted; does incorporate mitigation or preparedness
Stormwater Utility	No
Winter Emergency Policies	No
Mitigation & Preparedness Actions for Facilities	
Debris Site identified for storm debris disposal (not just woody debris)	Partially complete
Emergency Operations Center designated with generator/back-up power	Partially complete; lacks generator.
Public Storm Shelter/Community Safe Room designated	No, but interest and increasing demand.
Public Heating/Cooling Shelter designated with generator/back-up power	No
Storm/warning siren on back-up power	Yes; 1 new.
Storm/warning siren that can be activated remotely	Yes. Triggered by Fire Dept when storm warning; interested in exploring county activation.
Active shooter/threat plans and/or security hardening for municipal buildings	No
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Partially complete
Individuals in EOP have ICS/NIMS training	Partially complete
Public Information Officer designated & trained	No
Municipal officials and staff participate in regular disaster or emergency response exercises	Partially complete
Community-level efforts to improve hazard preparedness among residents	No
Adopted billing rates for public works labor & equipment use during emergencies	No, but plan to consider implementing
Adopted mutual aid agreements for public works equipment/personnel support	Rural Water Public Works agreements with Centuria & Balsam Lake, but no formal agreement for general public works support.
Adopted emergency contracting and purchasing policies	No
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Yes
Cyber-security systems and policies for municipal utilities	Yes
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	No
Other Flood Mitigation projects or activities	No
Municipal Dam-related planning or actions	No
Barriers to mitigation or preparedness actions	Funding (cash). Lack of alternative buildings for a storm shelter; only church has an accessible basement.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the Polk County mitigation plan are shared by all participating communities.

The community will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Sections VI.C. and D. of the Polk County mitigation plan includes additional mitigation and preparedness actions that are intergovernmental in nature and not specific to the community but may suggest coordination and funding opportunities.

The following recommended actions/projects are specific to the community:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
<p>1. Determine the continued availability and feasibility of the church as a public community safe room (storm shelter); if feasible, execute an agreement for its use and identify related responsibilities during and following activation. If/when needed, explore the retrofit or construction of a community safe room. This may be new construction, building replacement, or the hardening with ADA accessibility improvements and remote unlock of an existing structure, such as the Fire Hall or Community Center.</p> <p>If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location.</p> <p>For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.</p>	<p>High; 1-3 years</p>	<p>Village Board</p>	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMA)</p> <p>WCWRPC and Wisconsin Emergency Management can provide grant-related guidance as well as example templates of safe room operations plans.</p>
<p>2. As funding allows, install emergency power generators and/or electrical hook-ups for generators at Police Dept/EOC/Community Center and at the Fire Hall, plus an additional portable for public works.</p>	<p>Medium-to-High; 3-5+ years as resources allow</p>	<p>Village Board & Public Works; Fire Department Apartment Building ownership</p>	<p>See generator-related recommendations in Section VI.C.</p>

Work with the owner of the multi-story apartment building to address emergency power needs to ensure elevator availability during an emergency and/or implement other ADA/handicapped-accessibility improvements.			
<p>3. Evaluate active threat hardening needs and opportunities, including communications/assistance systems, at the Village Hall.</p> <p>Following the assessment, integrate any procedural or protocol recommendations into the Village’s Emergency Operations Plan, followed by basic Incident Command System and active threats training of staff and elected officials.</p>	Medium; 1-3 years	Village Board & Police Department	No cost for assessment. Improvements may be eligible for USDA Community Facilities and/or CDBG funding.
4. Continue to monitor effectiveness of stormwater management efforts, especially for those downtown area properties that have been repetitively impacted in the past. Explore additional flood mitigation options in the future if needed.	Ongoing	Village Public Works & Village Board	FEMA mitigation grant funding may be available to help address structures that have had repetitive flood damage, including studies and floodproofing.
5. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) increase public participation in the countywide mass notification system (CodeRED), severe weather sheltering options, awareness of emergency siren use and warning systems, and public preparedness in general.	Medium-to-High; ongoing	Village Clerk & Board; Fire Department	<p>County Emergency Management & partners have educational materials</p> <p>Could implement annually during Severe Weather Awareness Week and/or Preparedness Month using social media, posters, utility bill inserts, etc.</p>

Sub-Plan Coordination and Integration

The previous Capacity Assessment section identifies how this Mitigation Sub-plan has been integrated into or coordinated with other municipal plans or planning mechanisms. During the planning process, the following opportunities were identified to integrate the mitigation strategies into other community planning mechanisms:

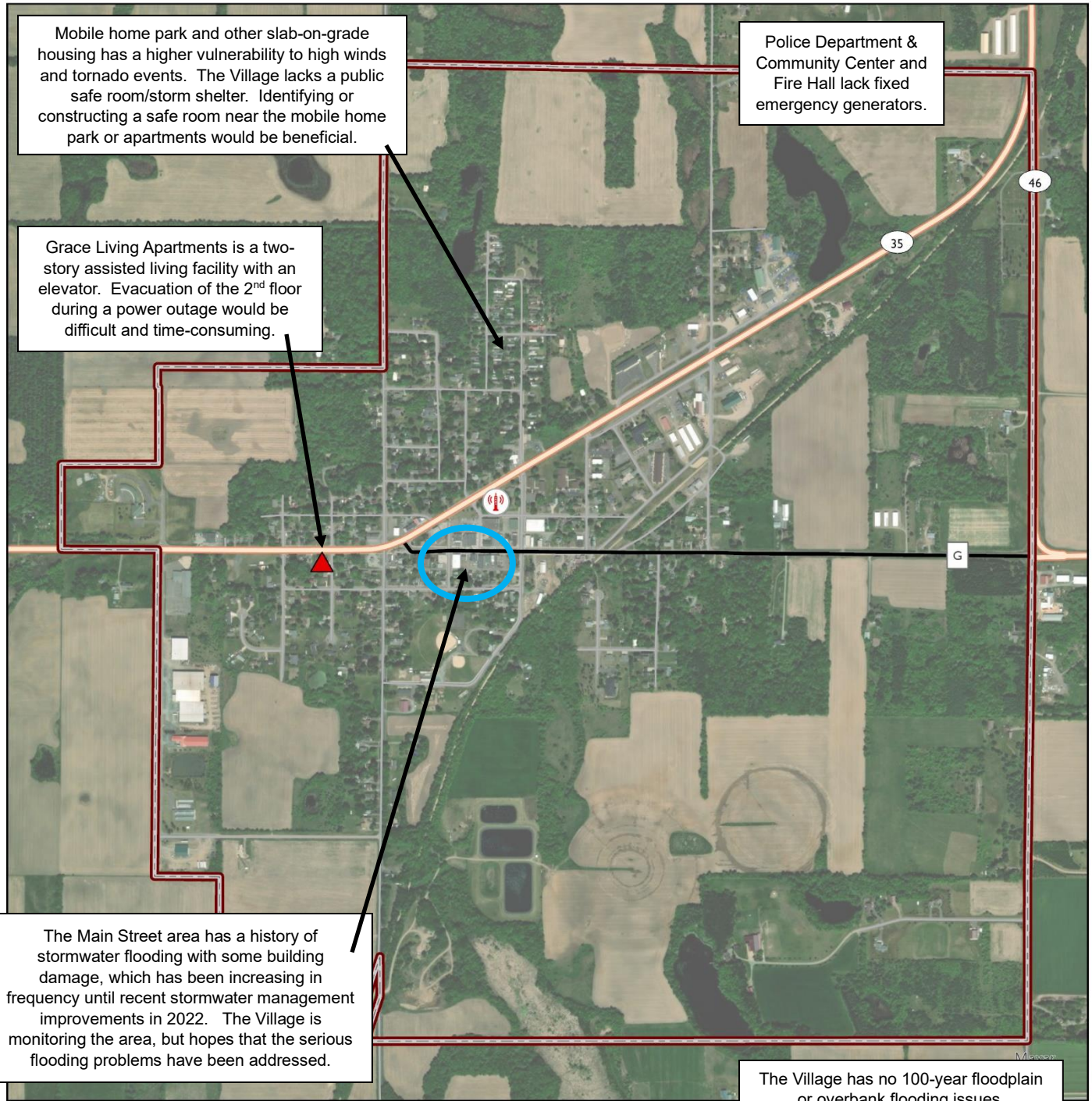
- The Village will continue to integrate stormwater management, siren replacement, security hardening, and other such projects into its capital improvement plan/budget.
- During review and update of its Emergency Operations Plan, the Village will discuss:
 - Ensuring sufficient contingencies and procedures are in place so that the sirens are triggered during a severe weather warning. This includes working with Polk County and other communities to explore county activation of sirens.
 - Emergency evacuation planning for the multi-story apartment building when the elevator is not available. This could be included as part of an exercise or drill.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

Sub-Plan Adoption and Maintenance

<p>Plan Adoption</p>	<p>Once updated, the community’s governing body will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This community-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The community may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>During the first quarter of each year or following a declared disaster event, the primary mitigation plan contact will review this Mitigation Sub-Plan concurrently with (at the same time as) the annual review of the municipal Emergency Operations Plan. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. The community’s planning contact will contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. The community may also request that the County consider changes to the County’s overall mitigation plan. 2. Provide the suggested changes to the community’s emergency planning committee, plan commission, or governing body for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the governing body will adopt the Sub-Plan as noted previously. Such changes will be limited to this community-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The community intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The community will provide opportunities for public participation throughout its mitigation planning processes, including: (1) all governing body or committee actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

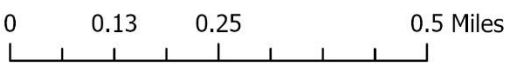
VILLAGE OF MILLTOWN - HAZARD ASSESSMENT

Polk County - 2024



Legend

- Municipal Boundary
- 100-yr Floodplain
- Assisted Living
- Storm Siren



Data Sources:
Polk County, WDHS, WDNR, WisDOT,
WDOA, WCWRPC.



VILLAGE OF OSCEOLA HAZARD MITIGATION SUB-PLAN

This sub-plan identifies past hazard events, risks, trends, capabilities, and strategies unique to or specific to the community and is part of the overall *Polk County Multi-Hazard Mitigation Plan*. The Polk County mitigation plan provides broader context and contains hazard assessment, capabilities, and strategies that are countywide or multi-jurisdictional.

Primary Contact:	Village Administrator
Planning Meetings:	<ul style="list-style-type: none"> • Primary planning meeting with WCWRPC staff occurred on 3/31/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment in July 2023. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by Village Board at a public meeting. Resolution included in Appendix A.

Community Profile	
<p>This table provides a brief overview of key community characteristics, primarily from the 2020 U.S. Census, which are important to assessing capacity and vulnerabilities. For example, the entire population and all above-ground structures in the community are vulnerable to a tornado event, while mobile homes have an elevated vulnerability.</p>	
Population	2,765
Median Age	37.1 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors and residents with disabilities; Economic disadvantaged community
Assessed Improvements (2023)	Residential: \$182,059,100; Commercial: \$56,499,600; Manuf.: \$29,027,300
# of Housing units	1,356
# of Mobile Homes	83
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan

Hazard Risk Assessment		
<p>This table describes past hazard events impacting the community and any <u>unique</u> vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the community. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all communities.</p>		
Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	Polk County has a long history of tornados, including some that have occurred nearby. Occasional high winds, but no unique or significant damage noted.	Areas of residential slab-on-grade construction without basements (e.g., Belmont neighborhood); such development has been increasing. Mobile home park, hospital, and senior housing are particularly vulnerable. Public safe room/storm shelter available.
Hail & Lightning	No unique history noted. Past damage largely limited to trees and minor roof damage.	No unique concerns noted.
Winter Storm, Ice, &	Experienced significant water line freeze-ups and breaks during Winter 2014 Polar Vortex; distributed bottle water temporarily	No unique concerns noted. No warming shelter activated in the past, but available if needed.

Extreme Cold	until flow restored. Previously, freeze-ups were mostly limited to under trailer homes.	
Extreme Heat	No unique history noted.	No unique concerns noted. No cooling shelter activated in the past, but available if needed.
Long-Term Power Outage	No history of long-term power loss and no areas uniquely prone.	No unique concerns noted. Fire Hall has generator. New Village Hall/EOC/Police partially served by generator. Portables for wastewater treatment system and wells.
Flooding – Riverine or Overbank	Mobile home park on Osceola Creek experienced damage in 2002 flooding. No other overbank flooding damages in the City during this historic event.	No significant riverine flooding vulnerabilities noted by the Village. FEMA mitigation grant dollars used to remove 19 manufactured homes prone to flooding and impacted by the 2002 event. Village elevated above the St. Croix River.
Flooding – Stormwater or Overland	In June 2024, heavy rains caused a rock slide that damaged and covered a portion of the Cascade Falls staircase making this popular tourist destination impassible. Some localized flooding along 3 rd Avenue every 2-4 years, but no significant damages to date.	Stormwater has been a greater issue than overbank flooding in recent years; see hazard assessment map. Since the previous mitigation plan, the Village has completed related planning and now has a stormwater management plan. Due to steep slopes along the St. Croix River, the Village does have some continued localized landslide risk, especially in the 2 nd Avenue area. Some improvements have been made along Ridge Road and the 2 nd Avenue area to mitigate.
Dams	No past dam-related events noted.	Village-owned Lower Osceola Dam is a small dam rated as “significant” hazard risk, but in good repair.
Drought	No significant impacts within the Village from past droughts. Good well capacity.	No unique concerns noted.
Wildfire	No significant events in the community in the past 50+ years.	No unique concerns noted. Could potentially use a dry hydrant on Lower Mill Pond.
Hazardous Materials Spills	No significant events in the community.	Truck traffic on Highway 35 is most significant risk. Some fixed facilities, but plans in place. PFAs not detected in municipal water supply.
Active Threats	No significant events in the community.	No unique concerns noted. Security hardening integrated into new Village Hall design.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted. Security and off-site back-up in place.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	None noted.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing frequency and severity of severe weather systems including downpours, wind events (including tornados) and extreme temperatures. Climate may be influencing these trends, including extending the tornado season into the fall and winter months.

Capabilities Assessment

The following is a general assessment of the community's resiliency and capabilities to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms. This assessment was completed by the community through the 2023 web-based survey, with some supplemental information from the community meeting and other sources (e.g., fire department survey, NFIP Community Status Book). The list of potential plans, policies, and other actions is not exhaustive, and it is not expected that the community has undertaken all actions listed or will undertake all actions in the future.

Planning Activities

Community Emergency Operations or Response Plan (EOP)	Adopted; does incorporate mitigation or preparedness
Community Evacuation Plan and/or Exercises	Adopted; does not incorporate mitigation or preparedness
Comprehensive Plan	Outdated plan; will consider mitigation or preparedness in update
Stormwater Management Plan	Adopted; does incorporate mitigation or preparedness
Historic Preservation Plan or Ordinance	Adopted; does incorporate mitigation or preparedness
Capital Improvements Plan or Similar Budget	Adopted; does not incorporate mitigation or preparedness
Involve Fire & Law Enforcement in planning & development plan review	Do this as needed.
Special emergency notification procedures or preparedness plans for vulnerable populations	No

Policies, Codes, & Ordinances

Building Codes	Adopted; does incorporate mitigation or preparedness
Building Code Efficiency Grading Schedule	Adopted; does incorporate mitigation or preparedness
Zoning Ordinance	Adopted; does incorporate mitigation or preparedness
Subdivision Ordinance	Unknown
Floodplain Management	
<i>Initial Flood Hazard Boundary Map:</i>	05/24/1974
<i>Initial FIRM Identified:</i>	01/05/1984
<i>Current Effective FIRM Date:</i>	09/16/2011
<i>Date Community First Joined NFIP (Reg-Emer)</i>	01/05/1984
<i>NFIP Participation Status (and reason if not participating):</i>	Participant
<i>Floodplain Regulations w/ NFIP standards:</i>	-
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	Zoning Administrator; then Plan Commission
<i>Other ongoing floodplain management activities:</i>	As of 2024, FEMA floodplain maps for Polk County are being updated, including new engineering & delineations for all Zone A, and new delineations for Zone AE using the most recent terrain data.
Stormwater Management Ordinance	Adopted; does incorporate mitigation or preparedness
Stormwater Utility	Adopted; does incorporate mitigation or preparedness
Winter Emergency Policies	Adopted; does incorporate mitigation or preparedness

Mitigation & Preparedness Actions for Facilities

Debris Site identified for storm debris disposal (not just woody debris)	Yes
Emergency Operations Center designated with generator/back-up power	Yes
Public Storm Shelter/Community Safe Room designated	Yes

Public Heating/Cooling Shelter designated with generator/back-up power	Yes
Storm/warning siren on back-up power	Yes. Newer siren on south side. May need an additional siren on north side in future as development occurs.
Storm/warning siren that can be activated remotely	Partially complete.
Active shooter/threat plans and/or security hardening for municipal buildings	Yes
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Yes
Individuals in EOP have ICS/NIMS training	Unknown
Public Information Officer designated & trained	Unknown
Municipal officials and staff participate in regular disaster or emergency response exercises	Partially complete
Community-level efforts to improve hazard preparedness among residents	Partially complete
Adopted billing rates for public works labor & equipment use during emergencies	Partially complete
Adopted mutual aid agreements for public works equipment/personnel support	Yes. Rural water agreement with Dresser.
Adopted emergency contracting and purchasing policies	Yes
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Yes
Cyber-security systems and policies for municipal utilities	Yes
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	Unknown
Other Flood Mitigation projects or activities	Past acquisition of manufactured homes prone to flooding.
Municipal Dam-related planning or actions	Typical required planning and maintenance.
Barriers to mitigation or preparedness actions	Funding; collective bargaining agreements for services
Other:	Improved broadband redundancy would increase community and economic resiliency.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the Polk County mitigation plan are shared by all participating communities.

The community will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Sections VI.C. and D. of the Polk County mitigation plan includes additional mitigation and preparedness actions that are intergovernmental in nature and not specific to the community, but may suggest coordination and funding opportunities.

The following recommended actions/projects are specific to the community:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
<p>1. Continue to maintain and implement the recommendations of the Village’s stormwater management plan, including requiring runoff and erosion control planning when considering new development proposals.</p> <p>Explore funding options for bank stabilization, revetments, or other mitigation actions in areas where structures or infrastructure are at risk, including the potential relocation of Ridge Road.</p>	<p>Medium; 3-5 years</p>	<p>Plan Commission; Public Work; Village Board</p>	<p>Most likely locally funded, except for where State or County highways are involved (e.g., 2025 Highway 243 project).</p> <p>FEMA Hazard Mitigation Grant Programs (BRIC & HMA) may be possible bank stabilization funding sources if significant vulnerabilities or imminent losses can be demonstrated.</p>
<p>2. As funding allows, increase emergency power generator capacity at the Village Hall and/or explore additional fixed generators at public utilities.</p>	<p>High; 1-3+ years as resources allow</p>	<p>Village Board & Public Works</p>	<p>See generator-related recommendations in Section VI.C.</p>
<p>3. Integrate mitigation plan recommendations as part of the next comprehensive plan update.</p>	<p>Medium-to-Low; timeline undetermined</p>	<p>Plan Commission and Village Board</p>	<p>CDBG Planning Grant, if income-eligible; WDNR for technical support if needed</p>
<p>4. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) to increase public participation in the countywide mass notification system (CodeRED), awareness of emergency siren use and warning systems, and public preparedness in general.</p>	<p>Medium-to-High; ongoing</p>	<p>Village Clerk & Board; Fire Department</p>	<p>County Emergency Management & partners have educational materials</p> <p>Could implement annually during Severe Weather Awareness Week and/or Preparedness Month using social media, posters, utility bill inserts, etc.</p>

Sub-Plan Coordination and Integration

The previous Capacity Assessment section identifies how this Mitigation Sub-plan has been integrated into or coordinated with other municipal plans or planning mechanisms. During the planning process, the following opportunities were identified to integrate the mitigation strategies into other community planning mechanisms:

- The Village integrates hazard mitigation into its stormwater management plan; recommended projects are then incorporated into the Village’s capital improvements.
- The Village maintains an emergency operations plan. Mitigation and preparedness recommendations can help guide future emergency training and exercises.
- The Village is in need of an update, which is an opportunity to integrate mitigation strategies.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

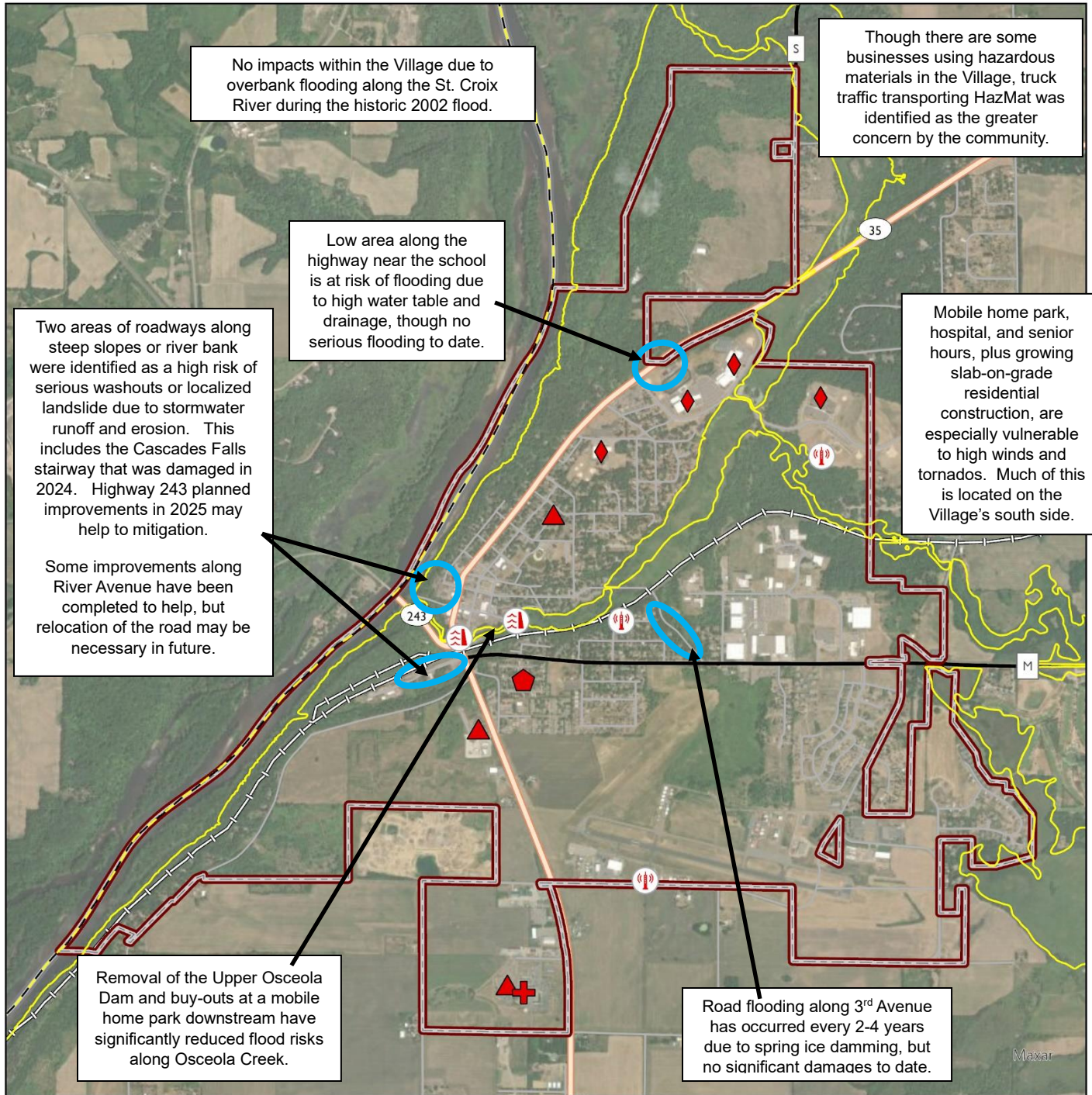
Sub-Plan Adoption and Maintenance

Plan Adoption	Once updated, the community’s governing body will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This community-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The community may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.
Plan Maintenance	<p>During the second quarter of each year or following a declared disaster event, the primary mitigation plan contact will review this Mitigation Sub-Plan concurrently with (at the same time as) the annual review of the municipal Emergency Operations Plan. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. The community’s planning contact will contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. The community may also request that the County consider changes to the County’s overall mitigation plan. 2. Provide the suggested changes to the community’s emergency planning committee, plan commission, or governing body for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the governing body will adopt the Sub-Plan as noted previously. Such changes will be limited to this community-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.

Plan Updates	The community intends to be a full participant in five-year updates of the County's overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.
Continued Public Participation	The community will provide opportunities for public participation throughout its mitigation planning processes, including: (1) all governing body or committee actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.

VILLAGE OF OSCEOLA - HAZARD ASSESSMENT

Polk County - 2024



Legend

- Municipal Boundary
- 100-yr Floodplain
- + Hospital
- ◆ School
- ▲ Assisted Living
- ⬠ Mobile Home Park
- ⚡ Storm Siren
- ⚡ Dam w/High or Significant Hazard Rating



Data Sources:
Polk County, WDHS, WDNR, WisDOT,
WDOA, WCWRPC.



CITY OF AMERY HAZARD MITIGATION SUB-PLAN

This sub-plan identifies past hazard events, risks, trends, capabilities, and strategies unique to or specific to the community and is part of the overall *Polk County Multi-Hazard Mitigation Plan*. The Polk County mitigation plan provides broader context and contains hazard assessment, capabilities, and strategies that are countywide or multi-jurisdictional.

Primary Contact:	City Administrator
Planning Meetings:	<ul style="list-style-type: none"> • Primary planning meeting with WCWRPC staff occurred on 3/14/23. Sign-in sheet excerpt in Appendix B identifies participants. • City participated in a mitigation/preparedness capabilities assessment in April 2023. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by City Council at a public meeting. Resolution included in Appendix A.

Community Profile	
<p>This table provides a brief overview of key community characteristics, primarily from the 2020 U.S. Census, which are important to assessing capacity and vulnerabilities. For example, the entire population and all above-ground structures in the community are vulnerable to a tornado event, while mobile homes have an elevated vulnerability.</p>	
Population	2,962
Median Age	41.6 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors; mobile home park residents; Economic disadvantaged community
Assessed Improvements (2023)	Residential: \$178,651,800; Commercial: \$63,105,000; Manuf.: \$17,477,600
# of Housing units	1,432
# of Mobile Homes	157
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

Hazard Risk Assessment		
<p>This table describes past hazard events impacting the community and any <u>unique</u> vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the community. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all communities.</p>		
Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	<p>Polk County has a long history of tornados, including some that have occurred nearby. Last tornado in the City about 1953, resulting in 1 death and significant building damage. Occasional high winds. Downburst in 2005 damaged hangars at airport, feed mill, and 1 home.</p>	<p>3 mobile home parks. Campground on north side; nearby park hosts events. Public storm shelter available as part of new City Center.</p>
Hail & Lightning	No unique history noted.	No unique concerns noted.

Winter Storm, Ice, & Extreme Cold	Winter 2014 (Polar Vortex) resulted in frozen utility lines and breaks. In other years, freeze-ups were adequately managed by residents dripping water in prone areas.	No unique concerns noted. Power loss most critical concern.
Extreme Heat	No unique history noted.	No unique concerns noted. Library available as a cooling shelter if needed.
Long-Term Power Outage	Some past ice damage to trees and power lines. No long-term events; 6-7 hours about the maximum outage length. No areas particularly prone.	Limited electric trunk lines/redundancy. Electric power not produced within the community, so subject to impacts on generating and distribution infrastructure outside the community. Fixed generators available at the City Center, WWTP, and Well #4; portable for liftstations.
Flooding – Riverine or Overbank	No recent history or problems noted. During 2001 flooding along the Apple River, floodwaters within the City did not exceed the banks- except some places along Riverside Blvd.	No unique concerns noted by the community. Flood assessment in Section III.D. suggests six residential buildings may be located within the 100-year floodplain. There has been one NFIP flood insurance claim within the Amery zip code from damages in 1978, though this may have occurred outside the City.
Flooding – Stormwater or Overland	Only significant concern is the urban creek and drainage way through the middle of the City. No damages prior to 2015. In July 2015, flood damage occurred to culvert & street infrastructure, along with two nearby businesses. Culvert under Highway 46 constricts flow, but was replaced in 2021 and only yards flooded since. See hazard map.	Overall, significant improvements since stormwater ordinance adopted in 2009. Remaining concerns limited to infrastructure and buildings near the creek/drainageway described to the left, as long as new development is carefully planned. Highway 46 culvert has remedied some, continuing to clean-up the creek and improve drainage.
Dams	Amery Dam managed for flood control.	Regularly inspected. New stop logs installed on west side in 2016.
Drought	No significant impacts within the City from past droughts. Good well capacity.	No unique concerns noted.
Wildfire	No significant events.	Some residential in mixed forest, but not a high wildfire risk. Good water quantity for fire protection. Area may benefit from additional dry hydrants.
Hazardous Materials Spills	No significant events in the community.	Truck traffic on highways and fuel at airport most significant concerns noted. PFAs not detected in municipal water supply.
Active Threats	No significant events in the community.	New City Center provides hardened protection vs. previous offices.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted. Data backed-up off-site & security systems/monitoring in place.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	None noted.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing frequency and severity of severe weather systems including downpours, wind events (including tornados) and extreme temperatures. Climate may be influencing these trends, including extending the tornado season into the fall and winter months.

Capabilities Assessment

The following is a general assessment of the community's resiliency and capabilities to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms. This assessment was completed by the community through the 2023 web-based survey, with some supplemental information from the community meeting and other sources (e.g., fire department survey, NFIP Community Status Book). The list of potential plans, policies, and other actions is not exhaustive, and it is not expected that the community has undertaken all actions listed or will undertake all actions in the future.

Planning Activities

Community Emergency Operations or Response Plan (EOP)	Adopted; does not incorporate mitigation or preparedness
Community Evacuation Plan and/or Exercises	No plan
Continuity of Government Plan	No plan
Comprehensive Plan	Updated; limited mitigation or preparedness, but includes floodplain management
Stormwater Management Plan	Outdated plan; will consider implementing mitigation or preparedness in update
Historic Preservation Plan or Ordinance	Outdated plan; will consider implementing mitigation or preparedness in update
Capital Improvements Plan or Similar Budget	Outdated plan. Includes fire & policy equipment when needed.
Involve Fire & Law Enforcement in planning & development plan review	Doing this as needed.
Special emergency notification procedures or preparedness plans for vulnerable populations	None noted. 5-story structure could be difficult to evacuate if elevator is not available.

Policies, Codes, & Ordinances

Building Codes	Adopted; does not incorporate mitigation or preparedness
Building Code Efficiency Grading Schedule	Unknown
Zoning Ordinance	Adopted; does not incorporate mitigation or preparedness
Subdivision Ordinance	Adopted; does not incorporate mitigation or preparedness
Site Plan Review Requirements	Outdated plan; will consider implementing mitigation or preparedness in update
Floodplain Management	
<i>Initial Flood Hazard Boundary Map:</i>	12/28/1973
<i>Initial FIRM Identified:</i>	09/18/1991
<i>Current Effective FIRM Date:</i>	09/16/2011
<i>Date Community First Joined NFIP (Reg-Emer)</i>	09/18/1991
<i>NFIP Participation Status (and reason if not participating):</i>	Participant
<i>Floodplain Regulations w/ NFIP standards:</i>	Adopted
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	Zoning Administrator; then Plan Commission
<i>Other ongoing floodplain management activities:</i>	As of 2024, FEMA floodplain maps for Polk County are being updated, including new engineering & delineations for all Zone A, and new delineations for Zone AE using the most recent terrain data.
Stormwater Management Ordinance	Outdated plan; will consider implementing mitigation or preparedness in update
Stormwater Utility	Outdated plan; will consider implementing mitigation or preparedness in update

Winter Emergency Policies	Adopted for parking & snow removal.
Mitigation & Preparedness Actions for Facilities	
Debris Site identified for storm debris disposal (not just woody debris)	No; planning to implement
Emergency Operations Center designated with generator/back-up power	Yes; City Center can connect to generator, but could benefit from a fixed generator
Public Storm Shelter/Community Safe Room designated	Yes. Availability advertised in paper plus placards are used with severe weather information.
Public Heating/Cooling Shelter designated with generator/back-up power	Yes; not activated to date
Storm/warning siren on back-up power	Yes; 3 sirens (1 new) + cable TV announcements, website, and P.A. system if needed. Sirens activated by Police/Fire; interested in County activation
Storm/warning siren that can be activated remotely	Yes
Active shooter/threat plans and/or security hardening for municipal buildings	New City Center includes significant hardening; very limited for other buildings.
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Currently being updated.
Individuals in EOP have ICS/NIMS training	Some; additional efforts being considered.
Public Information Officer designated & trained	No; planning or considering implementation
Municipal officials and staff participate in regular disaster or emergency response exercises	No; planning or considering implementation
Community-level efforts to improve hazard preparedness among residents	No; planning or considering implementation
Adopted billing rates for public works labor & equipment use during emergencies	No; planning or considering implementation
Adopted mutual aid agreements for public works equipment/personnel support	No; planning or considering implementation. "Handshake" mutual aid with New Richmond and Clear Lake if needed.
Adopted emergency contracting and purchasing policies	No; planning or considering implementation
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Yes
Cyber-security systems and policies for municipal utilities	No; planning or considering implementation
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	No; planning or considering implementation. Have distributed NOAA radios fairly recently.
Other Flood Mitigation projects or activities	No.
Municipal Dam-related planning or actions	EAP is up to date.
Barriers to mitigation or preparedness actions	Need to complete FEMA Incident Command and NIMS trainings. Limited funding; some mitigation actions would be dependent on grant funding.
Other vulnerabilities:	Four senior housing complexes & three low-income complexes owned by Housing Authority. Catholic Charities structure has 6-8 units. Lack of storm shelter options at Senior Center
Other:	Does have utilities emergency plan; hazard mitigation inclusion not indicated.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the Polk County mitigation plan are shared by all participating communities.

The community will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Sections VI.C. and D. of the Polk County mitigation plan includes additional mitigation and preparedness actions that are intergovernmental in nature and not specific to the community, but may suggest coordination and funding opportunities.

The following recommended actions/projects are specific to the community:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
<p>1. Explore designation or development of a community safe room (storm shelter) for mobile home parks and the north part of the community (campground, park users), <u>if</u> there is increased community demand. Explore storm hardening options for the senior center.</p> <p>If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location.</p> <p>For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.</p>	<p>Medium-to-Low; 3-5 years</p> <p>Timeline could change based on public demand for safe room or building projects.</p>	<p>Residents should express need; City Council</p>	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMA)</p> <p>FEMA Technical Assistance or Advanced Assistance grant funding could be available to assist with exploring storm hardening options.</p> <p>WCWRPC and Wisconsin Emergency Management can provide grant-related guidance</p>
<p>2. Update and implement the City's Stormwater Management Plan. Keep stormwater drainageways within the City clear of debris and obstructions to prevent flooding. If needed, explore regulatory and enforcement options.</p>	<p>Medium-to-High; 1-3 years</p>	<p>City Public Works; City Plan Commission and Council</p>	<p>Regulatory/enforcement options would likely require legal counsel.</p>
<p>3. Update and annually review the City's Emergency Operations Plan. Explore opportunities to address any gaps identified in the previous capabilities assessment.</p>	<p>High; ongoing</p>	<p>City Administrator to delegate responsibility</p>	<p>County Emergency Management can provide a template and guidance.</p>

<p>4. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) to increase public participation in CodeRed, awareness of emergency siren use and warning systems, and public preparedness in general.</p>	<p>Medium-to-High; ongoing</p>	<p>City Administrator (or designee); Fire Department</p>	<p>County Emergency Management & partners have educational materials</p> <p>Could implement annually during Severe Weather Awareness Week and/or Preparedness Month using social media, posters, utility bill inserts, etc.</p>
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Sub-Plan Coordination and Integration

The previous Capacity Assessment section identifies how this Mitigation Sub-plan has been integrated into or coordinated with other municipal plans or planning mechanisms. During the planning process, the following opportunities were identified to integrate the mitigation strategies into other community planning mechanisms:

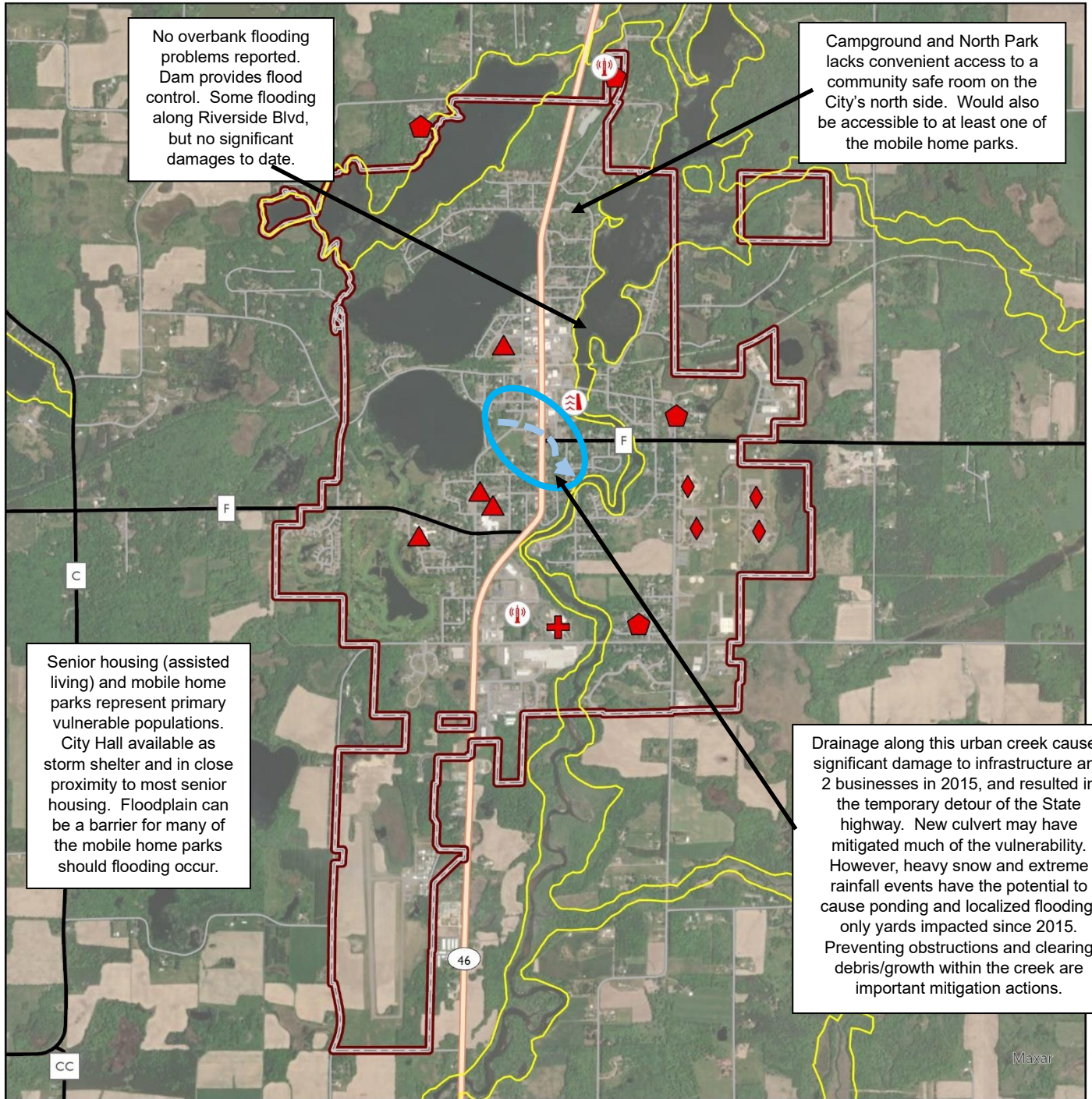
- The City is expected to update its comprehensive plan in the future. This is an opportunity to integrate mitigation strategies, including obtaining public input on the need for additional community safe rooms.
- The capacity assessment survey suggested a number of other plans are outdated. Updates of these plans should consider the risks, capabilities, and recommendations in this mitigation plan.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

Sub-Plan Adoption and Maintenance

<p>Plan Adoption</p>	<p>Once updated, the community’s governing body will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This community-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The community may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>During the second quarter of each year or following a declared disaster event, the primary mitigation plan contact will review this Mitigation Sub-Plan concurrently with (at the same time as) the annual review of the municipal Emergency Operations Plan. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. The community’s planning contact will contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. The community may also request that the County consider changes to the County’s overall mitigation plan. 2. Provide the suggested changes to the community’s emergency planning committee, plan commission, or governing body for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the governing body will adopt the Sub-Plan as noted previously. Such changes will be limited to this community-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The community intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The community will provide opportunities for public participation throughout its mitigation planning processes, including: (1) all governing body or committee actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

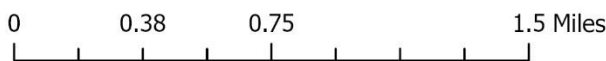
CITY OF AMERY - HAZARD ASSESSMENT

Polk County - 2024



Legend

- Municipal Boundary
- + Hospital
- ▲ Assisted Living
- Storm Siren
- 100-yr Floodplain
- ◆ School
- ⬠ Mobile Home Park
- Dam w/High or Significant Hazard Rating



Data Sources:
Polk County, WDHS, WDNR, WisDOT,
WDOA, WCWRPC.



CITY OF ST. CROIX FALLS HAZARD MITIGATION SUB-PLAN

This sub-plan identifies past hazard events, risks, trends, capabilities, and strategies unique to or specific to the community and is part of the overall *Polk County Multi-Hazard Mitigation Plan*. The Polk County mitigation plan provides broader context and contains hazard assessment, capabilities, and strategies that are countywide or multi-jurisdictional.

Primary Contact:	City Administrator
Planning Meetings:	<ul style="list-style-type: none"> • Primary planning meeting with WCWRPC staff occurred on 3/23/23 at the City Hall. Sign-in sheet excerpt in Appendix B identifies participants. • City participated in a mitigation/preparedness capabilities assessment in April 2023. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by City Council at a public meeting. Resolution included in Appendix A.

Community Profile	
<p>This table provides a brief overview of key community characteristics, primarily from the 2020 U.S. Census, which are important to assessing capacity and vulnerabilities. For example, the entire population and all above-ground structures in the community are vulnerable to a tornado event, while mobile homes have an elevated vulnerability.</p>	
Population	2,208
Median Age	46.4 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors, mobile home park residents, nursing home.
Assessed Improvements (2023)	Residential: \$99,764,500; Commercial: \$65,181,600; Manuf.: \$6,190,300
# of Housing units	1,125
# of Mobile Homes	34
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan

Hazard Risk Assessment		
<p>This table describes past hazard events impacting the community and any <u>unique</u> vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the community. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all communities.</p>		
Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	<p>Polk County has a long history of tornados, including some that have occurred nearby, but no tornado history in the City in 25+ years. Occasional high winds including damages to trees, roofs, and signage in Spring 2022.</p>	<p>Generally, structures on the top of the hill are more vulnerable to high winds. Multi-family housing and senior facilities on east side lack on-site safe rooms. Fairgrounds is forced to close during events every 2-3 years due to severe weather; no safe room on site and evacuation has its own safety concerns. A school has been used as a safe room for this area in the past, but concerns with distance and access when needed.</p> <p>Mobile home park has a high proportion of seniors and low-income residents; it has a building has been used</p>

		as a “shelter”, but not built to FEMA safe room standards and not certain if it is still available. Boaters on the St. Croix River a special vulnerability; marina is next to trailer park.
Hail & Lightning	No unique history noted.	No unique or repetitive concerns noted.
Winter Storm, Ice, & Extreme Cold	Winter 2014 utility breaks and frozen lines; pedestrian bridge also damaged. East-bound traffic on USH 8 cannot ascend hill under icy/snow-pack conditions resulting in accidents and backups. Also steep hills on some City streets; accidents not uncommon during winter.	Ongoing concerns with traffic impacts during winter and ice, especially on USH 8 at the hill; this has been a vulnerability identified in the original and all updates of the County’s mitigation plan; fog can also be an occasional problem at the USH 8 hill. Some flood-related concerns and basement flooding during heavy snow melts with steep topography being a factor.
Extreme Heat	No unique history noted.	No unique concerns noted.
Long-Term Power Outage	High wind damage in May 2022 left areas of the City without power for 36-48 hours. No other significant events noted and no areas particularly prone.	Generator added at City Hall/Police/EOC in 2023. Fixed at booster pump station and new well. One portable available for other sites; none at other wells and liftstations. WDNR encouraging more generators for utilities.
Flooding – Riverine or Overbank	No significant damages from the 2002 historical flood; wastewater treatment plant was protected with sandbags. Flood waters occasionally “lap against” the wastewater plant and temporarily restrict access (last time in 2016), but no serious damage to date. Periodic ice damming on the river, including damage to municipal docks/pier in 2013, but these are now removable. Other river flooding primarily limited to park.	No vulnerabilities requiring action at this time noted. River flooding largely mitigated through dam, zoning, and public parkland/greenspace.
Flooding – Stormwater or Overland	Steep topography causes stormwater flooding concerns, including basement flooding, ponding, etc. Most concerns have occurred along the hillside in the older neighborhoods of the City, though U.S. Highway 8 has washed-out near KFC. Older stormwater systems were not sized to handle natural flow from heavy rain events plus increased development near the Fairgrounds and far west side. See map at the end of the sub-plan.	Significant stormwater improvements made over past two decades, including near the Fairgrounds/nursing home in 2007, have reduced vulnerabilities, including the acquisition of a floodprone structure utilizing FEMA mitigation grant funding. However, new development and heavy rainfall events in recent years has exacerbated stormwater flooding concerns.
Dams	Xcel Dam provides some flood control	Dam break could damage the USH 8 bridge and City’s wastewater plant.
Drought	No significant impacts within the City from past droughts.	Well capacity could potentially be a concern during a period of extended drought. No dry hydrant available as a back-up source for fire protection.
Wildfire	No significant events in the community in the past 50+ years.	No unique concerns noted.
Hazardous Materials Spills	Fuel truck slid down Georgia Street on ice and was punctured.	Truck traffic on USH 8 is most significant concern. PFAS detected below hazard index in one or more samples from the water system
Active Threats	No significant events in the community.	No unique concerns noted. School, movie theatre, Fairgrounds events, and City Hall identified as largest

		vulnerabilities. More security hardening and continued exercises/training suggested.
Cyber-Attack	No significant events impacting municipal facilities or services.	More meetings and information sharing are occurring on-line following the COVID-19 public health emergency, which increases the reliance on safe Internet access and practices.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	Increasing stormwater runoff concerns related to increasing heavy rainfall events and new development. Also increasing cyber-security threats.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing frequency and severity of severe weather systems including downpours, wind events (including tornados) and extreme temperatures. Climate may be influencing these trends, including extending the tornado season into the fall and winter months. Potential for increase stormwater flooding, especially along the hillside, as extreme rainfall events increase.

Capabilities Assessment

The following is a general assessment of the community’s resiliency and capabilities to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms. This assessment was completed by the community through the 2023 web-based survey, with some supplemental information from the community meeting and other sources (e.g., fire department survey, NFIP Community Status Book). The list of potential plans, policies, and other actions is not exhaustive, and it is not expected that the community has undertaken all actions listed or will undertake all actions in the future.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	Adopted; does incorporate mitigation or preparedness
Community Evacuation Plan and/or Exercises	No
Continuity of Government Plan	No
Comprehensive Plan	Adopted; does not incorporate mitigation or preparedness
Stormwater Management Plan	No
Historic Preservation Plan or Ordinance	Adopted; does not incorporate mitigation or preparedness but incorporates actions to reduce overland flooding
Capital Improvements Plan or Similar Budget	Adopted; does incorporate mitigation or preparedness
Involve Fire & Law Enforcement in planning & development plan review	Do this as needed.
Special emergency notification procedures or preparedness plans for vulnerable populations	no
Policies, Codes, & Ordinances	
Building Codes	Adopted; does not incorporates mitigation or preparedness
Building Code Efficiency Grading Schedule	Adopted; does not incorporates mitigation or preparedness
Zoning Ordinance	Adopted; does not incorporate mitigation or preparedness
Subdivision Ordinance	Adopted; does not incorporate mitigation or preparedness

Site Plan Review Requirements	Adopted; does not incorporate mitigation or preparedness
Floodplain Management	
<i>Initial Flood Hazard Boundary Map:</i>	05/24/74
<i>Initial FIRM Identified:</i>	05/01/87
<i>Current Effective FIRM Date:</i>	09/16/11 (M)
<i>Date Community First Joined NFIP (Reg-Emer)</i>	05/01/87
<i>NFIP Participation Status (and reason if not participating):</i>	Participant
<i>Floodplain Regulations w/ NFIP standards:</i>	Has a floodplain ordinance, but may not be consistent with the latest WDNR model.
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	Zoning Administrator, then Plan Commission
<i>Other ongoing floodplain management activities:</i>	As of 2024, FEMA floodplain maps for Polk County are being updated, including new engineering & delineations for all Zone A, and new delineations for Zone AE using the most recent terrain data.
Stormwater Management Ordinance	Adopted; does incorporate mitigation or preparedness
Stormwater Utility	No
Winter Emergency Policies	Adopted; does not incorporate mitigation or preparedness
Mitigation & Preparedness Actions for Facilities	
Debris Site identified for storm debris disposal (not just woody debris)	Yes
Emergency Operations Center designated with generator/back-up power	City Hall; back-up power installed late 2023.
Public Storm Shelter/Community Safe Room designated	No
Public Heating/Cooling Shelter designated with generator/back-up power	City Hall is available if needed.
Storm/warning siren on back-up power	No; but has interest
Storm/warning siren that can be activated remotely	Yes. 3 sirens; 1 is aging. Police also drive through mobile home park using P.A. system. Concerns with siren coverage on south and far east sides.
Active shooter/threat plans and/or security hardening for municipal buildings	Some access controlled/hardening measures at City Hall. City Police participates in training/exercises with school district and movie theater.
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Yes
Individuals in EOP have ICS/NIMS training	Yes
Public Information Officer designated & trained	Yes
Municipal officials and staff participate in regular disaster or emergency response exercises	No
Community-level efforts to improve hazard preparedness among residents	No
Adopted billing rates for public works labor & equipment use during emergencies	Yes
Adopted mutual aid agreements for public works equipment/personnel support	Yes. Also, good communications with Interstate Park.
Adopted emergency contracting and purchasing policies	Yes
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Partially complete. Most data backed-up in cloud.
Cyber-security systems and policies for municipal utilities	Partially complete. Collaborating with WDNR to explore SCADA security improvements.

Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	No
Other Flood Mitigation projects or activities	Significant stormwater improvements made over past two decades have reduced vulnerabilities, including the acquisition of a floodprone structure utilizing FEMA mitigation grant funding.
Municipal Dam-related planning or actions	No municipal dam. Dam is owned by Xcel Energy and contributes to flood control, though it is primarily for power generation.
Barriers to mitigation or preparedness actions	Funding for mitigation actions. Availability of property for stormwater management improvements. With State-imposed levy limits, it is more difficult to implement certain cyber security and public notification processes because they come with yearly costs that are not easy to absorb into operational budgets.
Other:	Has interest in adopting a stormwater management plan, incorporating mitigation into comprehensive plan update, and look at costs of adding backup power to warning sirens. While portable emergency services' radio coverage has improved with the installation of a repeater, some interoperability challenges between departments (e.g., law enforcement & public works) remains.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the Polk County mitigation plan are shared by all participating communities.

The community will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Sections VI.C. and D. of the Polk County mitigation plan includes additional mitigation and preparedness actions that are intergovernmental in nature and not specific to the community, but may suggest coordination and funding opportunities.

The following recommended actions/projects are specific to the community:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
1. Create and adopt a stormwater management plan.	High; 1-3 years	City Administrator & Public Work; City Council	City budget; stormwater utility

<p>2. Explore designation or development of one or more community safe rooms (storm shelters). Potential locations include the Fairgrounds area and near the mobile home park/marina; these could be multi-functional safe rooms that support additional community or recreational uses. If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location.</p> <p>For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.</p>	<p>Medium-to-High 2-5 years</p>	<p>Polk County & Fairgrounds Association</p> <p>City Council & Mobile Home Park owner</p>	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMA)</p> <p>WCWRPC and Wisconsin Emergency Management can provide grant-related guidance</p>
<p>3. Explore funding to install batter back-up systems on existing sirens. Continue to monitor emergency siren coverage within the community with the goal of maintaining adequate coverage to notify residents who are outdoors that severe weather is approaching. If needed, exploring funding options to install battery back-up for the existing siren.</p>	<p>Medium; ongoing</p>	<p>Fire Department & City Council</p>	<p>Unless part of a larger mitigation project (e.g., safe room), securing grant dollars for a siren is unlikely. Can integrate into Village capital improvements plan and explore private foundation or fundraising options.</p>
<p>4. Consider the following projects to enhance the resiliency of the community:</p> <ul style="list-style-type: none"> • As funding allows, acquire additional emergency power generators for municipal utilities. • Pursue WDNR funding for the installation of a dry hydrant. • Distribution of NOAA all hazards (weather) radios to community lifeline facilities and seniors. 	<p>Medium; 3-5+ years as resources allow</p>	<p>City Council & Public Works regarding generators</p> <p>Fire Department for the dry hydrant</p> <p>Aging/Facilities/Non-Profits/County for weather radios</p>	<p>See generator-related recommendations in Section VI.C.</p> <p>WDNR has a grant funding to assist with dry hydrant costs</p> <p>A radio distribution project is eligible for FEMA Mitigation Grants.</p>
<p>5. Integrate mitigation plan recommendations as part of the next comprehensive plan update.</p>	<p>Medium-to-Low; 3-5 years</p>	<p>Plan Commission and City Council</p>	<p>WDNR for technical support if needed</p>

<p>6. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) to increase public participation in the countywide mass notification system (CodeRED), awareness of emergency siren use and warning systems, and public preparedness in general.</p>	<p>Medium-to-High; ongoing</p>	<p>City Clerk & Council; Fire Department</p>	<p>County Emergency Management & partners have educational materials</p> <p>Could implement annually during Severe Weather Awareness Week and/or Preparedness Month using social media, posters, utility bill inserts, etc. Could also be combined with a NOAA radio distribution project & eligible for FEMA Mitigation Grant funds.</p>
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Sub-Plan Coordination and Integration

The previous Capacity Assessment section identifies how this Mitigation Sub-plan has been integrated into or coordinated with other municipal plans or planning mechanisms. During the planning process, the following opportunities were identified to integrate the mitigation strategies into other community planning mechanisms:

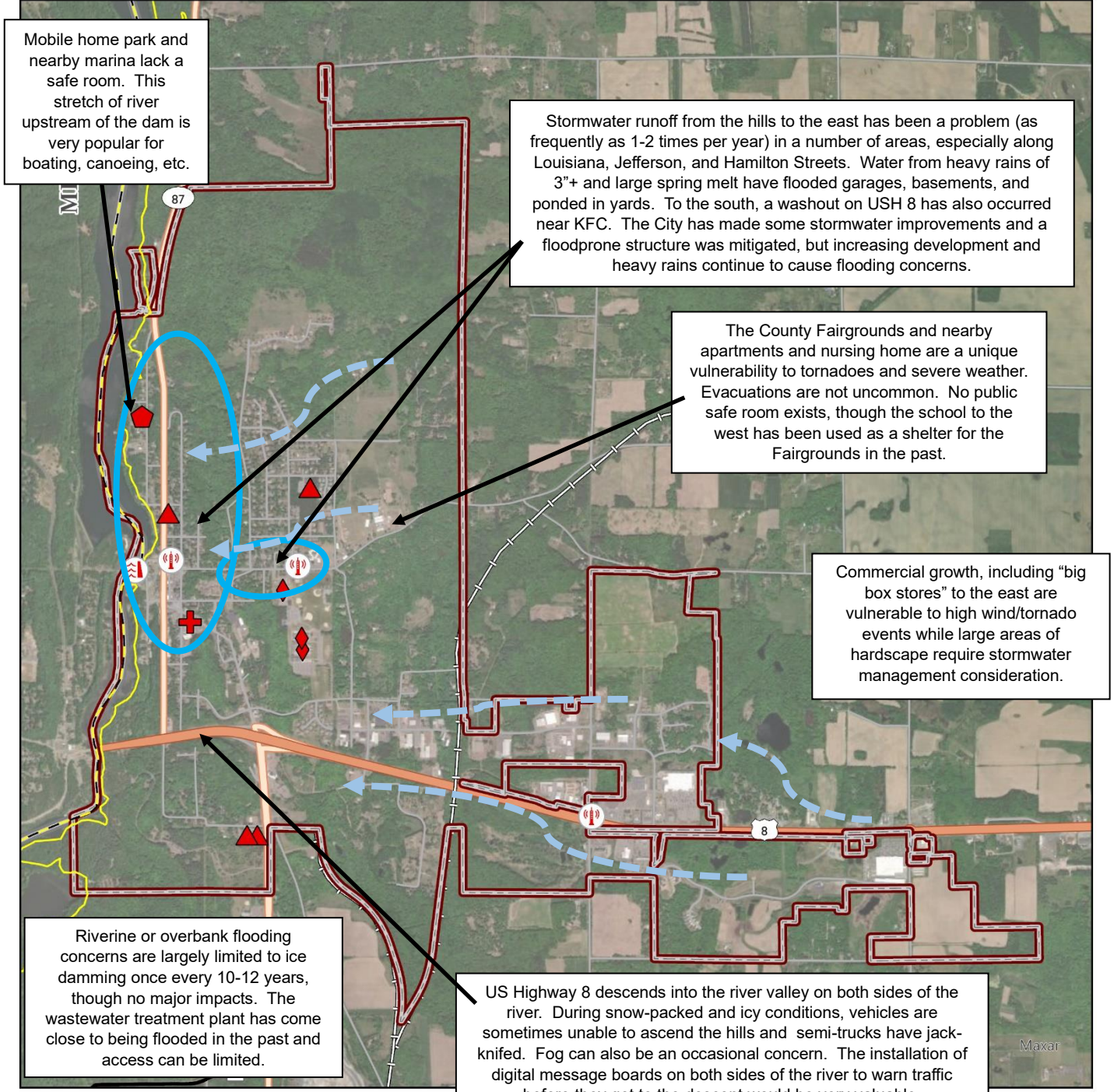
- In addition to the creation of a stormwater management plan, the City intends to incorporate the information within this Mitigation Sub-plan into the next comprehensive plan update, including obtaining public input on the need for a community safe room.
- Mitigation projects will also be integrated into the City’s Capital Improvements Plan (CIP), including the identification of anticipated funding sources.
- Collaborate with Polk County Highway Department for the planning of messaging boards on U.S. Highway 8 that can be used during emergency situations to warn travelers.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

Sub-Plan Adoption and Maintenance

<p>Plan Adoption</p>	<p>Once updated, the community’s governing body will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This community-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The community may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>During the second quarter of each year or following a declared disaster event, the primary mitigation plan contact will review this Mitigation Sub-Plan concurrently with (at the same time as) the annual review of the municipal Emergency Operations Plan. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. The community’s planning contact will contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. The community may also request that the County consider changes to the County’s overall mitigation plan. 2. Provide the suggested changes to the community’s emergency planning committee, plan commission, or governing body for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the governing body will adopt the Sub-Plan as noted previously. Such changes will be limited to this community-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Council or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The community intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The community will provide opportunities for public participation throughout its mitigation planning processes, including: (1) all governing body or committee actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

CITY OF ST. CROIX FALLS - HAZARD ASSESSMENT

Polk County - 2024



Legend

-  Municipal Boundary
-  100-yr Floodplain
-  Hospital
-  School
-  Assisted Living
-  Mobile Home Park
-  Storm Siren
-  Dam w/High or Significant Hazard Rating



Data Sources:
Polk County, WDHS, WDNR, WisDOT,
WDOA, WCWRPC.



APPENDIX L.

PARTICIPATING SCHOOL & TECHNICAL COLLEGE HAZARD MITIGATION SUB-PLANS

NOTE:

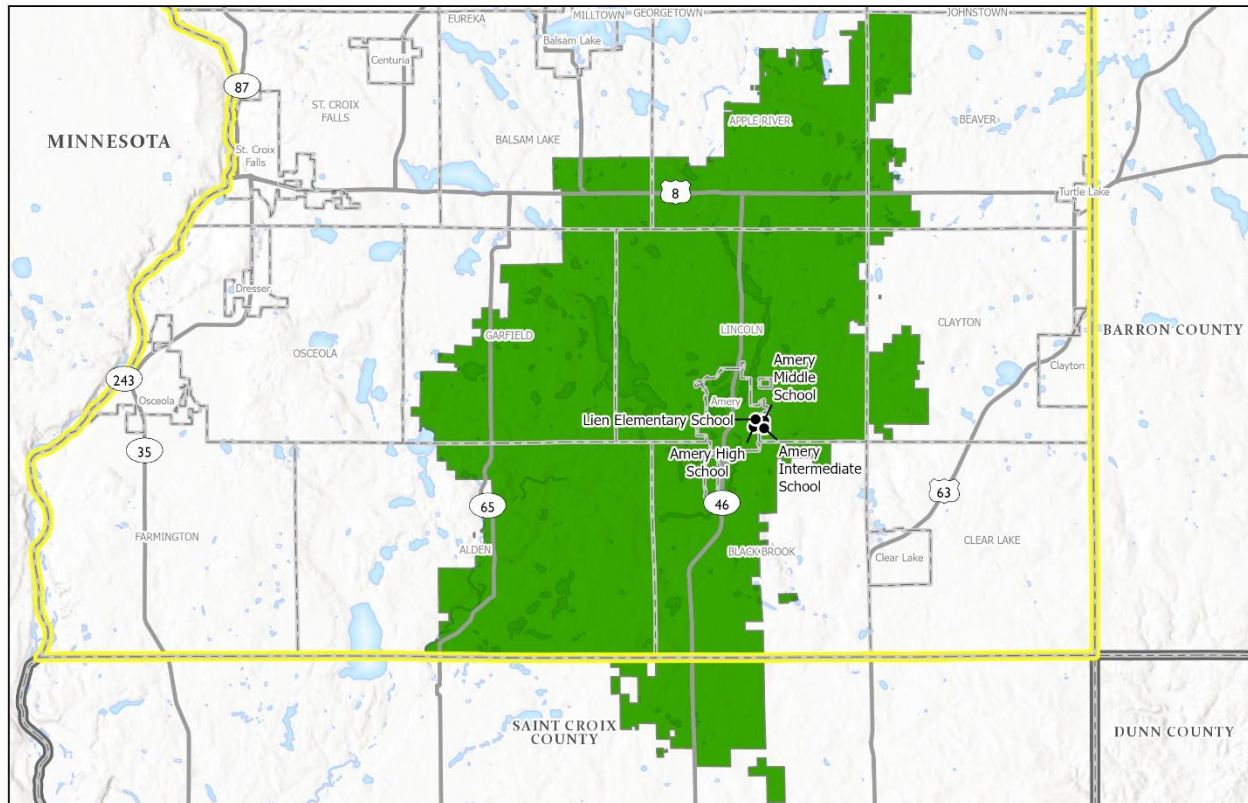
**Sub-Plans for Osceola & Unity School
Districts will be inserted once complete.**

SCHOOL DISTRICT OF AMERY HAZARD MITIGATION SUB-PLAN

Primary Contact:	Shawn Doerfler, Superintendent
Planning Process:	<ul style="list-style-type: none"> • Hazard mitigation webinar conducted by WCWRPC on February 28, 2023. • District completed a comprehensive hazard mitigation survey on February 24, 2023. WCWRPC prepared the draft sub-plan based on the survey results. • District reviewed the draft sub-plan and provided revisions to WCWRPC; provided additional input to WCWRPC on sub-plan and strategy alternatives as needed. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by School Board at a public meeting. Resolution included in Appendix A.

School District Profile

Institution Type:	Public; K4 thru 12 grades primary & secondary school		
Campus/Facility in Polk County	Address	approx. 2022-2023 Enrollment	approx. 2022-2023 Staff
Amery High School (9-12)	555 Minneapolis Ave S, Amery, WI 54001	459	61
Amery Middle School (6-8)	501 Minneapolis Ave S, Amery, WI 54001	303	54
Amery Intermediate School (3-5)	543 Minneapolis Ave S, Amery, WI 54001	288	64
Lien Elementary School (K4-3)	469 Minneapolis Ave S, Amery, WI 54001	351	60



Hazard Threat Assessment

This table describes past hazard events impacting the District and any unique vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the District. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all districts.

Hazard	History or Probability	Absenteeism	Vulnerability or Potential Impacts
Tornado & High Winds	Moderate	No Significant Impact	Moderate
Hail & Lightning	Moderate	No Significant Impact	Moderate
Winter Storm, Ice, & Extreme Cold	Moderate	Significant Impact, 1-2 Events	Moderate
Extreme Heat	Moderate	No Significant Impact	No
Long-Term Power Outage	Low	No Significant Impact	No
Flooding – Riverine or Overbank	Low	No Significant Impact	Low
Flooding – Stormwater or Overland	Low	No Significant Impact	Low
Drought	Moderate	No Significant Impact	No
Wildfire	Low	No Significant Impact	No
Hazardous Materials Spills	Low	No Significant Impact	No
Active Threats	Moderate	No Significant Impact	Moderate
Cyber-Attack	Moderate	No Significant Impact	No
Pandemic or Infectious Disease	Low	No Significant Impact	No
Landslides / Sinkholes	Low	No Significant Impact	No

Hazard Analysis

Flooding	
1. Flood history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of flooding.	None noted.
2. Are any existing or planned school buildings or assets located within the 100-year floodplain?	No structures believed to be within or near the 100-year floodplain.
3. Facilities covered by flood the National Flood Insurance Program or other flood insurance.	No or not sure, given lack of flood history or floodplain structures.
4. Existing or needed flood mitigation activities.	None noted.
Tornados, Thunderstorms, Winter Storms, & Extreme Temperatures	
5. Extreme weather event history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	None noted.
6. Facilities with storm shelters or safe rooms.	Yes.
7. Facilities serving as heating/cooling or other emergency/recovery shelters.	The District has an agreement to serve as a Red Cross or other emergency/recovery shelter.
8. Unique concerns, vulnerabilities, or resources/support needed to address future severe weather threats.	None noted.

Active Threats	
9. Active threat history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	None noted.
10. Adopted protocols for training and response to active threats.	The district has its own training and response protocols based on ALICE.
11. Concerns, strategies, resources, support, or training needed for the District or in partnership with others.	None noted.
12. Emergency agencies with access to floor plans for the District’s primary buildings.	Local law enforcement, fire department, and County 9-1-1 Communications Center
13. Does local law enforcement have physical keys or access cards to the District’s primary buildings?	Yes
14. Describe preparedness activities.	None noted.
Other Threats	
15. Wildfire history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	None noted.
16. Hazardous material spill history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	None noted.
17. Cybersecurity / cyber-attack history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	None noted.
18. Zoonotic / infections disease history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	None noted.
19. Other threat events or strategies of note.	None noted.
Underserved or Socially Vulnerable Communities	
20. Underserved or socially vulnerable populations in the service area.	None noted.
21. Preparedness, planning, mitigation or support recommendations for the above populations.	None noted.

Capabilities Assessment & Plan Coordination

The following is a brief assessment of the District’s resiliency and capability needs (or related recommendations) to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms.

Capability Needs or Recommendations	
Equipment Needs	None noted.
Training Needs	None noted.

Collaboration Needs	None noted.
Communications/Outreach Needs	None noted.
County Emergency Management Relationship	None noted.
Plan Coordination	
Key Plans related to hazard mitigation	<ul style="list-style-type: none"> • ALICE Training • Tornado Drills • Fire Drills • Active Shooter Drills • Lockdown Drills
Additional opportunities to integrate hazard mitigation plan recommendations into the above plans	None noted.
Other:	Not familiar with Student Tools for Emergency Planning (STEP) Program.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI. of the Polk County mitigation plan are shared by all participating communities and school districts.

The District will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Section VI of the Polk County mitigation plan includes additional mitigation projects and actions that are intergovernmental in nature and not specific to the District.

The District will continue to collaborate with the City of Amery, Polk County, area emergency response providers, and other partners to explore and implement such mitigation and preparedness actions to enhance the safety and disaster resiliency of the District and community.

The following recommended actions/projects are specific to the District:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
1. Explore the potential integration of the Student Tools for Emergency Planning (STEP) Program curriculum for fourth and fifth grade classes.	Medium; 3-5 years	School Board and/or District Administrator to discuss	Curriculum materials available at ReadyWisconsin website

<p>2. If requested, continue to collaboratively explore the use of school facilities as heating/cooling shelters, emergency shelters, and medical point of distribution, if a generator is available. Include such uses if a community safe room project is pursued.</p>	<p>Upon Request</p>	<p>Requesting party (e.g., Polk Co. Emergency Management or Public Health, Red Cross)</p>	<p>See County-level strategy recommendations. Of part of a safe room project, FEMA mitigation grant funding for generator and HVAC system may be available.</p>
<p>3. Continue to collaborate with County and local emergency services and other internal and external team members.</p> <ul style="list-style-type: none"> • Assess and maintain emergency and active threat plans. • Conduct regular tabletop exercises and, periodically, a larger functional active threat training exercise. • Sharing of plans and critical information, such as facility floor plans with window/door numbers. 	<p>Ongoing, including annual review of plans and protocols</p>	<p>District’s assigned crisis response or emergency planning team working with Local Law Enforcement and 9-1-1 Communication Center</p>	<p>Resources and involved parties/team members vary based.</p>
<p>4. As part of future facility expansions or new gym, explore the development of a community safe room (storm shelter)</p>	<p>Low-to-Medium; 3-5+ years, if grant funds are available No specific plans at this time.</p>	<p>School Board; District Administrator</p>	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMGP) Note: FEMA P-361, Section B4.2.2.6. defines the maximum travel time when determining the safe room user population.</p>

Sub-Plan Adoption and Maintenance

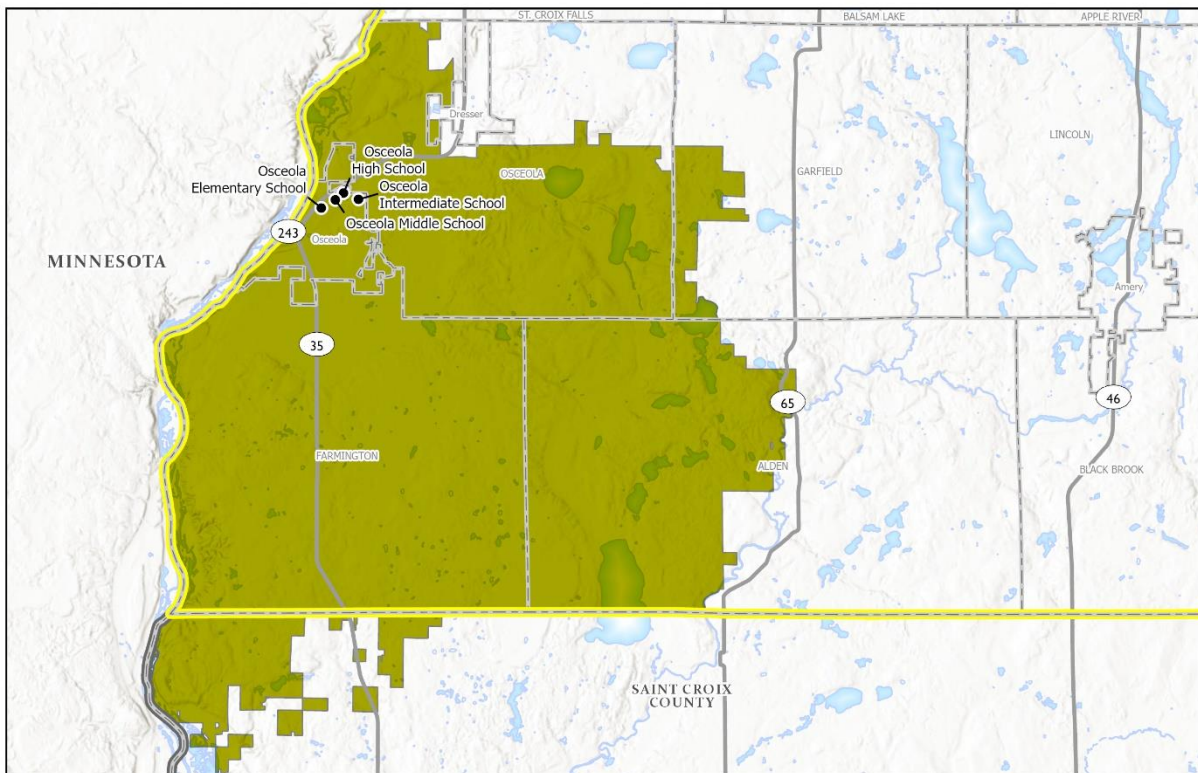
<p>Plan Adoption</p>	<p>The School Board will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments specific to the District) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This school district-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The District may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>Concurrent with the annual review of its other All Hazards Plans and protocols or following a declared disaster event impacting the District, District administration staff will review this Mitigation Sub-Plan and its recommendations. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. Contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. 2. Provide the suggested changes to the School Board or its committees for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the School Board will adopt the Sub-Plan as noted previously. Such changes will be limited to this district-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The District intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The District will provide opportunities for public participation throughout its mitigation planning processes, including: (1) School Board actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

SCHOOL DISTRICT OF OSCEOLA HAZARD MITIGATION SUB-PLAN

Primary Contact:	Rebecca Styles, Superintendent
Planning Process:	<ul style="list-style-type: none"> • Hazard mitigation webinar conducted by WCWRPC in September 2024. • District completed a comprehensive hazard mitigation survey on September 20, 2024. WCWRPC prepared the draft sub-plan based on the survey results. • District reviewed the draft sub-plan and provided revisions to WCWRPC; provided additional input to WCWRPC on sub-plan and strategy alternatives as needed. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by School Board at a public meeting. Resolution included in Appendix A.

School District Profile

Institution Type:	Public; K4 thru 12 grades primary & secondary school		
Campus/Facility in Polk County	Address	approx. 2022-2023 Enrollment	approx. 2022-2023 Staff
Osceola High School (9-12)	1111 Oak Ridge Drive, Osceola, WI	512	56
Osceola Middle School (6-8)	1029 Oak Ridge Drive, Osceola, WI	330	45
Osceola Intermediate School (3-5)	949 Education Avenue, Osceola, WI	312	39
Osceola Elementary School (K4-3)	250 th 10 th Avenue East, Osceola, WI	401	45
Osceola Bus Garage	531 Simmons Drive, Osceola, WI	0	36



Hazard Threat Assessment

This table describes past hazard events impacting the District and any unique vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the District. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all districts.

Hazard	History or Probability	Absenteeism	Vulnerability or Potential Impacts
Tornado & High Winds	Low to Mod	No Significant Impact	Moderate
Hail & Lightning	Moderate	No Significant Impact	Moderate
Winter Storm, Ice, & Extreme Cold	Moderate	Significant Impact, 1-2 Events	Moderate
Extreme Heat	Moderate	No Significant Impact	Moderate
Long-Term Power Outage	Low	No Significant Impact	High
Flooding – Riverine or Overbank	None	No Significant Impact	None
Flooding – Stormwater or Overland	Low	No Significant Impact	Low
Drought	None	No Significant Impact	None
Wildfire	None	No Significant Impact	None
Hazardous Materials Spills	Low	No Significant Impact	Moderate
Active Threats	Low	No Significant Impact	High
Cyber-Attack	Low	No Significant Impact	High
Pandemic or Infectious Disease	Moderate	Significant Impact, 1-2 Events	Moderate
Landslides / Sinkholes	None	No Significant Impact	None

Hazard Analysis

Flooding	
1. Flood history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of flooding.	Low area along Highway in front of School at risk of flooding; flood signage has been used in the past (see Village sub-plan). Stormwater running into the Osceola Creek due to detention pond breach. Tennis courts sinking into the marsh due to rising groundwater table. Turf/landscaping in athletic complex has washed out.
2. Are any existing or planned school buildings or assets located within the 100-year floodplain?	No structures believed to be within or near the 100-year floodplain.
3. Facilities covered by flood the National Flood Insurance Program or other flood insurance.	None. Does not believe it is needed given flood history.
4. Existing or needed flood mitigation activities.	None noted.
Tornados, Thunderstorms, Winter Storms, & Extreme Temperatures	
5. Extreme weather event history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	Wind damage to solar panels. Have cancelled school events in past. During warnings, students & staff go to designated safe places. Have had warnings during home/school release time.

6. Facilities with storm shelters or safe rooms.	While spaces are available that offer some protection, none built to FEMA standards and capable of withstanding a tornado. Interest in safe room as part of a facility improvements.
7. Facilities serving as heating/cooling or other emergency/recovery shelters.	The District has an agreement for the intermediate/middle school to serve as a Red Cross emergency/recovery shelter.
8. Unique concerns, vulnerabilities, or resources/support needed to address future severe weather threats.	Extreme heat/cold concerns, especially during power outage. Elementary school lacks air conditioning and District's buildings do not have generators. Unable to serve as an overnight shelter or to hold students longer during extreme weather if power loss.
Active Threats	
9. Active threat history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	Have had lockdowns and police intervention for student behavior as well as bomb threats and social media threats. Buildings have also served as a SWAT staging area for felon on the loose within the neighborhood.
10. Adopted protocols for training and response to active threats.	The District has training and response protocols based on ALICE.
11. Concerns, strategies, resources, support, or training needed for the District or in partnership with others.	Continue to collaborate with County and incident command. Would be advantageous to have a school resource officer, so District has an onsite person with a background to lead preventative measures and provide support during a time of crisis.
12. Emergency agencies with access to floor plans for the District's primary buildings.	Local law enforcement, fire department, and County 9-1-1 Communications Center. Dept. of Justice grant approved for digital mapping of buildings.
13. Does local law enforcement have physical keys or access cards to the District's primary buildings?	Yes
14. Describe preparedness activities.	Annual ALICE training and threat assessment education for all staff. Incident Command System (ICS) course completion by Superintendent and Building & Grounds Director. All District administrative staff were trained in Threat Assessment by Dept of Justice in July 2024.
Other Threats	
15. Wildfire history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	None noted.
16. Hazardous material spill history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	Located on Highway, so potential spills by trucks.
17. Cybersecurity / cyber-attack history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	Cybersecurity incident response plan in place. Tabletop exercise completed with team. Cybersecurity awareness/education plan being implemented with staff.

18. Zoonotic / infections disease history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	None noted.
19. Other threat events or strategies of note.	Many physical updates for school safety, such as cameras are used at OES and OIS. Hallway doors with automatic closure and locking.
Underserved or Socially Vulnerable Communities	
20. Underserved or socially vulnerable populations in the service area.	Homeless and English Learner students. 30% of students receive free or reduced meals.
21. Preparedness, planning, mitigation or support recommendations for the above populations.	District provides resources and opportunities individually as needed.

Capabilities Assessment & Plan Coordination

The following is a brief assessment of the District’s resiliency and capability needs (or related recommendations) to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms.

Capability Needs or Recommendations

Equipment Needs	Generators for each facility capable of running HVAC, kitchens, & security systems. Automatic door closing systems. Safe room for tornadoes and severe weather.
Training Needs	I LOVE YOU GUYS training. Updated ALICE training with certification of a lead.
Collaboration Needs	Tabletop exercise and grantwriting support.
Communications/Outreach Needs	None noted.
County Emergency Management Relationship	Just met and hope to continue partnering.

Plan Coordination

Key Plans related to hazard mitigation	<ul style="list-style-type: none"> • ALICE & Treat Assessment Training • Annual Safety Drills as required by State • Completed secure entrances for all four schools • Implemented Visitor Aware • Active Shooter Drills • Lockdown Drills
Additional opportunities to integrate hazard mitigation plan recommendations into the above plans	Continue to improve communication across the many organizations that are involved.
Other:	Not familiar with Student Tools for Emergency Planning (STEP) Program, but interested.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI. of the Polk County mitigation plan are shared by all participating communities and school districts.

The District will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Section VI of the Polk County mitigation plan includes additional mitigation projects and actions that are intergovernmental in nature and not specific to the District.

The District will continue to collaborate with the Village of Osceola, Polk County, area emergency response providers, and other partners to explore and implement such mitigation and preparedness actions to enhance the safety and disaster resiliency of the District and community.

The following recommended, key actions/projects are specific to the District:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
1. Continue to collaborate with partners to strengthen active threats prevention and preparedness, including regular exercises, updated ALICE training with certification of a lead, and potentially hiring or designating a School Resource Officer position. Complete the facility digital mapping project.	High; Ongoing	District Administrator; training team	Local/County law enforcement; CESA and DPI; County Emergency Management
2. Explore the potential integration of the Student Tools for Emergency Planning (STEP) Program curriculum for fourth and fifth grade classes.	Medium; 1-3 years	School Board and/or District Administrator to discuss	Curriculum materials available at ReadyWisconsin website
3. As resources allow, acquire emergency generators for District facilities to allow for continuity of operations and to more reliably serve as heating/cooling shelters, emergency shelters, or a medical point of distribution. Integrate generator-capability into plans for new facilities so infrastructure is in place.	Medium; As funding allows	School Board and/or District Administrator to discuss with partners as opportunities allow.	See generator-related recommendations in Section VI.C. of overall Polk County mitigation plan. If part of a safe room project, FEMA mitigation grant funding for generator may be available

<p>4. As part of future facility remodel, expansion/addition, or new gym, explore the development of a community safe room (storm shelter). Include a generator as part of the project so the space may also be used as a heating/cooling and emergency shelter.</p> <p>Given localized flooding history, incorporate of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff, while offering education opportunities.</p>	<p>Medium-to-High; 3-5+ years or as part of a facility improvement project</p> <p>No specific plans at this time.</p>	<p>School Board; District Administrator</p>	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMGP)</p> <p>WCWRPC and Wisconsin Emergency Management can provide grant-related guidance</p>
<p>5. Continue to collaborate with the Village to monitor and, if needed, mitigate localized flooding.</p>	<p>Low; ongoing</p>	<p>Building & Grounds Director & Village Public Works</p>	<p>If flooding damages or poses an imminent threat to school facilities or students, FEMA or WEM mitigation grant funding may be available.</p>

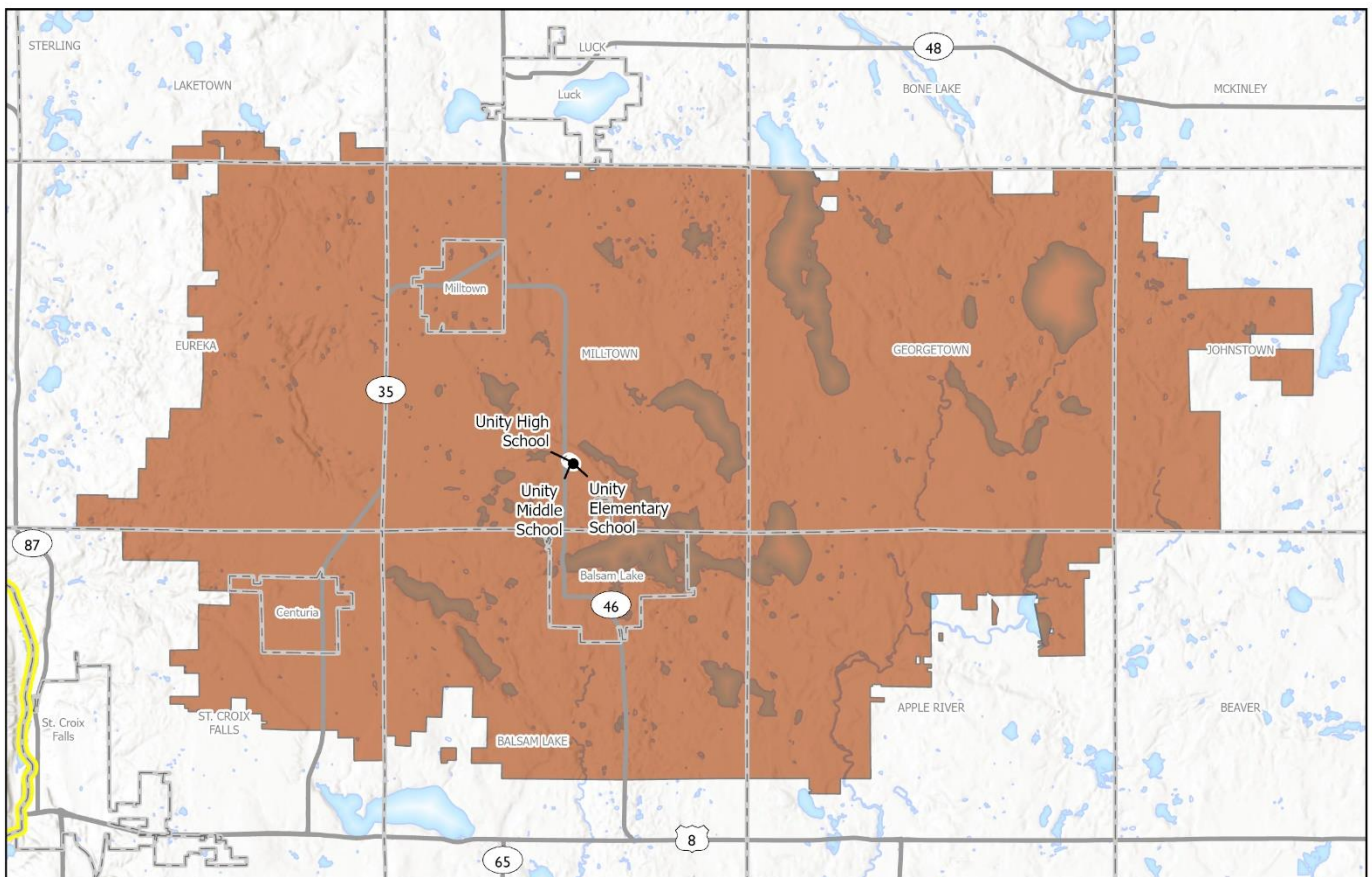
Sub-Plan Adoption and Maintenance

<p>Plan Adoption</p>	<p>The School Board will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments specific to the District) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This school district-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The District may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>Concurrent with the annual review of its other All Hazards Plans and protocols or following a declared disaster event impacting the District, District administration staff will review this Mitigation Sub-Plan and its recommendations. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. Contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. 2. Provide the suggested changes to the School Board or its committees for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the School Board will adopt the Sub-Plan as noted previously. Such changes will be limited to this district-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The District intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The District will provide opportunities for public participation throughout its mitigation planning processes, including: (1) School Board actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

UNITY SCHOOL DISTRICT HAZARD MITIGATION SUB-PLAN

Primary Contact:	Kara Holden, Business Manager
Planning Process:	<ul style="list-style-type: none"> • Hazard mitigation webinar conducted by WCWRPC in September 2024. • District completed a comprehensive hazard mitigation survey on September 30, 2024. WCWRPC prepared the draft sub-plan based on the survey results. • District reviewed the draft sub-plan and provided revisions to WCWRPC; provided additional input to WCWRPC on sub-plan and strategy alternatives as needed. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by School Board at a public meeting. Resolution included in Appendix A.

School District Profile			
Institution Type:	Public; K4 thru 12 grades primary & secondary school		
Campus/Facility in Polk County	Address	approx. 2022-2023 Enrollment	approx. 2022-2023 Staff
Unity School District Campus	1908 150 th Avenue/Highway 46 N., Balsam, WI	937	150



Hazard Threat Assessment

This table describes past hazard events impacting the District and any unique vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the District. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all districts.

Hazard	History or Probability	Absenteeism	Vulnerability or Potential Impacts
Tornado & High Winds	Low-to-Moderate	No Significant Impact	Moderate-to-High
Hail & Lightning	Low	No Significant Impact	Low
Winter Storm, Ice, & Extreme Cold	Moderate	Limited Impact, 3+ Events	Moderate
Extreme Heat	Low	No Significant Impact	Low
Long-Term Power Outage	Low	No Significant Impact	None
Flooding – Riverine or Overbank	None	No Significant Impact	None
Flooding – Stormwater or Overland	Low	No Significant Impact	None
Drought	Low	No Significant Impact	None
Wildfire	None	No Significant Impact	None
Hazardous Materials Spills	Low	No Significant Impact	None
Active Threats	Low	No Significant Impact	Low
Cyber-Attack	Low	No Significant Impact	None
Pandemic or Infectious Disease	Low	Significant Impact; 1-2 Events	Low
Landslides / Sinkholes	None	No Significant Impact	None

Hazard Analysis

Flooding	
1. Flood history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of flooding.	None noted.
2. Are any existing or planned school buildings or assets located within the 100-year floodplain?	No structures believed to be within or near the 100-year floodplain.
3. Facilities covered by flood the National Flood Insurance Program or other flood insurance.	No, given lack of flood history or floodplain structures.
4. Existing or needed flood mitigation activities.	None noted.
Tornados, Thunderstorms, Winter Storms, & Extreme Temperatures	
5. Extreme weather event history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	When the tornado & high winds struck area several years ago, School facilities were used to house the National Guard. Other than winter weather impacting attendance, the District has not experienced severe damage or impacts, but has been a resource.

6. Facilities with storm shelters or safe rooms.	Yes, but limited capacity and level of protection. District is interested in constructing a safe room for their child care center and as part of a future athletic dome.
7. Facilities serving as heating/cooling or other emergency/recovery shelters.	The District currently offers the use of their gyms as shelters under an agreement with Red Cross. However, they do not have a backup generator for heating & cooling purposes if there is power loss.
8. Unique concerns, vulnerabilities, or resources/support needed to address future severe weather threats.	None noted.
Active Threats	
9. Active threat history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	None noted.
10. Adopted protocols for training and response to active threats.	The District has training and response protocols based on ALICE.
11. Concerns, strategies, resources, support, or training needed for the District or in partnership with others.	None noted. Strong partnership with Polk County.
12. Emergency agencies with access to floor plans for the District's primary buildings.	Yes
13. Does local law enforcement have physical keys or access cards to the District's primary buildings?	Yes
14. Describe preparedness activities.	Each year, students and staff are training in ALICE protocols. Several District staff are also available to help provide training for Polk County agencies, such as the government center, hospitals, etc. District also works closely with law enforcement to conduct safety plan evaluations and updates.
Other Threats	
15. Wildfire history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	None noted.
16. Hazardous material spill history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	No past events or specific concerns. District conducts safety training annually for all staff members. The Facilities Director also provides specific and in-depth training for facilities staff members to handle potential HazMat events.
17. Cybersecurity / cyber-attack history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	No past events. Facilities are protected with up-to-date cybersecurity measures. The District has a robust network and a technology department that actively provides oversight and protection.
18. Zoonotic / infections disease history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	No specific concerns noted. Based on the COVID-19 experience, the District recognizes that community partnerships between law enforcement agencies, county service agencies, and school districts is critical. The ability to offer safety training, medical training, and mitigation planning between agencies is necessary for successfully navigating difficult scenarios.

19. Other threat events or strategies of note.	None noted.
Underserved or Socially Vulnerable Communities	
20. Underserved or socially vulnerable populations in the service area.	Polk County has a high percentage of households living in poverty and needs regarding mental health, alcohol/drug abuse, and child care. As a result, the largest population in the County that is often underserved are the children and young adults. Providing safe and secure facilities in the event of an emergency is critical. This is why the District is seeking to partner with Polk County to provide such facilities for area residents.
21. Preparedness, planning, mitigation or support recommendations for the above populations.	The District Safety Plan describes the District’s preparedness and mitigation strategy. One element of this plan is the importance of a safe and secure facility for reunification following a difficult or tragic event; providing such a facility has been struggle for other districts and communities in the past. The proposed athletic dome constructed as a safe room with generator would meet this need.

Capabilities Assessment & Plan Coordination	
The following is a brief assessment of the District’s resiliency and capability needs (or related recommendations) to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms.	
Capability Needs or Recommendations	
Equipment Needs	Generators to serve the planned safe rooms for the child care center and a new athletic dome. This would ensure that these spaces would be available as a heating/cooling and emergency generator as well as for staging for responders.
Training Needs	Continued safety training, Safety Plan updates, reunification training for staff, parents, and students, and continued mitigation training.
Collaboration Needs	The District will continue to collaborate and partner with Child Care Services, Polk County Health, local businesses, law enforcement agencies, emergency services providers, and the County Government Center.
Communications/Outreach Needs	A county-wide, monthly/quarterly newsletter with threat/vulnerability updates, training notifications, and communications with emergency services would be helpful.
County Emergency Management Relationship	Strong relationship, in part due to proximity to the County seat in Balsam Lake.
Plan Coordination	
Key Plans & Training related to hazard mitigation	<ul style="list-style-type: none"> • ALICE Training • School District Safety Plan • Suicide Prevention Training • Proper Handling of HazMat Training

Additional opportunities to integrate hazard mitigation plan recommendations into the above plans	Explore the inclusion of a medical services area or department as part of the proposed dome athletic facility.
Other:	The District is familiar with Student Tools for Emergency Planning (STEP) Program and may use it in the future.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI. of the Polk County mitigation plan are shared by all participating communities and school districts.

The District will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Section VI of the Polk County mitigation plan includes additional mitigation projects and actions that are intergovernmental in nature and not specific to the District.

The District will continue to collaborate with local communities, Polk County, area emergency response providers, and other partners to explore and implement such mitigation and preparedness actions to enhance the safety and disaster resiliency of the District and community.

The following recommended actions/projects are specific to the District:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
1. Continue to regularly evaluate, update, and test/exercise the District’s Safety Plan, including a training element. The Safety Plan serves as a training tool and drives related communications with all necessary professional personnel helping to provide support and recovery during an emergency or disaster event.	High; ongoing	District Administrator and Safety Team	DPI/CESA, County Emergency Management.
2. Maintain the strong collaborative partnerships with County Emergency Management, law enforcement, and area emergency response providers during safety planning, ALICE training, and other preparedness efforts. Work with the County Emergency Manager to explore the potential creation of a preparedness newsletter for distribution to communities, schools, health care	High; Ongoing	District Administrator & County Emergency Manager	County Emergency Management Shared training needs may be integrated into the County Integrated Preparedness Plan Possibly seek out private sponsorship of newsletter; may be digital based.

providers, long-term care facilities, non-profit organizations, and businesses.			
3. As resources allow, acquire emergency generators for District facilities to allow for continuity of operations and to more reliably serve as heating/cooling shelters, emergency shelters, emergency staging area, or a medical point of distribution. Integrate generator-capability into plans for new facilities so infrastructure is in place.	Medium; As funding allows	School Board and/or District Administrator to discuss with partners as opportunities allow.	See generator-related recommendations in Section VI.C. of overall Polk County mitigation plan. If part of a safe room project, FEMA mitigation grant funding for generator may be available
4. Explore the development of a community safe room (storm shelter) for the LEAP Childcare Center and for a new athletic dome expansion. Include a generator as part of the project so the space may also be used as a heating/cooling, emergency shelter, and reunification location. Incorporate an emergency medical area as part of the athletic dome safe room. /incorporate of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff, while offering education opportunities.	Medium-to-High; 3-5+ years or as part of a facility improvement project No specific plans at this time.	School Board; District Administrator	FEMA Hazard Mitigation Grant Programs (BRIC & HMGP) WCWRPC and Wisconsin Emergency Management can provide grant-related guidance

Sub-Plan Adoption and Maintenance

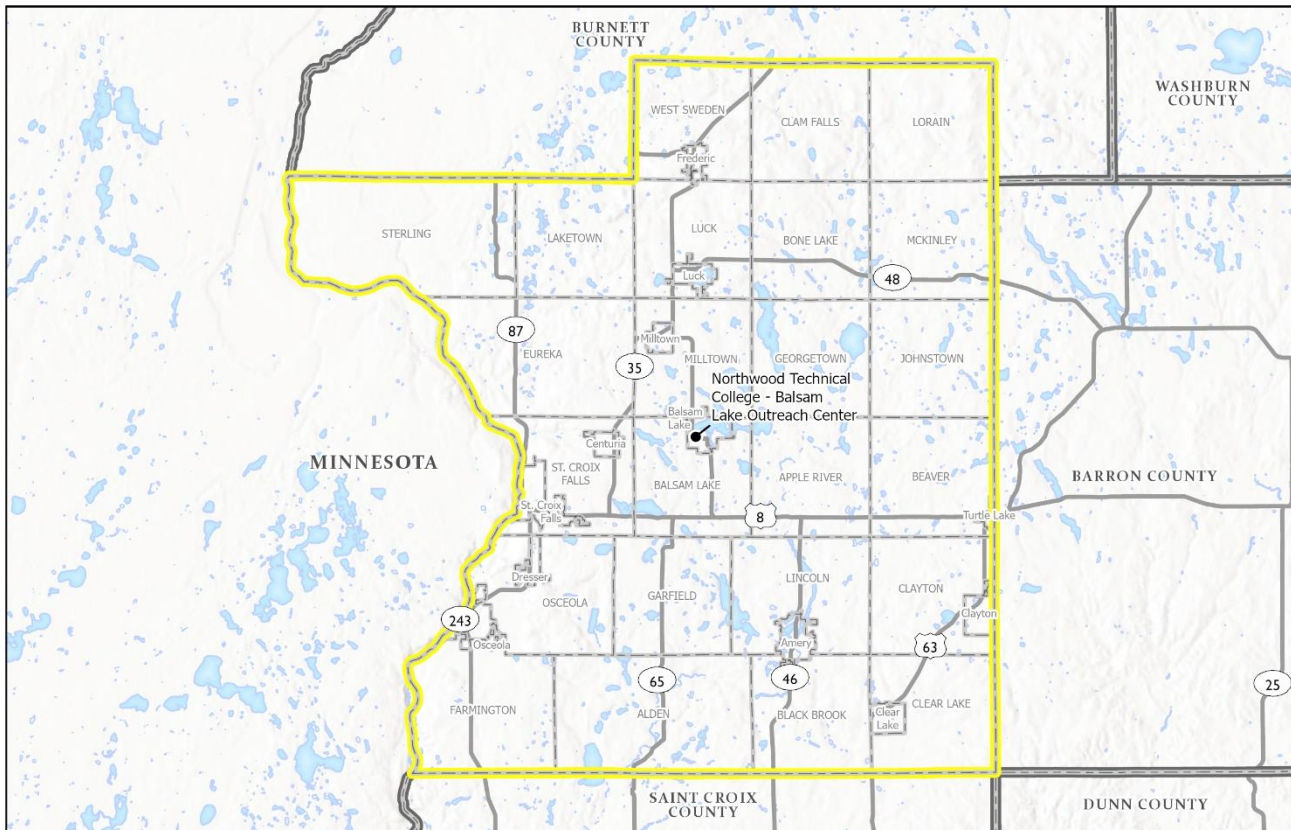
<p>Plan Adoption</p>	<p>The School Board will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments specific to the District) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This school district-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The District may modify and re-adopt its Sub-Plan by resolution during a noticed public meeting at any time at their discretion.</p>
<p>Plan Maintenance</p>	<p>Concurrent with the annual review of its other All Hazards Plans and protocols or following a declared disaster event impacting the District, District administration staff will review this Mitigation Sub-Plan and its recommendations. Other municipal and agency officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. Contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. 2. Provide the suggested changes to the School Board or its committees for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the School Board will adopt the Sub-Plan as noted previously. Such changes will be limited to this district-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
<p>Plan Updates</p>	<p>The District intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.</p>
<p>Continued Public Participation</p>	<p>The District will provide opportunities for public participation throughout its mitigation planning processes, including: (1) School Board actions regarding the Sub-Plan shall be conducted in adherence with the Wisconsin Open Meetings rules; (2) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (3) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.</p>

NORTHWOOD TECHNICAL COLLEGE HAZARD MITIGATION SUB-PLAN

Primary Contact:	Sara Nick, Vice President of Business Services / CFO
Planning Process:	<ul style="list-style-type: none"> • Hazard mitigation webinar conducted by WCWRPC on February 28, 2023. • College completed a comprehensive hazard mitigation survey on March 15, 2023. WCWRPC prepared the draft sub-plan based on the survey results. • College reviewed the draft sub-plan and provided revisions to WCWRPC; provided additional input to WCWRPC on sub-plan and strategy alternatives as needed. • Resolution adopting the Hazard Mitigation Plan and Sub-Plan will be approved by the College. Resolution included in Appendix A.

College Profile

Institution Type:	Public; Technical College		
Campus/Facility in Polk County	Address	approx. 2022-2023 Enrollment	approx. 2022-2023 Staff
Balsam Lake Outreach Center	400 Polk County Plaza, Balsam Lake, WI 54810	85	1



Hazard Threat Assessment

This table describes past hazard events impacting the College and any unique vulnerabilities to each event. This assessment is supplemented by the risk assessment map included at the end of this Mitigation Sub-Plan for the College. Also see the Risk Assessment in Section III of the main text of the Polk County mitigation plan for general risks and vulnerabilities applicable to most or all colleges.

Hazard	History or Probability	Absenteeism	Vulnerability or Potential Impacts
Tornado & High Winds	Low	No Significant Impact	Low
Hail & Lightning	Moderate	No Significant Impact	Moderate
Winter Storm, Ice, & Extreme Cold	Moderate	Significant Impact, 1-2 Events	Moderate
Extreme Heat	Low	No Significant Impact	No
Long-Term Power Outage	Low	No Significant Impact	Low
Flooding – Riverine or Overbank	Low	No Significant Impact	No
Flooding – Stormwater or Overland	Low	No Significant Impact	No
Drought	No	No Significant Impact	No
Wildfire	Low	No Significant Impact	No
Hazardous Materials Spills	Low	No Significant Impact	Moderate
Active Threats	Low	No Significant Impact	High
Cyber-Attack	Moderate	No Significant Impact	High
Pandemic or Infectious Disease	Moderate	Significant Impact, 3+ Events	Moderate
Landslides / Sinkholes	No	No Significant Impact	No

Hazard Analysis

Flooding	
1. Flood history, damage/impacts, repetitive losses, or concerns for College facilities and assets, including the nature/type of flooding.	None noted.
2. Are any existing or planned school buildings or assets located within the 100-year floodplain?	No. None noted.
3. Facilities covered by flood the National Flood Insurance Program or other flood insurance.	No special flood insurance noted.
4. Existing or needed flood mitigation activities.	None noted.
Tornados, Thunderstorms, Winter Storms, & Extreme Temperatures	
5. Extreme weather event history, damage/impacts, repetitive losses, or concerns for College facilities and assets, including the nature/type of event.	There is recent history of tornadic events in the area, but no significant damage to facilities has been reported to date.
6. Facilities with storm shelters or safe rooms.	The facility has classrooms / bathrooms that are used as tornado shelters.
7. Facilities serving as heating/cooling or other emergency/recovery shelters.	There are no agreements in place for this facility.

8. Unique concerns, vulnerabilities, or resources/support needed to address future severe weather threats.	None noted.
Active Threats	
9. Active threat history, damage/impacts, repetitive losses, or concerns for College facilities and assets, including the nature/type of event.	None noted.
10. Adopted protocols for training and response to active threats.	The college has adopted the Alert-Lockdown-Inform-Counter-Evacuate (ALICE) approach.
11. Concerns, strategies, resources, support, or training needed for the College or in partnership with others.	The facility is in the same building as the Balsam Lake Head Start Program and within walking distance of a group home and the County jail, which create opportunities for other threats.
12. Emergency agencies with access to floor plans for the College’s primary buildings.	Local law enforcement, fire department, and County 9-1-1 Communications Center
13. Does local law enforcement have physical keys or access cards to the College’s primary buildings?	Yes
14. Describe preparedness activities.	None noted. See previous references to related planning and exercises.
Other Threats	
15. Wildfire history, damage/impacts, repetitive losses, or concerns for College facilities and assets, including the nature/type of event.	None noted.
16. Hazardous material spill history, damage/impacts, repetitive losses, or concerns for College facilities and assets, including the nature/type of event.	No spill history noted. The facility has developed procedures for Hazardous Material Spills in its Emergency Action Plan. Development and implementation of Hazardous Material Spill training for staff is forthcoming.
17. Cybersecurity / cyber-attack history, damage/impacts, repetitive losses, or concerns for College facilities and assets, including the nature/type of event.	There is a history of attempted attacks. The College has implemented tools that prevented the attacks from succeeding.
18. Zoonotic / infections disease history, damage/impacts, repetitive losses, or concerns for College facilities and assets, including the nature/type of event.	None noted.
19. Other threat events or strategies of note.	None noted.
Underserved or Socially Vulnerable Communities	
20. Underserved or socially vulnerable populations in the service area.	<ul style="list-style-type: none"> Group home adjacent to the facility.

21. Preparedness, planning, mitigation or support recommendations for the above populations.	<ul style="list-style-type: none"> Following the campus emergency action plan as needed. On-staff academic counselors have a list of resources to provide to students or community members if requested.
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Capabilities Assessment & Plan Coordination

The following is a brief assessment of the College’s resiliency and capability needs (or related recommendations) to mitigate, respond to, and recover from a disaster event. It also notes if mitigation or preparedness has been integrated into planning mechanisms.

Capability Needs or Recommendations

Equipment Needs	<ul style="list-style-type: none"> None noted.
Training Needs	<ul style="list-style-type: none"> Incident Command to improve inhouse training.
Collaboration Needs	<ul style="list-style-type: none"> Identify additional partnership opportunities within the community.
Communications/Outreach Needs	<ul style="list-style-type: none"> None noted.
County Emergency Management Relationship	<ul style="list-style-type: none"> Limited partnership with County. Explore opportunities to expand relationship.

Plan Coordination

Key Plans related to hazard mitigation	<ul style="list-style-type: none"> Business Continuity Plan Emergency Action Plan
Additional opportunities to integrate hazard mitigation plan recommendations into the above plans	<ul style="list-style-type: none"> Conduct risk threat assessments to identify risks and develop goals, objectives, policies and projects accordingly.
Other:	<ul style="list-style-type: none"> None noted.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI of the Polk County mitigation plan are shared by all participating communities and school colleges.

The College will strive to implement the following mitigation actions/projects as resources and funding allows, though priorities could change due to a variety of fiscal, technical, or other factors, including changes in hazard risks. Section VI of the Polk County mitigation plan includes additional mitigation projects and actions that are intergovernmental in nature and not specific to the community.

The following recommended actions/projects are specific to the College:

Action/Project	Priority & Timeline	Primary Responsible Party	Potential Resources
1. Continue to collaborate with local emergency services and other internal and external team members on emergency, preparedness, and continuity planning. <ul style="list-style-type: none"> Continue active shooter/threat plans and exercises in conjunction with the 	High; ongoing	College Administrator & the college’s designated health/emergency team members	Resources and involved parties/team members vary based on the focus of the planning effort. County Emergency Management can be an important liaison,

<p>Head Start and, possibly, the County Jail.</p> <ul style="list-style-type: none"> • Evaluate and refine evacuation and reunification plans as needed. • Evaluate crisis communications and public information officer capabilities and protocols. • Incident Command System, including relationship to public/County emergency operations center during an emergency/disaster event. <p>Annually review all hazard plans and mitigation plan recommendations. Share plans with partners when appropriate.</p>		<p>Local law enforcement and fire department</p>	<p>resource, and training partner.</p>
<p>2. Upon request, explore potential agreement(s) for use of Campus facilities with generators as heating/cooling shelters and recovery shelters.</p> <p>If made available:</p> <ul style="list-style-type: none"> • Collaborate with County and local communities to raise awareness of shelter availability when activated. • Periodically review related policies and responsibilities; update if needed. 	<p>As needed or upon request</p>	<p>College Administration County Emergency Management or Public Health Red Cross – NW Wisconsin Chapter</p>	<p>In addition to the Red Cross, County Emergency Management & Public Health departments may assist with planning and resources.</p>
<p>3. Should a new building or building expansion be proposed in the future, explore the potential inclusion of a community safe room (storm shelter) as part of the project. If space allows, consider making the safe room available to nearby residents.</p> <p>Consider including an emergency power generator for safe room backup power as well as enhancing the facility’s availability as a heating & cooling shelter.</p>	<p>Low; 3-5+ years, if grant funds</p>	<p>College Administration</p>	<p>FEMA Hazard Mitigation Grant Programs (BRIC & HMGP)</p> <p>Note: The mobile home parks are located within the maximum travel time defined within FEMA P-361, Section B4.2.2.6.</p>

Sub-Plan Adoption and Maintenance

This sub-plan is part of the *Polk County Multi-Hazard Mitigation Plan*. While this sub-plan focuses on hazard risks and recommendations that are unique or a priority to this community, the County-level plan provides additional information on the hazard risks, capabilities, and mitigation strategies for the County as a whole. During plan implementation, including grant writing, it is important to evaluate needs and actions based on the County’s Mitigation Plan in its entirety.

Plan Adoption	The College will adopt the County’s overall hazard mitigation plan (and any future revisions/amendments specific to the College) by resolution. This college-specific Hazard Mitigation Sub-Plan is an appendix of the County’s overall plan. The College may modify and re-adopt its Sub-Plan by resolution at any time at their discretion.
Plan Maintenance	<p>Concurrent with the annual review of its other emergency plans and protocols or following a declared disaster event impacting the College, the planning contact will review this Mitigation Sub-Plan and its recommendations. Other College or public officials (e.g., public works, fire department, law enforcement) may be involved in this review or consulted as needed. The Mitigation Sub-Plan will be reviewed for:</p> <ul style="list-style-type: none"> • Any significant changes in vulnerabilities, priorities, or trends, including to populations, structures, community lifelines, and weather/event patterns. • Any significant changes in capabilities or barriers to plan implementation. • Opportunities to strengthen plan coordination (i.e., integrate mitigation and preparedness into other community planning mechanisms). • Potential new mitigation and preparedness strategies, projects, or grant opportunities. • Any comments or discussion with the public, partners, or other stakeholders. <p>If potential changes to the Sub-Plan are being considered, the planning contact will:</p> <ol style="list-style-type: none"> 1. Contact County Emergency Management and West Central Wisconsin Regional Planning Commission (WCWRPC) to discuss the proposed changes and any guidance regarding potential resources and next steps. 2. Provide the suggested changes to the School Board or its committees for consideration. Should it be determined that a Mitigation Sub-Plan change is needed, the School Board will adopt the Sub-Plan as noted previously. Such changes will be limited to this college-specific Mitigation Sub-Plan. Changes to this Sub-Plan may be made in the future without County Board or other participant re-adoption of the County’s overall mitigation plan.
Plan Updates	The College intends to be a full participant in five-year updates of the County’s overall hazard mitigation plan, which will include reviewing and updating the information provided in this Mitigation Sub-Plan. Changes to Sub-Plan content may be necessitated by applicable mitigation rules and planning guidance in effect at that time.
Continued Public Participation	The College will provide opportunities for public participation throughout its mitigation planning processes, including: (1) public comments will be accepted on draft Sub-Plans and Sub-Plan changes prior to adoption; and (2) public input and ideas on potential risks, vulnerabilities, capabilities, or mitigation projects are welcomed and will be considered.