St. Croix County
Multi-Hazard Mitigation Plan
2024-2029



Final Draft - 04/05/24

St. Croix County Wisconsin
Innovation Through Cooperation

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ST. CROIX COUNTY
MULTI-HAZARD MITIGATION PLAN

PREPARED BY:

St. Croix County Local Emergency Planning Commission
St. Croix County Emergency Support Services
St. Croix County communities

WITH ASSISTANCE BY:

West Central Wisconsin Regional Planning Commission

ADOPTED MONTH XX, 2024
BY THE ST. CROIX COUNTY BOARD OF SUPERVISORS

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SECTION I. INTRODUCTION

A. PURPOSE OF THE PLAN

The *St. Croix County Multi-Hazard Mitigation Plan* has been prepared as a result of the County's application for, and award of, Section 404 Hazard Mitigation Grant Program funds (FEMA-4520-DR-WI). These funds are disbursed by the Federal Emergency Management Agency (FEMA) through Wisconsin Emergency Management (WEM).

The primary focus of the Plan is to evaluate the County's potential exposure to natural disasters and identify appropriate mitigation strategies. After evaluating disaster threats facing St. Croix County, the Steering Committee for this plan update decided that the scope of the planning effort should continue to include some select non-natural hazards. By addressing those natural hazards of significant risk, this Plan conforms with Federal all hazards mitigation planning requirements.

> 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)

The update of this plan (*the 2024 Plan*) will help the County and its communities: identify areas of risk and vulnerable populations; assess the magnitude of the risk and related trends; gauge local mitigation and response capacity; and develop goals and strategies for reducing or eliminating the significant risk. Completion and approval of the 2024 Plan will continue to make St. Croix 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.

B. PLANNING PROCESS

St. Croix County contracted with West Central Wisconsin Regional Planning Commission (WCWRPC) to update the *St. Croix County All Hazard Mitigation Plan* previously adopted by the County Board in November 2018 and approved by FEMA in December 2013. The County decided to rename this plan update a "Multi-Hazard Mitigation Plan" in order to clarify that there are limitations to the plan scope and not all potential hazards are full included. This previous plan will be referred to as the 2018 Plan in this update, while this update will be referred to as the 2024 Plan.

Update of the *St. Croix County Multi-Hazard Mitigation Plan* was directed by the planning requirements and guidance provided by the Federal Emergency Management Agency (FEMA)[1]

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

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 plan's scope is inclusive of all of St. Croix County and is considered a multi-jurisdictional plan under Federal guidelines. St. Croix County Emergency Support Services will continue to coordinate with both communities and Pierce County Emergency Management on hazard mitigation issues as required. For this plan update, public educational institutions were also invited to be full participants, which is discussed in Section I.C.

To guide the plan's update, St. Croix County designated the County's Local Emergency Planning Committee (LEPC) to serve as a Multi-Hazard Mitigation Plan Steering Committee. Committee members, shown in **Table 1**, represented a very broad range of public, private, and non-profit stakeholder organizations. In addition to bringing insight on their respective roles, the Committee members are very knowledgeable of the issues and concerns of the County's residents, vulnerable populations, community lifelines, industry, and response agencies.

Table 1. St. Croix County Hazard Mitigation Plan Steering Committee

Name	Organization/Title
Terry Andersen	Emergency Communications Manager
Mary Blel	Citizen (CHS certified Hazardous Materials Mgr)
Mary Ellen Bol	Phillips Medisize - People Services
Natasha Brunell	Emergency Management Manager
Duana Bremer	Salvation Army Director
Joe Eichten	Hazardous Materials Manager
Kelli Engen	Public Health, Environmental Health Specialist (Mary Wienke Proxy)
Robbi Krejci	Highway Commissioner
Tim Kufus	Emergency Support Services Captain
Cathy Leaf	County Board Supervisor - Public Protection & Judiciary
Bob Long	County Board Chair
Jon Muller	Lakeview EMS Director
Megan Navarre	RSG - Norlake Hudson
Tom Overby	Countryside CO-OP Environmental and Regulatory Specialist
Paul Sickman	DNR Warden
Drew Spielman	Fire Chief, Hudson Fire
Brent Standaert	St. Croix County Sheriff's Office
Janet Smith	ESS Program Coordinator
Darren VanBlaricom	Emergency Manager, Health Partners Valley Hospitals
Lisa Olson-McDonald	WEM Regional Director
Dave Ostness	County Board Supervisor - Proxy available
Ken Witt	St. Croix County Administrator

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

Update of the 2024 Plan began in earnest in January 2023, 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 2018 Plan is provided in **Appendix K**, 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 2018 Plan, the Steering Committee agreed that the 2024 Plan update 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).

The Steering Committee agreed that the following 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
- Groundwater Contamination
- Invasive Species

The above three hazards are also not traditionally considered natural hazards for mitigation planning, so are discussed in Section III.B. as a recognition of their importance and in support of their related plans and initiatives. In light of the latest FEMA mitigation planning guidance, additional emphasis during the 2024 Plan update was placed on socially vulnerable populations, nature-based solutions, weather/climate patterns, and community lifelines (formerly critical facilities).

Using the direction provided by the compiled data and the interviews/meetings discussed in Sections I.C. and I.D., the Steering Committee: discussed local mitigation capacity (Section IV); provided input on the 2018 Plan progress (Section V); updated the plan goals (Section VI.A.), and prioritized mitigation and preparedness strategies (Section VI.C.&D.), and determined a plan maintenance approach (Section VII).

In February 2024, the full draft plan was released for public review and submitted to Wisconsin Emergency Management (WEM) for pre-review, prior to local adoption. Copies of adopting resolutions/letters for all plan participants are included in **Appendix A**.

C. PLAN PARTICIPANTS

The *St. Croix County Multi-Hazard Mitigation Plan* is a multi-jurisdictional plan and encompasses all incorporated and unincorporated jurisdictions within St. Croix County, with the exceptions of:

- The Village of Wilson, who did not respond to invitations to participate.

- The Village of Spring Valley and City of River Falls, which are covered under the Pierce County mitigation plan. Input from Pierce County Emergency Management was requested during the 2024 Plan update. St. Croix County Emergency Support Services will continue to coordinate with both communities and Pierce County on hazard mitigation issues and strategies as required.

Full plan participants are the following local entities that actively participated in the plan update and have adopted or approved the 2024 Plan, with the possible interest in pursuing FEMA mitigation grant funding in the future:

County Government
St. Croix County
Cities & Villages (incorporated municipalities)
Village of Baldwin
Village of Deer Park
Village of Hammond
Village of North Hudson
Village of Roberts
Village of Somerset
Village of Star Prairie
Village of Woodville
City of Glenwood City
City of Hudson
City of New Richmond, including municipal utility
Public Educational Institutions
Hudson School District
Northwood Technical College

For the 2024 Plan update, all public educational institutions serving St. Croix County were invited to be full participants for the first time; two agreed to participate. St. Croix Electric Cooperative is the primary non-profit electric cooperative serving the County and actively participated in the process, though other electric cooperatives do provide some service within the County...

All participating jurisdictions in St. Croix County were actively involved in the planning process through the following means:

- The Steering Committee included representation from different areas in the County and numerous organizations as 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 and County Emergency Management staff then conducted an interview meeting with each participating village and city on the planning effort, and input was obtained on changes since the 2018 Plan, including hazard

issues/trends, vulnerable populations, community lifelines, progress on 2018 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 L & M. The draft sub-plans were then distributed to each community for review and input. As discussed in Appendix K, 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**. Note: All municipalities in St. Croix County with 100-year floodplains identified on Flood Insurance Rate Maps (FIRMs) are participants in good standing in the National Flood Insurance Program (NFIP).

D. STAKEHOLDER & PUBLIC INVOLVEMENT

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

- **Steering Committee Meetings.** Steering Committee meetings were properly noticed in accordance with the Wisconsin Open Meetings Law and open to the public. Meeting agendas and minutes are available at the St. Croix County website. Agendas and sign-in sheets for the Steering Committee meetings are included in **Appendix B**. A final Committee meeting will be scheduled to discuss next steps and implementation of the plan priorities once the draft plan is complete.
- **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. These interviews 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 St. Croix 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) regional Dam Safety Engineer; St. Croix Electric

Cooperative; and St. Croix County Public Health and St. Croix County Community Development. 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 who participated are community members and are well informed of the 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. 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. For the 2024 Plan update, participation and consideration of these communities were largely obtained through:

  - City & Village meetings and Town surveys, which represent and have knowledge of local underserved communities. As discussed in Section II.C., the villages of Deer Park and Woodville are economically vulnerable rural communities; some other communities are also low income, but exceed the 3,000 rural population threshold.
  - Stakeholder interviews with agencies that provide services to and plans for the vulnerable populations, such as St. Croix County Public Health, the Aging & Disability Resource Center, and the American Red Cross.
  - Section VII.B.iii. states that St. Croix County will identify effective opportunities to engage vulnerable populations more directly as part of the 2029 mitigation plan update, if possible.

- **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 April 27, 2023, a presentation on the planning effort was made to the St. Croix County Towns Association. 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 St. Croix County, fewer than six 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 St. Croix 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 St. Croix County Board, and the participating communities during 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, USDA Agricultural Census, Wisconsin Department of Revenue tax assessment data, Wisconsin Department of Administration population estimates and projections, and EMSI. The community profile contains a mix of 2010 and more recent American Community Survey (ACS) U.S. Census data. Though outdated, the 2010 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 and recommendations from the 2017 *St. Croix County Surface and Groundwater Quality Study*. The cyber-attack and active threats sections rely heavily on FBI and other federal-level data sources.
- The GIS maps and GIS-based analysis found in Sections II and III were largely produced by WCWRPC with geo-referenced data primarily from Chippewa 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 is further detailed in Appendix H.
- 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. St. Croix 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; St. Croix County and all of its municipalities are participating in good standing. The city and village sub-plans in Appendix L provide similar references to community-specific planning mechanisms, including NFIP program and floodplain management status.

Figure 1. St. Croix 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

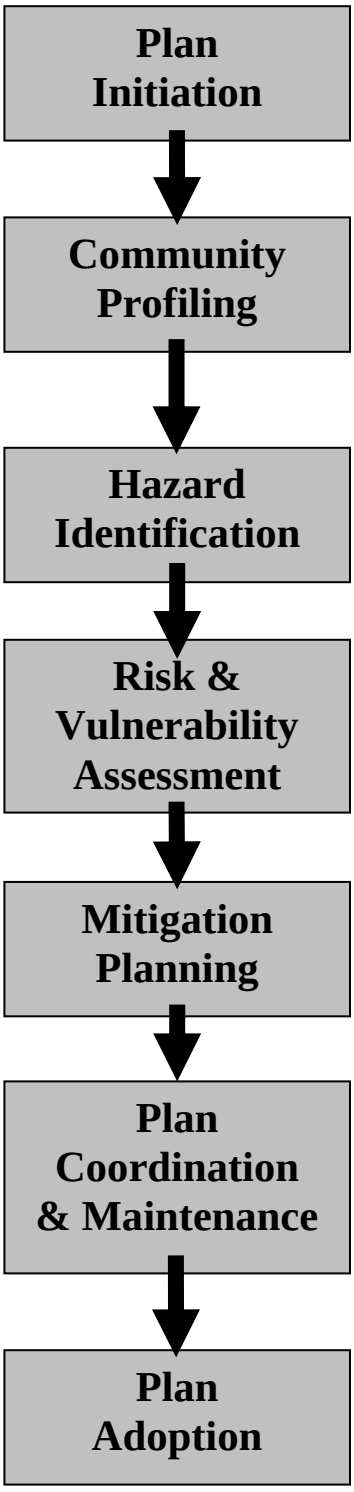
Hazard Identification
scope: update data and re-confirm key hazards
local roles: assist w/ data collection (historical records on events)
RPC roles: data collection (w/ NOAA data) & facilitation
Cmte roles: review and confirm key hazards

Risk & Vulnerability Assessment
scope: identify risks (full history & trends), and vulnerabilities (estimate potential losses to assets)
local roles: identify issues, concerns, and "hotspots"; capability assessment
RPC roles: data collection, analysis, & facilitation; interviews/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 2018 Plan
RPC roles: facilitation, analysis & guidance on strategies
Cmte roles: update goals & criteria; 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 -> State pre-review -> public comment period -> Cmte re-consideration if needed -> County & local adoption-> FEMA approval letter
local roles: facilitate public, notifications & adoption
RPC roles: assist w/ public hearings & modifications to plan
Cmte roles: consider public input & approve draft plan
other issues: special mailings; media



SECTION II.
COMMUNITY PROFILE – ST. CROIX COUNTY

The community profile section of the plan provides background data for a better understanding of the general characteristics of St. Croix County.

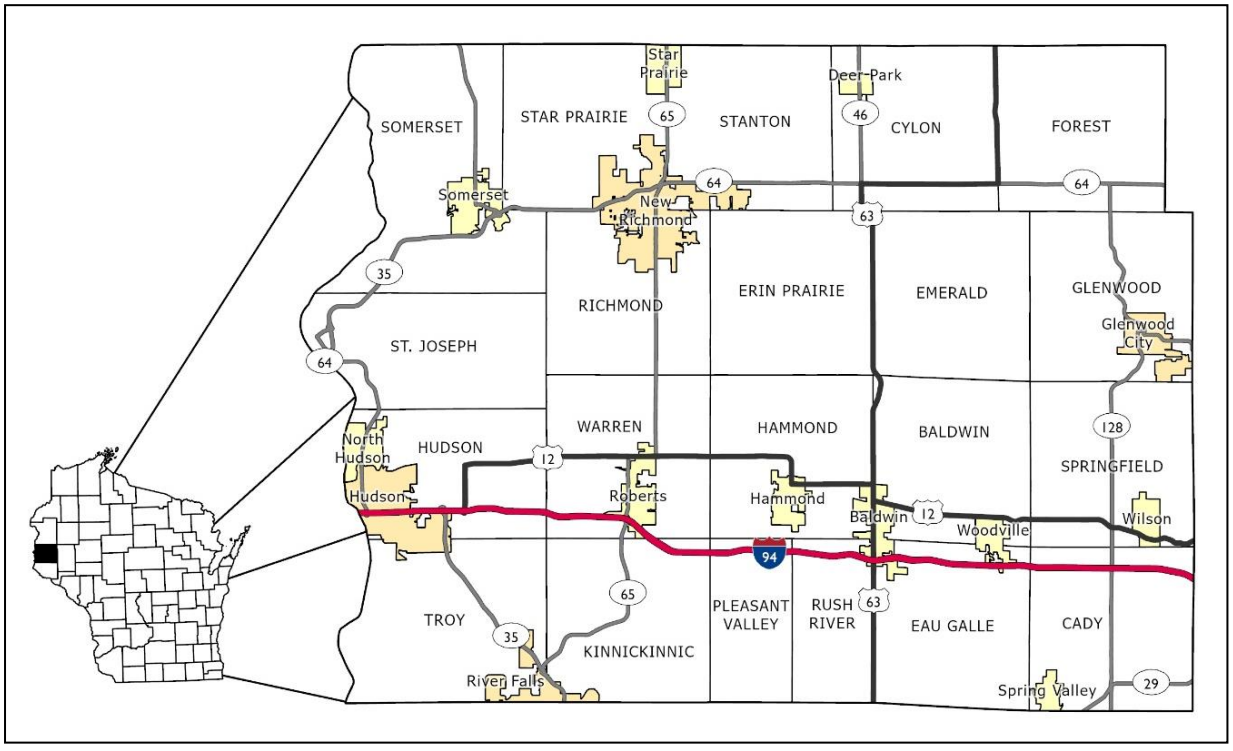
A. GEOGRAPHIC LOCATION

St. Croix County is located in north west-central Wisconsin (see **Figure 2** below). The County has a total surface area of approximately 722 square miles of combined land and water area. The County is bordered by Polk County to the north, Barron County to the northeast, Dunn County to the east, and Pierce County to the south.

The County is comprised of 35 minor civil divisions, which include 21 towns, 10 villages, and 4 cities. The largest portions of the City of River Falls and the Village of Spring Valley lie within Pierce County to the south. The largest city entirely located within St. Croix County—the City of Hudson—is the County seat.

St. Croix County is part of the Minneapolis-St. Paul Metropolitan Statistical Area and was the fastest growing county in Wisconsin during the previous two decades. Interstate 94, which bisects St. Croix County, is the primary transportation arterial between Minneapolis-St Paul and cities to the south and east, such as Eau Claire, Green Bay, Madison, Milwaukee, Rockford, and Chicago.

Figure 2. St. Croix County Geographic Location



B. NATURAL FEATURES AND ENVIRONMENT

The ecological landscape of St. Croix County is almost entirely Western Prairie. The landscape was fully glaciated and contains rolling till plains. There are end moraines in the northwest. The climate is more consistent with southern Wisconsin than neighboring counties and is considered a favorable climate for agricultural purposes. The DNR provides a full summary of the Western Prairie and its features in a book titled "Ecological Landscapes of Wisconsin".

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.

Most surface waters of St. Croix County fall within two major drainage systems—the Lower Chippewa River Basin and the St. Croix River Basin. Surface waters in the western two-thirds of the County, including the Apple, Kinnickinnic, and Willow Rivers, fall within the St. Croix River Basin. The eastern third of the County, including the Hay and Eau Galle Rivers, are part of the Lower Chippewa River Basin. **Figure 3** shows the locations of the watersheds within St. Croix County at the ten-digit hydrologic unit code (HUC).

ii. Surface Waters, Floodplains, and Wetlands

Figure 4 delineates the County's surface waters, floodplains, and wetlands. The lakes of St. Croix County, with the St. Croix River included, have a total surface area of approximately 9,598 acres or 15 square miles. The St. Croix River and its man-made lake, Lake St. Croix, is the largest surface water in St. Croix County. Approximately half of the 9,336-acre Lake St. Croix is located on the Wisconsin side of the state border with Minnesota. The St. Croix River is also notable since it has been designated by Congress as the Lower St. Croix National Scenic Riverway. With this designation, the National Park Service works with local jurisdictions to manage and protect this waterway.



At 416 acres, Bass Lake in the Towns of Somerset and St. Joseph is the largest inland surface water entirely within the County, though a considerable portion of the 1,107-acre Cedar Lake in the Town of Star Prairie is also in St. Croix County. Other lakes of considerable size include Little Falls Lake (172 acres), Lake Mallalieu (270 acres), Pine Lake (107 acres), and Squaw Lake (129 acres).

Figure 3. St. Croix County Watersheds

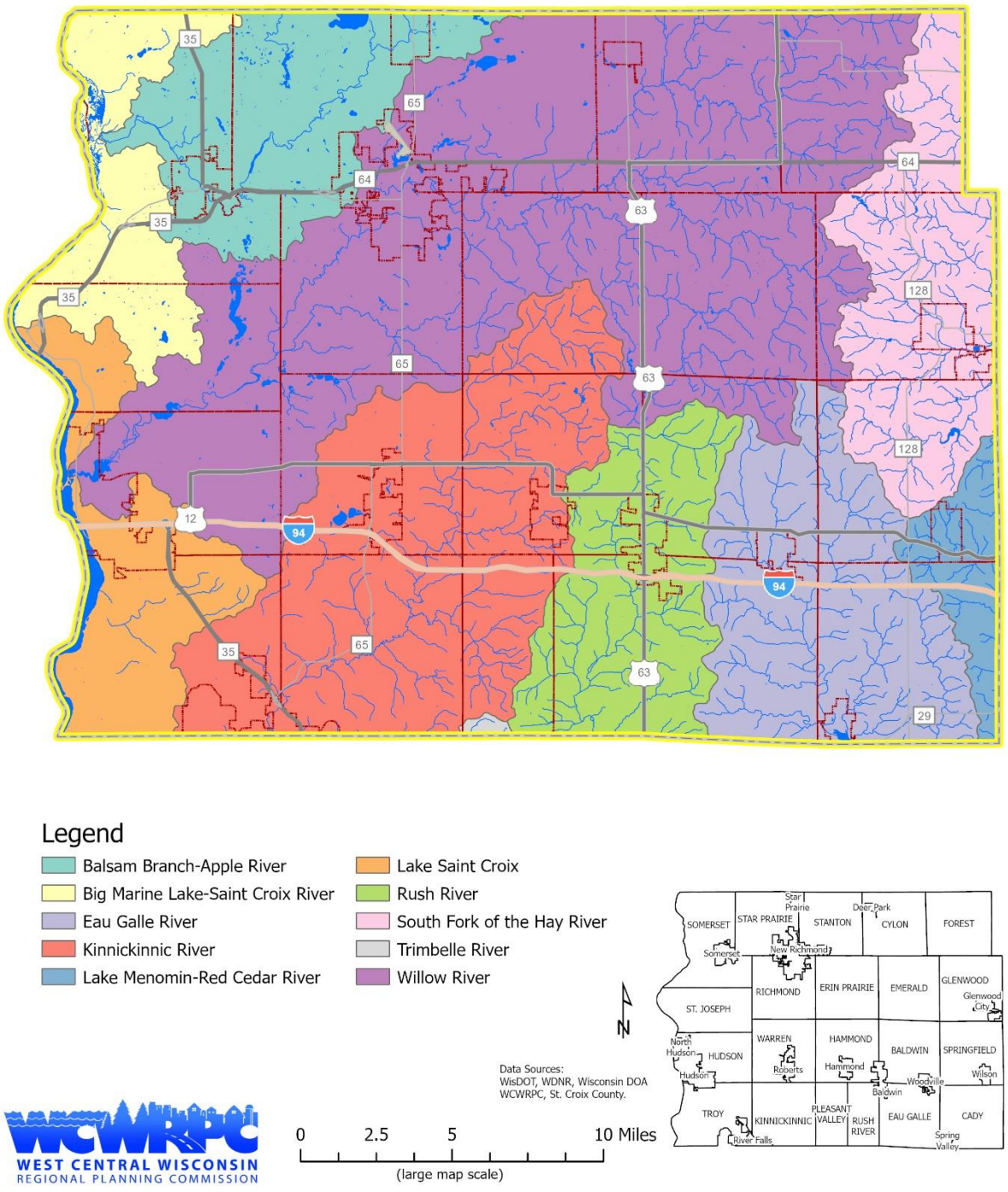
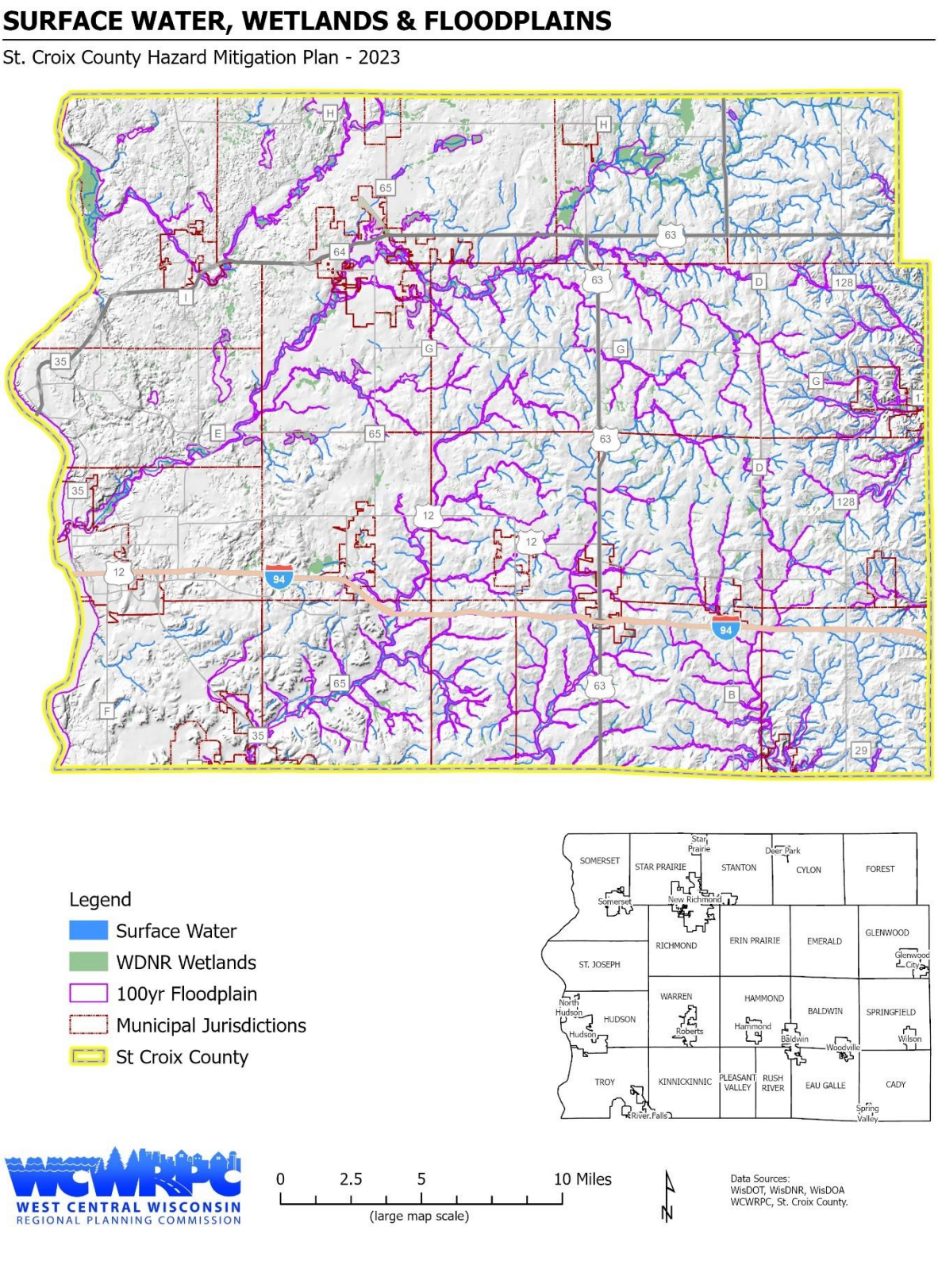


Figure 4. St. Croix County Floodplains & Wetlands



A portion of the 150-acre Eau Galle Lake/Lake George is located in the Town of Cady. Cedar Lake, Bass Lake, Willow River, and St. Croix River in the western half of the County account for about 90% of the County's surface water acreage.

Wetland areas within the watersheds can affect the water levels of rivers and creeks flowing through St. Croix County. Wetlands are defined by the State Statute as "an area where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic (water-loving) vegetation and which has soils indicative of wet conditions." Wetlands may be seasonal or permanent and are commonly referred to as swamps, marshes, or bogs. Wetland areas can have an important nature-based mitigation role given their capacity to store and filter pollutants, replenish groundwater supplies, store floodwaters, and maintain stream flows.

One sensitive land feature that most residents are aware of is the floodplain, which is the flood-prone land adjacent to water bodies. Floodplains can be desirable development areas due to the proximity to lakes, rivers, and streams, but pose problems by possibly putting residents and property at risk. Altering the floodplain landscape by filling or building levees, structures, or other hardscape (e.g., parking lots) can exacerbate flooding conditions. The filling of wetlands in floodprone areas has also been proven to increase the likelihood of flooding. Development in floodplains can also affect the environmental quality of the waterway.

To better protect the residents throughout the state, and to minimize the loss of property, the State of Wisconsin, under Wisconsin Statute 87.30(1), requires counties, cities, and villages to adopt and enforce floodplain zoning. In addition, Wisconsin Administrative Code NR116, Floodplain Management Program, has been promulgated for the protection of property and public investments from the effects of flooding. The floodplain and flood-hazard areas within the County associated with these water bodies are discussed in greater detail within **Section III. Assessment of Hazard Conditions** of this report.

iii. General Climate

The climate of St. Croix County is classified by the National Oceanic and Atmospheric Administration (NOAA) as moist subtropical mid-latitude. Warm, humid summers and mild 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 34 inches, with the majority falling in May-August. Seasonal snowfall ranges from 28 to 83 inches (2012-2022). St. Croix 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

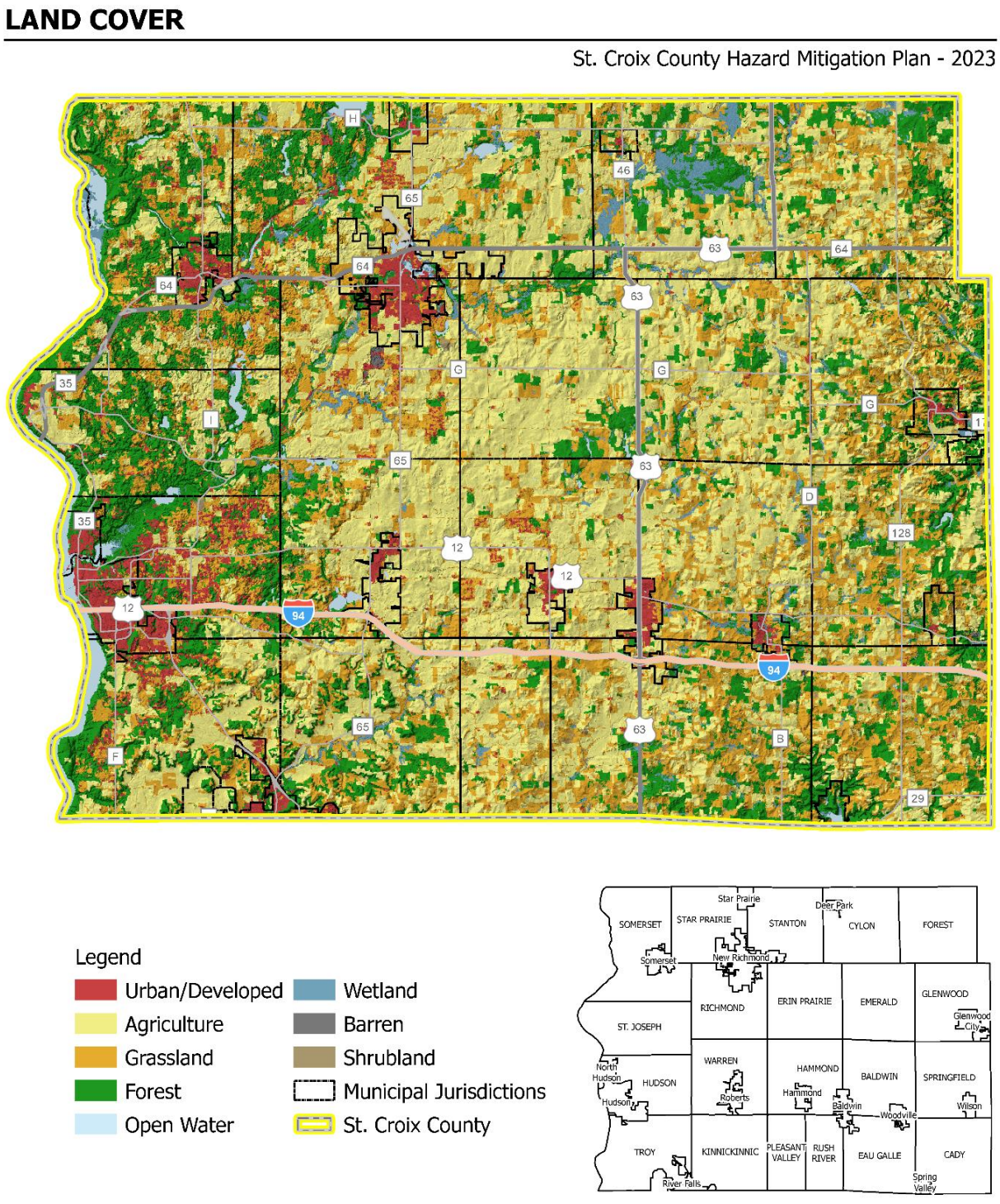
Historically, St. Croix County's landscape was dominated by prairie, brush, and scattered oak openings in the western three-quarters of the County and maple, spruce, and mixed forest in the eastern quarter. **Figure 5** shows that the St. Croix County landscape today is dominated by agriculture. Almost 60 percent of the County's total assessed acreage in 2022 was agricultural. An additional 13.5 percent was assessed 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 St. Croix County in greater detail.

USGS Land Cover data from 2021 can be used to generally classify vegetative land cover. **Table 2** provides the acreage and percentage of each land cover type. In 2021, approximately 7.8% of the County was forest or forested wetlands. Agricultural land cover as the predominate cover type, encompassing over 63% of land in the County. Developed areas comprised just under 10% of land area. This reflects a rural character for St. Croix County, though the percentages for developed area are increasing steadily.

Table 2. St. Croix County Land Cover

Land Cover Type	Acres	Percent
Open Water	9,001.94	1.91%
Developed, Open Space	25,359.75	5.39%
Developed, Low Intensity	12,447.32	2.64%
Developed, Medium Intensity	6,785.12	1.44%
Developed, High Intensity	2,161.83	0.46%
Barren Land	662.40	0.14%
Deciduous Forest	69,967.98	14.86%
Evergreen Forest	10,955.78	2.33%
Mixed Forest	17,976.38	3.82%
Shrub/Scrub	657.31	0.14%
Herbaceous	2,201.29	0.47%
Hay/Pasture	112,830.40	23.96%
Cultivated Crops	186,516.40	39.61%
Woody Wetlands	8,180.43	1.74%
Emergent Herbaceous Wetlands	5,203.21	1.10%

Figure 5 St. Croix County Land Cover



C. DEMOGRAPHIC AND ECONOMIC PROFILE

i. Population and Housing

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

- St. Croix County has seen double-digit growth in residential development for the last 4 decades and more than doubled its 1980 number of units (+22,445, or 150.4%).
- Housing stock has outpaced population growth since 1980. The average population per housing unit has decreased from 2.9 in 1980 to 2.5 in 2020.
- Residential development and housing growth in the county has slowed over the last decade, which is consistent with trends throughout the region.
- While growth has occurred at all municipal levels, cities have seen the highest rate of growth over the past 10 years.
- **Figure 6** shows the percent change in population for each community. The west side of St. Croix County has seen higher rates of growth. This is due, in part, to its proximity to the Twin Cities.
- Two communities are considered economically rural disadvantaged communities.
- Single-family detached housing is the most prevalent housing unit throughout the County, comprising more than 85% of all housing units. The percentages are higher in towns (94%) than in cities (70%).
- The potential vulnerability to hazardous events increases along with residential development and population growth. The more than doubling of both housing and residents over the past 40 years 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.
- While the County is generally younger and wealthier than the State averages, there are age and income discrepancies between older, more affluent towns and younger, less affluent cities and villages. As the elderly and economically disadvantaged populations are both groups of concern, these discrepancies present unique challenges and vulnerabilities for each community type.
- **Figure 7** shows St. Croix 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 nearly triple. This trend has future implications for services, housing, and the labor force.

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

Year	Number of Housing Units	Numerical Change	Percent Change	Population	Numerical Change	Percent Change
1980	14,924			43,262		
1990	18,519	+3,595	+24.1%	50,251	+6,989	+16.2%
2000	24,265	+5,746	+31.0%	63,155	+12,904	+25.7%
2010	33,983	+9,718	+40.0%	84,345	+21,190	+33.6%
2020	37,369	+3,386	+10.0%	93,500	+9,155	+10.9%

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

Table 4. St. Croix County Demographics

Municipality	Census 2010	Census 2020	% Change 2010-2020	Proj. 2027	Per Capita Income	% Persons Below Poverty Line	Median Age	*Economic Disadvantaged Rural Cmty
Towns								
Baldwin	928	1,047	12.8	1,115	33,160	2.3	38.9	
Cady	821	880	7.2	968	43,396	8.9	48.0	
Cylon	683	708	3.7	705	36,641	5.9	41.9	
Eau Galle	1,139	1,253	10.0	1,270	37,176	12.9	45.2	
Emerald	853	831	-2.6	889	35,073	4.9	43.4	
Erin Prairie	688	637	-7.4	725	60,407	3.0	51.4	
Forest	629	638	1.4	634	34,341	3.3	40.3	
Glenwood	785	747	-4.8	741	38,010	5.4	53.4	
Hammond	2,102	2,565	22.0	2,734	44,285	1.2	36.3	
Hudson	8,461	8,671	2.5	9,208	50,094	4.4	39.9	
Kinnickinnic	1,722	1,815	5.4	1,862	47,688	4.6	41.0	
Pleasant Valley	515	567	10.1	574	37,189	10.5	44.7	
Richmond	3,272	4,074	24.5	4,520	34,458	8.2	35.7	
Rush River	508	500	-1.6	502	45,716	4.9	50.8	
St. Joseph	3,842	4,178	8.7	4,422	67,033	1.3	51.1	
Somerset	4,036	4,291	6.3	4,485	40,070	1.6	46.8	
Springfield	932	993	6.5	993	32,176	2.1	48.7	
Stanton	900	907	0.8	992	35,510	2.9	53.8	
Star Prairie	3,504	3,733	6.5	3,875	38,466	6.2	47.0	
Troy	4,705	5,518	17.3	6,336	70,076	1.7	47.6	
Warren	1,591	1,733	8.9	1,824	46,856	0.9	42.7	
Subtotal:	**42,616**	**46,286**	**8.6**	**49,374**				
Villages								
Baldwin	3,957	4,291	8.4	4,426	30,873	6.5	35.0	
Deer Park	216	249	15.3	248	25,713	12.4	36.4	Yes
Hammond	1,922	1,873	-2.5	1,860	34,064	14.9	35.1	
North Hudson	3,768	3,803	0.9	4,000	56,455	2.4	47.6	
Roberts	1,651	1,919	16.2	2.001	33,628	12.1	31.8	
Somerset	2,635	3,019	14.6	3,203	28,168	10.9	29.3	
Spring Valley (part)	6	11	83.3	12	NA	0.0	20.0	
Star Prairie	561	678	20.9	675	37,805	9.3	39.4	
Wilson	184	209	13.6	209	30,501	4.9	39.8	
Woodville	1,344	1,386	3.1	1,381	26,701	9.0	34.6	Yes
Subtotal:	**16,244**	**17,438**	**7.4**	**16,016**				
Cities								
Glenwood City	1,242	1,306	5.2	1,288	35,472	16.6	41.7	
Hudson	12,719	14,755	16.0	15,284	43,551	6.8	39.7	
New Richmond	8,375	10,079	20.3	11,024	33,639	4.5	36.4	
River Falls (part)	3,149	3,636	15.5	3,987	41,077	3.7	34.7	
Subtotal:	**25,485**	**29,776**	**16.8**	**31,583**				
St. Croix County	**84,345**	**93,500**	**10.9**	**98,972**	**43,000**	**5.4**	**39.6**	

Sources: 2010 & 2020 US Census, 2017-2021 American Community Survey. Projections by ESRI.
*Economic disadvantaged rural community is 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. St. Croix 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									
Baldwin	368	0	0	0	0	0	3	1	0
Cady	243	0	0	0	0	0	8	0	15
Cylon	197	0	2	0	0	0	11	0	0
Eau Galle	431	0	0	0	0	0	0	0	3
Emerald	242	0	0	0	0	0	19	0	19
Erin Prairie	227	0	0	0	0	3	0	0	16
Forest	220	0	0	0	0	0	4	0	18
Glenwood	350	0	0	0	0	0	11	1	8
Hammond	836	0	30	0	0	0	5	0	0
Hudson	2,617	25	0	0	0	0	0	8	0
Kinnickinnic	567	6	6	0	0	0	5	0	3
Pleasant Valley	116	0	2	0	0	0	0	0	4
Richmond	1,030	0	0	0	0	0	35	1	0
Rush River	200	0	2	0	0	0	2	0	0
St. Joseph	1,731	0	0	0	0	0	0	2	0
Somerset	1,344	0	0	0	0	0	26	0	59
Springfield	287	0	0	0	0	0	49	0	24
Stanton	298	0	0	0	0	0	17	0	0
Star Prairie	1,172	0	0	0	0	0	183	1	98
Troy	1,719	0	0	9	0	0	114	0	24
Warren	561	3	0	0	0	0	0	0	0
Subtotal:	**14,756**	**34**	**42**	**9**	**0**	**3**	**492**	**14**	**291**
Villages									
Baldwin	967	30	38	0	0	0	54	14	0
Deer Park	65	0	0	0	0	0	1	0	0
Hammond	476	80	9	0	0	0	33	1	0
North Hudson	1,271	32	0	0	0	0	6	0	59
Roberts	312	43	7	9	0	2	110	1	0
Somerset	506	106	14	9	0	0	0	3	51
Spring Valley (part)	2	0	0	0	0	0	0	0	0
Star Prairie	177	11	5	0	0	0	0	0	7
Wilson	79	0	3	0	0	0	2	0	4
Woodville	278	14	3	0	0	0	40	3	3
Subtotal:	**4,133**	**316**	**79**	**18**	**0**	**2**	**240**	**22**	**124**
Cities									
Glenwood City	278	10	0	0	0	0	23	6	8
Hudson	2,795	1,228	48	142	0	0	0	31	105
New Richmond	2,009	301	12	47	0	0	0	35	103
River Falls (part)	684	291	8	8	0	0	7	7	0
Subtotal:	**5,766**	**1,830**	**68**	**197**	**0**	**0**	**30**	**79**	**216**
St. Croix County	**24,655**	**2,180**	**189**	**224**	**0**	**5**	**762**	**115**	**631**

Sources: 2020 US Census & 2017-2021 American Community Survey. Group/Assisted Living from Wisconsin Department of Health Services – Division of Quality Assurance Provider Search which includes: Assisted Living Facilities, Adult Day Care Center, Adult Family Home, Community Based Residential Facility, Residential Care Apartment Complex, Nursing Home, FDD/IDF-IID, Alcohol and Other Drug Abuse/Mental Health Treatment Program, Recovery Residences.

Figure 6. St. Croix County Population Change

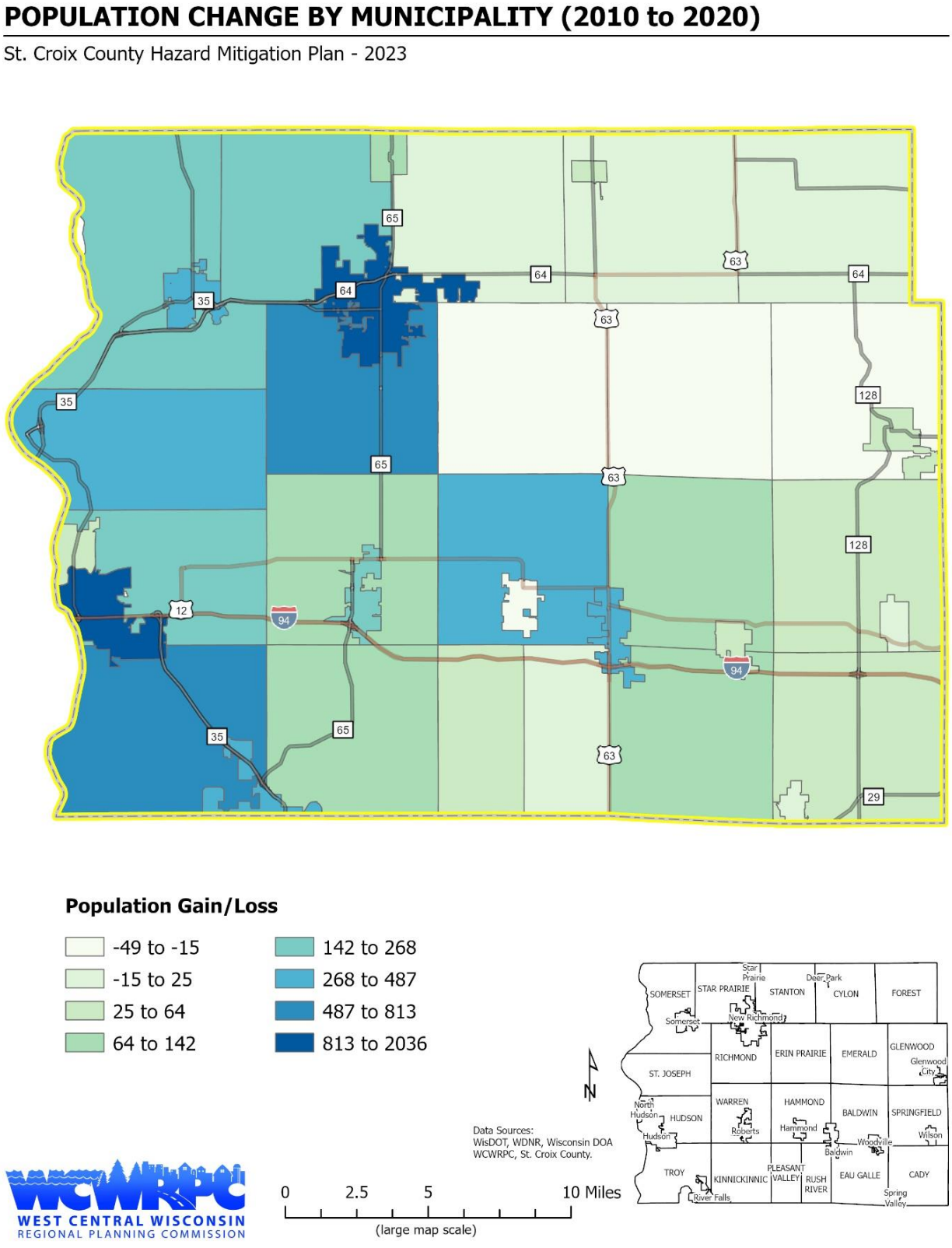
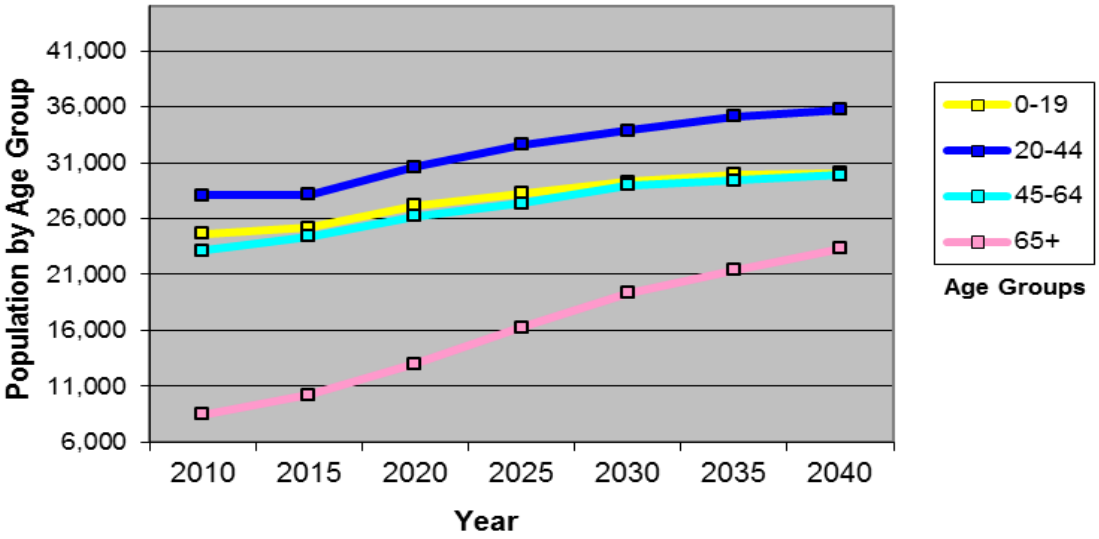


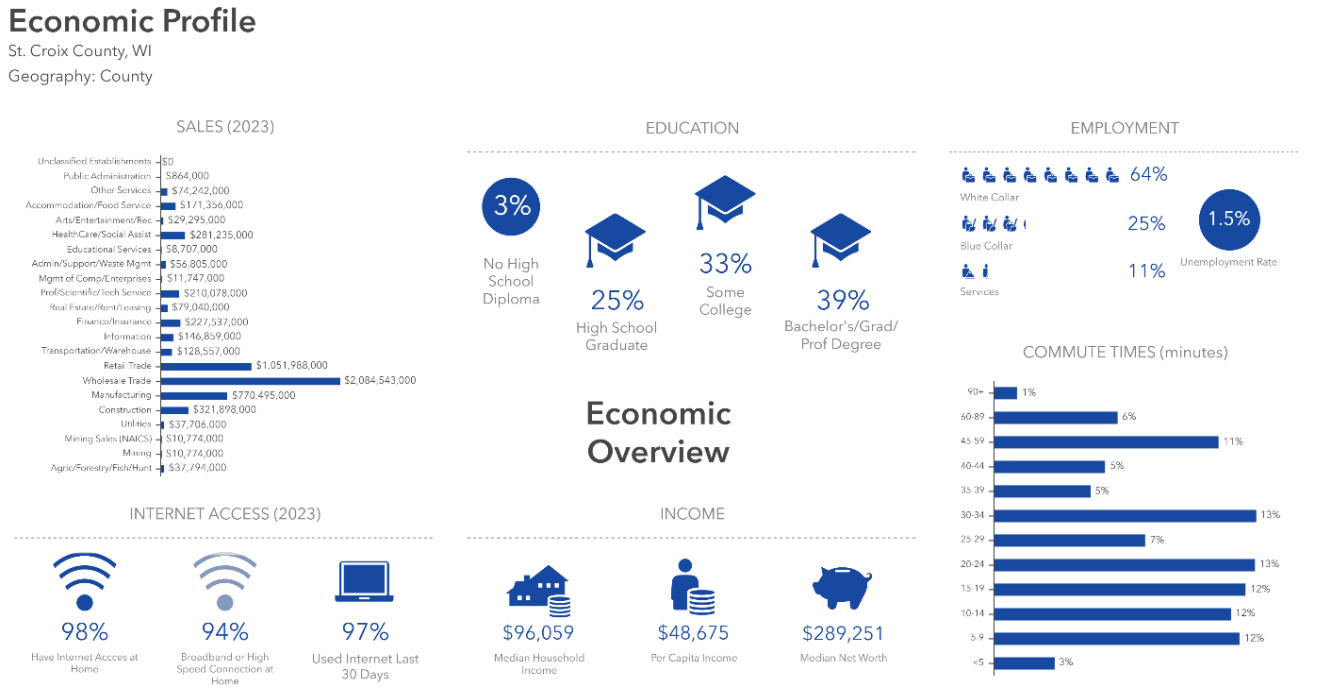
Figure 7. St. Croix County Age Group Projections • 2010 to 2040



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 below provides an overview of St. Croix County's economy. The County has low unemployment and a strong warehousing sector.



- Educational attainment is high, with over 70% having at least some college education.
- Employment in the County is predominantly white-collar jobs.
- Net worth and household income is high and well above national averages ($192,900 and $74,580 respectively).
- **Table 6** summarizes St. Croix County's employment by primary industry sector. In 2022, the County had nearly 2,500 payrolled business locations, resulting in over 35,000 jobs.
- Manufacturing is the County's largest employment sector with 7,478 jobs (21% of all jobs).
- Heath Care and Social Assistance is the second highest employment sector (14%), indicating a strong healthcare network within the County.
- Despite a large agricultural presence within the county, the number of agricultural jobs decreased at the second highest rate over the last 10 years.
- Agriculture in St. Croix County contributes to other sectors, including the County's large food processing sub-sector. Its economic contribution is often underestimated in such data.

As shown in **Figure 8**, St. Croix County's workforce is very 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, 17,481 County residents had their primary job within St. Croix County in 2021, while 33,879 residents commuted outside the County. An additional 16,884 workers lived outside St. Croix County but commuted in for their primary job.

Figure 8. St. Croix County Worker Commuting Patterns

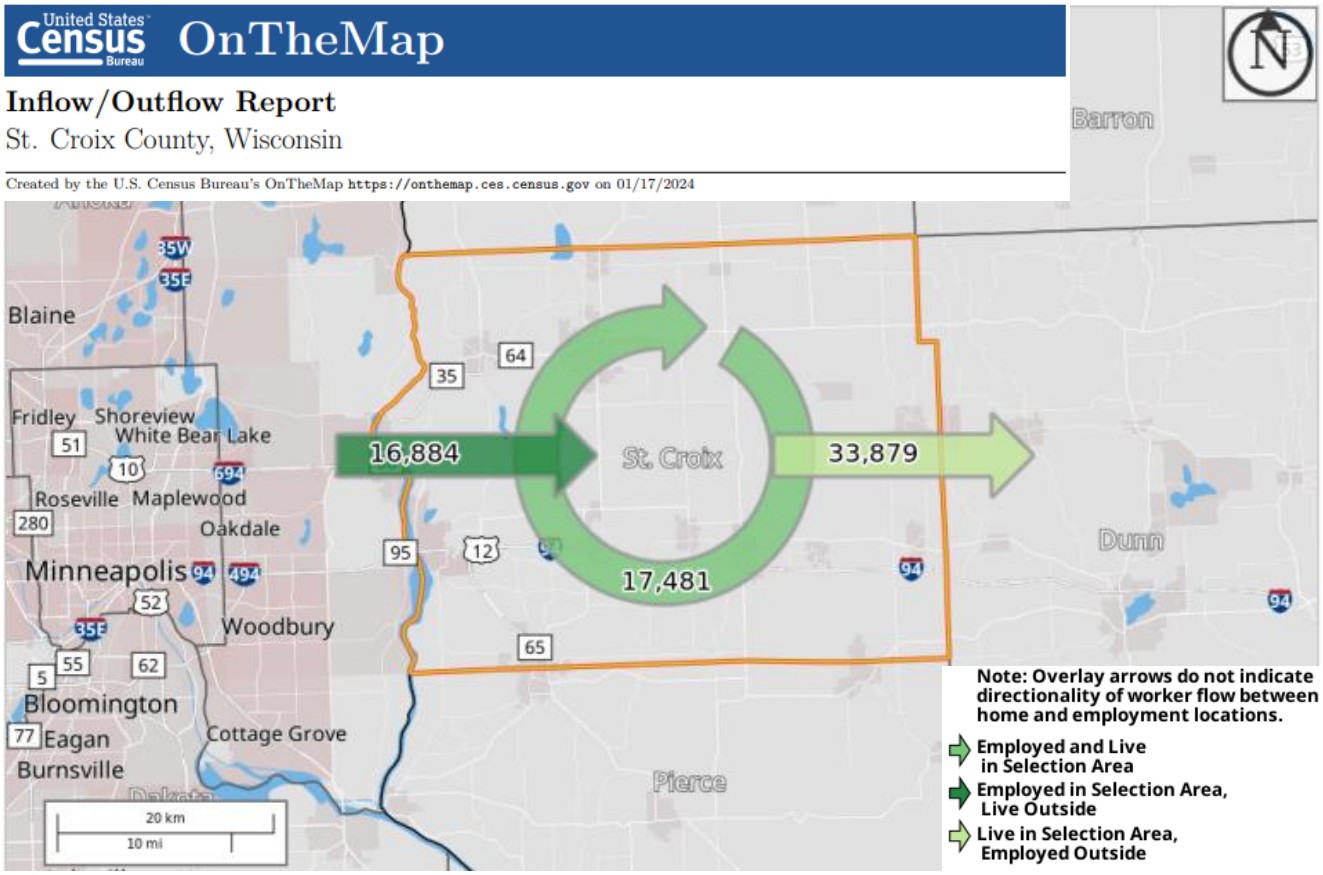


Table 6. St. Croix County Establishments & Employment By Industry Sector

Industry Sector (2-digit NAICS)	2022 Payrolled Business Locations	2012 Jobs	2022 Jobs	2012 - 2022 % Change	2022 Location Quotient
Manufacturing	187	6,013	7,478	24%	1,034
Health Care and Social Assistance	295	4,739	5,012	6%	(731)
Retail Trade	218	3,952	4,387	11%	272
Government	121	4,148	4,372	5%	174
Accommodation and Food Services	198	3,166	3,899	23%	289
Wholesale Trade	145	779	1,797	131%	973
Construction	285	1,091	1,701	56%	194
Professional, Scientific, and Technical Services	259	1,185	1,247	5%	(335)
Finance and Insurance	141	842	1,006	19%	59
Other Services (except Public Administration)	201	860	998	16%	166
Administrative and Support and Waste Management and Remediation Services	125	896	974	9%	(96)
Transportation and Warehousing	79	1,036	850	(18%)	(749)
Arts, Entertainment, and Recreation	47	463	584	26%	42
Agriculture, Forestry, Fishing and Hunting	26	286	243	(15%)	(60)
Information	34	210	198	(5%)	(41)
Real Estate and Rental and Leasing	72	136	170	25%	5
Management of Companies and Enterprises	17	182	156	(14%)	(71)
Utilities	2	44	145	228%	100
Educational Services	22	77	123	60%	35
Mining, Quarrying, and Oil and Gas Extraction	2	10	<10	NA	(5)
Unclassified Industry	0	0	0	NA	(1)
Totals	2,473	30,116	35,341	17%	1,256

iii. Agricultural Overview

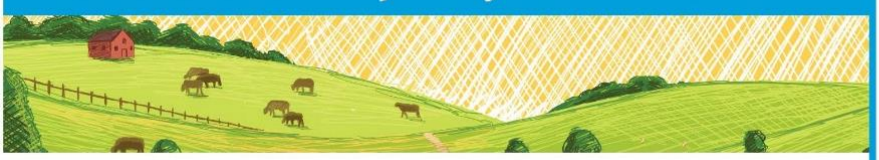
The hazard threats discussed later in this plan can impact parts or all of St. Croix County's agricultural base and economy. With more than 30 inches of rainfall per year and 145-day growing season, St. Croix County's climate is well-suited for forages, grain crops and oil seeds. Nearly 60 percent of all assessed (taxable) lands in the County are agricultural. St. Croix County has been and continues to be a strong producer of dairy products, though the County is diversifying its agricultural outputs. On the following two pages is the St. Croix County summary from the 2017 U.S. Census of Agriculture, which provides an overview of farming in the County.

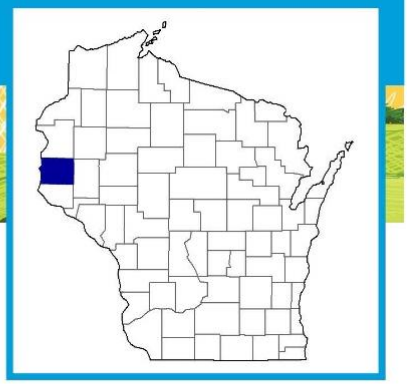
While agricultural sales are a small percentage of the County's economy, the indirect impact of agriculture in St. Croix County is significant. According to UW-Extension's *Agriculture Impact Report for St. Croix County* (2019), the County is the 10th largest producer of grains in the state, with annual production exceeding $72 million dollars. Milk and cattle account for another $96.7 million. In addition to direct outputs, farming in the County has several indirect and induced impacts:

- Agricultural processing helps support 3,710 jobs.
- The overall economic impact of agricultural production and processing in the County exceeds $712 million.
- Farms pay $16.7 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 St. Croix County's resiliency overall.

2017 CENSUS OF AGRICULTURE *County Profile*





St. Croix County
Wisconsin

Total and Per Farm Overview, 2017 and change since 2012

	2017	% change since 2012
Number of farms	1,444	+2
Land in farms (acres)	279,191	+4
Average size of farm (acres)	193	+2
Total	($)	
Market value of products sold	189,083,000	-12
Government payments	1,778,000	-60
Farm-related income	9,036,000	+4
Total farm production expenses	147,980,000	-11
Net cash farm income	51,917,000	-15
Per farm average	($)	
Market value of products sold	130,944	-13
Government payments (average per farm receiving)	2,476	-53
Farm-related income	11,614	+8
Total farm production expenses	102,479	-13
Net cash farm income	35,953	-16

2 Percent of state agriculture sales

Share of Sales by Type (%)

Crops	44
Livestock, poultry, and products	56

Land in Farms by Use (%) [a]

Cropland	78
Pastureland	7
Woodland	10
Other	5

Acres irrigated: 8,677
3% of land in farms

Land Use Practices (% of farms)

No till	14
Reduced till	22
Intensive till	22
Cover crop	8

Farms by Value of Sales

	Number	Percent of Total [a]
Less than $2,500	550	38
$2,500 to $4,999	121	8
$5,000 to $9,999	117	8
$10,000 to $24,999	173	12
$25,000 to $49,999	89	6
$50,000 to $99,999	117	8
$100,000 or more	277	19

Farms by Size

	Number	Percent of Total [a]
1 to 9 acres	99	7
10 to 49 acres	501	35
50 to 179 acres	472	33
180 to 499 acres	248	17
500 to 999 acres	78	5
1,000 + acres	46	3

USDA United States Department of Agriculture
National Agricultural Statistics Service
www.nass.usda.gov/AgCensus

St. Croix County
Wisconsin, 2017
Page 2

2017 CENSUS OF AGRICULTURE *County Profile*

Market Value of Agricultural Products Sold

	Sales ($1,000)	Rank in State [b]	Counties Producing Item	Rank in U.S. [b]	Counties Producing Item
Total	**189,083**	**27**	**72**	**564**	**3,077**
Crops	**83,156**	**15**	**72**	**678**	**3,073**
Grains, oilseeds, dry beans, dry peas	72,474	10	72	563	2,916
Tobacco	-	-	6	-	323
Cotton and cottonseed	-	-	-	-	647
Vegetables, melons, potatoes, sweet potatoes	879	44	72	782	2,821
Fruits, tree nuts, berries	164	56	71	1,109	2,748
Nursery, greenhouse, floriculture, sod	4,579	15	71	406	2,601
Cultivated Christmas trees, short rotation woody crops	315	13	64	123	1,384
Other crops and hay	4,746	24	72	522	3,040
Livestock, poultry, and products	**105,927**	**30**	**72**	**475**	**3,073**
Poultry and eggs	(D)	10	72	(D)	3,007
Cattle and calves	16,117	37	72	942	3,055
Milk from cows	80,842	22	68	103	1,892
Hogs and pigs	899	16	71	603	2,856
Sheep, goats, wool, mohair, milk	175	39	70	884	2,984
Horses, ponies, mules, burros, donkeys	298	16	69	733	2,970
Aquaculture	(D)	11	52	(D)	1,251
Other animals and animal products	335	30	70	387	2,878

Total Producers [c]	**2,425**
Sex	
Male	1,548
Female	877
Age	
<35	162
35 – 64	1,507
65 and older	756
Race	
American Indian/Alaska Native	1
Asian	3
Black or African American	1
Native Hawaiian/Pacific Islander	-
White	2,416
More than one race	4
Other characteristics	
Hispanic, Latino, Spanish origin	15
With military service	237
New and beginning farmers	491

Percent of farms that:

Have internet access	**79**
Farm organically	**1**
Sell directly to consumers	**8**
Hire farm labor	**25**
Are family farms	**95**

Top Crops in Acres [d]

Corn for grain	80,247
Soybeans for beans	57,080
Forage (hay/haylage), all	39,511
Corn for silage or greenchop	14,604
Oats for grain	2,026

Livestock Inventory (Dec 31, 2017)

Broilers and other meat-type chickens	1,405
Cattle and calves	51,122
Goats	829
Hogs and pigs	2,528
Horses and ponies	2,001
Layers	4,794
Pullets	219
Sheep and lambs	924
Turkeys	(D)

See 2017 Census of Agriculture, U.S. Summary and State Data, for complete footnotes, explanations, definitions, commodity descriptions, and methodology.
[a] May not add to 100% due to rounding. [b] Among counties whose rank can be displayed. [c] Data collected for a maximum of four producers per farm.
[d] Crop commodity names may be shortened; see full names at www.nass.usda.gov/go/cropnames.pdf. [e] Position below the line does not indicate rank.
(D) Withheld to avoid disclosing data for individual operations. (NA) Not available. (Z) Less than half of the unit shown. (-) Represents zero.

USDA is an equal opportunity provider, employer, and lender.

iv. Development Trends

Disaster events can have many impacts, including the damage to buildings and building contents. This sub-section provides insight into the taxable improvements and growth patterns within St. Croix County, which will be important when considering hazard vulnerabilities in Section III.D.

According to the Wisconsin Department of Revenue, the aggregated assessed value for St. Croix County was over $12 billion.[3] **Table 7** summarizes the 2022 Statement of Assessments for the County. This reflects the overall rural nature of St. Croix 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.

Table 7. St. Croix County 2022 Assessed Total Values
(not equalized)

Land	$ 3,025,305,350
Improvements	$ 9,553,367,800
Real Estate	$ 12,578,673,150
Personal Prop.	$ 108,858,913
Aggregate	$ 12,687,532,063

From 2017 to 2022, the County's total assessed value of improvements grew by over $3.6 billion (over 61.7% increase or +12.3% 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 St. Croix County.

Table 8. St. Croix County Assessed Value by Land Use • 2022

Use	Number of Parcels	Land Value	Number of Parcels Improved	Improvements	Total
Residential	35,952	$2,292,797,050	32,889	$7,951,895,900	$10,244,692,950
Commercial	2,593	$430,311,300	2,103	$1,191,744,100	$1,622,055,400
Manufacturing	155	$35,061,500	137	$223,237,100	$258,298,600
Agricultural	10,907	$42,389,600	-	-	$42,389,600
Undeveloped	7,373	$47,801,350	-	-	$47,801,350
Forest	1,544	$87,245,300	-	-	$61,841,150
Ag Forest	3,270	$61,841,150	-	-	$87,245,300
Other	1,282	$27,858,100	1,294	$186,490,700	$214,348,800
Totals	**63,076**	**$3,025,305,350**	**36,423**	**$9,553,367,800**	**$12,578,673,150**

SOURCE: WISCONSIN DEPARTMENT OF REVENUE. 2022 STATEMENT OF ASSESSMENTS.

Not included in the above values are tax-exempt properties. St. Croix County has over 8,000 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 6 and 7, 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. 2021 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 land cover map (**Figure 5)** shows the generalized development pattern in St. Croix County. Cultivated crops dominate most of the County with more urban development in the west. In 2020, the County had an overall population density of 129.5 persons per square mile, which is higher than 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 increase to 164.8 persons per square mile by 2040. Population growth and development has mostly occurred in the west, due in part to the proximity to the Twin Cities. The County's population density is also increasing on the west side, with many of the new structures being slab-on-grade construction.

Between 2017 and 2022, St. Croix County experienced an increase of 2,982 improved, assessed parcels, or an average increase of 596 parcels per year. Over 90% of these improvements occurred on residential parcels.

Over 70 percent of all improved, residential parcels are in cities and villages, yet almost 90 percent of all residential assessed acreage in St. Croix County is in the unincorporated towns. Residential development in unincorporated areas is typically at low densities within St. Croix County. In general, most commercial and industrial uses tend to be located within incorporated areas or within highway corridors.

Commercial and manufacturing development is focused primarily in cities and villages in St. Croix County. They have over 80 percent of all assessed commercial and manufacturing acreage. The per-acre combined assessed value of commercial land and improvements are over 6 times higher in cities and villages compared to towns and over four 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.

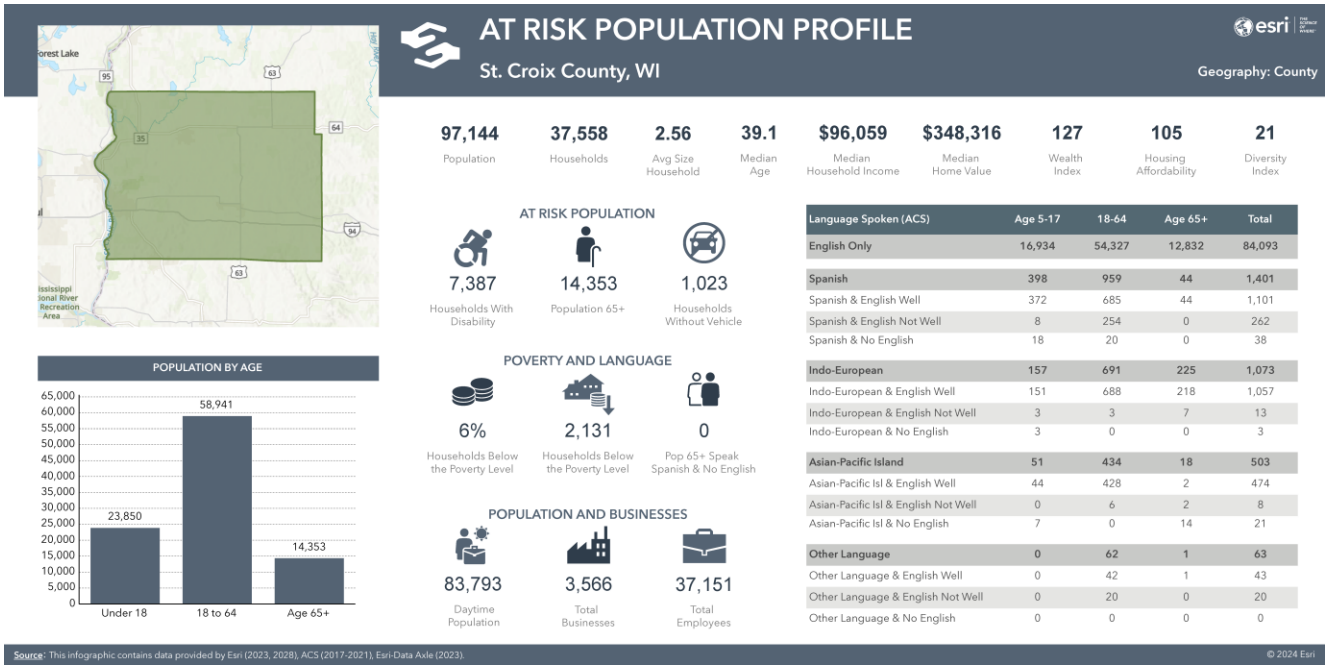
The most prevalent land uses in St. Croix County are agriculture and residential. Agriculture accounts for 60 percent of the assessed land in the County and almost 15 percent is considered residential. Land assessed as "undeveloped" accounts for another 9 percent of the assessed land in the County. In total, over 83 percent of the County's assessed acreage is agricultural, residential, or is otherwise undeveloped.

v. Underserved Communities & Socially Vulnerable Populations

This section reviews socio-economic factors throughout St. Croix County and their impacts on two groups: underserved communities and 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 stakeholders identified four primarily socially vulnerable populations and underserved communities:

- **Seniors** – As discussed previously, St. Croix County's population is aging and the County's seniors were the most frequently identified vulnerable population during the planning process.
- **Low-Income Residents & Communities** – Overall, St. Croix County is a relatively higher median household incomes compared to much of Wisconsin as discussed previously. However, over 2,100 households still reside below the poverty level as shown in the infographic on the following page. Mobile-home park residents, who are often lower income, were frequently identified as particularly vulnerable to tornado and high wind events.
- **Immigrant Populations** – St. Croix County has a growing immigrant population, for which English is a second language (ESL) or the population has very limited English proficiency. The Steering Committee expressed concerns that there are many uncertainties regarding the distribution of this population in the County, how much of this population is seasonal, how fast this population is growing, and what are the resources and preparedness needs of this population.
- **Rural Populations** – Portions of the County are less densely populated and access to emergency services and support systems varies as reflected by the community lifeline maps in Appendix D. The vulnerabilities for the three populations identified above are exacerbated in rural areas.



Language Spoken (ACS)	Age 5-17	18-64	Age 65+	Total
English Only	16,934	54,327	12,832	84,093
Spanish	398	959	44	1,401
Spanish & English Well	372	685	44	1,101
Spanish & English Not Well	8	254	0	262
Spanish & No English	18	20	0	38
Indo-European	157	691	225	1,073
Indo-European & English Well	151	688	218	1,057
Indo-European & English Not Well	3	3	7	13
Indo-European & No English	3	0	0	3
Asian-Pacific Island	51	434	18	503
Asian-Pacific Isl & English Well	44	428	2	474
Asian-Pacific Isl & English Not Well	0	6	2	8
Asian-Pacific Isl & No English	7	0	14	21
Other Language	0	62	1	63
Other Language & English Well	0	42	1	43
Other Language & English Not Well	0	20	0	20
Other Language & No English	0	0	0	0

- **Homeless -** St. Croix County also has a homeless population, which may be growing. The size, extent, and needs of this population has not been fully studied.

The cities, villages, and educational institutions were asked to further identify socially vulnerable populations within their respective communities or service areas, which are identified in Appendices L & M.

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 by the CDC 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 9. CDC Social Vulnerability Index Factors

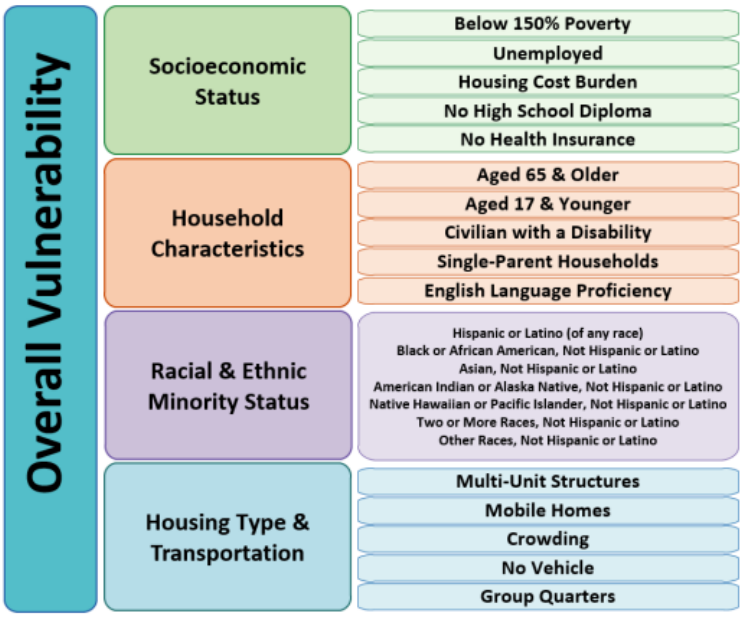
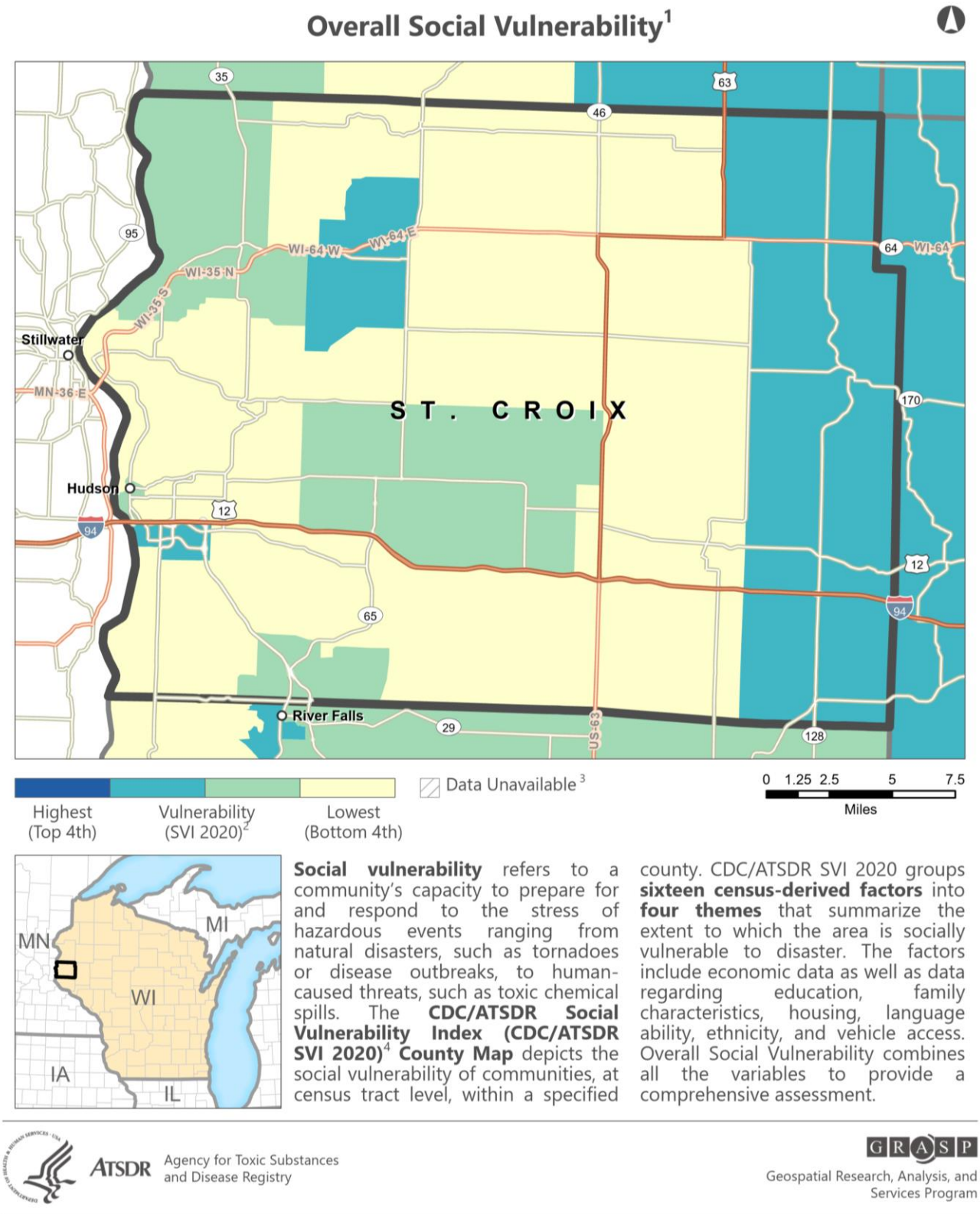


Figure 10 shows the overall vulnerability rankings for each of the census tracts in the County, as well as the vulnerability rankings within each theme and the following summarizes findings from the SVI data.

- Generally, St. Croix County has a relatively low social vulnerability with no tracts scoring above "low-medium" in overall risk (across all themes).
- No tracts ranked in the top 25%, or the highest-ranked grouping, for multiple SVI Themes. Additionally, no tracts scored in top 25% for overall vulnerability.
- Census tracts in the County's east and northwest had the highest vulnerability rankings in all themes, along with those tracts in the City of Hudson.
- The highest vulnerability across the County was in the Housing Type and Transportation Theme, with two tracts scoring in the top 25%--the New Richmond area and north of River Falls.
- The lowest vulnerability across the County was in the Racial and Ethnic Minority Status Theme.

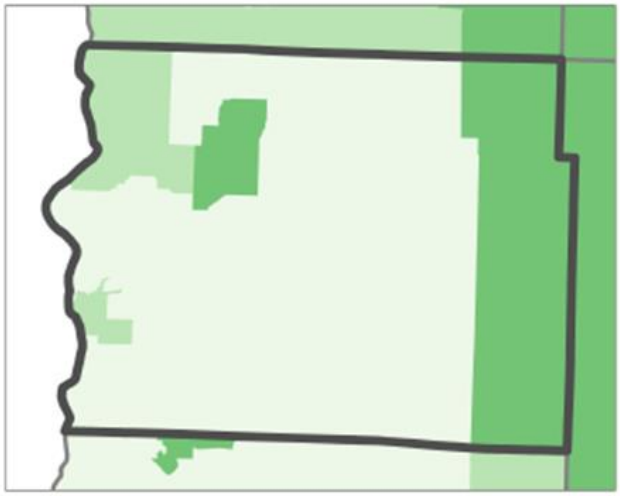
Figure 10. CDC Social Vulnerability by Census Tract for St. Croix County



CDC/ATSDR SVI 2020 – ST. CROIX COUNTY, WISCONSIN

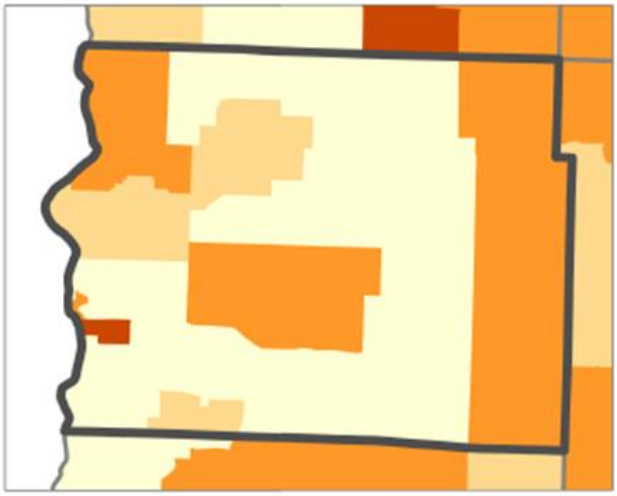
CDC/ATSDR SVI Themes

Socioeconomic Status[5]



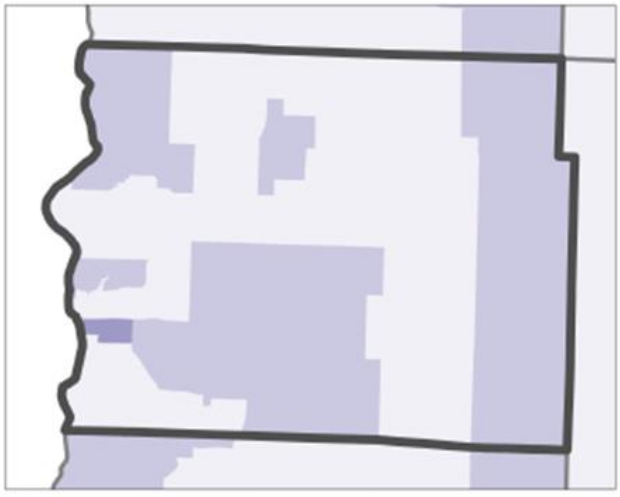
Highest (Top 4th) | Vulnerability (SVI 2020)[2] | Lowest (Bottom 4th)

Household Characteristics[6]



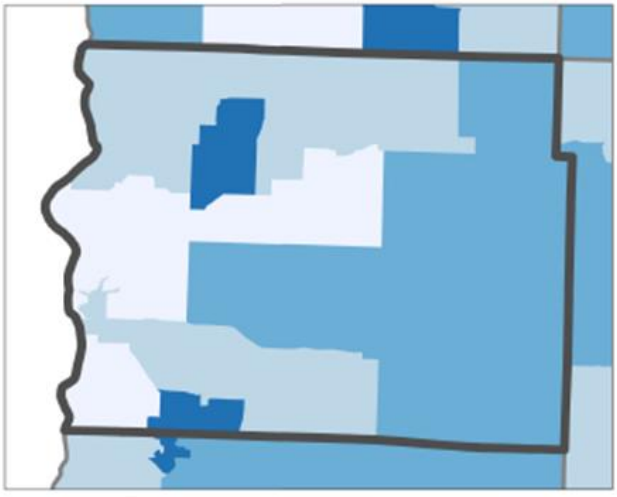
Highest (Top 4th) | Vulnerability (SVI 2020)[2] | Lowest (Bottom 4th)

Racial and Ethnic Minority Status[7]



Highest (Top 4th) | Vulnerability (SVI 2020)[2] | Lowest (Bottom 4th)

Housing Type/Transportation[8]



Highest (Top 4th) | Vulnerability (SVI 2020)[2] | Lowest (Bottom 4th)

Data Sources: [2]CDC/ATSDR/GRASP, U.S. Census Bureau, Esri® StreetMapTM Premium.
Notes: [1]Overall Social Vulnerability: All 16 variables. [3]Census tracts with 0 population. [4]The CDC/ATSDR SVI combines percentile rankings of US Census American Community Survey (ACS) 2016-2020 variables, for the state, at the census tract level. [5]Socioeconomic Status: Below 150% Poverty, Unemployed, Housing Costs Burden, No High School Diploma, No Health Insurance. [6]Household Characteristics: Aged 65 and Older, Aged 17 and Younger, Civilian with a Disability, Single-Parent Household, English Language Proficiency. [7]Race/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. [8]Housing 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

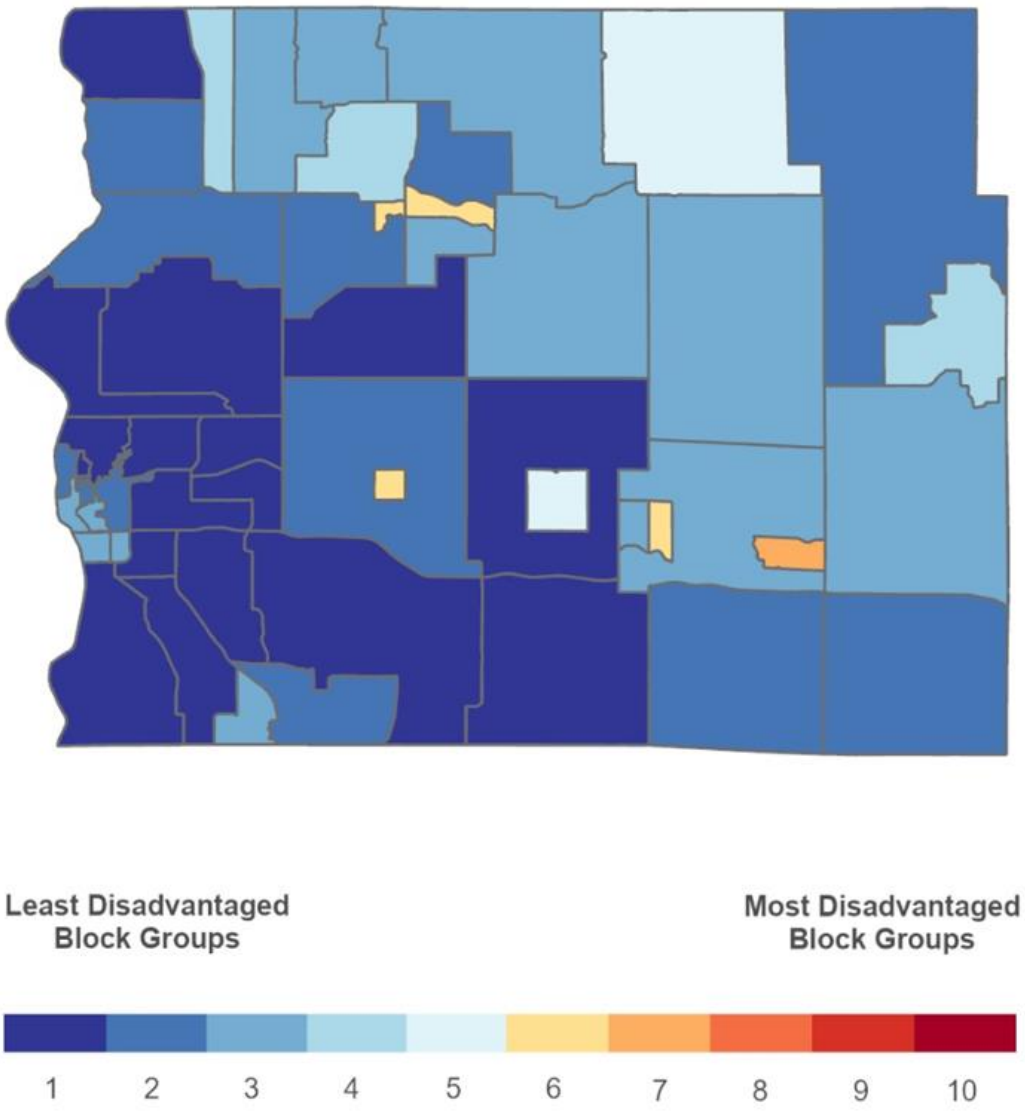
The Area Deprivation Index (ADI) utilized American Community Survey Census data from a 5-year average sample to identify socioeconomic disadvantaged Census block groups in terms of income, education, employment, and housing quality.

Figure 11 below shows the ADI results for St. Croix County. Overall, the ADI results reiterate St. Croix County's status as a resilient county. There are pockets of increased disadvantaged populations, with those areas being the following:

- Tracts in villages of Roberts, Baldwin, and Woodville and the City of New Richmond score in the 60th percentile (nationally).
- The Village of Hammond scored in the 50th percentile.
- Generally, the eastern half of the County is considered more disadvantaged than its western counterpart.

Figure 11.

Area Deprivation Index Results for St. Croix 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. St. Croix County's principal community lifelines are summarized in **Table 9** on the following page.

Appendix D includes a series of heat maps showing the distribution of most of the community lifelines in St. Croix 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 the previous table. 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 most of St. Croix County's community lifelines are concentrated in the cities and villages.

Appendix G evaluates the potential vulnerabilities for each category of community lifeline in St. Croix 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 L**, also frequently identify vulnerabilities, partnerships, or strategies related to these lifelines.

The following are the data sources identified in the second to last column of Table 9:

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

Table 9. St. Croix Community Lifelines

Lifeline	Component	Subcomponent	Count	Source/Date	Mapped
SAFETY & SECURITY					
	Law Enforcement/Security	Police Stations & Law Enforcement Agencies	11	HAZUS 2023	Y
		Correctional Facilities	1	ST CROIX COUNTY 2023	Y
	Fire & EMS Service	Fire/EMS Stations	11	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)	56	ST CROIX COUNTY, HAZUS 2023	Y
		Emergency Operations Centers (may also be within the above)	1	ST CROIX COUNTY 2023	Y
		Public K-12 Schools	29	WDPI 2023	Y
		Private K-12 Schools	5	WDPI 2023	Y
		Colleges & Post-Secondary Educational Institutions	2	HAZUS 2023	Y
		Public Libraries	9	WCWRPC 2023	Y
	Community Safety	All Dams	67	WDNR 2023	N
		Dams (significant to high hazard potential)	12	WDNR 2023	Y
		Emergency Shelters, Heating/Cooling Shelters, & Safe Rooms	11	WCWRPC 2023	N
FOOD, HYDRATION, SHELTER					
	Food	Commercial Food Distribution (e.g., retail, market, school)	490	WCWRPC 2023	Y
		Commercial Food Supply Chain	*not inventoried*		
		Food Distribution Programs (i.e., food banks)	13	WCWRPC 2023	Y
	Hydration	Bottled water distribution	*not inventoried*		
		see Water Systems lifeline for potable water systems			
	Shelter	Assisted Living Facilities & Nursing Homes	54	WDHS 2023	Y
		Homeless Shelters & Other Group Homes	4	ST CROIX COUNTY 2023	Y
		Adult Day Care, Alcohol, Drug, Mental Health Treatment Centers	28	WDHS 2023	Y
		Hotels or Other Commercial Housing Facilities	40	HAZUS 2023	Y
	Agriculture	*see Section II.C.iv.*			
HEALTH & MEDICAL					
	Medical Care	Hospitals	4	HAZUS 2023	Y
		Dialysis Clinics	1	WDHS 2023	Y
		Pharmacies	11	HSIP 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	69	HAZUS 2023	Y
		Clinical Laboratories	93	WDHS 2023	Y
	Patient Movement	Emergency Medical Service Providers	8	ST CROIX COUNTY 2020	N
		Air Ambulance/Heli-Pad	3	WDHS 2023	Y
ENERGY					
	Electrical Power Grid	Power Plants & Generation Systems, incl. hydro & natural gas	2	HIFLD 2023	Y
		Electric Transmission Systems	219 Miles	WPSC 2011	N
		Distribution Systems	*not inventoried*		
	Natural Gas, LP, & Other Fuels	Refineries/Fuel Processing	*none identified*		
		Fuel Storage Facilities & "Tank Farms"	*none identified*		
		Natural Gas Pipelines	100 Miles	WPSC 2011	N
COMMUNICATIONS					
	Infrastructure	Towers & Fixed Wireless	9	HIFLD 2023	Y
		Cable Systems & Wireline	*not inventoried*		
		Broadcast Facilities (TV & Radio)	8	HIFLD 2023	Y
		Data Centers	*not inventoried*		
	Responder Communications	ARES/RACES Base or Infrastructure	*not inventoried*		
	Alerts, Warnings & Messages	Emergency/Storm Sirens	34	ST CROIX COUNTY 2023	Y
	Finance	Banks & Credit Unions	25	HIFLD 2023	Y
	911 & Dispatch	Dispatch & Public Safety Answering Points (PSAP)	1	FCC 2023	N
TRANSPORTATION					
	Highway/Roadway/Motor Vehicle	Roads	1,760 Miles	WISLR 2023	N
		Bridges	296	HIFLD 2023	Y
	Mass Transit	Bus	*none identified*		
		Rail	*none identified*	HIFLD 2023	N
	Railway	Freight	67 Miles	HIFLD 2023	N
		Passenger	*none identified*		
		Bridges	50	HIFLD 2023	Y
	Aviation	Commercial (cargo/passenger)	*none identified*		
		General	1	HIFLD 2023	Y
HAZARDOUS MATERIAL					
	Facilities	HAZMAT-EPCRA Tier 1 EHS Planning Facilities			N
		HAZMAT-EPCRA Tier 2 Reporting Facilities			N
		Other HAZMAT storage, recycling, etc.	*none identified*		
	Spill Response	Spill Response Agencies or Resources, excluding fire depts	*none identified*		
WATER SYSTEMS					
	Potable Water Infrastructure	Wellhead Protection Areas	117	WDNR 2023	Y
		Community Wells, Towers, & Distribition Systems	36	WDNR 2023	Y
		Private High Capacity Wells	195	WDNR 2023	Y
		Water Bottling Facilities	*none identified*		
	Wastewater Management	Community Wastewater Treatment Plants & Systems	7	HIFLD 2023	Y

E. TRANSPORTATION SYSTEMS

Providing an uninterrupted transportation network is critical to St. Croix County given that residents often travel significant distances for services, critical facilities, and employment. The highway system serving St. Croix County links residents and businesses to the employment centers and services in Hudson, River Falls, New Richmond, and other area communities. The Wisconsin Department of Workforce Development estimates over half of employed residents commuted to Minnesota in 2023. Commuter traffic is expected to continue to rise and significantly influence growth and development in the County.

Interstate 94 is the principal arterial between Minneapolis-St. Paul and destinations to the east, such as Madison, Milwaukee and Chicago. Traffic on the Eau Claire-Hudson segment of the Interstate, which runs across St. Croix County, has been growing significantly. This stretch of Interstate 94 experiences traffic volumes of 40,000 to 80,000 vehicles a day and is the second most-traveled segment of interstate highway in the State of Wisconsin. In 2022, average daily traffic volumes at the I-94 bridge over the St. Croix River exceeded 83,000 vehicles per day.

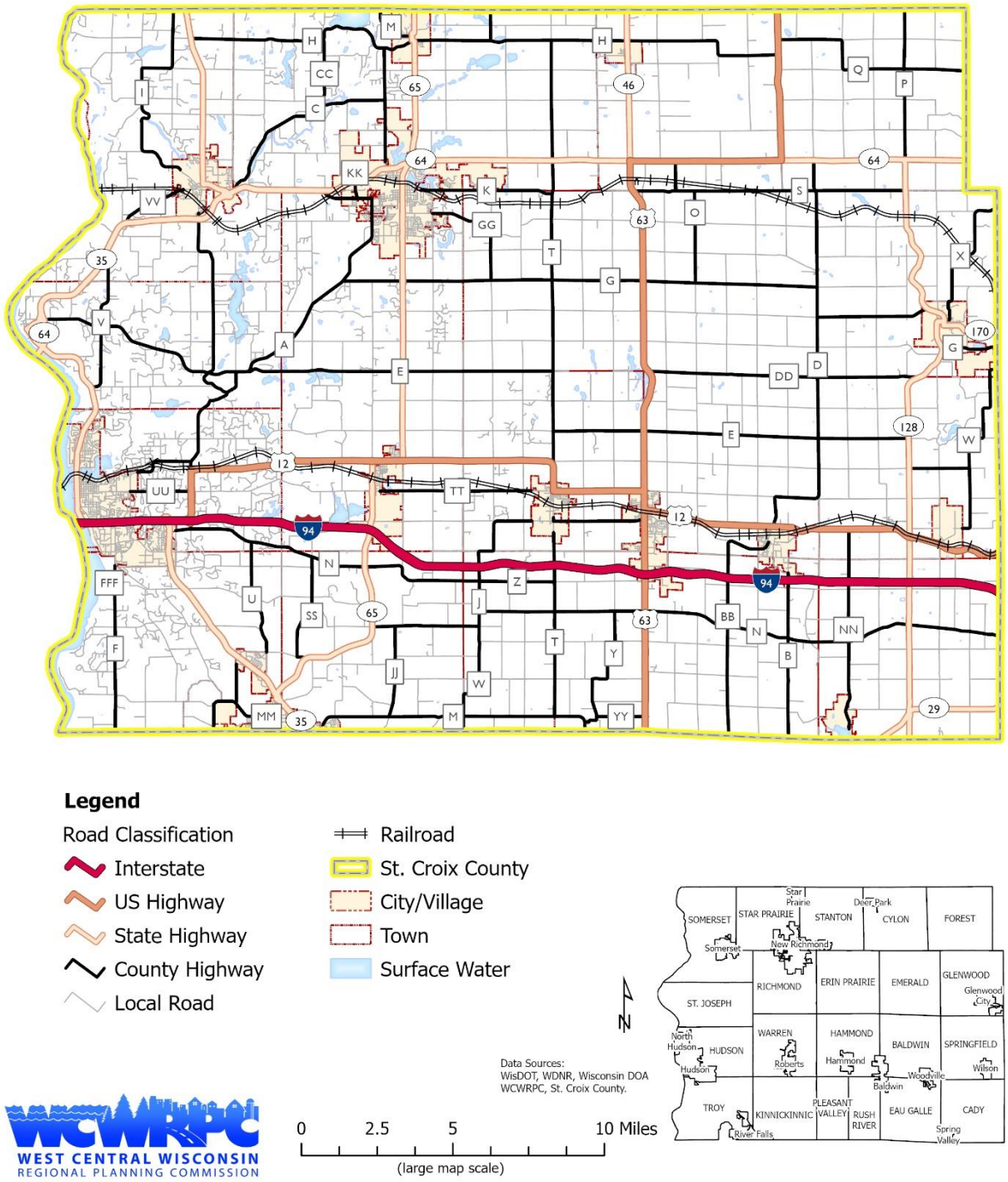
The County is also serviced by U.S. Highway 12, U.S. Highway 63, and seven State highways—STH 29, STH 35, STH 46, STH 64, STH 65, STH 128, and STH 170. These transportation routes and other transportation systems are shown on **Figure 12**.

In all, the County is served by approximately 1,941 miles of roads under federal, state, county, local municipal, or other jurisdiction, though these numbers are constantly changing due to growth and jurisdictional transfers. Due to widespread reliance on economic opportunities in Minnesota, hazard events that disrupt the bridges across the St. Croix River would significantly impact St. Croix County.

During the Plan update process, Interstate 94 was the most frequently mentioned transportation infrastructure concern due to the high volumes of truck, heavy truck traffic, travel speeds, and economic importance. Alternative routes to accommodate I-94 traffic are not feasible for a prolonged period of time. The I-94/Carmichael Road interchange area in Hudson was identified as a special concern since traffic volumes were exceeding the area's design capacity. This congestion has implications for emergency response.

The Mitigation Plan Update Steering Committee also stressed the critical importance of the I-94 and State Highway 64 bridges across the St. Croix River for the local economy and services. The average annual daily traffic volume for the I-94 bridge exceeded 83,400 in 2022. The AADT for STH 64 bridge in 2022 was 27,500 vehicles.

Figure 12. St. Croix County Transportation System



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. According to the National Register of Historic Places[4], St. Croix County has a total of 31 historic properties and six historic districts, which have received Federal or State historic landmark designation. Thirty of the 37 historic structures and districts are located within the cities of Hudson and New Richmond. **Table 10** lists the formally recognized locations of the places of historic significance within St. Croix County.

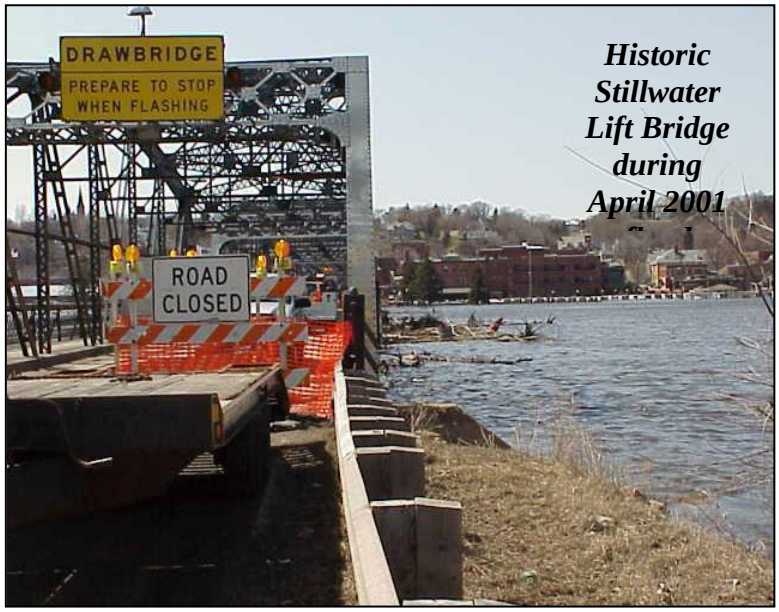
Table 10. St. Croix County Historic Properties

#	Historic Site	Address	City	Listed
1	Bell, Marcus Sears, Farm	1100 Heritage Dr.	New Richmond	1988
2	Bernd, William J., Bungalow	210 2nd St.	New Richmond	1988
3	Bernd, William J., House	143 Arch Av.	New Richmond	1988
4	Chicago, St. Paul, Minneapolis & Omaha Railroad Car Shop Historic District	Bounded by: Gallahad Rd., Sommers, 4th, & St. Croix streets	North Hudson	1984
5	Darling, Frederick L., House	617 3rd St.	Hudson	1984
6	Dwelley, William, House	1002 4th St.	Hudson	1984
7	Epley, Dr. Frank W., Office	137 3rd St.	New Richmond	1988
8	First English Lutheran Church	354 3rd St.	New Richmond	1988
9	Glover, Ezra, Jr., House	415 2nd St.	New Richmond	1988
10	Hudson Public Library	304 Locust St	Hudson	1984
11	Humphrey, Herman L., House	803 Orange St.	Hudson	1984
12	Johnson, August, House	427 St. Croix St.	Hudson	1984
13	Johnson, Dr. Samuel C., House	405 Locust St.	Hudson	1984
14	Kell, William H., House	215 Green Ave.	New Richmond	1988
15	Kinnickinnic Church	WI J, jct. with WI JJ	Kinnickinnic	2000
16	Kriesel, Louis C. & Augusta, Farmstead	132 State Trunk Hwy 35/64	St. Joseph	2009
17	Lewis Farmhouse	Farm Dr.	Boardman	1982
18	Lewis-Williams House	101 3rd St.	Hudson	1985
19	Merritt, Samuel T., House	904 7th St.	Hudson	1984
20	Mielke, Joseph, House	326 Second St. W	New Richmond	1988
21	Moffat, John S., House	1004 3rd St	Hudson	1974
22	New Richmond Commercial Historic District	All of S Knowles Ave between the Willow River and E Third St.	New Richmond	2022
23	New Richmond East Side Historic District	Bounded by S Arch Ave, E Second St, S Starr Ave and E Third St	New Richmond	2022
24	New Richmond News Building	145 2nd St.	New Richmond	1988
25	New Richmond Roller Mills Co.	201 N. Knowles Ave	New Richmond	1988

[4] National Register of Historic Places and Wisconsin Register of Historic Places databases. December 29, 2023.

26	New Richmond West Side Historic District	Bounded by: Willow, Minnesota, W. 2nd, S. Washington	New Richmond	1988
27	Opera Hall Block	516 2nd St.	Hudson	1979
28	Phipps, William H., House	1005 3rd St.	Hudson	1987
29	Second St. Commercial District	1st, 2nd, Walnut, & Locust	Hudson	1984
30	Sixth St. Historic District	6th St. between Myrtle & Vine St.	Hudson	1984
31	Soo Line Depot	120 High St.	New Richmond	1988
32	Soo Line High Bridge	Restricted	Somerset	1977
33	St. Croix County Courthouse	904 3rd St.	Hudson	1982
34	Stillwater Bridge	MN36/WI64 over St. Croix River	Houlton	1989
35	Thelen, John Nicholas & Hermina, House	1383 & 1405 Thelen Farm Trail	St. Joseph	2009
36	Thompson, Erick J., House	350 2nd St.	New Richmond	1988
37	Williams, T.E., Block**	321 2nd St.	Hudson	2009

The above list includes six historic districts—2 in Hudson, 3 in New Richmond, 1 in North Hudson—that encompass numerous buildings. Two of the structures are bridges which could be particularly vulnerable to flooding and ice damming.



Historic Stillwater Lift Bridge during April 2001

Travel on the Stillwater Lift Bridge is limited to pedestrian and bicycle traffic. Floods and ice dams will likely continue to threaten the historic Lift Bridge.

Most of these historic buildings are very well constructed, and they continue to serve as an important vestige of St. Croix County's past. As will be discussed later in the hazard vulnerability assessment of this Plan, these structures are generally not any more vulnerable to hazard risks (e.g., tornado, winter storms) than more recent construction.

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 over 1,500 buildings, structures, or objects in St. Croix County which illustrate Wisconsin's unique history. A detailed assessment of the vulnerability of each of these sites to hazard events is not currently available. Such sites are quite varied and include churches, cemeteries, homes, and barns, as well as archeological sites.

SECTION III.
ASSESSMENT OF HAZARD CONDITIONS

In order to 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 the greatest risk to St. Croix 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 St. Croix County could potentially be at risk from a variety of hazards, this plan focuses on those hazards that pose a significant risk.

i. Federal Disaster Declarations for St. Croix County

Since 1953, there have been seven Presidential Declarations for a Major Disaster that included St. Croix County:

Month & Year	Event Summary for St. Croix County	Public Assistance	Individual Assistance
April 1965	Tornadoes, severe storms, and flooding in Wisconsin	x	x
May 1969	Tornados, severe storms, and flooding result in a declaration of twenty Wisconsin counties.	x	x
Summer 1993	Flooding and severe storms in Summer of 1993 resulted in a declaration for 47 Wisconsin counties. Statewide damages exceeded $740 million.	x	x
June 1998	Severe storms, straight-line winds, tornados, heavy rain and flooding from June 18 to June 30 resulted in a declaration in fourteen Wisconsin counties.	x	
April-July 2001	Heavy snow cover rapidly melted in spring resulting in river flooding with additional flash flooding and other damage from severe thunderstorms, high winds, and tornados in late spring and early summer. Some counties also experienced flash flooding in early August. 32 WI counties were included in the declaration.	x	x
September 2002	Severe storms, tornados and flash flooding occurred from September 2 to September 6 affecting 19 WI counties, including the very destructive Ladysmith tornado.		x

July 2013	Severe storms, flooding, and mudslides between June 20 and June 28 resulted in a disaster declaration for eight Wisconsin counties primarily due to damages to roads, culverts, and bridges.	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, as of 12/31/22 there have been at least ten State or Federal Emergency Declarations involving St. Croix County primarily related to drought:

Month & Year	State or Federal	Event Type
June 1976	Federal	Drought
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
Mar 2020	State	Public Health Emergency for COVID-19
Mar 2020	Federal	COVID-19

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. For instance, the 2010 flooding resulted in the most flood damage in St. Croix County in recent history, but the event was not widespread. 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, 2022, St. Croix County experienced 424 extreme weather hazard events on 248 different dates reported to the National Climatic Data Center as summarized in **Appendix E**. These events included:

- 3 deaths and 10 injuries from lightning, high winds, winter storm, and flooding events.
- Over $60 million in property damage was reported (unadjusted for inflation), largely due to tornados, high winds, lightning, hail, and flash flooding.
- Hail is the mostly frequently reported natural hazard event with 136 reports, closely followed by Thunderstorm Wind/High Wind with 123 reports
- Winter Storms and Heavy Snows are fairly common with 78 reports, while true Blizzards are rare with no reports.

ii. St. Croix County Overall Threat Assessment

During the update of the 2024 *St. Croix County Multi-Hazard Mitigation Plan*, Steering Committee members discussed natural hazard trends and concerns. This included reviewing the National Risk Index data for St. Croix County, the 2022 Health Vulnerability Assessment results (HVA) completed by the Northwest Wisconsin Healthcare Emergency Readiness Coalition, and the hazards included in the 2018 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 St. Croix 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 number of respondents. The compiled results of the updated survey are shown in **Table 11**.

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?*

This exercise was very useful to the Steering Committee in finalizing which hazards pose a significant risk to St. Coix County. 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, overall, the hazards of significant risk for St. Croix County haven't changed since the 2018 Plan.

Table 11. St. Croix County Hazard Risk & Vulnerabilities Survey Results (2023)

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

Hazard	Proba-bility	Vulner-ability	Ntnl Risk Index	NWHERC HVA	in 2018 Plan?	section of 2024 plan
Natural Hazards						
Riverine or Overbank Flooding	2.6	2.3	V. Low	59-61%	x	flooding
Overland or Stormwater Flooding	2.3	2.4			x	flooding
Heavy Snow Storm and Blizzards	4.0	3.6	High	33-55%	x	winter storms & extreme cold
Ice Storms and Sleet	3.9	3.6	High	50-53%	x	winter storms & extreme cold
Winter Kill of Crops	1.9	1.9			x	winter storms & extreme cold
Extreme Cold/Cold Wave	3.6	3.0	V. High	56%	x	winter storms & extreme cold
Forest or Wild Fire	1.6	2.1	Low	38%		no
Tornadoes	2.9	3.4	Mod	48%	x	tornadoes
High Winds	3.5	3.1	V. High		x	tornadoes
Thunderstorms, Lightning, Hail, etc.	4.3	3.0	Mod-Hi	35%	x	thunderstorms
Extreme Heat/Heat Wave	3.3	2.8	Mod	56%	x	extreme heat
Drought	2.6	2.3	V. Low	32%	x	drought
Landslides or Sinkholes	1.0	1.5	Mod	37%		subsidence in haz mat spills
Earthquakes	0.3	1.4	V. Low	24%		no
Fog	2.1	1.3				no
Technological Hazards						
Haz Mat Incident - Fixed	2.5	3.0		36%	x	haz mat spills *(excludes non-point source)*
Haz Mat Incident - Transportation	3.1	3.4		55%	x	
Groundwater Contamination	2.5	3.0		56%		
Animal Waste Management	1.9	1.9				
Long-Term Power Outage	2.3	3.5		25-65%	x	long-term power outage
Nuclear Power Plant Incident	1.3	2.0		22%	x	nuclear accident
Dam Failure Flooding	1.0	2.4			x	flooding
Airline Accident	1.3	2.1		37%		partially in haz mat spills, but not passenger/mass casualty
Railroad Accident	2.5	3.8				
Manmade/Intentional & Other Hazards						
Pandemics/Zoonotic Disease	2.5	2.8		65%		reference Public Health plans
Livestock Flu and Diseases	1.6	1.8				no, unless zoonotic
Invasive Species & Diseases	2.1	2.3				reference to other plans
Active Shooter/Active Threats	1.9	4.0		67%	x	active threats & civil disturb.
Terrorism, Domestic (all)	1.4	3.3		29%		partially covered as part of active threats and cybersecurity
Terrorism, International (all)	1.3	2.8				
Terrorism, Critical Infrastructure	1.3	3.3				
Cyber Attacks	2.5	3.5		49-64%	x	cyberattack (brief)
Civil Unrest or Institutional Riot	1.6	2.5		58%	x	active threats & civil disturb.

FEMA guidelines require that mitigation plans describe all natural hazards that can affect the jurisdictions in the planning area, and provide the rationale if omitting any natural hazards that are commonly recognized to affect the jurisdictions in the planning area. FEMA defines natural hazards as a source of harm or difficulty created by a meteorological, environmental, or geological event.

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, nuclear accident, and, to a less extent, long-term power outage 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, St. Croix County's risk is low compared to the rest of the U.S.
- **Figure 13** shows the risk index classification for each census tract. 12 of the census tracts (in yellow) rank in the 65th to 83rd percentile nationally for severe weather risk, largely based on estimated annual losses based on past tornado, high wind, and other storm events.
- All tracts are classified as being relatively high in community resiliency. Four tracts had moderate social vulnerability, likely due to lower incomes or higher age.
- Expected Annual Losses for St. Croix County are highest for tornadoes, then strong winds, cold waves, hail, lightening, ice storms, and heat waves.

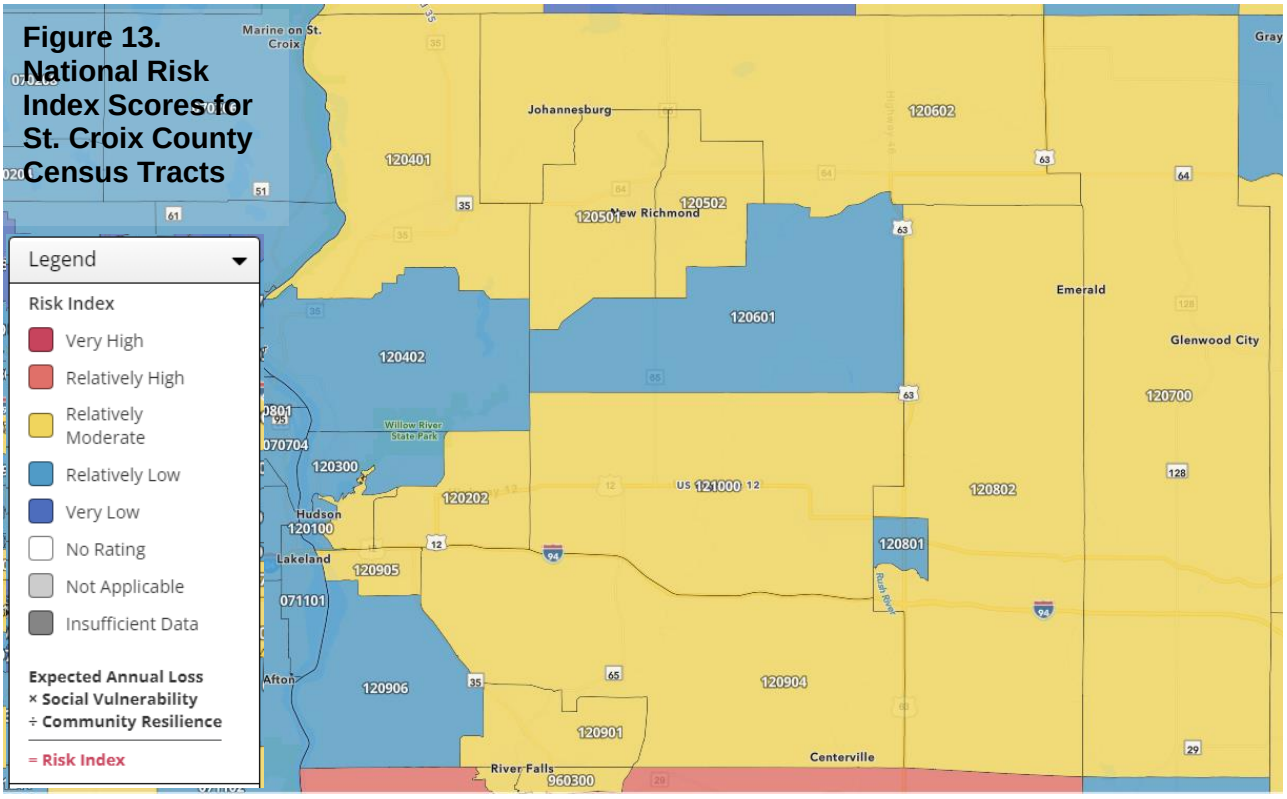


Figure 13. National Risk Index Scores for St. Croix County Census Tracts

iii. Natural Hazards of No Significant Risk

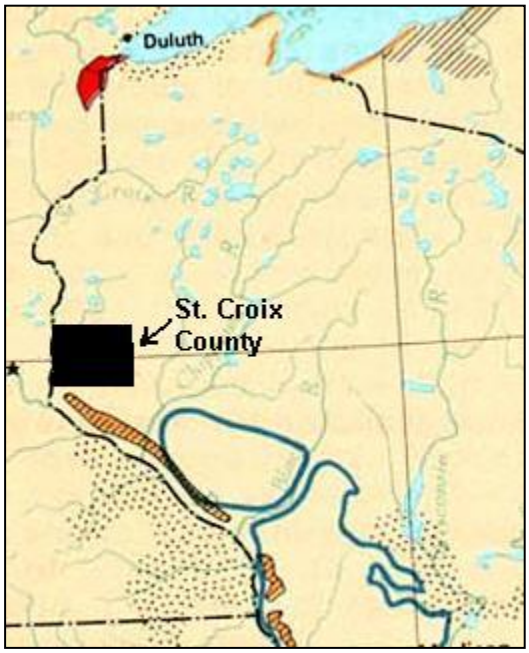
Although there are other hazards that could potentially impact the County, there are very few or no records of the following events occurring in St. Croix County in the NOAA database or the local impacts were very low when such events have occurred. In order to meet the comprehensive requirements for developing an all hazard mitigation plan, these other natural 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 as either: having a minimal chance of occurring, posing a minimal widespread risk to the safety of residents or property, or only offering very limited mitigation options.

Landslides

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*[5] (excerpt for Wisconsin in **Figure 14**) identifies no large-scale landslide risks for the St. Croix County area.

Figure 14. Landslide Hazards in Wisconsin



source: U.S. Geologic Service. Landslide Overview Map of the Conterminous United States.

According to the USGS topographic maps and U.S. Natural Resources Conservation Service soil maps for St. Croix County, there are 78,000 acres that potentially have a slope of 13 percent or greater representing 11.7 percent of the total St. Croix County land base. Of this, 13,815 acres (2.1% of St. Croix County) have slopes of 21 percent or greater. The majority of these steep slopes are located in the northern and western portions of the County. Additional localized and site-specific variations in topography and slope may exist. Past glacial activity has created some topography in St. Croix County that is scenic, but may also be sensitive to development in some areas.

While steeper areas exist, 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 may create serious riverbank erosion and washouts concerns for some locations, which will be discussed in the

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

flooding assessment. In comparison, the sudden, large-scale movement of ground which is characteristic of a landslide is not expected to occur in St. Croix County; and there are no records of large landslide events in the County.

Overall, the erosion which does occur has been largely mitigated through subdivision law, site plan review, forest management plans, agricultural practices, and erosion control plans for construction sites. However, during the planning process, some erosion problem areas associated with flooding or steep river banks were identified and will be discussed later in this report.

Land Subsidence and Sinkholes

Land subsidence is an event in which a large area 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. A sinkhole or closed depression is one type of subsidence where a depression in the ground has no natural external surface drainage.

Closed depressions (or sinkholes) are common features in St. Croix County. They are formed through karst topography, which is particularly well developed in the eastern half of the County, or through the kettle depressions remaining from glaciation, which are not uncommon in the western and northwestern portions of the County. Karst development occurs from thick, soluble areas of underground limestone which dissolve over time, forming sinkholes. Kettles develop when large blocks of glacier ice are buried with glacial deposits and subsequently melt. Due to melting snow and water draining off the landscape, sinkholes can be a more frequent concern in the spring months.

There are no records of substantial damage or injury from land subsidence within St. Croix County. The only damage event noted during the planning process was the reported opening of a sinkhole under a tractor during field work. However, closed depressions are considered environmentally sensitive features since the release of pollutants into or near a closed depression can reach groundwater immediately. As such, these closed depressions will be discussed further within the hazardous materials spills assessment.

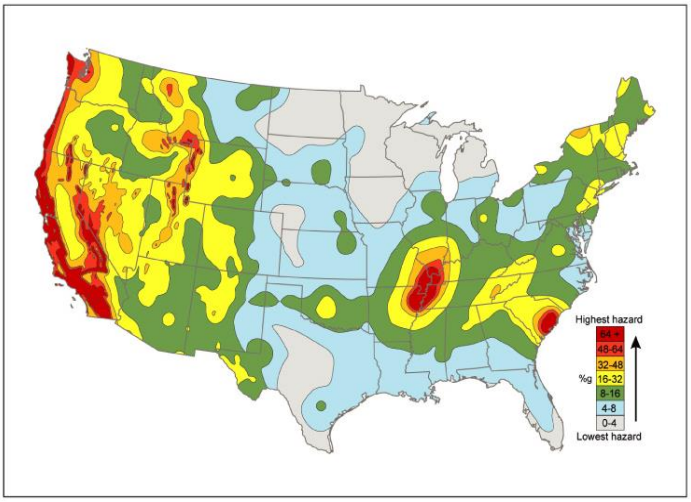
Earthquakes

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.

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 15** shows, the St. Croix 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, St. Croix 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; St. Croix County is a non-affected area.[6]

Figure 15. 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/CUShazard.html>.

University of Wisconsin-River Falls students and geologists have studied an ancient major fault line which is located approximately 2 miles south of Hudson and extends north towards Willow River State Park and west towards Hastings, MN. Called the Hastings Fault, it has characteristics similar to the New Madrid Fault; but there has been no evidence of any motion on the Hastings Fault for the last 400 million years. While an earthquake along the Hastings Fault could be catastrophic, geologists estimate that no significant effects on this fault will likely occur within the next few million years. As such, the earthquake threat to St. Croix 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 location and type of fog. Generally, strong winds tend to prevent fog formation. In St. Croix County, fog occurs infrequently and is typically a short-term weather event lasting only for portions of a day. The NCDC database has one St. Croix County record for a dense fog event, which occurred in November 2007 and included much of west central Wisconsin.

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). St. Croix 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. St. Croix County also has no very large inland lakes or seas within its boundaries. Such coastal hazards have no direct impact on St. Croix County, and only occasionally indirectly impact the County in the form of thunderstorms, which are discussed separately. There have been reported instances of waterspouts on Lake St. Croix, but these are not unique coastal hazards in the County, primarily being

[6] 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.

associated with tornados. For example, the 1899 New Richmond tornado was reported as a waterspout as it passed over Lake St. Croix.

Forest & Wild Fires

A wildfire is an uncontrollable fire spreading though 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, or other carelessness, or can be caused by natural events such as lightning. A wildfire occurring on forest or woodlands, typically outside the limits of incorporated villages and cities, is commonly referred to as a forest fire. Forest and wild fires can cause significant injury, death, damage to property, and loss of natural resources.

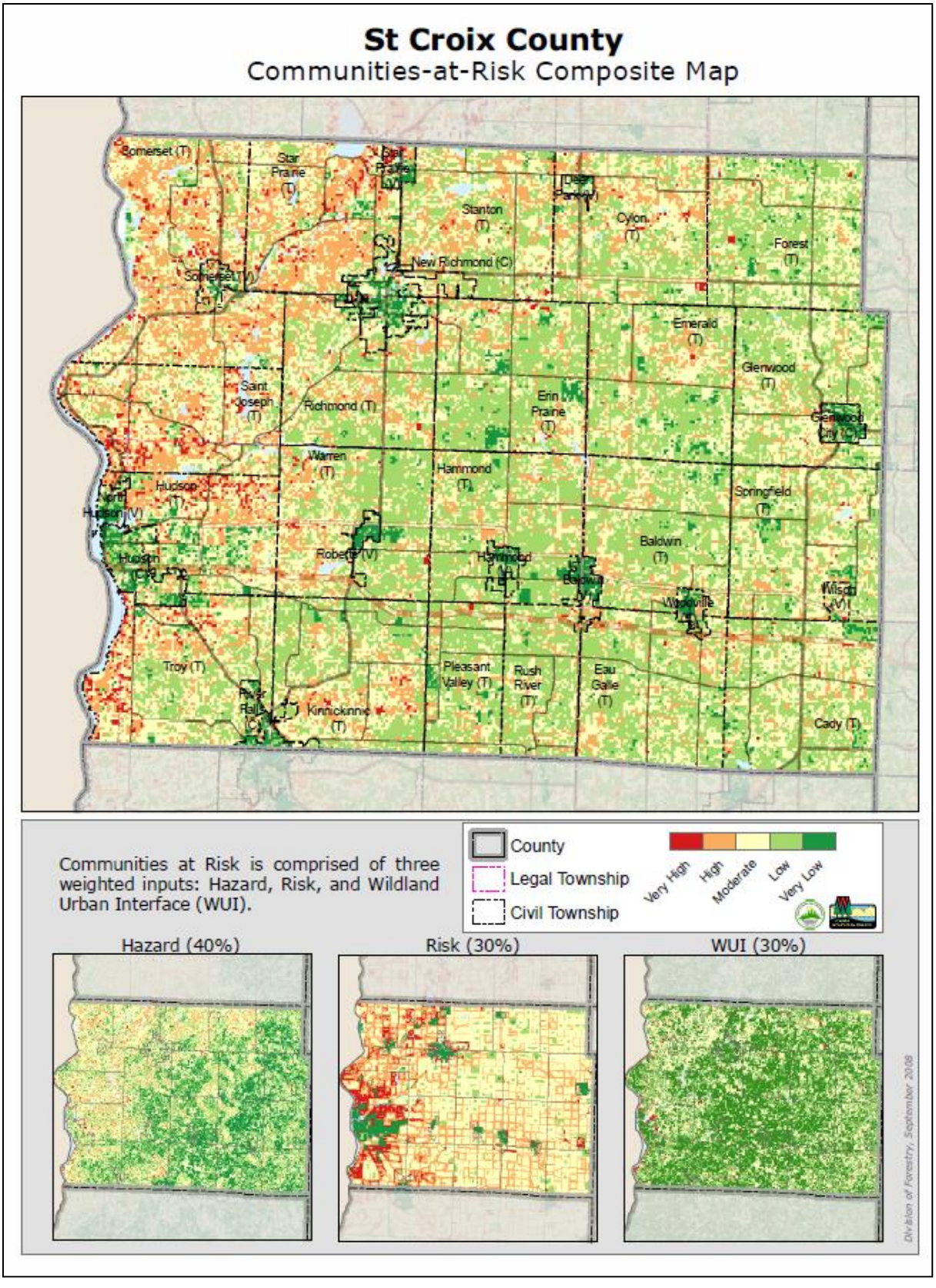
Land use, vegetation, amount of combustible materials present, and weather conditions (e.g., wind, low humidity, lack of precipitation) are the chief factors determining the number of fires and acres burned. Forest fire and wildfires are more likely when vegetation is dry from a winter with little snow cover, followed by a spring and summer with sparse rainfall. As development within forested areas increases, especially within pine plantation, so does the risk for forest fire.

There are no County Forest lands in St. Croix County and, as shown previously in Figure 8, the County has no large areas of pine or evergreen forest. In 2021, approximately 7.8% of the County was predominantly forest or forested wetlands. Over 70% of the forest land cover in St. Croix County was identified as being deciduous or mixed forest, which has a relatively lower vulnerability to forest fire. The remaining 30% of forested areas, or 2.3% of the overall County, were classified as evergreen forest. Forested areas in St. Croix County are relatively scattered. The highest concentrations of forested lands are in the west along the St. Croix River and in the towns of Hudson and St. Joseph. The largest contiguous block is approximately 94-acres in size along the St. Croix River in the Town of Troy.

All of St. Croix County falls within the lowest forest fire level of protection (LOP 5) as assigned by the Wisconsin Department of Natural Resources (WDNR) based on fuel types and number of improved parcels (vulnerabilities). No part of St. Croix County is within a WDNR intensive fire protection area. As such, WDNR wildfire data for the County is very limited with the largest wildfires consisting of two events east of the Boardman area—a 152-acre fire cause by campfire at a party and an 81-acre fire purposely started with an incendiary.

As part of the WDNR's 2010 Wildland Fire Management Program Assessment, St. Croix County falls within their Western Prairie and St. Croix Moraines fire landscapes. Mitigation recommendations for these fire landscapes are limited to school fire prevention programs by local partners and statewide media prevention messages, with some additional local messages when the fire danger is elevated. Only limited, specific situations will be considered for additional mitigation efforts. Based on a 2008 WDNR analysis, the Towns of St. Joseph, Somerset, and Star Prairie were rated as communities-at-risk of wildfire due to land cover and risk (potential ignition) as shown in **Figure 17** on the following page. Three additional towns were identified as communities-of-concern.

Figure 17. St. Croix County Wildfire Communities-at-Risk Composite Map



The Steering Committee rated wildfire as having a low-to-some probability in St. Croix County, with a slightly higher vulnerability, but still well below a substantial or significant risk overall. During meetings and surveys, grassland fires were more frequently mentioned as a hazard concern, rather than forest fire. The U.S. Fish & Wildlife Service owns 8,700 acres of public lands on 44 separate tracts within eight counties as part of the St. Croix Wetland Management District. While the largest concentrations of these grassland areas are located in St. Croix County, most are actively managed for wildlife; there is not wildland-urban interface within these grassland areas. In total, only about 1.7% of the County is covered by non-crop grasslands. They are typically small, scattered sites, primarily in the northern half of the County. The largest contiguous acreage is a roughly 315-acre portion of the Cylon Wildlife Area.

In short, large forest fires and wildfires are considered not to be of significant risk to St. Croix County and its residents at this time and for the near future. Based on vegetation, the risk of forest fire is higher in some localized areas and some relatively smaller wildfires will occur. Related risks and vulnerabilities should be monitored since the level of risk and vulnerabilities could change with development patterns (e.g., subdivision development in pine plantation), vegetation changes (e.g., large plantings of pine forest), or climatic changes (e.g., lengthy periods of drought).

B. HAZARDS OF CONCERN ADDRESSED IN OTHER PLANS

The hazards briefly described in this sub-section pose a risk for St. Croix 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:

- Most are not typically included in a county-level mitigation plan.
- Most are largely addressed through other intensive planning and preparedness efforts for which St. Croix County Emergency Services 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.
- The current risk for St. Croix County is relatively low.

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

i. Zoonotic & Emerging Infectious Disease

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 2024 Health Vulnerability Assessment (HVA) prepared by the Northwest Wisconsin Healthcare Emergency Readiness Coalition (NWW-HERC), of which St. Croix County Public Health is a member, evaluated the potential for a global/major and local/regional emerging infectious disease outbreak:

	Global/Major Outbreak	Local/Regional Outbreak
Probability of Future Occurrence		
Probability	High; 4+ events/30 years	High; 4+ events/30 years
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 to Substantial	Moderate to Substantial
Preparedness	Moderate to Substantial	Moderate to Substantial
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 third highest hazard threat facing our region, only behind pharmaceutical supply shortage and supply disruption, and tied with loss of normal electrical power.

Notable Events

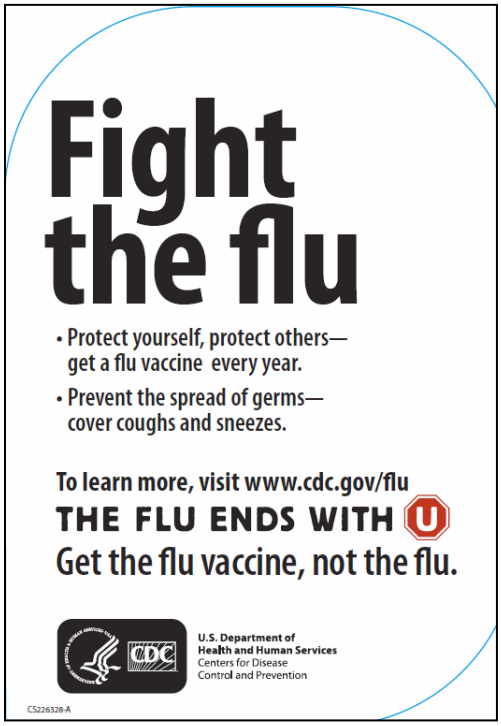
An **influenza pandemic (or pandemic flu)** occurs when a new influenza virus emerges for which there is little or no immunity in the human population, begins to cause serious illness, and then easily spreads person-to-person worldwide. The potential risk of transmission, vulnerabilities, and impacts 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).[7] The CDC further estimated that 8,720 to 18,050 H1N1-related deaths occurred during the same timeframe. H1N1 in the United States 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 poultry producers especially hard; the seasonal re-emergence was partially attributed to migrating waterfowl. 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.[8]



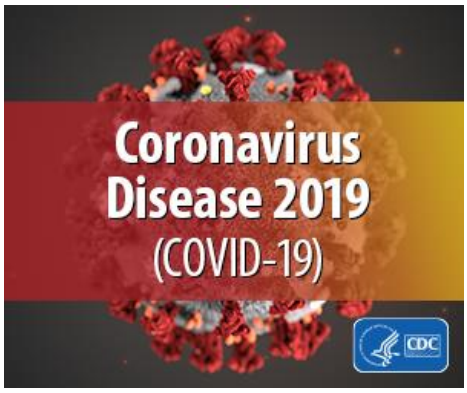
Though the H5N1 virus usually does not infect people, rare cases of human infection have been reported. There is no human immunity and no commercial vaccine is available. One study showed that it is possible for avian flu viruses (and bacteria like Salmonella) to enter groundwater from a large source of poultry fecal waste, though the risk of virus transmission from groundwater to people is not known.[9] And some avian flu variants have undergone mutations, which could impact the vulnerability to humans. But, to date, there has been no known human-to-human transmission of avian (or bird) flu.

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

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

[9] Borchardt, 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.

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.[10] 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 over 1.1 million deaths in the United States attributed to COVID-19. As of 3/10/23, there were over 31,000 confirmed COVID-19 cases in St. Croix County and 168 reported deaths. In addition, according to the CDC website, up to 41% of non-hospitalized adults 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. Statewide average SARS-COV-2 levels in municipal wastewater sampling for December 2023 are already well above 2022 peak levels and Wisconsin has been experiencing over 500 new hospitalizations each week due to COVID-19 related illness.

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.
- 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.
- Some communities initially struggled with determining who was an essential worker. More than one emphasized that public works personnel need to be included in this classification.

[10] https://www.cdc.gov/flu/pandemic-resources/monitoring/current-situation.html
[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).

- More than one community mentioned how hard the pandemic was on nursing homes and assisted living facilities, including the patients, staff, and family members of both.
- 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 CDC 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.

As of summer 2019, the Eastern Democratic Republic of the Congo is experiencing an outbreak of **Ebola Virus Disease** (EVD), which is the second largest outbreak since the virus was discovered in 1976. As of July 31, 2019, the World Health Organization states that a total of 2,713 EVD cases were reported with a 67% fatality rate.[12] 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.

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. 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. 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.

St. Croix County Public Health is concerned with decreasing immunization rates among County residents. According to the Wisconsin Department of Health Services and the Wisconsin Environmental Public Health Tracking Program:

- 15.1% of St. Croix County residents have received at least one dose of the most recent 2023-2024 COVID-19 vaccine, which is slightly lower than the State average.[13]

[12] https://www.who.int/csr/don/02-august-2019-ebola-drc/en/

[13] https://data.news-leader.com/covid-19-vaccine-tracker/wisconsin/55/

- Almost 28% of County residents received at least one dose of the 2023-2024 flu vaccine, compared to 33.4% Statewide.
- 66.4% of two-year old residents in 2021 were immunized compared to the State average of 68.9%.[14]

During the plan update, some stakeholdera mentioned that **tick-borne illnesses (e.g., Lyme Disease, Borrelia, Babesiosis, Anaplasmosis)** are increasing, which is consistent with State incidence. In 2022, St. Croix County had 131 cases of Lyme Disease and it is believed that cases are under-reported. This places St. Croix as 11th out of Wisconsin's 72 counties for confirmed or probable Lyme Disease cases. In comparison, St. Croix County only had thirteen reported Lyme Disease cases in 1991.

In early 2022, **blastomycosis** infections were identified in people and dogs in an area adjacent to the Willow River near Boardman, Wisconsin. Blastomycosis is a rare but potentially serious fungal infection that can affect humans and animals, but cannot be passed from person to person and is not zoonotic. St. Croix County Public Health worked with the Wisconsin Department of Health Services (DHS) and the Centers for Disease Control and Prevention (CDC) to investigate these cases. Public Health continues to share to information about blastomycosis with the public and workers in the area.

Communicable Disease Prevention and Control

Within St. Croix 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:

- St. Croix County Public Health maintains the 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

[14] https://dhsgis.wi.gov/DHS/EPHTracker/#/map

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. 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.

- The PHEPP includes an educational component with emphasis on prevention and control (e.g., recognizing symptoms, vaccinations, and personal preparedness).
- The PHEPP 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. The most commonly identified at-risk population during the planning process were seniors and persons with a disability, especially when living alone without a caregiver. As discussed in Section II.C.v., lower-income residents, homeless, and persons not proficient in English (immigrant residents and seasonal workers) are additional at-risk populations. Emergency contacts of potentially vulnerable populations 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.
- St. Croix County is currently restructuring the PHEPP based on the West Central Wisconsin Public Health Consortium's template. COVID-19 was bigger that the current PHEPP model could fully accommodate. The updated template is more scalable, allowing the PHEPP to better adapt to a larger-scale event.
- 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.
- 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.
- The pandemic eroded trust in Public Health officials and practices among some members of the public. The pandemic also showed that there is a significant shortage of health care workers in the region, such as Certified Nursing Assistants and nursing home workers. This need will only increase as the County's population ages.
- In addition to monitoring and preparing for communicable diseases, St. Croix 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.

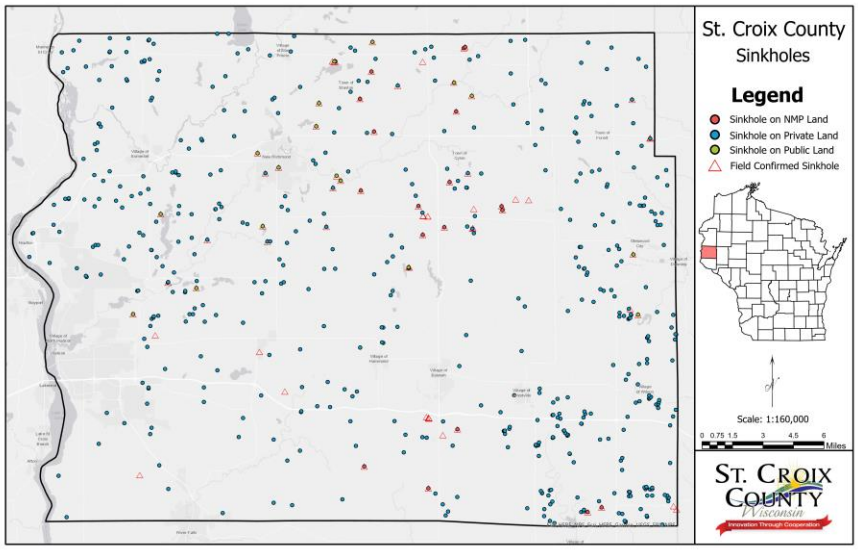
ii. Groundwater Contamination

Historically, St. Croix County has good groundwater quality and quantity. Protecting groundwater and surface water are consistently the top natural resource priorities in comprehensive planning efforts in most St. Croix County communities. This is not surprising since groundwater is the local source of drinking water for nearly all St. Croix County residents. This sub-section recognizes the importance of protecting groundwater from contamination.

Groundwater contamination can come from point sources (e.g., a leaking underground storage tank, a chemical spill, failing septic systems) or non-point sources (e.g,, landspreading, agricultural practices). Generally, point sources are often easier to identify, regulate, manage, remediate, and monitor. An assessment of hazardous materials spill risks and vulnerabilities is included later in Section III.D.x. Not covered in this report are the non-point sources of potential contamination. Such threats are not typically an emergency management function and can be the result of normal and accepted practices. The existence of closed depressions and karst topography, discussed previously, elevates the contamination risk.

For west-central Wisconsin, non-point source groundwater quality concerns are often due to agricultural practices, with nitrates and coliform bacteria among the top threats. According to reported data, over 10% of tested private wells in St. Croix County have exceeded the EPA's 10 mg/L maximum standard for nitrates, which is linked with some birth defects and an elevated risk of blue baby syndrome. Given that groundwater and surface waters are connected, these contamination risks and others (e.g., phosphorus) require management and monitoring. Wisconsin DNR does have a grant program to assist with the costs of well replacement when elevated nitrate levels are discovered.

St. Croix County has significant karst geology, especially in the central, southern, and eastern parts of the County. Not only can sinkholes form, but these cracks and caverns below the ground surface provide a direct conduit to the water table. This increases the risk of groundwater contamination and a contaminant can impact a relatively large area in a short time. In response, St. Croix County has established a **Sinkhole Program** that includes:



- a survey instrument for the mapping of known sinkholes,
- educating the public on sinkhole safety and risks, and
- connecting landowners with contractors to remediate sinkholes.

While the kart geology is more common in the central and southern parts of the County, many of the private wells in northern St. Croix County are shallower, which increases their risk of contamination. Private well testing is crucial for health and is recommended annually, though few households conduct regular testing.

In 2017, St. Croix County completed a ***Ground & Surface Water Quality Protection Study*** that explored potential groundwater conditions, contamination risks, policies, and programs followed by recommendations. Some of these recommendations have been incorporated into the hazardous materials spills assessment and strategies of this Plan. Actions to encourage the protection of the surface and ground waters of the County are also identified within the ***St. Croix County Land & Water Resource Management Plan***.

During the 2024 Plan update, there was also growing mention of PFAs and the potential impacts to water quality; this will be discussed as part of the hazardous materials spills assessment in Section III.D.x.

iii. 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.

Aquatic Invasive Species (AIS) have received the greatest attention in St. Croix County to date. Various AIS have been documented in the waters the County, including Chinese Mystery Snail, Curly-Leaf Pondweed, Eurasian Water-Milfoil, Purple Loosestrife, Zebra Mussel, Bighead Carp, and Rusty Crayfish. St. Croix County Community Development Department, in partnership with local lake associations and districts, have been on the front lines combatting AIS for numerous years through volunteer monitoring, public awareness initiatives, and control efforts. However, many lakes with public boat launches in the region do not have lake associations or districts.



There is growing attention in the region to the terrestrial invasive species threats. Buckthorn is very serious threat to the forests of St. Croix 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. St. Croix County has begun to track known locations of terrestrial invasives species of greatest concern

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.

In the United States, over $137 million is spent annually as a result of invasive species. Since its inception in fiscal year 2004, the Wisconsin Aquatic Invasive Species Grant Program has invested over $9 million in grants to reimburse local projects to monitor and control invasive species. Additional partners working to address this threat include:

- local communities and park groups
- local volunteers, scouting groups, schools, and community-based organizations
- St. Croix County Highway Department
- Invasive Plants Association of Wisconsin
- Midwest Invasive Plant Network
- St. Croix-Red Cedar Cooperative Weed Management Area (CWMA)
- U.S. Fish and Wildlife Service
- Wisconsin Lakes and the Wisconsin Lakes Partnership
- St. Croix River Association
- Aquatic Nuisance Species Task Force



The St. Croix-Red Cedar CWMA is coordinated by the Wild Rivers Conservancy and, in collaboration with other partners, takes a lead role in addressing terrestrial invasive species in St. Croix, Polk, Burnett, Washburn, and St. Croix counties.

The St. Croix County Highway Department also maintains an ***Invasive Species Operations Pl****an*, which includes targeted spring mowing to control the spread of Wild Parsnip. A proper, carefully timed mowing regimen is crucial to controlling this noxious weed, since it can spread rapidly once it has gone to seed. However, State funding and rules can limit the timing of such cuts along Federal and State highways. In addition to County highways, the Highway Department also performs the mowing for 16 towns through contract. The Department is also working with towns through annual training to increase the awareness of this growing threat and potential actions to mitigate. Portage and Wood counties have been particularly aggressive in attempting to map and eradicate this invasive, and some progress in controlling populations are being seen.

C. CLIMATE CHANGE AND NATURAL HAZARD RISK

While the assessment of natural hazard risk is largely based on past weather events and existing development trends, projecting future risks and vulnerabilities is also subject to the influence of possible large-scale, longer-term climatic changes. This brief section explores how: (i) the area's climate is changing; (ii) how climate change may impact the probability and severity of natural hazards in St. Croix County, and (iii) how climate adaptation is a necessary mitigation tool.

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. By 2100, the summer climate will generally resemble that of current-day Arkansas, and the winter will feel much like current-day Iowa.

To further document these climate changes and explore their impacts on our State, the Wisconsin Initiative on Climate Change Impacts (WICCI) was formed as a collaborative effort of the University of Wisconsin and the Wisconsin Department of Natural Resources. The following are key takeaways from the WICCI 2021 Assessment Report:

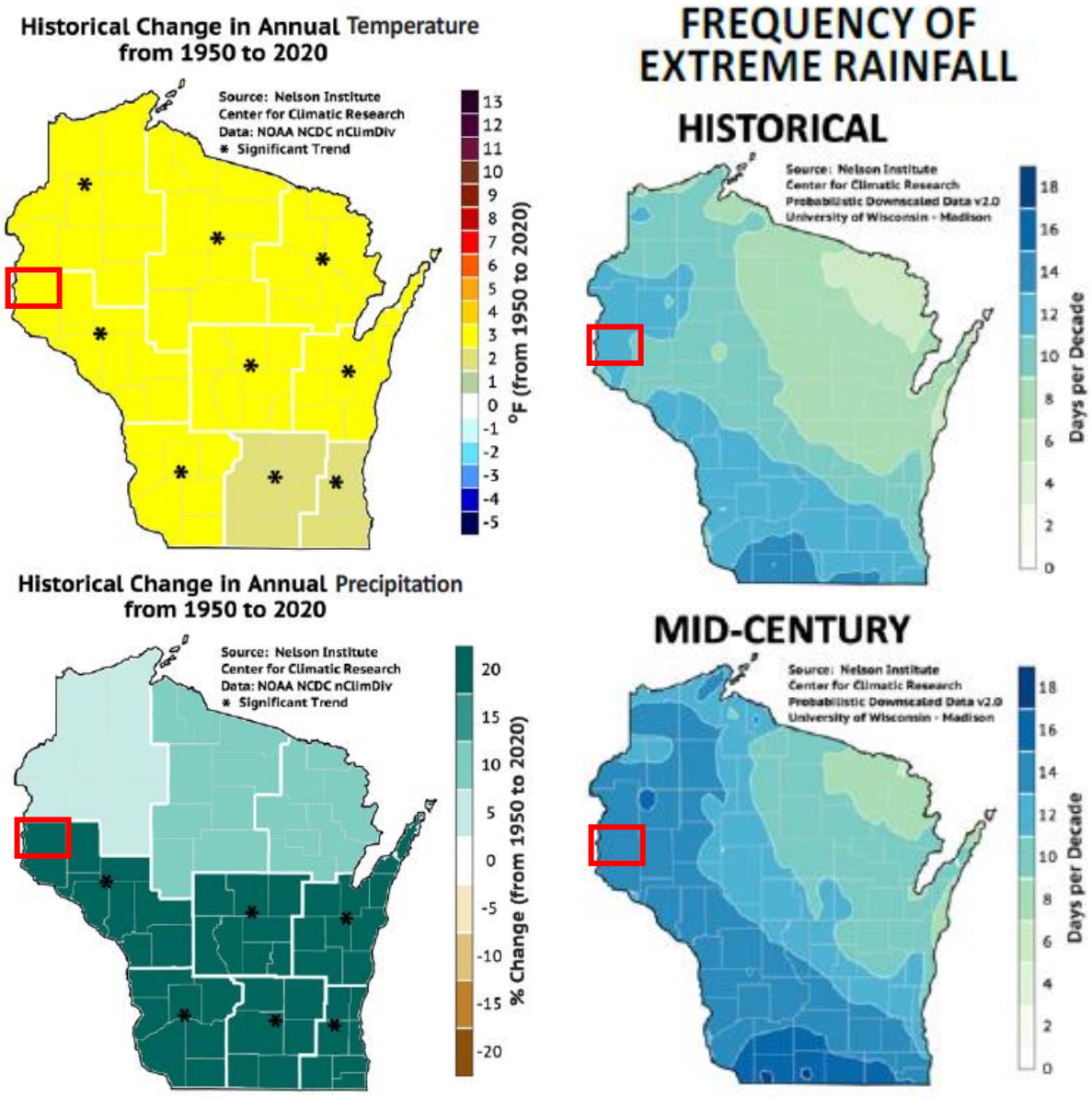
- Wisconsin's average daily temperature has become three degrees Fahrenheit warmer since the 1950's.
- The last two decades have been the warmest on record, and the past decade has been the wettest.
- Wisconsin has become wetter – average precipitation has increased 17 percent (about 5 inches) since 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

- 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 St. Croix County. **Figure 21** below includes maps from the 2021 Assessment Report indicating State climate trends for the area with St. Croix County outlined. Temperatures and annual precipitation have increased at a rate higher than the State average. As a result, the County must anticipate increased extreme precipitation events annually, as well as greater severity within individual events. The County should make use of new tools and resources as they become available to plan for and mitigate the impacts of climate change.

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 St. Croix 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.[16] However, warmer temperatures will increase the number of weeks that St. Croix County experiences severe thunderstorms and tornadoes. And during the 2024 plan update process, many local officials expressed concern with a perceived increase in the frequency of high wind events over the past 5-10 years. 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.[17] 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 St. Croix 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 6ºF warmer in St. Croix County since 1950, and these trends are projected to continue. By 2050, St. Croix 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).[18] However, the WICCI report suggests that extreme cold reports should decrease 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

[16] http://blogs.ei.columbia.edu/2016/12/01/increasing-tornado-outbreaks-is-climate-change-responsible/
[17] https://nca2014.globalchange.gov/highlights/regions/midwest#statement-16934
[18] https://www.climaterealityproject.org/blog/perfect-storm-extreme-winter-weather-bitter-cold-and-climate-change

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, some local officials and stakeholders noted that a potential for increased ice storm events with high winds 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 St. Croix County will grow from about 10 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 St. Croix 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.

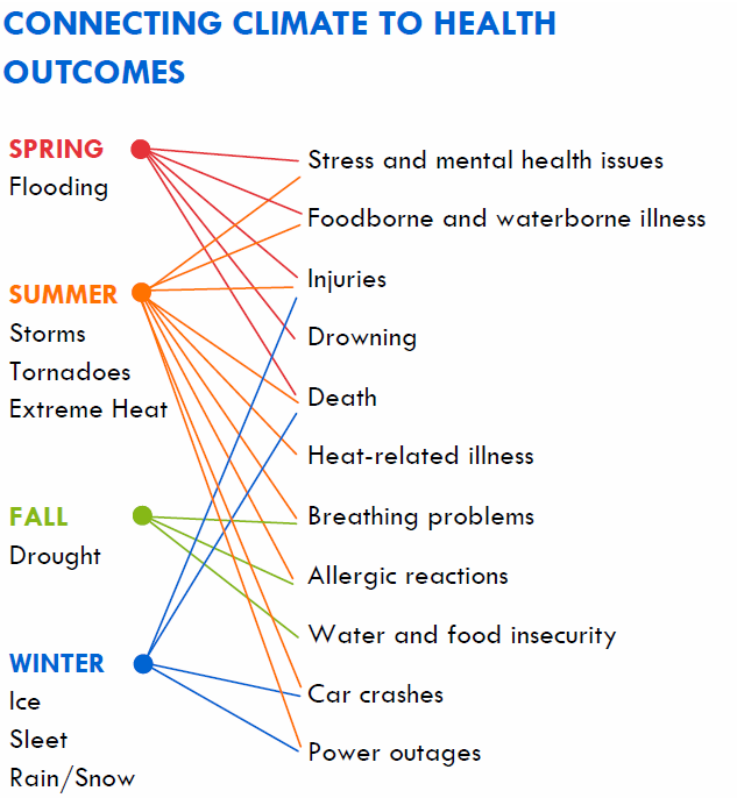
Human Health

According to the Wisconsin Department of Health Services—Climate & Health Program[19], 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.
- **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

[19] https://www.dhs.wisconsin.gov/climate/index.htm

- **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



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 St. Croix 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 St. Croix 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 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, it is not appropriate to 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.

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 St. Croix County. For the purposes of this plan, the following hazards have been grouped due to the potential to occur as part of the same event/storm system or similar vulnerabilities/impacts:

- tornadoes & high winds
- winter storms & extreme cold
- flooding (all types) & dam failure
- active threats, including active shooter & other types

The assessment for each hazard is generally organized into the following section, though some differences for some non-natural hazards exist:

Defining the Hazard – The introduction to this section includes definitions related to the hazard type.

- **Hazard Location** – This section 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, cyberattack, or an ice storm.
- **Hazard Extent (Potential Intensities)** – This section identifies the range of anticipated intensities that can occur within St. Croix 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**. This data is only available for certain natural hazards.
- **Significant St. Croix County (or Regional) Events** – This section highlights any significant or notable events that are particularly important for assessing capabilities or exploring mitigation alternatives.

Hazard Probability – This section 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 – This section summarizes the highest vulnerabilities identified in **Appendix G** 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** – This section 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 L & M**. This section summarizes any key or commonly shared findings from these two appendices for these other plan participants.

i. 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 32º 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 St. Croix County uniquely affected by winter storms or extreme cold events. These events can occur anywhere in St. Croix County and such events often occur at a regional scale involving most or all St. Croix 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 16** 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 17** 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 outages.

Figure 16. Winter Storm Impact Scale

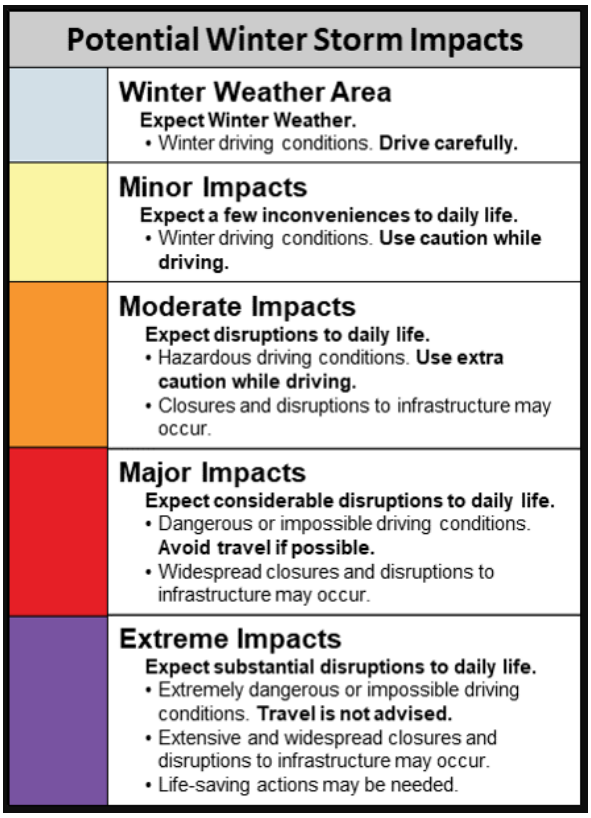


Figure 17. Ice Storm Damage Index

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 12** are the calculated **wind chill temperatures** as a result of specified air temperatures and wind speed.

Table 12. 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.

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.	Winter Storm Watch	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.
	Wind Chill Watch	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.
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.	Blizzard Warning	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.

	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.
	Wind Chill Warning	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.
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.	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.
	Wind Chill Advisory	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.

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 St. Croix 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. Since 1993, St. Croix County has experienced 97 winter weather event days or 3.34 event days per year. These events were further characterized by 13 heavy snowfall events, 65 winter storm/winter weather events (mix of snow, ice, wind), 6 cold/wind chill events, 9 extreme wind chill or cold, three 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.

Winter Weather 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:	2
Total Event Days with Property Damage:	2		
Property Damage (from NCDC):	$ 250,000		
Property Damage (adjusted for inflation):	$ 334,713		

Two deaths have been attributed to winter weather events; both of these deaths occurred during the December 2010 winter storm event. During this event, which dumped a significant amount of snow in the County, a rural River Falls man was killed when a metal shed collapsed and a Woodville man using a snow blower was killed when he was hit by a vehicle. 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.

Significant Regional and St. Croix County Events

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.

According to the Midwest Regional Climate Center, the annual snowfall for St. Croix County from 1981-2010 has been between 42 to 60 inches. A description and full list of the worst snow events, according to the National Weather Service, in the State of Wisconsin can be found in Appendix E. Several of the most severe winter storms in recent decades were:

- **March 2-4, 1881** - Southern / Central - Blizzard - 2 to 4 feet of snow. Drifts to 20 feet. Milwaukee reported 28.5 inches.
- **January 15, 1887** - Southern / Central - Snowstorm - 2 feet of snow. Huge drifts.
- **December 27-28, 1904** - Southern / Central - Heavy snow/ice. 26 inches of snow at Neillsville (Clark County).
- **January 30-February 1, 1915** - Southern / Central - Heavy snow / ice – severe glazing. 10 inches of snow in Milwaukee.
- **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.
- **January 28-30, 1947** - Southern / Central - Blizzard - 10 to 27 inches. Drifts to 15 feet. Roads blocked.
- **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.
- **Winter 2005** – In January, a statewide blizzard occurred with gusts up to 50 mph and snow totals up to 15 inches. Later in March, a winter storm struck west-central Wisconsin with 18 to 23 inches in a swath from southern Buffalo County to western Jackson County. The highest reported total was 23 inches 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 his St. Croix County 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. Total snow depths in St. Croix County averaged 16 to 20 inches, with some areas over 20 inches. All roadways were effectively shut down. The County Highway Department had over 36 trucks and graders out plowing and post-storm clean-up wasn't entirely complete before then next storm on December 20-21 struck.


2010 roof collapse at local animal shelter

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, which could have been fatal, when heating vents were blocked by accumulating snow. The weight of the snow collapsed the Metrodome's roof in Minneapolis. Closer to home, the roof of a local dog rescue shelter collapsed as shown in the picture to the right. An area barn collapsed resulting in livestock deaths. Two deaths were reported as a result of this snow event, as previously mentioned.

- **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 2014 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 planned on. 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 for many cities and villages. According to nearby Amery Public Works in Polk County, when one pipe was cut into in May, the line was still frozen. As reflected in **Appendix L,** the cities and villages of St. Croix County did not experience the extensive damage and service disruptions from water utility freeze-ups than many of their neighboring communities in Polk and Barron counties.
- **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 the region with snow totals of 5"-7" experienced over most of St. Croix County, 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 -25º to -35º 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 on April 1, 2023, brought additional snow, but less than what was experienced by counties to the north. However, it would still require over two months to clean-up in eastern portions of the County due to the large number of downed trees. Hudson reported about $234,000 in clean-up costs while North Hudson estimated an additional $166,000 in costs. St. Croix County Highway Department reported 114.8 inches of snow during Winter 2022-2023, including 24 wet snow storms, 13 dry snow storms, 7 freezing rain events, and 15 sleet events that cost the County Highway Department 6,785 worker hours and $3,112,001 in material, equipment, and labor. For comparison, this was about 60% more severe than the 5-year average.

Drifting of snow on many of the roads of St. Croix County is common during winters when snow and high winds are present, though this has been less of a problem in recent years due to weather patterns, improved equipment, furrowing, and snow fencing. According to Wisconsin DOT, 225 crashes occurred on Federal highways in St. Croix County during Winter 2022-2023, which is among the highest crash rates in Wisconsin. The effect of winter storms on Interstate 94 travel was a frequently mentioned concern during hazard mitigation planning meetings.

The I-94 segment between Eau Claire and Hudson is one of the most heavily traveled highways in the State of Wisconsin, second only to the stretch of I-94 in Kenosha County. Interstate traffic is also a mix of vehicle types; and travel often occurs at high speeds (65+ mph), which can be particularly dangerous during icy or white-out conditions. Winter storms often slow traffic; and about once every 25 years conditions are so bad that the Interstate closes, such as during the 1985 and 2010 storms. Conditions can be particularly hazardous due to high traffic volumes on the five or so miles of I-94 east of the Hudson (St. Croix River) Bridge on the west side of the County. The bridge can also become icy and poses snow removal challenges. St. Croix County Highway Department also coordinates closely with Dunn County regarding ice and snow removal efforts for the very steep "Knapp Hill" on the eastern end of St. Croix County, which is the most frequently closed portion of I-94 in the region.

Two video cameras on I-94 have been installed at Carmichael and Roberts, which was a strategy identified in a previous mitigation plan. Automated message boards have also been added, which is another previous mitigation plan recommendation. During extreme cold, a reminder for truckers to switch fuels to prevent fuel gel-up could be given, which has caused some past problems. Traffic control gates have been installed at I-94 on-ramps at exits 1 & 4. Parking and stranded vehicles on exit ramps during storm events have been a challenge for snow removal and are a safety concern.

Other than Interstate 94, a few other areas in the County were identified during current or past mitigation plan interviews and surveys as being especially dangerous or uniquely prone to the drifting of snow and ice:

- Highway 64 4-lane highway is a concern due to speeds, drifting, and potential ice on the bridge. Snow fencing is being used to help mitigate drifting.
- A number of towns (Emerald, Baldwin, Glenwood, Richmond) mentioned various roads that are prone to drifting or ice, though options to mitigate drifting are often limited or very costly. Drifting has blocked roads in a number of areas in the Town of Baldwin, most notably 220th St. south of CTH "E", 240th St. north of 80th Avenue, and 250th St. from USH 12 to CTH "DD". Glenwood has had to use an industrial-sized snowblower on 4-6 stretches of road when the grader with V-plow was unable to get through. And Richmond reported that a potential road rebuilding project in the next five years will hopefully serious mitigate drifting on 100th Street between CTH "A" and 170th Avenue.
- Johnson Street in the Village of Wilson is prone to drifting; upgrades may be planned or completed that may help reduce these drifting concerns.
- Icy conditions due to water freezing on the road and driveways near the intersection of County Highway "H" and State Highway 65 in Star Prairie.

- The City of Hudson has a number of hilly streets which can be hazardous when icy.
- Glen Meadows Lane in the City of Glenwood City is a particularly narrow road on a hill that has an accident history when a vehicle with five children slid off and was pinned on a tree, avoiding serious injury. Some relatively recent improvements have been made.

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.

Historically, other winter-related event impacts in St. Croix County in recent history have been primarily limited to scattered, short-term power outages and a limited number of areas potentially prone to ice damming. Areas noted for ice damming concerns during the planning process were:

- Some ice damming possibly caused by the old structures remaining from the Huntington Dam in the Town of Star Prairie have caused concern for potential damage to the nearby bridge and county highway. However, the remaining structures of the Huntington Dam have been removed; this seems to have largely mitigated the worst of the ice damming of the past.
- Also, in the Town of Star Prairie, ice is frequently pushed up along the south shore of Cedar Lake building to heights of 10 to 15 feet, contributing to shoreland erosion, and threatening to damage adjacent homes.
- A bridge culvert in Glenwood City has become plugged due to ice damming in the past causing flooding in the Syme Avenue neighborhood.

Hazard Probability – Winter Storm & Extreme Cold

As reflected previously in Table 11, the Plan Steering Committee rated heavy snow storms and blizzards, as well as ice storms and sleet, were two of the highest natural hazard threats facing St. Croix County. Heavy storms were given the second highest probability of any natural hazard, only behind thunderstorms; ice storms closely followed. Extreme cold received a moderate-to-high probability rating from the Steering Committee. Extreme cold, ice storms and high winds are the only natural hazards for which St. Croix County has a high National Risk Index score, reflecting that the region has a relatively higher threat to these events compared to the rest of the United States. Compared to the 2018 Mitigation Plan, the Plan Steering Committee rated the probability of these winter storm events slightly higher in this plan update.

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

- **3-3.5 severe winter storm, winter weather, heavy snow, or ice storm events per year**
- **1 extreme cold or wind chill event 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 all reported events regardless of intensity.
As discussed previously in Section III.C., Wisconsin and St. Croix 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 G provides the following regarding the potential impacts of winter weather events for St. Croix 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 St. Croix 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, especially on Interstate 94. 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. "Hudson Hill" on I-94 is a particular concern during the winter due to traffic volumes and the grade. During winter 2022-2023, County plow trucks were struck by other vehicles sixteen times resulting two injuries; nine of these collisions were on I-94. As noted previously, winter maintenance costs of roadways can be very expensive and burdensome.

- **Seniors and residents that have mobility or health challenges** can have their access to goods, services, needed treatments (e.g., dialysis), or needed medicines reduced. 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.
- **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.
- **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 low vulnerability to structures in St. Croix County due to winter storms. 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 St. Croix 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 St. Croix County and suggests that the County's largest winter-related loss expose is from extreme cold events:

Risk Factor	Winter Weather	Ice Storm	Cold Wave
EAL Rate – Population	1 per 3.58m	1 per 1.65m	1 per 638,220
EAL Rate – Buildings	$1 per $594.02k	$1 per $1.62m	$1 per $3.40m
EAL Rate – Agriculture	$1 per $142.38k	--	$1 per $1.59k
Total EAL	$336,026	$669,390	$1,840,833
Exposure	$1.1 trillion	$1.09 trillion	$1.1 trillion
Events per year	6.1	0.3	1.7
Historic loss ratio	Relatively Low	Relatively Moderate	Very Low
Overall Loss Score	89.4 (Relatively high)	91.8 (Relatively high)	97.2 (Very high)

The above loss estimates further suggest that agriculture is the County's largest winter-related vulnerability financially, though extreme cold events poses a substantial risk to residents. Based on St. Croix County's 2020 population of 93,500 and the above EAL rate, one County resident will be seriously injured by extreme cold about once every 7 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., St. Croix 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 storm 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 L provides "sub-plans" for each city and village and **Appendix M** 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 St. Croix County. For participating electrical cooperatives, related event history and vulnerabilities have been integrated into the *Long-Term Power Outage* threat sub-section.

Overall, there were very few unique or unique winter-related concerns expressed by these other participating jurisdictions. Some differences are noted based on the freezing vulnerability of infrastructure (e.g., depth of water lines) and the potential for drifting or accidents on roadways. Compared to the 2018 Plan, there was growing interest in heating shelters among some participants. But, overall, participants expressed that they have undertaken reasonable efforts to prepare for winter storm events while feasible opportunities to mitigate impacts are limited.



ii. Tornados



Tornados 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

Tornados 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 tornados 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.

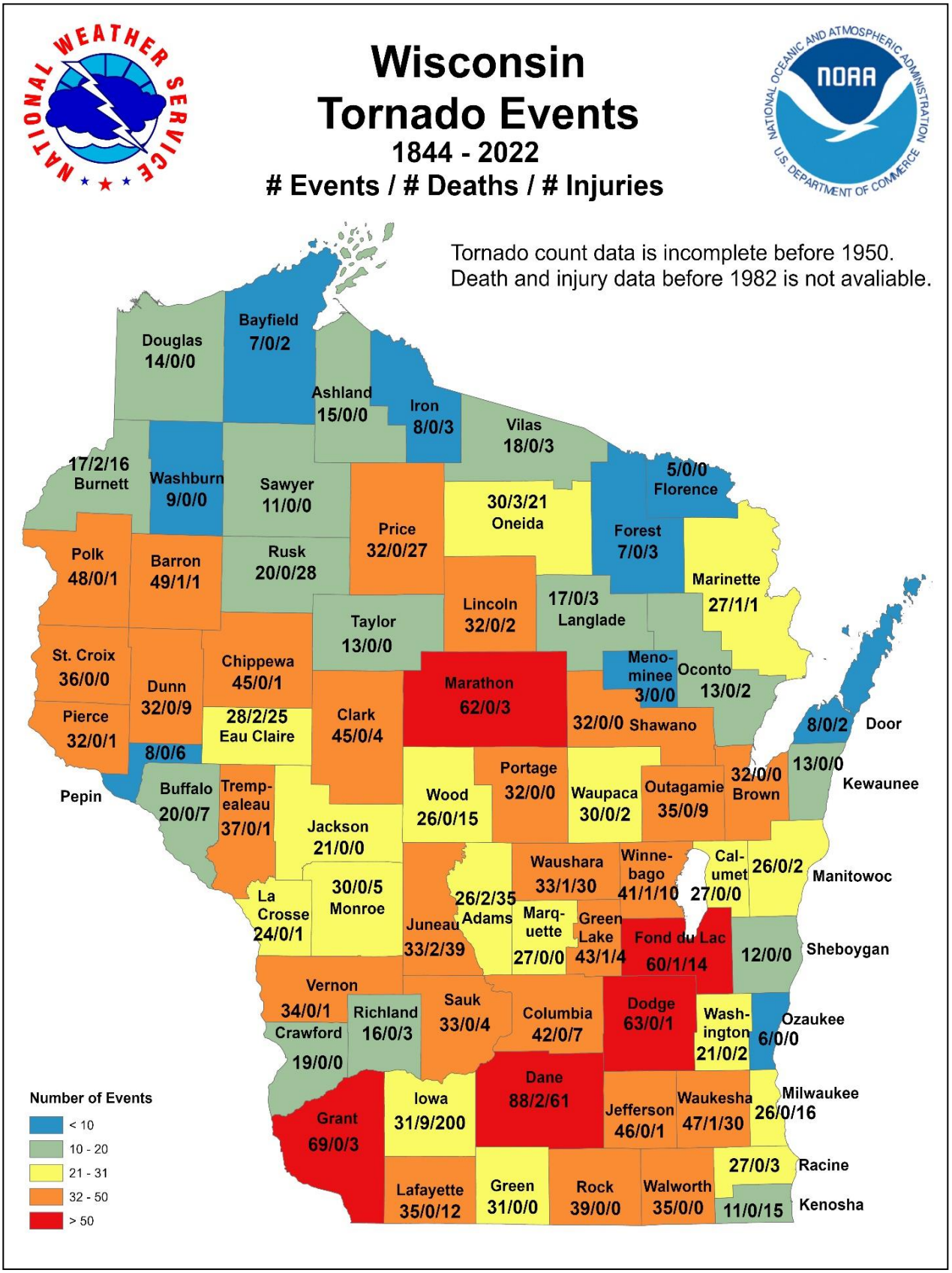
Downbursts (straight-line winds) – A downburst is a strong, violent downdraft, initiated by rapidly descending rain and/or rain-cooled air beneath a thunderstorm.

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 St. Croix County. There are no geographic boundaries or locations within St. Croix County uniquely affected by tornadoes or high wind events. As shown in **Figure 18**, tornadoes and high winds occur throughout the State of Wisconsin and have no defined hazard area within St. Croix County. All St. Croix 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, such as impacting the regional supply of electrical service or disrupting transportation networks.

Figure 18. Wisconsin Tornado Events • 1844 to 2022



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 13** 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.[20] 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 13. 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:

F0 Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees.

F1 Peels surface off roofs; mobile homes badly damaged or overturned; moving autos pushed off roads; attached garages may be destroyed.

F2 Roofs torn off well-constructed homes; mobile homes demolished; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.

F3 Entire stories of well-constructed homes destroyed; trains overturned; trees debarked.

F4 Well-constructed houses leveled; cars thrown and large missiles generated.

F5 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.

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

Table 14 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.

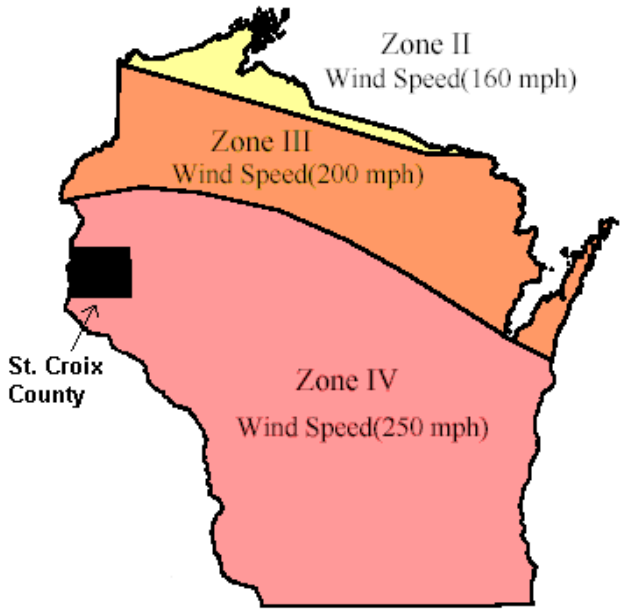
Table 14. Straight-Line Wind Gust Estimates

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 and the strongest tornado activity with wind speeds of up to 250 mph, and includes all of St. Croix County (see **Figure 19**).

Wisconsin lies along the northern edge of the nation's maximum frequency belt for tornados (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.

Figure 19. 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.
- West central Wisconsin 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 was the ninth deadliest in U.S. history.

National Climate Data Center (NCDC) Event Summary

Appendix E also includes NCDC severe storm reports for tornadoes and high winds impacting St. Croix 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 1993 to December of 2022.

Tornado Event Summary 1/1/1950 - 12/31/2022			
Total Events:	32	Number of Events Per Year:	0.44
Total Event Days:	27	Number of Event Days Per Year:	0.38
Total Injuries:	35	Total Deaths:	2
Total Event Days with Property Damage:	21		
Property Damage (from NCDC):	$ 38,580,250		
Property Damage (adjusted for inflation):	$ 325,574,296		
Funnel Cloud Event Summary 1/1/1993 - 12/31/2022			
Total Events:	10	Number of Events Per Year:	0.34
Total Event Days:	8	Number of Event Days Per Year:	0.28
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		
High Wind & Thunderstorm Wind Event Summary 1/1/1993 - 12/31/2022			
Total Events:	121	Number of Events Per Year:	4.17
Total Event Days:	74	Number of Event Days Per Year:	2.55
Total Injuries:	2	Total Deaths:	0
Total Event Days with Property Damage:	18		
Property Damage (from NCDC):	$ 52,161,500		
Property Damage (adjusted for inflation):	$ 77,723,824		

All the tornados in Appendix E occurred during the months of May through October. The far majority of the events occurred between the hours of 2:00 PM and 10:00 PM, with only three events reported for the morning hours. Of the two deaths and thirty-five injuries, one of the deaths and twenty of the injuries were the result of the June 4, 1958, Jim Falls tornado, which resulted in over $198 million in reported damages and was part of the same storm which produced the devastating Colfax tornado. The other deadly tornado occurred on May 10, 1953, resulting in one death and nine injuries and over $21 million in property damages.

But it is important to keep in mind that data reports can vary significantly. For instance, Wisconsin Historical Society information estimates only $45 million in property damage (*adjusted for inflation*) for the entire path of the June 1958 tornado, which has been estimated at 32 miles long and up to 800 feet wide. Other events can go unreported to the National Weather Service and do not appear in the NCDC database.

Since January 1993, there have been fourteen tornado and ten funnel cloud event reports for St. Croix County. This is an average of one tornado event report every 2.3 years, though one storm system can spawn multiple tornados or there can be multiple reports for a single tornado. Remarkably, no tornadoes or funnel clouds have been reported since 2010, especially after the relatively large number of reports in the late 1990s and 2000s.

1899 New Richmond Tornado

For St. Croix County, and in particular the residents of the New Richmond area, a single tornado event over a hundred years ago remains a large part of local history. On June 12, 1899, the City of New Richmond had about 2,500 residents in addition to hundreds of tourists who had come to town to see the Gollmar Brothers Circus. After a harsh and cold winter, residents were enjoying the very warm day which was sunny for most of the afternoon. At about 4:30 P.M., a heavy rain with some hail fell, driving people temporarily indoors. But after the circus ended and the rain let up, people began to head home for the day. At 6:00 P.M., the streets were full of tourists, travelers, and residents.

Unknown to them, approximately 30 minutes earlier, a waterspout was seen on Lake St. Croix about 15 miles southwest of New Richmond. As the waterspout moved northeast and reached land, it became a tornado which destroyed farm buildings and killed three people in its path.

The tornado reached New Richmond about 6:00 P.M. with little or no warning. Many people took shelter in a dry goods store which was swept away and those in the shelter were pelted to death by flying bricks and timbers. Many outside were also killed from flying debris or were picked up and thrown. A 3,000-pound safe was later found a block from its original location.

The Milwaukee Journal at that time estimated more than 500 structures were destroyed, most totally splintered and torn from their foundations, though another damage estimate states 230 buildings were destroyed. Regardless of the estimate, the entire City, except the extreme west end, was in ruins. Residents were unable to fight resulting fires since the water facilities were gone. According to one observer, the fire was the "saddest and most horrible part of the whole affair." Messengers had to be used to request medical supplies and emergency assistance since telegraph and telecommunication lines had also been destroyed. And as night fell, rescuers worked by the light of the fires as they

searched for those trapped, the injured, and the dead since the city's electrical power service was also in ruins. Many of the bodies found were burned beyond recognition and, in some cases, it was impossible to determine if the actual cause of death was directly due to the tornado or from the ensuing flames.

Official estimates determined that 117 people had been killed (114 within the city) and more than 200 injured, making the New Richmond tornado the ninth deadliest in U.S. history and the worst in Wisconsin history. Twenty-six families lost more than one individual, while six reported four or more deaths in the family. Over 400 animals were also killed. More than $600,000 (over $17 million in 2018 dollars) in damage claims were made, though it was believed that many people did not file claims, moved elsewhere, or there was no one left in the household to file a claim.



Ruins of the New Richmond Methodist Church, 1899.

Despite these losses, most of the residents looked to the future; and the rebuilding process began promptly. Within five months' time, an estimated 100 new buildings had already been completed. After a temporary post office was set up, postal officials in Washington D.C., who were unaware of the tornado, demanded to know who had authorized a change in location for a federal building. It is reported that New Richmond's postmaster replied, "God Almighty." Today, the disaster and those lost are memorialized at Cyclone Memorial Park located on the west side of State Highway 65 South near the technical college in New Richmond.

Recent St. Croix County and Regional Events

The following are the most significant tornado and high wind events impacting St. Croix County or nearby communities in recent decades:

July 1982 Straight-Line Winds (St. Croix County) - The NCDC data does not include damage for the July 1982 that ripped through the Wall Street Trailer Court in the Town of Star Prairie and collapsed a radio tower. Local debate continues over whether this was a tornado or high straight-line wind, but the storm did receive national attention, such as the article on the following page from a Santa Fe newspaper. Of the 67 mobile homes, only six were anchored. These six, plus one other, survived the storm relatively intact. The other sixty homes were moved, damaged, or destroyed. Twenty-two park residents were injured.



A-4 THE NEW MEXICAN Santa Fe, N.M., Wed., July 7, 1982

Thunderstorms, 100 mph winds batter Midwest

By The Associated Press

Winds gusting to 100 mph flipped autos, trucks and small airplanes, blew down trees and towers, and injured scores of people as thunderstorms and tornadoes roared across the northern Plains.

The line of storms swept into Illinois early today, washing out roads with up to 5 inches of rain. Three youths nearly drowned when they were swept down a storm sewer.

One man in Sioux Falls, S.D., was in critical condition with a chest injury, and dozens more were treated for minor injuries, mostly cuts from flying glass on Tuesday, officials said. At least

nation

18 people in Wisconsin were injured, none critically, including a woman and her 21-year-old son, whose house trailer was overturned near Watertown in the central part of the state.

"It was just straight winds," said meteorologist Mike Welland of Sioux Falls. "It can produce damage like a tornado, but there's no turning of winds like a tornado."

Tornadoes touched down in Iowa and Minnesota, destroying a cattle shed and a silo and extensively damaging two barns and a farm shed in northern Iowa.

Winds gusting up to 100 mph blew down a transmission tower for radio station WIXK and damaged 60 trailers at the Wall Street Village trailer park in New Richmond, Wis., near the Minnesota state line. Some of the trailers were moved 100 feet or more off of their foundations.

At least a dozen funnel clouds were sighted over central Minnesota but there were no reports of injury or property damage. Thunderstorms were scattered over central and southern Minnesota into west-central Wisconsin and north-central Iowa following record high temperatures on Monday.

In Illinois, up to 5 inches of rain pounded Monmouth and Galesburg in about 90 minutes, authorities said. Two Galesburg police officers swallowed water and were reported in serious condition after rescuing three boys who were swept down a storm sewer around midnight.

Police officers Fred Foster, 40, and John Woolsey, 22, swallowed "a bunch of water down the wrong pipe," said a spokesman at Cottage Hospital. The three rescued youths were not identified.

Three roads and a bridge were washed out in Marshall County in northern Illinois, said sheriff's dispatcher John Otto.

Several power outages also were reported in the Chicago area as lightning struck utility lines on the city's South Side and in northern and northwestern suburbs.

The storms dumped more than 1.5 inches of rain in the Des Moines, Burlington and Cedar Rapids areas of Iowa. Flash flood watches were in effect through the night for some areas.

In Sioux Falls, .72 inches of rain fell in 8 minutes and hail as dense covered the ground like snow in some parts of the city.

The winds pushed a street sweeper about 100 feet into a line of parked cars and knocked over two semi-trailer trucks in the middle of a busy avenue in eastern Sioux Falls.

At least three
Sioux Falls Al
aged and three
flipped over.

"Airplanes
much as 100 f
into some othe
ture," said
John Orr.

The storms d
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ported.

Winds gusting up to 100 mph blew down a transmission tower for radio station WIXK and damaged 60 trailers at the Wall Street Village trailer park in New Richmond, Wis., near the Minnesota state line. Some of the trailers were moved 100 feet or more off of their foundations.

2001 Siren & 2002 Ladysmith Tornadoes (Regional) - On June 18, 2001, an F3 tornado with a 27-mile path hit the Village of Siren approximately 40 miles to the north, resulting in three deaths, 16 injuries, 167 destroyed homes, and 280 damaged homes. More recently, 55 miles northeast of St. Croix 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 County and 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.

June 2005 Tornado (St. Croix County) – This EF1 tornado had a 8-mile path resulting in about 3.6 million in property damage to about 38 Hammond area residences as well as to barns and outbuildings. It is incredible that there were no injuries given the destruction and that the tornado crossed I-9; three golfers were forced to hang onto trees to survive. The Red Cross sheltered 27 families until home damage could be repaired.

August 2008 High Winds (St. Croix County) – This wind storm caused over 35 million in property damage largely on a large swath between the Village of North Hudson and Glenwood City. 109 homes and 48 barns were reported as damaged or severely damaged. Some roads were impassible due to downed trees and about 20,000 customers lost power; the entire Village of Hammond and the surrounding area lost power for about 12 hours. At least 1 livestock death.

May 2017 Chetek Tornado (Regional) - More recently, on May 16, 2017, an EF3 tornado caused over $10.1 million in damages along an 83-mile track from southeastern Polk County then northeast into Price County. 160 homes were affected, including 40 destroyed. Six businesses were also impacted, including six turkey burns with a loss of about 25,000 birds. The tornado struck a mobile home park near Chetek resulting in one fatality and at least 25 injuries. Tornado warnings were issued with adequate time for most persons to seek shelter, though the mobile home park lacked a safe room. The devastation, limited access, number of responders, and darkness all contributed to significant challenges at the mobile home park for providing services to survivors, coordinating response efforts, and centralizing command. This event also demonstrated the importance of good volunteer and donation management and tracking.

June 2017 High Winds (St. Croix County) - Severe storms and straight-line winds with hail caused roof, trees, and vehicle damage in the eastern part of the County with a lot of debris. A gas line was broken in the Village of North Hudson requiring evacuation. North Hudson, which was most hard hit, received Wisconsin Disaster Fund (WDF) assistance for debris cleanup and protective measures.

July 2021 Tornado (St. Croix County) – Severe storms and tornado damage over multiple days necessitated a County State of Emergency. An EF1 tornado and high winds on July 28-29, 2021, caused damage throughout the New Richmond area, including significant roof damage to about a dozen homes, blowing apart a garage, damage to a school gym roof, and the collapse of a barn. This storm was accompanied by high winds that caused damage over a very large area. Hundreds of trees were toppled due to a downburst. Reported damage did not meet thresholds for federal assistance.

September 2021 High Winds (St. Croix County) - Straight-line winds caused significant damage to public infrastructure, power outages, building damage, and downed trees throughout west-central St. Croix County, and especially in the North Hudson and Hudson areas. This September 2021 event was part of a line of severe thunderstorms that produced four brief tornados. At the Hudson library, the windows were blown out by debris from the roof of a nearby building. At least $500,000 in property damage was reported.

May 2022 High Winds (St. Croix County) – Severe storms throughout the County caused damages, with the hardest hit areas in the Towns of Emerald and Glenwood; these towns would received WDF funding. This storm also had damage-producing hail.

July 2023 High Winds (St. Croix County) – In July 2023, a severe thunderstorm with a high wind downburst of up to 85 mph caused substantial damage throughout the Hudson/North Hudson area. Within North Hudson, an 8-plex housing unit lost its roof and several homes were significantly damaged. There was large-scale tree damage and other debris. Power lines were downed by falling trees and a lightning strike; some homes and businesses were without power for over 24 hours during a period of extreme heat. Many other homes and buildings experienced damage. Remarkably, this storm is not included in the NCDC Storm Event database.

Hazard Probability – Tornadoes & High Winds

As shown previously in Section III.A.ii., the St. Croix County Plan Steering Committee rated tornadoes as having a moderate probability of occurrence, but with moderate-to-high potential vulnerability (impacts). Unsurprisingly, high winds had a slightly higher probability and slightly lower vulnerability. During the plan update process, a number of stakeholders and local officials commented on their perceived increase in destructing high wind events in recent years, which is a factor driving an increased interest in community safe room projects among many of the participating communities. It is also very notable that FEMA National Risk Index ratings for high winds in St. Croix County increased substantially over the past two years—from moderate to very high.

Based on the number of reports since 1993, **it is probable that a tornado will continue to touch down and be reported for St. Croix County once about every 2 years on average, with the potential for multiple tornado events on a single day.** If only tornado event days are considered, then St. Croix County would experience a tornado event day about once every 3 years. **High wind events will occur much more frequently, with about 4-5 events or 2-3 event days each year on average.**

Although the improvement of technology has enabled meteorologists to better identify and predict the conditions that are favorable for severe weather 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 Chetek tornado 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, figures showing change from the historical data to the model indicates 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 G provides the following regarding the potential impacts of tornado and high wind events for St. Croix County as a whole:

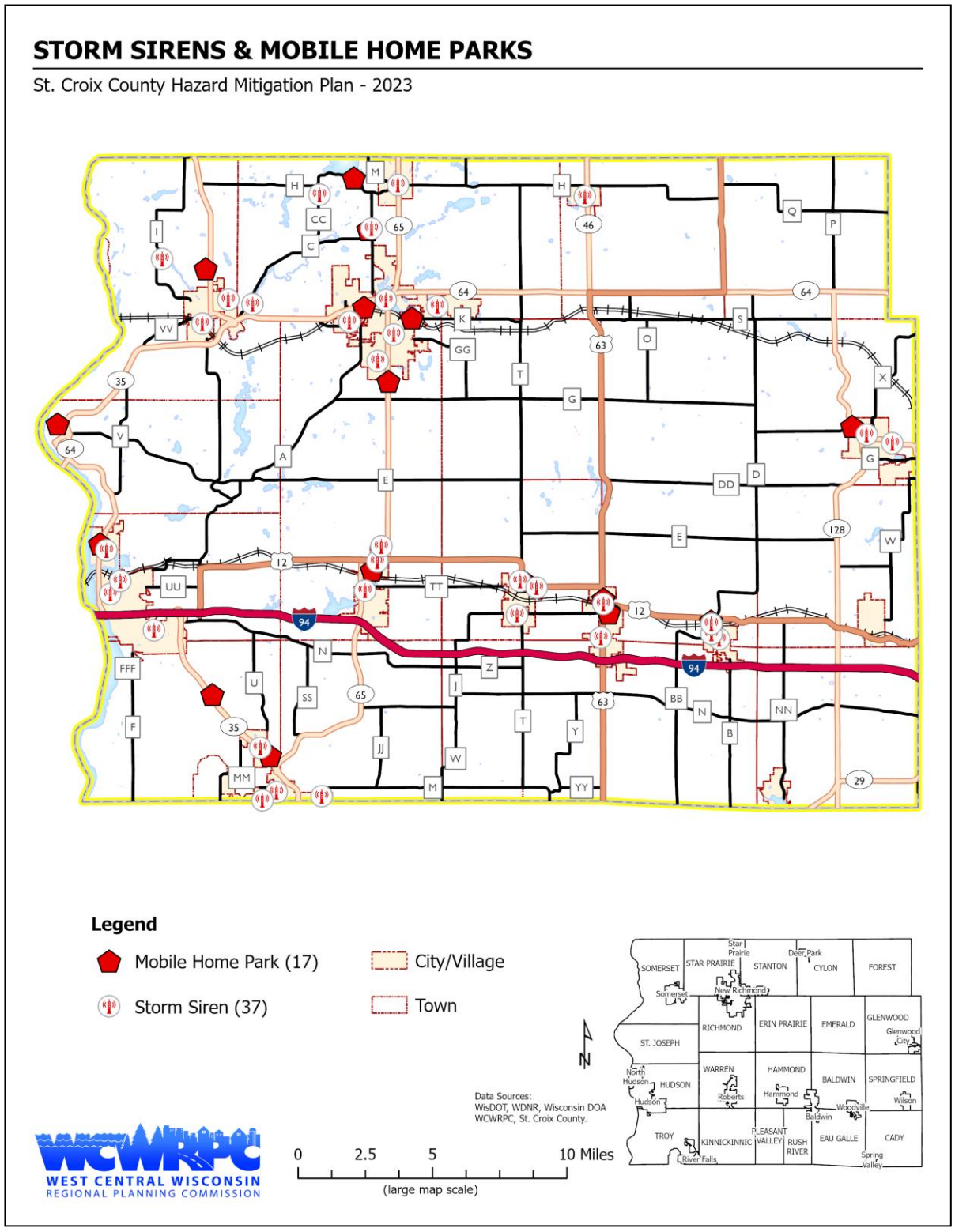
- a description of those assets, including populations, structures, economic sectors, services, and resources, that are at most risk or uniquely vulnerable;
- a description of the vulnerability of each community lifeline for this hazard; and,
- the potential consequences or impacts to the above assets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

In summary, all St. Croix 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. St. Croix County has about 762 mobile homes and 17 licensed manufactured housing/mobile home parks. **Figure 20** shows the location of mobile home parks in St. Croix County. During the plan update, stakeholders and local officials reported that the number of mobile homes is not increasing, though new slab-on-grade residential development continues to grow, especially for duplex or single-family attached development. Most detached single, family homes in the unincorporated towns have basements.
- **Senior living facilities and group homes** where 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. St. Croix County has 54 nursing homes and licensed assisted living facilities.
- **Visitors and staff of parks, campgrounds, festivals, and other large gatherings** were identified as a vulnerability since most of these facilities lack safe rooms or storm shelters, and out of town visitors may not have access to an alternative. The Somerset Amphitheatre, St. Croix County Fairgrounds, tubers on the Apple River, and boaters on the St. Croix River were

identified as having unique, elevated vulnerabilities due to the lack of safe room alternatives, evacuation challenges, and the potential for injury or death to these populations. See the Village of Somerset and City of Glenwood City sub-plans in **Appendix L** for more discussion.

Figure 20. Alert Warning Sirens and Licensed Mobile Home Communities



- **Above-ground power lines**, especially in wooded areas, were the most frequently identified infrastructure vulnerability. This vulnerability extends to facilities, services, and oxygen-dependent populations without access to emergency power generators. This vulnerability is further explored in the *Long-Term Power Outage* threat sub-section. And as will be discussed in the *Winter Storm* and *Extreme Heat* sub-sections, this lack of power can become deadly during periods of extreme temperatures. During the plan update, the need for warming and cooling shelters with emergency power generators was often expressed.
- **Schools and school gyms** were also a frequently mentioned vulnerability since these facilities serve a vulnerable population (children) and can host large events. Traditionally designed gyms can be especially vulnerable to high winds.

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

- St. Croix County's four **hospitals** (serves a vulnerable population that may have mobility challenges).
- **Other buildings with large spans** (e.g., airport hangars, pole barns, factories). This can include community lifeline facilities. For instance, Somerset Fire-Rescue noted that their building is a pole shed on a hill that is vulnerable to high winds and tornados.
- **Homes with crawlspaces** (elevated and more susceptible to lift).
- **Sites/buildings storing large quantities of hazardous materials** above ground.
- **Travelers on Interstate 94**
- **Growing immigrant populations** for which English is a second language and may not be aware of the risks, warning systems, preparedness action, etc., and may require special support should a disaster occur.

Projected Loss Estimates

Table 15 provides tornado and high-wind loss estimates for St. Croix County. Compared to the County's 2018 Mitigation Plan, the annual probability of tornado events increased slightly while high wind events are slightly lower. Given that this Plan update included inflation in the damages, the estimated future annual losses for tornadoes increased dramatically (about 8x higher). Wind loss estimates were slightly higher than in 2018.

Using FEMA standards, the 35 injuries and 2 deaths from tornado events between 1950-2022 resulted in an additional $23,880,0000 in total tornado losses (or $746,250 per tornado event). No deaths or only two injuries have been reported for high wind events in St. Croix County between 1993-2022 for an additional $576,000 in high wind losses (or $4,760 per reported event).

Again, the estimates in Table 15 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.

Table 15. St. Croix County Tornado & High Wind Loss Estimates

Tornado Loss Estimates (WI THIRA)			
Avg. Damage per Tornado (1950-2022)	**Annual Probability**	**Estimated Future Annual Loss (property & crop)**	**Estimated Future Annual Loss (injury, death, & property)**
$9,868,381 (32 events)	0.51	$5,032,874	$5,413,462
Thunderstorm High Wind Loss Estimates (WCWRPC)			
Avg. Damage per T-Storm Wind (1993-2022)	**Annual Probability**	**Estimated Future Annual Loss (property & crop)**	**Estimated Future Annual Loss (injury, death, & property)**
$628,870 (121 events)	4.17	$2,622,388	$2,642,238

Source: State of Wisconsin Homeland Security Council THIRA & SPR, updated January 2017; National Climatic Data Center (NCDC); and, West Central Wisconsin Regional Planning Commission (WCWRPC).

The methodology used to develop the tornado and high wind loss estimates in the previous table is based on the approach described in the *State of Wisconsin THIRA & SPR.*[21] The number of events, property damage, event probability and past losses are all based on the NCDC storm event data in Appendix E and the previous summaries of this data. For tornadoes, the annual probability is based the number of event days from 1993-2022, when storm events were more reliably reported and reflects more recent trends, while the annual damages were based on events from 1950-2022. Past property damage is adjusted for inflation. On average, each injury 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.

FEMA National Risk Index (NRI) Estimated Annual Losses

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

Risk Factor	Tornado	Strong Wind
EAL Rate – Population	1 per 307.88k	1 per 2.92m
EAL Rate – Buildings	$1 per $6.3k	$1 per $4.43k
EAL Rate – Agriculture	$1 per $47.27k	$1 per $1.78k
Total EAL	$7,045,892	$5,499,930
Exposure	$1.1 trillion	$1.1 trillion
Events per year	0.5	4.2
Historic loss ratio	Relatively moderate	Relatively moderate
Overall Loss Score	91.5 (Relatively Moderate)	98.6 (Very High)

According to the NRI data, tornadoes have the highest estimated annual losses of any natural hazard event ($7 million), followed by strong winds ($5.5 million) and cold waves ($1.8 million). Compared

[21] State of Wisconsin Homeland Security Council THIRA & SPR, updated January 2017.

to the loss estimates on the previous page, the NRI data has a comparable event probability, but have much higher estimated annual losses.

Other Factors Influencing Future Losses

1. Population Growth & New Development. As discussed in Section II.C., St. Croix County is one of the fastest growing counties in Wisconsin, 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. As will be further discussed in Appendix L, most communities and mobile home parks do not have access to a community safe room or storm shelter. One exception for the unincorporated towns is the 63-unit mobile home park in Houton that has a storm shelter.

Risks for Individual Plan Participants - Tornadoes & High Winds

All individual plan participants in St. Croix County (i.e., villages, cities, educational institutions, electric cooperatives) are equally at risk of experiencing a tornado event. 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 L provides "sub-plans" for each city and village and **Appendix M** provides "sub-plans" for participating educational institutions. These sub-plans identify 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 St. Croix 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. 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 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). Increasing public awareness of the County's SCC-Alert emergency notification was also frequently mentioned. 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.

iii. Thunderstorms, Lightnings, and 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 St. Croix 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
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 are 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 St. Croix County uniquely affected by thunderstorm, heavy rain, lightning, or hail events; all St. Croix 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 aways from the parent thunderstorm.

Hazard Extent (Potential Intensities)

Heavy rain intensities for 100-year rainfall events for St. Croix 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*, St. Croix County experienced 24-32 total lightning events per square kilometer per year from 2016-2022, though the density of cloud-to-ground flash is much lower at 2-3 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 16** 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 webpage[24] 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 16. 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 21 and 22 on the following pages show that lightning and hail events occur statewide. Since 1982, St. Croix County has experienced a relatively low number of reported lightning events (13). In comparison, St. Croix County has been a hotspot for hail events (140).

National Climate Data Center (NCDC) Summary

Thunderstorms are the most common hazard event for St. Croix County. Shown in the table below is a summary of the thunderstorm events that have been reported to the National Climatic Data Center for St. Croix 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:	269	Number of Events Per Year:	9.28
Total Event Days:	125	Number of Event Days Per Year:	4.31
Total Injuries:	10	Total Deaths:	1
Total Event Days with Property Damage:	24		
Property Damage (from NCDC):	$ 56,380,000 ($45m from the 8/13/07 event)		
Property Damage (adjusted for inflation):	$ 84,423,820		

For the above:

- 269 events were reported on 125 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.
- The 269 events include:
    - 5 heavy rain events on 4 event days with no associated damage or injuries.
    - 136 hail events on 65 event days with $5.11 million in reported property damage, no reported crop damage, and no associated injuries.
    - 10 lightning events on 10 different event days with 1 deaths, 8 injuries, $1.58 million in reported property damage and no reported crop damage.
    - 118 thunderstorm wind events on 71 event days with $62.55 million in property damage, $15.17 million in crop damage, 2 injuries and no deaths. A death did occur during a May 1991 storm.
- The damage and impacts of the 121 thunderstorm wind events (not heavy rain, hail, or lighting) were all or nearly all due to associated high winds. As such, these thunderstorm winds are also included in the previous *Tornadoes & High Winds* threat 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 21. Wisconsin Lightning Events, 1982-2022

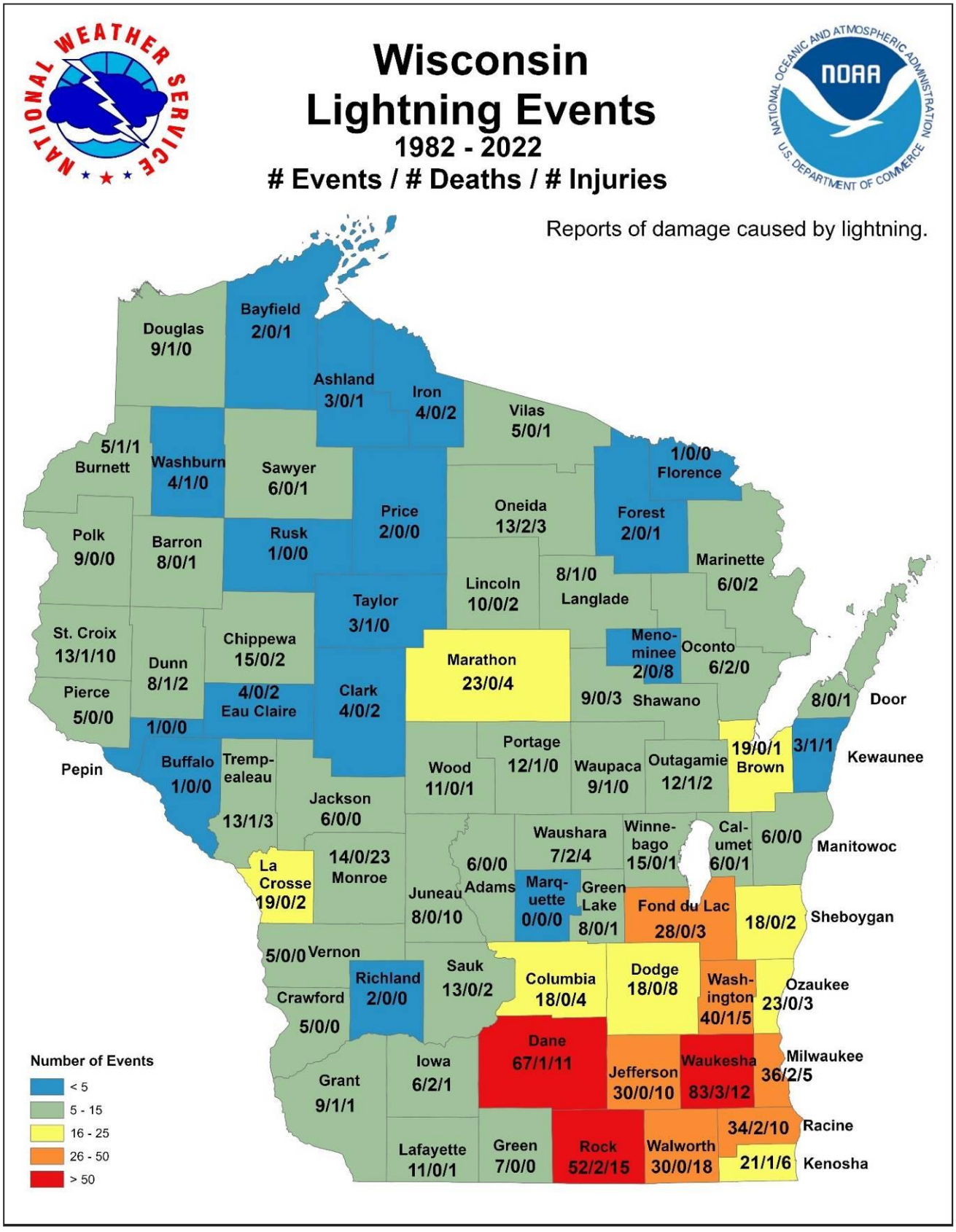
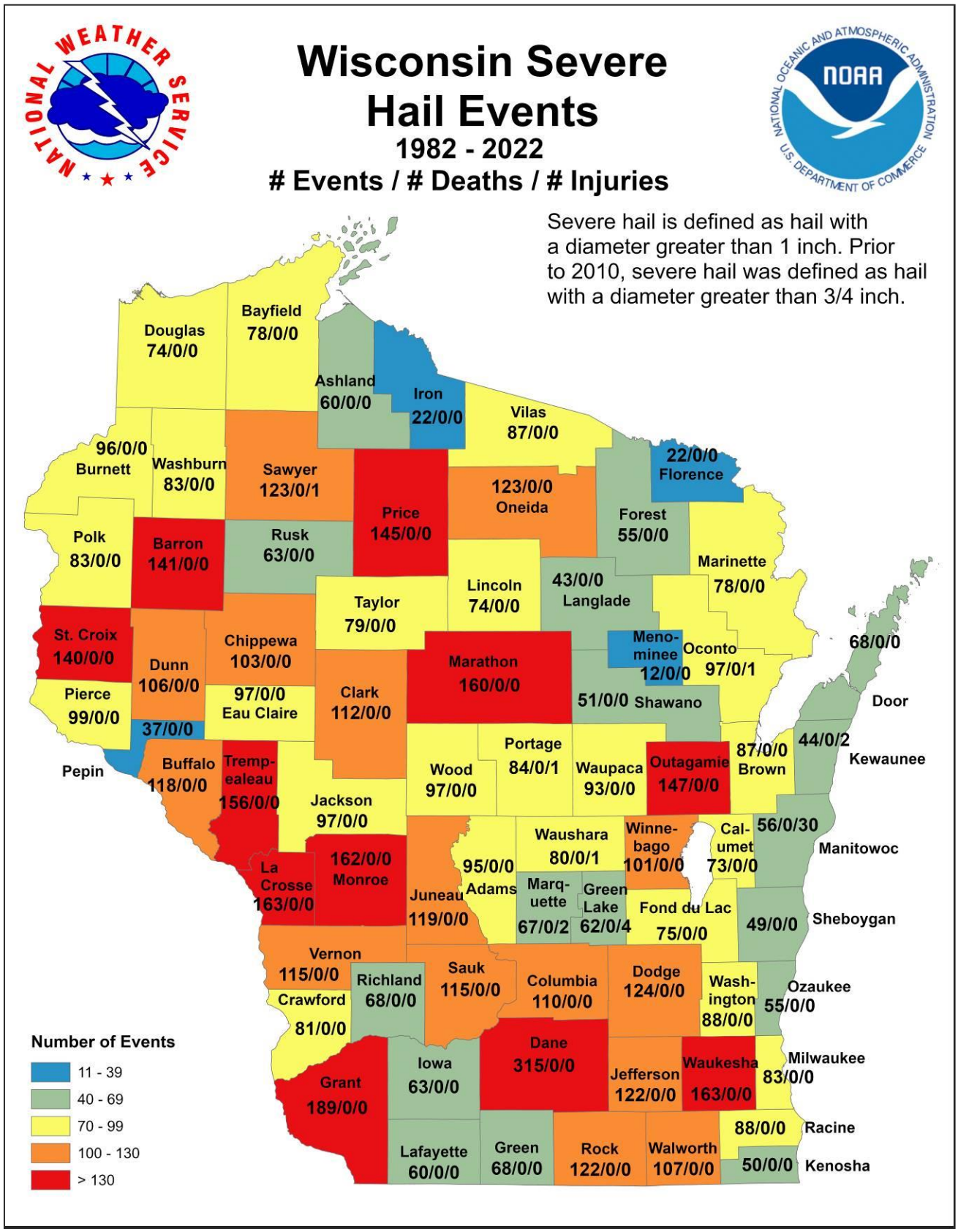


Figure 22. Wisconsin Hail Events, 1982-2022



Significant St. Croix County Events

The *Tornado & High Winds* section previously highlighted the most significant **thunderstorm wind events** in recent history. Flooding as a result of heavy rain is discussed in the *Flooding* section. In terms of damage, the August 13, 2007, thunderstorm was the most significant in recent decades, with high winds (and micro-bursts) the primary cause of the damages. Over $35 million in property damages and $10 million in crop damages were reported throughout the County. The City of New Richmond reported a collapsed hangar at the airport, over 200 homes damaged, seven vehicles destroyed, and 40-50 vehicles damaged. Infrastructure damage in New Richmond exceeded $1.5 million, including one-half of the traffic signals damaged and heavy debris.

The were two deaths and eight injuries associated with these storms in the database since 1980. One death is associated with a May 1991 thunderstorm with high winds. A second death and two injuries are attributed to a lightning strike on August 12, 2000, as Somerset concert goers were walking to a campsite; only a few rumbles of thunder had been reported. Another four injuries were attributed to two 2005 summer lightning storms also in the Somerset area. Two additional lightning strike injuries occurred in April 2017 near Boardman and seriously injured two men who were playing paintball at an area business. Some community members also commented on recent hail events that caused damage to roofs, siding, vehicles, etc. Since 2018, the NCDC database has 41 hail events recorded on six event days; even though four of these reports had hailstones of 2" or greater (H4-H5 TORRO rating), no damage estimates are provided.



Hudson Star-Observer — Thursday, April 20, 2017 A5

Lightning strike injures 2 in St. Joseph

Men were playing paintball when storm moved into St. Croix County

By Mike Longaecker
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TOWN OF ST. JOSEPH — Two men playing paintball were seriously injured Friday in a St. Croix County lightning strike.

The men, whose identities were not available from authorities, were taken by ambulance to Regions Hospital in St. Paul with what St. Croix County Sheriff's Office Chief Deputy Scott Knudson described as "very serious injuries."

The incident occurred at 11:36 a.m. in a wooded area at Splat Tag Inc., 835 County Road E, in the town of St. Joseph.

Knudson said one man was a 33-year-old and the second man was believed to be in his 40s.

Splat Tag owner Darrin Johnson said the victims were part of a bachelor party that was in the field at the time of a sudden, brief storm that brought a lightning strike.

"Thank God it wasn't a direct hit," he said Friday.

Knudson said burn marks found on the men suggested "that a lightning strike had occurred near them."

Johnson said he and others at the 100-acre paintball facility inspected the wooded area where the men were found injured, but couldn't find where the bolt struck. He and others at the facility said the deafening report left no doubt that it occurred very close.

Knudson said a deputy who was in the area at the time reported significant lightning around the time of the report at the paintball facility.

Hazard Probability—Thunderstorms, Lightning, & Hail

The Plan Steering Committee rated thunderstorms, lightning, and hail events as having the highest probability of occurrence of any hazard facing St. Croix County. The *Tornado & High Winds* section discusses the probability of high wind events, which were rated by the Plan Steering Committee as having a moderate probability of occurrence and vulnerability (impact). Based on the thunderstorm events since 1993 and the National Risk Index, it is probable that St. Croix County will experience:

- **4-5 thunderstorm wind events (or 2-3 event days) per year with a wind event causing serious damage about once every other year.** This frequency may be increasing.
- **4-5 hail events per year (on 2-3 event days), with serious hail damage being relatively rare (1 serious event every 20-30 years).** This frequency may be increasing.

Due to the limited number of lighting reports and lack of lighting damage or injury in available data, a probability estimate for lighting events is not included. However, every thunderstorm produces lighting, so the thunderstorm probability above also applies to lightning. 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 the probability for these events is 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. Anecdotally, this was confirmed during the planning process as many stakeholders and community representatives commented that the County is experiencing an increasing frequency of damage-producing hail and high wind events.

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 lighting 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 lighting, 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 G provides the following regarding the potential impacts of lightning and hail events for St. Croix 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 St. Croix 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:

<u>Lightning</u>

- Festivals, Fairgrounds, & Outdoor Recreation - Large outdoor gatherings pose a unique lightning vulnerability. Concert goers at the Somerset Amphitheater, persons at County Fairgrounds' events, and tuber/boaters participating in water-based recreation on the Apple and St. Croix Rivers were identified as the highest lightning vulnerabilities in St. Croix County. Village of Somerset officials reported that 25,000 – 30,000 visitors are in the area on a summer

day, in addition to the 6-10 concerts a year that draw an average of 25,000 concert goers and onsite camping with no safe room options available.

- Other Persons outside – There is conflicting information on the number of U.S. lighting 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 St. Croix 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 lighting 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 St. Croix County's losses to lighting and hail are relatively high, and provides the following expected annual losses (EALs) for the county:

Risk Factor	Lightning	Hail
EAL Rate – Population	1 per 1.28m	1 per 10.74m
EAL Rate – Buildings	$1 per $243,710	$1 per $17,310
EAL Rate – Agriculture	--	$1 per $1.36k
Total EAL	$936,275	$1,541,150
Exposure	$1.1 trillion	$1.1 trillion
Events per year	36.3	5.3
Historic loss ratio	Relatively High	Relatively Moderate
Overall Loss Score	94.6 (Relatively high)	93.6 (Relatively moderate)

The above table suggests that St. Croix County is projected to experience annual hail losses 1.6 times greater than lighting losses. Based on $9.55 billion in assessed improvements, annual hail damage to St. Croix County's buildings alone would exceed $560,000 each year once tax-exempt structures are included. The NRI data also shows that the risk of injury to St. Croix County's residents is much higher than that of hail, and a single lightning death would significantly increase the projected total lighting losses.

As discussed in the community profile, St. Croix 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 lighting events.

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

All individual plan participants in St. Croix County (i.e., villages, cities, educational institutions) are equally at risk of experiencing a thunderstorm, lighting, 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. The exception is the St. Croix Electric Cooperative and New Richmond Municipal Utilities who participated in this Plan update; lightning and electric storms can damage equipment and cause outages as discussed in the *Long-Term Power Outage* section.



Appendix L provides sub-plans for each city and village and **Appendix M** 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 St. Croix County. As discussed previously, the Village of Somerset has unique vulnerabilities due to the Amphitheater and river tubing.

For participating electrical cooperatives, the related 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 natural hazards.

iv. Flooding (including dam failure, riverine, & overland flooding)

This section is organized differently than the previous natural hazard assessments with the flooding assessment followed by a special analysis of St. Croix 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 St. Croix 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 <u>not</u> 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 23**).

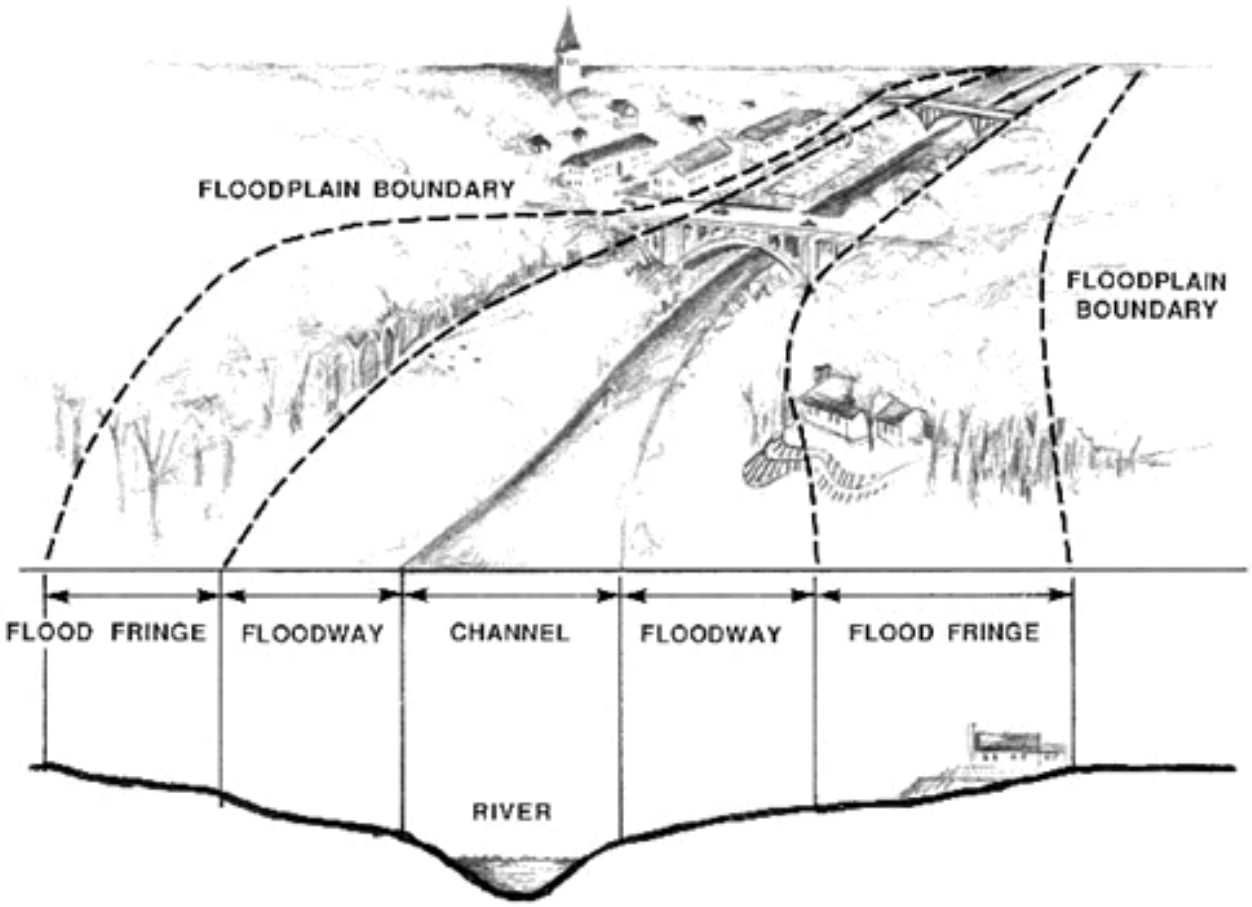


Figure 23. Elements of a Floodplain

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.
Often, the term "floodplain" is used inappropriately by assuming that floodplains are limited to the 100-year floodplain boundary. This is not the case, and a floodplain can be identified for a 500-year flood or other such level of risk.

The 100-year floodplain is a guide for regulatory and insurance purposes. Floods greater than a 100-year regional flood event can and do occur. Nationwide, approximately 25 percent of all National Flood Insurance Program 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.

Generally, the 100-year floodplain should be considered the 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.

Also, high-hazard flood areas can exist which are not shown on the Flood Insurance Rate Maps. And floodplains can change in hazard risk and size as development occurs or with other physical changes in the environment. 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. Allowing inappropriately planned development to occur with knowledge of such potential hazards could be a source of potential liability for a community should a flood event occur which impacts the development.

Updated FIRMs for St. Croix County were made effective as of March 16, 2009, and are available in a digital format (D-FIRMs). The accuracy of the D-FIRMs remains a major concern for some local officials and residents. Since 2009, St. Croix County has completed a light detection and ranging (LIDAR) remote-sensing project, which provides much improved topographical/contour data on which more accurate floodplain boundaries can be determined.

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 - Somewhat unique to some northern and northwestern portions of the County (e.g., Bass Lake, Perch Lake, Village of Deer Park) has been the serious flooding from groundwater fluctuations. These groundwater fluctuations can vary significantly, causing surface water levels at lakes or ponds to increase or decrease 10-15+ feet over a period of 10-20 years. Such fluctuations can contribute to both overbank or overland flooding, as well as underground seepage into basements. And unique to this phenomenon, 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

Flooding occurs throughout various parts of Wisconsin. Areas located in a Special Flood Hazard Area (SFHA), also known as '100-year floodplain', are most likely to experience riverine or overbank flooding. **Figure 4** in Section II.B.ii previously showed the locations identified as the 100-year floodplain in St. Croix County. While these are areas in the County 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.

Flooding can impact assets outside the areas inundated by flooding. In St. Croix County more than half of the 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.

Hazard Extent (Potential Intensities)

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

Table 17. 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 Trends

Summary of regional flooding trends:

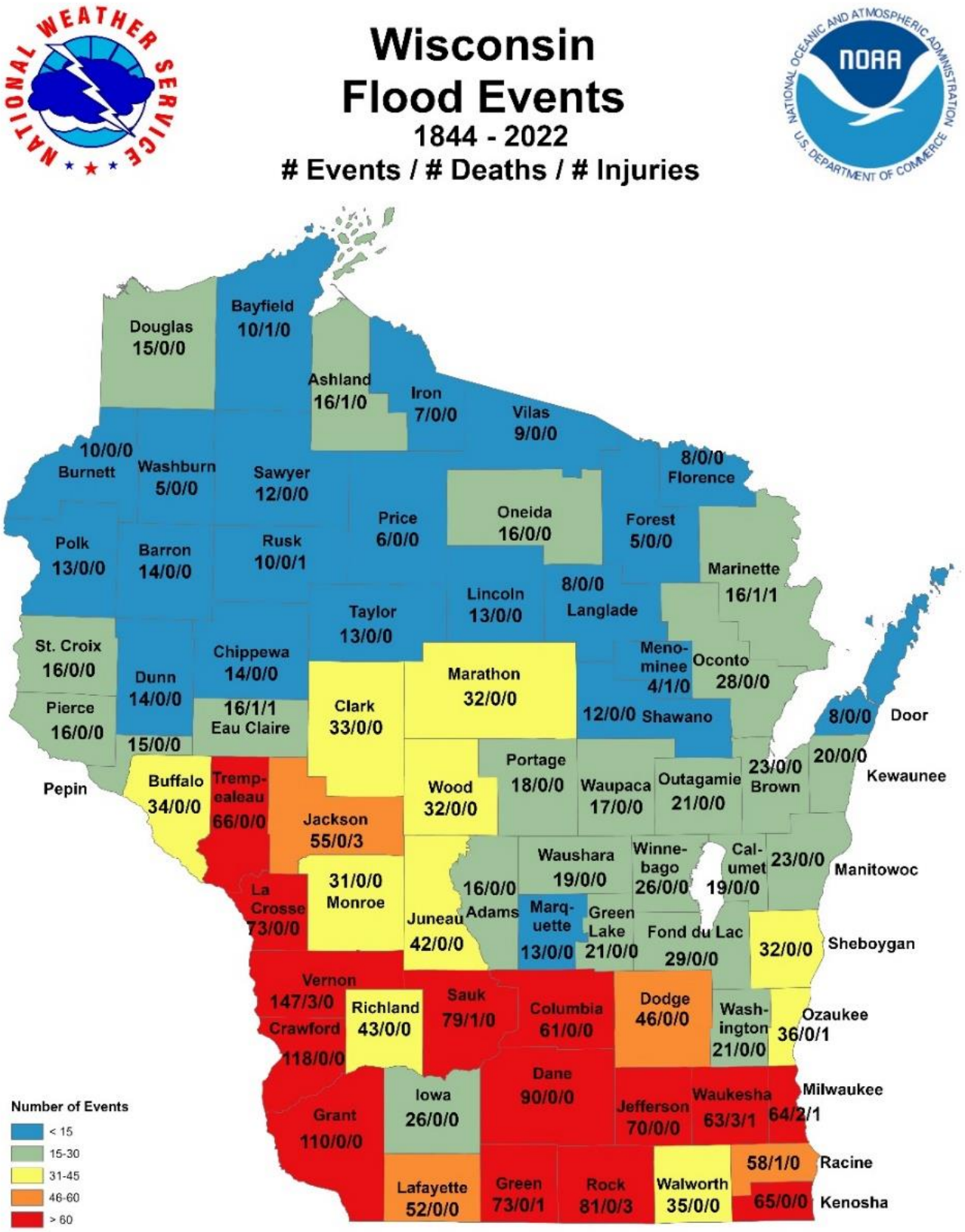
- Wisconsin has experienced a significant flooding event at least once every decade since 1880.
- Flood events tend to cause the most widespread damage of all Wisconsin's natural hazards. Since 1992, flood damages from major events in Wisconsin have exceeded $2.3 trillion.
- There have been very few dam failures resulting in major damage or loss of life in Wisconsin. 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.

Low-lying areas of those Wisconsin counties that border the Wisconsin and Mississippi rivers and many nearby tributaries, including the Chippewa River, are prone to riverine flooding. As development has increased, agricultural flooding in some areas has increased as well. Shoreline development has also increased both the risk and vulnerabilities to flooding. Since the 1960s, the number of homes along northern Wisconsin lakes has increased over 216 percent. Statewide, an estimated 250,000 structures lie within 100-year floodplains. Nationwide, floodplains have been slowly increasing in size due to increases in runoff and decreases in flood storage areas.

Flooding is the principal cause of damage for the far majority of Presidential Disaster Declarations in Wisconsin since 1971. From 1971 until 1993, the total flood damages in Wisconsin were estimated at $300 million. In June 1993, flooding over large areas of the State, including in St. Croix County, resulted in an estimated $352 million in damages from this single event. Even worse flooding damage was experienced in Wisconsin in June 2008, with damages estimated at roughly $697 million.

Figure 24 shows the county-by-county distribution of flood events across Wisconsin for the period of 1844 to 2022. Compared to southern Wisconsin, St. Croix 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.

Figure 24. Reported Flooding Events in Wisconsin by County, 1844 to 2022



National Climate Data Center (NCDC) Summary Table

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

Flooding Events Summary *(1/1/1993 to 12/31/2022)*			
Total Events:	24	Number of Events Per Year:	0.83
Total Event Days:	15	Number of Event Days Per Year:	0.52
Total Injuries:	0	Total Deaths:	1
Total Event Days with Property Damage:	5		
Property Damage (from NCDC):	$ 8.69M ($8M from the 6/29/2020 event)		
Property Damage (adjusted for inflation):	$ 10.09M		

21 of the 24 reported events from 1993 to 2022 were flash flooding events – five of which occurred in the City of Hudson and five of which occurred in the City of River Falls.

National Flood Insurance Program (NFIP) Claims

As of December 31, 2023, there were a total of 115 active National Flood Insurance Program (NFIP) flood insurance policies in St. Croix County, which is a significant decrease from 216 policies in 2012:

Community	# of Policies	Total Coverage	Total Premium + Federal Policy Fee
St. Croix Co. - unincorporated towns	66	$17,952,000	$54,742
City of Glenwood City	1	$352,000	$1,681
City of Hudson	8	$2,890,000	$7,505
City of New Richmond	7	$1,444,000	$6,486
Village of Baldwin	15	$3,241,000	$9,985
Village of Hammond	1	$500,000	$899
Village of North Hudson	9	$2,639,000	$6,316
Village of Somerset	1	$228,000	$640
Village of Star Prairie	1	$46,000	$355
Village of Wilson	1	$108,000	$803
Village of Woodville	5	$1,114,000	$5,433

The decrease in the number of NFIP policies since 2012 may be partially explained by the updated D-FIRMs in 2009, which improved the accuracy of determining what structures are identified in the 100-year floodplain. 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 Wisconsin Emergency Management, from 1978-2017 there had been 52 NFIP claims for St. Croix County with a total paid of $516,865.00. These numbers exclude River Falls and Spring Valley, since exact locations are unavailable and it is not possible to confirm which counties the claims are in. Thirty (60%) of these claims were in the unincorporated towns, eight in the

City of New Richmond, seven in the City of Hudson, four in the Village of Baldwin, one in the Village of North Hudson, one in the Village of Roberts, and one in the Village of Woodville. According to the FEMA NFIP website, there have been 20 NFIP claims paid, totaling $822,639.94, for St. Croix County since 2017.

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. This list is regularly compiled by FEMA and made available to the Wisconsin Division of Emergency Management. Two residential properties in the County are on the repetitive loss properties list. Both of these residential properties are located along the St. Croix River in the Town of Troy, and both had claims related to flooding in April 1997 and April 2001.

Significant St. Croix County Events

Historically in St. Croix County, the most serious riverine flooding has been along the Willow and St. Croix rivers. Older historical accounts highlight the larger riverine floods where dams were washed out or homes, farms, or streets were damaged. Between 1965 and 2018, St. Croix County was part of seven Presidential disaster declaration requests involving flooding: 1965, 1969, 1993, 1998, 2001, 2002, and 2013.

The 2006 *Somerset Hazard Analysis* provided an excellent overview of the primary St. Croix County flooding occurrences, which is further supplemented here with more recent events:

Spring 1876. The Willow River flooded due to tremendous amounts of rain and melting snow, threatening New Richmond. *(New Richmond News, April 11, 1931)*

December 1886. The Willow River flooded Hudson in a rare winter flood. *(New Richmond News, December 12, 2002)*

April 1897. Floodwaters backing up from the Mississippi River flooded Hudson. *(The Hudson Star Observer, 125th Anniversary Edition, June 21, 1979)*

March 1928. A large flow of water, along with some ice chunks, damaged the Willow River dam located at Roller Mills in New Richmond. *(New Richmond News, March 28, 1928)*

April 1934. A flood damaged much of the Roller Mills plant in New Richmond. *(New Richmond News, April 4, 1934)*

Spring 1936. The Willow River flooded all over St. Croix County, washing out roads in both New Richmond and Star Prairie. *(New Richmond News, March 25, 1936)*

April 1952. The St. Croix River stood at 689.48 feet above sea level, the highest level in recorded history up until then.

Spring 1965. Heavy rainfall resulted in major flooding as the St. Croix River reached a record 694.07 feet above sea level. An emergency dike was erected in nearby Stillwater.

April 1965. A dam on the Apple River crumbled to the pressure of a five-foot-high wall of water. *(New Richmond News, April 22, 1965)*

Spring 1966. Major flooding again occurred on the St. Croix River. *(A Century of Service – American National Red Cross – 1881-1981, published May 1981)*

April 1967. The Willow River flooded the streets of New Richmond. *(New Richmond News, April 6, 1967)*

April 1969. The St. Croix River reached 692.32 feet above sea level. An estimated 3,000 people from Bayport and Afton, Minnesota were evacuated.

Spring 1989. The Willow River flooded and washed into streets and homes of New Richmond. *(New Richmond News, March 30, 1989)*

Spring 1997. Flooding on the St. Croix River required nearby Stillwater to create an emergency dike.

April-May 2001. The St. Croix and nearby rivers were severely flooded. The Stillwater Lift Bridge was closed from April 10th into May. Debris accumulated at the Kennedy Mills Dam (Polk County) on the Apple River causing an adjacent embankment to collapse. An office building in Hudson was "engulfed" by the St. Croix River. *(National Weather Service)*

August 2001. Heavy rainfall caused flash flooding across much of St. Croix County. Water was several feet deep over many state and local roads. A few roads near Forest and Glenwood City washed out. Many roads were under water and damages were estimated at $200,000. *(National Weather Service)*

The 2001 floods resulted in the greatest flood damage in the County since the flooding of the 1960's. Approximately $160,000 in damage assistance requests were made under the Federal Disaster Declaration by St. Croix County governmental entities. Of this damage, 54% was related to the repair of roads, shoulders, and culverts. Another 37% of the damage was to park and trail facilities in the City of Hudson, Village of Somerset, and at Troy Beach County Park, reflecting that local governments have mitigated potential flood damage by using many high-risk floodplains for outdoor recreational uses. It is believed that many local municipalities did not submit damage assistance requests for their local costs related to debris clean-up or relatively minor road repairs. And some facilities, such as the YMCA Camp, experienced significant damage but was not eligible for federal assistance.



August 2010. Heavy rains, described as a solid sheet of water, resulted in flooding and damages over much of St. Croix County, with central and south-eastern parts of the County being especially hard hit. Up to eight inches of rain fell in a few hours, and many residents stated the event was unlike anything they had seen in their lifetimes. The event significantly raised awareness of local flash flooding vulnerabilities. 95 locations on area roads, shoulders, and culverts were washed out, damaged or in need of repair; and there was insufficient barricades/signage to cover all locations. Livestock were swept downstream at one farm. Fifty percent of the roads in Woodville were impassible, and the Village was effectively cut in half. Flooding occurred at the Woodville Village Hall and Fire Station.

In Baldwin, forty residents were evacuated, including residents from the Comforts of Home assisted living facility. Over 75 Baldwin residents reported some degree of flood damage. Many County residents experienced basement flooding from storm water and sewer back-ups. Lightning strikes and flooding also damaged electrical lines and created two electrical fires, leaving many without electricity (or sump pumps). There was also significant damage to property and vehicles, including one police car in Woodville. A number of storm-related traffic accidents also occurred, with six injuries. In all, 202 homeowners and renters reported damages to St. Croix County Emergency Management with hopes of obtaining assistance. 94 families were assisted by Red Cross and 98 different sites received substantial damage.

Damages in 2010 exceeded those of 2001. Estimated damages filed with the State were $3,779,398 in residential damage, $321,101 in damages to businesses, and over $1 million in road damage. $444,246 in public-sector damages and expenses were submitted for Wisconsin Disaster Aid in 2010, and over $333,000 in reimbursement was received. An even greater reimbursement Wisconsin Disaster Aid request was anticipated for 2011. Additional costs for road repairs were covered by the Wisconsin Department of Transportation. Also, a Federal HUD Community Development Block Grant (CDBG-EAP) request for emergency assistance was submitted for $691,500 in housing rehabilitation and/or replacement, $908,315 in public facilities assistance, and $25,000 in business assistance. More information and maps regarding the August 2010 flooding can be found in **Appendix F**.

June 2013. Severe thunderstorms in Minnesota moved into west central Wisconsin and produced some damaging winds, torrential rainfall, and hail. Up to 2.5 inches of rain fell in a 30-minute period in portions of west central Wisconsin, causing roads and bridges to be flooded. Responders rescued people in vehicles that were disabled due to the flood waters in the Hudson and Roberts areas. A high-water rescue occurred due to flood waters near Interstate 94, south of Roberts, near exit 10. No injuries were reported. Numerous town roads and a bridge in Baldwin were closed due to washouts and standing water. The City of Hudson declared a State of Emergency due to large amounts of debris, taking emergency protective measures. There were damages to roads due to high winds and flooding. Initial county damage estimates included debris clearance ($45,000) and road damage ($80,000). St. Croix County was part of a Presidential Disaster Declaration.

July 2015. Several hours of heavy rainfall occurred during the morning hours with 5-8 inches total reported. The Kinnickinnic River near River Falls rose almost 7 feet in less than 5 hours. The Troy Glen Trailer Park (consisting of about 20 homes) was evacuated to the Troy Town Hall, and the American Red Cross assisted with sheltering of displaced residents in Hudson. Reported damages included roads, a couple bridges, culverts, ditches, and houses with flooded basements. The hardest hit towns were Baldwin, Cady, Eau Galle, Kinnickinnic, Rush River, St. Joseph, Troy, Wilson, Woodville and especially River Falls. Estimated damage due to flooding in St. Croix County was $360,000.

May 17 & 23, 2017. Village of Hammond experienced flooding due to heavy rains on May 17th. Town of Warren declared an emergency due to heavy rains on May 23rd causing flooding, especially at Twin Lakes. Wisconsin Disaster Fund assistance was received by the communities for debris removal, protective measures, and road systems.

June 28-July 1, 2020. Described locally as a "unique event", flash flooding was experienced throughout the County due to heavy rains. Portions of St. Croix County received over 8 inches of

rain causing flooding and washed-out roads. The areas that experienced the most significant flooding were the Kinnickinnic, Rush and Eau Galle Recreation River areas, the Towns of Hammond, Baldwin, Emerald, Glenwood, and Cylon, the villages of Hammond and Baldwin, and the City of Glenwood City. Water was over County highways in at least 80 locations. One person died in the flooding when they lost control of their vehicle while driving into flood waters on Highway 63 north of Baldwin. Additional reports identify rescue efforts wherein people who had to climb on top of their cars to avoid rushing waters. Damages reported because of the event totaled $9 million in private property and $4 to $5 million for public infrastructure. At least 40 homes sustained major damage and one home was destroyed when its foundation caved in. The remaining costs are tied to bridge, highway and road damage. Some of the specific roads that were closed or washed out during the height of the flooding were: 1000 Block of 190th Street in Baldwin, 2100 110th Avenue in Baldwin, Country Road TK, DD & 240th Street in Baldwin, Highway 12 & 220th Street in Baldwin Township, 2254 130th Avenue in Emerald, 2900 Block of 200th Avenue in Glenwood City, and West Blvd & Highway 65 in Roberts. Small Business Administration (SBA), Community Development Block Grant (CDBG), and Wisconsin Disaster Fund (WDF) assistance was approved to assist the public and communities.

Taken together, the previous information provides insight into flooding trends and concerns for St. Croix County which were further confirmed by local officials and other sources during the mitigation planning process:

- Historically, flooding on the Willow River, especially in the New Richmond area, has been a significant problem. However, improvements to the dams on the Willow River, including the Mill Pond Dam in New Richmond, have helped to mitigate these problems. Large areas of floodplain along the Willow River have also been acquired for public lands, helping to mitigate potential flooding.



August 2010 Flooding in the Town of Rush River

- St. Croix River flooding is worst when flooding on the Mississippi River occurs and floodwaters back-up the St. Croix River. These floodwaters can sometimes overtop the Lake Mallalieu Dam between Hudson and North Hudson, causing flooding problems along the lakeshore, especially the north side. During planning meetings, options to address this concern through improvements at the dam were discussed, but no potential, feasible solutions were identified.
- Since the 1950s, St. Croix River flooding has had more serious impacts on the Minnesota side of the river, while many areas along the Wisconsin side of the river are protected from development through scenic easements, floodplain zoning, and public land ownership. In St. Croix County, North Hudson, Hudson, and the Town of Troy have been most acutely impacted, though the 100-year floodplains are relatively small in these communities; and impacts are typically limited to

certain areas or a small number of structures. Significant mitigation activities since the mid-1960s, such as the construction of dikes or installation of rip-rap, have mitigated some of the more serious St. Croix River flooding impacts in the County.

- In recent years, overland and flash flooding have been noted as more significant concerns, occurring every other year on average, with multiple events in some years. The August 2010 flooding is one such example. And unlike riverine flooding, there is a greater of chance of experiencing overland flooding during a non-spring month. Overland and flash flooding impacts are also not limited to floodplains, with significant damage typically occurring to local roads, shoulders, and culverts.

Smaller, but still serious 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. In recent years, these flash flood events have been reported annually, if not twice per year in some areas. Such flood events are largely the result of very heavy rains in a short period of time and can be relatively localized in impact. Damage to structures tend to be less per event 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.

One such "smaller" flash flood event was experienced in June 1993 due to heavy rains. This event is not reflected in either the NCDC database for St. Croix County or the *Somerset Hazard Analysis*, and St. Croix County did not experience the full force of this storm, compared to counties to the east. According to the "*Long Term Flood Recovery Plan*" completed by WCWRPC in April 1994, over $8.6 million in estimated direct damages (adjusted for inflation) to residential properties, agriculture, business, industry, and tourism occurred in St. Croix County as a result of the June 1993 flooding. This is a surprisingly high amount of damage, given that this storm event does not appear in the NCDC records for St. Croix County. However, for St. Croix County, almost 99% of this damage was due to crop losses, based on Wisconsin Department of Agriculture data.

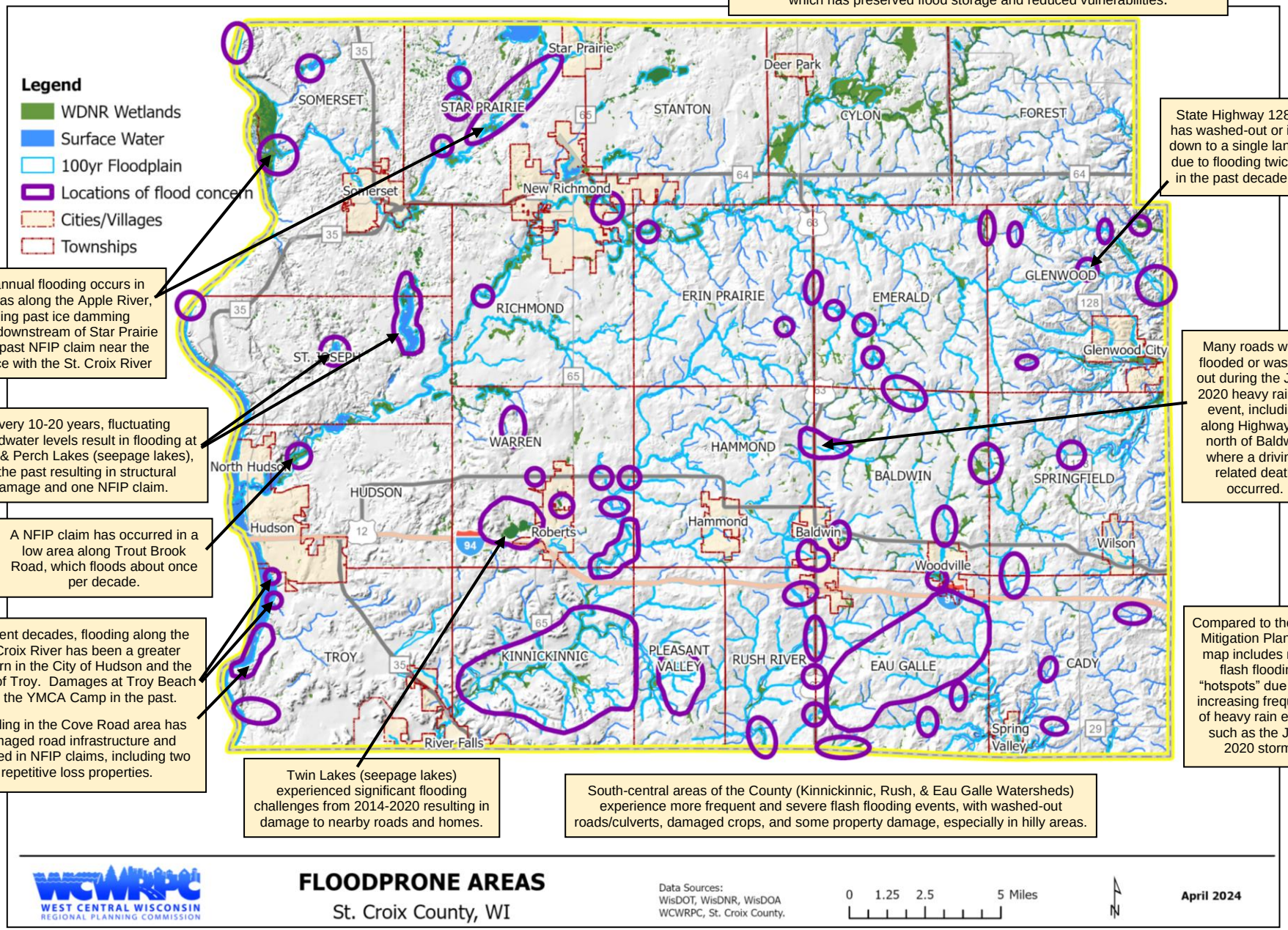
Areas Prone to Flooding

Riverine flooding over the past 30 years in unincorporated St. Croix County has typically been most frequent and severe along the St. Croix River, Willow River, and some lower-lying lands along the Apple River. Flash flooding and overland flooding is more frequent, however, and can occur countywide, though it has been a more significant problem in recent decades in central and southern portions of the County.

In St. Croix County, riverine flooding has the largest potential to cause serious damage to many structures as part of a single event, though such events are very infrequent and there is typically time available to prepare for such an event to reduce potential damage (e.g., evacuation, sandbagging). More frequent overland or flash flooding typically results in less severe damage to structures overall, with flooding damage to basements, yards, and garages possible, but costly road damage is typical. However, the large amounts of damage during the August 2010 event shows that flash flooding can also be very destructive.

Figure 25. Unincorporated Areas Prone to Flooding (Towns Only)

WDNR, U.S. Fish & Wildlife, and the National Park Service have acquired large areas of wetlands and floodplains near or along the St. Croix and Willow Rivers, which has preserved flood storage and reduced vulnerabilities.



Some of the unique aspects of the unincorporate areas identified as prone to flooding in **Figure 25** are further described below:

- **Some areas along the St. Croix River in the Town of Troy** experience riverine flooding to various degrees almost annually during times of spring melt. During the past twenty-five years, the worst flood damage has occurred when flooding downstream on the Mississippi River caused floodwaters to back-up on the St. Croix River. This area includes lakefront cottages, many of which have been renovated or replaced in recent years for bigger, year-round residences. In some cases, the steep, rugged topography in the area has limited home development to flatter sites closer to the river. Due to the high value of many of these homes and the prime location, the buyout and removal of floodprone homes in this area may not be a feasible alternative.
- **Troy Beach County Park/YMCA Camp.** Flooding of the beach area of the Troy Beach park and YMCA camp occurs approximately once every 3 to 5 years. Typically, debris must be cleared from the beaches or parking lots, and some bank erosion occurs, but serious damage is rare. The more severe 2001 flood did cause some significant damage, however. At Troy Beach, waves ripped off the roof to the bath house, while boats, deck supports, and other equipment were damaged at the YMCA Camp. Both facilities have minimal improvements in the floodplain and limit equipment storage in the high-hazard floodplain during flood seasons. No mitigation efforts were identified at this time for these locations.
- Slowly fluctuating groundwater levels have historically been a flooding problem for homes at **Bass Lake** in the towns of St. Joseph and Somerset. At least fourteen NFIP claims have been made for six properties on Bass Lake, making it the highest concentration of claims in the County. Groundwater levels have historically cycled, reaching an all-time high in 1998, but are 4 to 5 feet lower now; levels have been as much as 10 to 15 feet lower in the past. In the 1990s, a lake rehabilitation district was established; and an extensive pumping effort was undertaken to reduce waters. Water levels retreated very soon thereafter, apparently not due to the pumping, itself. There has been some speculation that removal of dams on the Willow River in the late 1990s may have helped lower groundwater levels in the area. Drier weather conditions and normal groundwater cycles may have also contributed to the lower levels.
- Similar groundwater fluctuations have been worse in the past at the nearby, smaller **Perch Lake** in the Town of St. Joseph, though fewer homes have been impacted. Water levels have been 3’ to 4’ up the sides of cabins for years at a time. Up to three additional homes have become flooded or landlocked during flood conditions, and one owner recently filled in their basement as a means of floodproofing. Unlike riverine flooding, the cause, trends, and solutions for these fluctuations are more difficult to determine. Though conditions at Perch Lake have temporarily improved, long-term water levels remain uncertain and some lakeshore structures remain floodprone. There may be potential to mitigate these concerns through acquisition of floodprone properties which would also allow for the relocation of the boat landing for much safer lake access.
- Since 2014, rising water levels at **Twin Lakes** in the Town of Warren has increasingly become a significant flooding concern, which was first identified in the 2017 County mitigation plan. Twin Lakes is a 60-acre seepage lake located just west of the Village of Roberts. Past flooding events have caused road damage, flooded 5-6 homes, and impacted or directly threatened about

20-25 other homes. This flooding is not limited to lakefront properties, but includes areas along 107th Street and 112th Street as well. Standing, stagnant water following the flooding poses health concerns. Water quality and shoreline habitat are also being negatively impacted. Some nearby roads were raised, but problems persist.

The problem is complex and there has been significant local disagreement over the factors contributing to this flooding. In September 2020, an engineering study was completed suggesting that precipitation and rainfall runoff were the primary contributing factors to the Lakes' inflow volume and suggested two alternatives be further explored. This study also noted that if water levels continued to increase at the rate of about 0.48 feet per year, the Roberts wastewater treatment plant would be inundated in 2026. Since the 2020 study, St. Croix County has entered into a drought period and water levels have retreated significantly at Twin Lakes. However, this may only be a temporary reprieve from the past flooding challenges.

- **Trout Brook Road** (or Rustic Road 13) where it crosses the Willow River bridge in the Town of Hudson overflows about once every decade. A small number of nearby homes is potentially in the floodplain, and there has been one NFIP claim from this area. Additional analysis to reduce flooding potential is needed, possibly as part of planned road/bridge improvements.
- Portions of the **lower Apple River** in the Town of Somerset have been subject to seasonal riverine flooding in the past, but impacts to structures have not been significant overall and limited to one NFIP claim. A few roadways in the Town also have occasional riverine flooding problems. The Town also mentioned that a campground is a concern should a dam failure occur.
- Flooding and ice-damming have been periodic problems for 1-2 homes along the **Willow River** in the Town of Richmond. The flooding has been the biggest concern just east of the City of New Richmond and just south of CTH "K". There has been 1 NFIP claim in this area in the past, and closure of the County Highway has been threatened. Dynamite has been used on occasion to break up the ice damming and reduce flooding potential.
- Included in the previous Plan, but not shown on the map, is the area southeast of the City of New Richmond in the Town of Richmond, where development near **Paperjack Creek** has increased runoff and flooding concerns in the 140th and 150th Streets area. This area had the potential to impact homes should a serious flood occur, such as during a quick snow melt combined with heavy spring rains. However, recent road and culvert improvements may have remedied this problem.



- **Southern parts of the County, such as in the Kinnickinnic and Rush River basins**, have had high incidences of road and culvert washouts due to stormwater flooding, but such road and embankment damage is not limited to this area. Generally, there are fewer large public-owned flood storage areas in these river basins which may be contributing to these stormwater problems, as compared to the

northern and western parts of the County. Landscape changes and heavier rain events are resulting in bank, ravine, and channel erosion within these basins and elsewhere.

In their hazard survey, the Town of Kinnickinnic noted that while flooding is not unique to the community, the June 29, 2020, flash flooding "exposed a vulnerability that exceeded familiar road flooding" due to a storm with over 8" of rainfall. The resulting road closures significantly impacted travel patterns and at least eight different roads were either flooded or otherwise not passable. To ensure safe travel for residents, businesses, and emergency responses, the Town recommended that local, county, and state entities should combine their efforts to address these challenges by:

- Identifying roads that are especially vulnerable during severe rain events.
- Mapping possible travel routes that assurance safe access during such an event.
- Investigating engineering solutions to keep major roads open (e.g., culvert redesign).
- Identifying and applying for financial help to implement solutions.

A number of bank restoration/stabilization projects have occurred along the Kinnickinnic, Rush, and Willow Rivers, though such projects are very expensive and can require much of the County Land Conservation office's cost-sharing dollars for that year.

- Reflecting the increasing frequency of heavy rainfall events, most towns in the **south-central, central, and eastern portions of the County** added or expanded flooding hotspots on the floodprone areas map compared to the previous mitigation plan.

It should be noted that many floodprone and high-hazard floodplain areas are now in public parks, recreational uses, or wildlife lands and are not of significant concern. This not only reduces potential vulnerabilities by preventing floodplain development, but has reduced risk further downstream by providing flood storage areas. The Wisconsin Department of Natural Resources, U.S. Fish & Wildlife, and National Park Services own significant amounts of floodplain land on the St. Croix and Willow rivers. In addition, the Army Corps of Engineers owns large amounts of floodplain near along Lake George and the Eau Galle River. Many local municipalities and the County have also maintained floodprone properties for recreational uses, such as Troy Beach County Park and numerous community parks. A number of communities during the plan update noted the importance of clearing brush in waterways or river channels to help prevent flooding, but undertaking such actions can be a challenge due to costs and obtaining permissions from landowners and WDNR.

It is important to note that many of the cities and villages have experienced significant flooding that are not included in the previous map. The flood history and concerns for the unincorporated cities and villages are described in their respective sub-plans in **Appendix L**.

Agricultural Flooding

Overall, the impacts of flooding on agricultural crops is not viewed as a major concern. However, approximately 42 percent of reported damages from Wisconsin floods between 1993 and 2000 were from crop losses. The large crop losses in St. Croix County in 1993 demonstrate that this is a vulnerability that is often overlooked. 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 increase 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.

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.

Farming land use practices, including modifying natural drainage and surface water retention areas, have the potential to exacerbate flooding and stormwater runoff as discussed in the Hammond and Glenwood City experiences in Appendix L. Best management practices and good soil health (e.g., grassed waterways, buffer areas, cover crops, overland flow ponds, minimizing tillage) are important tools to encourage the water infiltration and help reduce flash flooding.
Over 12,000 acres of assessed agricultural land falls within the 100-year floodplains of St. Croix County. 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 is 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. When prolonged flooded conditions are not common, periods of excessive soil wetness can delay spring planting and indirectly hinder yields by shortening the growing season.

Perhaps a greater agricultural-related threat is associated with manure storage and nutrient management. This is a multi-hazard issue that is addressed using an all-hazards approach. Flooding, heavy rains, and ice damming can contribute to the failure of older or improperly maintained manure storage facilities. And heavy rains, flooding, and unexpected snow melt can result in nutrient run-off into surface waters, resulting in high levels of contaminants and fish kills. This risk is discussed further in the hazardous materials spills assessment later in Section III.B.x.

Overall, riverine or lake flooding of agricultural 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. **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.** 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 St. Croix County or its municipalities within the scope of this plan at this time. County officials note that prevention is 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, and following a nutrient management plan are all important steps to preventing manure spills and runoff.

Hazard Probability – Flooding

The Plan Steering Committee rated riverine or overbank flooding as being some to moderate probability, slightly higher than overland flooding. Vulnerability or impacts were rated similarly. Flooding in St. Croix County will continue to be a significant risk for residents and improvements. The drought during the previous decade contributed to a reduction of recent flood events, though there have been three significant flood events in the County over the past six years. A smaller overland or stormwater flood event can be expected to occur annually in some areas, with multiple events in a single year not uncommon. Such flash flooding can be expected to primarily result in basement flooding, washing out of road infrastructure, and contributing to soil and bank erosion. Those areas most prone to the typical annual riverine flooding associated with snow melt are well known and potential damages have been largely mitigated.

Based on the past decade, it is likely that St. Croix County will continue to experience one serious, damage-causing flood event every two years on average, with some localized flooding and stormwater ponding occurring annually or even more frequently after heavy rain events. Some of these events may be localized in nature, only impacting a portion of the County, while multiple events may be experienced in the same year or even month. **St. Croix County has been experiencing an increasing frequency of heavy rainfall events over the past 2-3 decades and climate trends suggest that flash flooding may become more common.** 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. Flooding on seepage lakes is also very difficult to predict due to the cyclical nature of the groundwater levels and seriousness of the recent droughts. Appendix L addresses localized variance in flood frequency within the cities and villages.

Vulnerability Assessment

Appendix G provides the following regarding the potential impacts of flooding events for St. Croix 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, St. Croix 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. Traveling on flooded roadways or unexpectedly encountering a washed out culvert/shoulder poses the highest risk of injury or death.
- **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.** Unanchored homes (e.g. mobile homes) and outbuildings are more at risk of being swept away during flood events.
- **Croplands and livestock within floodplain or stormwater drainage areas** can be lost due to riverine or overland flooding, though the County's farmers are generally aware of the floodprone areas and associated risks on their properties and rented lands. Cropland practices, drain tiling, etc., have the potential to exacerbate runoff, resulting in flooding down-gradient.
- **Developed areas with large areas of impervious surfaces, heavier soils, and hardscape** are more prone to stormwater or flash flooding or the flooding of nearby areas. 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 L.
- 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 infrastructure in place.



Projected Loss Estimates

The amount of impervious surface along lakes and rivers has grown tremendously in recent decades. However, stricter enforcement of floodplain zoning, shoreland ordinances, and a decrease in available shoreland properties has limited new floodplain development.

Data was not readily available to perform a comprehensive, detailed vulnerability assessment of flooding in St. Croix County. Instead, through the use of D-FIRM maps and G.I.S. parcel data, those principal structures most likely located within a 100-year floodplain were identified by the St. Croix County Community Development Department. 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 H.**

Figure 26 identifies the 100-year floodplains within St. Croix County along with the location of all principal structures located partially or wholly within the 100-year floodplains of St. Croix County using the methodology discussed in Appendix G. Principal structures are those buildings located on a parcel within which the main use of the parcel takes place.

For most parcels, the principal structure will be a home or commercial business, while aerial photography was used to exclude ancillary structures (e.g., garages, barns, sheds) if possible. 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.

Table 18 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 26.

In total there are an estimated 736 parcels in St. Croix County with one or more principal structures potentially being located within the 100-year floodplain. While most parcels have a single principal structure, that is not always the case.

Of the 736 parcels, 626 (87%) are predominantly assessed for residential use, 60 are assessed as commercial, and only three are primarily assessed as manufacturing. Twenty-nine parcels are tax-exempt, so there is no assessment information for these improvements. Tax-exempt parcels include parks, utilities, municipal buildings, and non-profits. These structures are primarily located in the incorporated cities and villages; if flooding of these structures was a concern, they are addressed in each respective community's sub-plan found in Appendix L.

The improvements on the 707 assessed parcels had a 2023 estimated assessed improvement value of nearly $180 million. As shown on Figure 26, these potential floodplain structures can be found throughout the County. The Town of Star Prairie, City of New Richmond, Village of Woodville, Town of St. Joseph, and Town of Richmond account for nearly half of all of these parcels.

It must be noted that the structures identified in Figure 26 and in Table 18 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. 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.

Figure 26. St. Croix County Floodplains & Potential Structures in Floodplain

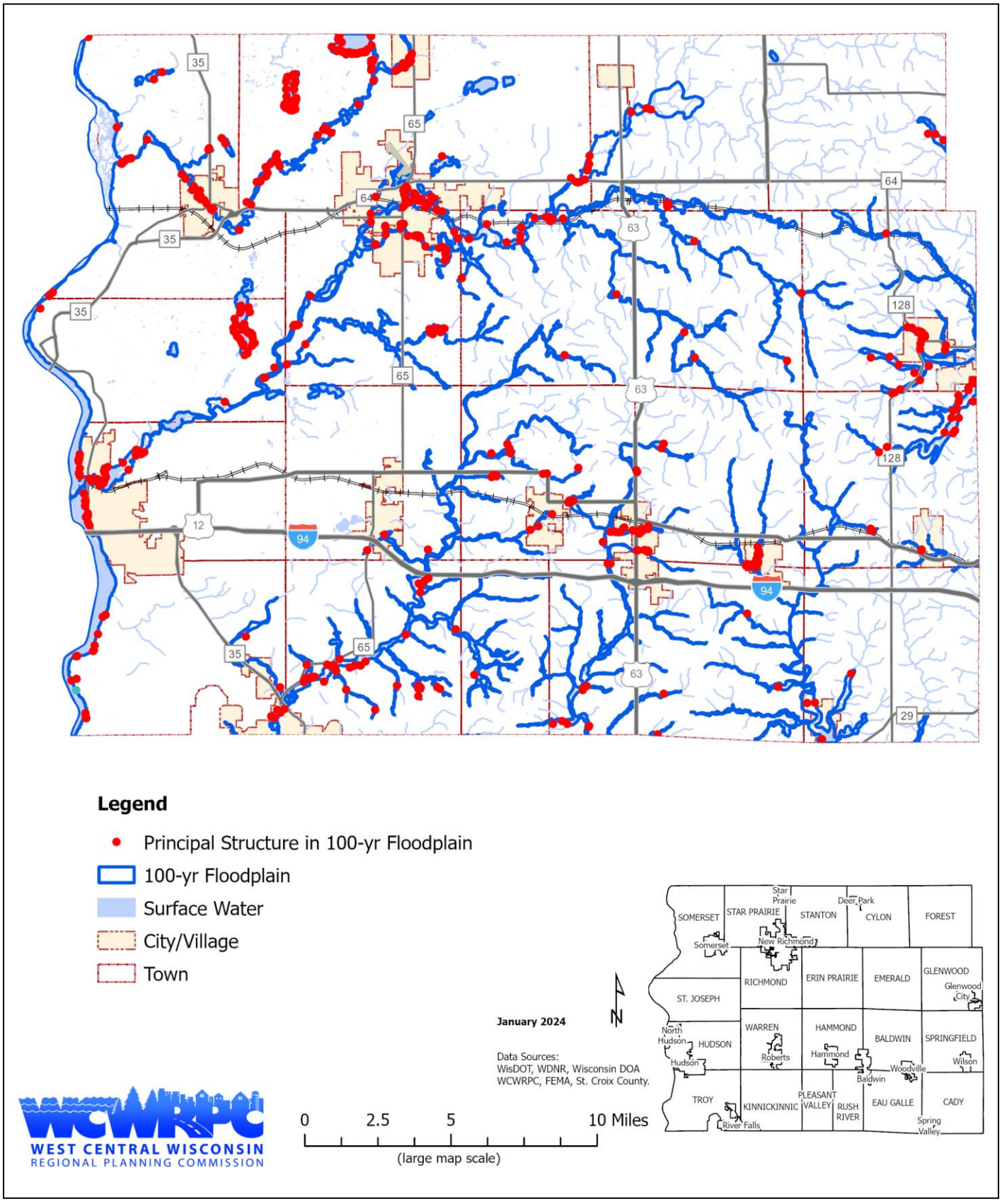


Table 18. Principal Structures potentially in 100-Year Floodplain—2023

Municipality	# Residential	# Commercial	# Manufacturing	# Agriculture	# Gov't Exempt	# Non-Govt Exempt	Total #	Total Assessed Impr
T - Baldwin	3			1			4	$877,000
T - Cady	2			1			3	$343,700
T - Cylon	11						11	$1,530,100
T - Eau Galle	4						4	$656,400
T - Emerald	5						5	$597,000
T - Erin Prairie	16						16	$4,908,500
T - Forest	2			1			3	$647,700
T - Glenwood	12			1			13	$2,340,000
T - Hammond	16	2		2	1		21	$3,132,200
T - Hudson	9				2		11	$1,904,800
T - Kinnickinnic	34			4			38	$8,806,100
T - Pleasant Vly	1						1	$180,000
T - Richmond	47						47	$14,655,400
T - Rush River	6			3		1	10	$1,783,900
T - Saint Joseph	54						54	$13,480,800
T - Somerset	20	2				1	23	$2,938,200
T - Springfield	19			1			20	$2,057,800
T - Stanton	19			1			20	$3,928,700
T - Star Prairie	122	7		1	1		131	$24,642,500
T - Troy	19	1		1			21	$6,171,800
T - Warren				1		1	2	$71,200
Town Totals	**421**	**12**	**0**	**18**	**4**	**3**	**458**	**$95,653,800**
V - Baldwin	13	5			2	1	21	$4,234,700
V - Hammond	1		1		1		3	$5,335,200
V - North Hudson	39						39	$16,580,200
V - Roberts		1					1	NA
V - Somerset	4	7			2		13	$4,133,000
V - Spring Valley					1		1	NA
V - Star Prairie	17	1			1	1	20	$3,874,600
V - Wilson	3						3	$88,400
V - Woodville	51	1			4		56	$8,896,400
Village Totals	**128**	**15**	**1**	**0**	**11**	**2**	**157**	**$43,142,500**
C - Glenwood Cty	11	13	1		4		29	$4,731,500
C - Hudson	7	7			3		17	$16,076,600
C - New Rich.	57	12	1		2		72	$19,316,900
C - River Falls	2	1					3	$975,400
City Totals	**77**	**33**	**2**	**0**	**9**	**0**	**121**	**$41,100,400**
County Totals	**626**	**60**	**3**	**18**	**24**	**5**	**736**	**$179,896,700**

Further, as discussed in Appendix H, 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 26 or Table 18 since the principal structure on that parcel was located outside the delineated floodplain.

FEMA National Risk Index (NRI) Estimated Annual Losses

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

Risk Factor	Riverine Flooding
EAL Rate – Population	1 per 13.51m
EAL Rate – Buildings	$1 per $488,880
EAL Rate – Agriculture	$1 per $7,030
Total EAL	$156,402
Exposure	$17.9 billion
Events per year	0.5
Historic loss ratio	Very low
Overall Loss Score	32.5 (Very low)

Based on $9.55 billion in assessed improvements, annual riverine flooding damage to St. Croix County's buildings alone would be close to $20,000 each year, not including tax-exempt structures. The NRI estimates that St. Croix County has $6.1 million in agricultural value exposure to riverine flooding, which would equate to less than $900 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 St. Croix 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 St. Croix County surface waters has been performed.

2) **Changes in Flood Storage** – Overall, the floodplains and wetlands of St. Croix 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. St. Croix County is experiencing relatively fast 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. Very little new floodplain development is occurring, so the number of structures in Table 18 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 St. Croix 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 26 and Table 18). **Appendix L** includes hazard mitigation sub-plans for each city and village within St. Croix 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.

Flooding concerns for participating educational institutions is included in **Appendix M**. For most of these communities, overland stormwater flooding has been of more significant concern in recent years rather than overbank flooding.

St. Croix 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.

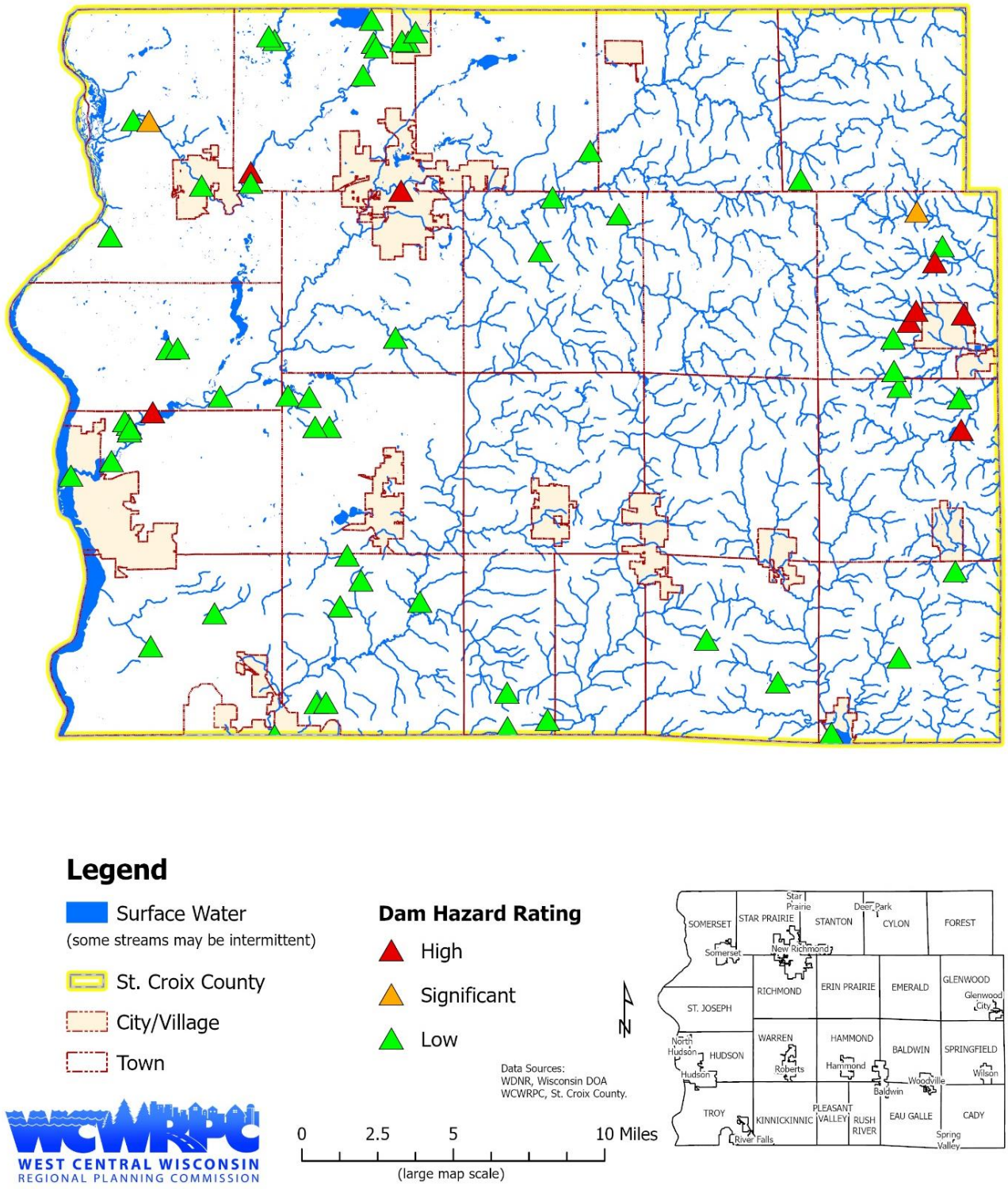
Older dams which have been poorly maintained have a larger potential of dam failure. Hydrologic problems may occur when there is heavy precipitation or snow melt, resulting in more water being impounded than by design or more than the spillway can handle, resulting in adjacent flooding, overtopping, 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 December 2023, St. Croix County had 59 existing dams in the WDNR dam database as summarized in **Appendix I**. The dams of St. Croix County are shown in **Figure 27**, along with their Wisconsin Department of Natural Resources hazard ratings.

As listed in Appendix I, St. Croix County has 16 large dams. Six of these large dams are rated or estimated to be low hazard due to lack of vulnerabilities downstream. Eight of the large dams have a high-hazard rating and two have significant-hazard ratings. No small dams have significant- or high-hazard ratings. Of the eight high-hazard rated dams, five are owned by St. Croix County in the Glenwood Hills area; 1 is owned by the Wisconsin Department of Natural Resources (Little Falls Dam) and one each is owned by the City of New Richmond (Mill Pond Dam) and Xcel Energy (Riverdale Dam).

Figure 27. St. Croix County Dams by Hazard Rating



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. **Based on G.I.S. information for available dam shadows, the mapped dam failure areas for most of St. Croix County do not exceed the 100-year floodplain boundaries.**

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.

St. Croix County has had no significant flooding due to dam failure since the mid-1960s. The Huntington Dam on in the Apple River in the Town of Star Prairie, which had caused some problems in the past, was removed in 1965. Washouts on older dams were not uncommon prior to 1970 (e.g., Upper Burkhardt Dam abt. 1920; Prairie Mills Dam abt. 1950s), but dams are much more closely regulated and monitored today. Based on interviews with Wisconsin DNR and local officials, all significant- and high-hazard dams in St. Croix County are in good structural condition, with many undergoing structural improvements within the last 20 years. Failure of these dams should not occur.

Event Probability – Dam Failure

Overall, **the potential of dam failure in St. Croix 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 extremely low, with a minimal to some vulnerability if a failure should occur.

St. Croix 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 St. Croix 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.

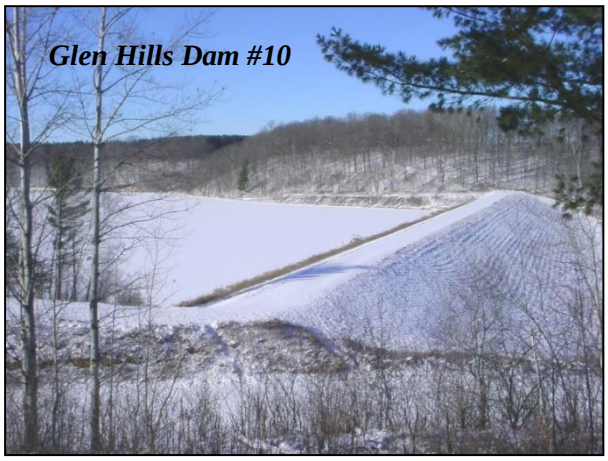
Event Vulnerability – Dam Failure

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 27, St. Croix County only has ten high-hazard dams and two significant-hazard dams.

High-Hazard Dams (10)

Except for perhaps the two bridges across the St. Croix River on I-94 and USH 64, the ten high-hazard dams represent the only high potential loss facilities within St. Croix County. Ten dams in St. Croix County have been given HIGH hazard ratings and all are large dams.

- ***Glen Hills Dams #4, #5, #6, #7, #10***


Glen Hills Dam #10

St. Croix County, through its Parks Division, manages ten dams in the Glenwood City area. These dams are very important to flood control in the City of Glenwood City and the Village of Downing in Dunn County to the east. Five of these Glen Hills dams (#4, #5, #6, #7, & #10) are rated as high-hazard dams. The inundation areas for these five dams, should a failure occur, would in some cases exceed that of the 100-year floodplain; and a significant number of structures within Glenwood City and Downing would be vulnerable, potentially including the high school, fairgrounds, and some industry. No significant needed repairs or actions regarding the high-hazard dams were noted. The installation of new, remote flood gauges and monitoring equipment should be considered. Only Glen Hills #10 has remote monitoring equipment.

- ***Little Falls***

Little Falls Dam is located in the Willow River State Park, approximately two miles up the Willow River from the City of Hudson and Village of North Hudson. A controlled breach and drawdown of this WDNR-owned dam occurred in Fall 2015 due to structural problems and insufficient flood flow capacity. At its previous capacity, approximately 23 residences were within the dam shadow inundation area for Little Falls Dam and identified as potential priorities for evacuation; the largest concentration of these homes is located in the Trout Brook Road area. Radio telemetry or other early warning link to the Lower Power Dam at Lake Mallalieu had been under discussion previously to automate opening of flood gates, if needed. The State of Wisconsin has made the decision to replace the dam, with construction tentatively to begin in late 2019. In the 2013 Mitigation Plan, the Town of Hudson questioned whether dam removals on the Willow River had reduced flood control and may contribute to future flooding.

- ***Riverdale***

The Xcel-owned Riverdale Dam is located approximately 3 miles upstream of the Village of Somerset on the Willow River. The inundation area for the first 2 to 3 miles downstream of the dam, should a failure occur, is significantly larger than the high-hazard floodplain area. Between five and eight structures may be located within this portion of the inundation area, with about four structures located within the first mile. Further down river, the inundation area significantly narrows and closely follows the river channel and 100-year floodplain to the Apple River Falls Dam. Some seasonal cabins on the north side of the Village of Somerset may be within the inundation area. Under flood conditions, floodwaters would take one hour and five minutes for the start of flooding on the southeast side of the Village of Somerset should a failure occur at the Riverdale Dam located 3.18 miles upstream. Peak flooding would occur in 1 hour 48 minutes at the Village. Floodwaters would reach the Apple River Falls Dam

in 1.5 hours and peak about an hour later under flood conditions. St. Croix County received updated flood inundation maps for the Xcel Dams in November 2023.

- ***New Richmond Mills***
  The New Richmond Mills Dam located within the City of New Richmond on the Willow River was reconstructed in 1996, allowing greater control over water levels to help mitigate potential flooding. Two residential structures, one being a seasonal home, lie within the dam shadow according to the 1998 inundation map.

It is worth noting that the Eau Galle Dam on Lake George, which is very important to flood control in the Village of Spring Valley, is located just south of the county line in Pierce County.

Significant-Hazard Dams (2)
Two additional dams were given a SIGNIFICANT hazard rating by the WDNR:

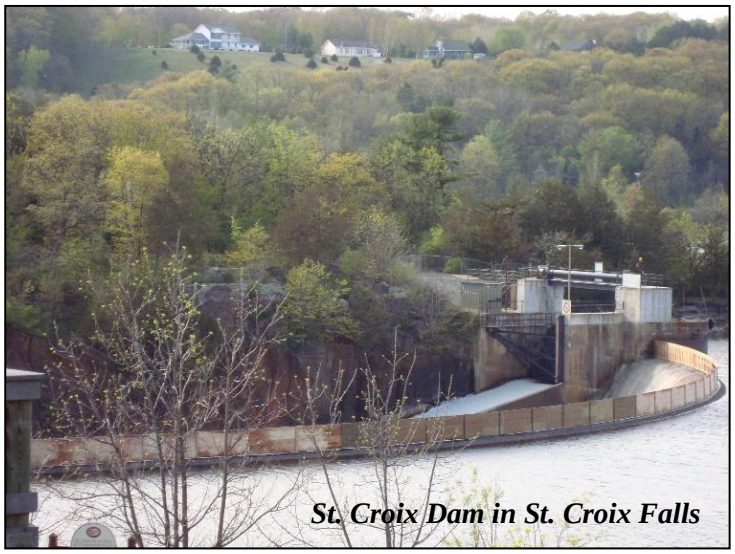
- ***Glen Hills #8***
  Like the five previously mentioned Glen Hills dams, this is additional dam owned by St. Croix County provides flood control in the Glenwood City and Downing area. Located on a tributary of Sandy Creek, Glen Hills #8 has less downstream damage potential compared to the previous high-hazard dams.

- ***Apple River Falls***
  The Apple River Falls Dam owned by Xcel Energy is highly regulated, inspected regularly, and has an emergency action plan on file with St. Croix County Emergency Support Services Department. The Apple River Falls Dam is located approximately 6.59 miles downstream of the Riverdale Dam and 2.32 miles upstream of the backwaters of the St. Croix River. The inundation area for a failure of the Apple River Falls Dam could be slightly larger than the 100-year floodplain for the first mile downstream, but would closely follow the 100-year floodplain boundary thereafter to the St. Croix River. The dam power plant itself is within the inundation area, as well as 5 to 6 structures closer to the mouth of the River where it joins with the St. Croix River. Should a failure occur, less time would be available for evacuation compared to the Riverdale Dam. Flood conditions would begin in 10-12 minutes at the mouth of the Apple River and peak flooding would occur within 30 minutes, likely allowing ten minutes or less to evacuate the 5 to 6 structures just upstream of the confluence before flooding begins.

Other Dam Risks and Vulnerabilities
Floodwaters on the St. Croix River can back-up over the Lower Power Dam at Lake Mallalieu on the Willow River, causing flooding. This dam is in good repair, but the Village of North Hudson suggested additional study of options to prevent or reduce the potential for such "reverse topping" of the dam. The Lower Power Dam is co-owned by the Village, City of Hudson, and St. Croix County. No feasible solutions were immediately identified.

The largest dam potentially impacting St. Croix County should a failure occur is not actually located in the County. St. Croix Hydroelectric Dam at St. Croix Falls is owned by Xcel Energy, and is the only existing dam on the St. Croix River. As a power-producing dam, it is highly regulated under FERC licensing standards. In the very unlikely event of a failure at the St. Croix Dam, floodwater would take

over four hours to reach St. Croix County allowing significant, though limited, time to evacuate and prepare. In comparing the dam hydraulic shadow analysis to the 100-year floodplain maps for St. Croix County, the dam's hydraulic shadow is very comparable to that of the 100-year floodplain of the County, being equal to or less than the high-hazard floodplain boundary in most instances.



St. Croix Dam in St. Croix Falls

Floodwaters from a failure of the St. Croix Dam, based on the dam inundation map, would reach the northern part of St. Croix County in 4.4 hours after the failure, with an incremental rise in floodwaters of 4.6 feet. It would be nearly another 4 hours (8.3 hours total) before floodwater would reach Houlton, with an incremental rise of 4.0 feet. This upper stretch of floodplain is relatively sparsely populated in large part due to significant amounts of Federal, State, and Boy Scout camp lands, in addition to special development regulations, such as the National Scenic Riverway. As floodwaters travel south, a large area on the Minnesota side of the River in the Bayport area becomes a wide floodplain compared to the narrower floodplain of the Wisconsin side due to bluffs along the River. The result is a significant drop to only 1.9 feet in the incremental rise of floodwaters by the time they reach Lake Mallalieu 8.7 hours after the failure. And south of the Interstate 94 bridge, the inundation areas for dam failure are expected to be less than a 100-year flood event and are no longer mapped as part of the dam emergency action plan.

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.

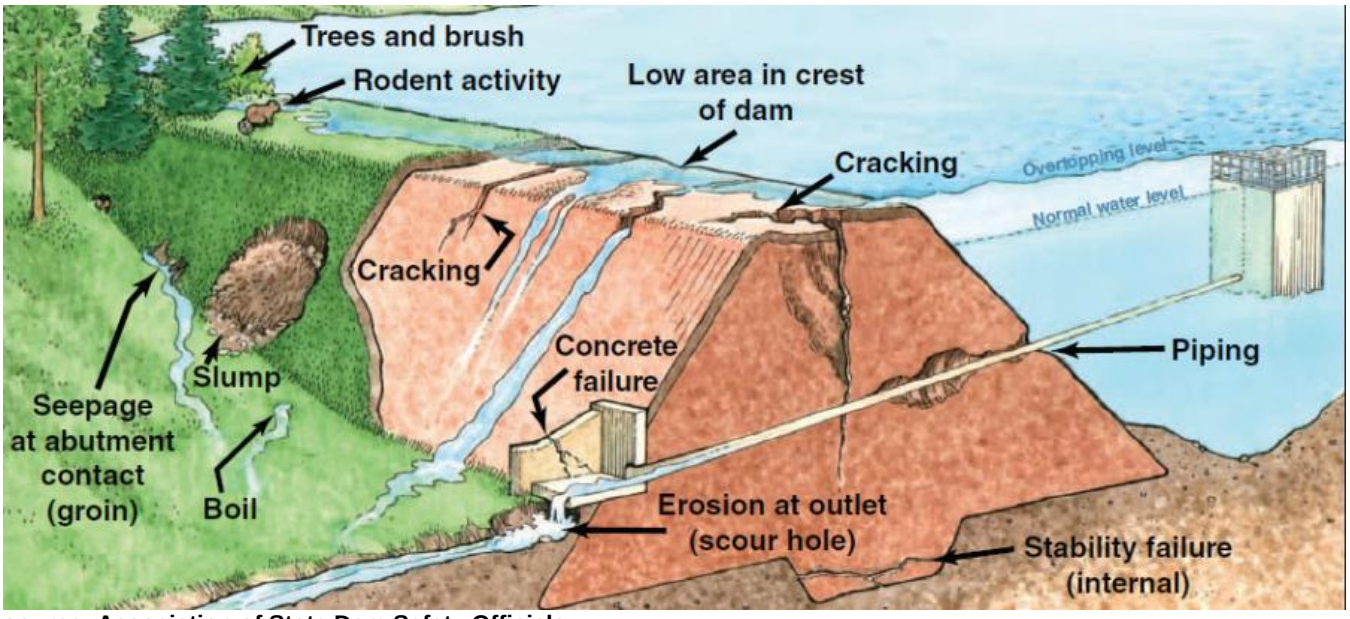
As documented previously, development and population growth in St. Croix County has been generally highest in those towns with significant surface waters. There continues to be development pressure along the shorelines of the County, including above and below dams. Overall, **the potential of damage-producing dam failure in St. Croix County is considered very low**, though the potential for damage and injury is high should failure of a larger dam occur. St. Croix 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. 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.

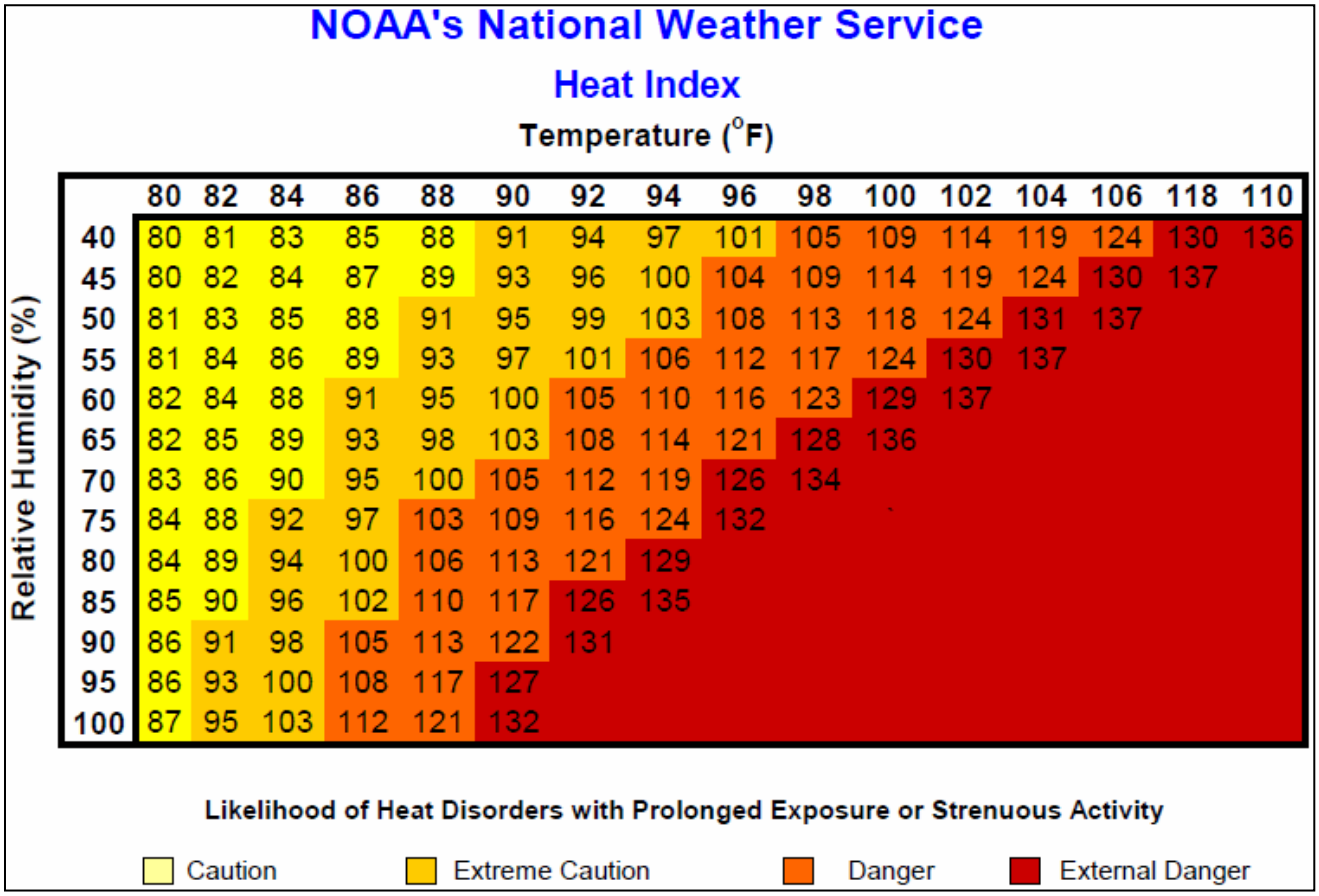
Hazard Location

Extreme Heat is capable of causing health concerns, especially for vulnerable populations. There are no geographic boundaries of locations within St. Croix County uniquely affected by extreme heat events. All St. Croix 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 28**.

Figure 28. Heat Index Table



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

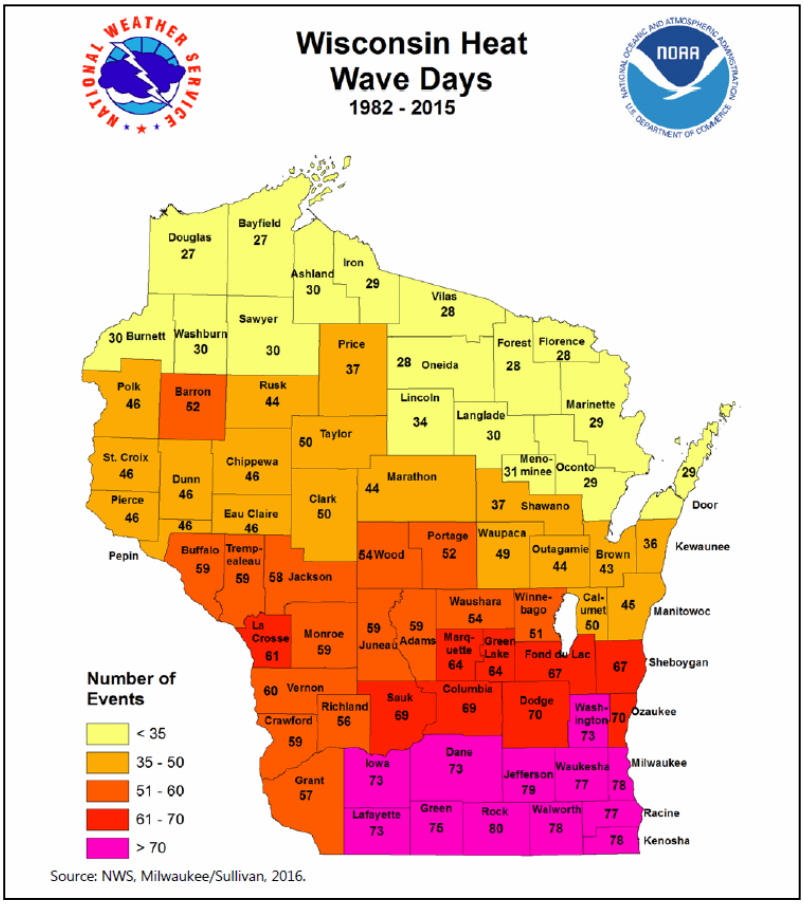
Regional Trends

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 100º to 115º 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.

St. Croix County Trends

From 1993 through 2022, St. Croix County has experienced eight extreme heat events shown on **Table 19**, though the 1999 and 2001 events could be considered part of a single heat wave lasting multiple days.

Table 19. St. Croix County Extreme Heat Events – 1993-2022

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

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

As shown in Table 19, the NCDC database records did not identify any deaths or injuries from excessive heat events within St. Croix County, though deaths and injuries often go unreported to the database.

Hazard Probability - Extreme Heat

The Plan Steering Committee rated extreme heat as a moderate probability in St. Croix County and of growing concern; this hazard was not considered a significant risk in the previous mitigation plans. While extreme heat is a concern for the residents of St. Croix 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 **St. Croix 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 G provides the following regarding the potential impacts of extreme heat events for St. Croix 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 G:

- **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. Campground facilities may also lack sufficient 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.[25] Extreme heat can also have long-term livestock reproductive and herd size management issues. Within confined livestock buildings, heat can also result in deaths, especially should power be lost, which has occurred in the region when a generator failed. 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. will be later discussed.
- **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, St. Croix 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 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.

[25] http://www.wbay.com/story/19037284/2012/07/16/milk-production-takes-a-dip-with-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 20** are the potential dangers associated with heat index temperatures.

Table 20. 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.

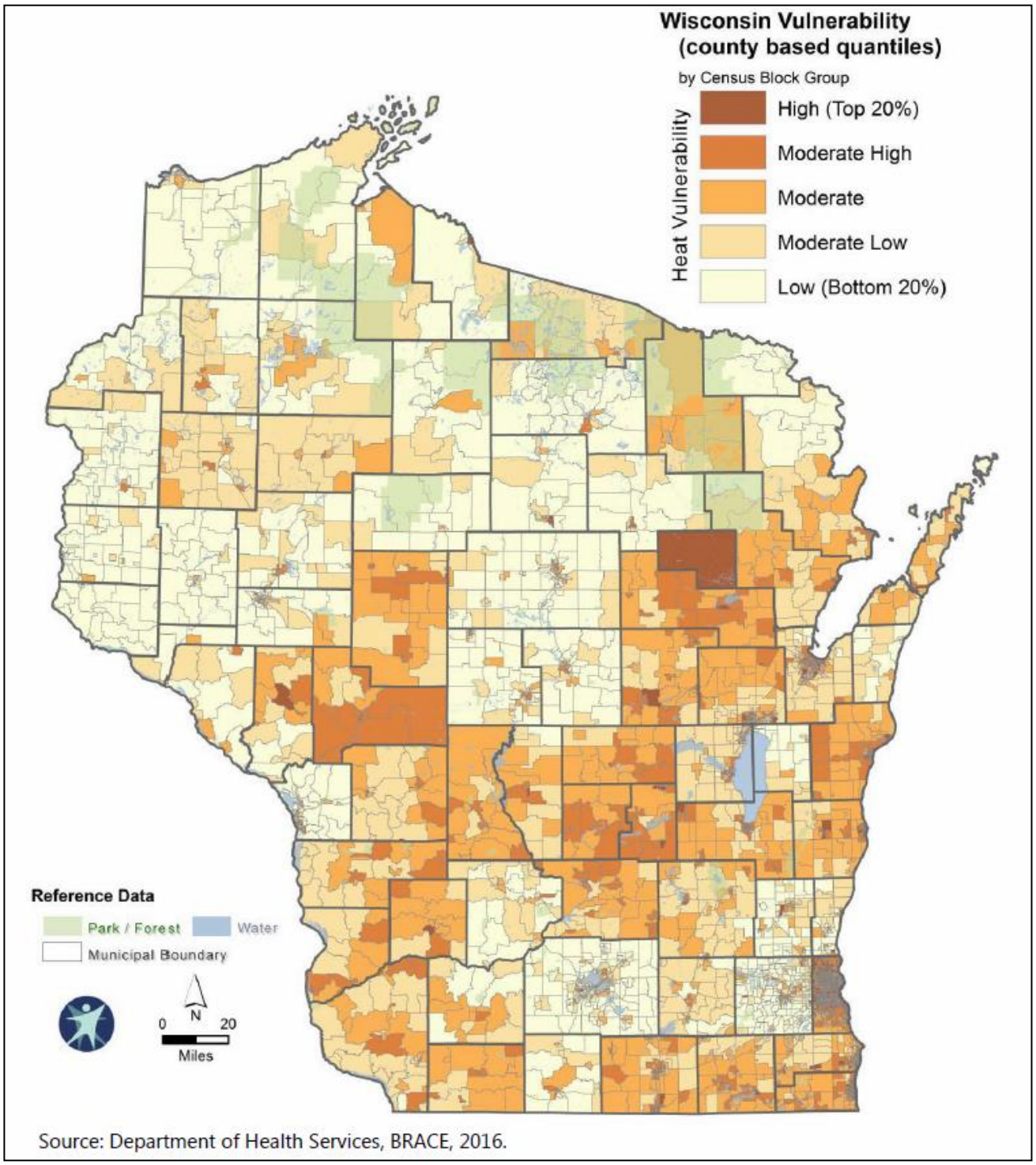
Source: National Weather Service

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 105º 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 29** shows the heat vulnerability index map for Wisconsin. The

vulnerability for most of St. Croix County was primarily rated low with some areas rated as moderate low, likely due to lower average incomes and/or an aging population.

Figure 29. 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 St. Croix County with a heat wave hazard.

Risk Factor	Heat Wave
EAL Rate – Population	1 per 1.80m
EAL Rate – Buildings	$1 per $57.85m
EAL Rate – Agriculture	$1 per $26,590
Total EAL	$610,534
Exposure	$1.1 trillion
Events per year	0.7
Historic loss ratio	Relatively Low
Overall Loss Score	85.1 (Relatively Moderate)

Out of thirteen hazard types for St. Croix County, heat wave is the seventh highest in expected annual losses with a value of $610,534, primarily due to the estimated losses to agriculture. Based on St. Croix County's 2020 population of 93,500 and the above EAL rate, one County resident will be seriously injured by extreme heat about once every 19 years; this is about three times as rare as an extreme cold injury.

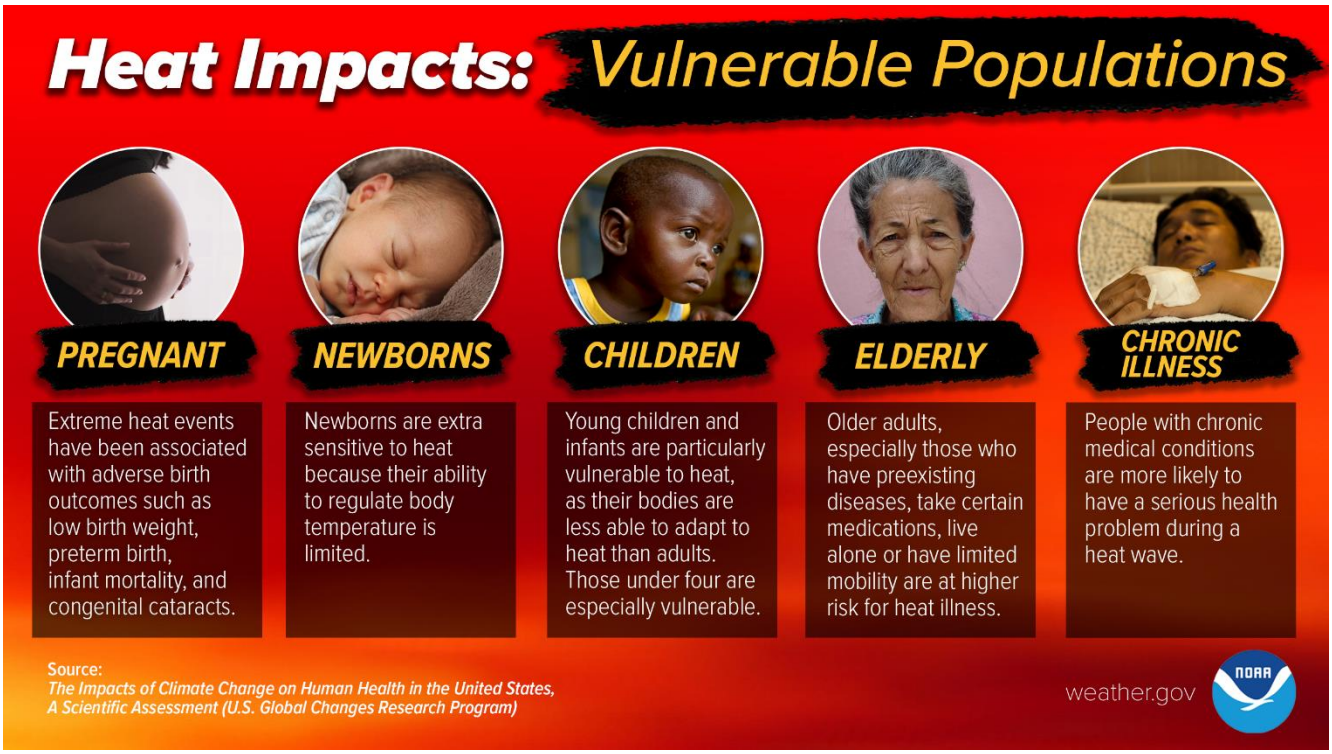
Other Factors Influencing Future Losses

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 St. Croix 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, there was significant emphasis on identifying cooling shelters with emergency generators. The 2024 Plan Steering Committee also recognized the potential of extreme heat events occurring during a period of power outage, which is discussed further in the *Long-Term Power Outage* section.
4. Access to Cooling Shelters. During the 2024 Plan update, there was increased interest in identifying cooling shelters with emergency power generators compared to previous mitigation plans. 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.

Risks for Individual Plan Participants - Extreme Heat

All individual plan participants in St. Croix 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 L compiles sub-plans for each city and village within St. Croix County and educational institution sub-plans are included in **Appendix M**. These sub-plans 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 St. Croix County.



vi. 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

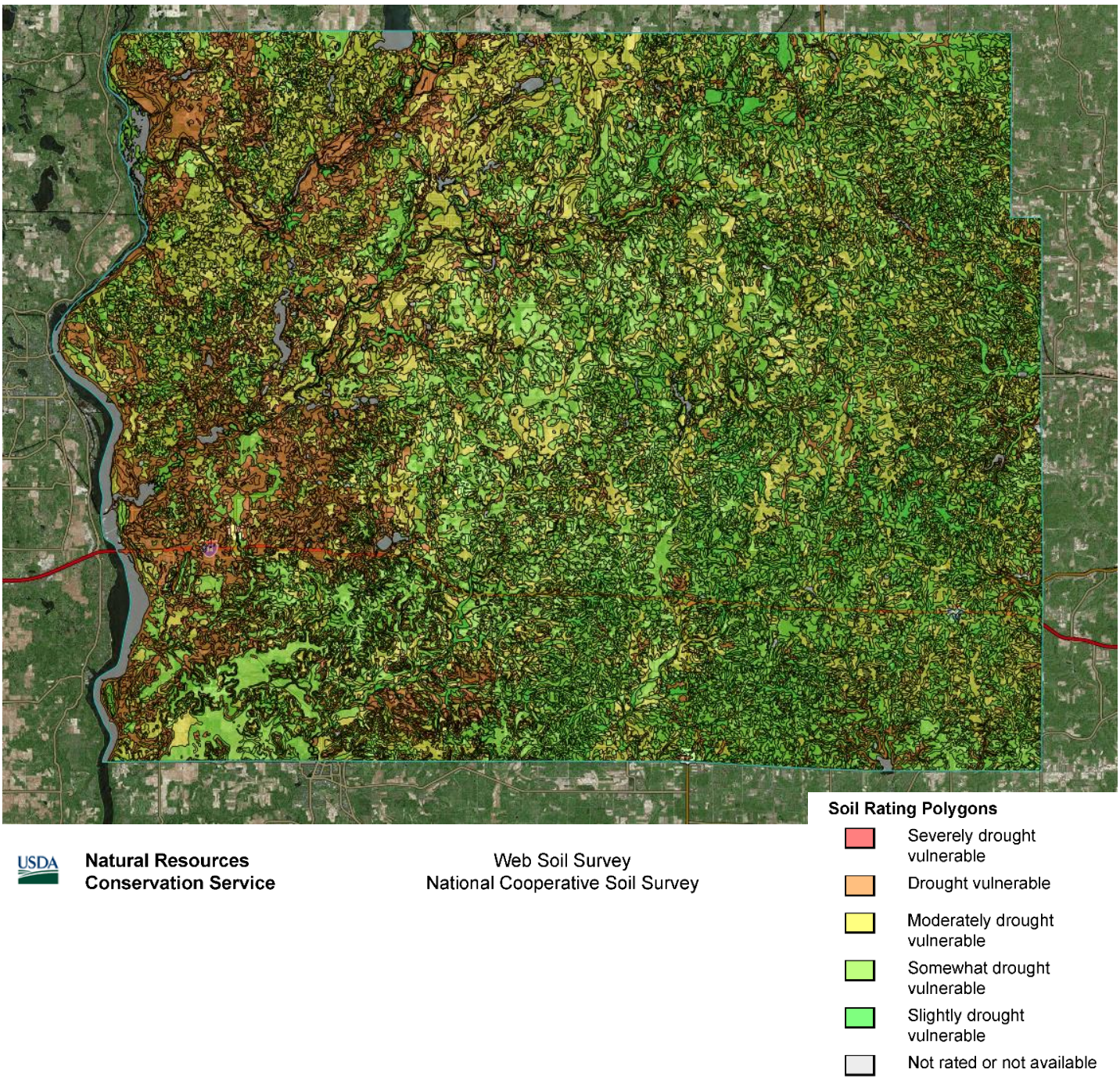
Droughts can occur in all areas throughout the State, including areas with high and low average precipitation. Healthy soils allow more water to infiltrate and retains more moisture, enabling it to effectively absorb extreme rainfalls as well as support crops during droughts. Soil texture refers to the 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 30 and the table below show that the soils of St. Croix County have some drought vulnerability, **though no soils are severely vulnerable**:

Drought Rating	% of Soils	Soil-Drought Characteristics
Slightly vulnerable	3.3%	typically low-lying areas with near-surface water
Somewhat vulnerable	45.2%	annual precipitation generally adequate for plant growth)
Moderately vulnerable	33.8%	some water stress in an average year
Drought vulnerable	15.5%	drought generally occurs every year
Severely vulnerable	0.0%	plants must be very drought tolerant even in normal years
Not rated	2.2%	e.g., lakes, rivers

Figure 30. Drought Vulnerable Soils – St. Croix County



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 St. Croix County is provided in **Figure 31** on the following page.

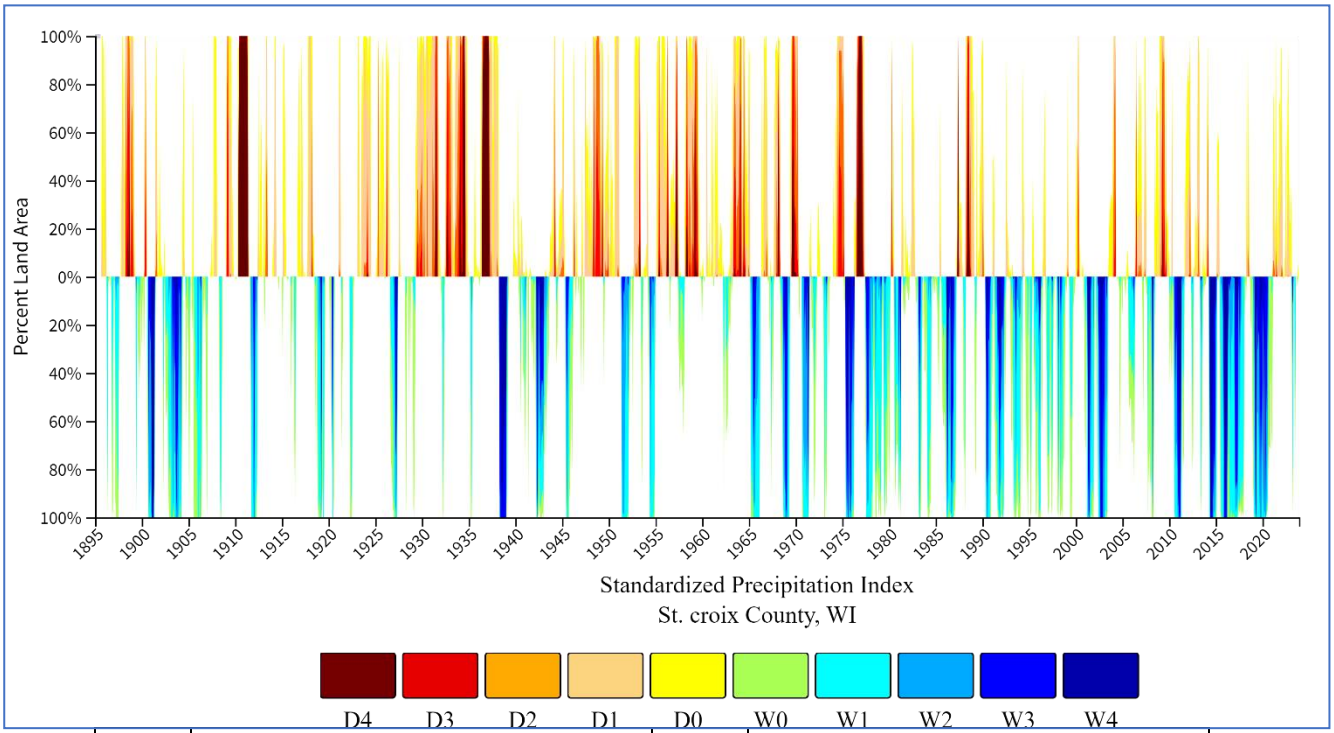
Event History - Drought

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 31, recorded years of severe drought for St. Croix County occurred in 1895, 1910, 1930s, 1939, 1958, 1976, 1977, 1988, 1989, 2003, 2005, 2006, 2007, 2009, and 2012.

Figure 31. St. Croix 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 State and Federal Drought Emergency Declarations involving St. Croix County for which financial assistance was provided:

Month & Year	State or Federal	Event Type
June 1976	Federal	Drought
Aug 2003	State	Drought
July 2005	State	Drought
July 2006	State	Drought
Aug 2007	State/USDA	Drought/Agricultural Drought
Aug 2009	State	Drought
July 2012	State	Drought

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 County 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% of 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 five to seven years. 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 issues State of Emergency drought declarations, which included St. Croix 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 St. Croix 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.

2020-2023 Droughts

St. Croix Count began to experience another period of abnormally dry soils and drought in Fall 2020, which continued through most of 2021 and became more severe drought during the second half of 2023. The drought has somewhat abated in early 2024 with abnormally dry soils, but drought conditions could return. The U.S. Secretary of Agriculture designated a drought disaster for St. Croix County in 2022 and 2023 as a contiguous county to more severely impacted counties Within St. Croix County, agricultural crops on sandier soils were most impacted during these drought periods. Some surface water levels also decreased, especially on seepage lakes, which likely contributed to the reprieve from flooding near Twin Lakes.

Hazard Probability - Drought

The Plan Steering Committee rated drought probability as being of some (below moderate) concern in St. Croix County, with moderate vulnerability. **Based on the ten severe drought years since 1970, a severe, countywide or regional drought year can be anticipated once every 5 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 Impacts[26] (WICCI) shows that annual precipitation in St. Croix 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. Concurrently, St. Croix County's average annual temperatures have increased 1.5ºF to 2.5ºF since 1950. WICCI has projected that St. Croix 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. With projected increases in heavy rain events, less of this precipitation will infiltrate into the soil. The increased precipitation will also likely be offset, in part, by increased evapotranspiration due to the higher projected temperatures and longer growing season. As time goes on, higher temperatures and increased evapotranspiration have the potential to exceed the added recharge from increased precipitation, resulting in lower infiltration and groundwater recharge.

Vulnerability Assessment - Drought

Appendix G provides the following regarding the potential impacts of extreme heat events for St. Croix 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 G:

- **Agricultural crops and the agricultural economy** are the greatest drought vulnerabilities in St. Croix 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. Some 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

[26] Wisconsin Initiative on Climate Change Impacts website: www.wicci.wisc.edu

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 early 2000s. 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 St. Croix County's agricultural base. The agricultural overview in Section II.C.iv. discussed and quantified the importance of agriculture to St. Croix 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 St. Croix 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.

Table 21 provides an example of how one recent, countywide drought impacted crop yields by comparing crop production for the 1988 drought year against the average production for 1980 through 2000.[27] Bushels per acre provides the best indicator, since it is not dependent on acres planted. For both grain corn and soybeans, there was nearly a 50-percent loss in bushels per acre yield for the 1988 drought year and total bushels produced were over five times lower in 1988 compared to the 1980 to 2000 period. Drought losses were so significant in 1988 that approximately 21 percent of the soybean acreage planted was not harvested, while over 67 percent of the grain corn acreage planted was never harvested.

Table 21. Comparison of Average Annual Soybean & Grain Corn Yields[28]

Years	Bushels per Acre Yield	Total Bushels Produced	Est. Value Produced (based on 2010 prices)

[27] More recent data is available, but ethanol demands for corn beginning about 2007 resulted in significant increases in corn acreage being planted with potential related impacts to average yields as some marginal or formerly fallow lands were put into production. Utilizing older data largely avoids such concerns with grain corn, though the number of acres of soybeans harvest did vary significantly from 1980 to 2000.

[28] USDA-NASS, Agricultural Statistics Database, <http://www.nass.usda.gov:81/ipedb/>.

	Grain Corn	Soybeans	Grain Corn	Soybeans	Grain Corn	Soybeans
1988 Drought	54.5	18.5	2,345,000	237,000	$12.5 mil.	$2.7 mil.
1980 thru 2000 Avg	108.8	32.5	7,638,067	575,144	$40.9 mil.	$6.6 mil.

During the 2003 drought and related winter kill, soybean yields in St. Croix County were up to 48 percent lower and grain corn yields were up to 17 percent lower than the averages for 2000-2005 (excluding 2003).

Such losses are a significant financial hardship, especially for an industry that is struggling overall. In 2010, grain corn prices averaged $5.35 per bushel and soybeans averaged $11.40 per bushel.[29] Using 2010 prices, total grain corn and soybeans losses for 1988 are estimated at around $28.4 million and $3.9 million, respectively, for each of these crop types based on total bushels produced.



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 51,000 head of cattle = $76.5 million) resulting in many millions in required supplemental feed for St. Croix County farmers under a typical, single-season, severe drought event or other weather that reduces alfalfa, hay, etc.

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

[29] http://www.nass.usda.gov/Statistics_by_State/Ag_Overview/AgOverview_WI.pdf

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 St. Croix County:

Risk Factor	Drought
EAL Rate – Population	--
EAL Rate – Buildings	--
EAL Rate – Agriculture	$1 per $12,430
Total EAL	$17,444
Exposure	$22.7 million
Events per year	2.1
Historic loss ratio	Relatively Low
Overall Loss Score	48 (Very low)

The NRI table suggests drought impacts in St. Croix County will largely be limited to agricultural crop losses. The data suggests that two drought events will occur annually, reflecting that some soils of St. Croix County will experience drought on a near annual basis. Overall, the NRI rates the County's drought vulnerability as very 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.
- High-capacity wells have the potential to impact groundwater and nearby surface waters, especially during drought periods. As of January 2024, the Wisconsin DNR database included 235 active high-capacity wells and 17 permitted but not yet drilled high-capacity wells for St. Croix County; this is a slight increase from March of 20138 when 242 high-capacity wells were permitted in the County. The majority of these wells are for irrigation.
- 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 St. Croix 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 St. Croix County are equally at risk of a drought event, though some, have 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.

No cities or villages reported fire protection concerns due to limited groundwater quantity, though additional municipal wells and/or water storage will be needed as growth continues. The participating electrical cooperatives and educational institutions identified no significant drought vulnerabilities; they primarily rely on municipal water systems.

Appendix L provides the sub-plans for each city and village and **Appendix M** provides the sub-plans 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 St. Croix County. The sub-plans also assess each participant's capabilities to prepare for and mitigate hazards.

vii. Long-Term Power Outage

Long-term power outages in St. Croix County are 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 outage 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 outage is capable of harming residents and damaging homes and infrastructure throughout St. Croix County. While long-term power loss can occur throughout all of St. Croix 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 outage 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 Outage

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 St. Croix County. In **January 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. And in **1997**, to the northeast of St. Croix County, an ice storm resulted in the loss of power for many Barron County residents for up to three days.

Most recently, a winter storm struck the region in **December 2022** with heavy snow and some ice weighing down trees and power lines, resulting in some brief periods of power loss in the County. A late-season winter storm in **April 2023** included ice build-up on trees and power lines as well as a wet, heavy snow. The general quadrant from North Hudson to Houlton to State Highway 65 was particularly hard hit with some St. Croix Electric Cooperative customers without power for up to 28 hours. In all, about 700 Cooperative customers lost power during this event.

However, the risk of a longer-term outage event is very real. For example, the March 1976 ice storm was one of the worst natural disasters to hit Wisconsin; St. Croix 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 with-out 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, 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) 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.

Other wind events have resulted in localized power outages in St. Croix 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. For example, in August 2013, a straight-line wind resulted in power outages of up to 25 hours in the New Richmond to Emerald area.



Aftermath of the 2007 Storm in the Town of Emerald

photo courtesy of St. Croix Electric Cooperative

The most significant, recent event was the **August 13, 2007** devastating storm during which high straight-line winds took down trees, electric power lines, and power poles throughout much of the St. Croix County area. Lightning strikes to electrical equipment also resulted in outages in some areas. Due to the severity and extent of the damages, some residents were without power for several days. Since 2000, this is the only power outage event for which St. Croix Electric Cooperative requested mutual aid assistance from other electric cooperatives through the Restoration of Power during an Emergency (ROPE) system.

More recently, west-central Wisconsin experienced high winds in **September 2019** as part of a storm front that spawned an EF 3 tornado farther to the east in Chippewa County. In St. Croix County, winds took down trees and sheared electrical poles with some areas of the County without power for 1-3 days, especially in the Deer Park and Spring Valley areas. St. Croix Electric did bring-in contract crews to assist with restoration and clean-up, but noted that looped feeds did help mitigate power loss in some areas. Straight-line winds occurred in **September 2021** resulting in short-term power loss for many Xcel Energy customers in the Hudson area. And a **July 2023** wind storm and a lightning strike resulted in short-term power loss, especially in the south half of the County; some homes and businesses were without power for over 24 hours during a period of extreme heat.

St. Croix County Electric Cooperative Events

There are three primary electrical providers in St. Croix County:

St. Croix Electric Cooperative (serves approximately 75% of the County area)
Xcel Energy Electric Cooperative (serves approximately 18% of the County area)
Polk-Burnett Electric Cooperative (serves approximately 5-6% of the County area)

The remaining 1.5%-2% percent of the County area is served by River Falls Municipal Utility, Pierce-Pepin Electric Cooperative Services, New Richmond Electric Utility, and Dunn Energy Cooperative.

While St. Croix County has not recently experienced a long-term power outage event, a look at the recent causes of power outages for St. Croix Electric Cooperative provides further insight into the potential risk. A comparison of recent causes of power outages for St. Croix Electric Cooperative in **Table 22** provides further insight into the sources of power outages. The numbers below are for the entirety of the Cooperative's system, which includes some areas in Pierce, Polk, Dunn counties.

Table 22. St. Croix Electric Cooperative Power Outages • 2018-2022

Outage Cause	# of outages						# customers affected
	2018	2019	2020	2021	2022	Total	
Tree	79	79	63	122	86	429	17,082
Ice/Snow	3	4	8	12	5	32	139
Lightning	26	16	26	32	16	116	636
All Other	199	246	254	220	219	1,138	14,853
Total	**307**	**428**	**351**	**386**	**326**	**1,798**	**32,710**

source: St. Croix Electric Cooperative, 12/7/23

The table shows that less than 10% of outages from 2018-2022 were directly caused by weather, such as ice damage and lightning strikes. An additional 24% were tree-related (non-human), such as tree limbs falling upon power lines; many of these tree-related outages are also related to weather, such as high winds, heavy snow, or ice. Perhaps more notable is that the weather- and tree-related outages from 2018-2022 had over half of all lost customers affected.

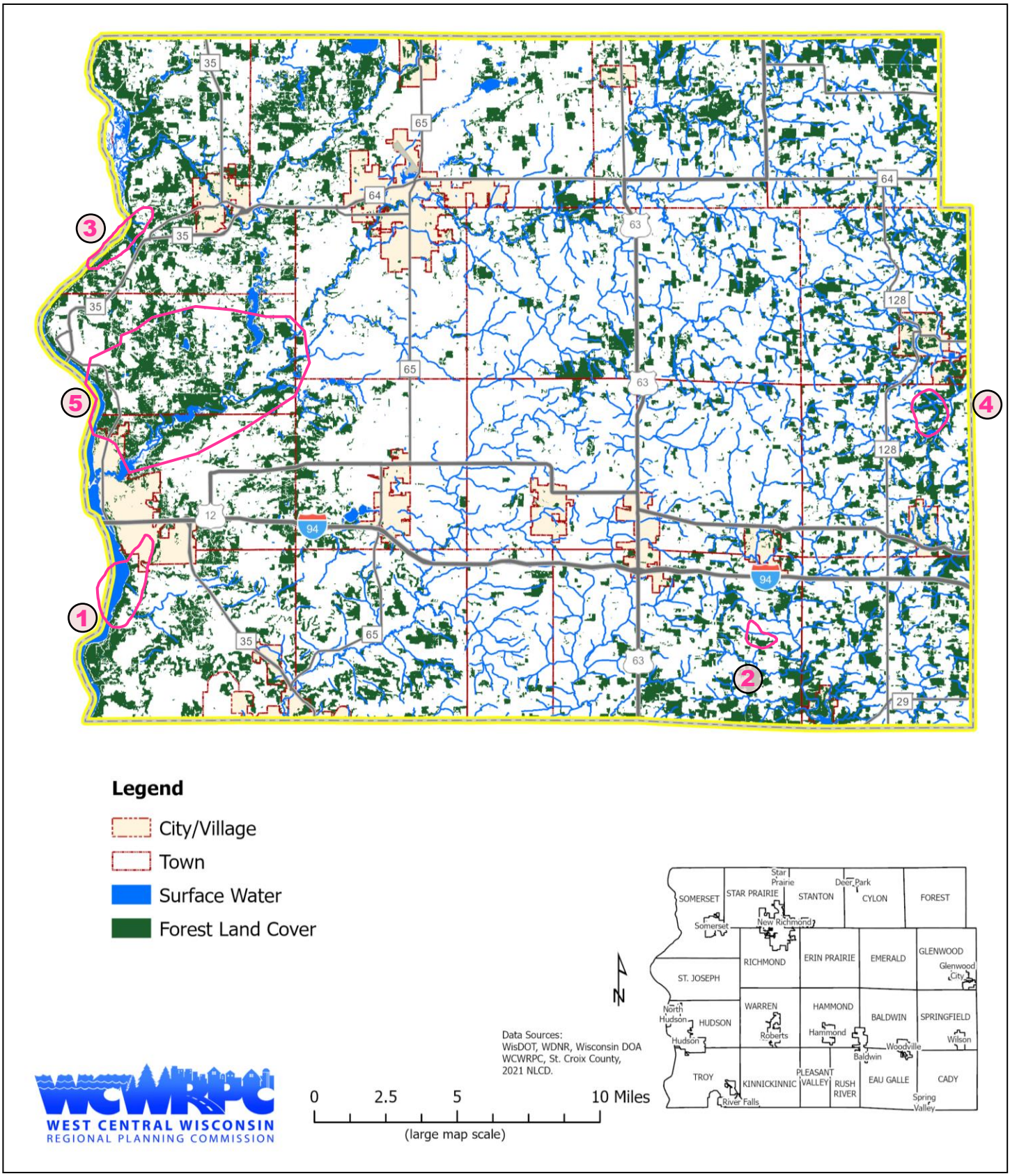
Areas of Higher Risk

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. For example, St. Croix Electric Cooperative has continued to bury power lines in the Town of Troy near the St. Croix River and has plans for additional such projects in the future.

The loss of power due to falling limbs and trees has been further significantly mitigated through proactive, aggressive tree-trimming programs by the electric providers serving St. Croix County. The Cooperative conducts such tree-trimming on a five-year cycle. But even with such efforts, forests are the dominate land cover in about 18 percent of the County and overhead lines in such wooded areas are still at higher risk. Such tree trimming also reduces the wildfire ignition risk.

Xcel Energy, St. Croix Electric, and local municipalities were asked to identify areas of higher outage risk or prone to outages. Xcel Energy did report occasional outages from winds or ice, but did not identify any specific problem areas within the County.

Figure 32. Areas with an Elevated Power Outage Risk



St. Croix Electric Cooperative identified the following general areas as having an elevated risk of power outage as reflected on **Figure 32** on the following page and described below:

1) Along the St. Croix River in the Town of Troy has significant residential growth located within forested areas. Shallow depth to bedrock and high water in the spring has made burying electric lines difficult and costly in much of this area. Scenic protections along the St. Croix River, poor access, and resident apprehension also combine to make tree-trimming and removal in this area more challenging. As a result, the identified area has a history of power outage problems due to falling trees during high winds, ice storms, etc. As previously noted, the Cooperative has buried about 3,000 feet of lines along Shallow Sand Drive and Black Bass Road as well as relocated some facilities in this area. This required a County conditional use permit due to the scenic protections, which initially resulted in some delay, but the Cooperative and County is more familiar with such permitting now. More recently, an additional 1.5 miles or so of line has been buried along Glenmont Road. The Cooperative would like to bury more above ground power lines in this area if landowner consent is granted, especially along Cove Road.

2) A second concern identified by the Cooperative is the single-phase overhead line along Boston Road feeding the siren and monitoring equipment at the Eau Galle Dam. Boston Road travels through a narrow, winding and wooded valley along a creek. Due to topography and access challenges, maintaining this line is difficult and it would also be very difficult to repair should it be damaged. The Cooperative is also planning work on aerial facilities immediately north of Boston Road to the top of the hill.

3) A third area prone to outages is located south of Glenwood City along Rustic Road 4 between State Highway 128 to County Highway "W" on the east side of Glen Hills County Park. The area is wooded with undulating terrain.

4) A fourth area of elevated concern is along the St. Croix River in the Town of Somerset. This area has characteristics similar to the Town of Troy area in #1—these are wooded areas, often with hilly terrain, shallow depth to bedrock, and high water in spring. Some of these areas are provided with lengthy radial service (a single source of power transmission), since the power lines are on dead end roads. Special permitting would also be required due to the Riverway's scenic protections. The Cooperative identified Twin Springs Road (about 25 accounts) as a priority for possible mitigation in this area.

5) St. Croix Electric Cooperative identified the general area from North Hudson to Houlton to State Highway 65 to be the greatest power outage concern within their system. As shown by Figure 32, this area is largely wooded, which elevates the power outages risks to overhead lines due to high winds, ice/heavy snow, and wildfire; above ground power lines may also be a source of ignition. Flooding in some areas, such as along Trout Brook Road, can also damage power lines or make restoration more difficult; a pole has washed out in this area in the past. Similar to areas #1 & #4 along the St. Croix Riverway, since this line passes through a State Park, the Cooperative is limited in its ability to cut trees and clear vegetation, and related permitting is also more difficult.

The Cooperative has expressed strong interest in pursuing FEMA mitigation grant funding to construct an upgraded distribution line with new underground facilities in the area to improve service and reliability. The overhead power line extending from the north end of North Hudson

east through the Willow River State Park (Trout Brook Road area) is currently the worst performer in their system. This was separately confirmed by the Town of Hudson who noted in their hazard survey that "snow, wind, etc. take(s) out trees and cause power outages for a large area" along Trout Brook Road.

Power loss due to falling trees is not limited to the unincorporated areas. Residential neighborhoods with older trees or built within wooded areas of cities and villages are also vulnerable to outages, which is addressed as part of the city and village sub-plans in Appendix L. St. Croix Electric Cooperative also noted that areas prone to flooding can also prevent the restoration of power. For example, flooding in the Twin Lakes area west of Roberts has limited access to electric power lines and equipment in the past.

Hazard Probability – Long-Term Power Outage

The Plan Steering Committee the probability of a long-term power outage event as being of some (below moderate) concern in St. Croix County, with a moderate to high level of vulnerability. Based on the six major, previously described events since 1990, **St. Croix County is expected to experience a significant long-term power outage about once every 4 to 5 years on average.** Nearly all of these events would impact a part of St. Croix County and affect less than 15,000 customers, with power restored with 5-6 days. While a widespread, long-term power outage event covering most or all of St. Croix County would be rare, but the potential does exist. Past power outage events in St. Croix County have not approached the scale of the 1976 Wisconsin, 1998 Montreal, or 2009 Kentucky outages.

As discussed in the ***Tornadoes & High Winds*** and ***Winter Storms*** sections, the probability of these hazards is likely to increase due to climate change tends. As such, the probability of long-term power outage events is also likely to increase. In fact, St. Croix Electric Cooperative staff believe such events are indeed increasing in frequency.

It is possible that a widespread, long-term loss of power could 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.

Vulnerability Assessment – Long-Term Power Outage

Many of the natural hazard events facing St. Croix County have the potential to cause an extended and widespread loss of electrical power. **Appendix G** provides the following regarding the potential impacts of tornado and high wind events for St. Croix 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 St. Croix 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 outage event in St. Croix 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.**
- **St. Croix 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 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 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 St. Croix 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. St. Croix Electric Cooperative has approximately 1,864 miles of electric lines serving 11,992 customers. A of these lines are single phase. Approximately 1,100 miles of line is below ground, which significantly reduces the chance of weather-related outages in the County. The remaining 764 miles of overhead lines is very vulnerable however. Given the above replacement costs, the potential damages to overhead power lines from a severe storm event in St. Croix County could easily be in the millions.

Replacement costs for lines vary based on physical site conditions, but are approximated as follows:

Phase I – Above Ground:	$75,000/mile
Phase I – Underground:	$85,000/mile
Phase III – Above Ground:	$160,000/mile
Phase III – Underground:	$170,000/mile

Other Factors Influencing Future Losses

- **St. Croix County's aging population** is documented in Section II.C. Seniors living alone in rural areas are especially of special concern. With this aging population, the County has a significant number of assisted living and nursing facilities as documented in Section II.D.

  The St. Croix County Aging and Disability Resource Center (ADRC) has been promoting individual emergency planning for senior and special needs clients, with emergency communications networks and other preparedness actions. During the intake assessment of new ADRC clients, emergency contact information is collected and periodically updated. This information is available for use by the RAVE (SCC-Alert) autodialer system if mass emergency notifications are needed. ADRC also works with County Emergency Services, Public Health, and other partners for the distribution of hazard awareness and preparedness educational announcements through the ADRC monthly newsletter with a monthly circulation of about 1,500 issues. It should be noted that ADRC staff, drivers, and volunteers have received various health and first aid training and have a key role in monitoring the needs of ADRC clients during any emergency or disaster. The ADRC also has three ADA-accessible buses/vans that are potentially available to assist with evacuation as well as a vehicle at each ADRC meal site.

  Local electric providers have made efforts to tag "critical accounts" that may need attention during an outage, such as residents on oxygen, but the providers may not be aware of all such circumstances. Providers also encourage household planning. For example, the following statement is provided to Xcel Energy's "critical accounts":

  > *"An approved medical designation on the customer's account does not guarantee uninterruptible utility service or immediate restoration of utility service. Inform customers of the importance of having a household backup plan in place for use of their medical equipment should a disruption of utility service occur."*

  St. Croix Electric Cooperative also maintains a critical clients list for customers who are dependent on oxygen or other electronic medical devices. The Cooperative checks with these clients annually and encourages other households to join this list. The Cooperative's electrical crews are able to view these clients on their maps, which is helpful when prioritizing power restoration.

- **Residential development located in forested areas with overhead lines is particularly at risk of power loss.** Some of the greatest concentrations of these at-risk areas are lake properties. These concerns are not limited to the unincorporated towns. Residential neighborhoods with older trees or built within wooded areas of cities and villages are also vulnerable to outages. Compared to some other counties in the region, St. Croix County does

not have large forested areas. However, development along the St. Croix River and other rivers is often in forested areas.

- **Burying overhead lines is an effective mitigation action.** Electrical providers in the County have buried some electric lines in the most at-risk areas. And many of the local and municipal electric providers have a policy of moving towards all below-ground power lines through attrition and as part of annual work plans. The loss of power due to falling limbs has been further significantly mitigated through proactive, aggressive tree-trimming programs by the electric providers serving St. Croix 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 St. Croix County could be much more severe—Kentucky's temperature warmed well above freezing following their ice storm. In comparison, St. Croix County's average winter temperatures could prove quite deadly should power be lost and transportation systems hindered for an extended time. This is discussed more in the winter storm risk and vulnerability assessment.
- 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.
- **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, St. Croix County Emergency Management has participated in workshops and exercises on this topic. regional- level workshops and tabletop exercises in 2010 on this topic. Based on these workshops and exercises, the following groups and critical facilities were identified as being especially vulnerable or important during a long-term power outage event:

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, St. Croix 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 LTPO 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. Lodging availability has limited mutual aid options.
- During a disaster or power outage, electric providers can "ping 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. Customers can register for St. Croix Electric Cooperative's priority medical list and, if these meters report an outage, linemen will make restoring services to these homes a priority, if possible. Considering such critical client lists of utilities may help the public sector in prioritizing the clearing of roadways from debris, etc.
- Public messaging and crisis communication 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. St. Croix Electric Cooperatives utilizes an autodialer to message customers via email, text, and, if needed, landline/voice.
- 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. St. Croix 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 needed 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.
- Tracked vehicles can be important resources for electrical providers when restoring power under difficult conditions.

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.

Risks for Individual Plan Participants – Long-Term Power Outage

All individual plan participants in St. Croix County (i.e., villages, cities, educational institutions, electric cooperatives) are equally at risk of experiencing the vulnerabilities of long-term power outage events. The potential impacts, in general, are shared, though vulnerability increases in wooded areas near overhead power lines.

Appendix L provides the sub-plans for each city and village and **Appendix M** provides sub-plans 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 event history, probability, and vulnerability assessment for St. Croix County. Generally, most communities did not have areas particularly prone to outages. Power outages concerns for these participants tended to focus on the need for emergency power generators and potentially vulnerable populations.

NOTE: While this section largely emphasized St. Croix Electric Cooperative, a significant portion of the County is served by Polk-Burnett Electric Cooperative, who is also eligible for mitigation grant funding. Polk-Burnett is an active, full participant in the Polk County mitigation plan, which includes a recommendation to bury overhead power lines in areas prone to outages. Polk-Burnett would consider similar mitigation actions in St. Croix County.

viii. Active Threats and Civil Disturbance

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 our violence. A weapon includes any firearm, knife, vehicle, or other instrument that can cause bodily harm, injury, or death. Such incidents can include:

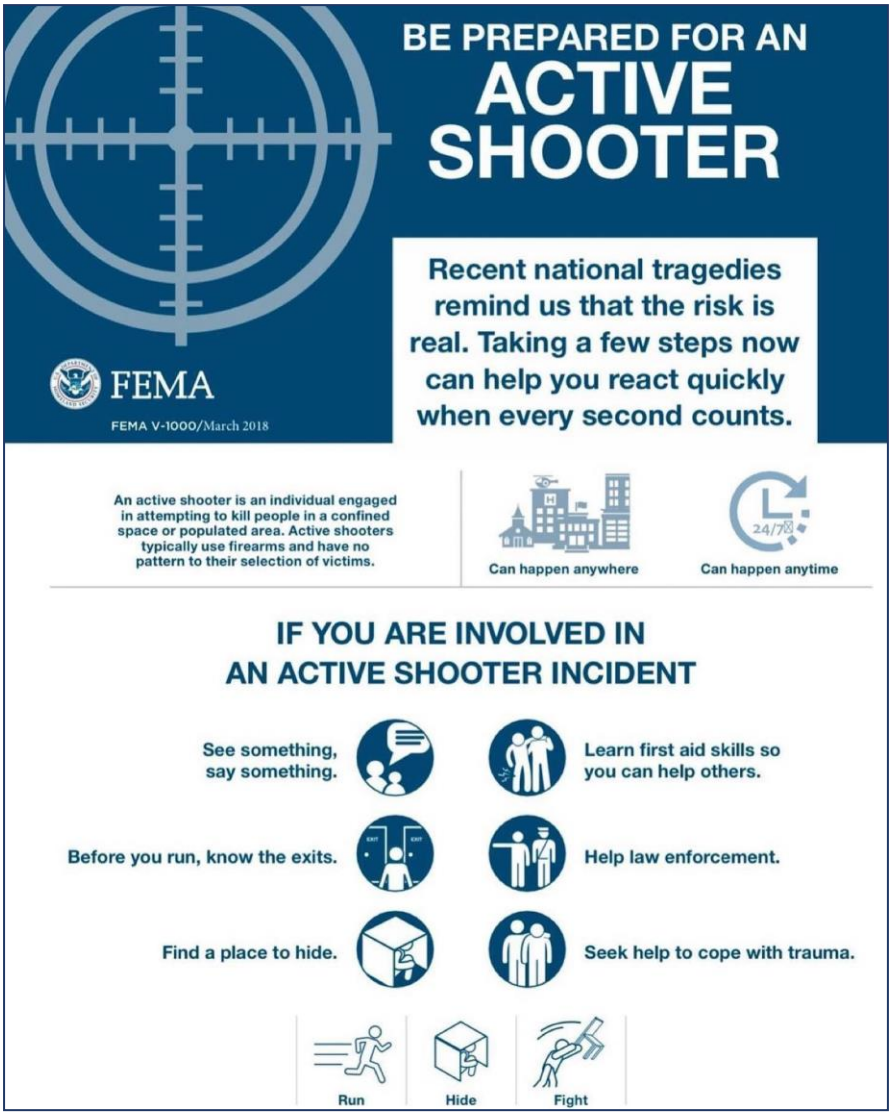
- **Active shooters** – one or more subjects who participate in a random or systematic shooting spree with the intent to continuously harm or kill others.
- **Bombs and/or bomb threats** – any explosive device or bomb or bomb on or near a target, regardless of the method of delivery (e.g., pipe bomb, 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. n 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."[30] 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.

[30] 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.

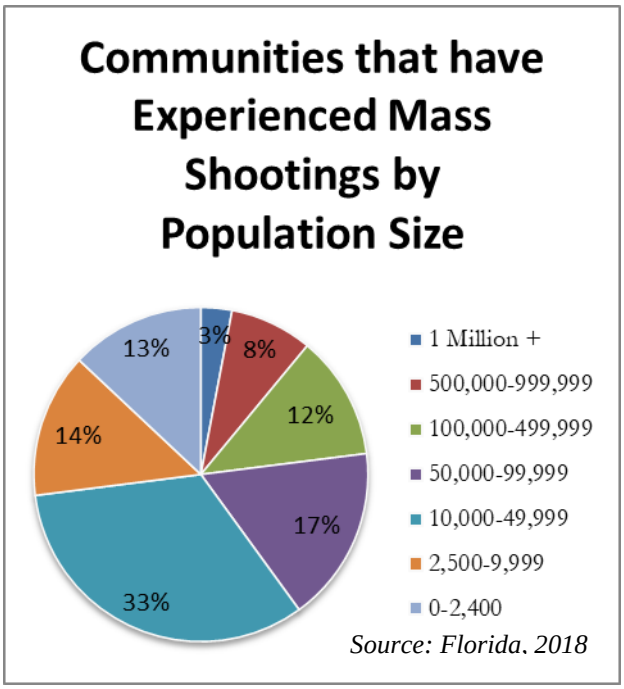
Active threats can include acts of terrorism, but not all active threats are performed for reasons of terrorism. The FBI defines two categories of terrorism:

> **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 St. Croix 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.[31] 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.



Source: Florida, 2018

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 Sates 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

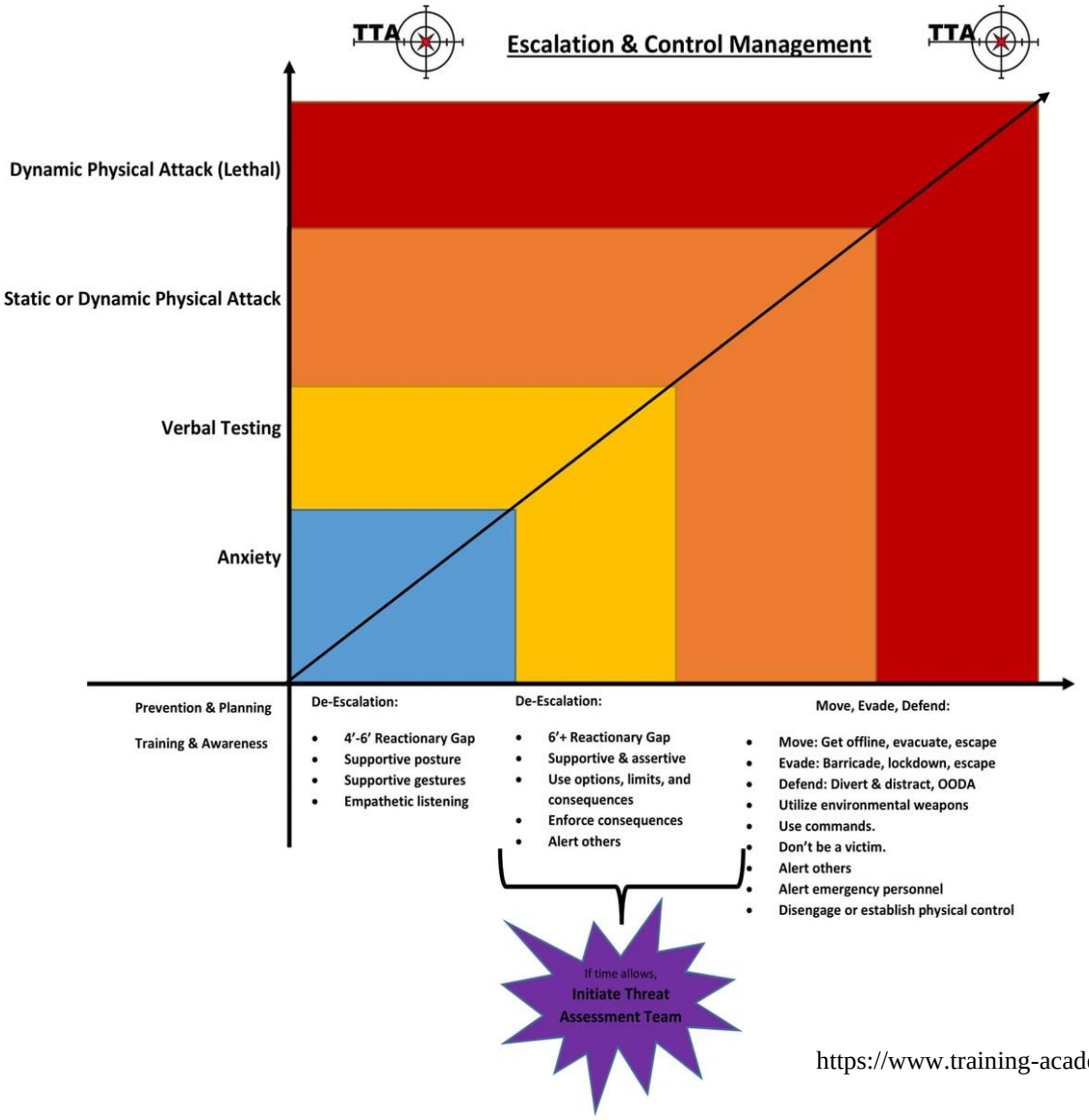
[31] Boone, a. (2018, March 1). *Where Do Mass Shootings Take Place?* Retrieved March 3, 2018, from City Lab: https://www.citylab.com/life/2018/03/where-do-mass-shootings-take-place/554555/

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 St. Croix 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:



https://www.training-academy.org/

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 St. Croix 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.

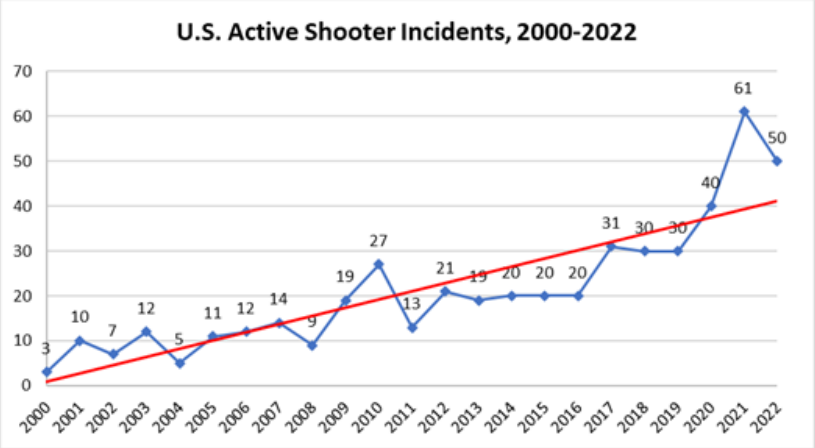
Event History - Active Threats

National Trends

Active Shooter 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. Now almost tripled to 29 events per year from 2010 to 2022.

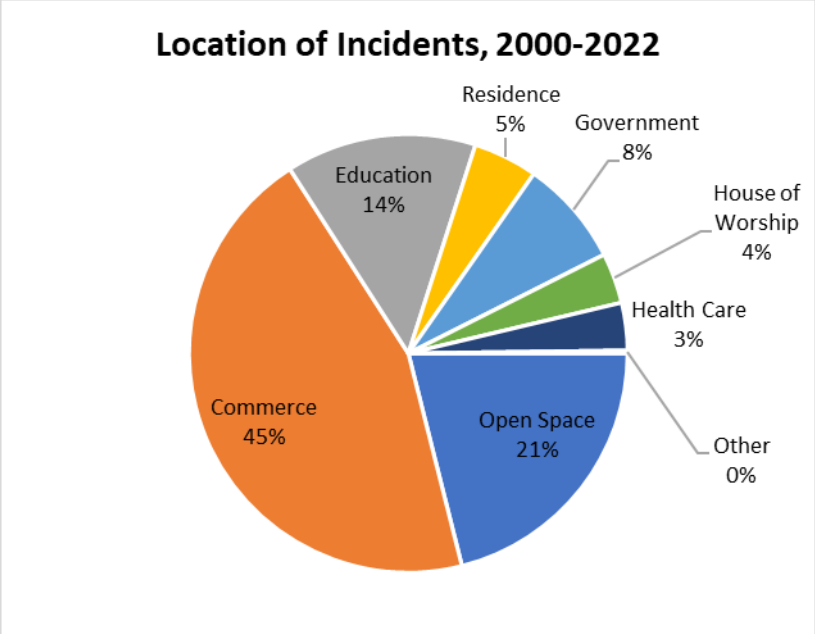
The largest majority of these 484 events (45%) occurred at commerce locations, such as retail stores, malls, non-profit organizations, and manufacturing plants. While not technically meeting the Federal

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).



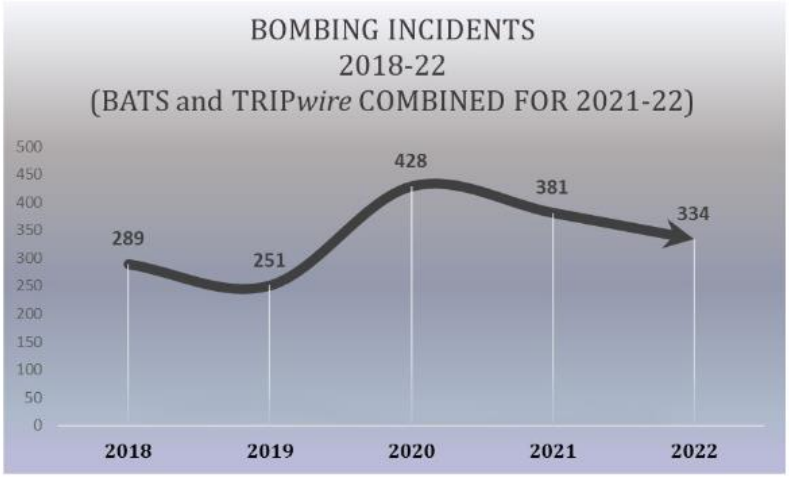
It is important to remember that very few organizations will experience an active shooter incident involving a shooting spree that wounds and kills multiple victims. However, a far greater number will experience other forms of workplace violence [e.g., threats, simple assaults (no weapon), aggravated 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.[32] Explosive incidents refer to bombings, accidental explosions ,and undetermined explosions. Additionally, the report inventories bomb recoveries, reports of suspicious packages, bomb threats, and hoaxes.

[32] United Sates Bomb Data Center. *2016 and 2022 Explosives Incident Reports.*

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.



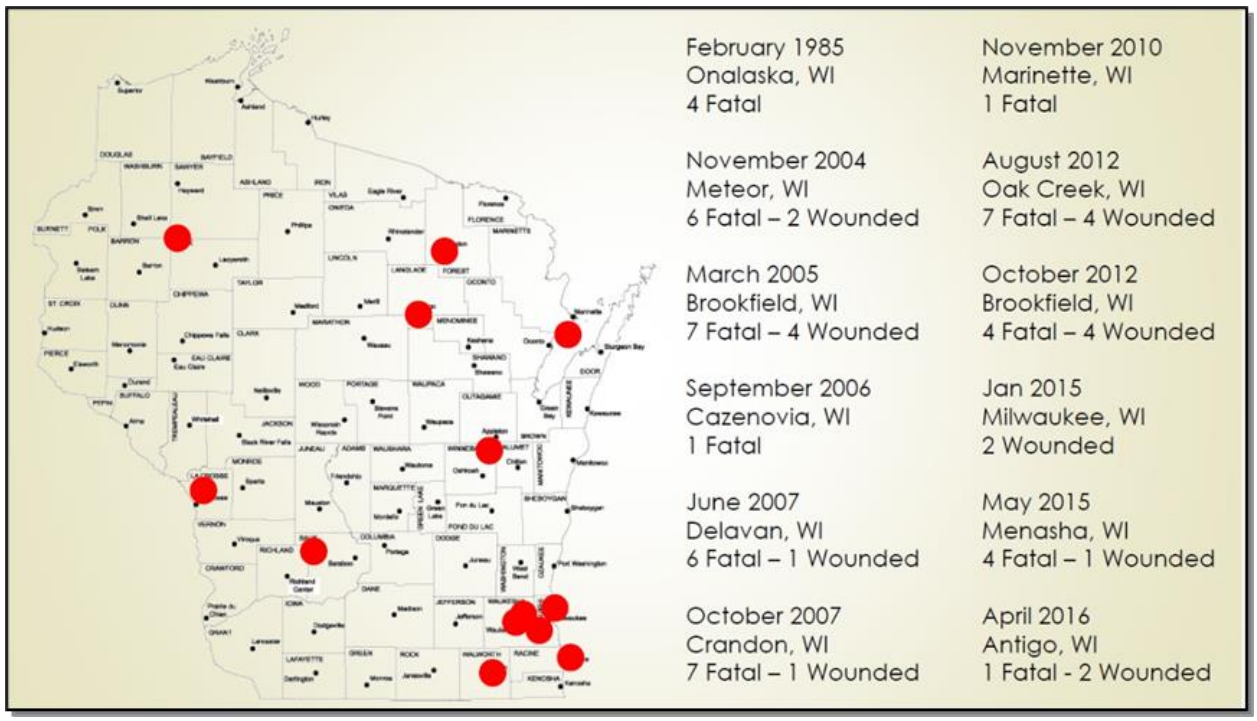
- Of the 2022 bombings, 50% were explosive (non-IED), 32% were IED, 4% were over-pressurized devices, and the remaining were other types or not specified.
- Only two of the 2022 bombings occurred in Wisconsin.
- Reported bomb threats more than tripled between 2020-2022 with a total combined number of 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, 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 not been publicly announced. According to one database.[33] 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.

[33] https://apps.revealnews.org/homegrown-terror/

Significant St. Croix County Events

To date, there have been no large, active shooter incidents in St. Croix 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.

There is no reason to believe that active shooter events in Wisconsin (or St. Croix 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 northeast of St. Croix 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 a hazard of some concern and a relatively low risk of occurring in St. Croix County. Terrorism, including domestic, international, and critical infrastructure, were ranked low with minimal risk. However, the Committee ranked active threat events as the highest threat vulnerability (potential impacts) facing St. Croix County. Terrorism vulnerabilities were rated as more moderate or substantial.

Predicting the active threat risk for St. Croix County (93,500 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, **St. Croix County has a 12% chance of experiencing an active shooter incident and a 96% 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 St. Croix County, are not immune to active shooter events, though the risk is higher in areas of higher population density.

The previous pie 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 St. Croix 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 St. Croix 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 Threats

Appendix G provides the following regarding the potential impacts of active threat events for St. Croix 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 St. Croix County residents, employees, students, and the many thousands of visitors who come from outside St. Croix 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 St. Croix County. The greatest concentration of businesses and community lifelines are located in the cities and villages, as discussed in Section II.D.

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 M**.

Between 2007 and 2011, there were a total of 3,721 emergency 9-1-1 calls from St. Croix County schools for numerous reasons. Of the 3,721, there were:

- three bomb threats (.08%)
- four domestic-related incidents (.11%)
- three shooting complaints (.08%)
- 242 suspicious activity complaints (6.5%) and
- 38 threat complaints (1.02%).

Civil Disturbance



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. Typically, this is accomplished by rules designed to permit non-protesting citizens to move freely and to respect private property. The use of a street or other public space typically requires a local use permit because it closes the street or space to other users for the duration of the demonstration.

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. Most planned events involve a protest rally or march. Protest leaders and law enforcement can meet before the event to develop mutual understanding. Sometimes, this pre-planning does not work because one or both sides will not or cannot control its people on the street. Violence can erupt between protesters and law enforcement. In other cases, clashes can occur between persons of opposing view (counter protests). Mutual aid is also a critical component of a successful response, but introduces additional vulnerabilities as this requires extra time and planning. Sometimes there is not a direct connection between the law broken (e.g., trespass) and the issue being protested, as when demonstrators blockade a private business to protest what the business is doing.

Larger protests have occurred in St. Croix County in the past. Most recently, in May and June 2020, peaceful protest marches with about 200 participants occurred in Hudson in New Richmond in response to the death of George Floyd and in solidarity with the Black Lives Matter movement.

While it is impossible to know what groups or issues could be involved in a future conflict, St. Croix County could face a civil disturbance involving a large, violent crowd, an overwhelmed police force, or some kind of conflict between groups. Conflicts can be further magnified by live media coverage and a growing sense of mass victimization that is a widespread effect of civil disturbance. Prompt response is especially critical when people are directly challenging local authorities. However, the long-term reputation of a community and law enforcement can be damaged depending on the response.

Interstate 94 is by far the most heavily used corridor in the County, along with the new St. Croix Crossing over the St. Croix River, connecting Wisconsin Highway 64 and Minnesota Highway 36. These routes are especially vulnerable to disruption given their high traffic, high visibility, and the lack of convenient alternatives for crossing the St. Croix River. Interstate 94 in St. Paul, Minnesota was shut down to traffic briefly in July 2016 due to protests over a police shooting earlier that year. About 500 protesters were involved, not all from the local community; and some projectiles were thrown at law enforcement. For such reasons, it is important that St. Croix County coordinate any related planning and exercises with adjacent counties in Minnesota.

Businesses, governmental facilities (e.g., courthouses, jails, schools, parks), sporting/concert venues, and utilities (e.g., power & gas transmission lines) are also common places or targets of civil disorder. St. Croix County deputies received civil disturbance training in 2017, and some provided support during the Dakota Access Pipeline protests.

The majority of the calls, 3,431 (or 92.21%), were not related to targeted school violence. Of the incidents potentially related to targeted school violence, suspicious activity and threat complaints topped the list. Although there have been no acts of violence associated with the suspicious activity or threat complaints, it is important to note them since any suspicious activity or threat complaints could potentially lead to an incident of targeted school violence. A complaint could also have prevented an occurrence of violence.

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; St. Croix 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 St. Croix County. Details on the active threat vulnerabilities and capabilities the cities and villages are included in **Appendix L**.

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 St. Croix County, projected loss estimates are not provided in this plan.

Other Factors Influencing Future Losses

- Population Growth. As noted previously, St. Croix 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.

Risks for Individual Plan Participants - Active Threats

There are no unique city, village or town risks associated with active shooter events in St. Croix County. Generally, the communities with larger populations, more businesses, and more critical facilities have slightly higher risks, but no location is immune.

Appendix L provides the sub-plans for each city and village and **Appendix M** provides sub-plans for participating educational institutions within St. Croix 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 St. Croix County.

During community meetings, nearby schools and large employers were typically identified by the communities as being the greatest active shooter concern, with governmental buildings and other local businesses also mentioned. Most communities did not have a specific active shooter policy or plan, but did find value in encouraging the participation of municipal staff in related training. Some communities have made security hardening improvements since the 2018 Plan. Some communities noted that the same social-distancing physical improvements and policies put into place during the height of the COVID-19 pandemic also have some value for active threats mitigation (e.g., physical barriers, limiting access). St. Croix County's educational institutions have been very active in preparing, planning, and exercising for active threat events with most (or all) using an ALICE-based protocol. St. Croix County has also adopted an ALICE-based protocol for its Government Center.

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 St. Croix 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.

Over the last decade, St. Croix County Emergency Management has dramatically increased local awareness of active shooter risks, warning signs, and ALICE protocols through presentations to municipalities, church groups, and other critical facilities.

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

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.

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 St. Croix County. The County now has access to a bomb squad in the Twin Cities during an emergency; if the situation is stable, a bomb squad can be activated from further away within Wisconsin. 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.

ix. 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 St. Croix 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.[34]

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 St. Croix County uniquely affected by cyberattacks. All St. Croix 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

[34] 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.

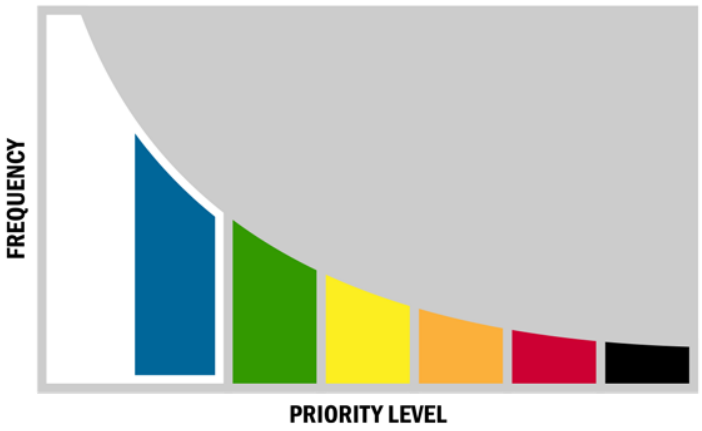
Minimal (Blue) – Same as baseline, but needs further scrutiny and could be escalated.

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) – Serous 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:[35]

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

[35] 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."[36] 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.[37] 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.[38] 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."[39]

The 2018 Government Outlook issued by the non-profit Center for Internet Security, Inc. and its Multi-State Information Sharing and Analysis Center[40] 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 having 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.

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[36] CSIS Commission on Cybersecurity for the 44th Presidency, Securing Cyberspace for the 44th Presidency, December 2008.

[37] World Economic Forum. http://reports.weforum.org/global-risks-2018/global-risks-of-highest-concern-for-doing-business-2018/#country/USA

[38] Director of National Intelligence, Annual Threat Assessment of the Intelligence Community for the Senate Armed Services Committee, Statement for the Record, March 10, 2009.

[39] Director of National Intelligence, Annual Threat Assessment of the Intelligence Community for the Senate Armed Services Committee, Statement for the Record, March 10, 2009.

[40] https://www.cisecurity.org/white-papers/2018-sltt-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.[41]

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".[42] An Axios article states that the average number of weekly cyberattacks against utilities grew 118% from 2020 to 2022.[43] 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:



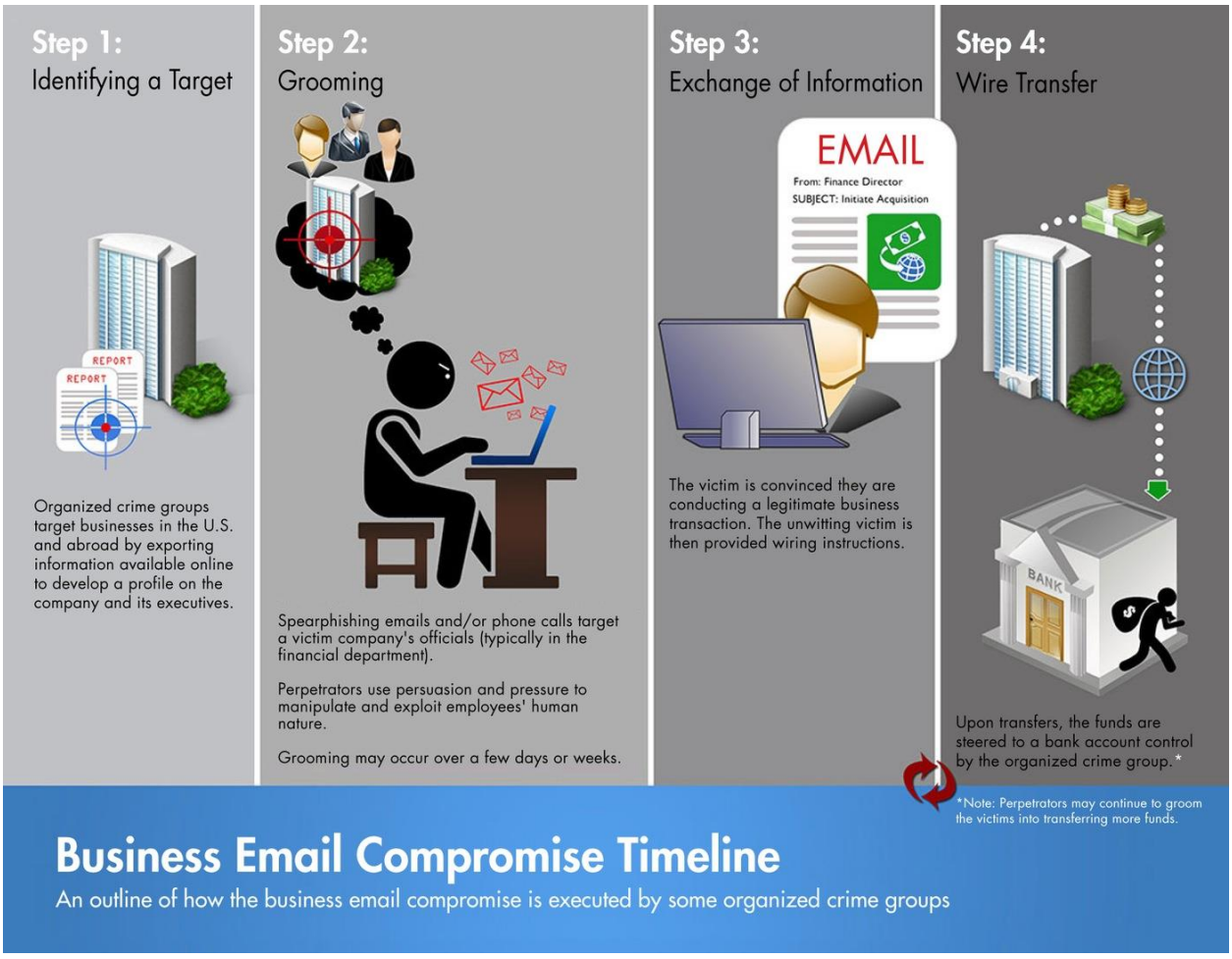
- **Ransomware** is a "huge" and growing problem for Wisconsin and the world" making it important to keep systems and applications up-to-date and to regularly maintain backups offline. Ransomware is a form of malware designed to encrypt files on a device, rendering any files and the systems that rely 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

[41] 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
[42] Waterfall Security. *2023 Threat Report*. https://waterfall-security.com/scada-security/whitepapers/2023-threat-report/
[4343] 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 cyberattacks 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 cyberattack 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 – Cyberattacks 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.

St. Croix County Trends

No data source was identified during this Plan update that provides a history of attacks, impacts, and losses within St. Croix County or the region. However, within west-central Wisconsin, a number of communities have experienced cyberattacks. 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. In April 2012, the City of Eau Claire's website was hacked and temporarily unavailable, but no computer systems were impacted.

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. More recently, the Village of Roberts had experienced identity theft, though this was not cyber-security related. The County government has not experienced a significant cyberattack or incident. The County government and a number of communities have experienced non-targeted attacks that were contained, such as business email compromise, malware, and viruses that were acquired through web-surfing and email "phishing"; employee education is key to preventing such attacks.

Hazard Probability - Cyberattack

The Plan Steering Committee rated major cyberattacks as of some concern or some to moderate probability; cyberattacks, along with pandemics/zoonotic disease are the highest rated probability of all manmade/intentional & other hazard events. These events will continue to occur within or affect St. Croix 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.

Vulnerability Assessment - Cyberattack

Appendix G provides the following regarding the potential impacts of cyberattack events for St. Croix 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 23** shows the primary cyberattack vulnerabilities discussed during the planning process.

Table 23. 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.
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 *Long-Term Power Outage* 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 HIPPA (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.
Other Businesses	For many of the same reasons identified previously, St. Croix 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.[44] 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.[45] In another case, a U.S.

[44] www.sans.org/newsletters/newsbites/newsbites.php?vol=10&issue=5, CIA presentation, SANS SCADA Security Summit, January 16, 2008.

[45] www.bankinfosecurity.com/article.php?art_id=1197, February 5, 2009.

retailer in 2007 experienced data breaches and loss of personally identifiable information that compromised 45 million credit and debit cards.[46]

- **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.[47]

Projected Loss Estimates

The Federal Bureau of Investigation's Internet Crime Complaint Center's 2022 Internet Crime Report provides some estimates on the financial impacts as a result of cyberattacks.

- $10.3 billion dollars were lost to cyber crime. 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 St. Croix County (i.e., villages, cities, educational institutions, electric cooperatives, businesses) are equally at risk of experiencing a cyberattack event. The level of preparedness in terms of both policy and level of protection varies among the governmental entities in St. Croix County, though overall has improved since the 2018 Plan, including some communities purchasing cyber-insurance and nearly all back-up their data off-site.

Appendix L provides sub-plans for each city and village and **Appendix M** 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 St. Croix County. During the planning process, cities and villages were asked about their current policies and protections, which are summarized in Appendix L. 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 St. Croix 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.

[46] www.infoworld.com/d/security-central/retailer-tjx/reports-massive-data-breach-952, January 17, 2007.

[47] 16 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.

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.[48]

Cyberattack Preparedness and Mitigation

National Level of Preparedness

The Cybersecurity & Infrastructure Security Administration (CISA) has wide range of preparedness and response resources. 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 2.5-4 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 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. Bill is available to assist businesses 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.[49] 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.[50] US-CERT partners with private and public sector critical infrastructure owners and operators to enhance

[48] Wisconsin Energy Cooperative News, Cyber Security Patrols Electric Co-ops Protecting Security of their Systems. June 2012.

[49] http://www.us-cert.gov/control_systems/

[50] http://www.us-cert.gov/about-us/

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."[51] 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."[52]

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; St. Croix County is part of the northwest Wisconsin team.

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.

St. Croix County Government Preparedness

St. Croix County has an Information Technology unit that has been very proactive in mitigating cybersecurity threats, including:

- The County has a Security Analyst position, who meets with maintains communications with other counties on cyber-security practices and participates on the Wisconsin Cyber Response Team
- Multiple layers of defensive steps and practices are in place. The County has robust cyber-security policies, including password policies and 2-factor authentication requirements, especially for off-site access. Strong emphasis is placed on employee education, including quarterly training and simulated phishing.

[51] Cyber Incident Annex—State of Wisconsin, http://emergencymanagement.wi.gov/planning/WERP/Annex%20Cyber%20Terrorism%20Incident%20RD.pdf, June 30, 2010.

[52] Ibid.

- St. Croix County has a comprehensive backup strategy based on industry best practices.
- The County has a Cyber Incident Response Plan, which is currently being updated.
- 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 local 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 2002 Disaster Ready Chippewa Valley cyber-security workshops, such as:

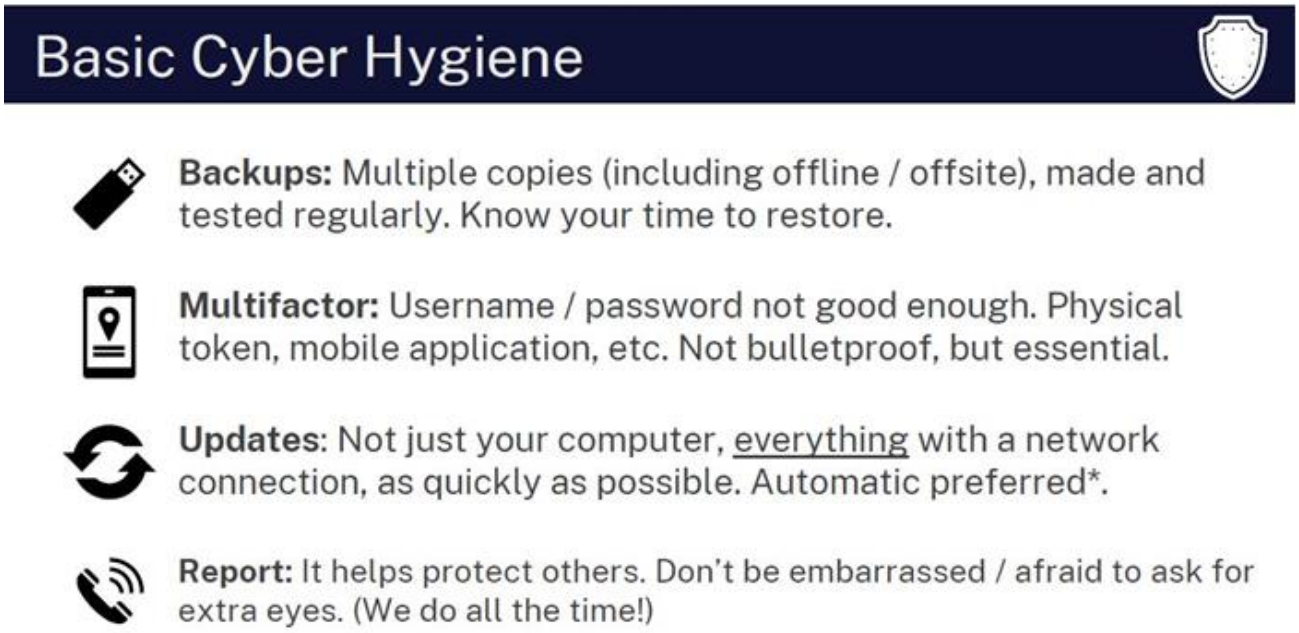
- use of hardware firewalls and how web servers are managed
- use multi-factor authentication
- IDS/IPS real-time monitoring in both directions
- data and password encryption, including encrypted tunnels for transport
- password policies and procedures
- policies for the use of computer equipment, Internet, 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 St. Croix 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.



x. Hazardous Materials Spills

Note: This plan only focuses on point sources of contaminants due to an accidental or malicious hazardous materials spill or chemical 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 certain chemicals that 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. [53]

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 Commission.

At any one time, the EPA has an average of 300 new chemicals under review that are being proposed for commerce.[54] Originally, the United States Congress compiled a list of specific toxic chemicals (approximately 300) and chemical categories (approximately 20) based on two existing lists in use by the states of New Jersey and Maryland. Since that time, the toxic chemical list has grown to 595 chemicals in 32 categories.[55] The criteria that the EPA uses to define and evaluate toxic chemicals for addition to the list are specified in Title III of SARA and are listed below:

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

[53] Ingham County Emergency Planning Committee, Hazardous Materials Page, http://www.orcbs.msu.edu/AWARE/pamphlets/hazwaste/HazMatdef.html, as of Feb 2004.
[54] U.S. Environmental Protection Agency. https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca/statistics-new-chemicals-review
[55] U.S. Environmental Protection Agency. https://www.epa.gov/toxics-release-inventory-tri-program/tri-listed-chemicals

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 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 St. Croix 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 Interstate 94, have a higher likelihood of experiencing a hazardous spill event. Per the 2023 St. Croix County County-wide Strategic HazMat Plan, there are no local ordinances in St. Croix County that mandates specific routes for vehicles carrying Extremely

Hazardous Substances (EHS) chemicals/substances. 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.

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).

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 St. Croix County. The closest site is the Baytown Township Ground Water Plume in Baytown Township, Washington County, Minnesota – west of St. Croix County. This site is defined by 34 contaminated wells. Per data from the EPA, a former metal working facility in Lake Elmo is the primary source of the site's contamination. Treatment of drinking water, source area treatment, and groundwater monitoring are ongoing.

CERCLIS (Superfund Database) Sites

St. Croix County has four active sites listed in the EPA Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) database, none of which are on the Superfund National Priority List (NPL). This is a relatively high number of active sites per capita given that there are only 296 active sites in Wisconsin. These sites are:

- Baldwin Battery Site (Baldwin) – ACTIVE REMOVAL SITE. This site was added to the list on September 1, 2010, and has been designated a removal site only; and no site assessment work is needed at this time. Removal of lead-contaminated soils at the site is underway.

- New Richmond Landfill (License #2492) – ACTIVE BROWNFIELD. This landfill operated from approximately 1975 through early 1992, at which time it was capped with two feet of final cover material and six inches of top soil. First reported to the EPA in 2002, the preliminary assessment states that this former municipal landfill northwest of the City has impacted private wells in the Town of Star Prairie with volatile organic compounds (VOCs), with some trace amounts found in wells farther north. A deep-well casing area was established for new private wells, and some wells have been replaced. Through an intergovernmental agreement, municipal water from New Richmond has been extended to about forty homes in a roughly six-square-mile area, while other residents have installed whole-house carbon filters.



Though closed in 1975, this landfill in the Town of Star Prairie has released a plume of VOC contaminants resulting in a deep-well casing

- St. Croix Wetland Management District – This Fish & Wildlife Service location northeast of New Richmond was added to the database in 1993 for an inspection review. No further details available.
- St. Croix River TCE (tetrachloroethylene) Plume – This site was first reported to the EPA in 2004, and is part a well advisory area located in the Town of Warren. According to the initial discovery, groundwater contamination by TCE has impacted several nearby private wells near the suspected source area. TCE contamination has been documented as far back as 1984. The suspected source is not known, but may be related to illegal dumping in the past. TCE is known to cause cancer and damage the nervous and immune systems. Children and seniors are especially vulnerable to TCE's toxic effects. Additional remediation is planned for this site.

The County has two additional sites in the database which are no longer considered active remediation sites or have been removed from the database:

- Seversen Salvage (Cady) – This is a 30-acre property with approximately 100 cubic yards of printed circuit boards and other scrap materials; lead contamination is a concern, but any contamination is believed to have been limited to the site. It was identified as a "removal only" site and a full site assessment was not performed. The site was referred from EPA to WisDNR for remedy.
- Rosen Metal Inc. (Baldwin) –This scrap metal and former battery site was partially cleaned-up in 1993-1996. Currently, no further remedial action is planned; and it has been referred to removal. Related to this property is the Lee Farm site nearby in the Town of Eau Galle where batteries from Rosen Metal were dumped. At this time, remediation is complete at the Lee Farm site; and a long-term groundwater monitoring program is in place.

Event History – Hazardous Materials Spills

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.[56] 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.

State & Regional Events

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 5-10% of the time. A majority of reported hazardous materials incidents in Wisconsin result from the loading, unloading, and transportation of hazardous materials. [57]

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.

As described previously, Wisconsin has 56 active or closed Superfund sites. Wisconsin also is home to approximately twenty-six licensed hazardous waste management facilities, which increased in

[56] Wisconsin Department of Natural Resources. "Hazardous Substance Spills in Wisconsin". July 2014.
[57] Wisconsin Department of Natural Resources. "Hazardous Substance Spills in Wisconsin", July 2014 and August 2016.

number from the previous 2018 plan.[58] 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. 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

[58] Wisconsin Department of Natural Resources, "Wisconsin Hazardous Waste Treatment/Storage/Disposal Facilities. Licensed for Year 2015". April 2, 2015.

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.

Significant St. Croix County Events

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 24**, there are 1,068 BRRTS records for St. Croix County from 1978 to 2022, of which 718 (67%) are closed and no further action or monitoring is currently planned.

Since 1978, about half 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 69.4 percent of all reports since 2000, largely due to a significant decrease in the proportion of leaking underground storage tank reports in recent years.

Table 24. BRRTS Records for St. Croix County – 1978 thru 2022 report dates[59]

Activity	1978-1999		2000-2022	
Spills	234	42.6%	344	69.4%
Leaking Underground Storage Tanks	167	30.4%	40	8.1%
Environmental Repair (non-LUST)	38	6.9%	37	7.5%
No Action Required Discharge	84	15.3%	57	11.5%
Abandoned Container	0	0.0%	7	1.4%
Totals	**523**	**100.0%**	**496**	**100.0%**
Average Reports per Year	**23.8**		**21.6**	

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. At least fourteen locations in the County have had five or more such reports. While the average number of all reports per year have been decreasing, the number of spills reported has increased dramatically (15 reports/year since 2000). 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.

[59] Wisconsin Department of Natural Resources, WDNR BRRTS on the Web, http://dnr.wi.gov/topic/Brownfields/wrrd.html The locations 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 33** later in this assessment shows the location of the open LUST and ERP sites in the County.

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.

Federal data collection for spills and leaks of toxic substances changed in 2010 with the implementation of the new National Toxic Substance Incidents Program (NTSIP) managed by the Center for Disease Control, though this data was only maintained until 2014. This data source not only includes releases at fixed sites, but transportation-related spills as well.

The largest, most recent spill occurred on February 27, 2012, when a gasoline tanker hauling 3,500 gallons of gas and diesel crashed on Interstate 94 just outside Roberts. The driver was killed in the fiery crash, and traffic was re-routed for about five hours. Response and coordination was good overall, though there was some communication challenges regarding traffic control between local responders on the scene and State Patrol.

Between 1996 to 2009, 60 hazardous materials spills in St. Croix County were reported to the Hazardous Substances Emergency Events Surveillance (HSEES) system through the Wisconsin Department of Health & Family Services. Federal data collection for spills and leaks of toxic substances changed in 2010 with the implementation of the new National Toxic Substance Incidents Program (NTSIP) managed by the Center for Disease Control. The spills in the HSEES and NTSIP databases are accidental or illegal in nature, as opposed to the majority of releases in the TRI database. This data source not only includes releases at fixed sites, but transportation-related spills as well.

From 1996 to 2014, 63 hazardous materials spills in St. Croix County with actual or threatened releases were reported to the HSEES or NTSIP databases through the Wisconsin Department of Health & Family Services or other sources as shown in **Table 25.** It is unknown to what extent this list includes all such spills of public health concern. NTSIP data is not available after 2014. It is notable that no spills are reported for St. Croix County after 2011, which likely reflects a gap in reporting rather than a lack of spills.

Nearly 70% of the reported spills occurred at fixed facilities. All transportation-related releases were ground-based, with none involving train derailment or pipelines. The far majority of spills occurred during daytime hours, and nearly half occurred within ¼-mile of a residential area.

Table 25. Reported Hazardous Materials Spills – 2010 through 2014[60] St. Croix County

Year	# of Reports	Fixed Facilities	Transportation Related	Notes
1996	3	3	0	
1997	0	0	0	
1998	4	2	2	
1999	5	2	3	
2000	3	0	3	
2001	5	4	1	
2002	5	2	3	
2003	13	11	2	
2004	7	6	1	
2005	1	1	0	
2006	5	4	1	
2007	2	2	0	
2008	3	2	1	
2009	4	2	2	
2010	1	1	0	1 diesel fuel spill at gas station
2011	2	1	1 (ground/truck)	1 antifreeze release at a mfg
2012	0	0	0	
2013	0	0	0	
2014	0	0	0	
Total	**63**	**43**	**20**	

For release records prior to 2010 with an associated cause in the database, the highest number of these releases was due to equipment failure at 38 percent. Operator error was the next most common cause at 31 percent. All three of the deliberate releases were meth related, though there have been no such reported spills since 2006. A notable trend in the pre-2010 data is the number of methamphetamine-related releases. In 2003 and 2004, 65% of the reports were related to methamphetamine labs. All but two of the "meth" reports were at fixed facilities, and only one of the reports involved an actual release. Eleven of the 17 meth-related reports occurred at sites within ¼-mile of residential areas, and most of these reports involved more than one toxic chemical with ammonia being the predominant concern. There were no immediate injuries associated with these reports. Efforts to combat meth labs and meth addiction during the past two decades have been having success, with the number of discovered labs in Wisconsin decreasing. Overall, the number of reported accidental or illegal hazardous materials releases prior to 2010 stayed fairly consistent at about four to five reports per year, decreasing slightly over time, perhaps due to the absence of meth-related reports.

[60] Center for Disease Control. National Toxic Substance Incidents Program database. https://www.atsdr.cdc.gov/ntsip/index.html

St. Croix County's Countywide Haz Mat Plan identified 30 spills that were reported in 2022, noting that this was an increase of 14 spill reports from 2021. Many of these spills were at gas stations and involved gasoline or diesel fuel spills with other spills occurring on major highways or near rail lines. A breakdown of the spill types is as follows:

Diesel Fuel:	20 reports
Waste Oil:	1 report
Manure:	3 reports
Gasoline:	2 reports
Corn Syrup:	1 report
Herbicides/Pesticides/Insecticides:	1 report
Hydraulic Oil:	1 report
Fire (toxic) smoke:	1 report

Many of the diesel fuel spill reports were identified as being caused by human error with the customer overfilling the tank, causing diesel to spill. Other natural hazards can also be the cause of the spill. For instance, flooding in 2021 resulted in the release of sewage from the Hudson wastewater plant. Most recently during Fall 2023, Interstate 94 was closed three times within two months due to Haz Mat spills. These closures lasted up to six hours in both directions, which created a chaotic situation on parallel roadways that were not designed to serve as alternate routes. One of the spills was ignited by a brake fire resulting in a bleach spill.

Hazard Probability – Hazardous Materials Spills

The Plan Steering Committee rated hazardous materials spills as having a moderate probability of occurrence (frequency) and a moderate vulnerability (impact) should an event occur. Transportation-related events were of higher concern compared to fixed sites. **Based on recent trends, approximately 20-35 hazardous materials spills will be reported in any given year in the County.** 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, such as the diesel spills noted above.

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 1-2 per year, though not all will require significant remediation activities.**

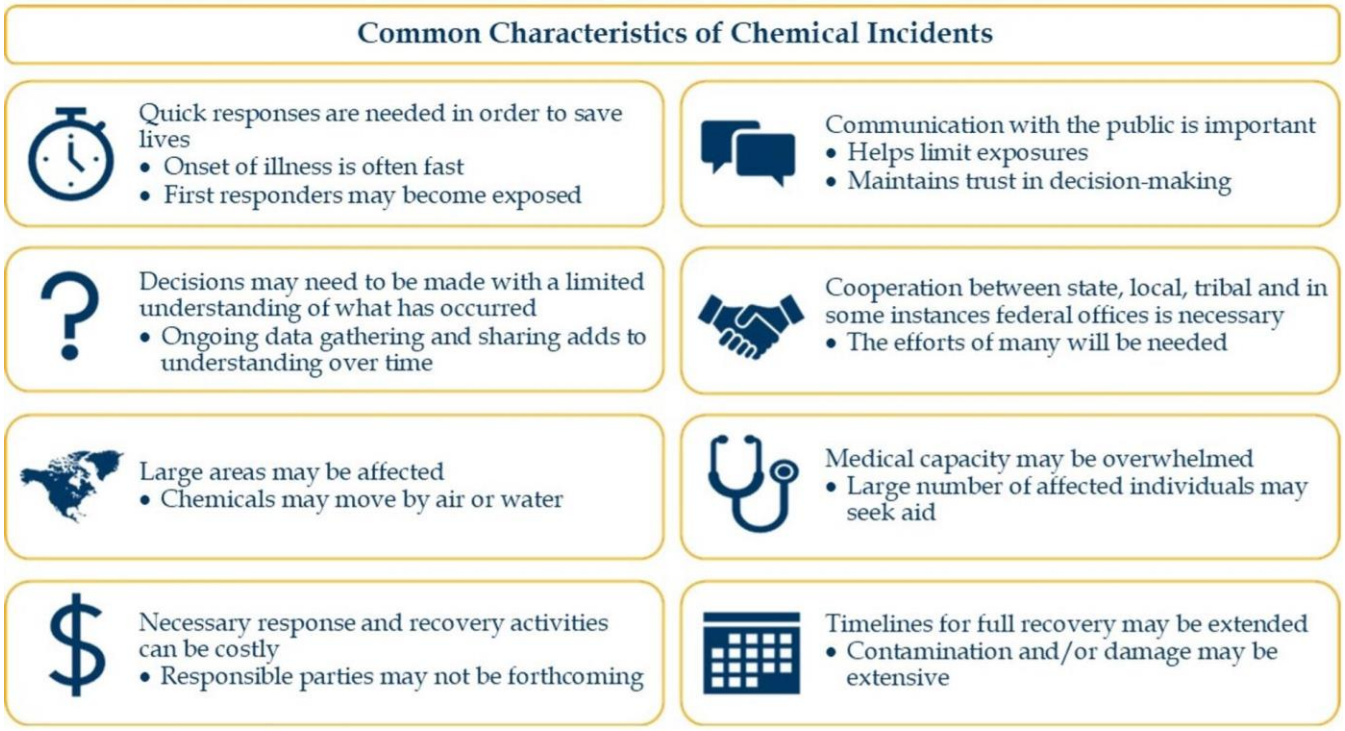
The level of risk is also influenced by the relatively fast pace of growth in St. Croix County. As more growth occurs, there is an increase in the potential number of contamination sources. And, as the number of industries increases, there is an increase in the general use of hazardous materials in the County for domestic, institutional, and commercial purposes. Traffic volumes are also rising, which increases the potential for accidents involving vehicles carrying hazardous materials. 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.

It was noted during the process that the frequency and probability of agricultural chemical spills has been decreasing as fewer farmers are mixing and storing chemicals on site. Instead, farmers are increasingly choosing to purchase chemicals and non-manure fertilizers through cooperatives and contracting out the application.

Vulnerability Assessment – Hazardous Materials Spills

Appendix G provides the following regarding the potential impacts of hazardous materials spill events for St. Croix 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 St. Croix 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 and Wastewater Treatment Systems.** 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 atrazine pesticides over time within a wellhead draw area. 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.

Wastewater treatment systems can also be impacted by the introduction of chemicals or hazardous materials. Dissolved oxygen levels can change, and the biological treatment of effluent can be impacted. Keeping a municipal treatment system balanced and operating efficiently can be a challenge, especially when there are sudden changes in the effluent entering the treatment plant.

- **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 St. Croix County via railroad and truck traffic. If a spill should occur, adjacent 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. Rail lines pass through portions of most incorporated communities in St. Croix County; likewise, the Interstate 94 corridor travels through numerous incorporated and developing area in the County. As traffic volumes increase on Interstate 94 and 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; these are discussed more later.

- **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.

- **Other Utilities and Services**. Three natural gas pipelines also cross St. Croix County; these transport substances that are hazardous.

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

Northern Natural Gas operates two of the natural gas transmission lines (one each in the Town of Star Prairie area and the Town of Pleasant Valley area). A third natural gas transmission line owned by Viking Gas runs through the Town of Forest area. An oil pipeline owned by Williams Pipeline Company generally runs from the Hudson area southeast to the Town of Kinnickinnic, then east through the southern towns of the County.

During the planning process, a number of communities identified natural gas lines, transfer stations, and gas 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 33** 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.

The *2023 St. Croix County Countywide HazMat Plan* notes that "It is assumed that exposure to all transported hazardous substances in St. Croix County will be the result of road, rail and air transportation and pipeline delivery". The potential exists for the transport of any EHS within the County; these substances are transported in containers that range from a 10-ounce agricultural package to 429,000 pounds of substance in a rail car.

Highways and Railroads

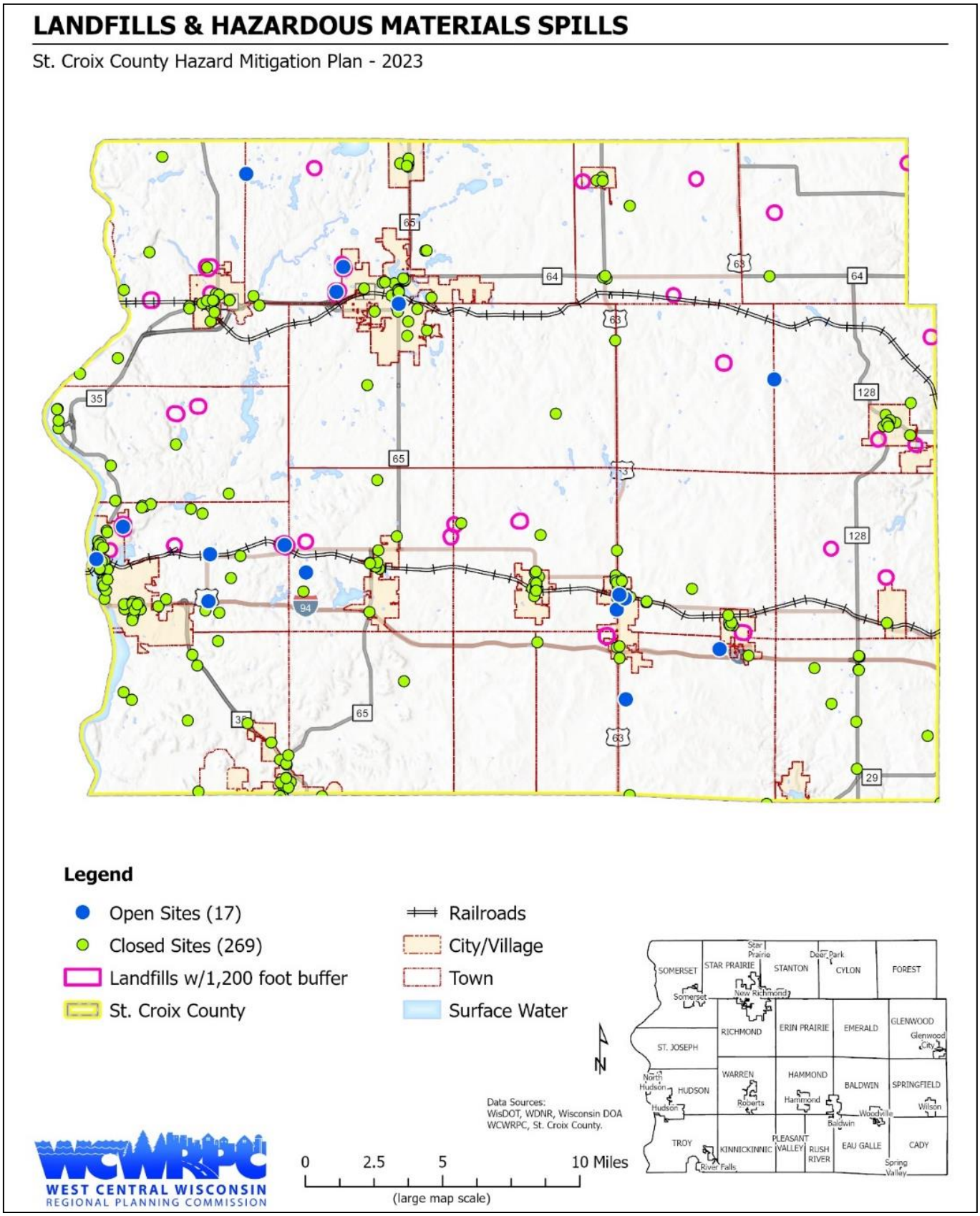
Figure 33 also identifies the highways and railroads of St. Croix County. During the planning process, transportation-related spills were consistently identified as the greatest hazardous materials concern for the following primary reasons:

- Accidents can occur with many contributing factors that can be difficult to control or mitigate. This includes collisions with vehicles at rail crossings, which was a HazMat risk identified by the Town of Emerald.



Transportation-related hazardous materials spill near the Village of Roberts

Figure 33. Areas of Hazard Materials Spill Concerns



The uncertainty of what materials and quantities are being transported. The Town of Richmond noted that a rail intermodal terminal exists in the community, but the Town did not believe any hazardous materials are being transferred.

- Major highways with heavy truck traffic and rail lines 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 EHS and Tier Two facilities, local emergency response personnel are familiar with the facilities and materials being used.

Interstate 94, including truck stops along this route, was most frequently identified as being of concern due to speeds and the volumes of truck traffic, though hazardous materials are transported on roads throughout the County. There are both State and Federal commercial drivers' licensing and other rules for the transport of hazardous materials on roadways as summarized at the Wisconsin DOT website.

Deep-well casing areas

Not shown on Figure 33 are Wisconsin DNR-designated deep-well casing areas for potable groundwater due to groundwater contamination. The two, largest deep-well casing areas are related to the previously mentioned Superfund sites in which Volatile Organic Compounds (VOCs) have caused significant groundwater contamination. By far, the largest area is in the Towns of Warren and Hudson due to leaks at three different locations. The second largest deep-well casing area is associated with the New Richmond landfill and is largely located in the Town of Star Prairie.

Long-term exposure to VOCs can include cancer, liver damage, spasms, and impaired speech, hearing, and vision. Each of these areas has related requirements for private wells, such as increased testing and the installation of whole-house, point-of-entry, activated carbon filter treatment systems. In some cases, landowners have elected to use bottled water, while extending municipal water was explored for the Town of Star Prairie area.

The potential impact area of a second plume of groundwater contamination in the Town of Star Prairie from a second, older landfill; it is uncertain if or how far this plume (and the other nearby plume) may have spread. Landfill license #310 is reported to have operated from approximately 1945 until it closed in 1975. In 1992, an Environmental Conditions Assessment was completed; and, based on the results of that assessment, one private well was replaced because of VOC contamination and the landfill was capped in 1994 with clay material. Since that time, Operation & Maintenance (O&M) continues at the site with scheduled water sampling from monitoring wells and private wells. This second plume has not been declared a deep-well casing area or other formally identified well advisory area. However, the Wisconsin Department of Natural Resources may require additional actions at this site in the future.

Four additional, smaller deep-well casing areas have been established in the Town of Emerald (3) and the Town of Forest (1). These areas have been established due to elevated groundwater contaminants from agricultural practices. The map does show the locations of the landfills in the County. State law requires that no wells are allowed within a 1,200 foot buffer area from a landfill.

Gas/Oil/Petroleum Pipelines
Within St. Croix County there are both natural gas/oil pipelines as well as petroleum pipelines. There are 9 natural gas/oil service providers within the County. County Emergency Management maintains records, contact information, and plans for the pipeline transmission lines in St. Croix County. These are not mapped in this plan for security reasons.

Transmission pipelines that carry larger quantities of energy resources (e.g., petroleum products, natural gas) were identified as the primary, larger-scale, pipeline-related concern. Smaller distribution pipelines can have similar threats, but typically at a smaller scale, such as a person accidentally hitting a pipeline while digging. Natural disasters, like tornadoes and earthquakes, can place pipelines at risk for leaks and service disruptions. Pipeline providers are required to have emergency response plans for such disasters. More information on pipeline safety and preparedness can be found at www.pipelineawareness.org.

Other Areas
Not shown on the map, the Town of Richmond previously noted that an auto salvage yard is a concern due to oil, etc., that could be spilled during crushing, though the Town noted that no special action is needed at this time. The Town also noted that aging sanitary district infrastructure for 27 households could create problems if sewer lines are damaged or the system begins to fail. And the Town of St. Joseph identified the old County garage area south of Houlton as a possible concern.

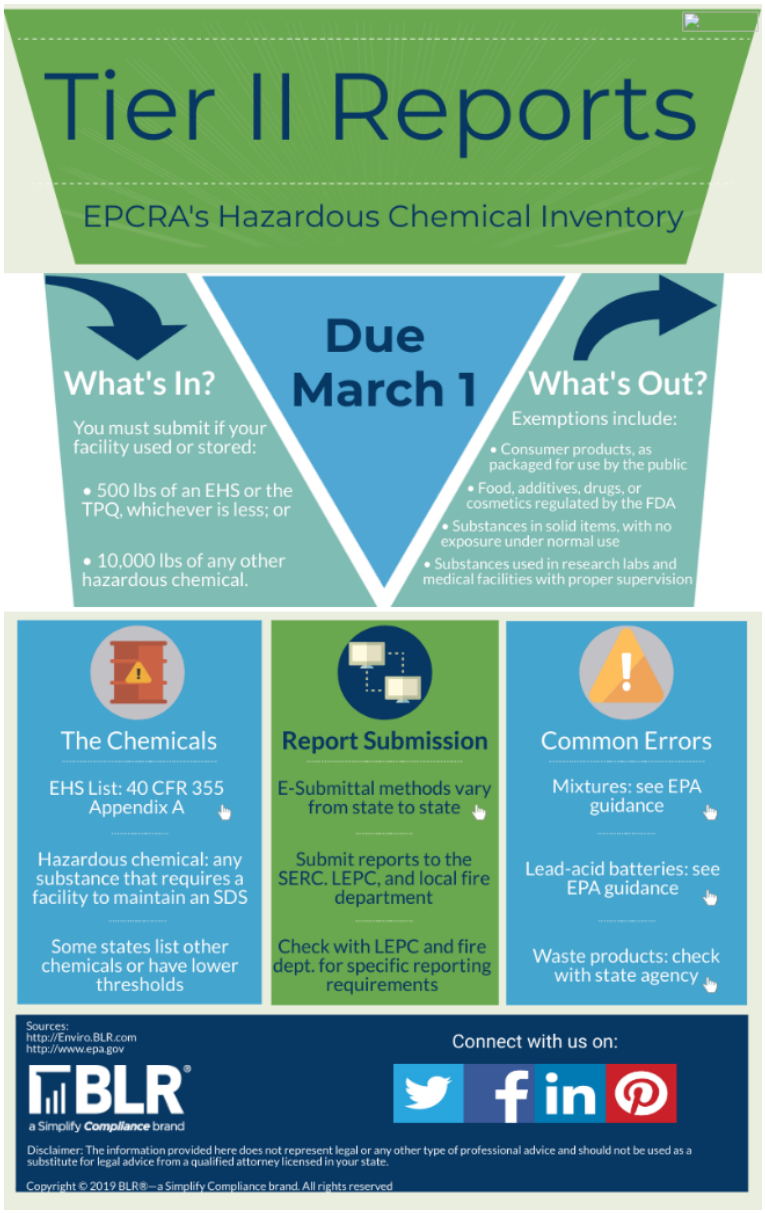
Manufacturers and facilities storing large amounts of hazardous substances were the most frequently mentioned Haz Mat spill concerns by local officials during the planning process. As shown in Figure 33, while most fixed sites where Haz Mat spills have occurred are located in the cities and villages, there are sites in some unincorporated towns.

EHS and Tier Two Facilities

According to St. Croix County Emergency Support Services, as of March 2018, there were 98 Tier Two Reporting facilities and 30 active EHS Planning facilities located within St. Croix County. These facilities represent significant potential sources for a hazardous materials incident, with the EHS facilities being the greater concern. The majority of these 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, nor is it known if any of these facilities are located within the 100-year floodplain.

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. EHS (Extremely Hazardous Substances) 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 St. Croix County Emergency Support Services 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 points (or the



threshold planning quality, 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.

The 2023 St. Croix County Countywide Hazmat Plan identifies six different chemicals found at fixed facilities throughout the County: Lead, Chlorine, Sulfuric Acid (AKA Battery Acid), Anhydrous Ammonia, Nicotine, and Nitric Acid (40% Red Acid No 195). The chemicals range in quantities from 1,000 to 132,000 pounds per facility site.

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 2016, St. Croix County had 12,477 pounds of on-site disposal or other releases of toxic chemicals, with all being released into the air. No chemicals were reportedly transferred and released/disposed of at a site not where the chemical was originally produced. Trichloroethylene, xylene, and styrene were the chemicals most commonly released. These chemicals fall into the classification of Volatile Organic Compounds (or VOCs) that are omitted as gases.

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.

Multi-County Commodity Flow Studies

During the planning process, areas and neighborhoods adjacent to the County's rail lines and major highways were the most frequently mentioned risk. In 2012, a *Multi-County Commodity Flow Study* was completed by Five Bugle Training & Consulting, LLC to attempt to provide insight into the types of hazardous materials moving through the region. This study included Chippewa, Dunn, Eau Claire, and St. Croix counties.

As part of the study, 48 hours were spent observing HazMat placards at five locations on Highway 29, two locations on Highway 10, and one location on each of Highways 95, 98, and 28, typically at intersections with other arterial highways. Based on placards, 27 different types of EPCRA Tier Two hazardous materials were identified as being transported via these highways during the study period. The study suggests that the "majority of hazardous materials being transported…is either not placarded or not listed in the Tier II report" being provided to County Emergency Management. A complete list of hazardous materials transported by rail was not available.

The study also included a Fire Department survey that showed that all of the departments had a percentage of their personnel trained at the Haz Mat awareness level. The typical department trains six hours or less a year on Haz Mat response, with over half never having trained with the regional Haz Mat response team. The vast majority would like to see additional training made available to them. The detailed results of this study are not published here for reasons of security.

An update to the commodity flow study is nearing completion. The February 2024 initial draft recommended:

- Review and assess preparedness measures, including training records and response capabilities.
- Schedule a minimum of annual training appropriate to each fire department, including reviewing chemical properties and types of vehicles transporting HazMat.
- Inventory HazMat response equipment
- Collaborate to ensure that local decontamination equipment and procedures are in place.

Some local stakeholders expressed concern over the limitations of the commodity flow survey since it is a "point in time" visual analysis of placards, which offers limited information, skepticism regarding the compliance with placarding, and the limited information on what is being transported via railroads. For information regarding a specific train, an AskRail application was launched in 2014 for emergency responders to query railcar contents.

Manure Storage and Animal Waste Management Facilities

As documented in Section II.C.iii., St. Croix 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 storage facility failures or large fish kills as a result of manure spills or nutrient run-off in St. Croix 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 overtopping or a line break. About thirty percent of manure spills occurred during transportation between the storage facility and application site. An additional 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. Only four percent of the incidents in this study resulted in a fish kill.

Locally, in late December 2016, a pumping system at a dairy near Emerald began leaking manure. The leak would not be reported to State officials until late March 2017. Most of the seepage was contained in a nearby wetland area. Nearby residents were very concerned with the impact on groundwater quality with one stating that "the spill amounted to "tens of thousands of gallons of manure water" that had not been reported to the DNR until after County officials urged staff to do so."[61] This incident was one of the driving factors for the completion of a County water quality study in 2017, which will be discussed later in this section.

To discourage landspreading 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 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 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 Wisconsin Department of Natural Resources and St. Croix County Community Development with partnership support of the St. Croix County UW-Extension Agricultural Agent. The County Community Development Department enforces the County's manure storage ordinance, provides related educational services, and manages a program to properly abandon facilities that are no longer being used. And should a spill occur, St. Croix County has adopted a *Manure Spill & Brown Water Event Response Plan* covering responsibilities, communications, and other planning and response actions. This Plan includes the following summary table for evaluating risk factors:

Summary Table of Factors Considered in Determining Public Risk

Factor	*Low Risk*	*Moderate Risk*	*Significant Risk*
Spill Size	<3000 gallons	3000 to 15000 gallons	>15,000 gallons
Location	>300 feet from waterway leading to public waters	Within 300 feet of navigable stream Within 1000' of navigable lake or pond	Manure enters any public water
Sinkhole Presence	None in Proximity	Possible in area	Spill within 100 feet of drainage pathway to verified sinkhole(s)
Proximity to Wells (see below)	2X minimum application setback	1 – 2X minimum application setback	Within minimum application setback
Weather	Dry soil	Normal weather	Wet cycle – wet soils
Proximity to Wellhead Protection Area	>1/2 miles from Wellhead Protection Areas	<1/2 miles from Wellhead Protection Area	Within Wellhead Protection Area

- **Minimum Well Application Setbacks For Spill Plan**
  - Within ½ mile of delineated wellhead protection areas for local municipal wells
  - 1000' from Transient Non-Community, Non-Transient Non-Community, and Other-than-Municipal wells
  - 250 feet from private domestic well
  - Within 100 feet of concentrated flow channel leading to navigable water or groundwater (sinkhole)

[61] Wisconsin Public Radio. April 13, 2017. https://www.wpr.org/dnr-investigating-large-manure-spill-st-croix-cafo

The Wisconsin Department of Natural Resource 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 DATCP, and UW-Extension provide additional education and support programs regarding nutrient and animal waste management.

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.

Projected Loss Estimates

Due to the lack of comprehensive, up-to-date data and related studies, future loss estimates for hazardous materials spills in St. Croix County are not included. However, basing future losses on historic spill data under-estimates the true vulnerability. A very large Haz Mat release is possible in St. Croix 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.

Potential Impacts

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).

Potential Groundwater Impacts

Nearly all St. Croix 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.

Nitrate in groundwater and the previously described manure spill near Emerald were driving factors in the County Board's creation of a Surface and Groundwater Quality Protection Study Group in December 2016. After 14+ data gathering and discussion meetings, the Study Group presented their findings to the County Board of Supervisors in October 2017 in a report titled "*Background, Main Findings, and Recommendations Report for the Protection of Surface and Groundwater Quality in St. Croix County*." The report included: a summary of existing groundwater conditions in the County; regulations, management, and programming related to surface and groundwater; a review of existing studies; findings regarding wells, nutrient management planning, and livestock operations; and eight core recommendations. In November 2017, the County Community Development Department prepared a more detailed implementation guide with estimates of staff hours and costs for addressing the core recommendations.

Core Recommendations from the St. Croix County 2017 Surface & Groundwater Quality Study

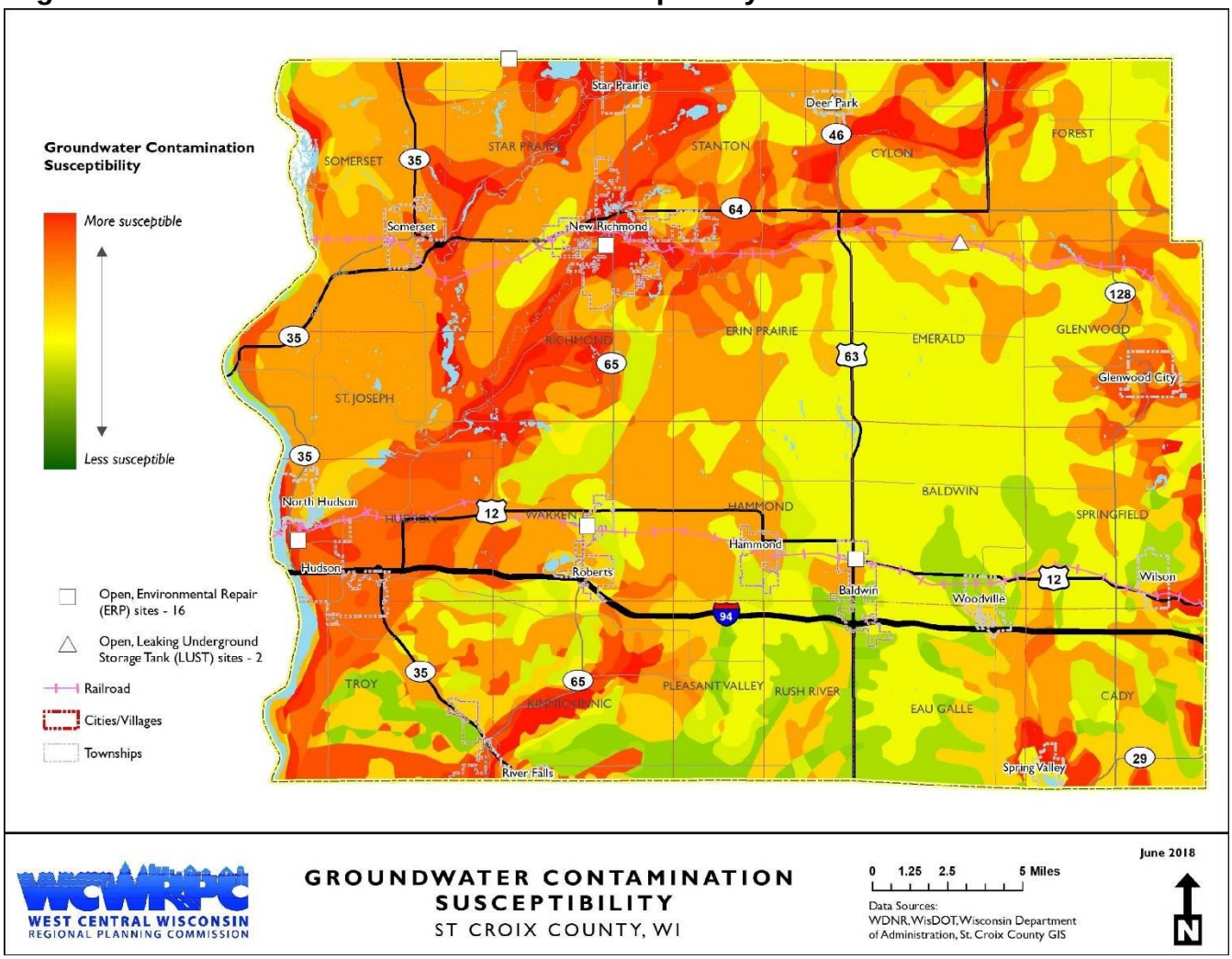
Implementing the eight core recommendations of the 2017 Study is important to mitigating potential water quality impacts of hazardous materials spills. These recommendations are summarized below; see the full report for more detail:

1. Explore regulatory and licensing options for the siting and monitoring of livestock operations.
2. Increase the number of acres in nutrient management plans.
3. Revise the County's land use policy and zoning ordinances to protect groundwater resources.
4. Develop a County protocol for urgent response to actual or potential water resource pollution events.
5. Develop a scientifically sound drinking water well testing program and create baseline data to measure quality over time.
6. Inventory and map environmentally sensitive areas and conduits to groundwater as well as areas with high vulnerability to pollutants.
7. Develop a plan for an inset model and conduct additional research on the source of nitrate issues.
8. Establish an active water quality committee.

source: Background, Main Findings, and Recommendations Report for the Protection of Surface and Groundwater Quality in St. Croix County

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 34** on the following page 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.

Figure 34. Groundwater Contamination Susceptibility



As referenced in the 2017 Study, the existence of closed depressions in St. Croix County exacerbates the groundwater contamination threat. The "Closed Depression Map of St. Croix County, Wisconsin" provides an excellent description of the phenomena of closed depressions in the County, as paraphrased in the *St. Croix County Development Management Plan* completed in 2000:

> *Closed depressions are common features in St. Croix County. They have formed through two quite different geological processes: karst development and glaciation. Karst development occurs in regions with highly soluble bedrock and results in distinctive landforms such as sinkholes. St. Croix County is covered by several rather thick, soluble carbonate units, and has particularly well-developed karst, especially in the eastern half of the County. Glacial action can also result in topography marked by closed depressions known as kettles or kettleholes. Kettles develop when large blocks of glacier ice are buried within glacial deposits and subsequently melt. Many of the depressions in the western and northwestern portions of the County are kettles that developed in the St. Croix moraine after it was deposited during the Wisconsonian glaciation.* - Baker, Hughes, Huffman and Nelson, Closed Depression Map of St. Croix County, Wisconsin, 1991

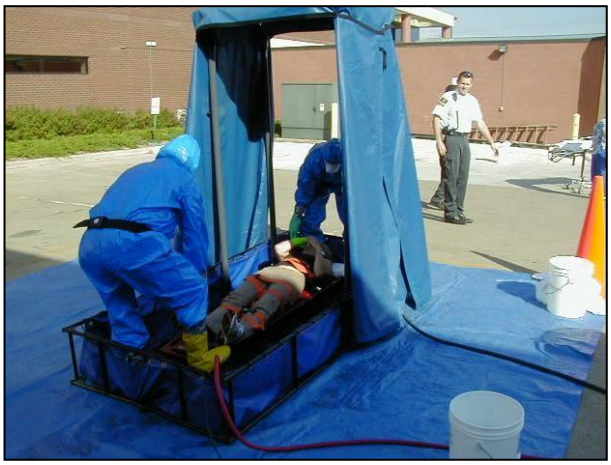
Closed depressions (or sinkholes) are significant groundwater contamination vulnerabilities since there are sometimes minimal soil layers between the bottom of the depressions and the bedrock underneath. Contaminants at the surface are not given the opportunity to be adequately filtered by soils, but, instead, are passed more directly from the surface to the groundwater aquifer. Given the nature of bedrock fractures and aquifers, contaminants can travel large distances in relatively short timeframes.

The karst topography more common in the eastern half and some central areas of the County is more vulnerable to groundwater contamination since this is often in areas characterized by thin soils or surficial deposits. With the closed depressions or kettles created by glacial activity, more common in the western and northwestern parts of the County, there are typically greater amounts of soil layers between the depression and the bedrock to provide additional filtration of potential contaminants.

Many of the largest closed depressions and sinkholes in St. Croix County are known, though some are so small to be hardly noticeable on the map. Many others exist, but have not been discovered or formally mapped, since these depressions can be difficult to identify. On occasion, these depressions or sinkholes have been used for convenient dumping sites for a variety of potential contaminants, such as lead batteries. Closed depressions are also many times used as natural drainageways or stormwater ponds, though often without adequate buffer areas. The County's Sinkhole

Other Factors Influencing Future Losses

St. Croix 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.



WC WI Regional Response Team Practice Drill

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. St. Croix County does not have a county-level (Type 4) Hazardous Materials Response Team, though all fire departments have been trained to the operations level. 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 leaves. An agreement between Wisconsin and Minnesota is not in place to allow communities in western St. Croix County to received hazmat response support from Minnesota-based teams, even thought they are in closer proximity.

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)

During the 2024 Plan update, PFAs were identified by the Steering Committee and some local officials as a growing concern. This subsection recognizes these growing concerns, though information regarding PFA contamination are 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.FAS are 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 studies 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 January 2024, PFAs have not been detected above the WI DHS hazard index in any municipal water system in St. Croix County. There are two sites in St. Croix County – New Richmond Landfill and Junkers Landfill, that are open and under investigation. The New Richmond Landfill #2492, located in Star Prairie, is an open site for PFAS in the groundwater. Junkers Landfill, located in the Town of Hudson, is an open site with confirmed impacts to drinking water, groundwater, and leachate. Neither open site currently has a drinking water advisory.

What are PFAS?

PFAS are a group of human-made chemicals used for decades in numerous products.



Products that **may contain PFAS**.

What is Wisconsin Doing About It?



establishing PFAS health standards for drinking water, groundwater and surface water



soil & water testing



researching fish & wildlife



listening & feedback sessions



state collaboration

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



developmental delays



infertility & low birth weight

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

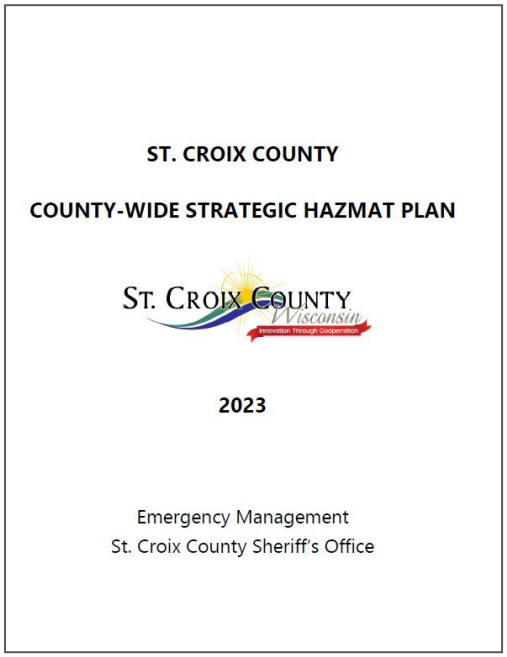
Risks for Individual Plan Participants – Hazardous Materials Spills

All individual plan participants in St. Croix 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.

Appendix L provides the sub-plans for each city and village and **Appendix M** 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 St. Croix County. One unique threat not addressed elsewhere in this report is high radon reported for some basements in the Deer Park area, though this is not technically a hazardous materials spill. A mobile home park in the Town of Stanton just outside the City of New Richmond was identified as having significant problems with septic systems, potentially related to high groundwater.

HazMat Mitigation, Preparedness & Response Plan

The 2023 *St. Croix County County-wide Strategic HazMat Plan*, prepared by the County's Emergency Management staff, provides a comprehensive description of the hazardous materials and fixed locations within the County along with a description of the County's response procedures, Emergency Response Team, related resources, and other responsibilities.



The County is currently served by twelve fire departments that provide 'First Due' engine company response at a Type IV response level. The County works with local first response agencies to provide 'Operations Level' hazmat responder response training to comply with Federal and State requirements. Law enforcement and EMS personnel are expected to maintain the 'Awareness Level' training, which trains them to recognize an incident involving a hazardous substance, and to notify the County for the need for a hazardous materials response. St. Croix County will support both Awareness and Operations level refreshers on an annual basis through grant applications to pay for the training.

Dunn, Eau Claire, and Chippewa Counties are nearby counties that, in addition to Wisconsin Emergency Management, can assist with a level B response. Per the County's Strategic HazMat Plan, in the event that a sustained release of a hazardous substance that directly threatens the health and welfare of citizens within St. Croix County occurs, and offensive actions are needed to stop the release of the substance, a local emergency response team will be contacted by the St. Croix County Incident Command and appraised of the situation. Planning and preparation are essential to ensure that the County is equipped and organized to respond to any future hazardous materials incident.

xi. Nuclear Accident

A nuclear-accident category was added to the scope of the *St. Croix County Multi-Hazard Mitigation Plan* given the County's proximity to the Prairie Island Nuclear Generating Facility near Red Wing, MN. Sources of information for this section of the Plan include: WEM interviews, various hazard mitigation plans from other communities, Nuclear Management Company (NMC) interview and website, interview with the State Radiological Coordinator, Wikipedia, various FEMA fact sheets, the *State of Wisconsin Homeland Security Council THIRA & SPR*, and the *St. Croix County Emergency Operating Plan—Radiological Annex*.



Defining the Hazard – Nuclear Accident

In the context of this Plan, 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. The intentional release from a radiological dispersal device or improvised nuclear devices is not covered in this Plan. *The State of Wisconsin Homeland Security Council THIRA & SPR* completed by Wisconsin Emergency Management in 2016 discusses radiological release risks and vulnerabilities more broadly.

Accidental radiological releases can occur anywhere radioactive materials are stored, used, or transported. Such a release may vary in scale, location, and potential damage. A small radioactive release may occur at a nuclear medicine or science facility, or a release could occur along the interstate or railroad tracks when a vehicle transporting radioactive material is involved in an accident. These events would likely be smaller in geographic scale and impact, with risks, vulnerabilities, and emergency response actions comparable, if not identical, to those of the chemical, biological, or other hazardous materials spills discussed in the previous subsection.

This section of the report focuses on the accidental radiological release from a fixed nuclear facility. ***Fixed nuclear facilities*** are complexes in which fissionable fuel is stored or used for such functions as electrical power generation.

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.

The higher risk area is the **Emergency Planning Zone** (EPZ) (or plume exposure pathway), which extends about 10 miles in radius around the reactor site. Protective action plans within this area are designed to avoid or reduce dose from potential exposures such as inhaling radioactive particles. These

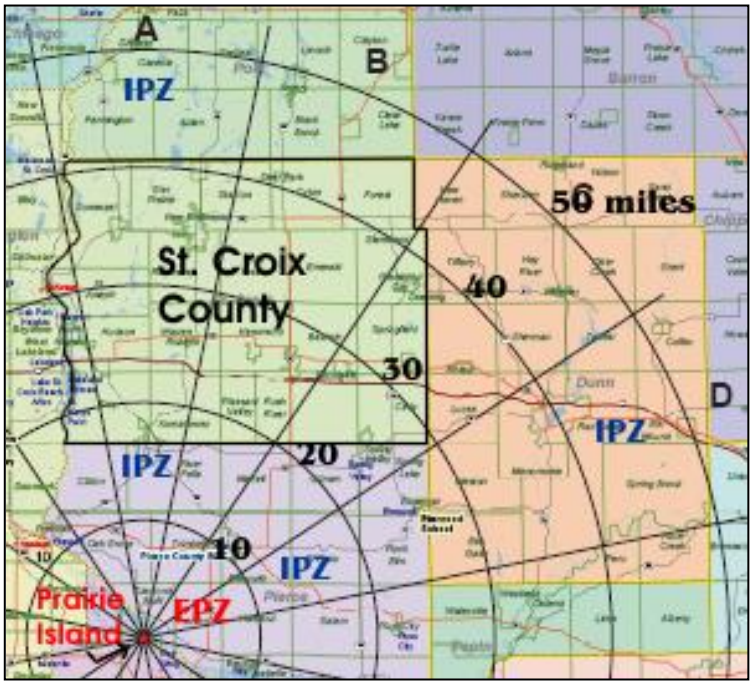
actions include sheltering, evacuation, and the use of potassium iodide pills where appropriate. St. Croix County is located outside the EPZ.

Hazard Location

St. Croix County has no fixed nuclear facilities within its boundaries. However, it is located within the 50-mile Ingestion Pathway Zone (IPZ) of the Prairie Island Nuclear Plant located to the south near Red Wing, MN, as shown in **Figure 35**.

An accidental release at the Prairie Island Plant could disperse airborne radioactive particulates that could contaminate areas within 50 miles of the facility. This can potentially be a long-term problem for the IPZ, as contaminates could enter the soil and then be absorbed into plants which might enter the food chain of people and animals. If a release should occur, aggressive testing and monitoring of vegetation, water, milk, food products, and wildlife would take place within the IPZ to ensure radioactivity falls within safe levels as established by the Food and Drug Administration. Action plans include a ban on contaminated food and water within in the IPZ.

Figure 35. Prairie Island Nuclear Generating Facility EPZ & IPZ



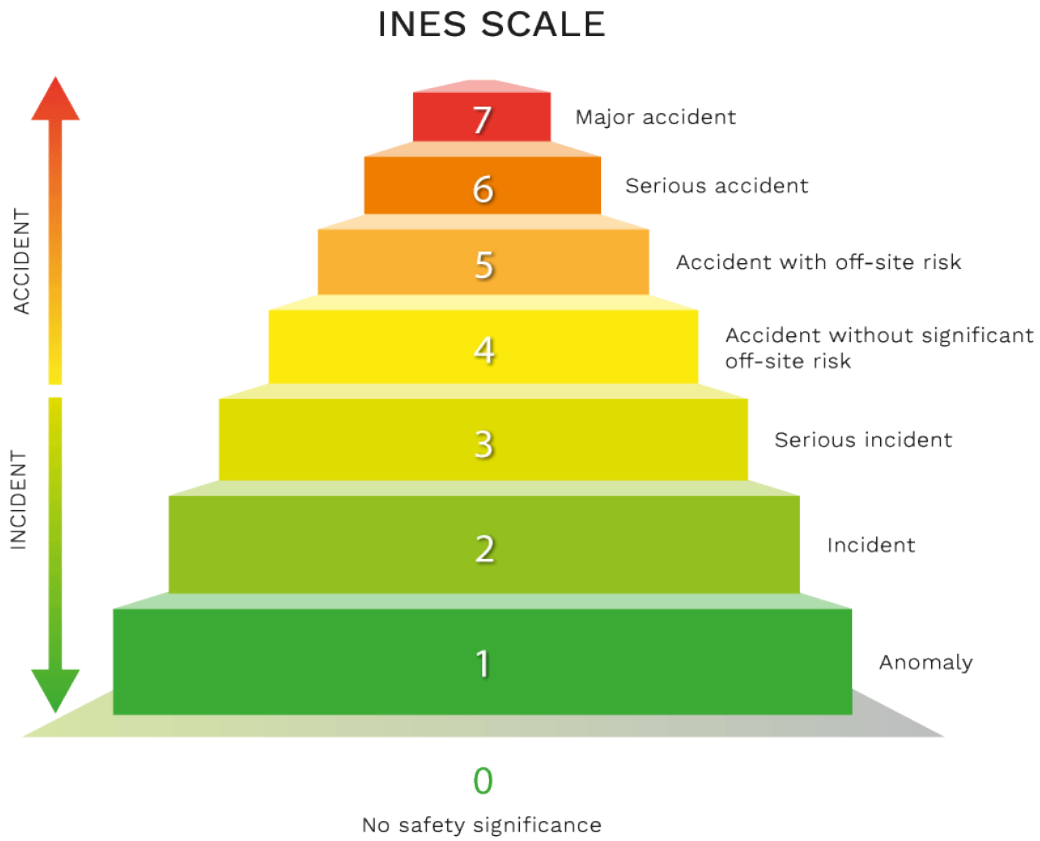
base map from State of Minnesota – Division of Homeland Security and Emergency Management

It is important to note that a nuclear plant cannot explode like a nuclear bomb. Nuclear plants do not have the right concentration of radioactive materials in sufficient quantities to produce a nuclear explosion. For St. Croix County, the primary hazard that the Prairie Island Nuclear Plant presents is a potential airborne release of radioactive materials which could contaminate the soil and food supply.

Hazard Extent (Potential Intensities)

The closer in proximity to the nuclear station, the more at risk a region is to be impacted by a nuclear incident. The International Atomic Energy Association has developed a scale called the International Nuclear and Radiological Event Scale (INES), which provides a quantitative means of assessing the extent of a nuclear event. The scale was developed in 1990 to assess nuclear power plant accidents; the scale considers three areas of impact: people and the environment, radiological barriers and defense. As shown in **Figure 35**, this scale is logarithmic which means that each increasing level on the scale represents an event 10 times more severe than the previous level. Levels 1-3 are called incidents while levels 4-7 are accidents.

Figure 35. International Nuclear and Radiological Event Scale



Source: Radiation and Nuclear Safety Authority

Emergency classifications for nuclear power plants fall into four categories:

1. **Notification of Unusual Event:** Events are in progress or have occurred that indicate potential degradation in the safety level of the plant. No release of radioactive material requiring offsite response or monitoring is expected unless further degradation occurs.

2. **Alert:** Events are in progress or have occurred that involve an actual or potential substantial degradation in the safety level of the plant. Any radioactive material releases from the plant are expected to be limited to a small fraction of amounts described in the Environmental Protection Agency (EPA) Protection Action Guides (PAGs).

3. **Site Area Emergency:** Events are in progress or have occurred that caused actual or likely major failures of plant functions needed to protect the public. Any radioactive material releases are not expected to exceed EPA PAGs except near the site boundary.

4. **General Emergency:** Actual or imminent substantial core damage or melting of reactor fuel with the potential for loss of containment integrity has occurred. Radioactive releases during a general emergency can be expected to exceed EPA PAGs for more than the immediate site area.

It is important to note that the vast majority of events reported to the NRC are routine in nature due to the very high safety standards and do not require incident response. The Prairie Island Nuclear

Generating Plant owned by Xcel Energy, Inc. has had 4-5 "unusual events" and one declared alert, but no releases of radioactive material.

Event History – Nuclear Accident

A release of radiological materials from a nuclear power plant has never occurred in Wisconsin or the region. Known events have occurred at Three Mile Island, Chernobyl, and Fukushima.

March 28, 1979, Three Mile Island Nuclear Generating Station:
The only major accident at a commercial nuclear power plant in the United States occurred at Three Mile Island in Pennsylvania in 1979. Operator error and a minor mechanical malfunction combined to damage the nuclear reactor core. A serious release was avoided, although some radiation was detected up to 20 miles from the facility. Located approximately 200 miles from New York City, the Three Mile Island nuclear plant has now been shut down.

April 26, 1986, Chernobyl Nuclear Power Plant:
Likely the worst nuclear disaster in the world occurred at the Chernobyl Nuclear Power Plant near Pripyat, Ukraine, on April 26, 1986. An explosion at the plant and resulting dispersal of radioactive contamination required the evacuation and resettlement of over 336,000 people. Contamination was detected throughout much of Europe. In Sweden, contaminated milk was combined with uncontaminated milk to dilute radioactivity to acceptable health levels.

Given Soviet cover-up attempts, it is difficult to determine the likely impacts. According to a 2005 report prepared by the Chernobyl Forum, there were fifty-six direct deaths (mostly accident workers) and as many as 9,000 people of the estimated 6.6 million most highly exposed could die of cancer.[62] Other recent studies predict anywhere between 30,000 to 93,000 likely related fatalities in time. The soldiers and workers (called "liquidators") sent in by the Soviet government for initial clean-up have had the highest rate of mortality and sickness, with an estimated 10% of the 600,000 deceased and 165,000 disabled, according to Union Chernobyl.

As of 2000, the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) estimated that the number of thyroid cancer cases linked to the Chernobyl disaster has risen to about 1,800. A 2006 Physicians for Prevention of Nuclear Welfare report estimated over 10,000 people were affected with thyroid cancer, with 50,000 case expected, and attributed increases in deformities and newborn mortality rates in Europe to Chernobyl's radioactive discharge. Other studies allege similar links, such as heightened mortality in Sweden. While a 2006 study by the French Institute of Radioprotection and Nuclear Study could not identify a clear link between Chernobyl and cancer rates in France, it acknowledged that reported papillary thyroid cancer had tripled in the years following the event. Most of the long-term expected impacts have not yet occurred, so it is difficult to estimate and will be a challenge to measure the overall impacts.

A 30-kilometer (18.6 mile) exclusion zone was established around the Chernobyl site to prevent people

[62] http://en.wikipedia.org/wiki/Chernobyl_accident from International Atomic Energy Agency Report *In Focus: Chernobyl*.

from entering the most heavily contaminated area, except for scientific study, day tours, and operations of the Chernobyl facility. However, dozens of peasants and others either refused to be evacuated or illegally returned to the zone, for which authorities have now become reconciled after multiple attempts at expulsion. These individuals either deny or are resigned to the health risks and accept that available services are now very limited.

While a tragedy, the Chernobyl accident brought great attention to nuclear plant operations and safety, in particular to those plants within the former Soviet Union. Significant knowledge on the impacts of radioactive fallout on the environment and human populations has been gained, and measures to remediate the impacts are being studied and attempted. And floura and fauna within the exclusion zone has increased in diversity due to the reduction in human activity.

March 11, 2011, Fukushima I Nuclear Power Plant:
More recently, the impacts from the failure of the Fukushima I Nuclear Power Plant in Japan as a result of the March 2011 earthquake and tsunami are still unclear; and the amount of radioactive material released is not yet fully known. The tsunami destroyed emergency generators powering cooling systems leading to three nuclear meltdowns, release of radioactive material, and contamination of ground and sea water. To date, it has been estimated that Japan has spent the equivalent of $15 billion dollars on regional clean up and decontamination. However, the cleanup is ongoing effort; and total costs will not be known until decommissioning. There were no deaths directly attributed to accident. Long-term, the number of cancer deaths from radiation exposure may reach many hundred.

There are opportunities to learn from the impacts of this release which may influence policy in many countries. Of the 104 active nuclear plants in the United States, the federal Nuclear Regulatory Commission ranked Prairie Island 95th in earthquake risk with a 1 in 333,333 chance of experiencing a catastrophic failure due to an earthquake.[63]

Regional and Local Events

As previously noted, closer to home, the Prairie Island Nuclear Generating Plant owned by Xcel Energy, Inc. has had a few "unusual events" and one declared alert, but no releases of radioactive material.

One recent unusual event at Prairie Island occurred in March 2015 when a fire alarm went off inside the containment building and the notification was terminated a few hours later when it was confirmed that no fire existed. A previous unusual event was in March 2012 and was due to a faulty reading. The declared alert occurred in January 2012 when a plant worker reported a break in a pipe to a tank of industrial bleach. This event demonstrated the importance of controlling the public relations message to prevent undue panic or concern since the health and safety of the public was not threatened.

The plant houses two pressurized water reactors totaling 1,100 megawatts of capacity. The units have been in commercial operation since 1973 (Unit 1) and 1974 (Unit 2). In 1996, the Nuclear Energy

[63] MSNBC.com. "What are the odds? US nuke plants ranked by quake risk." 3/16/2011.

Institute (NEI) rated Prairie Island among the best performing U.S. nuclear plant in two of three benchmarking studies. The NRC renewed Prairie Island's operating license for twenty years in 2011.

However, the plant is not without its detractors. The Minnesota Public Interest Research Group and Enformable Nuclear News noted previously on their websites that the Prairie Island facility has had safety violations in the past, problems with flood gates opening, a fire in an electrical box, and experienced monitoring problems during an emergency safety shutdown in 2001.

Hazard Probability – Nuclear Accident

The Plan Steering Committee rated the probability of a nuclear accident at the Prairie Island Nuclear Generating Plant directly impacting St. Croix County as low; this is the same rating as was given to this hazard in the 2018 plan.

The Prairie Island Nuclear Generating Plant has many safeguards and systems to minimize the chances of an accident. A series of barriers and safety systems within the plant keeps radioactivity from normal operations inside. The building that contains radioactive fuel and the reactor has 3-1/2-foot-thick concrete and steel walls and thick concrete and steel flooring which act as a containment barrier and extend well below the ground. The reactor vessel, where fission takes place, is a thick steel cylinder that contains the fuel assemblies. All U.S. nuclear plants are conservatively designed and built with many safety systems and emergency back-ups. Procedures and emergency plans are also in place to minimize the potential impacts and extent of the release in the unlikely scenario an accident occurs.

Nuclear facilities in the United States are highly regulated and secured; and if the Prairie Island Nuclear Plant is well-operated, well-maintained, and well-secured in the future, **a nuclear accident at the Plant that impacts St. Croix County is not expected to occur.**

Vulnerability Assessment – Nuclear Accident

Appendix G provides the following regarding the potential impacts of nuclear accident events for St. Croix 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.

Agriculture and dairy industry in St. Croix County were identified as having the greatest vulnerability in Appendix G.

Projected Loss Estimates

Radiation is a form of energy and its exposure to humans is measured in millirems. On average, the public is exposed to about 360 millirems of radiation each year to a wide variety of natural and manmade sources, such as the natural environment (e.g., radon), cosmic rays, building materials, televisions, and diagnostic X-rays. Government regulations do not allow the public to be exposed to a radiation dose from a nuclear power generating facility of more than 100 millirem per year above natural background levels. For perspective, a single chest x-ray exposes an individual to 4 to 8 millirems. The U.S. Nuclear Regulatory Commission's Nuclear Power and Radiation Workshop Manual gives the expected biological effects from radiation exposure to the whole body within a 24-hour period:

Millirems	Effect
0 to 5,000	No detectable effect
5,000 to 50,000	Slight changes in your blood
50,000 to 100,000	Changes in your blood, nausea, fatigue
100,000 to 200,000	Changes in your blood, nausea, fatigue, vomiting. Up to 1% of the people exposed to this level of radiation may die if they do not receive medical treatment.
450,000 to 700,000	Up to 50% of the people exposed to this level of radiation may die within one month if they do not receive medical treatment.

For comparison, the Fukushima nuclear plant meltdown resulted in radiation levels as high as 400,000 to 500,000 millirems per hour on the grounds of the plant between the two reactors. Remarkably no adverse health effects among Fukushima residents or power station workers have been documented that are directly attributable to radiation exposure from the accident. Fatalities did occur during response and evacuation, with most attributable to related stress or fear. In farmland areas, radiation was strongly absorbed into the soils of the fallout area with the amounts absorbed by crop plants being relatively small. By 2016, all agricultural products were below the thresholds for radiation exposure. Since the plant is located near the ocean, marine life was exposed. As recently as 2022, testing of fish near the accident site continued to show elevated radioactive (Cesium) levels.

In addition to the size and type of release, four factors are very important in determining potential impacts if a release of radioactive material should occur:

- Meteorological Conditions
- Distance
- Shielding
- Time

Meteorological conditions would greatly determine where airborne contamination would settle and the concentration of that contamination. These influencing weather conditions include wind speed, wind direction, humidity/precipitation, and how high the contaminants are dispersed into the atmosphere (e.g., air pressure). It is possible that a sizable release could have no impact on St. Croix County, depending on the wind direction. And it would likely take many hours, if not days, before airborne radiological contaminants would fully settle.

The greater the distance between the source of radiation and a person, the less radiation received. The greater amount of heavy, dense material between the radiation source and a person can also provide protection. Sheltering-in-place or remaining indoors with windows and doors closed can, in some cases, provide an adequate level of protection. And most radioactivity loses its strength and dissipates relatively quickly, especially when diluted with water (e.g., surface waters, rainfall, high humidity). Limiting one's time spent near the radiation source reduces the amount of radiation received. And in the case of an event, temporary, controlled reentry into a restricted area may be allowed to tend to livestock or other operations.

Given the distance of St. Croix County from Prairie Island, direct exposure of County residents to gamma radiation or inhaling radioactive materials from a plume released during an incident is very unlikely. The possible exception would be those County residents who work or travel within the area closer to the Prairie Island facility (e.g., Red Wing, Treasure Island Casino) at the time of a release. Under most circumstances, such direct exposure and impacts would primarily be limited to the area within the 10-mile plume exposure pathway (also called the Emergency Planning Zone).

For the 50-mile Ingestion Pathway Zone (IPZ), which includes St. Croix County, the radioactive contamination of soil thereby entering the food chain through crops or dairy products is the primary concern. The highest risk is contaminated food products (e.g., milk, crops) from the 10-mile EPZ being transported to dairies, processors, or producers within the 50-mile IPZ and mixing with uncontaminated product.

Less likely, but still possible, would be the contamination of soils and vegetation in St. Croix County from airborne contamination if certain weather conditions exist at the time of the release. This contamination would most likely be in low levels, not requiring evacuation or shelter. In some cases, a general health advisory may be issued recommending food preparation practices or other precautionary measures (e.g., carefully washing and peeling fruit before consumption).

But in a more severe and unlikely scenario, the low levels of contamination could be a more significant health concern over time. Evacuation would still not be required, but a **temporary agricultural hold** would be placed on producers in the contaminated area. Raw materials and food products may be withheld and isolated from the marketplace until sampling is completed and the product is determined to be safe for production or marketing. Producers may be required to not move or harvest commodity and specialty products (e.g., soils, grains, honey, berries).

One approach—"the solution to pollution through dilution"—would not be practiced in Wisconsin, especially in regards to dairy. Dairy is the highest priority since radioactive contaminants can quickly move through cattle, children drink a lot of milk, and it can be easily mixed with uncontaminated product. And, if not carefully controlled, the risk of contamination could have long-term disastrous effects on milk marketing throughout the State, soiling the reputation of the "Dairy State." Under a temporary agricultural hold, there could be significant losses for agricultural producers in the area.

Under any circumstances, information suggests that there would be negligible risk to groundwater within the IPZ. Contamination of the surface waters within St. Croix County is also deemed to be a very low risk given expected contamination levels, the potential for dilution, and the southerly flow of

most surface waters. Wildlife could be a concern primarily within the 10-mile EPZ, though animal contamination levels and movements would be closely monitored and appropriate remedies or advisories made. In the unlikely scenario of an accident, it is quite possible that some residents from areas closest to the Prairie Island facility may travel to or through St. Croix County as part of their evacuation. Up to 10,000 Pierce County persons live or work within the 10-mile plume exposure EPZ who may require evacuation if a general emergency occurs. St. Croix County may be asked to help provide assistance to some of these displaced persons.

Other Factors Influencing Future Losses

- Population Growth. As noted previously, St. Croix County continues to grow, which increases the exposure and potential population that could be affected by a nuclear accident. Growth in the southwestern portion of the County (e.g., City of River Falls) will increase the level of exposure for the County.
- Preparedness & Mitigation. Potential losses can be reduced through mitigation actions.
- Public Perceptions & Panic. Misinformation is very possible during such an event, given that the contamination cannot be seen and can exist for an extended period of time. Public panic is very possible and proactive, consistent messaging will be critical. Public perceptions may linger long after the event, impacting public confidence in the safety of visiting or living in St. Croix County or consuming products made in the County. As a positive, the distance from the Prairie Island facility would give the County several hours, or days, to respond to an incident before airborne contaminants would arrive and/or fully settle.

Risks for Individual Plan Participants – Nuclear Accident

The incorporated communities of St. Croix County do not have any unique jurisdictional risks or vulnerabilities in the event of a nuclear accident at the Prairie Island facility. Again, distance from the plant would likely affect exposure, so those communities in the southwestern portion of the County (e.g., City of River Falls) may have the most risk of exposure in the County. There are no nuclear accident concerns or vulnerabilities identified in the city, village, or educational institution sub-plans.

Response Plans and Activities

Different action plans, notifications, and protocols apply depending on the previous classification levels. The greatest concerns are the *site area emergency* and *general emergency*.

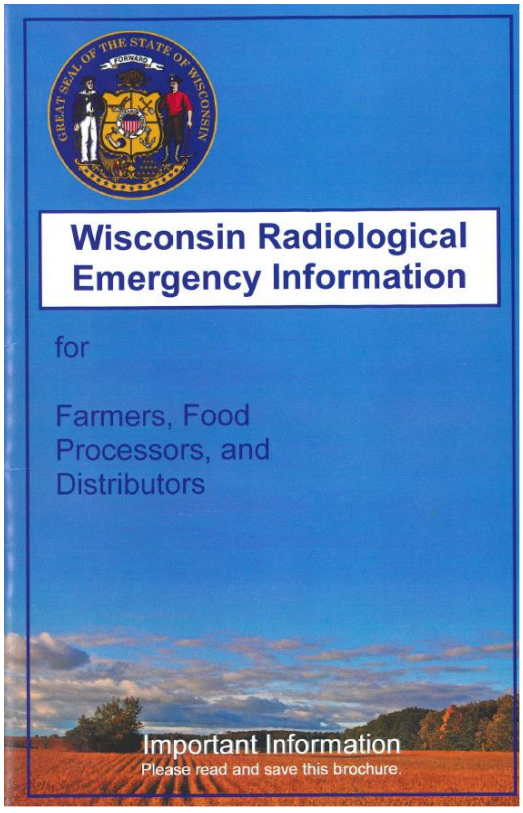
In the event of a **site area emergency**, advisory announcements would be broadcast over local television and EAS radio stations. During a **general emergency**, additional warning systems will be activated in accordance with established procedures, including warning sirens and PA systems in those areas closest to the facility. It is expected that only in the case of a general emergency would there potentially be significant impacts upon St. Croix County residents, with the possible exception of any residents who work at or near the facility, or happen to be traveling near the facility (e.g., Red Wing, MN, Treasure Island Casino).

In accordance with the Federal Radiological Emergency Response Plan, the lead federal agency for most radiological incidents at nuclear generating stations is the Nuclear Regulatory Commission (NRC). The NRC coordinates any federal assets that state and local emergency management agencies request, such as the Federal Radiological Monitoring and Assessment Center (FRMAC). State and local plans would also be activated, such as the policies and procedures defined in the *St. Croix County Emergency Operating Plan—Radiological Annex.*

FRMAC's team would be activated immediately to monitor, model, and assess the plume direction and anticipated contamination areas. Monitors attached to aircraft would provide real-time mapping of the movement of airborne particulates which would be further supplemented by on-the-ground monitoring. Within 10-12 hours, detailed maps of expected contamination areas would be available, allowing further emergency response and action as needed.

In Wisconsin, the Department of Health Services (WI DHS), Radiation Protection Section carries primary responsibility for the safety and health of the populace during radiological incidents. Wisconsin DHS is augmented by specially trained local responders as well as regional hazardous material (Hazmat) teams and military assets when available. Of concern at the state and local level is the range of protective and detection equipment available to first responders. This has led to questions regarding equipment standardization and state and local preparedness.

Throughout this time, local officials will assist State and Federal agencies in disseminating information to the media, public, agricultural community, and food producers/distributors through general media, brochures, and direct contacts for the appropriate actions as warranted by the event. During the initial phases for St. Croix County, these could include general educational efforts, protective actions such as sheltering livestock, and sheltering-in-place. Each dairy and agricultural processor may need to be individually contacted if a temporary agricultural hold is issued. Wisconsin Emergency Management has prepared an excellent brochure covering the risks, protective actions, and post-emergency actions for farmers and the agricultural economy.



After the initial monitoring and a firm model of the extent of the contamination is established, additional information would be issued, such as any needed health advisories, instructions regarding reentry, insurance procedures, and recovery operations (e.g., how to decontaminate animals, food, and property). Monitoring of water, air, soils, wildlife, food products, and residents would continue for a lengthy time throughout the region. Local officials would also be needed to assist in monitoring, given their knowledge of the landscape, and to help in accessing private lands, surface waters, and milk producers for testing.

SECTION IV.
CAPABILITY ASSESSMENT

Overall, FEMA's National Risk Index (NRI) rates St. Croix County's community resilience as having a relatively VERY 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 and Wisconsin (i.e., 85.4 national percentile & 58.3 state percentile) based on 49 socio-economic, environmental, governance, and infrastructure variables.

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 activities indicating whether each activity is being carried out in Barron County; additional notes are provided for each activity, including any opportunities to expand upon or improve local actions. This capability assessment section evaluates St. Croix County as a whole and demonstrates a strong tradition of communication and inter-agency cooperation. Each participating city, village, and educational institution completed an individualized capabilities assessment as part of their respective sub-plans that are provided in Appendices L & M. And many related policies and programs are also discussed previously in Sections III.B. and III.D. in the context of their related hazards.

Community Planning and Regulatory Activities

Mitigation Action	Yes	Some	No	Notes
1. Mitigation planning has previously occurred in the County.	x			• County has previously adopted FEMA-approved mitigation plans in 2007, 2013, and 2018.
2. County and communities have incorporated mitigation strategies into their comprehensive plans.		x		• Varies by community, primarily limited to floodplain management and emergency services. See city/village sub-plans in Appendix L. • County has integrated/referenced the Mitigation Plan and related flood strategies as part of its comprehensive plan.
3. Construction standards mitigate natural and other hazard risks.		x		• 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.
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		• Most of St. Croix County is zoned under County Zoning or by the local municipality. Emergency planning/mitigation can be addressed as part of conditional use permitting to extent allowed by State law. No safe rooms or emergency plans required for manufactured home parks, but some towns have adopted their own standards requiring such. Most campgrounds likely lack such plans. • County subdivision regulations apply to unincorporated towns. Includes road design standards (e.g., if 30+ lots, a second road outlet required). Some towns have their own subdivision ordinances. • See city/village sub-plans in Appendix L. • A formal process for consultation of police/fire during plan review not established in most cases.

Mitigation Action	Yes	Some	No	Notes
5. Land information and GIS data is available to accurately delineate hazard risks.		x		• County GIS and land information coordinated through County Planning & Zoning Department. • Data layers for mitigation planning improved since 2007 mitigation plan. • Countywide GIS data for individual structures (e.g., # stories, value/structure, BFEs) not available for detailed hazard assessment. • Concerns over accuracy of D-FIRMs.
6. Improvements or updates to emergency services mapping were identified during the process.	x			• Ongoing. • Working with FEMA to improve accuracy of D-FIRMs is a priority, now that LIDAR is available.
7. A Comprehensive Land Use Plan has been adopted to maintain healthy County Forest Lands and mitigate wildfire risks.			x	• No County Forest.
8. Driveway regulations or other actions are used to encourage adequate design and maintenance for access by emergency vehicles.		x		• County has basic standards for private roads/driveways if under county zoning, for subdivision or access to County highways. Most C/V/Ts have also adopted standards. • A number of Fire Departments remain concerned 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.
9. 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	• Determined by towns. Movement towards more of the "flag style" signs. • County addressing ordinance has been considered in past, but not adopted. •
10. Community wildlife protection planning or related wildfire mitigation projects have occurred.			x	• No communities of very high wildfire risk. Other than burning permits, no significant wildfire mitigation.

Other community planning and regulatory activities or notes:

- See Appendix L for a summary of city and village mitigation activities.
- Planning and regulatory activities related to flood mitigation discussed in the "flood mitigation" table below.
- Building codes are enforced at the city/village/town level. 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. Further, 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 also in place regarding hazardous materials planning, use, and reporting. Additional rules, policies, and plans are in place regarding surface and groundwater quality, manure management, and the landspreading of waste.

Flood Mitigation				
Mitigation Action	**Yes**	**Some**	**No**	**Notes**
1. Floodplain ordinances have been adopted and communities are NFIP participants in good standing.	x			• Ordinances consistent with State model have been adopted. County floodplain ordinance applies to all unincorporated towns and was updated in May 2022. • No NFIP-sanctioned municipalities in St. Croix County. See flood assessment in Section III.
2. Development is strongly discouraged in 100-year floodplains and dam shadows.	x			• County Comp Plan states, "The county will restrict all development or re-development within the 100-year floodplain and identified dam breach inundation areas." • All permit applications reviewed to determine whether proposed building sites are reasonably safe from flooding.
3. Stormwater management planning and regulation occurs.	x			• 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 L for city and village discussion.
4. Stormwater system improvements have been completed.	x			• Significant improvements made by County and local communities since August 2010 flooding, especially to culverts and drainage systems along county highways and local roads. Many of the flooding "hotspots" identified in previous mitigation plans have been addressed as discussed in the flooding assessment of Section III. • See Appendix L for city and village discussion.
5. Flood acquisition, floodproofing, and/or flood elevation projects have been implemented.	x			• Deer Park has received FEMA grant dollars for acquisition of a home. • Large areas with wetlands and/or high groundwater have been acquired by WDNR and U.S. Fish & Wildlife Service that contribute to important flood storage. • Many local parks are located in floodplain areas. • WDNR & National Park Service land acquisitions along the St. Croix River and mouth of the Willow River have resulted in significant, long-term protection of floodplain.
6. Dams offer flood control, dam shadows are mapper, and dams are in good repair.		x		• While existing dams offer some flood control, some larger dams are managed primarily for power generation. • The Eau Galle Dam at Lake George and County-owned Glenwood Hills dams have greatly mitigated past flooding problems in downstream communities (e.g., Spring Valley, Glenwood City, Downing, Boyceville). • No dam condition concerns noted.
7. Flood monitoring systems are used.		x		• National Weather Service observes, predicts, and provides warnings. • Added monitoring for St. Croix River under consideration.
8. Flood emergency planning has occurred.		x		• Emergency action plans for large and high-risk dams on file at the County Emergency Support Services Department and Emergency Communications Center. • Emergency plans for County dams reviewed annually, 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 RAVE system. • Limited number of sandbags available at County and in some communities.
9. Public education regarding flood risks and insurance has occurred.		x		• Largely limited to plan review and permitting processes for new development.
10. Communities participate in the NFIP Community Rating System.			x	• Due to low number of floodplain structures, costs outweigh benefits for most communities.
11. Other special flood prevention or mitigation activities occur.		x		• Lower St. Croix National Scenic Riverway has additional rules and easements in place that offer floodplain protection.
Other flood mitigation activities or notes: • See Appendix L for a summary of city and village mitigation activities related to flooding. • See flood risk and vulnerability assessment in Section III. • County Code Administrator designated as NFIP Coordinator for St. Croix County. • The St. Croix County Land & Water Resource Management Plan includes objectives, recommendations, and significant discussion on flood storage, limiting flood peaks, and managing stormwater runoff.				

Other Physical Mitigation Activities

Mitigation Action	Yes	Some	No	Notes
1. Community safe rooms have been designated or constructed.		x		• See Appendix H for city and village discussion. • No community safe rooms have been designated at the County-level, at the County Fairgrounds, or at Glenwood Hills Park campgrounds. FEMA grant funding was secured for a safe room at the Fairgrounds, but the project was not feasible due to unforeseen, escalating construction costs. • Growing interest and demand since 2018 Plan. See city/village sub-plans in Appendix L.
2. Power lines have been buried in some areas prone to outages.		x		• Some. See long-term power outage assessment in Section III.
3. Regular tree trimming near power lines occurs.	x			• Xcel Energy 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		• Some snow fencing and "berming" of snow used by County Highway Department. Hill cuts not cost-feasible. • Low farmer participation in the WDOT program to leave rows of standing corn along drift-prone highways; promote more. • Opportunity to exploring live plantings.
5. Special traffic calming, traffic controls, and/or notifications system have been installed on highways.	x			• On-ramp gates and some remote monitoring cameras have been installed on I-94. Additional digital signage added. However, use of gates strongly discouraged by State.
6. Emergency power generators have been obtained for critical facilities.		x		• Significantly improved since 2018 Plan, but substantial needs still exist. See sub-plans and long-term power outage section for details. • No formal inventory of generator needs for key community lifeline facilities. • New Highway Dept offices will have generator and serves as County's back-up EOC.

7. Emergency fuel agreements have been executed for critical facilities.		x		• Very limited and no formal inventory. See long-term power outage assessment in Section III.
8. Convenient access to water supplies is available for fire protection.	x			• See Appendix L for city and village discussion. Good water capacity overall. • Dry hydrant(s) at Twin Lakes may be beneficial, but no other needs identified.
9. Warming or cooling shelters have been designated.		x		• In July 2011, 21 cooling shelters were designated in the County and are occasionally activated. Not common knowledge. Many/most do not have generators and many have limited hours. • No official warming shelters designated. • Increasing interest in identifying since 2018 Plan.

Other physical mitigation projects or notes:

- See Appendix L for a summary of city and village mitigation activities related to the above.
- County Community Development Department manages the County's Clean Sweep Program, which collects and disposes of hazardous waste. Due to budget cuts at the State level, residential and business collections had been scaled back to once a year, but was expanded in 2017. Pharmaceutical and agricultural clean sweeps also occur annually. High participation rates, but vendor costs have risen about four-fold since 2019.
- Significant security hardening has been completed at the County Government Center and other County offices. Some schools and other critical facilities have taken similar measures since the last plan. See Active Threats subsection.
- County Highway Department performs winter road maintenance for 16 towns.

Emergency Operations Planning and Training

Mitigation Action	Yes	Some	No	Notes
1. The County has an Emergency Operations Plan (EOP) with annexes for various hazard events.	x			• Continuing to update EOP and add annexes. • Continuing collaboration between EOP and PHEPP. • County facility policies for active shooter and severe weather also recently updated. Tornado drills 1x/year and fire drills 2x/year.
2. The cities, villages, and towns have updated EOPs or emergency policies.		x		• Varies. Most have plans, but some require updating. Significant improvements since initial mitigation plan in 2008. • See Appendix L for city and village discussion.
3. The County and municipal EOPs are regularly exercised.		x		• Regular training organized by County Emergency Management, but not all municipalities regularly test their emergency plans; many have some type of drills. • County facilities have tornado drills 1x/year and fire drills 2x/year. • See Appendix L for city and village discussion.
4. The County EOC has been activated or exercised in the last 5 years.	x			• Activated for January 2018 Super Bowl. • Prairie Island Nuclear Generating Station functional exercises in past included EOC activation for an EPRCA event and agricultural quarantine.

Mitigation Action	Yes	Some	No	Notes
5. HazMat planning and training occurs and gear is available.	x	x		• County emergency response protocols in place. Regular training organized by County Emergency Management. WEM survey recently completed assessing capability, gear, etc. • More exercises regarding I-94 and rail haz mat spills frequently mentioned as a need during interviews with cities and villages. • See hazardous materials assessment in Section III. Incorporates County groundwater and surface water study.
6. Individuals identified in EOPs, including elected officials, have a minimal level of ICS training suggested for their roles.		x		• No local official minimum NIMS/ICS standards for non-emergency services set. Additional training required or suggested depending on role. Federal minimum standard is ICS 100, 200, 700, & 800 for all response and support personnel. • Varies. Most emergency personnel and responders and many public works staff meet minimum standard. • More training for elected officials and P.I.O./crisis communications suggested.
7. Other stakeholder groups participate in exercises.	x			• Increasing participation by other partners so they understand their potential roles during a disaster, so they may strengthen their own plans, was a concern expressed in the 2013 mitigation plan • Regular participants include other County departments, public works/highway, VOADs, critical infrastructure, and some private-sector businesses depending on the exercise scenario. • Related preparedness recommendations in Section VI.D.
8. The County and some municipalities have developed continuity of government plans.		x		• County has adopted a basic continuity of government plan. • Most municipalities do not have a COOP/COG plan, but most have off-site data back-up and some have other continuity components.
9. Evacuation and access control planning has occurred.	x			• Annex E of County Emergency Operations Plan. • State of Wisconsin (WEM) has been piloting a private-sector credentialing program.
10. Debris management sites have been designated.		x		• Largely limited to woody debris. Uncertain otherwise. Municipalities encouraged to consider as part of mitigation interviews. Sites may be available for vegetation, but have not been assessed for other debris. • No county-level debris or compost site. • WDNR may be able to provide guidance on appropriate siting to avoid potential environmental concerns.
11. Emergency planning and periodic exercises are required for large festivals, fairs, and gatherings.		x		• County Fairgrounds and the Somerset concert facility have emergency plans, but lack safe rooms. Somerset events and some others prepare emergency plans that are shared with County law enforcement. • No County-level mass gathering ordinance. • County's involvement primarily limited to Fairgrounds planning input and zoning/land use permitting in towns. • Related TTX planned for Spring 2024.
12. Planning for pandemics has occurred.	x			• Part of the Public Health Emergency Preparedness Plan. See Section III.B.i. for discussion.

13. Highway and public works department have adopted billing rates for equipment.		x		• 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.
14. Policies and training has been completed for volunteer management.		x		• Volunteer Reception Plan (part of PHEPP) and related training completed through Public Health. • Medical Reserve Corps (MRC) established and active. • Annex for County EOP. • IS-244a EMI course available for additional training. • WDNR's Incident Management Team can also be utilized if needed.
15. Policies and training has been completed for active threats and workplace violence.	x			• County has participated in ALICE train-the-trainer exercises, and have provided this training to most County employees. • Majority of school districts have completed ALICE or similar training. • Training and response for general threats.
16. School Districts and post-secondary institutions have completed active threats training and have taken actions to mitigate risks.	x			• Well addressed. Most or all districts have worked with local law enforcement to conduct exercises and drills. See discussion in Active Threat section and Appendix M. • Tactical EMS (ECHO3) training continuing in County for victim evacuation and curbside treatment.

Other emergency operations planning and training activities and notes:

- See Appendix L for a discussion of city and village emergency planning and training.
- Emergency management and hazard mitigation planning is often a low priority for 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. Education and outreach to cities, villages, and towns on emergency management issues is an ongoing effort.
- Similarly, the turnover in elected officials necessitates continued, periodic outreach to local officials on resources, public safety agencies, mitigation issues, and recent events. There were very large improvements in updating and maintaining city, village, and town emergency operations plans (EOPs) since the 2008 mitigation plan. One innovative example comes from the Town of Warren where each Town Board member has an IPod with a copy of the Towns EOP and emergency contacts. The communities, local emergency services, and County emergency management personnel should be commended for their emergency planning efforts.
- County participates in Federally required training for Prairie Island Nuclear Generating Facility every eight years.
- Concerns with safety/access at Carmichael/I-94 intersection, which has traffic volume well exceeding its design capacity. Some initial planning underway to expand I-94 to 6 lanes.
- New Stillwater Bridge has increased truck traffic on some side roads.
- See cyber-security assessment in Section III for a discussion on related mitigation.
- Law enforcement has key fob access for many schools and critical facilities.

Emergency Notification and Communication Systems

Mitigation Action	Yes	Some	No	Notes
1. Emergency communications in the County is centralized.	x			• St. Croix County Emergency Communications Center has county-wide dispatch for emergency services and has an enhanced 9-1-1 system. • MABAS and IAmResponding in place, though not all depts have resources to respond via MABAS, so need mutual aid. • Communication maintained with Washington County, MN to the west.

Mitigation Action	Yes	Some	No	Notes
2. Gaps or weaknesses in emergency communications and equipment have been addressed.	x			• Much improved compared to when narrowbanding was originally implemented, though some gaps in service exist, especially for cell phones in the Glenwood Hills area. Many public works departments rely on cell phones, but inconsistent in approach. Equipment being installed to improve communication with State Patrol. • During the 2013 plan, one interviewee asked, "are we prepared for the impacts if numerous cell and radio communications towers go down during an event?"
3. Outdoor storm sirens are used for notification of severe weather warnings. Any coverage, power, procedural, or educational concerns?	x			• See tornado assessment in Section III. • Some of public do not understand warning sirens, warning systems, or expect that the sirens will be heard indoors. • Good information at County website.
4. NOAA All Hazard Radios or other notification equipment have been distributed.	x			• Distributed to interested mobile home parks and at County Fair in past. • Limited interest in NOAA radio distribution project; mobile phones are be reducing this need.
5. A reverse-911 or similar GIS-based notification system exists.	x			• St. Croix County has a RAVE-based mass notification or autodialer system (SCC-Alert) with GIS-based notifications. Increasing awareness of this system was identified as a high priority during community meetings during the plan update.
6. County has Integrated Public Alert & Warning System (IPAWS) authority and capability.	x			• 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			• Helpful preparedness information available at the County Emergency Management and Public Health webpages • County is using Facebook and Twitter for more timely announcements.
8. An active ARES/RACES group exists in the County.	x			• Formal role in emergency communications procedures and EOC in the County. • Over 95% of the group is NIMS certified. • MOU between the group and 2 area hospitals for emergency communications if needed.
9. The County has an active Skywarn Storm Spotters program.	x			• Coordinated by County Emergency Support Services Department with assistance from National Weather Service & County ARES/RACES.
10. Railroad bridges, crossings, and sign posts have been mapped.		x		• 9-1-1 Center has CAD-based identification numbers of at-grade road crossings.

Other Educational, Outreach, and Preparedness Activities

Mitigation Action	Yes	Some	No	Notes
1. Public education occurs are part of severe weather awareness week and during other seasons.	x			• Largest outreach via press, social media, and community organizations during Tornado & Severe Weather Awareness Week in April. • Additional press releases during times of elevated risk.

Mitigation Action	Yes	Some	No	Notes
2. Outreach to seniors and special needs populations occurs.	x			• County ADRC works with County Emgy Mgmt to on preparedness-related outreach through the 1,500+ ADRC newsletters distributed monthly. • When clients join ADRC Nutrition Program, assessment of special needs completed that can be valuable for follow-up during a disaster event. • ADRC's 9 meal sites and over 31,000 home-delivered meals in 2023 are an excellent forum for outreach and communications. Meal sites can be a valuable resource during event recovery.
3. Outreach and education to area businesses occurs.		x		• Involve some industry and critical facilities in exercises, depending on the scenario.
4. Outreach to the agricultural community occurs.	x			• Local UW-Extension staff, Farm Services Agency, NRCS, and County Community Development 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 insurance information in other notes below.
5. Staff from FSA, NRCS, County Land Conservation, and UW-Extension meet periodically to discuss mitigation opportunities, education needs, and damage assessment procedures.		x		• No formal group or regular meetings in place. FSA typically takes the primary lead with support from NRCS and UW-Extension Ag Agent when need arises. • Support from FSA and NRCS available to County during times of disaster. Some participation in County-coordinated exercises and FSA staff have NIMS/ICS training.
6. Soil health and shoreland best practices are promoted in the County to help mitigate flooding impacts.	x			• 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	• Limited. Some basic wildfire prevention PSAs, etc. Forest owners may participate in WDNR or UW-Extension events.

Other educational, outreach and preparedness activities and notes:

- 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 access to commercial kitchens, 9 meal sites, ADA-equipped vehicles, paid drivers, 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.

Mutual Aid and Other Partnerships

Mitigation Action	Yes	Some	No	Notes
1. Mutual aid between local law enforcement agencies exists and meet regularly.	x			• 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			• Countywide MABAS adopted and regular meetings take place.
3. Mutual aid between local public works & highway departments exist and meet regularly.		x		• Countywide public work mutual aid agreement for equipment and personnel has been executed, though not widely known and should be revisited. • See Appendix L for city and village discussion.
4. Public health partnerships exist.	x			• County and local medical facilities participate in the Northwest Wisconsin Healthcare Emergency Readiness Consortium.
5. Public-private partnering occurs.		x		• No formal private-public partnership group exists. • Some businesses are represented on LEPC and participate in exercises.
6. Intergovernmental preparedness and mitigation planning occurs across county lines.	x			• Good intergovernmental relationships across county lines. • Regional WEM Office provides multi-county support and participates on LEPC. • Mitigation planning and other support also available through West Central Wisconsin Regional Planning Commission.
7. VOADS are active in the community and participate in preparedness planning and training.	x			• Very good relationships with local VOADs, including American Red Cross and Salvation Army, which participate on the County LEPC. Critical volunteer base if needed. • Red Cross coordinates recovery shelters.
8. Support is provided for area educational institutions for preparedness planning and training.	x			• WITC provides required training for emergency responders. • County Emergency Management and local law enforcement has partnered for active threat exercises and planning, which are continuing. The County has a trained EMS team for such events. • See school and technical college sub-plans in Appendix M.

Other mutual aid and partnership activities and notes:

- St. Croix County Interfaith Caregivers are a value resource for supporting seniors and adults with disabilities.
- Sheriff's Department has a mounted posse team if needed. County also has access to Team Rubicon and some larger businesses also have support teams (e.g., Walmart, Target).
- Housing authorities, community action programs, and long-term care facilities are other important partners.
- Federal CMS rules require additional emergency preparedness for health care providers receiving Medicare and Medicaid. Smaller providers (e.g., assisted living, long-term care) have reached out to County Emergency Management or County Public Health for planning assistance. Since the 2018 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.
- The 2013 mitigation plan noted a need for additional planning and exercises related to volunteer management.
- 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.

As part of the 2018 Mitigation Plan, an Emergency Power Generation Survey of some community lifeline facilities was conducted. The survey results offer the following key insights:

- 73% agreed or strongly agreed that more planning, training, and/or other preparedness is needed for natural disasters.
- 81% agreed or strongly agreed that more planning, training, and/or other preparedness is needed for non-natural disasters.
- 77% agreed or strongly agreed that they have an emergency communications plan for contacting employees and clients if their main place of business or power is not available.
- 46% agreed or strongly agreed that they have a business continuity of operations plan or resiliency plan with strategies to recover and/or maintain critical businesses functions following a disaster event. 12% did not know.
- 54% agreed or strongly agreed that they have an emergency plan with procedures for sheltering in-place if needed as well as a recovery location. 19% did not know.
- 88% agreed or strongly agreed that they have a data security, back-up, and recovery strategy for critical paper and digital records. 4% did not know.
- 58% agreed or strongly agreed that they have one or more individuals delegated and trained to handle information, media, and social media during an emergency on their organization's behalf. 8% did not know.
- Only 23% agreed or strongly agreed that they regularly practice or drill their emergency response and recovery plans.
- 58% agreed or strongly agreed that their employees are familiar with their roles and responsibilities during an emergency.
- 46% agreed or strongly agreed that their organization strongly advocated for employee preparedness at home. 12% did not know.

While this survey was not updated as part of the 2024 Plan, some communities reported significant improvements in emergency power generator capabilities since 2018. Updating this survey as part of the next mitigation plan update should be considered.

SECTION V.
PROGRESS ON THE 2018 MITIGATION PLAN STRATEGIES

Table 26 below reviews the progress on each mitigation strategy recommendation from the 2018 *St. Croix County All Hazard Mitigation Plan*. For the 2018 strategies that are primarily preparedness-related (non-mitigation), only the high priority strategies are included in Table 26.

As discussed in the 2018 Plan, the availability of resources and changing priorities affect implementation. For instance, some strategies were contingent on grant funding. The 2018 strategy list was comprehensive, and there was not an expectation that all strategies would be fully addressed within five years' time.

Table 26 also includes a recommendation on how each strategy may be addressed in this Plan update based on the input of the responsible parties identified in the 2018 Plan and the Steering Committee. Later in this report, the recommendations in Table 26 are further considered and analyzed for feasibility by the Steering Committee.

Table 26. Progress on 2018 Plan Strategies

2018 Plan Strategy	Progress	Recommendation for Plan Update
Flood-Related Strategies		
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. **(High Priority)** ***related to continued NFIP compliance***	Ongoing progress, mostly at a smaller scale or as part of road reconstruction projects (e.g., replacement of culverts, installation of management systems.). Greater attention to stormwater planning and management is occurring in larger, more developed communities.	Keep. Emphasize nature-based solutions.
2. 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. ***related to continued NFIP compliance***	No substantial flood mitigation projects since 2018 Plan identified.	Keep. Emphasize nature-based solutions.
3. Complete a study identifying the causes of flooding at Twin Lakes and potential alternatives to solve or mitigate. Once the study is completed, consider mitigation grant funding to assist with eligible project costs. ***related to continued NFIP compliance***	An initial engineering study was completed in 2020, but additional assessment of solutions recommended.	Build upon the 2020 study. Continues to be a source of concern.

2018 Plan Strategy	Progress	Recommendation for Plan Update
4. Pursue opportunities to improve the accuracy of floodplain maps (D-FIRMs) now that LIDAR data is available. ***related to continued NFIP compliance***	D-FIRM accuracy continues to be "terrible" and undermines planning, enforcement, and public trust.	Keep. Explore LiDAR LOMA as interim solution.
5. Continue to maintain dams and dam emergency operating plans. Discourage development in the hydraulic shadows (dam failure floodplains) of dams. Encourage residents and businesses within or near dam shadows to sign-up for SCC-Alert emergency notification system. Consider adding dam shadows to RAVE system.	Ongoing practice and development discouraged through County floodplain ordinance. No formal initiative targeting RAVE sign-up.	Keep in plan. Push RAVE countywide.
6. Continue to enforce County and local floodplain regulations to: discourage future floodplain development and the storage of hazardous materials in floodplains; require dry land access for new structures; limit development in dam shadows; and maintain natural flood storage areas. ***related to continued NFIP compliance***	Ongoing practice and development discouraged through County floodplain ordinance. Dry land access required if floodplain.	Keep in plan as a general policy.
7. Continue to educate the public and elected officials of flood risks, flood insurance, and alternatives to mitigate stormwater runoff (e.g., soil health, erosion controls, rain gardens, low-impact development). Especially target those municipalities with the greatest assessed improvements in or near floodplain areas. ***related to continued NFIP compliance***	No formal initiative or targeted effort. Generally completed as part of code enforcement activities.	Keep in plan.
8. Stress the importance of culvert maintenance and sizing to municipalities. Encourage municipalities to work cooperatively to consider impacts downstream when making stormwater system improvements (e.g., resizing culverts, new drainageways).	No formal initiative or targeted effort.	Consider including in plan update. Encourage watershed-level approaches.
Severe Weather Strategies		
1. Based on landowner and/or community interest, pursue grant funding to make cost-sharing available for the installation of safe rooms (storm shelters) at mobile home parks, campgrounds, RV parks, recreational properties, slab-on-grade residential developments, and other areas and communities where no existing shelter alternatives exist. **(High Priority)**	No new safe room projects completed since 2018 plan.	A high priority. Keep. Explore opportunities to mitigate multiple hazards and integrate nature-based solutions.
2. Explore the construction of a community safe room(s) at the St. Croix County Fairgrounds. **(High Priority)**	Grant dollars were secured, but escalating costs in interim made project unfeasible.	Keep in plan, but will need to reassess local cost share sources.
3. Adopt County ordinance language which requires new or expanding campgrounds, RV parks, and resorts to construct or identify, per formal agreement, a community safe room (storm shelter) for visitors. Provide model language to cities and villages for consideration.	No action.	Keep in plan. Potentially expand or other alternatives focused on emergency notification systems & gatherings.

4. Implement an educational initiative targeting campgrounds, resorts, mobile home parks, realtors, builders, and the general public with informational materials to promote safe rooms, emergency planning, use of notification systems, etc. If grant funding is available, consider distribution of weather radios and/or construction of a small, model safe room for educational purposes.	No specific, targeted outreach effort undertaken.	Discuss alternatives with Steering Committee. Could be included as part of other general outreach.
2018 Plan Strategy	**Progress**	**Recommendation for Plan Update**
Long-Term Power Outage Strategies		
1. If funding opportunities become available, work with communities to pursue grant dollars for emergency power generators for critical facilities and emergency operations centers in St. Croix County.	Improvement in generator availability, but largely self-funded; no grant projects.	Keep in plan. Remains a priority.
2. 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 or for service to critical facilities. For areas prone to flooding, transformers or other such power infrastructure may require floodproofing, elevating, relocation, or other flood mitigation.	Some burying occurring as part of new construction or road reconstruction, but no large-scale projects since 2018 Plan noted.	Effective mitigation tool. Keep in plan, but may remove flood-related aspects.
3. Encourage households with persons having special needs who 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 SCC-Alert and to notify their electric provider.	General outreach through ADRC, Public Health, Emergency Services, and electric suppliers.	Keep in plan as a preparedness action.
Hazardous Materials Strategies		
1. Implement the core recommendations of the *Report for the Protection of Surface & Groundwater Quality in St. Croix County*, including baseline groundwater testing, mapping of areas of high vulnerability, and developing urgent response protocols for pollution events.	County is continuing related actions.	Reference the report as part of plan coordination, but does not require a related mitigation strategy.
2. Update the 2011 Commodity Flow Study to provide a better understanding of the types of hazardous materials being transported by highway and rail in St. Croix County.	Currently being updated. Includes capacity & response readiness among fire depts.	Reference/keep in plan.
Active Shooter Strategies		
1. Conduct periodic active shooter exercises at school, government buildings, large businesses, houses of worship, and other critical facilities to test response plans and assess security hardening. Include all response agencies (law enforcement, fire, EMS, other) as part of these exercises so that roles and responsibilities are understood. **(High Priority)**	Continuing.	Keep in plan, but scale back. County can provide "train the trainer"-type support to local law enforcement.. Integrated into school sub-plans in Appendix M.

2. For large businesses and critical facilities with significant numbers of employees and clients, encourage the numbering of interior and exterior doors (and windows if appropriate) and provide copies of floor plans with door numbers to local emergency responders and County Emergency Communications.	Cameras added for some. Some plans shared with local responders. Limited engagement based on business or lifeline interest. Most progress among assisted living & nursing homes, hospitals, schools, & UW-River Falls.	Keep in plan as part of broader training efforts. Explore opportunities
2018 Plan Strategy	**Progress**	**Recommendation for Plan Update**
Other All Hazards Mitigation Strategies		
1. County Emergency Management should continue to maintain an up-to-date list of the status of local Emergency Operations Plans (EOPs) and work with local communities to practice/drill and update these plans regularly. Municipalities are encouraged to incorporate continuity planning, data backup, debris management, and mutual aid into their plans and to notify the County when plan changes or updates are completed. **(High Priority)**	Continuing	Keep in plan as part of a preparedness action.
2. Continue the development of geographic informational systems (GIS) data for hazard mitigation and emergency management purposes. Continue to explore Reverse-911 capabilities.	Continuing	Ongoing recommendation. Emphasize GIS role in response & recovery.
3. Encourage the County and municipalities to integrate hazard mitigation issues and strategies into their comprehensive plan updates.	County has strong integration with updated comp plan. Less integration at city/village/town levels.	Keep in plan and community sub-plans.
4. Encourage St. Croix County residents, businesses, and organizations to enroll their land-line and cell phone numbers for the County's SCC-Alert mass notification system. Educate residents and critical facilities on the capabilities of SCC-Alert, such as severe weather, hazardous spill locations, missing persons, evacuations, road closures, etc. **(High Priority)**	Ongoing. Identified as a priority during community meetings.	Keep in plan.
5. Once every two years, or more frequently as needed, St. Croix County Emergency Services will continue to provide presentation(s) to the Towns Association on basic roles/responsibilities of town officials, emergency operations planning, available resources, hazard event reporting, emerging issues, and training opportunities. **(High Priority)**	Continuing	Propose as a preparedness action.

SECTION VI.
MITIGATION GOALS AND STRATEGIES

St. Croix 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 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 apply to all hazards. The goals are intended to provide direction to achieve the desired outcome and are to be used as guidelines by which mitigation activities are identified and impact is evaluated. The goals provide St. Croix 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 Steering Committee reviewed, updated, and amended the *20l8 Pan* goals:

Goal One: Physical Development and Infrastructure

Build and maintain a strong, resilient infrastructure and limit damage to homes, structures, community lifelines, and other improvements from the impacts of hazard events when cost-effective opportunities exist.

Goal Two: Planning and Policy

Use empirical analysis to anticipate changing hazard threats and to develop plans and policies that are implemented and enforced in an effective and uniform manner to mitigate hazard vulnerabilities.

Goal Three: Communication and Coordination

Provide an effective hazard warning system and maximize available resources for emergency planning, response, and recovery, by strengthening intergovernmental coordination and private-public partnership.

Goal Four: Education and Training

Provide opportunities for the citizenry, private sector, local officials, and emergency personnel of St. Croix County to be aware of local hazard risks and vulnerabilities, along with current emergency plans, warning systems, and mitigation strategies to help make our communities safer and more resilient.

When updating the goals, the Steering Committee made a conscious decision that the goals should be broad and comprehensive. The Committee did discuss related aspects of these goals, such as:

- Goal 1 encompasses not only the built environment (e.g., roads, dams, stormwater management systems, homes, businesses) but the broader infrastructure that is critical to the

County and its communities (e.g., emergency services, educational institutions). This goal does not limit or prioritize a specific approach, recognizing that the most feasible solution may vary by characteristics specific to the location or community.

- Goal 2 is a recognition that hazard risks, probabilities, and vulnerabilities are always changing and for many different reasons ranging from climate change to new development to new threats. The Committee expressed concerns over increasing extreme weather events. The Committee also placed particular emphasis on community lifeline facilities and changing demographics, including an increasing ESL/immigrant population and an aging population. It was also noted that potential solutions and partnerships are also changing.
- Compared to the 2018 Plan, the Committee desired to emphasize the importance of private-public collaboration as critical to community resiliency as part of Goal 3.
- Goal 4 reflects an increased desire for more public awareness emergency warning systems, including emergency sirens and RAVE (a/k/a SCC-Alert).

B. EVALUATING MITIGATION ALTERNATIVES

i. Evaluating & Prioritizing the Mitigation Alternatives

The Plan Update Steering Committee felt that three criteria were most important when evaluating mitigation alternatives:

- **Financial cost** to St. Croix County and the local communities. Can we afford it and do the benefits outweigh the cost?
- What is the **vulnerability** of the hazard threat? Most importantly, what is the likelihood and potential for casualties and **loss of life**?
- What is the **availability of staff resources and/or partners** to implement the mitigation action? And related, what are the "opportunity costs" if staff or partner resources are redirected to mitigation efforts from other priority projects?

The Committee identified the following <u>additional</u> criteria for consideration when evaluating and prioritizing mitigation alternatives:

<u>Relative Need Criteria</u>

- mitigates an imminent or high-probability threat
- protects life, community lifelines, or critical infrastructure
- benefits a vulnerable or underserved population
- enhances mitigation capacity, continuity of critical functions, or community resiliency

<u>Feasibility Criteria</u>

- technical, engineering, and environmental feasibility and capacity
- social, legal, and political feasibility (community acceptance, local support)
- provides a long-term reduction in impacts; not a short-term solution
- lack of another effective mitigation alternative

Benefits vs. Costs Criteria

- financial costs for implementation, maintenance, etc.
- financial benefits – potential for loss prevention or reduction
- financial benefits – provides multiple benefits or other cost savings
- enhances a larger mitigation project
- mitigates multiple risks or vulnerabilities
- incorporates nature-based solutions/enhances natural systems
- unique costs & benefits (e.g., displaces a current use, loss/enhanced function)
- 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:

Note:

The priorities for the strategies herein were made in the context of this plan and the hazard threats facing St. Croix County.

A low priority should not necessarily be interpreted as having a lesser importance to St. Croix 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.

#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 2018 Mitigation Plan. The alternatives in FEMA's *Mitigation Ideas* resource guide from January 2013 were also considered.

#2 From this comprehensive list, a range of specific mitigation actions to address the current and future hazard vulnerabilities (Section III.D.) or to strengthen mitigation capacity (Section IV) were discussed and identified during the key stakeholder interviews, meetings, and surveys as part of 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 as a "homework assignment" using the previous criteria in Section VI.B.i. More specifically, each Committee member was asked:

- 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.

The results of this evaluation are incorporated into the strategy recommendations in Section VI.C., including their top priorities, timelines, and analysis.

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 by Steering Committee members, County staff, stakeholders, and general public.

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.

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:

Priority	The priorities were determined by the Plan Update Steering Committee during their review of the mitigation alternatives. These priorities provide focus and are suggested to assist with plan implementation and monitoring. Also see related discussion in Section VI.F.
Timeframe	Based on the priorities, meetings, and stakeholder interviews, a timeframe was assigned for each strategy using the following categories: **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* 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.

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. **It must be remembered that this is a St. Croix County plan, not a plan for the St. Croix County government.** While County government may take a lead role in implementation of many of the county-level strategies, this is not always the case. Collaboration and partnerships are essential to a safe, resilient community.

Severe Weather & Extreme Temperature Mitigation Strategies – Project Actions

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 actions mitigate the impacts of multiple hazards.

2024 Plan Strategy Recommendation	Priority	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 where landowners are strongly interested and supportive of such projects.	Medium Timeline varies by community	Landowner Communities and county may need to raise awareness of grant options. A partnership with a mitigation plan participant (eligible grant applicant) may be required in some cases.	FEMA BRIC or HMGP grant funding with local cost share by municipality and/or landowner	• $$-$$$ • Increasing interest in safe room projects, including at parks. • A safe room meeting FEMA standards provides near-absolute protection for occupants. • WCWRPC can provide direction & grant support with WEM assistance. • Emergency power generator may be FEMA mitigation grant eligible as part of a safe room project. • If a community safe room will also serve as a heating/cooling shelter, HVAC and generator costs may be FEMA mitigation grant eligible. • Pepper Festival desires to incorporate a community safe room & heating/cooling shelter into a new community center in North Hudson. • May also target Glen Hills Campground (new welcome center?) and County Fairgrounds.
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.	Medium Timeline varies by community			
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 St. Croix County.	Medium	Facility or shelter operator	Limited grant opportunities, unless part of a larger or multi-use facility.	• $$ • While generator availability continues to improve, it continues to be a significant need. • USDA Rural Development may fund generators in rare cases. • WI PSC Refueling Readiness Grant Program for wiring of fueling stations.
4. Continue to work with local power providers to bury overhead electrical lines in areas prone to outages due to falling trees/limbs or high winds, when cost feasible. Pursue mitigation grant funding when needed and available.	Medium-to-High Determined by electric provider	Electric Provider	Electric Provider typically covers cost, though may be FEMA BRIC/HMGP grant eligible	• $$-$$$ • 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. • St. Croix Electric Coop identified potential priority areas. • Priorities can change based on work plans, growth, road construction, etc.

5. Conduct a NOAA All Hazards/Weather Radio distribution project. Make radios available at County/municipal campgrounds for use by visitors, perhaps under a short-term "rental/deposit" basis. Consider working with communities, ADRC, and other partners to also distribute to seniors and mobile home park residents.	Medium -to-High	County Emergency Services	FEMA Hazard Mitigation Program Grant 5% initiative	• $ • Some communities have expressed interest in such a project; could be a multi-jurisdictional initiative. • The programming of the radios could potentially be a local in-kind contribution towards the grant. • It would be beneficial if this strategy is part of a broader public awareness initiative on mitigation and preparedness, including past events, warning systems, RAVE, and flood insurance. • St. Croix Electric Cooperative expressed interest in potentially partnering on such a project.

Severe Weather & Extreme Temperature Mitigation Strategies – Planning, Policy, & Outreach Actions

2024 Plan Strategy Recommendation	Priority	Lead Party(s)	Funding	Analysis
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.	Medium	County Community Development & County Board	Existing County operational budget	• $ • Could potentially be handled as part of a conditional use requirement in zoned communities. • May also explore if could be part of a Public Health or operational license.
2. Conduct a survey of campgrounds, RV parks, and resorts to determine the status of emergency plans, storm shelter availability, and related resource needs.	Low	County Emergency Management	Existing County operational budget	• $ • 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.
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.	Low	Highway Department and towns	WisDOT Standing Corn Snow Fence program	• $ • More feasible than large-scale hill cuts. • Increases traveler) safety and emergency vehicle access; reduces snow removal expenses. • Will not work everywhere. • Corn rows can work well, but WisDOT not always quick to pay.
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.	Low	Industry Safety Group and/or Emergency Management	Existing staff and private-sector volunteers to initiate	• $ to evaluate; $$ to implement • No specific solution but, identifies needs & engages in discussion. • WI PSC Refueling Readiness Grant Program may assist with related wiring.

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.	Medium -to-Low	County Public Health & Emgy Mgmt to initiate	Existing staff operational budgets	• $ for evaluation/planning • County has some tanks available. • Uncertain of emergency availability. • May need to survey home O2 suppliers. • Access to State list of Medicare patients using oxygen-assisted devices not available unless there is an emergency.
6. 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 and share with Wisconsin/Great Rivers 211 and	High	County Public Health working with Red Cross	If part of safe room, generator and HVAC costs may be eligible for FEMA BRIC or HMGP funding.	• $-$$ • 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.

Flood Mitigation Strategies - Project Actions

2024 Plan Strategy Recommendation	Priority	Lead Party(s)	Funding	Analysis
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 or expansion of flood/stormwater storage areas, the installation or re-sizing of culverts, the creation or improvement of drainageways, the clearing of brush or obstructions from streams or drainageways, and the restoration/protection of natural drainage, wetlands, and other retention areas. Encourage nature-based solutions, low-impact development practices, and basin-level planning. Consider inventorying those roads most vulnerable to flooding to help prioritize such efforts as well as identifying alternative travel/evacuation routes if needed.	High	County Community Development or Soil & Water Conservation, County Emergency Management, County Highway, municipalities, landowners	Stormwater utilities, development impact fees, CIPs, & road funding are traditional sources. CDBG-Public Facilities, TIF, FEMA Flood Mitigation Grants, & WI Municipal Flood Control Grants for large projects.	• $$ to $$$ • Increasing frequency & intensity of heavy rain events = more flooding. • Grant funding could mitigate a reoccurring flooding threat/vulnerability. • Could include establishing a fund or exploring projects for floodplain/wetland protection, mitigation, and restoration. Such projects would have additional environmental benefits. • Often impacts transportation (a community lifeline). • Localized approach that increases drainage can increase flooding downstream. • Increase emphasis on nature-based solutions. • If significant damages, County Emergency Mgmt may provide support. • *Potentially related to continued NFIP compliance.*

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.	Medium	Developer or land owner	Same as above. New development unlikely eligible for mitigation grants	• $ to $$$ • Proactive. • If part of a mitigation grant project, may score additional points. • May not be political support to amend ordinances to require or incentivize. • May serve as a model; could use WDNR Health Lakes grant dollars in shoreland areas.
3. Pursue hazard mitigation grant funding to acquire, relocate, or floodproof structures and properties with a flood history, most at risk of flood damage, and/or following a flood event in which significant damage occurs if the landowner agrees to participate.	Medium	Landowner, County Zoning or municipalities	FEMA Flood Mitigation Grant & WI Municipal Flood Control Grant programs with local match.	• $$ to $$$ • No critical/imminent projects identified. • Strong grant potential if a reoccurring or vulnerability. • May mitigate a reoccurring flooding threat/vulnerability. • Solutions are typically feasible, if funding is available and with the landowner's consent. • *Potentially related to continued NFIP compliance.*
4. Continue to monitor bank erosion and landslide risks along the St. Croix River and explore flood mitigation grant funding if there is an imminent threat to buildings or infrastructure.	Medium -to-Low	Landowner, Municipality	FEMA Flood Mitigation Grant & WI Municipal Flood Control Grant programs with local match.	• $$ to $$$ • No critical/imminent projects identified. • Grant potential for a bank stabilization or revetment project is imminent or reoccurring threat with significant vulnerability

Flood Mitigation Strategies - Planning, Policy, & Outreach Actions

2024 Plan Strategy Recommendation	Priority	Lead Party(s)	Funding	Analysis
1. Using updated LiDAR data, continue to advocate for and participate in modelling efforts to improve floodplain map accuracy. In the interim, obtain FEMA certification that its LiDAR data meets PM-61 standards, so that St. Croix County may, at its discretion, engage in LiDAR-based Letter of Map Amendment (LOMA) approvals, which can save considerable time and expense.	Medium	County Community Development, WDNR, FEMA,	FEMA & WDNR; County projects budget	• $$ • Poor accuracy of floodplain maps weakens flood vulnerability assessment, creates flood insurance and ordinance compliance challenges, and damages public trust. • While FEMA may reassess some small stream stretches, there are no current plans for a large-scale or countywide D-FIRM update. • *Potentially related to continued NFIP compliance.*

2024 Plan Strategy Recommendation	Priority	Lead Party(s)	Funding	Analysis
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 St. Croix County's RAVE emergency notification system.	High	varies by Dam Owner; Zoning staff for code enforcement	Funded by dam owners; WDNR Municipal Dam Grant; FEMA High Hazard Potential Dams Grant	• $$ to $$$ • 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. • *Potentially related to continued NFIP compliance.*
3. Explore grant funding options for mitigation of flooding at Twin Lakes based on the recommendations within the 2020 SEH *Twin Lakes Temporary Drawdown Study*. If additional study is needed, FEMA mitigation Capability & Capacity Building or Advanced Assistance grant dollars may be options.	Medium -to-Low	varies by solution, but likely Town & landowners taking lead	varies by solution, incl. potential grants	• $$+ • FEMA flood mitigation grant dollars may assist with some of the "No Pumping" suggested actions. • Potentially approach WDNR and/or Army Corps for a more in-depth engineering analysis.
4. 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	County Zoning and County Board	County annual operating budget	• $ • Proactive; strong mitigation strategy. • County has adopted the most recent WDNR floodplain ordinance model. • No additional costs expected unless enforcement/compliance issues arise. • *Potentially related to continued NFIP compliance.*
5. 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.	High	County and local designated floodplain managers County Emergency Management	County and community operational budgets. FEMA mitigation grant funding could be used for a more formal outreach initiative	• $ • 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.

2024 Plan Strategy Recommendation	Priority	Lead Party(s)	Funding	Analysis
6. Discourage the placement of farm pipeline systems (e.g., liquid manure pipelines) within public ditches, culverts, and other flood conveyance infrastructure.	Low	County Land Conservation and/or Zoning; Town governments	Operational budgets	• $ • 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.
7. 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.	High	County Land Conservation, WDNR, local communities	County and community budgets. Some grant funding available for larger initiatives, especially if linked to flood control or water quality.	• $ • Could involve many partners, such as municipalities and lake groups. • Could include model projects, including using Healthy Lakes grant dollars near lakes. Rain to Rivers of Western Wisconsin has some related educational materials and mini-grants.. • Some overlap with other mitigation strategies. • St. Croix County has higher stormwater standards for new development compared to many rural counties. • Local governments could explore integrating such standards into site plan review or local ordinances.
8. Educate local officials and community members on permitting, enforcement, and best practices for steep slopes and erosion controls, especially near the St. Croix River and other water bodies. Work with WDNR and National Park Service to develop landowner guidance for controlling invasives (e.g., Buckthorn) and re-planting post-storm events in such areas, especially along the Riverway. Explore options to increase or require disclosure of such rules and development limitations as part of land sales, especially near the Riverway.	Medium	County Land Conservation & Community Development County Highway & Local Public Works w/in road rights of way	County & State/Fed staff or operating budgets.	• $ • Property site and vegetative management can help mitigate/prevent bank erosion and landslides. • WDNR & NPS are key resources • Special rules in place along St. Croix Riverway • May include impervious surfaces, site changes, re-planting following storm events • Encourage replanting with native vegetation that is drought tolerant; could be expanded as part of a larger climate adaptation strategy.
9. Encourage a watershed-level approach to the design and sizing of culverts and stormwater systems. Encourage municipalities to work cooperatively to consider impacts downstream when making stormwater system improvements, including the installation of new drainageways or larger culverts.	Medium -to-High	County Land Conservation & Community Development; County Highway; Municipalities	Operating budgets, unless a formal outreach initiative	• $; educational effort • WDNR may be a resource • Potentially could use a small Rain to Rivers or WDNR grant • May be eligible for FEMA mitigation grants if tied to flood prevention

Other Mitigation Strategies

The following are multi-hazard mitigation strategies or strategies to address non-natural hazards.

2024 Plan Strategy Recommendation	Priority	Lead Party(s)	Funding	Analysis
1. MULTI-HAZARD – Integrate natural hazard risks, climate trends, and hazard mitigation into future updates of the St. Croix County Comprehensive Plan and other County plans.	Medium	County Zoning and Planning & Zoning Committee	As part of County operational/program budget for plan update.	• $ • Strong coordination with draft County Comp. Plan update. • Limited inclusion of mitigation in existing comprehensive plans for most cities, villages, and towns. • Explore opportunities to integrate mitigation plan priorities into the County Strategic Plan.
2. MULTI-HAZARD – Monitor the County's increasing ESL and immigrant population and attempt to better define the extent of this population. Should it be needed, conduct a public educational outreach initiative that increases knowledge of natural hazard risks, notification systems, insurance programs, and available resources.	Low	Public Health with partner support	Largely a collaboratively supported initiative, but some grant funding may be available.	• $ • Targets a socially vulnerable population. • As referenced earlier in the plan, the numbers, geographical extent, and other characteristics of this population is not clear. • 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. • Could be expanded to include homeless populations, for which the extent is also not fully known.
3. MULTI-HAZARD - Conduct a special workshop or outreach initiative that educates local communities on the relationships between local codes/code enforcement and potential hazard mitigation opportunities.	Medium-to-Low	WCWRPC and/or WI DSPS	May be eligible for FEMA HMGP grant funding	• $ • Minimal local familiarity with options; State rules limit some opportunities. • Could be a regional-level or web-based workshop series. • Should incorporate BCEGS; very low familiarity with this program.
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.	Medium-to-Low	County Land Conservation, NRCS, Extension	Collaborative efforts with <u>many</u> different potential funding sources	• $-$$ • Consistent with County's Land & Water Conservation 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 Recommendation	Priority	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 outage, avian flu, and radiological release. This strategy could be expanded to educating landowners on the value of landscaping with native and drought-tolerant plant species.	Medium -to-Low	County Land Conservation, Emergency Management, NRCS, Extension	Operational budgets	• $-$$ • Also promotes climate adaptation.
6. HAZ MAT SPILLS – Conduct periodic tabletop exercises that assess the risks and response capabilities of a transportation-based HazMat spill. Focus on I-94 in particular, including addressing alternative routes.	High	County Emergency Management	Operating budgets; HazMat Emgy Planning Grant administered by WisDOT	• $-$$ • 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. • WEM has a “Railroad Training & Resources” guide if needed.
7. HAZ MAT SPILLS – Consider HazMat spill risks as part of land use and site planning. Discourage new residential subdivision development near I-94, railroad lines, and existing animal waste storage facilities. Discourage sanitary sewer/septic systems, large areas of impervious surfaces, and potential pollutant sources near areas where there is a significantly elevated risk of groundwater contamination due to karst.	Medium	County Community Development	Planning and policy-related. Likely part of other planning & regulatory actions.	• $ • Could be incorporated into comprehensive plans and land use ordinances. • “Low areas” (e.g., valleys, gullies) in areas of karst bedrock are particularly vulnerable.
8. ACTIVE THREATS – Encourage active shooter/active threat building assessment, training, and reunification planning for government facilities, area businesses, community lifeline facilities, festival grounds, and other gathering places. Encourage annual exercises at schools as part of their mandatory drills. After exercises, encourage the sharing of after-action reports with law enforcement.	High	Facility owner Local Law Enforcement	None identified. Responsibility of each facility working with local police departments	• $ ($$-$$$, if security hardening) • May reduce vulnerability through recommended security hardening or improved procedures. • Not feasible for County to conduct these activities, but could benefit from a county- or regional-level “train-the-trainer”-style approach where protocols and resources are provided to police departments & facilities for local action. • Could also encourage related hardening and practices, such as numbering doors/window or the sharing of floor plans with local response agencies.

2024 Plan Strategy Recommendation	Priority	Lead Party(s)	Funding	Analysis
9. PANDEMIC - Encourage residents to report sick or dead animals for which the cause may be a disease (e.g., West Nile, Avian Flu) and related practices to prevent the exposure or spread of such diseases.	Low	County Public Health and partners	Uses existing staff or volunteer support.	• $ • Supports Public Health's current activities. • Special messaging may target farm workers (livestock), households with bird feeders, hunters, etc.
10. CYBERATTACK – Continue efforts to educate the public, businesses, and local governments on good cybersecurity/cyber-hygiene practices to reduce vulnerabilities. For organizations, include related resources and continuity planning (e.g., back-up, restoration). Longer term: (1) Explore opportunities for St. Croix County to serve as a cloud provider for cities, villages, and towns, which would enhance cyber-security while offering licensing discounts. (2) Explore a firewall modernization project, including SIEM with log aggregation.	High	Establish a special team for educational outreach? ADRC for senior education Long-term actions – St. Croix County IT	Uses existing staff or volunteer support. Many smaller communities lack resources to adopt more aggressive or robust cyber-security policies & actions.	• $-$$ • Emphasize during Cybersecurity Awareness Month (October) • ADRC provides related outreach to seniors (a socially vulnerable population) via its newsletter. • Local ISPs may be good partners. • Cyber insurance providers can assist by assessing risk and vulnerabilities. • Vulnerabilities related to elections provide opportunities to increase attention to this issue among smaller communities. • Promote availability of CISA and State Cyber Response team resources. • Perhaps a regional effort by the West Central WI Broadband Alliance.
11. WILDFIRE – As part of the next St. Croix County Hazard Mitigation Plan update, reconsider the inclusion of wildfire as a hazard of significant risk. In the interim, limited Firewise-style programming may be beneficial in some areas of wildland-urban interface development	Low	County Emergency Mgmt for Plan Update Fire Depts for Firewise	FEMA BRIC or HMGP covers haz mit planning	• $ • Wildfire not deemed a significant risk in past and no Intensive Fire Protection Areas in County, but St. Joseph Fire Rescue noted WUI and wildfire potential as part of their survey. • Firewise activities might include educating residents of risks, burning permits & restrictions, defensible spaces, driveway assessments, and signage. • Plan Update Steering Committee discussed the need for additional education in some areas focused on access by emergency vehicles and related driveway/private street design, including landowners and local officials/code enforcement staff.

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. Continue to update and maintain the St. Croix 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.	High
2. Encourage local businesses and organizations to create preparedness and continuity of operations plans, including efforts to encourage employee preparedness at home.	Medium
3. Develop a technology, operational, and layout plan for the County's new EOC to facilitate a countywide communications and command structure.	Medium-to-High
4. 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, (3) adopt written mutual aid agreements for public works support, and (4) regularly review and maintain community emergency operations plans, including planning for large events and gatherings. As an alternative to #3, a countywide public works mutual aid agreement could be discussed.	Medium

5. 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.	Low
6. Continue to encourage multi-jurisdictional collaboration on emergency planning and disaster mitigation, including the sharing and coordination of resources across county lines. Explore formalizing mutual aid support between area county highway departments for winter maintenance and during emergency events.	Medium-to-High
7. 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-to-Low

Communications	
1. Increase RAVE subscriptions and awareness of Wisconsin 211. Create a standard "ad" and/or flyer that can be used locally, by the ADRC, etc.	Medium
2. Educate communities and partners on the availability of the RAVE 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. 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?).	Medium
4. Continue efforts to address the increasing demand for more repeated channels for emergency communications and to improve Wisconsin-Minnesota interoperability.	Medium
5. 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-Low
6. Continue to engage with local ARES/RACES (ham radio operators) members during exercises and through crisis communications planning.	Low
7. Through relationship building activities and frequent, shared communications, work to strengthen public trust in recommended immunizations and Public Health messaging.	Medium
8. The County Highway Department should continue to collaborate with adjacent counties regarding winter road maintenance and response to emergency events, including the planning of alternative routes. Formalize such mutual aid or cooperative agreements if needed.	Medium

Education & Outreach	
1. Strive to 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, RAVE/related smart phone apps, safe room/storm shelter availability, where to access power outage information, pet preparedness, emergency/disaster supplies kits, etc. Continue to conduct outreach in conjunction with Severe Weather Awareness Month, National Preparedness Month, and community events. Educate on the importance of adequate insurance coverage for storm and hail damage. During the winter, include education on winter-related risks and driver safety. Some of these outreach activities may be eligible for a small FEMA mitigation grant, especially if combined with NFIP insurance, distribution of weather radios, etc.	Medium-to-High
2. 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, MRC, general support).	Medium
3. In collaboration with Extension, establish an educational outreach program focused hazard awareness, preparedness, and mitigation for the agricultural community.	Medium-to-Low
4. Encourage large employers to consider becoming a member of the Wisconsin Business Emergency Operations Center (WI BEOC).	Low
5. Conduct an educational initiative to increase the preparedness of campgrounds, RV parks, resorts, and events for severe weather, including promoting use of weather radios, the identification of storm shelters/safe rooms, and making visitors aware of risks and warning systems.	Medium
6. Encourage households with people 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 RAVE and to notify their electric provider who may maintain a critical client list. The ADRC newsletter is an excellent resource for such outreach. St. Croix Electric Cooperative expressed an interest in partnering on such outreach efforts.	Medium-to-High
7. Regarding street design & driveways: Encourage municipalities to adopt road and driveway design standards with local fire department input. Work with Towns to address any non-conforming driveway so that emergency vehicles have adequate access. Through subdivision ordinances and official mapping, discourage long, dead-end roads/cul-de-sacs and large subdivisions with only one entrance/exit.	Medium-to-High
8. St. Croix 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
9. 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
10. Conduct a winter driving safety outreach initiative with a particular emphasis on I-94 traffic and reducing collisions with snow plows.	Medium-to-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-to-High
2. Continue to provide guidance and training to cities, villages, and towns on emergency action planning, continuity 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, Medical Reserve Corps, and other support agencies.	Very 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. Include electric providers and public works/highway crews. Prepare an after-action report with strategic priorities. St. Croix Electric Cooperative expressed a desire to partner on such an exercise.	Medium-to-High
4. Maintain and regularly drill the mobile, multi-agency Field Force Team for crowd control.	Low
5. 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
6. Continue to invite Volunteer Organizations Active in Disaster (VOADs), such as the Red Cross, Salvation Army, and the Medical Reserve Corps, to be part of County emergency exercises and planning.	Medium
7. Conduct periodic tabletop exercises focusing on large Interstate 94 crashes due to winter conditions and/or hazardous materials spills. Include managing alternative routes, evacuation near interchanges, and incident command & communications among key players.	Medium

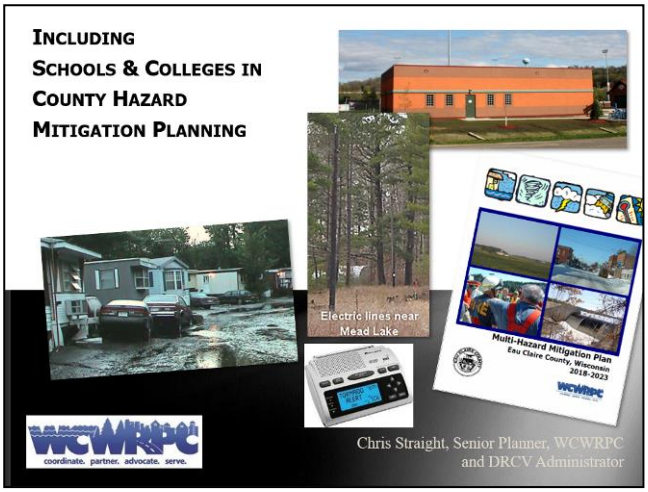
Patient Care, Mass Care, & Sheltering	
1. Update, maintain, and share warming and cooling shelter lists, with available basic resources (e.g., power generators, cots, kitchen, AEDs) and operational information (e.g., availability limitations, responsibilities, contacts) (see related mitigation strategies)	Medium-to-High
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. Inventory and 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.	Medium-to-Low
4. Identify residential care facilities and unlicensed group homes, especially those with ventilators or other assisted breathing devices. Determine the status of their emergency plans and provide planning guidance.	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
2. Fuel Shortage - Assess needs, logistics, and supply chains regarding the availability of emergency fuel supply for essential services during regional fuel shortages. (see related mitigation strategy)	Medium-to-Low
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. (see related mitigation strategy)	Medium-to-High
4. HazMat – Consider the creation of a cost-sharing program for the testing of private wells for nitrates, PFAs, etc.	Medium-to-Low
5. HazMat – Conduct a feasibility study for a new recycling/materials recovery facility, including demand and a sustainable funding approach.	Medium-to-Low
6. HazMat - Encourage continued local fire department participation in HazMat incident training coordinated by St. Croix County Emergency Management. • Regularly rotate HazMat exercises and training throughout St. Croix 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. • Invite EHS facilities give presentations on their hazardous materials, facilities, and plans at fire chiefs' meetings. • Consider the review, inventory, and training recommendations of the 2024 Commodity Flow Study.	Very High
7. 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.	Medium-to-High
8. 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. Explore cost-sharing alternatives to incentivize regular well testing.	Medium-to-Low
9. Agriculture-Related – As part of a County Conservation Partners Meeting, which includes typical agricultural disaster assessment team members (i.e., FSA, NRCS, Extension, Land Conservation) include an annual discussion on agricultural-related emergency procedures, programs, and threats. Invite participation from Emergency Management and Public Health (e.g., how is Public Health or Emergency Management notified if a manure spill potentially impacts a well or during a livestock disease outbreak?). Monitor agricultural threats and activate the team when needed.	Medium-to-Low

E. CITY, VILLAGE, & EDUCATION INSTITUTION SUB-PLANS

Appendices L & M 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), 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 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 sub-plan recommended strategies, the same criteria and general approach was encouraged 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. 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 St. Croix 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 J 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 J. 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 J for potential assistance, since available resources and related requirements frequently change, and this list is not all-inclusive.

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.

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. Examples and

model language for some of these strategies are available from St. Croix County Emergency Management or West Central Wisconsin Regional Planning Commission (WCWRPC). Such models and reference information do not constitute legal advice, but provide insight into similar activities by other communities that can be used at the discretion of each community. Further, due to the 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, St. Croix 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

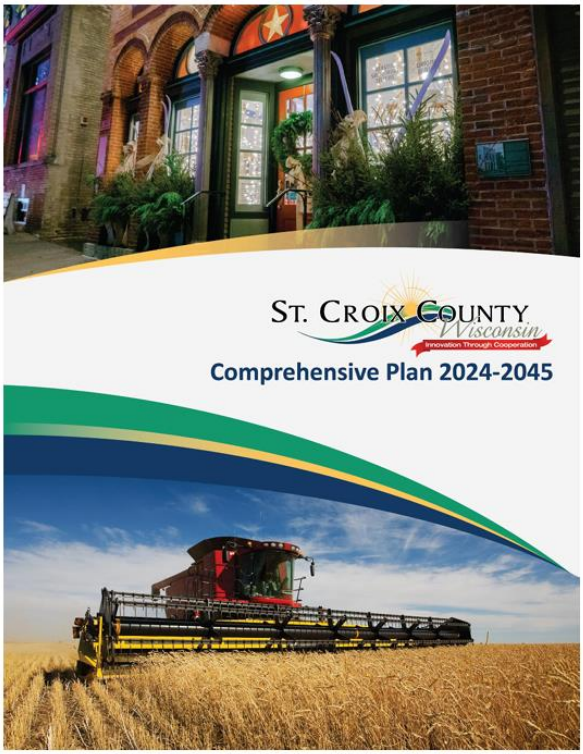
Many of the mitigation and preparedness strategies in Sections VI. and the sub-plans specifically reference other planning mechanisms that are vital to successful implementation such as:

- Comprehensive & land use plans 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 role that the County's *Land & Water Resources Conservation Plan* has in addressing stormwater management/flooding, drought, certain water quality threats, and invasive species. The mitigation plan also references recommendations within the **Report for the Protection of Surface & Groundwater Quality in St. Croix County**.
- 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.
- Emergency preparedness & response plans Mitigation and preparedness recommendations 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 St. Croix County Emergency Management provides support for these updates. County Emergency Management and other County offices will continue to 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.

St. Croix County Emergency Management has also used the discussions on and prioritization of the mitigation and preparedness alternatives to guide the County's Integrated Preparedness Plan (IPP), training considerations, and working planning. The IPP provides the most significant, new way to improve plan coordination since the previous mitigation plan.

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. Generally, the strongest ties between the mitigation plan and community comprehensive plans were on issues of floodplain management, stormwater management, subdivision design, and emergency services.

Dring this mitigation plan update, comprehensive plans were considered and discussed by local participants for potential issues and guidance for integration into the mitigation plan. Such plan coordination for the participating cities and villages are noted in Appendix L.



St. Croix County has strongly integrated the 2018 mitigation plan into its comprehensive plan. The St. Croix *County Comprehensive Plan 2024-2045* references and includes information from the County's mitigation plan in a number of sections, including the discussions on groundwater contamination, HazMat response, dams, and stormwater flooding. A special Hazard Mitigation section is included in the comprehensive plan and numerous plan recommendations reference the mitigation plan or have directly incorporated strategies from the mitigation plan. The County's updated comprehensive plan is an excellent model demonstrating how mitigation plan priorities can be considered in the context of the overall vision and goals for a community.

As the mitigation plan strategies reflect, WCWRPC and St. Croix County staff will continue to work with local municipalities to encourage coordination and consistency between comprehensive planning and the hazard mitigation plan, 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 *St. Croix County Multi-Hazard Mitigation Plan.*

As Sections IV and V showed, past hazard mitigation plan strategies have been integrated into additional local planning mechanisms. 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. As part of its work plan, St. Croix County Emergency Management continues to encourage and assist local

jurisdictions in the update of their emergency operating plans; these plans often address mitigation policies or issues.

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 St. Croix 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. St. Croix 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 St. Croix County's Emergency Management Manager. No special plan reviews or plan amendments were needed. The Steering Committee for this mitigation plan update (2024 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

St. Croix County's 2024 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.

Starting in the second quarter of the 2025 calendar year and each 2nd quarter thereafter, St. Croix County, through its Emergency Support Services-Emergency Management Division, will complete an annual review of plan progress unless a plan update is already in progress. This review may be performed concurrently with other work planning, such as Integrated Preparedness Plan updates. The annual plan review should consider aspects of the plan, such as the following:

- Progress on mitigation plan and preparedness recommendations, including the suggested timelines and the pursuit of related mitigation grant funding.
- Any significant changes in vulnerabilities, priorities, or trends, including changes 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.

If any critical issues or potential plan amendments are noted during this review, the Emergency Management Manager will provide a brief report to the Local Emergency Planning Committee (LEPC), which includes a diverse representation of community stakeholders. The LEPC will recommend any revisions or amendments to the plan if necessary. The recommended revisions will then be forwarded to the County Board for its consideration and action. The Emergency Management 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 LEPC and County Board meetings are subject to the Wisconsin Open Meeting Law and are 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. St. Croix County Emergency Management will also continue to actively engage the public in hazard mitigation actions envisioned in the 2024 Plan through its website, public informational campaigns through local media (e.g., Severe Weather Awareness Month), and presentations to interested community organizations.

ii. Special Plan Reviews (Post-Disaster or New Project)

Within three to six months following a significant disaster event, the Emergency Management 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 Management Manager. If a mitigation plan amendment is potentially needed, this information will be provided to the Local Emergency Planning Committee (LEPC) for their review.

At a duly called and posted public meeting, the LEPC will analyze factors that contributed to any impacts of the hazard risk, the likelihood of the event reoccurring, and any strategy alternatives. The Emergency Management Manager will have primary responsibility for establishing special plan review meeting dates, distributing related materials, and facilitating the meetings. The Emergency Management Manager will also advertise these special meetings to affected department heads, citizens, or community groups, so additional input and comments can be received. Special plan review meetings will be subject to the Wisconsin Open Meeting Law and properly noticed to allow for public involvement and comment.

The Committee may recommend revising or amending the existing plan. 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 St. Croix County Multi-Hazard Mitigation Plan will be comprehensively reviewed, current data collected, and fully 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. At that time, the Emergency Management Manager will designate a plan update Steering Committee that will include a diverse mix of stakeholders involved in hazard mitigation. At this time, it is believed that the LEPC will continue to serve as the Steering Committee for future plan updates. Steering committee meetings will be subject to the Wisconsin Open Meeting Law and properly noticed to allow for public involvement and comment.

Each update of St. Croix County's mitigation plan has strengthened weaknesses or incorporate 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 sub-plans in particular. While this required additional time for this update, this is anticipated to "streamline" and simplify future plan updates.
- 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, especially among public schools.
- 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, homeless), threats (e.g., ag/avian flu, cybersecurity), or mitigation measures (e.g., nature-based solutions, low impact development, code enforcement). This includes identifying effective opportunities to engage vulnerable populations and the business community more directly, if possible.
- The 2024 Plan included a new vulnerability assessment attachment. Continue to strengthen this section by incorporating quantifiable data regarding exposure. This may also allow more of the threats in Section III.D. to include only highlights of vulnerabilities, similar to how the Tornadoes & High Winds vulnerability assessment is structured.
- The 2024 Plan update incorporated FEMA community lifelines data. For the next update, additional FEMA GIS-based tools (e.g., HAZUS) will be re-evaluated and potentially used more.
- Consider updating and expanding the emergency power survey of community lifeline facilities, potentially including other preparedness and private-public partnership actions.

APPENDIX A.

ADOPTING RESOLUTIONS AND ELECTRIC COOPERATIVE LETTER

INSERT ONCE ADOPTED

APPENDIX B.

STAKEHOLDER INTERVIEWS AND MEETINGS

St. Croix County Natural Hazards 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 Baldwin	1 village attendee + County E.M.	9/7/23
Village of Deer Park	4 village attendees + County E.M. staff	8/16/23
Village of Hammond	2 village attendees + County E.M. staff	8/16/23
Village of N. Hudson	3 village attendees + County E.M. staff	8/29/23
Village of Roberts	5 village attendees + County E.M.	9/7/23
Village of Somerset	2 village attendees + County E.M.	8/29/23
Village of Star Prairie	2 village attendees + County E.M. staff	9/11/23
Village of Woodville	3 village attendees + County E.M. staff	9/11/23
City of Glenwood City	3 city attendees + County E.M. staff	8/16/23
City of Hudson	8 attendees + County E.M. staff	8/29/23
City of New Richmond	7 city attendees + County E.M.	11/9/23
Town's Association	meeting + every town sent a follow-up survey	4/27/23
Fire Chief's/EMS	brief presentation & distributed survey	May-June '23
County LEPC	Steering Committee meeting #1	5/4/23
County LEPC	Steering Committee meeting #2	8/15/23
County LEPC	Steering Committee meeting #3	11/2/23
County LEPC	Steering Committee meeting #4	2/20/24
Natasha Brunell & Janet Smith	St. Croix County Emergency Management	various dates
Robbie Krejci	St. Croix County Highway Commissioner	11/9/23
Tim Kufus	St. Croix County Emergency Support Services Captain + 2 E.M. Staff	11/30/23
Tim Steiber	St. Croix County Land & Water Conservation Administrator	11/30/23
Mike Wozniak & Jared Wehner	St. Croix County Land Use & Zoning	11/2/23
Brett Budrow	St. Croix County Planning & Land Information Administrator	11/2/23 + follow-up
Kelli Engen	St. Croix County Public Health Administrator/Health Officer + 2 E.M. staff	11/9/23
John Allegro & Dylan Zdroik	St. Croix County Information Technology	3/1/24
Kristin Nelson	St. Croix County Aging & Disability Resource Center Administrator	3/18/24
St. Croix Electric Coop.	4 staff; plus data & review	11/30/23
Jenny Legaspi	American Red Cross	8/7/23

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	11/27/23
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.

The mitigation plan was discussed as part of a broader LEPC meeting. Mitigation planning topics covered included:

- What is hazard mitigation planning & related FEMA grant programs
- Plan update process, stakeholder interviews, and community engagement
- Threat assessment survey results and hazards of significant risk
- Initial hazard event data

ST. CROIX COUNTY Wisconsin
Innovation Through Cooperation

AGENDA

LOCAL EMERGENCY PLANNING COMMITTEE

May 4, 2023 1:00 PM

St. Croix County Government Center - Room 1284
Government Center - 1101 Carmichael Road, Hudson, Wisconsin

CALL TO ORDER

ROLL CALL

APPROVAL OF MINUTES

PUBLIC COMMENT

BUSINESS ITEMS

1. Membership review
2. FFY22 Hazmat Operations and Awareness Training Summary
3. All-Hazard Mitigation Plan update – presentation from Chris Straight, Senior Planner, with the West Central Wisconsin Regional Planning Commission (WCWRPC)

REQUEST FOR FUTURE AGENDA ITEMS

ANNOUNCEMENTS & CORRESPONDENCE

ADJOURN

DATE OF NEXT MEETING

Reasonable efforts will be made to provide special accommodations for access to public meetings. To request a special accommodation, please contact the County Clerk's Office at (715) 386-4600 at least two business days prior to the time of the meeting. Please see www.sccwi.gov for available digital options to access the meeting.

The mitigation plan was discussed as part of a broader LEPC meeting. Mitigation planning topics covered included:

- Hazard issues & opportunities exercise
- Exploration of past hazard events & meeting/interview input to date
- Capabilities assessment & coordination with related plans
- Review & update plan goals

ST. CROIX COUNTY Wisconsin
Innovation Through Cooperation

AGENDA

LOCAL EMERGENCY PLANNING COMMITTEE

August 15, 2023 1:00 PM

St. Croix County Government Center - Room 1284
Government Center - 1101 Carmichael Road, Hudson, Wisconsin

CALL TO ORDER BY CONVENER

ROLL CALL

APPROVAL OF MINUTES

1. Thursday, May 04, 2023

PUBLIC COMMENT

BUSINESS ITEMS

1. Election of Chair
2. Election of Vice Chair
3. Designation of Coordinator of Information
4. Designation of Secretary for the Local Emergency Planning Committee (LEPC)
5. Designation of State as Compliance Inspector
6. Approve By-Laws of the Local Emergency Planning Committee
7. Approval of Off-Site Facility Plans
8. Approval of Hazardous Materials Strategic Plan
9. All Hazard Mitigation Plan Update

REQUEST FOR FUTURE AGENDA ITEMS

ANNOUNCEMENTS & CORRESPONDENCE

ADJOURN

DATE OF NEXT MEETING

Reasonable efforts will be made to provide special accommodations for access to public meetings. To request a special accommodation, please contact the County Clerk's Office at (715) 386-4600 at least two business days prior to the time of the meeting. Please see www.sccwi.gov for available digital options to access the meeting.

The mitigation plan was discussed as part of a broader LEPC meeting agenda. Mitigation planning topics covered included:

- Mitigation vs preparedness alternatives
- Criteria for evaluating mitigation alternatives
- Plan maintenance and continued public engagement
- Homework – selection and prioritization of mitigation & preparedness alternatives

ST. CROIX COUNTY Wisconsin
Innovation Through Cooperation

AGENDA

LOCAL EMERGENCY PLANNING COMMITTEE

November 2, 2023 1:00 PM

St. Croix County Government Center - Room 1284
Government Center - 1101 Carmichael Road, Hudson, Wisconsin

CALL TO ORDER

ROLL CALL

APPROVAL OF MINUTES

1. Tuesday, August 15, 2023

PUBLIC COMMENT

BUSINESS ITEMS

1. All Hazard Mitigation Plan Update

REQUEST FOR FUTURE AGENDA ITEMS

ANNOUNCEMENTS & CORRESPONDENCE

ADJOURN

DATE OF NEXT MEETING - TO BE DETERMINED

Reasonable efforts will be made to provide special accommodations for access to public meetings. To request a special accommodation, please contact the County Clerk's Office at (715) 386-4600 at least two business days prior to the time of the meeting. Please see www.sccwi.gov for available digital options to access the meeting.

The mitigation plan was discussed as part of a broader LEPC meeting agenda. Mitigation planning topics covered included:

- Review of the final mitigation plan recommendations
- Discussion on potential changes for the next plan update
- Discussion on plan implementation
- Review of an example safe room project

ST. CROIX COUNTY Wisconsin
Innovation Through Cooperation

AGENDA

LOCAL EMERGENCY PLANNING COMMITTEE

February 21, 2024 1:00 PM

St. Croix County Government Center - Room 1284
Government Center - 1101 Carmichael Road, Hudson, Wisconsin

CALL TO ORDER

ROLL CALL

APPROVAL OF MINUTES

1. Thursday, November 02, 2023

PUBLIC COMMENT

BUSINESS ITEMS

1. All Hazard Mitigation Plan Update - Chris Straight

REQUEST FOR FUTURE AGENDA ITEMS

ANNOUNCEMENTS & CORRESPONDENCE

ADJOURN

DATE OF NEXT MEETING - TO BE DETERMINED.

Reasonable efforts will be made to provide special accommodations for access to public meetings. To request a special accommodation, please contact the County Clerk's Office at (715) 386-4600 at least two business days prior to the time of the meeting. Please see www.sccwi.gov for available digital options to access the meeting.

Meeting/Contribution: Stakeholder/Key Informant Interview

DATE(S)	SIGNATURE (please be legible)	TITLE	ACTIVITY	*HR
8/29			Hudson	
8/29	Natasha Cardinal	SCC - EM	Meeting	
8/29	Janet Smith	SCC - ESS Coord.	Haz mit. Mtg Hudson	
8/29	Tiffany Wiss	C. Hudson - Planner	Hazard Mitigation Update	
8/29		UTILITY Director	HAZ. UPDATE	
8/29	Michael Mraz	DPW	HAZ. Update	
	Geoff Williams	CITY EM POLICE CHIEF	HAZ. UPDATE	
8/29	DREW SPIELMAN	FIRE CHIEF	HAZARD UPDATE	
8/29	Kevin Soltis	Public Works	HAZARD Update	
9/7		Admin/ Clerk-Treas	Baldwin	
9/7	Natasha Cardinal	Emerg. Mngt. Dir.	Hazard Mit. update	

Meeting/Contribution: City & Village Meetings

DATE(S)	SIGNATURE (please be legible)	TITLE	ACTIVITY	*HRLY W SALA
8/16			Deer Park	
8/16	Natasha Cardinal	EM	Meeting	
8/16	Janet Smith	Program Coord St Croix	Meeting	
8/16		TRUSTEE	MEETING	
8/16	Dale Clarkson	CLERK/TREASURER	MEETING	
8-16	M Strohn	Fire Dept Captain	Meeting	
8-16	Morgan Olson	Deputy Clerk 1st responder	meeting	
8/16			Harmond	
8/16	Janet Smith	ESS - Coordinator	meeting ~~Village Meeting~~	
8/16	Natasha Cardinal	EM-	Meeting	
8/16	Sandi Hayes	Administrator Clerk	meeting	
8/16	Daniel Orr	Police Chief	meeting	

Meeting/Contribution: City & Village Meetings

DATE(S)	SIGNATURE (please be legible)	TITLE	ACTIVITY
8/16		Mayor	Glenwood
8/16		chief of police	City
8/16	Shawn Rosenow	City Clerk-Treas	Meeting
8/16	Janet Smith	ST Prog Coord ESS	Meeting
8/16	Natasha Cardinal	EM	Meeting
8/29	R. Gunther	PW/ECONOMIC DEV.	Somerset
8/29		CHIEF OF POLICE	M+S
8/29	Natasha Cardinal	Emerg. Mngt.	Somerset
8/29	Janet Smith	SCC EM Prog Asst	N. Hudson
8/29		VILLAGE PRESIDENT	meeting
8/29		Director of Public Works	meeting
8/29		EM DIRECTOR & POLICE CHIEF	Meeting

Meeting/Contribution: City & Village Meetings

DATE(S)	SIGNATURE (please be legible)	TITLE	ACTIVITY
9/7	Aaron O'Connell	Public Works	Roberts
↓	Chris Holmes	↓	Mtg
"	Jerry Strohbach	P.D Chief of Police	↓
9/7	John Bond	Director of Public Works	↓
9/7	Megan Dull	Clerk / Treas	Roberts
9/7	Natasha Cardinal	Emerg. Mngt. Director	Roberts
9/11	Angela Popenhagen	Consulting Engineer	Star
9/11	Amanda Engesther	Administrator	Prairie
9/11	Janet M Smith	St. Croix	STAR PRAIRIE
9/11	Natasha Cardinal	Emerg. Mngt. SCC	Star Prairie

Meeting/Contribution: Stakeholder/Key Informant Interview

DATE(S)	SIGNATURE (please be legible)	TITLE	ACTIVITY
9/11	[illegible] Brent Knegendorf	DPW	Woodville
9/11	Lori Russett	Chief of Police	Woodville
9/11	Julie A. Wathke	Clerk/Treasurer	Woodville
9/1	Natasha Cardinal	Emerg. Mngt. SCC	Woodville
9/11	Janet M Smith	SCC Emer. Supp Services	Woodville
11/9	Noah Wiedenfeld	City Admin	New Richmond
11/9	mike Strey	Asst Chief NRPD	New Richmond
11/9	Craig Yehlik	chief of Police	New Richmond
11/9	Natasha Cardinal	EM-SCC	NR-Mit. Mtg
11/9	[illegible]	NRPD	New Richmond
11/9	[illegible]	Electric Sup.	New Richmond
11/9	[illegible]	Public Works	New Richmond
11/9	[illegible]	DPW	New Richmond

APPENDIX C.

PUBLIC INFORMATIONAL NOTICE

April 8, 2024

PUBLIC NOTICE

PLEASE TAKE NOTICE that St. Croix County Emergency Management is inviting comment and input from residents, businesses, area organizations, and communities regarding the draft *St. Croix County Multi-Hazard Mitigation Plan, 2024-2029* and any needed projects to reduce or eliminate hazard risks to residents and property.

St. Croix 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 emergency storm shelter (safe rooms), 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 in the County Government Center at 1101 Carmichael Road, Hudson, Wisconsin, or is available for download at: https://www.wcwrpc.org/hazard-mitigation-planning

The public is invited to provide comments as the draft plan is finalized. Comments may be submitted online at: https://www.surveymonkey.com/r/SCCoHazMit through May 10, 2024. Any questions or written comments on the draft plan may also be directed to Natasha Brunell, St. Croix County Emergency Management, at 715-381-4911.

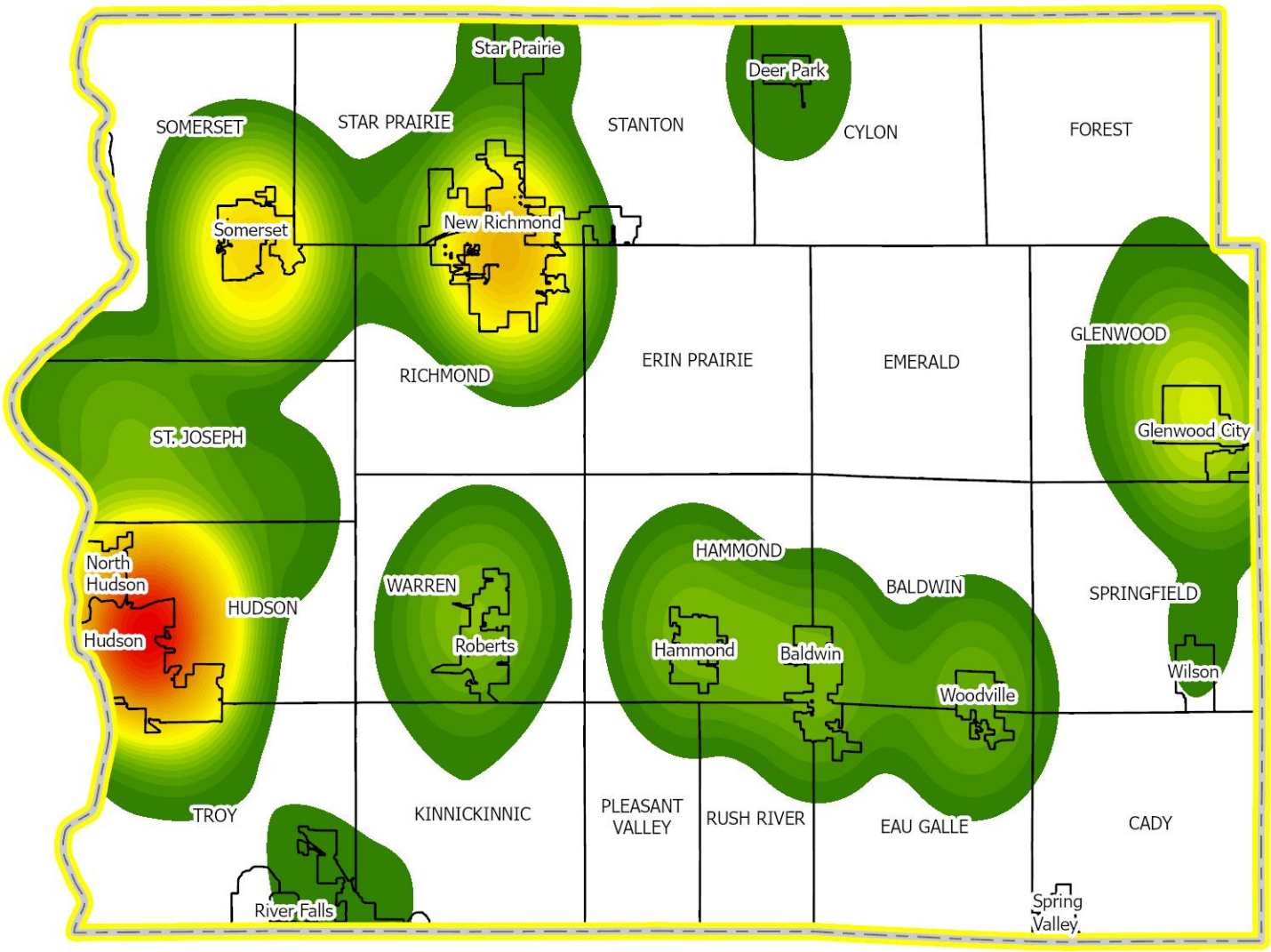
_____
Natasha Brunell
St. Croix County Emergency Support Services – Emergency Management Manager

cc: News Media
Public Bulletin Board/County Clerk's Office

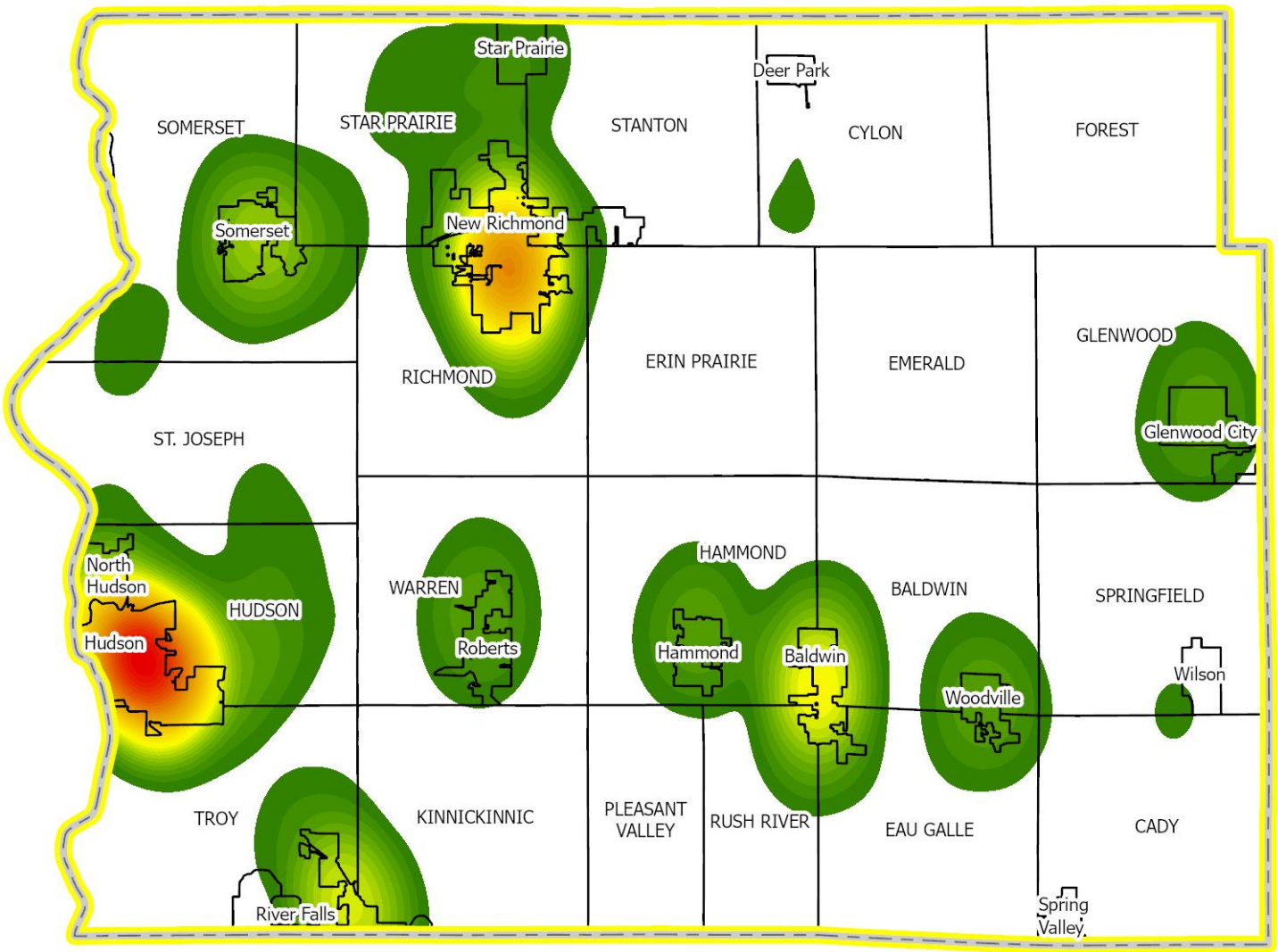
APPENDIX D.

DISTRIBUTION OF COMMUNITY LIFELINES

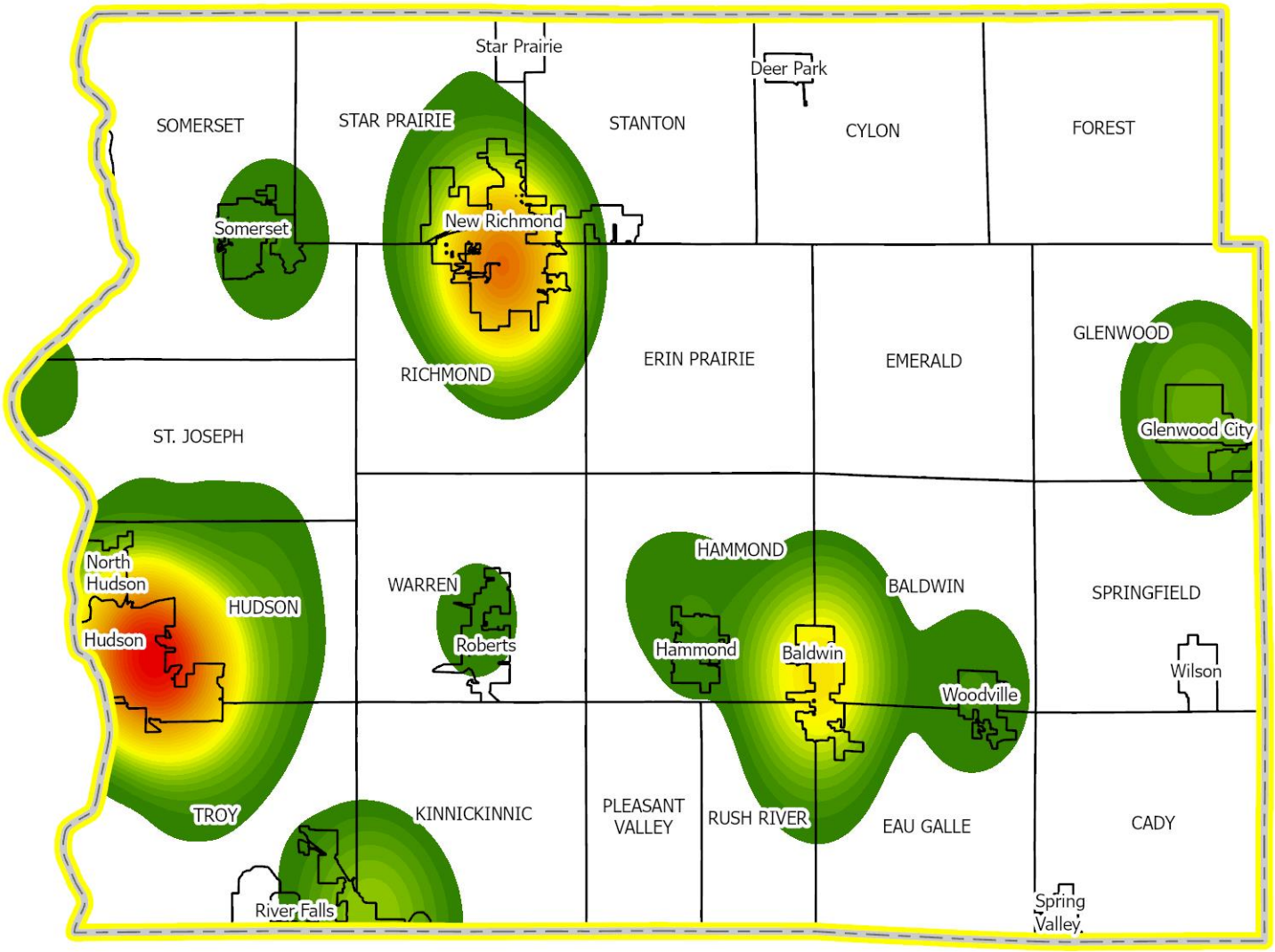
DISTRIBUTION OF SAFETY & SECURITY LIFELINES



DISTRIBUTION OF FOOD, HYDRATION, & SHELTER LIFELINES



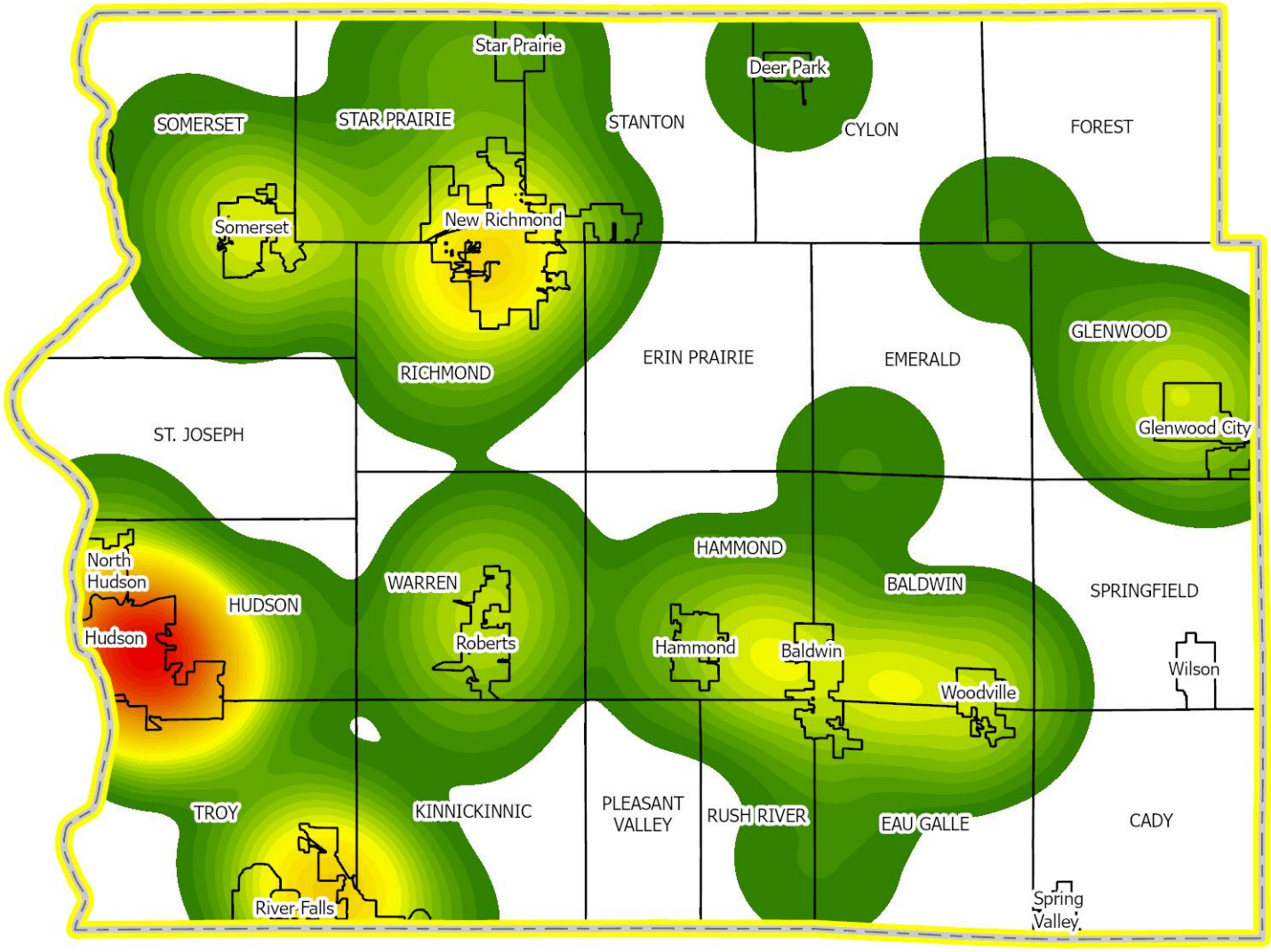
DISTRIBUTION OF HEALTH & MEDICAL LIFELINES



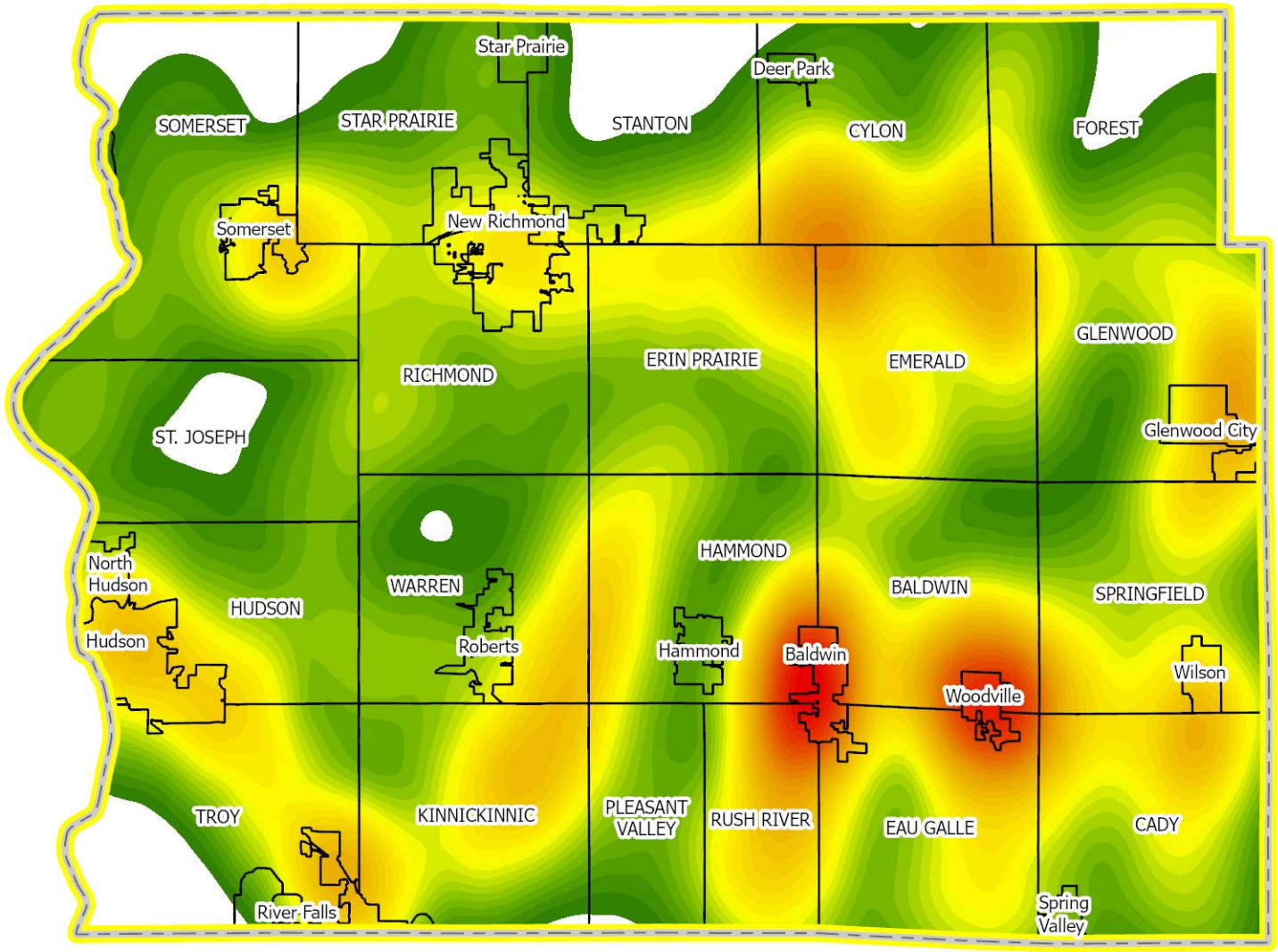
DISTRIBUTION OF ENERGY LIFELINES



DISTRIBUTION OF COMMUNICATIONS LIFELINES

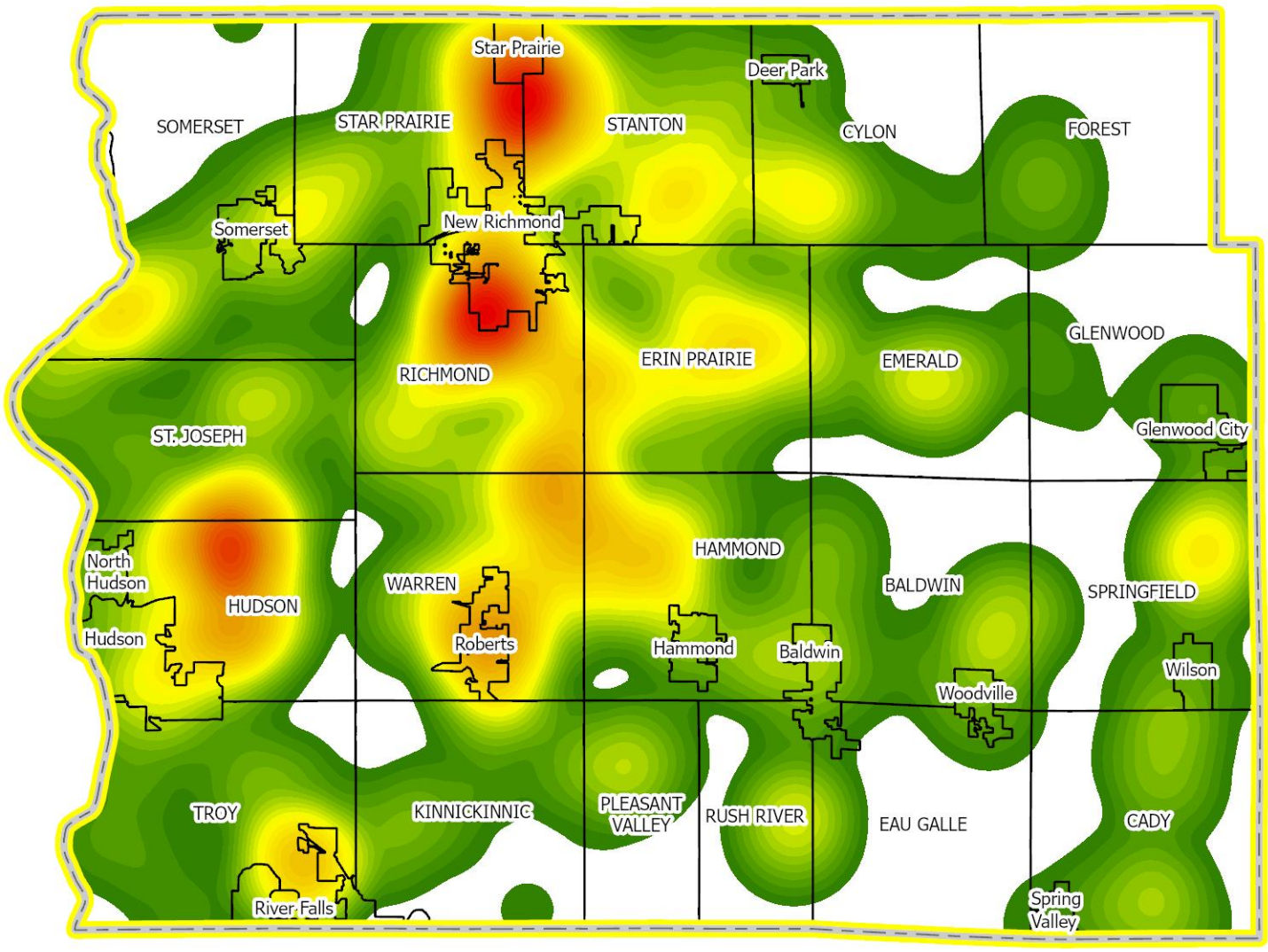


DISTRIBUTION OF TRANSPORTATION LIFELINES



DISTRIBUTION OF WATER SYSTEMS LIFELINES

(includes source water protection areas, ground water withdrawals/high capacity wells, s



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APPENDIX E.

NATURAL HAZARD EVENT HISTORY

(NCDC DATA)

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**

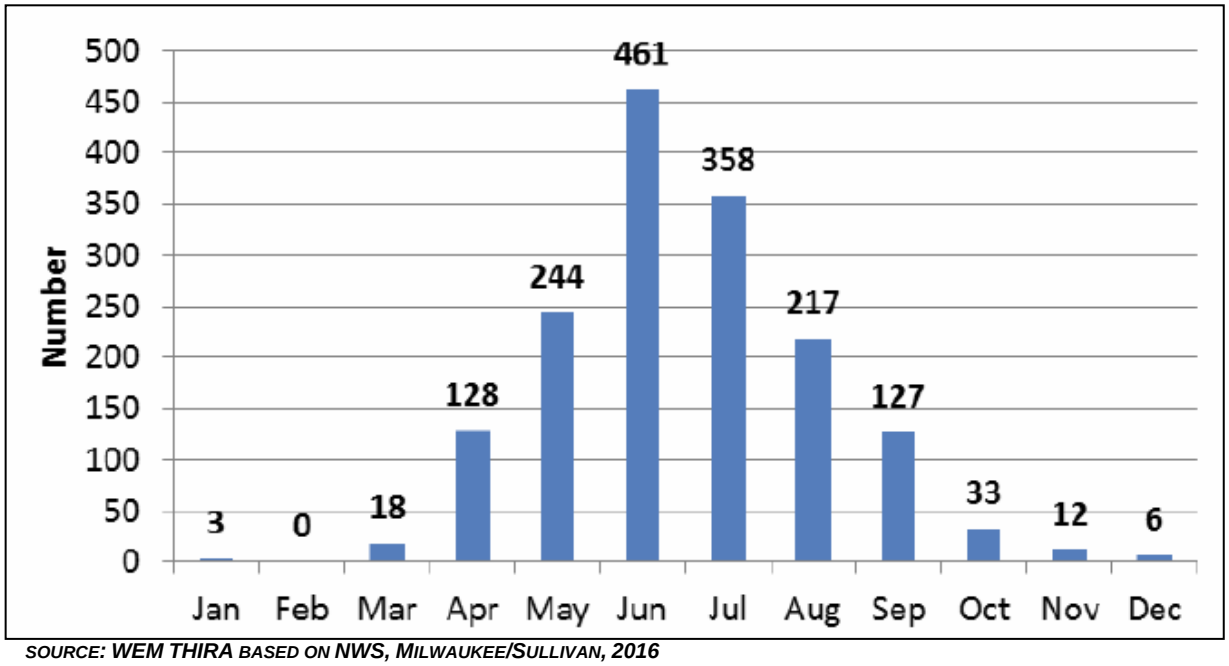
Appendix E is largely limited to National Climate Center Data (NCDC) for reported severe weather events posing a significant risk for St. Croix County. Not all severe weather events are reported in the NCDC database. Key events, especially if recent, are further discussed in Section III.

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.

From 1980 to 2015, Wisconsin experienced 44 significant tornado events, including twelve EF-3, three EF-4, and one EF-5 tornado. St. Croix County has had a moderately high number of tornadoes with 44 reported tornadoes between 1844 and 2015. Only five other counties have had higher numbers of tornado reports during this timeframe.

There have been two recent and substantial tornado events in the region outside of St. Croix 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 St. Croix 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 St. Croix 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 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 position was unfortunate.

Local Events

Shown in the following tables are the tornado and high wind events reported for St. Croix County in the National Climate Data Center (NCDC) database. All of the tornadoes occurred during the months of April through September. The majority of the events occurred between the hours of 2:00 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 April 28, 1994, tornado severely damaged at least three trailer homes, a barn, and a house near Canton and killed as many as 10,000 young turkeys. And the majority of the reported impacts in the table are associated with the May 2017 tornado event, which included the only recent tornado-related death ever reported for St. Croix County. However, damage is often under-reported. For example, the July 2019 tornado and high wind event caused extensive damage throughout St. Croix 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 St. Croix County prior to 2017. A record search yielded five different “killer tornados” which included St. Croix County in their paths. The most recent was the April 8, 1929, tornado which caused over $3.8 million in damage and resulted in at least six deaths in the County.

St. Croix County Tornado Events

Location	Date	Time	Type	Mag	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
St. Croix Co.	5/10/1953	6:35 PM	Tornado	F2	1	9	27,713,534	-
St. Croix Co.	8/15/1954	6:00 PM		F2	0	0	2,719,841	-
St. Croix Co.	5/24/1958	2:45 PM		F3	0	6	2,612,990	-
St. Croix Co.	6/4/1958	5:30 PM		F5	1	20	260,369,143	-
St. Croix Co.	6/22/1958	3:25 PM		F0	0	0	2,604	-
St. Croix Co.	10/9/1958	12:00 PM		F2	0	0	258,529	-
St. Croix Co.	9/2/1961	9:30 PM		F1	0	0	24,717	-
St. Croix Co.	7/28/1964	7:00 AM		F1	0	0	23,832	-
St. Croix Co.	7/3/1966	5:30 PM		F0	0	0	231,531	-
St. Croix Co.	6/4/1971	7:40 PM		F1	0	0	188,566	-
St. Croix Co.	6/12/1976	5:00 PM		F2	0	0	136,499	-
St. Croix Co.	7/30/1977	5:20 PM		F3	0	0	12,813,263	-
St. Croix Co.	7/15/1980	8:45 PM		F2	0	0	10,008,718	-
St. Croix Co.	7/24/1981	5:35 PM		F0	0	0	88,469	-
St. Croix Co.	8/7/1984	6:30 PM		F0	0	0	-	-
St. Croix Co.	5/29/1987	2:53 PM		F0	0	0	-	-
St. Croix Co.	7/6/1987	3:08 PM		F0	0	0	-	-
Woodville	5/30/1994	4:35 PM		F1	0	0	1,014,754	101,475
Somerset	6/5/1999	3:40 PM		F0	0	0	-	-
Hudson	7/26/2000	12:02 PM		F0	0	0	-	-
Cylon	6/11/2005	2:43 PM		F0	0	0	-	-
Emerald	6/11/2005	1:20 PM		F0	0	0	-	-
Hammond	6/11/2005	2:04 PM		F1	0	0	5,553,810	-
Roberts	9/23/2006	1:34 PM		F0	0	0	-	-
Somerset	5/25/2008	4:16 PM		EF0	0	0	-	-
Burkhardt	8/8/2009	9:24 PM		EF1	0	0	667,900	-
Hammond	8/8/2009	9:51 PM		EF0	0	0	133,580	-
Burkhardt	8/19/2009	2:05 PM		EF0	0	0	33,395	-
Emerald	8/19/2009	2:58 PM		EF0	0	0	-	-
Forest	8/19/2009	3:11 PM		EF0	0	0	-	-
Hammond	7/14/2010	9:54 AM		EF1	0	0	679,484	-
New Richmond	7/28/2021	8:48 PM		EF1	0	0	197,663	-
Funnel Cloud Reports								
River Falls	8/23/1997	6:05 PM	Funnel Cloud		0	0	-	-
River Falls	7/26/2000	11:40 AM			0	0	-	-
Wilson	9/5/2004	6:28 PM			0	0	-	-
Roberts	6/11/2005	6:18 PM			0	0	-	-
Northline	7/25/2008	2:43 PM			0	0	-	-
Hudson	8/8/2009	9:10 PM			0	0	-	-
Woodville	6/15/2010	2:25 PM			0	0	-	-
Hammond	7/14/2010	7:11 PM			0	0	-	-
River Falls	7/14/2010	1:58 PM			0	0	-	-
River Falls	7/14/2010	6:50 PM			0	0	-	-
TOTALS			**42 Events**		**2**	**35**	**325,472,820**	**101,475**

source: National Climatic Data Center (NCDC)
Damage estimates adjusted to 2023 dollars based on U.S. Bureau of Labor Statistics CPI Inflation Calculator

St. Croix County High Wind Events

Location	Date	Time	Type	Mag	Property Damage ($)	Crop Damage ($)
Hudson	4/26/1994	11:00 AM	Thunderstorm Wind	0 kts	$-	$-
Hudson	5/30/1994	3:40 PM	Thunderstorm Wind	0 kts	$101,475	$10,148
Somerset	6/25/1994	4:00 PM	Thunderstorm Wind	0 kts	$-	$101,335
Star Prairie	6/25/1994	4:10 PM	Thunderstorm Wind	0 kts	$1,013,348	$101,335
Hudson	7/5/1994	4:30 AM	Thunderstorm Wind	0 kts	$10,133	$1,013
Deer Park	6/25/1995	2:35 PM	Thunderstorm Wind	50 kts	$-	$-
Deer Park	6/25/1995	2:35 PM	Thunderstorm Wind	50 kts	$-	$-
Hudson	6/26/1995	3:20 PM	Thunderstorm Wind	60 kts	$-	$-
Maiden Rock	8/12/1995	8:32 PM	Thunderstorm Wind	0 kts	$-	$-
Maiden Rock	8/12/1995	8:32 PM	Thunderstorm Wind	0 kts	$-	$-
Hudson	5/17/1996	10:30 PM	Thunderstorm Wind	52 kts	$-	$-
New Richmond	5/19/1996	12:05 AM	Thunderstorm Wind	52 kts	$-	$-
Hudson	5/19/1996	12:55 AM	Thunderstorm Wind	85 kts	$4,807,078	$-
Roberts	5/19/1996	1:05 AM	Thunderstorm Wind	70 kts	$5,191,644	$576,849
River Falls	5/19/1996	1:15 AM	Thunderstorm Wind	70 kts	$-	$-
St Croix County	10/29/1996	11:00 PM	High Wind	50 kts	$-	$-
New Richmond Airport	6/28/1997	9:05 AM	Thunderstorm Wind	55 kts	$-	$-
Hudson	7/1/1997	7:42 PM	Thunderstorm Wind	52 kts	$-	$-
River Falls	5/30/1998	10:15 PM	Thunderstorm Wind	75 kts	$228,494	$-
Glenwood City	6/25/1998	1:26 AM	Thunderstorm Wind	55 kts	$-	$-
Hudson	6/26/1998	11:16 PM	Thunderstorm Wind	56 kts	$-	$-
Deer Park	6/5/1999	4:30 PM	Thunderstorm Wind	52 kts	$-	$-
Deer Park	7/23/1999	1:28 AM	Thunderstorm Wind	60 kts	$-	$-
Hudson	7/23/1999	1:28 AM	Thunderstorm Wind	60 kts	$-	$-
Somerset	7/30/1999	5:15 PM	Thunderstorm Wind	52 kts	$-	$-
Somerset	7/30/1999	5:33 PM	Thunderstorm Wind	50 kts	$-	$-
New Richmond	7/30/1999	5:40 PM	Thunderstorm Wind	50 kts	$-	$-
River Falls	7/7/2000	10:30 AM	Thunderstorm Wind	55 kts	$-	$-
Somerset	7/7/2000	10:30 AM	Thunderstorm Wind	55 kts	$-	$-
North Hudson	8/7/2000	11:10 PM	Thunderstorm Wind	50 kts	$-	$-
Hudson	8/26/2000	1:00 AM	Thunderstorm Wind	50 kts	$-	$-
River Falls	8/26/2000	1:20 AM	Thunderstorm Wind	50 kts	$-	$-
St Croix County	4/7/2001	9:15 AM	High Wind	53 kts	$-	$-
River Falls	5/1/2001	5:40 PM	Thunderstorm Wind	55 kts	$-	$-
Hudson	5/6/2001	6:51 PM	Thunderstorm Wind	60 kts	$-	$-
New Richmond	6/11/2001	4:40 PM	Thunderstorm Wind	52 kts	$-	$-
Star Prairie	6/11/2001	5:38 PM	Thunderstorm Wind	50 kts	$-	$-
Glenwood City	6/11/2001	5:48 PM	Thunderstorm Wind	52 kts	$-	$-
Somerset	7/17/2001	11:05 PM	Thunderstorm Wind	50 kts	$-	$-
Star Prairie	6/25/2002	7:15 PM	Thunderstorm Wind	60 kts	$-	$-
Glenwood City	6/25/2002	7:45 PM	Thunderstorm Wind	50 kts	$-	$-
Somerset	7/28/2002	6:10 PM	Thunderstorm Wind	52 kts	$-	$-
New Richmond Airport	7/28/2002	6:25 PM	Thunderstorm Wind	51 kts	$-	$-
Deer Park	7/28/2002	6:28 PM	Thunderstorm Wind	55 kts	$16,488	$-

Hudson	9/1/2002	10:00 PM	Thunderstorm Wind	55 kts	$-	$-
Baldwin	9/1/2002	10:15 PM	Thunderstorm Wind	55 kts	$-	$-
Hudson	7/4/2003	3:05 AM	Thunderstorm Wind	52 kts	$-	$-
New Richmond	7/4/2003	3:20 AM	Thunderstorm Wind	60 kts	$-	$-
Roberts	7/4/2003	3:20 AM	Thunderstorm Wind	55 kts	$-	$-
St Croix County	4/18/2004	1:00 PM	High Wind	52 kts	$-	$-
Hudson	5/9/2004	5:15 PM	Thunderstorm Wind	50 kts	$-	$-
New Richmond	5/9/2004	5:16 PM	Thunderstorm Wind	50 kts	$-	$-
Hudson	9/23/2004	1:40 PM	Thunderstorm Wind	52 kts	$-	$-
Hammond	10/29/2004	6:05 PM	Thunderstorm Wind	55 kts	$-	$-
Hammond	10/29/2004	6:05 PM	Thunderstorm Wind	55 kts	$-	$-
Emerald	10/30/2004	1:40 AM	Thunderstorm Wind	52 kts	$-	$-
St Croix County	12/12/2004	8:00 AM	Strong Wind	35 kts	$159	$-
Houlton	6/5/2005	4:00 PM	Thunderstorm Wind	50 kts	$-	$-
Hudson	6/5/2005	4:07 PM	Thunderstorm Wind	50 kts	$-	$-
Roberts	6/20/2005	12:30 PM	Thunderstorm Wind	52 kts	$-	$-
River Falls	6/27/2005	6:50 PM	Thunderstorm Wind	52 kts	$-	$-
New Richmond	6/29/2005	10:05 PM	Thunderstorm Wind	55 kts	$-	$-
Roberts	7/23/2005	10:15 AM	Thunderstorm Wind	52 kts	$-	$-
Glenwood City	7/23/2005	10:35 AM	Thunderstorm Wind	52 kts	$-	$-
St Croix County	9/12/2005	10:30 PM	Thunderstorm Wind	52 kts	$-	$-
Hudson	9/21/2005	9:00 PM	Thunderstorm Wind	52 kts	$-	$-
New Richmond Airport	8/24/2006	6:36 PM	Thunderstorm Wind	51 kts	$-	$-
Hammond	5/23/2007	4:04 PM	Thunderstorm Wind	50 kts	$-	$-
New Richmond	7/8/2007	1:58 PM	Thunderstorm Wind	50 kts	$-	$-
New Richmond	7/8/2007	2:00 PM	Thunderstorm Wind	52 kts	$-	$-
New Richmond	7/8/2007	2:03 PM	Thunderstorm Wind	54 kts	$-	$-
New Richmond	7/8/2007	2:05 PM	Thunderstorm Wind	52 kts	$-	$-
Glenwood City	7/26/2007	3:50 PM	Thunderstorm Wind	52 kts	$-	$-
Hudson	8/11/2007	2:57 AM	Thunderstorm Wind	55 kts	$-	$-
New Richmond	8/13/2007	8:35 PM	Thunderstorm Wind	78 kts	$50,235,027	$14,352,865
Wilson	8/13/2007	9:00 PM	Thunderstorm Wind	52 kts	$-	$-
River Falls	8/13/2007	10:40 PM	Thunderstorm Wind	52 kts	$-	$-
Hudson	8/28/2007	2:26 AM	Thunderstorm Wind	50 kts	$-	$-
Woodville	9/20/2007	8:28 PM	Thunderstorm Wind	50 kts	$-	$-
Star Prairie	5/25/2008	4:25 PM	Thunderstorm Wind	60 kts	$-	$-
Deer Park	5/25/2008	4:40 PM	Thunderstorm Wind	55 kts	$-	$-
Hammond	6/5/2008	5:15 PM	Thunderstorm Wind	52 kts	$-	$-
Somerset	7/11/2008	7:55 PM	Thunderstorm Wind	54 kts	$-	$-
Star Prairie	7/11/2008	8:00 PM	Thunderstorm Wind	52 kts	$-	$-
Deer Park	7/11/2008	8:20 PM	Thunderstorm Wind	55 kts	$-	$-
Baldwin	7/19/2008	4:00 PM	Thunderstorm Wind	62 kts	$-	$-
Northline	7/25/2008	2:45 PM	Thunderstorm Wind	60 kts	$-	$-
River Falls	7/25/2008	3:15 PM	Thunderstorm Wind	52 kts	$-	$-
Woodville	7/14/2010	2:00 PM	Thunderstorm Wind	52 kts	$-	$-
Baldwin	7/14/2010	2:20 PM	Thunderstorm Wind	61 kts	$-	$-
Hersey	7/14/2010	7:22 PM	Thunderstorm Wind	52 kts	$-	$-
New Richmond	7/17/2010	8:28 PM	Thunderstorm Wind	55 kts	$-	$-

Airport						
Hudson	9/21/2010	12:52 AM	Thunderstorm Wind	52 kts	$-	$-
Somerset	7/1/2011	7:45 PM	Thunderstorm Wind	52 kts	$-	$-
Roberts	7/6/2012	5:49 PM	Thunderstorm Wind	56 kts	$-	$-
Cylon	8/3/2012	10:05 PM	Thunderstorm Wind	50 kts	$-	$-
Hudson	8/3/2012	10:55 PM	Thunderstorm Wind	56 kts	$-	$-
Somerset	8/3/2012	10:55 PM	Thunderstorm Wind	52 kts	$-	$-
Roberts	8/3/2012	11:10 PM	Thunderstorm Wind	56 kts	$-	$-
Baldwin	5/19/2013	4:40 PM	Thunderstorm Wind	56 kts	$6,367	$-
New Richmond Airport	5/19/2013	4:55 PM	Thunderstorm Wind	52 kts	$6,367	$-
Deer Park	6/17/2013	12:53 PM	Thunderstorm Wind	56 kts	$-	$-
Deer Park	6/21/2013	3:25 AM	Thunderstorm Wind	52 kts	$-	$-
New Richmond	6/21/2013	3:26 AM	Thunderstorm Wind	52 kts	$-	$-
River Falls	6/21/2013	7:45 PM	Thunderstorm Wind	50 kts	$-	$-
Star Prairie	7/9/2013	7:50 AM	Thunderstorm Wind	52 kts	$-	$-
Hudson	5/3/2015	4:33 PM	Thunderstorm Wind	50 kts	$-	$-
Baldwin	5/3/2015	4:55 PM	Thunderstorm Wind	52 kts	$-	$-
Hammond	5/3/2015	5:10 PM	Thunderstorm Wind	52 kts	$-	$-
North Hudson	6/11/2017	8:10 AM	Thunderstorm Wind	52 kts	$-	$-
Somerset	7/12/2017	1:48 AM	Thunderstorm Wind	56 kts	$-	$-
Star Prairie	7/12/2017	1:52 AM	Thunderstorm Wind	56 kts	$-	$-
Star Prairie	5/25/2018	4:55 PM	Thunderstorm Wind	52 kts	$-	$-
New Richmond Airport	6/17/2018	5:15 PM	Thunderstorm Wind	50 kts	$-	$-
Hudson	8/27/2018	5:00 PM	Thunderstorm Wind	50 kts	$-	$-
Boardman	4/20/2020	3:15 PM	Thunderstorm Wind	52 kts	$5,726	$-
Deer Park	7/28/2021	8:46 PM	Thunderstorm Wind	65 kts	$112,950	$-
Hammond	7/28/2021	8:50 PM	Thunderstorm Wind	61 kts	$112,950	$28,238
Roberts	7/28/2021	9:17 PM	Thunderstorm Wind	61 kts	$28,238	$-
Hudson	9/17/2021	2:29 AM	Thunderstorm Wind	68 kts	$562,192	$-
Somerset	9/17/2021	2:30 AM	Thunderstorm Wind	61 kts	$112,438	$-
St Croix County	9/17/2021	2:31 AM	Strong Wind	48 kts	$225	$-
Roberts	9/17/2021	2:34 AM	Thunderstorm Wind	48 kts	$1,124	$-
TOTALS	75 Days		123 Events		62,552,425	15,171,782

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)

Since 1993, there have been 97 reported events. Of the reported events, three were ice storms, 13 were heavy snow, 15 were wind chill events, three were classified as “winter weather”, 62 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.

Winter storm events occurred generally between the months of November and April. Events were most common between December and March, with 19-23 events occurring. An early frost/freeze in August of 2004 and late winter storm in May of 2013 are the only outliers.

St. Croix County Winter Storms and Extreme Cold Events January 1993 – December 2022

Location	Date	Time	Type	Deaths	Injuries	Property Damage ($)
St Croix County	1/17/1996	9:00 PM	Ice Storm	0	0	-
St Croix County	1/18/1996	5:00 AM	Heavy Snow	0	0	-
St Croix County	1/31/1996	5:00 AM	Cold / Wind Chill	0	0	-
St Croix County	2/1/1996	12:00 AM	Cold / Wind Chill	0	0	-
St Croix County	2/8/1996	12:00 AM	Winter Weather	0	0	-
St Croix County	3/24/1996	1:00 AM	Heavy Snow	0	0	-
St Croix County	11/15/1996	1:00 AM	Ice Storm	0	0	-
St Croix County	11/23/1996	12:00 AM	Heavy Snow	0	0	-
St Croix County	12/14/1996	4:00 PM	Heavy Snow	0	0	-
St Croix County	12/23/1996	9:00 AM	Heavy Snow	0	0	-
St Croix County	1/15/1997	5:00 PM	Cold / Wind Chill	0	0	-
St Croix County	3/13/1997	1:00 AM	Winter Storm	0	0	-
St Croix County	1/4/1998	5:00 PM	Ice Storm	0	0	-
St Croix County	1/11/1998	10:00 AM	Winter Storm	0	0	-
St Croix County	1/22/1999	3:00 AM	Winter Storm	0	0	-
St Croix County	3/8/1999	8:00 AM	Winter Storm	0	0	-
St Croix County	1/12/2000	10:00 AM	Heavy Snow	0	0	-
St Croix County	12/28/2000	2:00 AM	Winter Storm	0	0	-
St Croix County	1/29/2001	7:00 PM	Winter Storm	0	0	-
St Croix County	2/7/2001	7:00 AM	Heavy Snow	0	0	-
St Croix County	3/12/2001	12:00 AM	Heavy Snow	0	0	-
St Croix County	3/8/2002	6:00 PM	Winter Storm	0	0	-
St Croix County	3/14/2002	8:00 AM	Winter Storm	0	0	-
St Croix County	2/2/2003	8:00 PM	Winter Storm	0	0	-
St Croix County	12/9/2003	3:00 AM	Winter Storm	0	0	-
St Croix County	1/26/2004	12:00 AM	Winter Storm	0	0	-
St Croix County	2/1/2004	2:00 AM	Winter Storm	0	0	-
St Croix County	3/5/2004	12:00 AM	Winter Storm	0	0	-
St Croix County	8/21/2004	2:00 AM	Frost/Freeze	0	0	-
St Croix County	1/1/2005	2:00 PM	Winter Storm	0	0	-
St Croix County	1/21/2005	2:00 PM	Winter Storm	0	0	-
St Croix County	2/19/2005	9:00 PM	Winter Storm	0	0	-
St Croix County	3/18/2005	6:00 AM	Winter Storm	0	0	-
St Croix County	3/12/2006	8:00 PM	Winter Storm	0	0	-
St Croix County	3/15/2006	10:00 PM	Winter Storm	0	0	-
St Croix County	2/24/2007	5:00 AM	Winter Storm	0	0	-
St Croix County	3/1/2007	12:00 AM	Winter Storm	0	0	-
St Croix County	12/1/2007	10:00 AM	Winter Storm	0	0	-
St Croix County	2/10/2008	2:00 AM	Cold / Wind Chill	0	0	-
St Croix County	2/19/2008	6:00 PM	Cold / Wind Chill	0	0	-
St Croix County	3/31/2008	9:30 AM	Heavy Snow	0	0	-

St Croix County	4/1/2008	12:00 AM	Heavy Snow	0	0	-
St Croix County	12/20/2008	6:00 PM	Winter Storm	0	0	-
St Croix County	12/30/2008	1:15 PM	Winter Storm	0	0	-
St Croix County	1/15/2009	12:00 AM	Cold / Wind Chill	0	0	-
St Croix County	2/26/2009	1:00 PM	Winter Storm	0	0	-
St Croix County	10/12/2009	6:00 AM	Winter Weather	0	0	-
St Croix County	12/8/2009	12:00 PM	Winter Storm	0	0	-
St Croix County	12/23/2009	7:00 PM	Winter Storm	0	0	-
St Croix County	12/3/2010	3:00 PM	Winter Storm	0	0	-
St Croix County	12/10/2010	10:00 PM	Winter Storm	2	0	271,041
St Croix County	2/20/2011	10:00 AM	Winter Storm	0	0	-
St Croix County	3/22/2011	9:00 PM	Winter Storm	0	0	-
St Croix County	12/9/2012	2:00 AM	Winter Storm	0	0	-
St Croix County	1/27/2013	3:00 PM	Winter Storm	0	0	-
St Croix County	3/4/2013	12:00 PM	Winter Storm	0	0	-
St Croix County	4/10/2013	3:00 AM	Winter Storm	0	0	-
St Croix County	4/22/2013	7:00 PM	Winter Storm	0	0	-
St Croix County	5/1/2013	5:00 PM	Winter Storm	0	0	63,672
St Croix County	1/5/2014	8:00 PM	Extreme Cold / Wind Chill	0	0	-
St Croix County	1/14/2014	6:00 AM	Winter Storm	0	0	-
St Croix County	1/23/2014	6:00 AM	Extreme Cold / Wind Chill	0	0	-
St Croix County	1/27/2014	2:00 AM	Extreme Cold / Wind Chill	0	0	-
St Croix County	1/30/2014	6:00 AM	Winter Storm	0	0	-
St Croix County	2/20/2014	4:00 PM	Winter Storm	0	0	-
St Croix County	2/27/2014	6:00 AM	Extreme Cold / Wind Chill	0	0	-
St Croix County	4/3/2014	2:00 PM	Winter Storm	0	0	-
St Croix County	11/10/2014	4:00 AM	Winter Storm	0	0	-
St Croix County	1/17/2016	6:00 AM	Extreme Cold / Wind Chill	0	0	-
St Croix County	2/2/2016	11:00 AM	Winter Storm	0	0	-
St Croix County	3/23/2016	10:30 AM	Winter Storm	0	0	-
St Croix County	12/18/2016	1:00 AM	Extreme Cold / Wind Chill	0	0	-
St Croix County	1/22/2018	7:30 AM	Winter Storm	0	0	-
St Croix County	3/30/2018	10:30 PM	Winter Storm	0	0	-
St Croix County	4/3/2018	4:00 AM	Winter Storm	0	0	-
St Croix County	4/13/2018	9:00 PM	Winter Storm	0	0	-
St Croix County	1/29/2019	3:00 PM	Extreme Cold / Wind Chill	0	0	-
St Croix County	2/5/2019	1:00 PM	Heavy Snow	0	0	-
St Croix County	2/7/2019	8:00 AM	Heavy Snow	0	0	-
St Croix County	2/10/2019	8:00 AM	Heavy Snow	0	0	-
St Croix County	2/11/2019	11:00 PM	Winter Storm	0	0	-
St Croix County	2/20/2019	2:30 AM	Winter Storm	0	0	-
St Croix County	4/10/2019	1:00 PM	Winter Storm	0	0	-

St Croix County	11/26/2019	9:00 PM	Winter Storm	0	0	-
St Croix County	12/30/2019	7:00 AM	Winter Storm	0	0	-
St Croix County	1/17/2020	2:00 PM	Winter Storm	0	0	-
St Croix County	2/9/2020	3:00 AM	Winter Storm	0	0	-
St Croix County	4/12/2020	7:00 AM	Winter Storm	0	0	-
St Croix County	10/20/2020	10:30 AM	Winter Storm	0	0	-
St Croix County	12/23/2020	2:00 PM	Winter Storm	0	0	-
St Croix County	2/14/2021	1:00 AM	Extreme Cold / Wind Chill	0	0	-
St Croix County	2/15/2021	12:00 AM	Extreme Cold / Wind Chill	0	0	-
St Croix County	12/10/2021	12:30 PM	Winter Storm	0	0	-
St Croix County	2/22/2022	3:00 AM	Winter Storm	0	0	-
St Croix County	11/28/2022	11:00 PM	Winter Storm	0	0	-
St Croix County	12/21/2022	11:00 AM	Winter Storm	0	0	-
St Croix County	12/23/2022	12:00 PM	Winter Weather	0	0	-
TOTALS			**97 Events**	**2**	**0**	**334,713**

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 event in St. Croix 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. Since 1993, there have been 125 days during which storms were reported, which included 269 separately reported events. Of the reported events, 118 were thunderstorm wind events, 136 were hail events, 10 were lightning, and five were for heavy rain.

High winds are discussed in the previous section. The event "Thunderstorm Wind" indicates both a high wind event and a thunderstorm event. To emphasis the focus on the thunderstorm component, "Thunderstorm Wind" events have been modified to "Thunderstorm" events for this data table.

Events occurred generally between the months of April and October. Events were most common between May and July, with 65-66 events occurring each month.

St. Croix County Thunderstorms & Severe Storm Events January 1993 – December 2022

Location	Date	Time	Type	Mag.	Deaths	Inj.	Property Damage ($)	Crop Damage ($)
Burkhardt	4/26/1994	11:00 AM	Hail	0.75 in	0	0	-	-
Hudson	4/26/1994	11:00 AM	Thunderstorm	0 kts	0	0	-	-
Baldwin	4/26/1994	11:25 AM	Hail	0.75 in	0	0	-	-
Glenwood City	4/26/1994	11:30 AM	Hail	0.75 in	0	0	-	-
Somerset	5/30/1994	3:38 PM	Hail	1.5 in	0	0	-	-
Hudson	5/30/1994	3:40 PM	Thunderstorm	0 kts	0	0	101,475	10,148
Somerset	6/25/1994	4:00 PM	Thunderstorm	0 kts	0	0	-	101,335
Star Prairie	6/25/1994	4:10 PM	Thunderstorm	0 kts	0	0	1,013,348	101,335
River Falls	6/27/1994	5:43 PM	Hail	0.75 in	0	0	-	-
Hudson	7/5/1994	4:30 AM	Thunderstorm	0 kts	0	0	10,133	1,013

Deer Park	6/25/1995	2:35 PM	Thunderstorm	50 kts	0	0	-	-
Deer Park	6/25/1995	2:35 PM	Thunderstorm	50 kts	0	0	-	-
Star Prairie	6/25/1995	3:15 PM	Hail	0.75 in	0	0	-	-
Star Prairie	6/25/1995	3:15 PM	Hail	0.75 in	0	0	-	-
Burkhardt	6/25/1995	4:00 PM	Hail	0.75 in	0	0	-	-
Burkhardt	6/25/1995	4:00 PM	Hail	0.75 in	0	0	-	-
Hudson	6/26/1995	3:20 PM	Thunderstorm	60 kts	0	0	-	-
Maiden Rock	8/12/1995	8:32 PM	Thunderstorm	0 kts	0	0	-	-
Maiden Rock	8/12/1995	8:32 PM	Thunderstorm	0 kts	0	0	-	-
Hudson	5/17/1996	10:30 PM	Hail	1.75 in	0	0	-	-
Hudson	5/17/1996	10:30 PM	Thunderstorm	52 kts	0	0	-	-
New Richmond	5/17/1996	10:45 PM	Hail	1. in	0	0	-	-
New Richmond	5/18/1996	10:45 PM	Hail	1. in	0	0	-	-
New Richmond	5/19/1996	12:05 AM	Thunderstorm	52 kts	0	0	-	-
Hudson	5/19/1996	12:55 AM	Thunderstorm	85 kts	0	0	4,807,078	-
Roberts	5/19/1996	1:05 AM	Thunderstorm	70 kts	0	0	5,191,644	576,849
River Falls	5/19/1996	1:15 AM	Thunderstorm	70 kts	0	0	-	-
Baldwin	6/26/1996	12:09 PM	Hail	0.75 in	0	0	-	-
River Falls	10/16/1996	6:59 PM	Hail	0.75 in	0	0	-	-
Hammond	10/16/1996	7:30 PM	Hail	0.88 in	0	0	-	-
Baldwin	6/15/1997	2:15 PM	Hail	0.75 in	0	0	-	-
River Falls	6/15/1997	2:15 PM	Hail	0.75 in	0	0	-	-
New Richmond Airport	6/28/1997	9:05 AM	Thunderstorm	55 kts	0	0	-	-
Hudson	7/1/1997	7:42 PM	Thunderstorm	52 kts	0	0	-	-
Woodville	3/29/1998	4:04 PM	Hail	0.75 in	0	0	-	-
River Falls	5/30/1998	10:15 PM	Thunderstorm	75 kts	0	0	228,494	-
Roberts	6/15/1998	6:48 PM	Hail	1.75 in	0	0	-	-
Hudson	6/15/1998	7:10 PM	Hail	1.75 in	0	0	-	-
Glenwood City	6/25/1998	1:26 AM	Thunderstorm	55 kts	0	0	-	-
Hudson	6/26/1998	11:16 PM	Thunderstorm	56 kts	0	0	-	-
Baldwin	6/5/1999	4:30 PM	Hail	1.75 in	0	0	-	-
Deer Park	6/5/1999	4:30 PM	Thunderstorm	52 kts	0	0	-	-
Deer Park	7/23/1999	1:28 AM	Thunderstorm	60 kts	0	0	-	-
Hudson	7/23/1999	1:28 AM	Thunderstorm	60 kts	0	0	-	-
Somerset	7/30/1999	5:15 PM	Thunderstorm	52 kts	0	0	-	-
Somerset	7/30/1999	5:33 PM	Thunderstorm	50 kts	0	0	-	-
New Richmond	7/30/1999	5:40 PM	Thunderstorm	50 kts	0	0	-	-
River Falls	7/30/1999	5:52 PM	Hail	0.75 in	0	0	-	-
River Falls	7/7/2000	10:30 AM	Thunderstorm	55 kts	0	0	-	-
Somerset	7/7/2000	10:30 AM	Thunderstorm	55 kts	0	0	-	-
Hudson	7/7/2000	10:50 AM	Hail	0.75 in	0	0	-	-
North Hudson	8/7/2000	11:10 PM	Thunderstorm	50 kts	0	0	-	-
Somerset	8/12/2000	10:35 PM	Lightning		1	2	-	-
Hudson	8/26/2000	1:00 AM	Thunderstorm	50 kts	0	0	-	-
River Falls	8/26/2000	1:20 AM	Thunderstorm	50 kts	0	0	-	-
Hudson	10/26/2000	5:14 PM	Hail	1. in	0	0	-	-
River Falls	10/26/2000	5:33 PM	Hail	1. in	0	0	-	-
River Falls	5/1/2001	5:30 PM	Hail	1.25 in	0	0	-	-
River Falls	5/1/2001	5:40 PM	Hail	1.75 in	0	0	5,119,328	-
River Falls	5/1/2001	5:40 PM	Thunderstorm	55 kts	0	0	-	-
Baldwin	5/1/2001	6:04 PM	Hail	1.75 in	0	0	-	-
Hudson	5/6/2001	6:51 PM	Thunderstorm	60 kts	0	0	-	-
New Richmond	6/11/2001	4:40 PM	Thunderstorm	52 kts	0	0	-	-

Star Prairie	6/11/2001	5:38 PM	Thunderstorm	50 kts	0	0	-	-
Glenwood City	6/11/2001	5:48 PM	Thunderstorm	52 kts	0	0	-	-
Hammond	6/18/2001	5:45 AM	Hail	0.75 in	0	0	-	-
Baldwin	6/18/2001	5:50 AM	Hail	1. in	0	0	-	-
Somerset	7/17/2001	11:05 PM	Thunderstorm	50 kts	0	0	-	-
Roberts	4/18/2002	3:30 AM	Hail	0.75 in	0	0	-	-
Somerset	5/5/2002	5:39 PM	Hail	1.75 in	0	0	-	-
Star Prairie	5/5/2002	5:53 PM	Hail	0.75 in	0	0	-	-
New Richmond	5/5/2002	5:55 PM	Hail	1.75 in	0	0	-	-
Glenwood City	5/5/2002	6:17 PM	Hail	1.75 in	0	0	-	-
North Hudson	5/5/2002	6:30 PM	Hail	1.75 in	0	0	-	-
Hudson	5/5/2002	6:40 PM	Hail	0.75 in	0	0	-	-
Star Prairie	6/25/2002	7:15 PM	Thunderstorm	60 kts	0	0	-	-
Star Prairie	6/25/2002	7:15 PM	Hail	1. in	0	0	-	-
Glenwood City	6/25/2002	7:45 PM	Thunderstorm	50 kts	0	0	-	-
Somerset	7/28/2002	6:10 PM	Thunderstorm	52 kts	0	0	-	-
New Richmond Airport	7/28/2002	6:25 PM	Thunderstorm	51 kts	0	0	-	-
Deer Park	7/28/2002	6:28 PM	Thunderstorm	55 kts	0	0	16,488	-
Hudson	9/1/2002	10:00 PM	Thunderstorm	55 kts	0	0	-	-
Baldwin	9/1/2002	10:15 PM	Thunderstorm	55 kts	0	0	-	-
Hudson	7/4/2003	3:05 AM	Thunderstorm	52 kts	0	0	-	-
New Richmond	7/4/2003	3:20 AM	Thunderstorm	60 kts	0	0	-	-
Roberts	7/4/2003	3:20 AM	Thunderstorm	55 kts	0	0	-	-
Somerset	7/11/2003	4:41 PM	Hail	1. in	0	0	-	-
River Falls	4/18/2004	1:05 AM	Hail	1. in	0	0	-	-
Glenwood City	4/18/2004	1:46 AM	Hail	1.5 in	0	0	-	-
Hudson	5/9/2004	5:15 PM	Thunderstorm	50 kts	0	0	-	-
New Richmond	5/9/2004	5:16 PM	Thunderstorm	50 kts	0	0	-	-
Woodville	6/12/2004	7:51 PM	Hail	0.75 in	0	0	-	-
Hudson	9/23/2004	1:40 PM	Thunderstorm	52 kts	0	0	-	-
Hammond	10/29/2004	6:05 PM	Thunderstorm	55 kts	0	0	-	-
Hammond	10/29/2004	6:05 PM	Thunderstorm	55 kts	0	0	-	-
Emerald	10/30/2004	1:40 AM	Thunderstorm	52 kts	0	0	-	-
Houlton	6/5/2005	4:00 PM	Thunderstorm	50 kts	0	0	-	-
Hudson	6/5/2005	4:07 PM	Thunderstorm	50 kts	0	0	-	-
Somerset	6/7/2005	7:20 AM	Hail	0.75 in	0	0	-	-
Somerset	6/7/2005	7:24 AM	Lightning		0	1	-	-
Glenwood City	6/8/2005	3:30 AM	Hail	0.75 in	0	0	-	-
Hammond	6/8/2005	3:55 AM	Hail	0.88 in	0	0	-	-
Hudson	6/8/2005	4:45 AM	Lightning		0	0	-	-
Roberts	6/20/2005	12:30 PM	Thunderstorm	52 kts	0	0	-	-
River Falls	6/27/2005	6:50 PM	Thunderstorm	52 kts	0	0	-	-
New Richmond	6/29/2005	10:05 PM	Thunderstorm	55 kts	0	0	-	-
Glenwood City	6/29/2005	10:30 PM	Hail	0.88 in	0	0	-	-
River Falls	7/8/2005	5:55 PM	Hail	1.5 in	0	0	-	-
Roberts	7/23/2005	10:15 AM	Thunderstorm	52 kts	0	0	-	-
Somerset	7/23/2005	10:15 AM	Lightning		0	3	-	-
Glenwood City	7/23/2005	10:35 AM	Thunderstorm	52 kts	0	0	-	-
Burkhardt	8/8/2005	4:45 AM	Hail	0.75 in	0	0	-	-
Roberts	8/9/2005	2:40 PM	Hail	1.75 in	0	0	-	-
St Croix County	9/12/2005	10:30 PM	Thunderstorm	52 kts	0	0	-	-
Hudson	9/21/2005	9:00 PM	Thunderstorm	52 kts	0	0	-	-
Somerset	5/29/2006	6:30 PM	Hail	0.88 in	0	0	-	-

Somerset	7/24/2006	5:24 PM	Hail	0.75 in	0	0	-	-
Hudson	8/24/2006	2:35 PM	Hail	0.75 in	0	0	-	-
Roberts	8/24/2006	2:45 PM	Hail	1. in	0	0	-	-
Roberts	8/24/2006	2:46 PM	Hail	1. in	0	0	-	-
Roberts	8/24/2006	3:56 PM	Hail	1.75 in	0	0	-	-
New Richmond Airport	8/24/2006	6:36 PM	Thunderstorm	51 kts	0	0	-	-
Emerald	10/3/2006	6:00 PM	Hail	0.75 in	0	0	-	-
Hammond	5/23/2007	4:04 PM	Thunderstorm	50 kts	0	0	-	-
Hammond	6/7/2007	2:38 AM	Hail	1.25 in	0	0	-	-
Hudson	6/20/2007	8:40 PM	Hail	0.75 in	0	0	-	-
New Richmond	6/20/2007	8:43 PM	Hail	1. in	0	0	-	-
River Falls	6/20/2007	8:57 PM	Hail	1. in	0	0	-	-
New Richmond	7/8/2007	1:58 PM	Thunderstorm	50 kts	0	0	-	-
New Richmond	7/8/2007	2:00 PM	Thunderstorm	52 kts	0	0	-	-
New Richmond	7/8/2007	2:03 PM	Thunderstorm	54 kts	0	0	-	-
New Richmond	7/8/2007	2:05 PM	Thunderstorm	52 kts	0	0	-	-
Glenwood City	7/26/2007	3:50 PM	Thunderstorm	52 kts	0	0	-	-
Hudson	8/11/2007	2:57 AM	Thunderstorm	55 kts	0	0	-	-
New Richmond	8/13/2007	8:35 PM	Thunderstorm	78 kts	0	0	50,235,027	14,352,865
Hammond	8/13/2007	8:55 PM	Hail	0.75 in	0	0	-	-
Wilson	8/13/2007	9:00 PM	Thunderstorm	52 kts	0	0	-	-
River Falls	8/13/2007	10:40 PM	Thunderstorm	52 kts	0	0	-	-
Hudson	8/28/2007	2:26 AM	Thunderstorm	50 kts	0	0	-	-
Woodville	9/20/2007	8:28 PM	Thunderstorm	50 kts	0	0	-	-
Star Prairie	5/25/2008	4:25 PM	Thunderstorm	60 kts	0	0	-	-
Deer Park	5/25/2008	4:40 PM	Thunderstorm	55 kts	0	0	-	-
New Richmond Airport	5/25/2008	5:00 PM	Hail	2.5 in	0	0	-	-
Somerset	5/25/2008	5:00 PM	Hail	2.75 in	0	0	-	-
Star Prairie	5/25/2008	5:00 PM	Hail	3. in	0	0	-	-
Star Prairie	5/25/2008	5:02 PM	Hail	1. in	0	0	-	-
New Richmond	5/25/2008	5:06 PM	Hail	1. in	0	0	-	-
New Richmond	5/25/2008	5:06 PM	Hail	1.75 in	0	0	-	-
Erin	5/25/2008	5:10 PM	Hail	0.75 in	0	0	-	-
Cylon	5/25/2008	5:18 PM	Hail	2. in	0	0	-	-
Emerald	5/25/2008	5:22 PM	Hail	2.5 in	0	0	-	-
Glenwood City	5/25/2008	5:24 PM	Hail	1.75 in	0	0	-	-
Glenwood City	5/25/2008	5:42 PM	Hail	0.75 in	0	0	-	-
Hammond	6/5/2008	5:15 PM	Thunderstorm	52 kts	0	0	-	-
Somerset	7/11/2008	7:55 PM	Thunderstorm	54 kts	0	0	-	-
Star Prairie	7/11/2008	8:00 PM	Thunderstorm	52 kts	0	0	-	-
Deer Park	7/11/2008	8:20 PM	Thunderstorm	55 kts	0	0	-	-
New Richmond Airport	7/16/2008	10:35 AM	Hail	1. in	0	0	-	-
New Richmond Airport	7/16/2008	10:42 AM	Hail	1. in	0	0	-	-
Roberts	7/19/2008	3:34 PM	Hail	0.75 in	0	0	-	-
Hammond	7/19/2008	3:35 PM	Hail	1. in	0	0	-	-
Baldwin	7/19/2008	3:47 PM	Hail	0.75 in	0	0	-	-
Baldwin	7/19/2008	4:00 PM	Thunderstorm	62 kts	0	0	-	-
Northline	7/25/2008	2:45 PM	Thunderstorm	60 kts	0	0	-	-
River Falls	7/25/2008	3:15 PM	Thunderstorm	52 kts	0	0	-	-

Star Prairie	5/5/2009	1:34 PM	Hail	0.88 in	0	0	-	-
River Falls	7/24/2009	7:50 AM	Hail	0.88 in	0	0	-	-
River Falls	7/24/2009	8:00 AM	Hail	0.88 in	0	0	-	-
Roberts	8/2/2009	11:23 PM	Hail	1. in	0	0	-	-
Star Prairie	8/8/2009	7:40 AM	Hail	0.75 in	0	0	-	-
Emerald	8/8/2009	10:05 AM	Hail	0.88 in	0	0	-	-
New Richmond	8/8/2009	9:30 PM	Lightning		0	0	33,395	-
Hammond	6/6/2010	1:02 PM	Hail	0.75 in	0	0	-	-
Hammond	7/11/2010	3:51 PM	Hail	0.75 in	0	0	-	-
Baldwin	7/11/2010	5:31 PM	Hail	1. in	0	0	-	-
Glenwood City	7/14/2010	7:00 AM	Heavy Rain		0	0	-	-
Woodville	7/14/2010	2:00 PM	Thunderstorm	52 kts	0	0	-	-
Baldwin	7/14/2010	2:20 PM	Thunderstorm	61 kts	0	2	-	-
Hersey	7/14/2010	7:22 PM	Thunderstorm	52 kts	0	0	-	-
New Richmond Airport	7/17/2010	8:28 PM	Thunderstorm	55 kts	0	0	-	-
Glenwood City	8/10/2010	11:00 PM	Heavy Rain		0	0	-	-
Roberts	8/13/2010	4:45 AM	Lightning		0	0	54,237	-
River Falls	8/13/2010	5:13 PM	Hail	0.75 in	0	0	-	-
Hudson	9/21/2010	12:52 AM	Thunderstorm	52 kts	0	0	-	-
Burkhardt	5/9/2011	7:00 AM	Lightning		0	0	134,136	-
Somerset	7/1/2011	7:45 PM	Thunderstorm	52 kts	0	0	-	-
Somerset	5/3/2012	9:31 AM	Hail	0.75 in	0	0	-	-
Forest	5/3/2012	10:03 AM	Hail	1. in	0	0	-	-
Hudson	5/26/2012	10:30 AM	Lightning		0	0	971,355	-
New Richmond Airport	6/14/2012	12:05 PM	Hail	0.75 in	0	0	-	-
Roberts	7/6/2012	5:49 PM	Thunderstorm	56 kts	0	0	-	-
Cylon	8/3/2012	10:05 PM	Thunderstorm	50 kts	0	0	-	-
Hudson	8/3/2012	10:55 PM	Thunderstorm	56 kts	0	0	-	-
Somerset	8/3/2012	10:55 PM	Thunderstorm	52 kts	0	0	-	-
Roberts	8/3/2012	11:10 PM	Thunderstorm	56 kts	0	0	-	-
Hudson	8/18/2012	9:45 PM	Lightning		0	0	387,545	-
Baldwin	5/19/2013	4:40 PM	Thunderstorm	56 kts	0	0	6,367	-
New Richmond Airport	5/19/2013	4:55 PM	Thunderstorm	52 kts	0	0	6,367	-
Woodville	5/31/2013	4:11 PM	Hail	1.75 in	0	0	-	-
Star Prairie	6/17/2013	12:36 PM	Hail	0.75 in	0	0	-	-
Deer Park	6/17/2013	12:53 PM	Thunderstorm	56 kts	0	0	-	-
Deer Park	6/17/2013	12:55 PM	Hail	0.75 in	0	0	-	-
Deer Park	6/21/2013	3:25 AM	Thunderstorm	52 kts	0	0	-	-
New Richmond	6/21/2013	3:26 AM	Thunderstorm	52 kts	0	0	-	-
River Falls	6/21/2013	7:45 PM	Thunderstorm	50 kts	0	0	-	-
Hudson	6/21/2013	8:00 PM	Heavy Rain		0	0	-	-
Star Prairie	7/9/2013	7:50 AM	Thunderstorm	52 kts	0	0	-	-
Hudson	5/3/2015	4:33 PM	Thunderstorm	50 kts	0	0	-	-
North Hudson	5/3/2015	4:53 PM	Hail	1.25 in	0	0	-	-
Baldwin	5/3/2015	4:55 PM	Thunderstorm	52 kts	0	0	-	-
Hammond	5/3/2015	5:10 PM	Thunderstorm	52 kts	0	0	-	-
New Richmond	6/29/2015	5:05 PM	Hail	1. in	0	0	-	-
Hudson	7/6/2015	2:00 AM	Heavy Rain		0	0	-	-
River Falls	7/6/2015	2:00 AM	Heavy Rain		0	0	-	-
Hammond	7/13/2016	10:00 AM	Hail	1.4 in	0	0	-	-
Glenwood City	7/13/2016	10:12 AM	Hail	1. in	0	0	-	-

Hammond	9/21/2016	12:00 AM	Hail	1. in	0	0	-	-
Hammond	10/17/2016	10:40 PM	Hail	0.75 in	0	0	-	-
Boardman	4/14/2017	10:30 AM	Lightning		0	2	-	-
Hudson	6/11/2017	8:10 AM	Hail	0.75 in	0	0	-	-
North Hudson	6/11/2017	8:10 AM	Thunderstorm	52 kts	0	0	-	-
Somerset	6/11/2017	8:17 AM	Hail	2. in	0	0	-	-
Somerset	6/11/2017	8:22 AM	Hail	1.5 in	0	0	-	-
Deer Park	6/11/2017	8:25 AM	Hail	1. in	0	0	-	-
Hammond	6/11/2017	8:25 AM	Hail	1.75 in	0	0	-	-
New Richmond	6/11/2017	8:25 AM	Hail	1. in	0	0	-	-
New Richmond	6/11/2017	8:25 AM	Hail	1.25 in	0	0	-	-
New Richmond	6/11/2017	8:25 AM	Hail	1.75 in	0	0	-	-
Cylon	6/11/2017	8:32 AM	Hail	1.25 in	0	0	-	-
Somerset	7/12/2017	1:48 AM	Thunderstorm	56 kts	0	0	-	-
Star Prairie	7/12/2017	1:52 AM	Thunderstorm	56 kts	0	0	-	-
Star Prairie	5/25/2018	4:55 PM	Thunderstorm	52 kts	0	0	-	-
New Richmond Airport	6/17/2018	5:15 PM	Thunderstorm	50 kts	0	0	-	-
New Richmond Airport	8/26/2018	6:16 AM	Hail	1.5 in	0	0	-	-
Cylon	8/26/2018	6:25 AM	Hail	0.88 in	0	0	-	-
Hudson	8/27/2018	5:00 PM	Thunderstorm	50 kts	0	0	-	-
Hersey	9/24/2019	6:34 PM	Hail	1. in	0	0	-	-
Boardman	4/20/2020	3:15 PM	Thunderstorm	52 kts	0	0	5,726	-
River Falls	7/9/2020	4:47 AM	Hail	1. in	0	0	-	-
Hammond	5/15/2021	4:20 PM	Hail	1.25 in	0	0	-	-
New Richmond	7/28/2021	11:30 AM	Hail	0.75 in	0	0	-	-
Deer Park	7/28/2021	8:46 PM	Thunderstorm	65 kts	0	0	112,950	-
Hammond	7/28/2021	8:50 PM	Thunderstorm	61 kts	0	0	112,950	28,238
New Richmond	7/28/2021	8:55 PM	Hail	1.5 in	0	0	-	-
New Richmond	7/28/2021	8:56 PM	Hail	0.75 in	0	0	-	-
Roberts	7/28/2021	9:17 PM	Thunderstorm	61 kts	0	0	28,238	-
Hudson	9/17/2021	2:29 AM	Thunderstorm	68 kts	0	0	562,192	-
Somerset	9/17/2021	2:30 AM	Thunderstorm	61 kts	0	0	112,438	-
Roberts	9/17/2021	2:34 AM	Thunderstorm	48 kts	0	0	1,124	-
New Richmond	5/9/2022	5:25 PM	Hail	1. in	0	0	-	-
Houlton	5/19/2022	3:07 PM	Hail	1. in	0	0	-	-
Burkhardt	5/19/2022	3:08 PM	Hail	1. in	0	0	-	-
Hudson	5/19/2022	3:13 PM	Hail	2. in	0	0	-	-
Hudson	5/19/2022	3:13 PM	Hail	1.5 in	0	0	-	-
North Hudson	5/19/2022	3:13 PM	Hail	1.5 in	0	0	-	-
Burkhardt	5/19/2022	3:15 PM	Hail	1.4 in	0	0	-	-
Hudson	5/19/2022	3:18 PM	Hail	2. in	0	0	-	-
Roberts	5/19/2022	3:21 PM	Hail	1.5 in	0	0	-	-
River Falls	5/19/2022	3:25 PM	Hail	1. in	0	0	-	-
Baldwin	5/19/2022	3:33 PM	Hail	1.75 in	0	0	-	-
Hammond	5/19/2022	3:34 PM	Hail	1.5 in	0	0	-	-
Forest	9/2/2022	5:05 PM	Hail	1.5 in	0	0	-	-
New Richmond	9/20/2022	7:04 PM	Hail	1. in	0	0	-	-
Glenwood City	9/20/2022	7:35 PM	Hail	1.75 in	0	0	-	-
Hudson	9/20/2022	7:35 PM	Hail	1.5 in	0	0	-	-
Hudson	9/20/2022	7:35 PM	Hail	1.25 in	0	0	-	-
River Falls	9/20/2022	7:42 PM	Hail	2.75 in	0	0	-	-
River Falls	9/20/2022	7:44 PM	Hail	3. in	0	0	-	-

River Falls	9/20/2022	7:50 PM	Hail	1.25 in	0	0	-	-
TOTALS	**125 Days**		**269 Events**		**1**	**10**	**69,252,038**	**15,171,782**

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

Since 1993, there have been 24 reported events. Of the reported events, five were heavy rain events, three were flood events, and 16 were flash flood events. One flash flood, occurring in June of 2020 was the cause of almost all reported property damage since 1993. Flood events have been increasing in the number of reports since 1993. The most heavily reported period was during 2010-2016, when 15 flood events (63%) were reported. Events occurred generally between the months of April and August. Events were most common between June and July, with seven and eight events occurring respectively.

St. Croix County Flooding Events January 1993 – December 2022

Location	Date	Time	Type	Deaths	Injuries	Property Damage ($)
St Croix County	4/6/1997	6:00 AM	Flood	0	0	-
St Croix County	4/1/2001	12:00 PM	Flood	0	0	-
St Croix County	5/1/2001	12:00 AM	Flood	0	0	-
St Croix County	8/1/2001	8:00 AM	Flash Flood	0	0	338,721
Hudson	6/25/2003	12:00 AM	Flash Flood	0	0	-
River Falls	7/8/2005	7:30 PM	Flash Flood	0	0	-
River Falls	10/4/2005	9:00 PM	Flash Flood	0	0	-
Baldwin	6/26/2010	11:30 PM	Flash Flood	0	0	-
Glenwood City	7/14/2010	7:00 AM	Heavy Rain	0	0	-
Glenwood City	8/10/2010	11:00 PM	Heavy Rain	0	0	-
Baldwin	8/11/2010	1:00 AM	Flash Flood	0	0	-
Woodville	8/11/2010	1:00 AM	Flash Flood	0	0	-
Hudson	6/21/2013	8:00 PM	Heavy Rain	0	0	-
Roberts	6/21/2013	8:30 PM	Flash Flood	0	0	-
Woodville	6/21/2013	8:30 PM	Flash Flood	0	0	6,377
Baldwin	6/21/2013	9:00 PM	Flash Flood	0	0	159,413
Hudson	7/6/2015	2:00 AM	Heavy Rain	0	0	-
River Falls	7/6/2015	2:00 AM	Heavy Rain	0	0	-
Hudson	7/6/2015	3:30 AM	Flash Flood	0	0	442,207
Hudson	7/6/2015	3:30 AM	Flash Flood	0	0	-
River Falls	7/6/2015	3:30 AM	Flash Flood	0	0	-
River Falls	7/6/2015	3:30 AM	Flash Flood	0	0	-
Roberts	4/17/2019	12:45 PM	Flash Flood	0	0	-
Deer Park	6/29/2020	1:30 AM	Flash Flood	1	0	9,140,360
TOTALS	**15 Days**		**24 Events**	**1**	**0**	**10,087,078**

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 is rare in the greater west central Wisconsin region. Only eight events have been reported since 1993, with three events occurring in 2001 alone. See the Drought section for more information.

The NCDC database includes 8 extreme heat events, though the events in 1999 and 2001 were reported on multiple dates.

St. Croix County Heat/Excessive Heat Events January 1993 – December 2022

Location	Date	Time	Type
St Croix County	7/23/1999	10:00 AM	Heat
St Croix County	7/29/1999	3:00 AM	Heat
St Croix County	7/31/2001	9:00 AM	Heat
St Croix County	8/1/2001	12:00 AM	Heat
St Croix County	8/4/2001	12:00 PM	Heat
St Croix County	7/31/2006	10:00 AM	Heat
St Croix County	7/18/2011	12:00 PM	Excessive Heat
St Croix County	7/20/2016	1:00 PM	Excessive Heat
TOTALS	**8 Days**		**8 Events**

source: National Climatic Data Center (NCDC)

APPENDIX F.

AUGUST 2010 FLOOD INFORMATION

The following information and maps provide highlights of the impacts of the August 2010 flooding event.

Damage summary from CDBG-EAP grant application prepared by St. Croix County Emergency Support Services.

During the late hours of August 10th into the early morning of August 11th, 2010, areas across St. Croix County experienced a rainstorm of immense magnitude. Rainfall reports of 6" to 8" in a two hour period were reported throughout the region by local wastewater treatment plant gauges. Added to the already saturated ground from previous rainfall, major flooding occurred just after midnight throughout the region. Small creeks and dry-runs swelled and overflowed their banks. Water covered roads. Ground collapsed, mud slides occurred, roads were washed out, culverts undercut, and homes were extensively damaged. Roadways were closed making it impassible for emergency vehicles and residents. Sanitary sewermains were inundated in a short time and sewer backed up into basements in the villages.

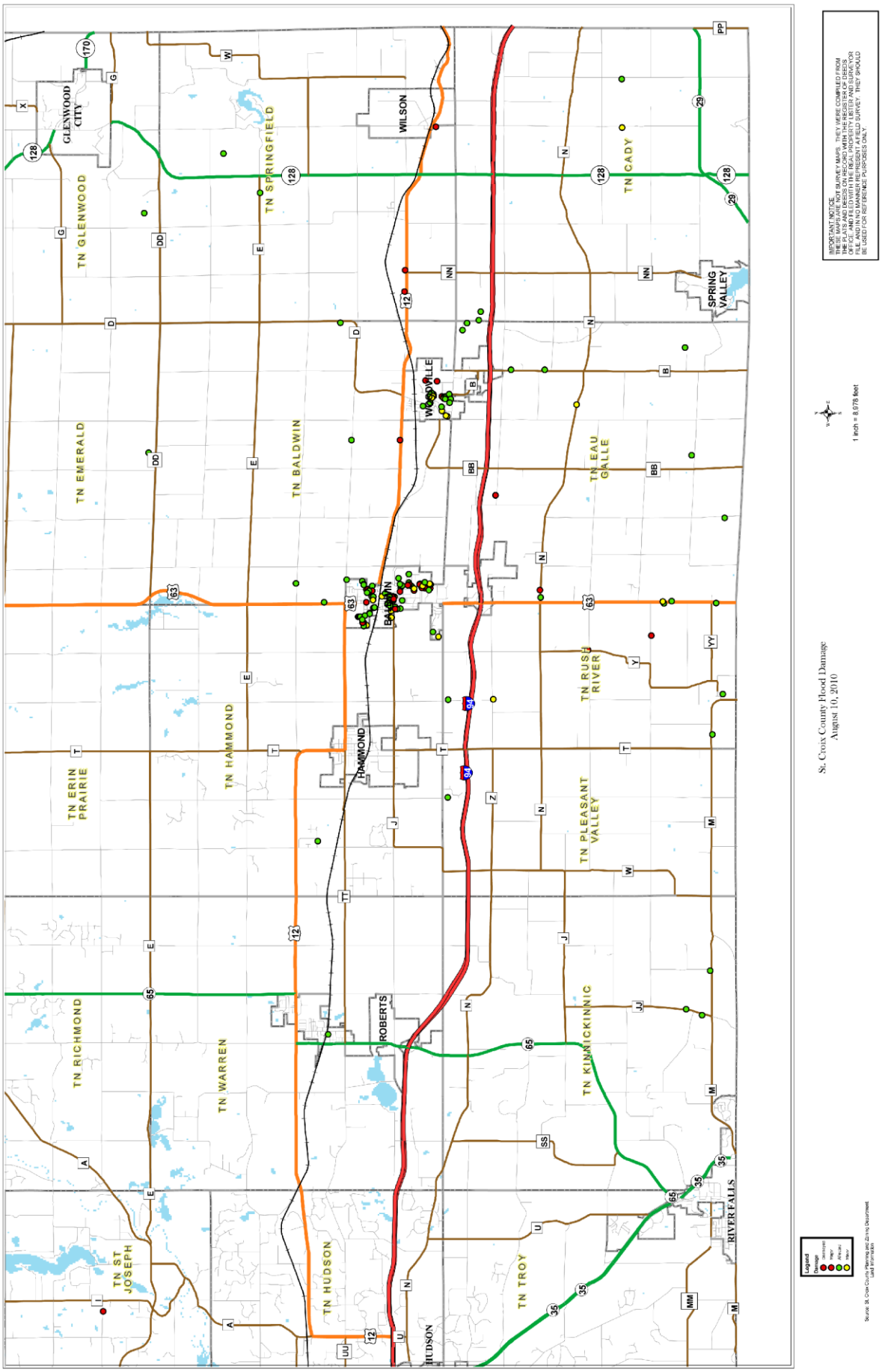
Please see damage reports in *Attachment E* and photographs in *Attachment F*. Reports from the Village of Baldwin, Village of Woodville, Village of Wilson, Town of Hammond, Town of Baldwin, Town of Springfield, Town of Rush River, Town of Eau Galle, and Town of Cady were received.

U.S. Highway 63, in the Village of Baldwin and south of the Village, was closed because of numerous washouts at bridge abutments and along the shoulders. Various village, town, and county roads—approximately 50 total—were closed due to road washouts and bridge closures.

In the Village of Baldwin, United Fire & Rescue evacuated a total of forty (40) persons, sixteen (16) of which were from the assisted living facility "Comforts of Home". The fire station in the Village of Woodville had at least 6" of flood water throughout the building. A total of six (6) injuries were reported in the county, mainly due to vehicle accidents caused by roadway washouts.

Floodwaters and sewer backups caused extensive damage to area homes. The following types of damage were reported: structural damage, flooring, drywall, furnace, air conditioners, water heaters, driveway washouts, submerged private wells, sewer backups, and electrical systems. With the warm summer temperatures, mold was an immediate problem in these homes.

St. Croix County used their emergency system and contacted 3700 homes in 6 hours to warn them of the dangerous situation. Red Cross was called in immediately and United Way & St. Croix County began taking calls from homeowners. 202 homeowners and renters contacted the County. The homeowners were asked about the extent of damage and their income (to determine LMI status). The summary and estimate in Attachment E shows **only** those 45 homeowners that are LMI and the four rental units which have LMI renters. 94 families were assisted by Red Cross and 98 different sites received extensive damage (roads, homes, etc.).


GLENWOOD CITY
TN GLENWOOD
TN SPRINGFIELD
WILSON
TN CADY
SPRING VALLEY
TN EMERALD
TN BALDWIN
WOODVILLE
TN EAU GALLE
BALDWIN
TN RUSH RIVER
TN HAMMOND
HAMMOND
TN ERIN PRAIRIE
TN PLEASANT VALLEY
TN RICHMOND
TN WARREN
ROBERTS
TN KINNICKINNIC
TN ST JOSEPH
TN HUDSON
TN TROY
HUDSON
RIVER FALLS
St. Croix County Flood Damage
August 10, 2010
1 inch = 8,978 feet
IMPORTANT NOTICE
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Legend
Damage
Source: St. Croix County Planning and Zoning Department
Land Information

Summary of Wisconsin Disaster Assistance Request

Wisconsin Emergency Management
Department of Military Affairs

County Application for Wisconsin Disaster Funding

County	WEM Region	Today's Date
St. Croix	West Central	10/26/2010

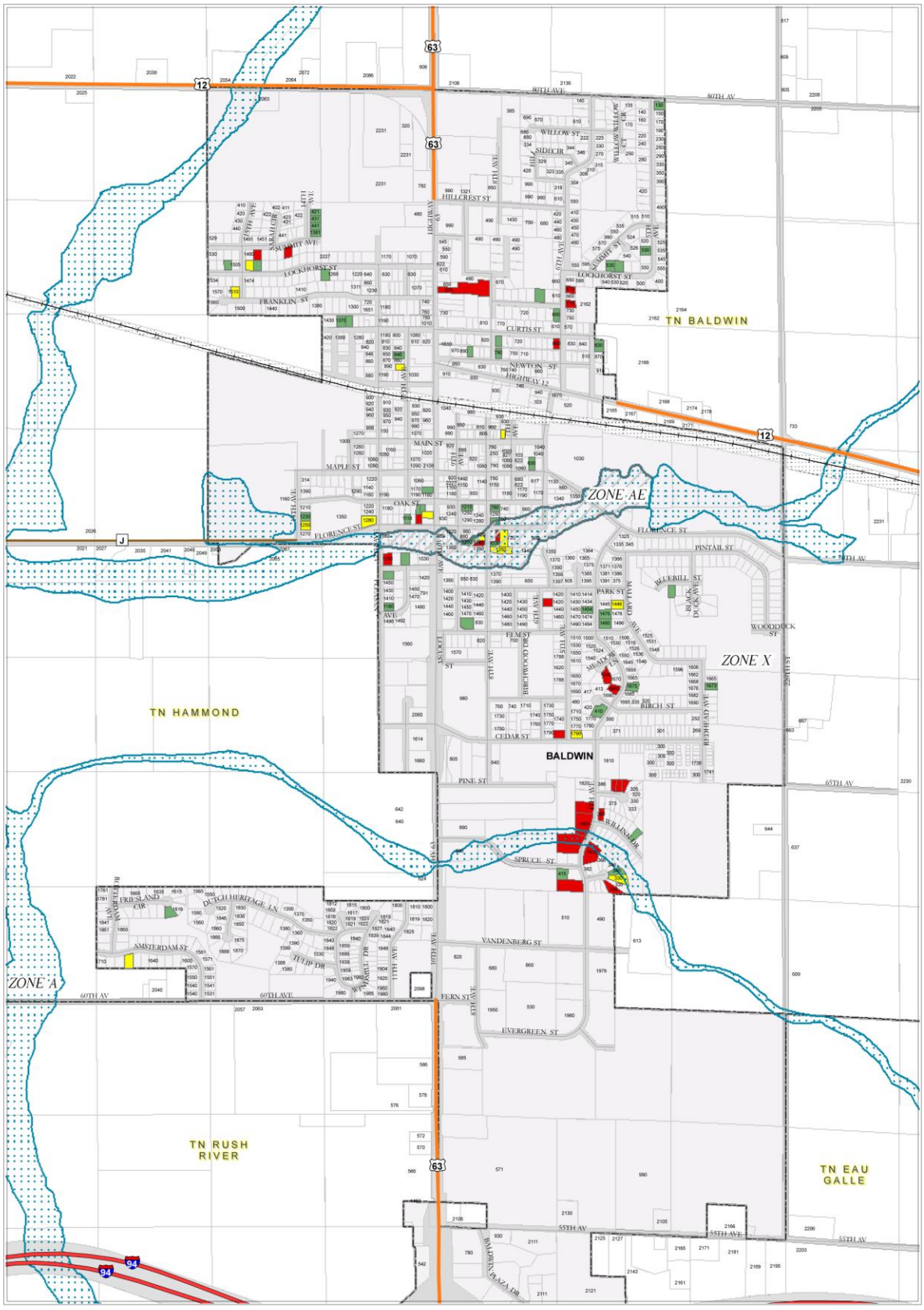
County Contact Name	Address	Phone	Incident Period	Type of Incident
Kristen Sailer, Emergency Manager	1101 Carmichael Road, Hudson, WI 54016	715-381-4911	8/10-8/14/2010	Flash Flooding

TVC (Town Village or City)	Jurisdiction Name	Damage Category A) Debris Removal	Damage Category B) Protective Services	Damage Category C) Road Systems	Total Damages (include all public assistance categories in this total)	Population (Use Last Census Information)	Ratio (Total Damages / Pop)
County	St. Croix County	$ 36,000.00	$ 7,700.00	$ 492,500.00	$ 536,200.00	63,155	$ 8.49
Village	Baldwin	$ 11,100.00	$ 22,500.00	$ 75,000.00	$ 108,600.00	2,667	$ 40.72
Village	Hammond			$ 25,000.00	$ 25,000.00	1,153	$ 21.68
Village	Wilson			$ 30,000.00	$ 30,000.00	176	$ 170.45
Village	Woodville	$ 14,000.00	$ 10,000.00	$ 81,843.00	$ 105,843.00	1,104	$ 95.87
Town	Baldwin			$ 285,000.00	$ 285,000.00	903	$ 315.61
Town	Cady	$ 4,800.00	$ 1,050.00	$ 31,000.00	$ 36,850.00	710	$ 51.90
Town	Cylon			$ 5,000.00	$ 5,000.00	629	$ 7.95
Town	Eau Galle	$ 1,000.00	$ 3,600.00	$ 226,300.00	$ 230,900.00	882	$ 261.79
Town	Emerald	$ 1,000.00	$ 1,000.00	$ 8,000.00	$ 10,000.00	691	$ 14.47
~~Town~~	~~Erin Prairie~~			~~$ 2,000.00~~	~~$ 2,000.00~~	~~658~~	~~$ 3.04~~
Town	Forest		$ 500.00	$ 15,000.00	$ 15,500.00	590	$ 26.27
~~Town~~	~~Glenwood~~	~~$ 200.00~~	~~$ 1,500.00~~		~~$ 1,700.00~~	~~755~~	~~$ 2.25~~
Town	Hammond			$ 41,100.00	$ 41,100.00	947	$ 43.40
~~Town~~	~~Hudson~~	~~$ 2,200.00~~		~~$ 8,000.00~~	~~$ 10,200.00~~	~~6,213~~	~~$ 1.64~~
Town	Kinnickinnic		$ 700.00	$ 10,700.00	$ 11,400.00	1,400	$ 8.14
Town	Pleasant Valley			$ 81,500.00	$ 81,500.00	430	$ 189.53
Town	Rush River			$ 41,500.00	$ 41,500.00	498	$ 83.33
Town	Springfield		$ 6,000.00	$ 43,000.00	$ 49,000.00	808	$ 60.64
TOTALS		$ 70,300.00	$ 54,550.00	$ 1,502,443.00	$ 1,627,293.00		

Summary of CDBG-EAP Assistance Request

Jurisdiction/Entity	Roads		Debris Removal	Public Buildings	Public Utility Systems	Total*
	FDA Funds (DOT)*	CDBG Funds				
St. Croix County						
Highway	$369,375	$123,125	$1,000	$1,000		$125,125
Floodwater Control Structures			$35,000			$35,000
Regional Fire Department						
United Fire & Rescue				$9,000		$9,000
Villages						
Baldwin	$56,250	$18,750	$11,100	$6,000	$4,500	$40,350
Hammond	$18,750	$6,250				$6,250
Somerset					$77,000	$77,000
Wilson	$0	$30,000				$30,000
Woodville	$10,000	$20,500	$3,190	$24,300	$96,100	$144,090
Towns						
Baldwin	$0	$285,000				$285,000
Cady	$18,000	$13,000	$4,800			$17,800
Cylon	$0	$5,000				$5,000
Eau Galle	$169,725	$56,575	$1,000			$57,575
Emerald	$6,000	$2,000	$1,000			$3,000
Erin Prairie	$0	$2,000				$2,000
Forest	$11,250	$3,750				$3,750
Glenwood			$200			$200
Hammond	$30,825	$10,275				$10,275
Hudson	$6,000	$2,000	$2,200			$4,200
Kinnikinnic	$0	$10,700				$10,700
Pleasant Valley	$61,125	$20,375				$20,375
Rush River	$31,125	$10,375				$10,375
Springfield	$32,250	$10,750				$10,750
Warren	$0	$500				$500
Totals	**$820,675**	**$630,925**	**$59,490**	**$40,300**	**$177,600**	**$908,315**

Estimated FDA funding is not included in totals
Estimates based on FEMA reporting and any additional updates available.



Legend

Damage	FLOOD HAZARD AREAS
Affected	FLOODZONE, FLOODWAY
Destroyed	ZONE A - 100 Year
Major	ZONE AE - 100 Year
Minor	ZONE AE - FLOODWAY - 100 Year
	ZONE X - 0.2 PCT ANNUAL CHANCE FLOOD HAZARD
	ZONE X

Source: St. Croix County Planning and Zoning Department, Land Information

Village of Baldwin Flood Damage
August 10, 2010

1 inch = 1,015 feet

IMPORTANT NOTICE
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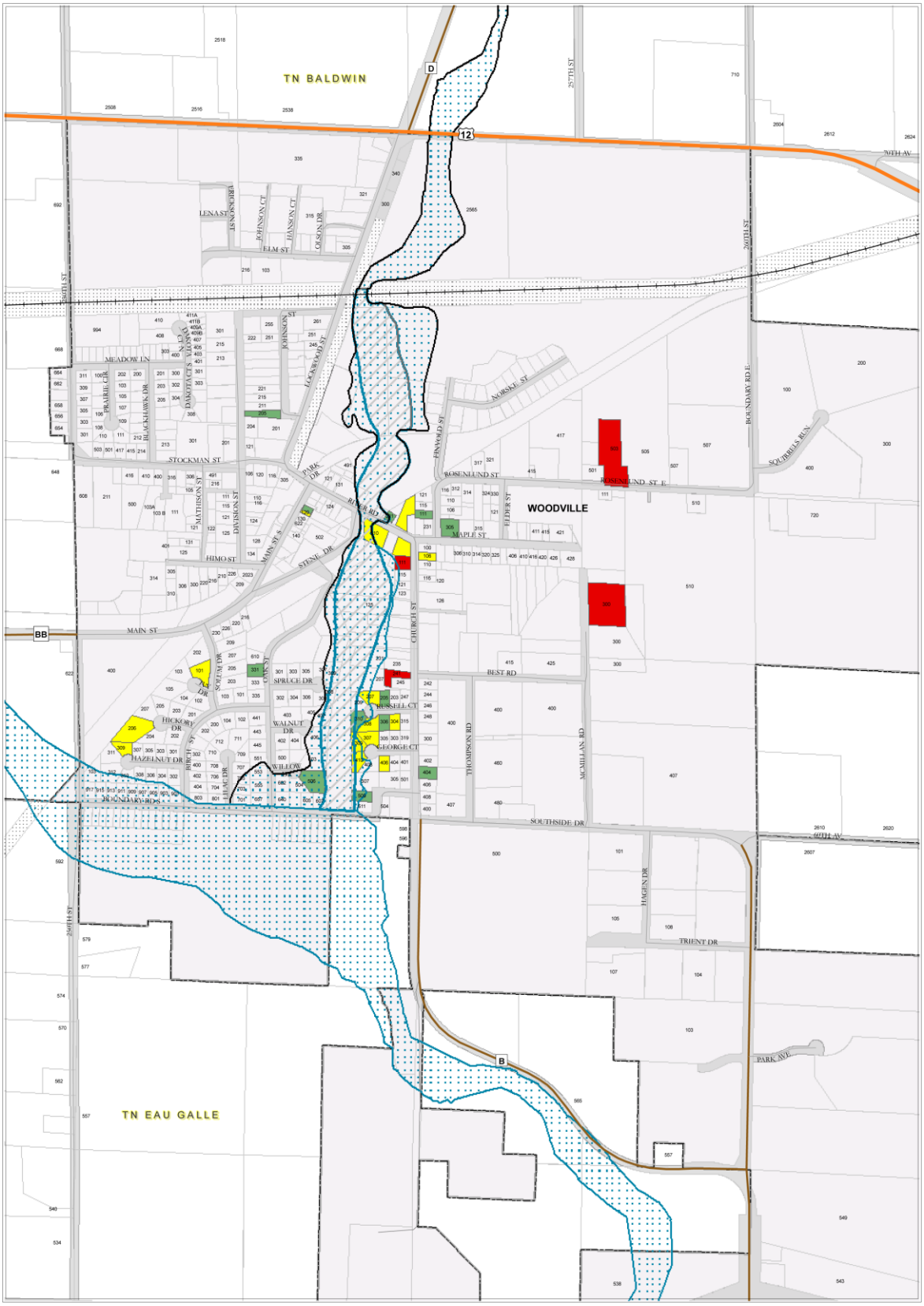

Legend

Damage	FLOOD HAZARD AREAS
Affected	FLOOD ZONE, FLOODWAY
Destroyed	ZONE A - 100 Year
Major	ZONE AE - 100 Year
Minor	ZONE AE - FLOODWAY - 100 Year
	ZONE X - 0.2 PCT ANNUAL CHANCE FLOOD HAZARD
	ZONE X

Source: St. Croix County Planning and Zoning Department, Land Information

Village of Woodville Flood Damage
August 10, 2010

1 inch = 685 feet

IMPORTANT NOTICE
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APPENDIX G.

HAZARD VULNERABILITY ASSESSMENT

1. **Winter Storms & Extreme Cold**
2. **Tornadoes & High Winds**
3. **Lightning & Hail**
4. **Flooding**
5. **Extreme Heat**
6. **Drought**
7. **Long-Term Power Loss**
8. **Active Threats**
9. **Cyberattack**
10. **Hazardous Materials Spills**
11. **Nuclear Accident**

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.

Vulnerability Assessment— Winter Storms & Extreme Cold

General Vulnerabilities	
Above-Ground Utilities	• 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	• Underground utility lines can freeze and / or burst.
Large or Clear Span Structures	• Buildings with large spans (e.g., airport hangars, pole barns, gyms, factories) have a higher structural vulnerability during heavy snowfall events. A past heavy snow event collapsed the roof at the Humane Society. • 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	• 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	• 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 temperatures. Potentially leading to water damage or water supply issues. • The number of mobile homes as full-time residences and licensed mobile home parks have been decreasing.
Local Economy	• Winter storm events make commercial activity difficult due to travel restrictions.
Natural, Historic, & Cultural Resources	• None known.
Community Lifelines	
Safety & Security	• 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	• 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 some breaks of water lines and laterals, though St. Croix County was not impacted to the same extent as

	other counties in the region. • 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.
Health & Medical	• The County's four hospitals in New Richmond, Hudson, Baldwin, and River 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	• Ice and heavy snow can topple trees and take down power lines and communications infrastructure. See *Long-Term Power Outage* section.
Communications	• Ice and heavy snow can topple trees and take down power lines and communications infrastructure.
Transportation	• 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, especially on I-94 due to speeds and traffic volumes. • New Richmond and River Falls 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	• No specific concerns noted.
Educational Institutions	• 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. • Public primary and secondary schools have a moderate-to-high 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	• 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	• Excessive cold spells drive up energy expenses, which could be a financial challenges 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	• As reflected in **Section II.C. Community Profile**, St. Croix County continues to grow rapidly in terms of population, new development, and traffic volumes on many roadways, thus increasing overall exposure to winter storm events. • St. Croix County 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

2. Vulnerability Assessment—Tornadoes & High Winds

General Vulnerabilities	
Above-Ground Structures	• $25 million in damages to property during an F5 tornado in 1958 ($260 million when adjusted for inflation). • Nearly all structures are vulnerable to damage. As of 2023, St. Croix County has over **$9.6 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. o Towns: **$4,862,883,013** o Villages: **$1,471,016,800** o Cities: **$3,328,326,900** • 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	• 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 **762 mobile homes in 2020, constituting about 2.7% of the total housing supply**, a ratio that has been decreasing over the past several years. • As of January 2023, St. Croix County had **17 licensed manufactured/mobile home parks**, though some of these parks may be used for recreational or seasonal purposes. 13 of the parks are licensed for less than 51 units, while three are licensed for 51-100 units and one for 101-175 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 St. Croix 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	• Residents in slab-on-grade homes and homes with crawlspaces (elevated and susceptible to lift) have a higher vulnerability than homes with basements. • Plan participants noted that a high proportion of the new construction occurring in the County is slab-on-grade.
Campgrounds, Cabins, & Resorts	• The Summer 2010 wind storm that struck Cumberland's municipal campground in neighboring Barron County provides an excellent example of this elevated vulnerability. • The **County owns and operates one campground** with no on-site safe room or siren: o Glen Hills Park (2.5 miles south of Glenwood City) – 105 camping sites. • **Two municipalities have campgrounds** with no safe rooms: o City of New Richmond (Hatfield Park and Campground) – 20 sites o City of Glenwood City (St. Croix County Fairgrounds) – sites not specified o *See mini-plans in **Appendix L** for more information* • 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	• As reflected in the community profile, St. Croix 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.
Local Economy	• 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	• There are no natural areas or environmental characteristics within St. Croix 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	• 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	• All above-ground structures are vulnerable. • Barns are particularly vulnerable to high wind damage.
Health & Medical	• All above-ground structures are vulnerable. • The County's four hospitals in New Richmond, Hudson, Baldwin, and River Falls 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. St. Croix County has **8 nursing homes and 46 licensed assisted living facilities.**
Energy	• Above-ground utilities are especially vulnerable in wooded areas due to falling trees or limbs. • See *Long-Term Power Outage* section.
Communications	• All above-ground structures are vulnerable, but no specific concerns noted. • St. Croix County activates community-owned warning sirens for tornado and severe weather warnings. **Appendix L** 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. There may also be unincorporated areas with population concentrations and high recreational traffic that would also benefit from siren coverage. The purpose and function of the sirens and warning system are often misunderstood by the public. • St. Croix County issues emergency alert notifications and tornado warnings to cell phones and email through a RAVE 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	• New Richmond and River Falls 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	• All above-ground structures are vulnerable, but no specific concerns noted.
Educational Institutions	• There are **6 public school districts with school facilities** in St. Croix County, in addition to the **Northwood Technical College campus** in New Richmond. • 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. • St. Croix County also has **5 smaller private schools**, typically lacking larger span structures. • The following public educational institutions chose to be full participants in this mitigation

	plan update and are anticipated to adopt the plan: the Hudson and River Falls school districts and Northwood Technical College. A "mini-plan" for each is included in **Appendix M**.
Disadvantaged or Socially Vulnerable Populations	
Residents of Mobile Home Parks	• 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	In particular, the following if lacking safe room access: • 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	As reflected in **Section II.C. Community Profile**, St. Croix County continues to grow rapidly in terms of population and new development, thus increasing overall exposure to tornados and high winds. • 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. • St. Croix 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	• The festival grounds in Somerset was identified as a unique severe weather vulnerability and attendance could increase in the future. • Tubing on the Apple River and water-based recreation on the St. Croix River pose an additional unique vulnerable population. These activities could continue to increase.

3. Vulnerability Assessment— Lightning & Hail

General Vulnerabilities	
Above-Ground Structures	• $3 million in damages to property in River Falls during a single storm event.
Campgrounds	• Limited shelter in the event of a thunderstorm or hailstorm.
Individuals	• On average 28 people die each year from lightning strikes.
Local Economy	• Power outages may disrupt or shutdown electronic business transactions / communications.
Natural, Historic, & Cultural Resources	• Lightning strikes can ignite older, wood structures. • Heavy rains and hail may cause damage to older structures and historic sites.
Community Lifelines	
Safety & Security	• Many of these facilities do not have storm shelters or emergency power generation.
Food, Water, Shelter	• 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 *Wildfire* section.
Health & Medical	• Vulnerability to potential loss of power mitigated through availability of on-site generators at hospitals
Energy	• Lightning strikes can cause power outages. • Hail exceeding 1" in diameter has the potential to damage solar panels / arrays.
Communications	• Lightning strikes can cause power outages. • Lightning strikes can cause damage to telecommunication equipment.
Transportation	• Hail can impact travel conditions and shatter windshields, causing accidents or delays.
Hazardous Materials	• None known.
Educational Institutions	• None known.
Disadvantaged or Socially Vulnerable Populations	
Unhoused	• Lack sufficient shelter during lightning and hail events.
Vulnerability to Future Assets	
Population Growth & Development	• 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	• Similar to tornados and high winds, the festival grounds in Somerset and water-based recreation on the Apple River and St. Croix River are an additional unique vulnerable population. Lightning deaths at the festival grounds have occurred in the past. The potential exists for these populations will increase in the future.

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, except at the City of Hudson wastewater treatment plant.

General Vulnerabilities	
Underground Structures	• 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	• Unanchored homes are at risk of being swept away during flood events. At least one mobile home park is partially located within 100-year floodplain.
Campgrounds, Cabins, & Resorts	• 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	• Individuals in flooded areas may drown or be cut off from critical life-saving services.
Local Economy	• 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, & Cultural Resources	• Resources located along waterways have a higher risk of damage during flood events. No specific concerns noted.

Community Lifelines	
Safety & Security	• Personnel are exposed to life-threatening conditions when serving individuals caught in flooded areas.
Food, Water, Shelter	• Crop failure if fields are under prolonged flood conditions. • Hudson's wastewater treatment plant has experienced flooding. See the City's subplan in Appendix L.
Health & Medical	• Flooded roads may limit access to essential medical services. • A flood event in 2010 impacted an assisted living facility in Baldwin.
Energy	• 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	• None known.
Transportation	• The washout of roads, culverts, bridge abutments, etc., have been the primary storm-related damage in recent decades. • Travelers in the region and St. Croix County have died from in recent decades when attempting to cross flooded areas or when encountering an unmarked road washout at night.
Hazardous Materials	• No specific concerns noted. Flooding in areas with hazardous materials may allow unencapsulated materials to flow downstream or leach into the groundwater.
Educational Institutions	• See subplans in Appendix L.
Disadvantaged or Socially Vulnerable Populations	
	• No unique vulnerabilities identified.
Vulnerability to Future Assets	
Population Growth & Development	• 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	• During heavy rains, some communities have problems with stormwater entering the wastewater system through manholes, lift stations, or basements. These problems will increase as additional impervious surface is added through development. • Using the mapped Community Lifelines identified in Section II.D., the following are potentially located in the 100-year floodplain: o 13 commercial food distribution locations o 2 clinical laboratories o 1 power plant/generation system (dam) o 2 emergency/storm sirens o 6 wellhead protection areas o 10 community wells or towers o 10 private high capacity wells o 1 wastewater treatment facility For the above, there has been no reported flooding concerns, except for the Hudson wastewater treatment facility, which is further discussed in Appendix L.

5. Vulnerability Assessment— Extreme Heat

General Vulnerabilities	
Mobile Homes	• Mobile homes can become very hot if there is a lack sufficient air conditioning / HVAC

	systems.
Campgrounds, Cabins, & Resorts	• Facilities may lack sufficient cooling stations.
Individuals	• 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	• No significant impacts identified.
Natural, Historic, & Cultural Resources	• Long periods of extreme heat can stress vegetation and wildlife.
Community Lifelines	
Safety & Security	• Personnel face increased health risks while operating under high temperatures.
Food, Water, Shelter	• No unique vulnerabilities noted.
Health & Medical	• Increased demand on services during periods of extreme heat due to dehydration, heat stroke, and other related health risks.
Energy	• Increased demand on services can result in "brown outs" or other power outages. • Most communities lack cooling shelters with emergency power generators.
Communications	• None known.
Transportation	• Prolonged exposure to extreme heat can cause buckling in pavement.
Hazardous Materials	• None known.
Educational Institutions	• None known.
Disadvantaged or Socially Vulnerable Populations	
Unhoused/Homeless	• Lack access to air-conditioning and shelter.
Economically Disadvantaged	• Prolonged periods of high temperatures increase energy consumption / costs.
Vulnerability to Future Assets	
Population Growth & Development	• 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 increase the "heat island" effect if it increases the amount of paved surfacing and removes green space / canopy.

6. Vulnerability Assessment— Drought

General Vulnerabilities	
Agriculture (Crops)	• Drought in Wisconsin has the greatest impact on agriculture. Agriculture plays a critical role in St. Croix 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 section provides example crop losses.
Agriculture (Livestock)	• 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 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.
Ground Water & Surface Water	• 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.
Forest & Vegetation	• Drought stresses forest vegetation, making it more vulnerable to pests and diseases, while increasing the risk of wildfires due to extreme dryness. St. Croix County does not have a high wildfire vulnerability.
Community Lifelines	
Safety & Security	• 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	• Drought causes water shortages, drying up private wells and ponds, and increasing the demand for irrigation, putting strain on water supplies and raising concerns about future availability. • Ponds previously used by farmers may dry up, causing farmers to drill new wells and pump groundwater for their stock. • High-capacity wells have the potential to impact groundwater and nearby surface waters, especially during drought periods. • As of 2023, Wisconsin DNR database identified 220 active high-capacity wells within St. Croix County. Drought can lead to crop failures and reduced agricultural production, resulting in food scarcity, increased food prices, and potential food insecurity. • 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	• 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	• No drought concerns noted.
Communications	• No drought concerns noted.

Transportation	• Drought conditions can lead to soil instability, increasing the risk of road and highway damage.
Hazardous Materials	• No drought concerns noted.
Educational Institutions	• No drought concerns noted.
Disadvantaged or Socially Vulnerable Populations	
	• No unique vulnerabilities for St. Croix 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	• No unique vulnerabilities noted.

7. 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	• Wind, ice, heavy snow, and flooding can damage electric infrastructure and topple trees, which can take down power lines.
Homes & Buildings	• Extended power loss during freezing temperatures can result in the freezing and breaking of water lines and backing-up of sewer lines.
Individuals	• 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	• 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. • Security and monitoring systems may be inactive.
Natural, Historic, & Cultural Resources	• No unique vulnerabilities specific to these resources identified. Forested area with overhead power lines are more prone to outages.
Community Lifelines	
Safety & Security	• 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.
Food, Water, Shelter	• Livestock are vulnerable to extreme temperatures. Livestock deaths during power outages have occurred in the region. • Freezing water lines can occur, posing health and safety risks to citizens.

	• 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	• Hospitals and larger facilities have emergency plans and generators. • 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	• 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 *Long-Term Power Outage* section.
Communications	• 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	• Power outages will impact some signalization.
Hazardous Materials	• Extended power loss during periods of extreme heat could increase the potential for a HazMat release of certain substances f an emergency power source is not available.
Educational Institutions	• During a long-term power outage event, most educational institutions will be cancelled.
Disadvantaged or Socially Vulnerable Populations	
Seniors & Persons with Certain Health Challenges	• 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 occurred to such individuals during power outage events. • 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	• 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	• As reflected in **Section II.C. Community Profile**, St. Croix County continues to grow rapidly in terms of population and new development, thus increasing overall exposure to long-term power outage events. • St. Croix County is aging, so the vulnerabilities to this population and the community lifelines serving this population are expected to increase.

8. Vulnerability Assessment— Active Threats & Civil Disruption

General Vulnerabilities	
Gathering Places, Parades, & Festivals	• Locations with increased populations and transient populations face have an increased potential for active threat events.
Individuals	• All individuals are at risk of experiencing active threat events.
Local Economy	• Active threat events may result in shutdowns or closures.
Natural, Historic, & Cultural Resources	• None known.
Community Lifelines	
Safety & Security	• Emergency services and law enforcement personnel are required to respond to active threat events, placing these individuals in harm's way.
Food, Water, Shelter	• Utility infrastructure is a potential target in threat events.

	• Crops and livestock are potential targets for biological attacks.
Health & Medical	• Healthcare infrastructure is a potential target in a threat events. See also *Cyberattack* section.
Energy	• Utility infrastructure is a potential target in threat events. See also *Cyberattack* section.
Communications	• Infrastructure is a potential target in a threat events. See also *Cyberattack* section.
Transportation	• Public transit has an increased potential for active threat events. • Bridges, roads, and other infrastructure are potential targets in active threat events.
Hazardous Materials	• Sites containing hazardous materials are potential targets in active threat events.
Educational Institutions	• Facilities are at an increased risk of active threat events. See also *Cyberattack* section. • Most systems / organizations have increased preparedness to address active threat events.
Disadvantaged or Socially Vulnerable Populations	
	• No unique vulnerabilities noted.
Vulnerability to Future Assets	
Population Growth & Development	• 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	• Mental health facilities and services will be strained during and after active threat events. Additional capacity may be needed as the population grows.

9. Vulnerability Assessment— Cyberattack

General Vulnerabilities	
Individuals	• 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	• Cyber-attacks can cripple networks and shut down businesses at any time.
Natural, Historic, & Cultural Resources	• None known.
Community Lifelines	
Safety & Security	• 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	• 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	• 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	• Network can be accessed and manipulated in a cyber-attack. • Power can be redirected or terminated remotely.
Communications	• Network can be accessed and manipulated in a cyber-attack.
Transportation	• 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	• 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	• Networks contain large volumes of personal data that can be targeted in a cyber-attack.
Disadvantaged or Socially Vulnerable Populations	
Elderly	• 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	• There are no areas of higher or lower risk to cyber-attack. • As the population in St. Croix County increases, the probability of a cyber-attack occurring increases.

10. Vulnerability Assessment— Hazardous Material Spills

General Vulnerabilities	
Individuals	• Exposure to toxic levels of hazardous materials can result in medical ailments and or death.
Local Economy	• 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	• None known.
Community Lifelines	
Safety & Security	• 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	• 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	• Exposure to hazardous materials can cause medical ailments, potentially increasing demand for healthcare facilities.
Energy	• None known.
Communications	• None known.
Transportation	• 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	• Compounded effects.
Educational Institutions	• None known.
Disadvantaged or Socially Vulnerable Populations	
	• No unique vulnerabilities noted.

Vulnerability to Future Assets	
Population Growth & Development	• Increased industrial development increases the probability of hazardous materials being located in the area, increasing the potential for hazardous material spills.

11. Vulnerability Assessment— Nuclear Accident

St. Croix County lies within the ingestion pathway zone (IPZ) for Prairie Island Nuclear Plant, which is the significant nuclear accident vulnerability for the County.

General Vulnerabilities	
Individuals	• Direct exposure of County residents to gamma radiation or inhaling radioactive materials from a plume released during a nuclear accident is very unlikely, unless the residents were working or traveling within the 10-mile emergency planning zone at the time of release. • A potential for soil or vegetation contamination exists within the IPZ, which would most likely be in low levels and could require general health advisories regarding food preparedness and other cautionary measures.
Local Economy	• Relocation of individuals near the facility may significantly increase occupancy in hotels and rental properties. • Increased populations during an evacuation / relocation period could increase commercial activity. • The largest economic impact would likely be on the agricultural economy. See Food lifeline below.
Natural, Historic, & Cultural Resources	• Vegetation may be contaminated, though serious impacts in St. Croix County not expected.
Community Lifelines	
Safety & Security	• A potential for public panic and misinformation exists, which could be a burden for safety and emergency services personnel.
Food, Water, Shelter	• Radioactive contamination of soil and vegetation is estimated to be the greatest risk in a nuclear accident for St. Croix County. There is likely negligible risk to groundwater and surface water. • Holds on agricultural production may occur because of radioactive contamination, which would impact both producers/farmers and food processing. Some product may not be harvested or may be purposefully destroyed. The County's dairy farms and related processing would likely experience significant losses. • Increased testing and public perception of agricultural products in a contaminated area may negatively impact farmers and producers financially over the long term.
Health & Medical	• Residents in proximity of the nuclear accident may seek medical consultation, increasing demand on the health network. A demand for related testing will likely increase. • Treatment and cleaning contaminated individuals and rooms will increase demands on staff.
Energy	• A shutdown of the Prairie Island facility would decrease the available power supply, potentially causing brownouts and blackouts.
Communications	• None known.
Transportation	• Evacuation of areas close to the Prairie Island facility would have short-term impacts on some roads and highways in St. Croix County. Evacuation routes may be activated. Some congestion is to be expected.
Hazardous Materials	• No impacts of other non-nuclear are expected.
Educational Institutions	• Increased population from an evacuation zone may require temporary shelter within school facilities and, longer-term, may increase enrollment in area schools.

Disadvantaged or Socially Vulnerable Populations	
	• No unique vulnerabilities for St. Croix County noted, though a prolonged hold on production 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	• Growing populations increase the potential impact in the County. Development, farms, and agri-business closest to Prairie Island would have a higher risk.

APPENDIX H.

FLOOD ASSESSMENT METHODOLOGY

St. Croix County Flood Assessment Methodology

Flood Assessment Data Challenges

1. G.I.S. data for individual structures (building footprints) is available for all of St. Croix County. However, no geographic database exists which identifies the 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 which does not account for site-specific topographic variation. A structure might appear to be located within the 100-year floodplain on a map, but could it have been landscaped or otherwise elevated above the base flood elevation.

2. Assessed values for improvements and tax records are linked to the parcel database, but are not linked to building point data. Based on orthophotography and building footprints, we are able to identify which buildings may potentially be located in a 100-year floodplain, but the use and value of each individual building are not available. Since our assessment information is for the entire parcel, this becomes a problem in cases where not all of the buildings within a single parcel are within or intersect the 100-year floodplain or in case where only a portion of a building may intersect the floodplain boundary.

3. Estimated values of improvements are not available for all parcels. 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).

4. Topographic data from county-wide LIDAR was not available when the Flood Insurance Rate Maps (D-FIRMs) for St. Croix County were last updated, so the accuracy of D-FIRMs is very unreliable in some areas. Updating the D-FIRMs using now available LIDAR data should be a priority. However, it is also important to keep in mind that a serious flood could exceed the estimated 100-year limits as well as being impacted by other factors which may change over time, such as reduced flood storage or increased stormwater runoff.

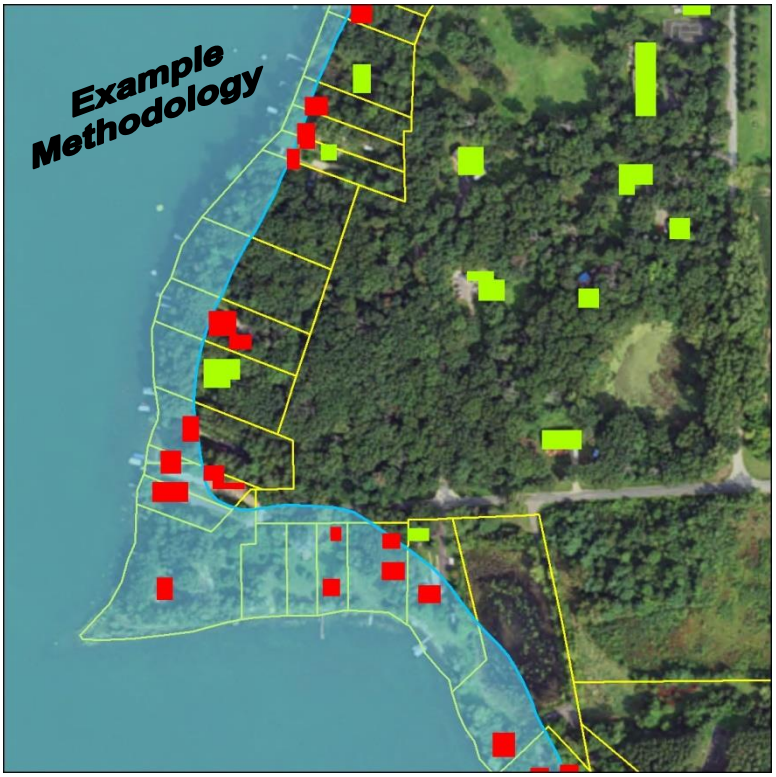
5. Related to #4, most designated 100-year floodplain areas in St. Croix County fall within Zone A which have no base flood elevations (BFEs) established, making it much more difficult to determine the actual vulnerability to individual structures.

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. 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 St. Croix County the following methodology was used:

1. The D-FIRM G.I.S. shapefiles were used to identify the 100-year floodplain boundaries (example shown by the blue shading and blue line on the map below).



2. The G.I.S. parcel data provided by St. Croix County Land Information January 2023 was linked to the 2022 tax assessment data, thus providing information on municipality, assessed uses, and assessed values for those areas where parcel mapping was complete.
3. Those improved parcels which were within or intersected the 100-year were identified for guidance (shown as the yellow lines on the previous map). This made it easier to determine where improvements may potentially lie within the floodplain.

4. The building footprints layer provided by the county was then overlaid with the selected improved parcels from the previous step to identify those parcels where physical structures intersected the 100-year floodplain. Selected structures are shown in red and the unselected structures are shown in green on the previous map.

5. Using a grid system, principal structures were identified by visual inspection of recent orthophotography overlaid with the 100-year floodplain. Structures highlighted in the previous step were examined to determine their physical location in relation to the 100-year floodplain and any structures (e.g., garages, barns, boat houses) were excluded if it could be reasonably determined that they were not the principal structure on the parcel.

This approach was used to create a G.I.S. point data layer of all structures, taxable and exempt, which intersect or are contained within the 100-year floodplain (shown as the red structures 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. The point file includes the polygon centroid of parcels with structures that partially intersect the floodplain.

6. 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.

   Though it has its weaknesses, this approach provides a good picture of which principal structures are most likely to be impacted by a 100-year flood in St. Croix County. However, this should not be relied upon as an accurate indicator of flood depth or potential damages during flood events since elevation, flood depth, and assessed value for each individual structure is not currently valued. Many of the structures likely have no recent flood history and may not have a significant vulnerability to a flood event.

7. 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 in the plan 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 St. Croix County, while providing insight into the distribution of potentially vulnerable structures within the County and the location of past flooding events.

APPENDIX I.

ST. CROIX COUNTY DAM INVENTORY

Official Name	Popular Name	Stream	Impoundment	Hazard Rating	Size	Normal Storage (Acre Ft)	Max Storage (Acre Ft)	Flood Control?	Owner Name	Owner Type
New Richmond Mills	New Richmond	Willow River	New Richmond Flowage	High	Large	826	1500		City of New Richmond	City
Glen Hills 7		Unnamed		High	Large	0	490	Y	St. Croix County	County
Glen Hills 4		Tiffany Creek		High	Large	0	178	Y	St. Croix County	County
Glen Hills 6		Unnamed		High	Large	0	191	Y	St. Croix County	County
Glen Hills 10		Beaver Creek	Glen Lake	High	Large	1451	3845	Y	St. Croix County	County
Glen Hills 5		Unnamed	Unnamed	High	Large	0	184	Y	St. Croix County	County
Riverdale		Apple River	Riverdale Flowage	High	Large	569	840		Xcel Energy	Private
Little Falls		Willow River	Little Falls Lake	High	Large	1342	1700		WDNR	State
Glen Hills 8		Unnamed	Unnamed	Significant	Large	43	430	Y	St. Croix County	County
Apple River Falls		APPLE RIVER	Apple Falls Flowage	Significant	Large	520	680		Xcel Energy	Private
Lower Power	Saint Croix	Willow River	Mallalieu Lake	Low	Large	1388	3000		City of Hudson	City
Glen Hills 1		Unnamed	Unnamed	Low	Large	32	115	Y	St. Croix County	County
Glen Hills 11		Unnamed	Unnamed	Low	Large	32	344	Y	St. Croix County	County
Glen Hills 2		Stephens Creek		Low	Large	22	200	Y	St. Croix County	County
Glen Hills 3		Ryan Creek	Unnamed	Low	Large	30	274	Y	St. Croix County	County
Prairie Flats Unit 3		Unnamed		Low	Small	15	30	Y	U.S. Dept. of the Interior	Federal
Prairie Flats Unit 1		Unnamed		Low	Small	40	90	Y	U.S. Dept. of the Interior	Federal
Dunn, Douglas		TR-KINNICKINNIC RIVER		Low	Small	1	9		,	Missing
Knops, John		TRIB SANDY CREEK	Unnamed	Low	Small	4	15	Y	,	Missing
Sullwold, Thomas	Donald Erler	TRIB DRY DAM LAKE	Unnamed	Low	Small	2	4		,	Missing
Roberts Jeff	Snowcrest Ski Club Inc	Unnamed		Low	Small	1	4		,	Missing
Peterson, Darrell		DRY RUN-TR-APPLE RIVER		Low	Unknown				,	Missing
Wert, Darrel		TRIB PERCH LAKE		Low	Small	1	3		,	Missing
Nielsen, Merle		Kinnickinnic River		Low	Small	1	2		,	Missing
Schoenwetter Wildlife			Lake Wausau	Low	Small		30		,	Missing
Cedar Lake	Cedar Lake Impr Assoc	Cedar Creek	Cedar Lake	Low	Small	1100	3300		,	Missing
Melby, Dr.Neal A.		Dry Run		Low	Small	1	3		,	Missing
Smith, Ernest	Thomas Seim	NO WATERWAY		Low	Small	1	4		,	Missing
Faber, Walter		Unnamed		Low	Small	4	6		FABER, WALTER	Private
Borgstrom-Erin Prairie Twn		Tributary to Willow River		Low	Large	22	230	Y	Borgstrom, Eleanore	Private
Ickler, Robert		Unnamed		Low	Small	2	6		ICKLER, ROBERT	Private
Day, Herbert		Unnamed		Low	Small	1	2		DAY, HERBERT	Private
Williams, Owen	Robert Richter	Unnamed		Low	Unknown	2	9		Williams, Owen	Private
Martinek, Richard No. 2	Eagle Ridge Sub	Unnamed		Low	Unknown				Martinek, Richard	Private
Martinek, Richard No. 4	Eagle Ridge Sub	Unnamed		Low	Small	1	1		,	Private
Leber	Hennesey Springs Cr.	HENNESEY SPRING CREEK		Low	Unknown				Leber, William	Private
Star Prairie	Star Prairie	Apple River	Apple River	Low	Unknown				Route, Henery	Private
Bauer, Daniel		TR-KINNICKINNIC RIVER		Low	Small	1	2		Bauer, Daniel	Private
Bauer, Daniel		Unnamed		Low	Unknown			Y	Bauer, Daniel	Private
Geiger, Gene		Eau Galle River	Lake George	Low	Small	1	9		GEIGER, GENE	Private
Freeman, Donald		Unnamed		Low	Small	6	24		FREEMAN, DONALD	Private
Bethke, Chris		TR-WILLOW RIVER	Willow River	Low	Small	1	4		BETHKE, CHRIS	Private
Trout Brook	Air V. Fry	Willow River	Mallalieu Lake	Low	Unknown				Kaemmer, Arthur	Private
Schutts, Lee		Unnamed		Low	Small	6	15		SCHUTTS, LEE	Private
Larson, Harvey		Unnamed		Low	Small	5	15		LARSON, HARVEY	Private
Cedar Lake Milling Company	John Nutzmann	CEDAR CREEK	STAR PRAIRIE LAKE 11-2	Low	Small	7	10		Nutzmann, Charles	Private
Derrick, Loren		TR-TEN MILE CREEK	Unnamed	Low	Unknown				DERRICK, LOREN	Private
Vorwald, Raymond		NO WATERWAY		Low	Small	3	9		VORWALD, RAYMOND	Private
Martinek, Richard No. 1	Eagle Ridge Sub	Unnamed		Low	Small	1	2		,	Private
Martinek, Richard No. 3	Eagle Ridge Sub	Unnamed		Low	Small	1	1		,	Private
Mello, Robert L.		Unnamed		Low	Small	2	6		Mello, Robert	Private
Leber	Hennessey Springs Cr.	Unnamed		Low	Small	0.7	2		Leber, William	Private
Swenson, Duane E.		Trimbelle River		Low	Small	4	14		Swenson, Duane	Private
Baumgartner		Unnamed		Low	Small	0.8	1.5		Baumgartner, Lyly	Private
Graham		TRIB TO APPLE RIVER		Low	Small	0.1	0.1		Graham, C.	Private
York		TRIB. TO APPLE RIVER		Low	Small	73.3	100		York, John & Gary	Private
Garbe, Charles	Robert Garbe	Unnamed		Low	Small	1	2		GARBE, CHARLES	Private
Paul Casey	Saratoga Springs	Spring Brook		Low	Unknown				Casey, Paul	Private
Webster	UNNAMED TRIB TO BOLEN CREEK			Low	Small	0.4	1		Webster, Paul	Private

APPENDIX J.

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.

Potential Federal and State Grant Programs for Natural Hazard Mitigation

This is a selection of more commonly used grant programs, but is not 100% complete.

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.

	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 Infrastructu & Communities (BRIC) Program *(replaced PDM Program)*	Wisconsin Emergency Management P.O. Box 7865 2400 Wright Street Street, Madison, WI 54707-7865	Grant 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 pubic 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 includes 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. Food 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.

12	Wisconsin Housing and Economic Development Agency Temporary Housing Grants	WHEDA 201W. 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 govt's 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 measure 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 cmte
23	U.S. Department of Agriculture, Natural Resources Conservation Servi 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 Servi 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 few grant sources that may fund sirens and generators.	

26	Wisconsin Department of Natural Resources, Forest Fire Protection (FPF 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
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 $1mil 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 Reslient 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

APPENDIX K.

SUMMARY OF CHANGES SINCE THE 2018 PLAN

The 2024 *St. Croix County All-Hazards Mitigation Plan* was a complete review and update of the 2018 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 2018 Plan met most requirements and some changes were largely semantic. This section highlights some of the major changes since the 2018 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 2018 Plan recommendations.
- Town surveys were customized for each town and incorporated aspects of the 2018 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 2018 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 L); 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 M).
- 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 2018 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

- 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.
- A new appendix (Appendix G) was created, providing a more robust vulnerability assessment as suggested by the new FEMA planning guidance. Key findings from Appendix G were then summarized in the main text in Section III.D.
- The Steering Committee re-assessed the risks and vulnerabilities facing St. Croix 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 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 zoonotic 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, including a review of the results of the hazard survey performed as part of the 2012 plan. 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 2018 Mitigation Plan Strategies

- During stakeholder interviews, lead parties for each strategy from the 2018 plan were asked to provide an update on progress, which was integrated into this section.
- Steering Committee Analysis & Review: Progress on 2018 strategies was discussed by the Steering Committee during its third and fourth meeting, 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 and low impact development.
- 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 J was updated.
- Steering Committee Analysis & Review: Plan goals were reviewed and discussed as part of the third Steering Committee meeting. Mitigation and preparedness strategy alternatives were discussed during the fourth Steering Committee meeting as well as identifying criteria on which to evaluate and prioritize strategy alternatives. In December 2023, 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 fourth meeting. Committee members were challenged to identify opportunities to continue to engage the public during plan maintenance as well as future plan updates.

APPENDIX L.

CITY & VILLAGE HAZARD MITIGATION SUB-PLANS

VILLAGE OF BALDWIN HAZARD MITIGATION SUB-PLAN

Primary Contact:	Village Administrator/Clerk
Planning Meetings:	• Primary planning meeting with WCWRPC staff occurred on 9/7/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment in November 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	4,291
Median Age	35 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors, Special Needs populations, Households without vehicle
Assessed Improvements (2023)	Residential: $2271,339,800; Commercial: $88,178,500; Manuf.: $27,687,800
# of Housing units	1,787
# of Mobile Homes	54
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

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 St. Croix County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	No tornado history in area in 25+ years. Occasional high winds, but no unique or significant damage noted.	Significant numbers of slab-on-grade units without basements, including some multi-family. Mobile homes; 3 mobile home parks.
Hail & Lightning	May 2022 hail event damaged buildings and vehicles.	No unique concerns noted.
Winter Storm, Ice, & Extreme Cold	No unique events. During 2014-2015 Polar Vortex and Winter 2022, a handful of residents left faucets dripping to prevent water line freezing, but no major breaks.	No unique concerns noted. No designated warming shelter, though Village Hall may be available at least during business hours.
Extreme Heat	No unique history noted.	No unique concerns noted. Have opened Village Hall/Library during business hours as a cooling shelter twice in past, but no users.

Long-Term Power Outage	No history of power loss of 12+ hours.	Older neighborhoods with mature trees and overhead lines (e.g., NW part of Village) are more vulnerable to outages. Generator at Village Hall/EOC. Fixed generators at Fire Hall/Emergency Services Building and Wastewater Plant; portable for liftstations, etc.
Flooding – Riverine or Overbank Flooding – Stormwater or Overland	Substantial riverine and stormwater flood history. Some stream flooding every 3-5 years with some continuing bank erosion. Relatively flat topography exacerbates stormwater flooding risks. Small tributary on the Rush River that bisects the Village has closed Highway 63 every 4-5 years. August 2010 flooding washed-out Hwy 63 bridge and 40 residents evacuated, including 16 from assisted living facility. Significant damage to homes and sewer back-ups. 2'-3' of water in Comforts of Home. See 2010 flood report in appendix. More recent overland flooding in the 8th Avenue area can result in ponding up to 3-4 feet deep, which is a potential safety concern for neighborhood children. Up to 2.5 inches of rain in a 30-minute period fell in June 2013; floodwaters in Baldwin rose up to 6" across Highway 12 and Highway 63, closing the Highway 63 bridge. A late season snowfall (12" in 24 hours) in May contributed to local flooding issues. 4 NFIP claims in May 2017. June 2020 flooding caused flooding of 3-5 homes and required evacuation of some residents near the stream, with three families spending the night at the Village Hall. The basement and living space of one home was flooded and a car lost. At the peak of the flooding, the following streets were closed: 1000 Block of 190th Street, 2100 110th Avenue, and Country Road TK, DD & 240th Street. There was one related driving fatality and other stranded motorists in the area.	Significant number of buildings potentially within the 100-year floodplain. Most are mobile homes; uncertain if all/most are anchored. A portion of an elementary school building is also near the floodplain. See flood vulnerability assessment in Section III.D. Highway 63 bridge handles over 10,000 vehicles in the average day. Limited options to cross the creek within the Village; significant impacts if multiple crossing are flooded and closed for extended period. Some past improvements at Hwy 63 bridge to increase flow. Stormwater improvements in 2011, dredging in 2017, elevation of the walking bridge, and the clearing of some vegetation/stumps within the Village's stream extent have helped to mitigate some past concerns, but floodwaters are also coming from upstream outside the Village. As development occurs near the I-94 interchange, there is a potential of increased stormwater runoff if not carefully planned. Without additional mitigation and stormwater management, street flood and damage to property is expected to continue. The Village requires stormwater management planning for new development to help mitigate or prevent additional flooding.
Dams	No dams or hydraulic shadow within the Village.	None.
Drought	No significant impacts within the Village from past droughts.	No unique concerns noted.

Hazardous Materials Spills	No recent events in the community, though there have been spills on Interstate 94. Contamination at Old Creamery/Coop site has been cleaned-up and should not be disturbed. Less chemicals being stored on-site at Cenex.	I-94, railroad, and State Highway are the most significant concerns; the latter two pass through residential neighborhoods.
Active Threats	No significant events in the community.	Schools and Village Hall identified as having highest vulnerability (potential targets).
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted.

The Village also noted that certain features on the landscape can hinder transportation, emergency services response, and evacuation, most notably: (1) if bridge(s) are closed due to flooding, etc. and (2) rail accidents, especially if involving long trains.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	Continued flooding has increased interest in exploring flood mitigation options (e.g., acquisition, floodproofing, upstream flood storage)
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Heavy rain events may be increasing in frequency.

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 a 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.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	Outdated plan; will consider mitigation or preparedness when updating. Desires to "test" the EOP once updated.
Community Evacuation Plan and/or Exercises	Not sure; unknown
Continuity of Government Plan	Adopted; does not incorporates mitigation or preparedness
Comprehensive Plan	Adopted; does not incorporates mitigation or preparedness
Stormwater Management Plan	Not sure; unknown
Historic Preservation Plan or Ordinance	Adopted; does not incorporates mitigation or preparedness
Capital Improvements Plan or Similar Budget	Not sure; unknown
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 incorporates mitigation or preparedness
Subdivision Ordinance	Adopted; does not incorporates mitigation or preparedness
Site Plan Review Requirements	Adopted; does not incorporates mitigation or preparedness
Floodplain Management	
Initial Flood Hazard Boundary Map:	05/10/74
Initial FIRM Identified:	08/15/90
Current Effective FIRM Date:	03/16/09
Date Community First Joined NFIP (Reg-Emer)	08/15/90
NFIP Participation Status (and reason if not participating):	Participant
Floodplain Regulations w/ NFIP standards:	Has a floodplain ordinance, but may not be consistent with the latest WDNR model.
Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:	Village engineer, then Plan Commission
Other ongoing floodplain management activities:	Will reassess NFIP participation as part of upcoming comprehensive plan update.
Stormwater Management Ordinance	Adopted; does not incorporates mitigation or preparedness
Stormwater Utility	Adopted; does not 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)	No
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	2 sirens with good coverage; may need additional siren in future as the community grows..
Storm/warning siren that can be activated remotely	Activated by County dispatch.
Active shooter/threat plans and/or security hardening for municipal buildings	None currently, but planning to or considering
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Not currently, but planning to or considering
Individuals in EOP have ICS/NIMS training	Partially complete
Public Information Officer designated & trained	Not currently, but planning to or considering
Municipal officials and staff participate in regular disaster or emergency response exercises	No
Community-level efforts to improve hazard preparedness among residents	No. Uses Facebook for public messaging.
Adopted billing rates for public works labor & equipment use during emergencies	No

Adopted mutual aid agreements for public works equipment/personnel support	Partially completed
Adopted emergency contracting and purchasing policies	No
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Yes, including cyber-insurance coverage, testing, training, and off-site back-up.
Cyber-security systems and policies for municipal utilities	Complete and active
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	Limited financial resources. Potential need for increased public awareness of preparedness practices, including having a household emergency plan, storm sheltering, flooding action, and RAVE.
Other:	Interested in coordinating with County regarding emergency fuel planning. Village recognizes that its employees are essential workers for the provision of governmental services.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the St. Croix 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 St. Croix 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. Continue to monitor, study, plan for, and address stream and stormwater flooding in the community. Consider the creation of a community-level stormwater management plan or strategy. Consider and encourage low impact development design and nature-based solutions (e.g., rain gardens, bioswales) for new development to limit runoff. Ensure Wisconsin DOT considers past flooding when completing Highway 63 bridge improvements planned for 2025. Encourage the Town of Baldwin, St. Croix County Land & Water Conservation, and Wisconsin DNR to engage in the clearing of vegetation from the stream to the east of the Village; continue similar efforts with the Village. Explore flood mitigation grant funding to address repetitive flooding problems, with landowner consent, such as flood acquisition, flood proofing, and increased flood storage. Approach WDNR and FEMA to perform a flood analysis studying the elevations of structures near or within the 100-year floodplain.	High; timeline varies by activity	Village Public Works & Plan Commission WDNR & WDOT Landowners	FEMA Flood Mitigation Assistance may be available to assist with flood mitigation actions if a history of repetitive losses can be demonstrated and the benefits outweigh costs for a preferred solution. FEMA mitigation Capability & Capacity Building or Advanced Assistance grant dollars may be an option if study needed. Wisconsin Municipal Flood Control Grant Program If eligible, CDBG-Public Facilities and Planning grants may be available. WDNR technical support
2. Collaborate with landowners and community groups to pursue FEMA mitigation grant funding for the construction of community safe rooms (storm shelters) or the storm hardening of existing structures, if there is interest. If the safe room is a multi-use community gathering place, consider including a generator and HVAC system, so the safe room space can also be used as a heating/cooling shelter and emergency assembly location.	Medium 3-5+ years, if interest	Landowner or community organization	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) WCWRPC and Wisconsin Emergency Management can provide grant-related guidance Could include installation of remote unlock of existing buildings.

3. Collaborate with County Emergency Management to update the Village's Emergency Operations Plan (EOP). Incorporate flood evacuation and emergency fuel availability. Once updated, exercise the EOP and EOC, including a public information officer (PIO) component. Exercising the EOC may help to identify any needed communications systems improvements.	Medium-to-High; 1-3 years	Village Administrator and/or emergency team	County Emergency Management may provide templates and exercise support. Periodic PIO training offered through WEM, if needed.
4. Integrate mitigation plan recommendations as part of the next comprehensive plan update, including re-assess floodplain management measures and participation in the NFIP program.	Medium-to-Low; 5+ years	Plan Commission and Village Board	CDBG Planning Grant, if income-eligible; WDNR for technical support if needed
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 RAVE, awareness of emergency siren use and warning systems, flood insurance and actions, and public preparedness in general.	Medium-to-High; ongoing	Village Clerk & Board; Fire Department May be part of a County-led effort.	County Emergency Management & partners have educational materials Potentially eligible for FEMA grant dollars, especially if flood-related education involved. 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:

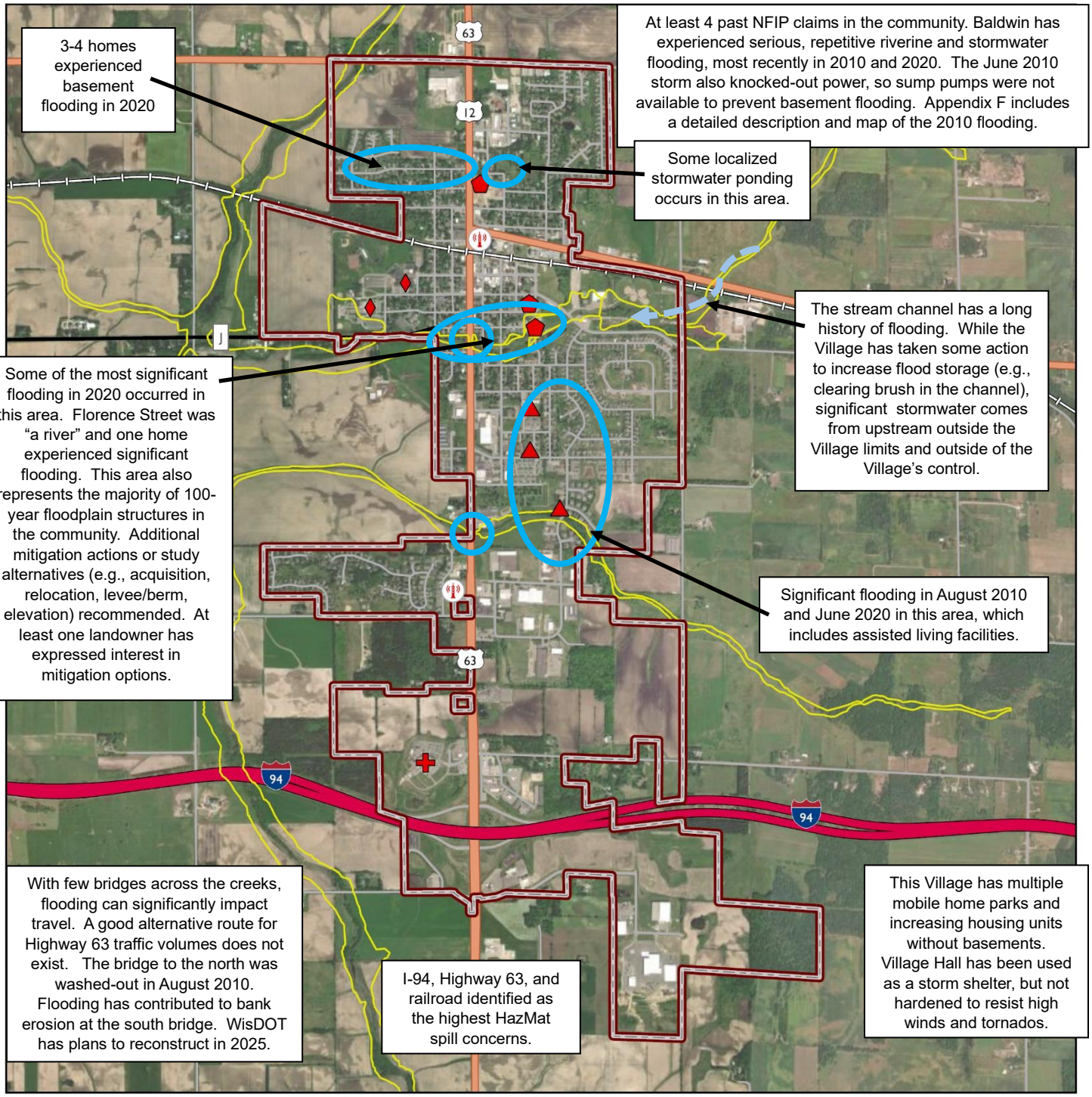
- The Village has adopted a comprehensive plan; this is an opportunity to integrate mitigation strategies, including obtaining public input on the need for a community safe room, climate resiliency, and flood-related strategies. This may also be an opportunity to explore the need for creating a community-wide stormwater management plan.
- The Village can integrate proposed projects into the Capital Improvements Plan, which allows the community to further prioritize projects and align projects with funding sources.
- The Village recognizes the importance of updating its Emergency Operations 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

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	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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 BALDWIN - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



VILLAGE OF DEER PARK HAZARD MITIGATION SUB-PLAN

Primary Contact:	Village Clerk-Treasurer
Planning Meetings:	• Primary planning meeting with WCWRPC staff occurred on 8/16/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment in November 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	249
Median Age	36.4 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors; Economic disadvantaged rural community
Assessed Improvements (2023)	Residential: $12,947,800; Commercial: $1,855,400; Manuf.: $0
# of Housing units	120
# of Mobile Homes	1
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

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 St. Croix County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	No tornado history. Straight-line winds about once a decade in past, but high wind events increasing in frequency. Typical damage is to trees and some roofs. A transformer caught on fire due to falling trees resulting in a short-term outage.	About 80% of homes have basements and no mobile home park. Some apartments, with seniors, lack a shelter. Events, annual festival, and smaller gatherings at the park. No public safe room/storm shelter.
Hail & Lightning	No unique history noted. About $25,000 in hail damage to Village buildings in 2008.	No unique concerns noted.
Winter Storm, Ice, & Extreme Cold	Costs of snow removal increasing. Some drifting on 3rd Street. High speeds on Hwy 46 coming down the hill poses accident risks, especially during winter conditions.	Power loss from trees falling on power lines or icing of lines the largest concern. No warming shelter; community center would be an option, but lacks a generator.

Extreme Heat	No unique history noted.	No cooling shelter with generator. Library available during normal operating hours.
Long-Term Power Outage	No outages of 24+ hours and no areas uniquely prone.	No generator for Village Hall/EOC or the Community Center/Senior Meal site. Portable needed for liftstations.
Flooding – Riverine or Overbank	No 100-year floodplain or overbank flooding problems noted.	None.
Flooding – Stormwater or Overland	Groundwater levels fluctuate significantly and multiple springs in the area, while heavy rain events are increasing. High groundwater elevates flooding concerns about once every 10-15 years. During heavy rains, heavy snow melt, and/or high groundwater periods, sump pumps needed in many basements. Pond on east side of State Highway 46 can rise 15+ feet; it has not flooded the Highway since the road reconstruction. Past flooding of a home and ballfield to west have been mitigated, though continuing infiltration of sewer lines just southwest of ballfields. 22nd Street has often been closed, but culvert improvements have helped. Increasing concern with stormwater flows 3-4x/year from north through a dry run near the Fire Hall. Has potential to damage one home in particular and other nearby buildings.	Many past critical flooding concerns mitigated, including use of FEMA grant dollars for an acquisition of a floodprone home near Park and elevating the ballfield 3-4 feet. Home and buildings near Fire Hall continue to be particularly vulnerable. Bear hibernating in culvert in 2019 contributed to some basement flooding. So much snow in 2022-2023, some stormwater runoff "took a different path". Stormwater study completed recommending additional retention.
Dams	No dam or hydraulic shadow.	None.
Drought	No significant impacts within the Village from past droughts.	No unique concerns noted. No municipal well/water system; private wells used.
Hazardous Materials Spills	No significant events in the community.	Truck traffic on Highway 46 and nearby natural gas pipeline identified as most significant risks. Use of ag chemicals decreasing. Some naturally occurring Radon; basement use concern. Community also noted the increasing use of electric vehicles and Fire Dept training with Northwood Tech.
Active Threats	No significant events in the community.	Library identified as a potential target; questioned whether should harden.
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?	Increasing interest in a community safe room, perhaps as part of a new Fire Hall. Increasing emergency generator need.

Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing high wind and heavy rain events.

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 a 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.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	Outdated Plan; will consider mitigation or preparedness when updating
Community Evacuation Plan and/or Exercises	Not sure; unknown
Continuity of Government Plan	Not sure; unknown
Comprehensive Plan	Outdated Plan; will consider mitigation or preparedness when updating
Stormwater Management Plan	Outdated Plan; will consider mitigation or preparedness when updating
Historic Preservation Plan or Ordinance	Not sure; unknown
Capital Improvements Plan or Similar Budget	Not sure; unknown
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 incorporates mitigation or preparedness
Subdivision Ordinance	Adopted; does not incorporates mitigation or preparedness
Site Plan Review Requirements	Not sure; unknown
Floodplain Management	
Initial Flood Hazard Boundary Map:	No 100-year floodplain.
Initial FIRM Identified:	
Current Effective FIRM Date:	
Date Community First Joined NFIP (Reg-Emer)	
NFIP Participation Status (and reason if not participating):	
Floodplain Regulations w/ NFIP standards:	Has a floodplain ordinance, but may not be consistent with the latest WDNR model.
Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:	Zoning Administrator, then Plan Commission
Other ongoing floodplain management activities:	Will reassess NFIP participation as part of upcoming comprehensive plan update.

Stormwater Management Ordinance	Not sure; unknown
Stormwater Utility	No
Winter Emergency Policies	Not sure; unknown
Mitigation & Preparedness Actions for Facilities	
Debris Site identified for storm debris disposal (not just woody debris)	Not sure; unknown
Emergency Operations Center designated with generator/back-up power	No action taken; has interest if funding available
Public Storm Shelter/Community Safe Room designated	No action taken; has interest if funding available
Public Heating/Cooling Shelter designated with generator/back-up power	Partially complete
Storm/warning siren on back-up power	Yes; about 3 years old. However, the existing pole is cracked and in great need of replacement. Further, it would be beneficial if the siren was relocated to higher ground where it is more accessible and safer for maintenance.
Storm/warning siren that can be activated remotely	Activated by County dispatch.
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	Not sure; 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	Not sure; unknown
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Partially complete. Lion's Club conducted a "scam awareness" seminar, but low turnout.
Cyber-security systems and policies for municipal utilities	Not sure; unknown
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	No
Other Flood Mitigation projects or activities	Zoning used to discourage development in areas with springs or prone to flooding.
Municipal Dam-related planning or actions	No dam.
Barriers to mitigation or preparedness actions	Limited financial resources for training and resources, including the costs to apply for grant funding. Potential need for increased public awareness of preparedness practices and Code Red.
Other:	Electric provided by Xcel Energy. Town of Cylon "owns half" of the community center, which also serves as their Town Hall.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the St. Croix 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 St. Croix 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. Explore designation or development of a community safe room (storm shelter), potentially as part of new Fire Hall or a hardening retrofit at the community center. If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location as well as training location. For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.	Medium; 3-5+ years May vary based on public demand	Village Board working with Fire Dept.	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) WCWRPC and Wisconsin Emergency Management can provide grant-related guidance
2. Continue to monitor, plan for, and address flooding challenges. Solutions may include, but are not limited to, additional study or planning, flood storage (retention), flood proofing or elevation, and other stormwater management systems.	High; Ongoing	Village Public Works; Village Board	FEMA Flood Mitigation Assistance may be available to assist with flood mitigation actions if a history of repetitive losses can be demonstrated and the benefits outweigh costs for a preferred solution. See the similar County-wide stormwater management strategy under Flood Mitigation Strategies – Projects in Section VI.C
3. As funding allows, install emergency power generators and/or electrical hook-ups for generators at the Village Hall/EOC and at the treatment plant as well as acquisition of a portable generator for the liftstations.	High; 1-3+ years as resources allow	Village Board & Public Works	No strong sources of generator grant funding. Also see County-wide generator-related recommendations in Section VI.C.

4. Replace the deteriorating storm siren pole and relocate the siren to higher ground at the park.	High; 1-3 years as resources allow	Village Board; Fire Department	Rarely has FEMA mitigation grant funding been available for sirens, though the funding has been commonly used for NOAA radios. USDA Rural Development Community Facilities grant program may be a better alternative.
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 RAVE, awareness of emergency siren use and warning systems, and public preparedness in general. Consider participation in a County or multi-jurisdictional NOAA All Hazards/Weather Radio distribution project.	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. Weather radios and some education may be eligible for FEMA mitigation grant dollars

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:

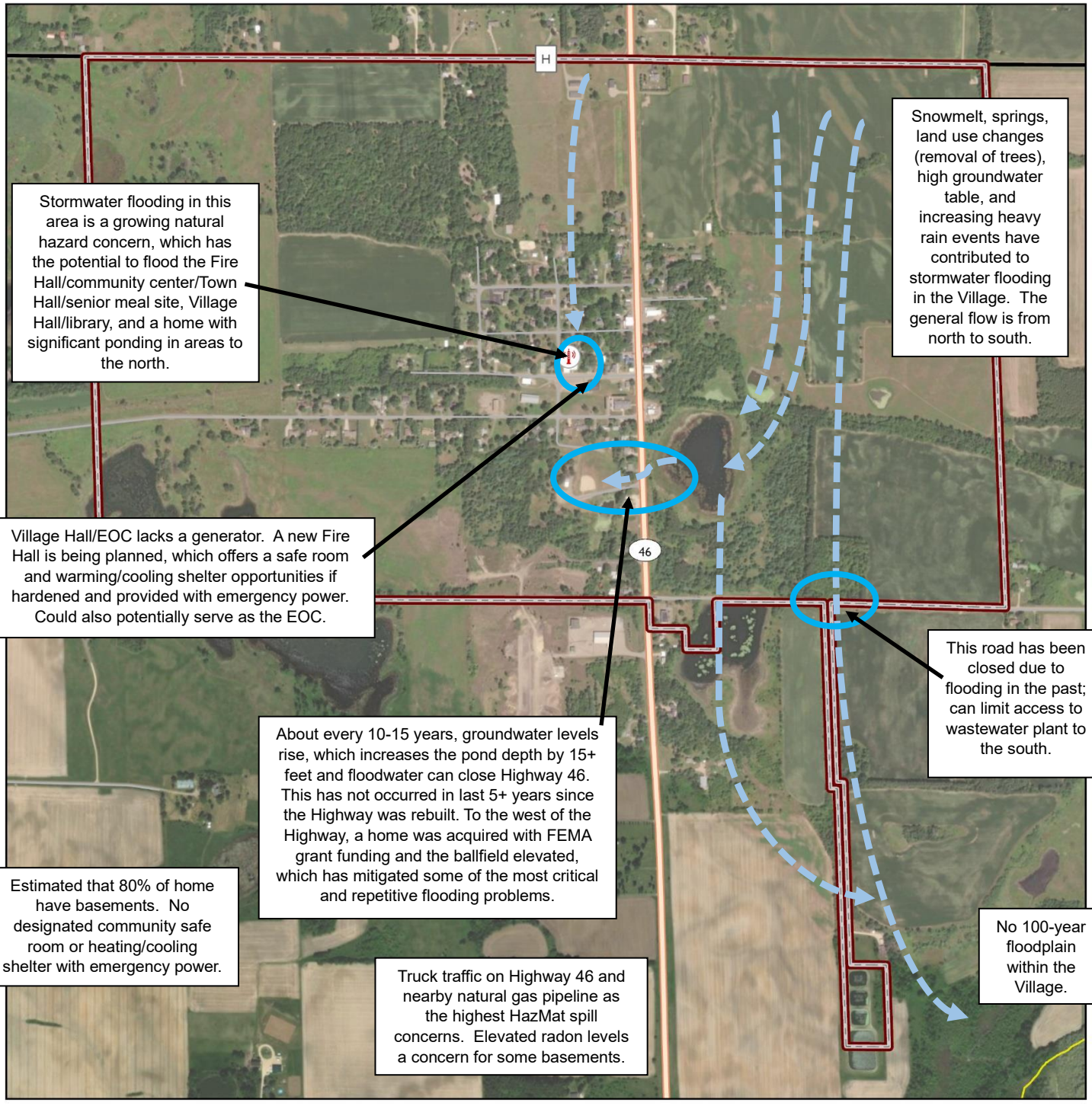
- The Village will be updating its comprehensive plan in the next 1-3 years. This is an opportunity to integrate mitigation strategies, including obtaining public input on the need for a community safe room and re-assessing participation in the NFIP.
- The next section describes how this Sub-Plan will 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	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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 DEER PARK - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



Legend

Municipal Boundary

Storm Siren

WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION

0 0.13 0.25 0.5 Miles

Data Sources:
St. Croix County, WDHS, WDNR, WisDOT, WDOA, WCWRPC.

N

VILLAGE OF HAMMOND HAZARD MITIGATION SUB-PLAN

Primary Contact:	Village Administrator
Planning Meetings:	• Primary planning meeting with WCWRPC staff occurred on 8/16/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment in November 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	1,873
Median Age	35.1 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors; mobile home park residents (high winds/tornados)
Assessed Improvements (2023)	Residential: $95,250,000; Commercial: $22,379,400; Manuf.: $12,070,100
# of Housing units	767
# of Mobile Homes	33
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

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 St. Croix County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	Tornado hit in 2005 and abt. 38 residences damaged w/ no injuries. Damage-producing high winds about once every decade.	2 m.h. parks w/o shelters, plus slab-on-grade residential homes/duplexes. Village receives phone calls from m.h. park residents each spring requesting shelter availability. Village requires new mobile homes to be anchored. No public safe room/storm shelter.
Hail & Lightning	No unique history noted. Siren hit by lightning 2x in 2011.	No unique concerns noted.
Winter Storm, Ice, & Extreme Cold	Water tower occasionally froze in past, but redid in 2022, including anti-icing. Relatively new water system with fairly deep lines have reduced freezing potential. Heavy snow in winter 2022-23 did cave-in roof of 1 unoccupied home.	No unique concerns noted. Some water line freeze-ups during 2014-2015 Polar Vortex. Dripping used to prevent widespread freeze-ups. No warming shelter.

Extreme Heat	No unique history noted.	No unique concerns noted. No cooling shelter; library is available during regular hours, but lacks generator.
Long-Term Power Outage	No significant event history.	No unique concerns noted. Village Hall/Police lacks generator, but plans to obtain one. Fire Hall has generator and two portables for public works; adding a portable. Village has own fuel tank.
Flooding – Riverine or Overbank	No recent history or problems noted. No NFIP claims. Very limited, unconnected floodplain that is largely a series of stormwater retention areas. Stormwater drainage system near school and under railroad tracks. Culvert under highway failed in Aug 2010. Highway and shoreland improvements near school may have mitigated past concerns.	No unique concerns noted. The floodplain essentially serves as natural stormwater retention areas and this role has been incorporated into the Village's stormwater management plan.
Flooding – Stormwater or Overland	Heavy rain can flood into Village Hall/Police Department. In June 2011, up to 2' water in parking lot; redid ditch near Hall and provided some relief. June 2020 flash flooding caused damage within the Police Dept and to two squad cars. Past concerns at east end of Pintail Dr; flooding 4x in Summer 2017 until cover crops on nearby fields. Many nearby farm fields drain into this area; more conservation practices may be needed. May 2017 heavy rains resulted in road flooding, washouts, debris, loss of a squad car, and water in basements of 1-2 homes. Some street flooding in 2020, but no other significant concerns since 2017.	Village has taken action to reduce past vulnerabilities: (1) Near Village Hall – Since 2020, Village has replaced/resized 2 culverts and performed other work to help address. A nearby lot was also required for additional retention. (2) Some clearing out of the retention pond at south end of Marjorie near tracks. Vulnerability may increase with increasing heavy rain events, more development, or changes in agricultural practices near the Village. Section VI.C. includes a county-level mitigation strategy supporting soil health best practices to promote infiltration and reduce runoff.
Dams	No dam or hydraulic shadow within the Village.	No dam vulnerability.
Drought	No significant impacts within the Village from past droughts.	No unique concerns noted. Good well capacity.
Hazardous Materials Spills	No significant events in the community.	Truck traffic on I-94 and USH 12, railroad, and 1 propane company are the primary HazMat spill concerns.
Active Threats	No significant events in the community.	No unique concerns noted. School is the highest concern.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted. Municipal staff engages in related training.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	Village has undertaken more efforts to address stormwater concerns and strengthen active threat and cyber security.

Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing heavy rain events and high wind events in the region. National trends regarding increasing active threats and cyber-attacks.

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 a 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.

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	Outdated Plan; will consider mitigation or preparedness when updating
Stormwater Management Plan	Adopted; does not incorporate mitigation or preparedness
Historic Preservation Plan or Ordinance	No plan
Capital Improvements Plan or Similar Budget	No plan
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	No policy or code
Zoning Ordinance	Adopted; does not incorporates mitigation or preparedness
Subdivision Ordinance	Adopted; does not incorporates mitigation or preparedness
Site Plan Review Requirements	Adopted; does not incorporates mitigation or preparedness
Floodplain Management	
Initial Flood Hazard Boundary Map:	05/10/74
Initial FIRM Identified:	07/16/87
Current Effective FIRM Date:	03/16/09
Date Community First Joined NFIP (Reg-Emer)	12/11/13
NFIP Participation Status (and reason if not participating):	Participant
Floodplain Regulations w/ NFIP standards:	Has a floodplain ordinance, but may not be consistent with the latest WDNR model.
Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:	Village engineer, then Plan Commission
Other ongoing floodplain management activities:	Will reassess NFIP participation as part of upcoming comprehensive plan update.

Stormwater Management Ordinance	Adopted; does not incorporates mitigation or preparedness
Stormwater Utility	Adopted; does not incorporates mitigation or preparedness
Winter Emergency Policies	No policy or code
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	Yes
Public Storm Shelter/Community Safe Room designated	Yes
Public Heating/Cooling Shelter designated with generator/back-up power	No
Storm/warning siren on back-up power	Yes; 3 sirens, 1 is older with battery back-up
Storm/warning siren that can be activated remotely	No
Active shooter/threat plans and/or security hardening for municipal buildings	No
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Yes; updated January 2023
Individuals in EOP have ICS/NIMS training	Yes
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	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. Security hardening of municipal offices, including panic buttons for law enforcement assistance.
Cyber-security systems and policies for municipal utilities	No; considering limiting remote capabilities to system monitoring, but not control
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	No
Other Flood Mitigation projects or activities	Addresses stormwater management as part of site plan and subdivision plat review.
Municipal Dam-related planning or actions	no
Barriers to mitigation or preparedness actions	Limited financial resources for training and resources. Potential need for increased public official awareness of roles and responsibilities during an event, including communications. Requiring construction of safe room for existing mobile home park(s).
Other:	A storm shelter for mobile home park development or expansion is required by ordinance via a conditional use permit, but can be difficult to enforce. Uses Facebook for public outreach.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the St. Croix 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 St. Croix 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. Collaborate with landowners and community groups to pursue FEMA mitigation grant funding for the construction of community safe rooms (storm shelters), if there is interest. Continue to require and enforce construction of a safe room for mobile home parks. This could include a partnership to contribute to a larger public safe room for the entire community. If the safe room is a multi-use community gathering place, consider including a generator and HVAC system, so the safe room space can also be used as a heating/cooling shelter and emergency assembly location For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.	Medium-to-Low; 3-5 years No public demand for safe room to date.	Residents should express need; Village Board Mobile Home Park ownership	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) WCWRPC and Wisconsin Emergency Management can provide grant-related guidance

2. Maintain a stormwater management plan. Continue to address stormwater flooding concerns and explore low impact development design and nature-based solutions for new development to limit runoff. As needed, collaborate with County Land Conservation and nearby farmers to mitigate stormwater runoff from agricultural lands into the Village.	Medium-to-High; ongoing	City Public Works	FEMA Flood Mitigation Assistance may be available to assist with flood mitigation actions if a history of repetitive losses can be demonstrated and the benefits outweigh costs for a preferred solution.
3. Every 2-3 years, conduct a tabletop exercise that drills the Village's Emergency Operations Plan with an emphasis on roles, responsibilities, and communication of elected officials and others identified within the EOP.	Medium; 2-5 years	Village Board & Municipal Staff; persons identified in the Village EOP	County Emergency Management may be able to provide support. This could also be a multi-jurisdictional exercise with nearby communities.
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 RAVE, awareness of emergency siren use and warning systems, 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:

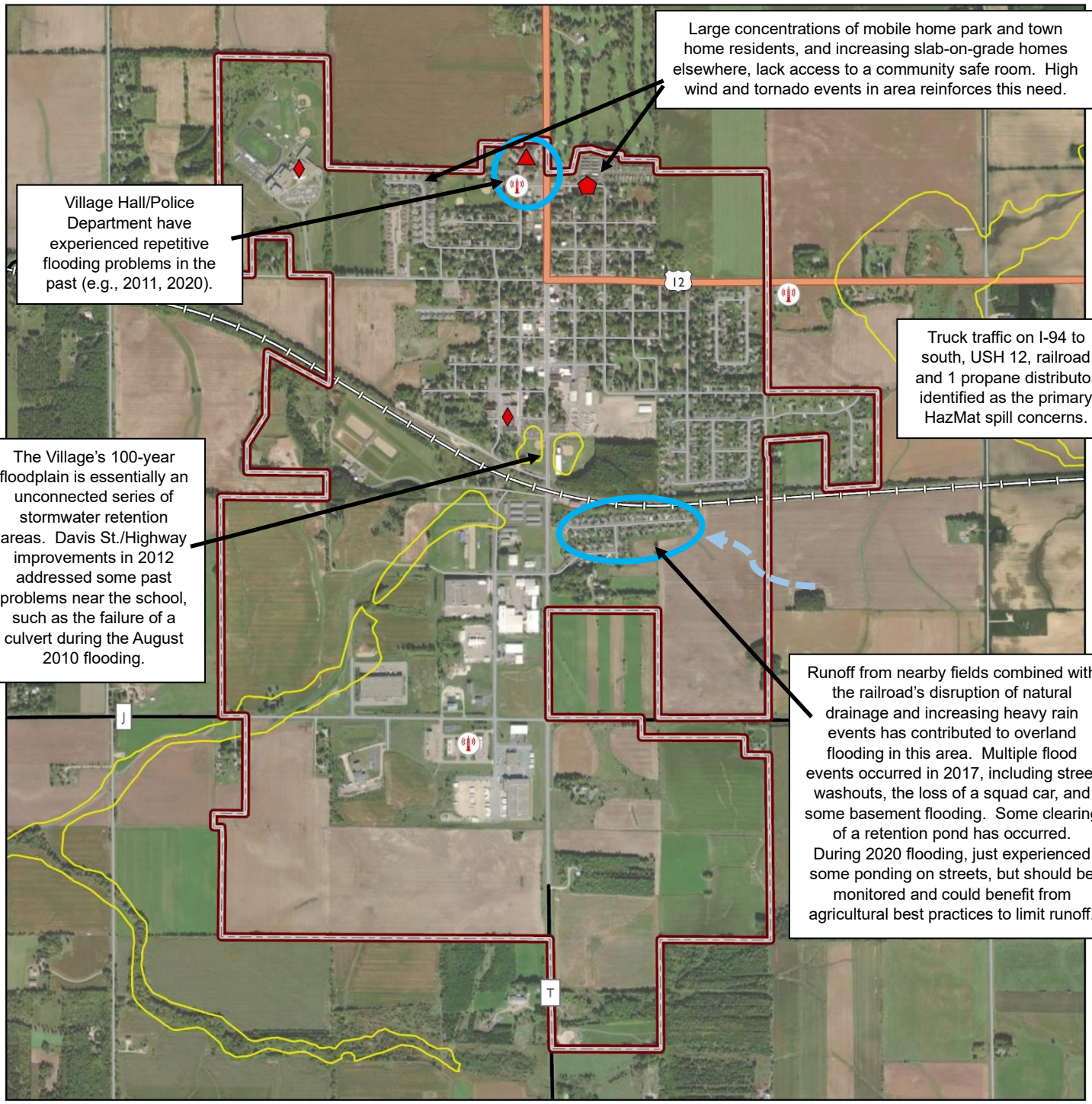
- The Village maintains a 5-year capital improvements plan that can include mitigation projects (e.g., stormwater system improvements). A variety of other potentially related tools are identified, including subdivision and stormwater ordinances and the Emergency Operations Plan.
- The Village will be updating its comprehensive plan in the future. This is an opportunity to integrate mitigation strategies, including obtaining public input on the need for a community safe room and addressing stormwater practices.
- 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	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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 HAMMOND - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



Legend

- Municipal Boundary
- 100-yr Floodplain
- Storm Siren
- School
- Assisted Living
- Mobile Home Park

WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION

0 0.13 0.25 0.5 Miles

Data Sources:
St. Croix County, WDHS, WDNR, WisDOT, WDOA, WCWRPC.

N

VILLAGE OF NORTH HUDSON HAZARD MITIGATION SUB-PLAN

Primary Contact:	Police Chief / Emergency Management Director
Planning Meetings:	• Primary planning meeting with WCWRPC staff occurred on 8/29/23 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	3,803
Median Age	47.6 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors
Assessed Improvements (2023)	Residential: $403,602,600; Commercial: $28,773,800; Manuf.: $341,900
# of Housing units	1,624
# of Mobile Homes	6
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

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 St. Croix County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	No tornado history within Village, but have struck the area. Increasing frequency of high wind events with significant impacts in Aug 2008, June 2017, and July 2023. June 2017 high winds and hail event damaged trees, roofs, and vehicles; tree damage broke a gas line requiring the evacuation of six homes. The Village signed an Emergency Declaration for clean-up. July 2023 downburst resulted in extensive damage. 8-plex lost its roof and 14 homes	No public safe room. While most homes have basements, there are some residents without storm shelters—mobile home park, Sally's landing, and Keystone Court duplexes on Village's north side. Increasing residential and commercial slab-on-grade. Growing community, so overall vulnerability increasing.

	damaged with temporary evacuation needed; Red Cross shelter activated. Power lines damaged (and a lit) by falling trees and limbs; and power loss of up to 27 hours for some residents. Woody debris pile was 129'x110'x30' tall.	
Hail & Lightning	No unique history noted. Hail caused damage as part of the June 2017 storm. Lightning strike to gas under July 2023 storm.	No unique concerns noted, except lighting during outside events (e.g., Pepper Fest)
Winter Storm, Ice, & Extreme Cold	2010, 2011, and 2022-23 were heavy snow years; snow removal challenges. April 1, 2023 saw 12.8" of snow within 8 hours, followed by strong winds. Downed trees and power lines with a great deal of clean-up. Some residents lost power for over 24 hours. Estimated Village response and clean-up costs were about $115,875. Clean-up was still ongoing in June.	No designated warming shelter. Village Hall could be used temporarily, but lacks space if EOC activated. Library lacks a generator. The April 2023 snow storm and July 2023 wind storm had a benefit of "removing" many older trees, which mitigates the potential of tree-related damage to a degree for the near future.
Extreme Heat	No unique history noted, though increasing frequency of extreme heat events noted.	No designated cooling shelter. Aging population; seniors and those on certain medications more vulnerable. Mobile homes also tend to have an elevated vulnerability.
Long-Term Power Outage	No history of power loss of 3+ days, though multiple shorter events in 2023 described previously. Neighborhood near Village Hall with mature trees slightly more prone to outages.	Village Hall/Police/EOC has an emergency generator. Sewer and water provided by City of Hudson. Xcel Energy more aggressive with tree trimming since 2023 storms.
Flooding – Riverine or Overbank	Overbank flooding is of greatest concern when floodwaters backup on the St. Croix River from ice damming and/or flooding downstream on the Mississippi River. The primary river flooding concern within the Village are the homes along the north shore of Lake Mallalieu (i.e., Sally's Alley) when floodwaters backup over the dam on the Willow River; specific solutions to address this concern have not been identified. Flooding damaged a street and liftstation in this area in 2001. 1 NFIP claim in 2017. Sandbagging has been used. Shoreland bank erosion from flooding and ice damming has occurred on the St. Croix River in the Ferry Park and Brown's Beach areas in the past. At Brown's Beach, a retaining wall was undercut and 1 home at risk. WDNR has approved a grant to rebuild the retaining wall and stairs, which may help address these concerns.	Primary overbank flooding vulnerability are homes and street in the Sally's Alley neighborhood when floodwaters back-up on the St. Croix River and overtop the dam. Loss of parkland and beach has occurred in the Ferry Park & Brown's Beach area; potential risk to children and beach-goers. See the flood vulnerability assessment in Section III.C. of the mitigation plan.
Flooding – Stormwater or Overland	In the past, stormwater during heavy rain storms has flooded yards and closed some streets, including Highway 35, Lund St, and Sommes St,, for about an hour about	Stormwater improvements and new catch basins in 2021 appear to have largely remedied the worst of past problems; the Village is continuing to monitor.

	4x per year. Cars have stalled out and 1 home has experienced significant basement flooding. Significant flooding in Keystone Court during heavy rains; primarily in yards, but nearing homes. Stormwater can infiltrate via older manholes and cause problems at the wastewater plant and storm sewer can back-up into yards; sandbagging of some manhole covers used, but safety concern.	Stormwater planning and improvements to prevent runoff is important for new construction. Some Keystone Court residents have purchased flood insurance due to stormwater flooding. Water quality issues on the Willow River/Lake Mallalieu and the St. Croix River also make such practices important.
Dams	The Lower Power Dam is a large dam creating Lake Mallalieu on the Willow River with 1,388 normal acre-feet of storage owned by the City of Hudson. Though no recent history of dam damage or failure, the dam is frequently overtopped by backed-up floodwaters on the St. Croix River.	Low hazard dam; no significant vulnerabilities. An Emergency Action Plan and IOM Plan were updated in 2016. Concrete repairs are needed and planned.
Drought	No significant impacts within the Village from past droughts.	No unique concerns noted. Municipal water from City of Hudson; see Hudson's mini-plan.
Hazardous Materials Spills	2008 warehouse fire near the St. Croix River was a concern due to firefighting foam.	Truck traffic on Highway 35 and railroad the highest Haz Mat spill concerns; STH 35 is an alternate route for I-94. Natural gas line and fuel depot on 4th Street near a residential area.
Active Threats	No significant events in the community.	School and businesses identified as the potential targets of greatest concern. School is upgrading security systems.
Cyber-Attack	No significant events impacting municipal facilities or services.	No unique concerns noted. Village is assessing its systems and exploring cyber-insurance.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	Increased demand for a community safe room. Greater municipal gov't attention on cyber-security and stormwater management planning.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increased severe wind events, heavy rain events, and cyber-security risks.

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 a 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.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	Adopted; does not incorporate mitigation or preparedness
Community Evacuation Plan and/or Exercises	No

Continuity of Government Plan	No, but planning to work on components.
Comprehensive Plan	Adopted; does not incorporate mitigation or preparedness
Stormwater Management Plan	Not sure; unknown
Historic Preservation Plan or Ordinance	Adopted; does not incorporate mitigation or preparedness
Capital Improvements Plan or Similar Budget	Adopted; can include mitigation projects (e.g., stormwater management) when needed
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. Includes max. cul-de-sac length with min. radii turnaround.
Site Plan Review Requirements	Adopted; does not incorporate mitigation or preparedness
Floodplain Management	
Initial Flood Hazard Boundary Map:	-
Initial FIRM Identified:	08/22/75
Current Effective FIRM Date:	03/16/09
Date Community First Joined NFIP (Reg-Emer)	01/12/73
NFIP Participation Status (and reason if not participating):	Participant
Floodplain Regulations w/ NFIP standards:	Has a floodplain ordinance, but may not be consistent with the latest WDNR model.
Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:	Zoning Administrator, then Plan Commission
Other ongoing floodplain management activities:	Will reassess NFIP participation as part of upcoming comprehensive plan update.
Stormwater Management Ordinance	Adopted; does not incorporates mitigation or preparedness
Stormwater Utility	Adopted; does not incorporate mitigation or preparedness
Winter Emergency Policies	No
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	No. Desire to include a community safe room space as part of new community center being planned on the Pepper Fest grounds.
Public Heating/Cooling Shelter designated with generator/back-up power	No, but desire to include as part of new community center if generator is provided.
Storm/warning siren on back-up power	New siren installed in 2006 with battery backup; may need additional siren coverage in future as Village grows
Storm/warning siren that can be activated remotely	No, but plan to or consider implementing

Active shooter/threat plans and/or security hardening for municipal buildings	No, but plan to consider or implementing.
Other Mitigation & Preparedness Actions	
Review EOP at least annually	No, but plan to consider implementing
Individuals in EOP have ICS/NIMS training	Partially complete
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
Adopted emergency contracting and purchasing policies	Yes
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	The Village is assessing its systems and will be implementing additional measures.
Cyber-security systems and policies for municipal utilities	No, but plan to consider or implementing
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	No
Other Flood Mitigation projects or activities	Various stormwater management projects with street work. Some slope stabilization and rip-rapping in shoreland areas. Occasional sandbagging.
Municipal Dam-related planning or actions	No
Barriers to mitigation or preparedness actions	Implementation and logistical support
Other:	Coordinates with City of Hudson on utilities, emergency services, and other issues. New Fire Hall under discussion.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the St. Croix 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 St. Croix 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. Explore designation or development of a community safe room (storm shelter), preferably as part of a new, multi-use community center on centrally located Pepper Festival property near the Village Hall. If a generator and HVAC system are provided, use the safe room space as a heating/cooling shelter and emergency assembly location. For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.	High; 1-3 years	Pepper Festival in cooperation with Village Emergency Manager (Police Chief)	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) WCWRPC and Wisconsin Emergency Management can provide grant-related guidance
2. Continue to monitor, study, plan for, and address overbank and stormwater flooding in the community. Consider and encourage low impact development design and nature-based solutions (e.g., rain gardens, bioswales) for new development to limit runoff. Continue to explore flood mitigation options and funding resources to: (1) address repetitive flooding problems, with landowner consent, such as flood acquisition, flood proofing, and increased flood storage; (2) develop a community-level stormwater management plan to prioritize and improve stormwater management capacity; (3) reduce infiltration at manhole covers, perhaps with temporary covers; and (4) educate residents on flood insurance.	Medium; timeline varies by activity	Village Public Works & Plan Commission Landowners	FEMA Flood Mitigation Assistance may be available to assist with flood mitigation actions if a history of repetitive losses can be demonstrated and the benefits outweigh costs for a preferred solution. FEMA mitigation Capability & Capacity Building or Advanced Assistance grant dollars may be an option if study needed. Wisconsin Municipal Flood Control Grant Program WDNR technical support

3. Continue with Village emergency planning and preparedness efforts. Integrate continuity of government (COG) components into the Villages EOP or create a Village COG Plan. Complete an assessment of the Village's cyber-security needs and implement planned activities. Integrated preparedness and mitigation into the Village's next comprehensive plan update.	Medium-to-High; 1-3+ years	Village Emergency Manager (Police Chief) and Village Clerk; Village Board & Plan Commission	St. Croix County Emergency Management & WCWRPC may assist with planning guidance. See countywide cybersecurity strategy with resources 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 RAVE, awareness of emergency siren use and warning systems, risk insurance, 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:

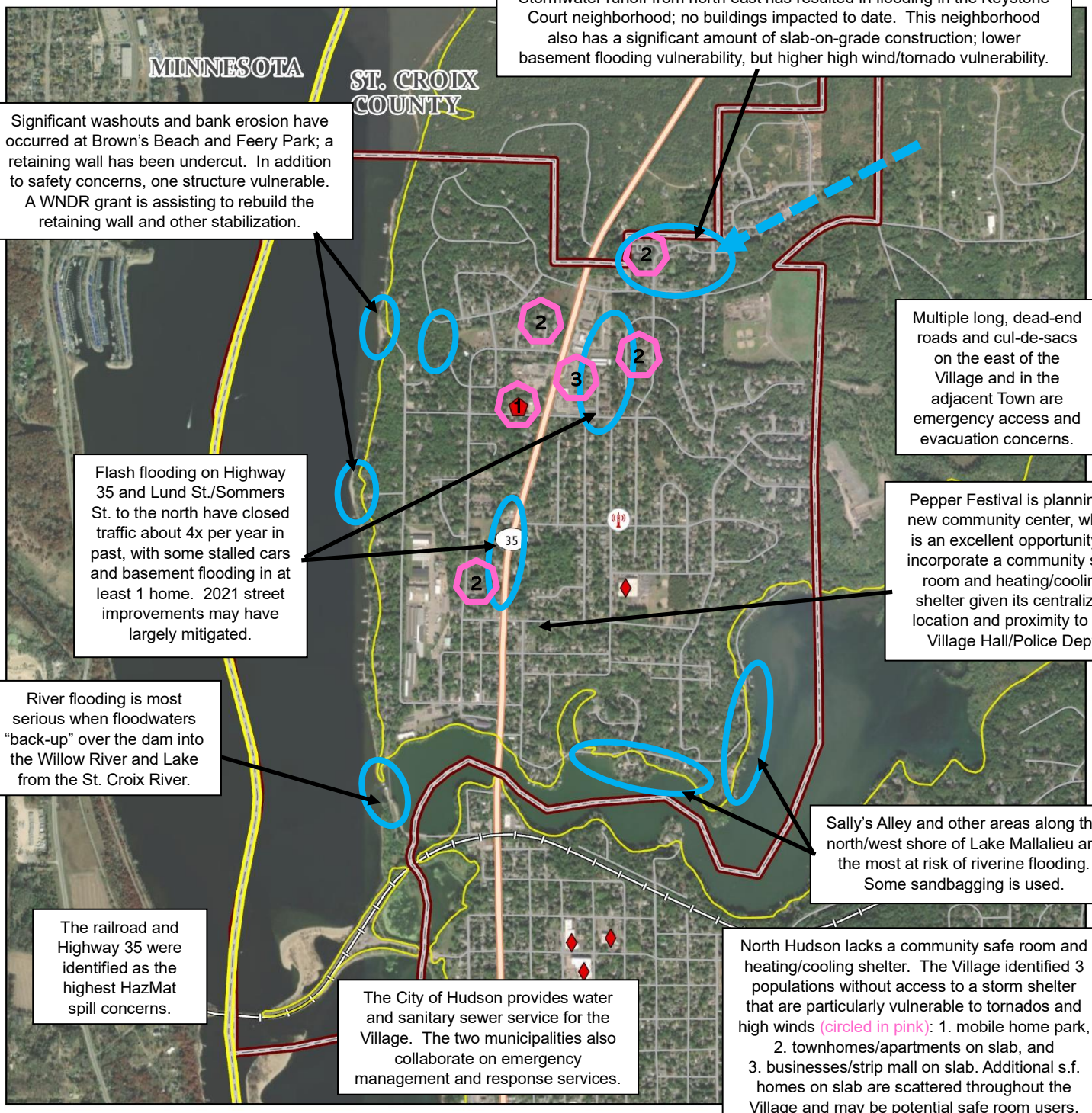
- Strategy #3 above references other related plans. In addition, the Village maintains a capital improvements plan that can include mitigation project and efficiently coordinate such projects with other planned improvements (e.g., stormwater systems with planned street projects).
- The next section describes 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

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	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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 NORTH HUDSON - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



VILLAGE OF ROBERTS HAZARD MITIGATION SUB-PLAN

Primary Contact:	Chief of Police/Emergency Manager
Planning Meetings:	• Primary planning meeting with WCWRPC staff occurred on 9/7/23 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

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	1,919
Median Age	31.8 years
Underserved, disadvantaged, or uniquely vulnerable populations	seniors and senior housing; very large mobile home park
Assessed Improvements (2023)	Residential: $93,204,000; Commercial: $41,576,200; Manuf.: $8,228,200
# of Housing units	775
# of Mobile Homes	110
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

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 St. Croix County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	No tornado history in Village. Occasional high winds with typical damage to trees, roofs, etc.; parks shelter collapsed.	Highest vulnerabilities include a very large mobile home park, newer slab-on-grade construction, and a very active, growing park. Great demand for a storm shelter (500+ residents could potentially use). School used as a storm shelter for now, but no formal agreement; school is also separated from mobile home park by railroad tracks, which could restrict access during a weather warning. Park is located close to the mobile home park; would be an excellent location for a community safe room as part of a multi-use structure.
Hail & Lightning	Repetitive lightning strikes at wastewater treatment plant.	No unique concerns noted.

Winter Storm, Ice, & Extreme Cold	Occasional freezing of water lines under 2-5 homes (mobile homes), but rare. 2014-2015 Polar Vortex about 50 laterals froze and some mains; used dripping on 50-100 homes to help mitigate. Required about a week to restore water to everyone.	No unique concerns noted. School is potentially available as a warming shelter and has natural gas heat and has generator, but no plan on how to staff such a shelter. Also, not certain how to coordinate shelter use if school is in session or conflicts with other activities.
Extreme Heat	No unique history noted.	No unique concerns noted. School is potentially available as a cooling shelter, with similar challenges for use as warming shelter noted immediately above.
Long-Term Power Outage	No long-term power loss events; outages less than 12 hours have occurred. No areas of the Village particularly prone.	No unique concerns noted. Fire Hall, wastewater plant, and school, which would serve as EOC, have generators. No generator at Village Hall/Police/Garage.
Flooding – Riverine or Overbank	1 NFIP claim as of May 2017. Flooding has closed Highway 65 just south of I-94 interchange twice in last 10-15 years, but not recently.	Very limited 100-year floodplain. Some encroachment on County Materials site, including one building, a stormwater retention pond, and outside materials storage, but no history of flood damage reported.
Flooding – Stormwater or Overland	Map at the end of this sub-plan identifies areas of flooding concern. Heavy rainfall has caused flooding across 130th St. requiring closure for about 1/2 day. Flooding occurred in June 2013 when 2.28 inches of rain fell in the area in less than 20 minutes; responders rescued people in disabled vehicles due to flood waters in the Hudson and Roberts areas, but no structural damage in the Village. July 2020 heavy rain storm caused street and yard ponding in many areas. As discussed in the flooding assessment in Section III.D., flooding at Twin Lakes to the west of the Village has been a source of concern for both the Village and the Town of Warren; groundwater and lake levels have been lower in recent years.	Increasing frequency of heavy rain events. Stormwater management and flooding potential related to developing area near I-94 intersection area is recognized, especially in light of past Twin Lakes flooding. Stormwater management plan has been adopted and the Village has been relatively aggressive in addressing past flooding problem areas. As more development occurs, the potential for stormwater flooding increases unless carefully planned.
Dams	No dams or hydraulic dam shadow.	No dam-related vulnerabilities noted.
Drought	No significant impacts within the Village from past droughts.	During drought periods, water supply can be "tight"; normally has up to 2 days of storage available. Village is exploring a second water tower and a third well.
Hazardous Materials Spills	No significant events in the community.	Truck traffic on I-94, truck stop, railroad, and LP tank farm are the most significant HazMat spill risks. Wellhead protection in place. Railroad travels through the heart of the community, including near the downtown, school, Village Hall, and large mobile home park.
Active Threats	No significant events in the community.	School and Village Hall identified as highest concerns. Both facilities have undertaken some security hardening. New camera system at school and cooperation in ALICE training/exercises with law enforcement. Village considering further hardening. If a community safe room was constructed off-site, it could serve as a reunification or assembly site if needed.

Cyber-Attack	No significant events impacting municipal facilities or services. Village did experience identify theft, but it was not Internet related)	No unique concerns noted.

Notable Trends or Changing Priorities

Have any hazard-related priorities changed since the previous mitigation plan?	Increased interest in a safe room closer to mobile home park. Increased attention to cybersecurity and physical security hardening. More stormwater flooding.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing heavy rain and high wind events in area. Also, growing cybersecurity and active threat incidents nationally.

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 a 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.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	Outdated, but currently being updated.
Community Evacuation Plan and/or Exercises	Outdated plan.
Continuity of Government Plan	Adopted; does incorporate mitigation or preparedness
Comprehensive Plan	Adopted; does incorporate mitigation or preparedness
Stormwater Management Plan	Adopted; does incorporate mitigation or preparedness
Historic Preservation Plan or Ordinance	Not sure/unknown.
Capital Improvements Plan or Similar Budget	Outdated plan; will incorporate mitigation as needed.
Involve Fire & Law Enforcement in planning & development plan review	We 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	Not sure/unknown.
Zoning Ordinance	Adopted; does incorporate mitigation or preparedness
Subdivision Ordinance	Adopted; does incorporate mitigation or preparedness
Site Plan Review Requirements	Adopted; does incorporate mitigation or preparedness
Floodplain Management	
Initial Flood Hazard Boundary Map:	-
Initial FIRM Identified:	03/16/09
Current Effective FIRM Date:	03/16/09
Date Community First Joined NFIP (Reg-Emer)	05/14/09
NFIP Participation Status (and reason if not participating):	Participant
Floodplain Regulations w/ NFIP standards:	Adopted.
Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:	Village engineer, then Plan Commission

Other ongoing floodplain management activities:	None noted.
Stormwater Management Ordinance	Adopted; does incorporates mitigation or preparedness
Stormwater Utility	No.
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; School.
Public Storm Shelter/Community Safe Room designated	Yes, but no formal agreement and long-term availability is uncertain. Due to railroad, access can also be restricted for two of the most vulnerable populations (mobile home park residents, park visitors).
Public Heating/Cooling Shelter designated with generator/back-up power	Yes; School.
Storm/warning siren on back-up power	Yes. 3 sirens provide good coverage.
Storm/warning siren that can be activated remotely	Yes. Activated by County Dispatch.
Active shooter/threat plans and/or security hardening for municipal buildings	Some initial hardening, but additional actions being considered.
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Partially completed.
Individuals in EOP have ICS/NIMS training	Yes.
Public Information Officer designated & trained	No. Could be part of future exercises.
Municipal officials and staff participate in regular disaster or emergency response exercises	Some. Interest in continued exercises and training for elected officials and staff, including basic ICS/NIMS, with an emphasis on the roles and responsibilities of Village staff (e.g., clerk, public works) during a critical incident.
Community-level efforts to improve hazard preparedness among residents	This is primarily handled by the County.
Adopted billing rates for public works labor & equipment use during emergencies	Yes,
Adopted mutual aid agreements for public works equipment/personnel support	Partially completed.
Adopted emergency contracting and purchasing policies	No., but considering.
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Yes, under an IT contract. Including cloud-based data back-up, security software, phishing tests, etc.
Cyber-security systems and policies for municipal utilities	Basic protections in place
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	Yes,
Other Flood Mitigation projects or activities	Very strong stormwater management ordinance with 17+ retention ponds.
Municipal Dam-related planning or actions	No municipal dam.
Barriers to mitigation or preparedness actions	Funding and staff resources to implement some actions. Some residents don't understand what sirens mean and are intended to do (e.g., can't hear inside), and are not using other notification systems (e.g., weather radios, RAVE). Lack of a safe room closer to mobile home park and not separated by railroad tracks.
Other:	Electric service provided by Xcel Energy and St. Croix Electric Cooperative. Dry hydrant installed at Twin Lakes for additional fire protection support. New mobile homes discouraged. Similar to many fire departments,

	there are continuing challenges with sufficient numbers of Fire/EMS volunteers, especially during daytime hours; see related countywide strategy in Section VI.C. Village recognizes that public works employees are essential staff during emergencies.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the St. Croix 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 St. Croix 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. Explore designation or development of a community safe room (storm shelter), potentially at the park. If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location. For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff. In the interim, work with the School District to update the agreement and operations plan to use the School as a storm/heating/cooling shelter, including roles and responsibilities. Conduct a drill with the safe room operations team. Due to the railroad tracks, it may be beneficial if the community has two safe room; one on each side of the tracks. If the School is to remain a safe room, explore grant funding for remote unlock capability and other retrofit/hardening (e.g., storm shutters, missile-rated doors, supplies).	Medium-to-High; 2-5 years	Village Emergency Manager and School District Other safe room advocates/potential team members	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) can help fund safe room construction and storm retrofit measures. WCWRPC and Wisconsin Emergency Management can provide grant-related guidance and model safe room operations & maintenance plans.

2. Continue to monitor, study, plan for, and address stormwater flooding in the community. Consider and encourage low impact development design and nature-based solutions (e.g., rain gardens, bioswales) for new development to limit runoff. Monitor and discourage any new intensive land disturbances within the 100-year floodplain.	Medium-to-High; ongoing, with further action as needed	Village Public Works & Plan Commission WDNR & WDOT Landowners	FEMA Flood Mitigation Assistance may be available to assist with flood mitigation actions if a history of repetitive losses can be demonstrated and the benefits outweigh costs for a preferred solution. FEMA mitigation Capability & Capacity Building or Advanced Assistance grant dollars may be an option if additional study needed. Wisconsin Municipal Flood Control Grant Program If eligible, CDBG-Public Facilities and Planning grants may be available. WDNR technical support
3. Continue to regularly review and update the Village's Emergency Operations Plan (EOP). Encourage basic ICS/NIMS training for elected officials. Periodically exercise the EOP and EOC, including public officials' roles and a public information officer (PIO) component.	Medium-to-High; 1-3 years	Village Emergency Manager	County Emergency Management may provide templates and exercise support. Basic FEMA training for elected officials are online. Periodic PIO training offered through WEM, if needed.
4. As funding allows, install emergency power generators and/or electrical hook-ups for generators at the Village Hall/Police Station.	Medium-to-Low; 3+ years as resources allow	Village Board & Public Works	Generator grants are very limited and difficult to obtain. See countywide generator-related recommendations in Section VI.C.
5. Continue to collaborate with the Town of Warren to address stormwater management challenges in the area, explore long-term solutions for flooding at Twin Lakes, and integrate mitigation plan recommendations into the joint comprehensive plan update.	High; ongoing	Plan Commission and Village Board	WCWRPC is providing plan facilitation support.

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 RAVE, awareness of emergency siren use and warning systems, and public preparedness in general. Explore FEMA mitigation grant funding for the distribution of NOAA all hazards/weather radios, potentially as a multi-jurisdictional or countywide project.	Medium-to-High; ongoing	Village Emergency Manager with support from County Emergency Management	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. FEMA HMPG & BRIC grant funding can be used for NOAA radio purchase and distribution as well as some related education.

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:

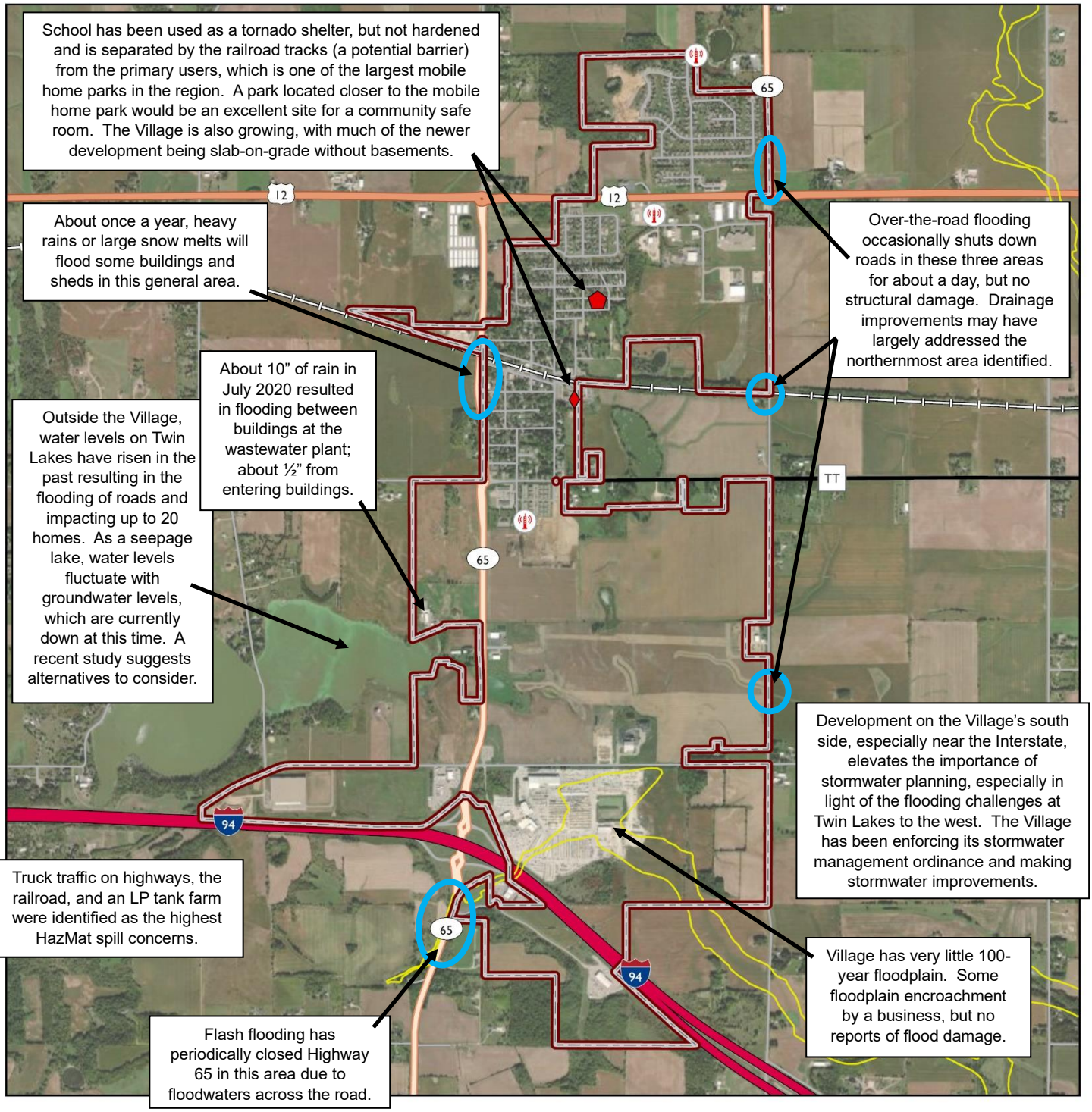
- The Village maintains a capital improvements plan (CIP) and a stormwater management plan that integrate mitigation projects are needed and resources allow.
- The Village is currently updating a joint comprehensive plan with the Town of Warren, providing an opportunity to integrate hazard concerns and mitigation strategies, the potential need for a community safe room, stormwater management, and Twin Lakes flooding alternatives.
- 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	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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 ROBERTS - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



Legend

- Municipal Boundary
- 100-yr Floodplain
- School
- Mobile Home Park
- Storm Siren

WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION

0 0.25 0.5 1 Miles

Data Sources:
St. Croix County, WDHS, WDNR, WisDOT, WDOA, WCWRPC.

N

VILLAGE OF SOMERSET HAZARD MITIGATION SUB-PLAN

Primary Contact:	Chief of Police
Planning Meetings:	• Primary planning meeting with WCWRPC staff occurred on 8/29/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village did not participate in a mitigation/preparedness capabilities assessment survey; capabilities based on 8/29/23 meeting. • 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	1,386
Median Age	29.3 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors; Residents with a disability; very large visitor population (festivals/concerts, tubing)
Assessed Improvements (2023)	Residential: $177,665,000; Commercial: $53,879,200; Manuf.: $13,773,100
# of Housing units	3,019
# of Mobile Homes	0
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

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 St. Croix County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	No recent tornado history in immediate area. Occasional high winds, but no unique or significant damage noted. In 2023, concert grounds was evacuated 2x due to severe weather warnings; visitors informed to take shelter in vehicles.	High vulnerabilities. With campground, river floating/tubing, and concerts, can be over 30,000 visitors in the areas on summer days. 6-10 concerts per year with avg. 25,000 persons and onsite camping. No safe room options available. While most homes have basements, some newer construction is slab-on-grade. No community safe room available.
Hail & Lightning	6 injured and 1 death in past at festival grounds due to lightning.	

Winter Storm, Ice, & Extreme Cold	Sporadic waterline freezing along Arnold Street in past, but this has been corrected and some lines insulated. About 20 laterals froze during 2014-2015 Polar Vortex, but no mains.	Dripping used to help prevent freeze-ups. Power loss greatest vulnerability. No formally designated warming shelter; school (has generator) or churches are options.
Extreme Heat	No unique history noted.	Concert goers, especially if "packed in" pose the highest vulnerability. Seniors also have an elevated vulnerability. No formally designated cooling shelter ; school (has generator) or churches are options.
Long-Term Power Outage	Used to occur more frequently, but improved. Short-term loss in June 2017. Heavy snows in Dec 2022 left some residents and businesses without power for 3-5 hours. No areas uniquely prone.	No unique concerns noted. Generators available for Village Hall/Police/EOC, Fire Hall, 1 well, wastewater plant, and some liftstations (1 fixed, 1 portable). Needed generators for Well 5 and watershed; fire protection could become an issue if power outage and only 1 well available.
Flooding – Riverine or Overbank	No NFIP claims or major impacts. Most of the floodplain is park. Lost the footbridge over the Apple River in 1993 and 2001.	Highest concern is a structure near Float Rite Park, but no recent flood damage reported. Sewer & water lines hanging under the bridge.
Flooding – Stormwater or Overland	Most past concerns have been remedied. Some past drainage and ponding problems to the north of Forrest Drive.	Stormwater management plan has been adopted. As more development occurs, the potential for stormwater flooding increases unless carefully planned.
Dams	No dams in the Village and no high- or significant-hazard dams immediately upstream.	No dam vulnerabilities identified.
Drought	No significant impacts within the Village from past droughts. .	No unique concerns noted. Good well capacity.
Hazardous Materials Spills	1985 tire fire, but no contamination found. Highway 65 bridge "cooked" during a line break.	Highway 65 truck traffic, railroad and high pressure natural gas line are the highest HazMat spill concerns. Railroad spill a special concern due to proximity to school. Would be valuable if HazMat response assistance available from Minnesota.
Active Threats	No significant events in the community. Some limited security situations at concert/festival.	School and concert grounds are the greatest vulnerabilities or sites of concern. Frequent training between school and police department; school has hardened buildings and limits access. Concert/festival grounds has own security staff with post-event debriefs.
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?	Decreased stormwater/overland flooding due to Village infrastructure improvements. Increasing concerns with active threats and extreme heat among concert goers.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing extreme heat events in region. Increasing active threats nationally. Increasing high wind storms in region may be increasing demand for safe rooms.

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 a 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.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	No
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 not incorporate mitigation or preparedness
Historic Preservation Plan or Ordinance	Not sure; unknown
Capital Improvements Plan or Similar Budget	No
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	No policy/code
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	
Initial Flood Hazard Boundary Map:	05/24/74
Initial FIRM Identified:	05/04/89
Current Effective FIRM Date:	03/16/09
Date Community First Joined NFIP (Reg-Emer)	05/04/89
NFIP Participation Status (and reason if not participating):	Participant
Floodplain Regulations w/ NFIP standards:	Has a floodplain ordinance, but may not be consistent with the latest WDNR model.
Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:	Zoning Administrator, then Plan Commission
Other ongoing floodplain management activities:	Will reassess NFIP participation as part of upcoming comprehensive plan update.
Stormwater Management Ordinance	Adopted; does not incorporates 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
Emergency Operations Center designated with generator/back-up power	Yes
Public Storm Shelter/Community Safe Room designated	Partially complete
Public Heating/Cooling Shelter designated with generator/back-up power	Partially complete
Storm/warning siren on back-up power	Yes. Good coverage.
Storm/warning siren that can be activated remotely	Yes. Activated by County dispatch.
Active shooter/threat plans and/or security hardening for municipal buildings	Some limited hardening of buildings.
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Partially complete
Individuals in EOP have ICS/NIMS training	Yes
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	No
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Some cyber-security actions completed. Managed services via an IT contract.
Cyber-security systems and policies for municipal utilities	
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 dam.
Barriers to mitigation or preparedness actions	Funding to complete projects. Some public/visitors not familiar with emergency warning systems, preparedness actions, RAVE, etc. Very large visitor population and concerts limit mitigation options (e.g., can't build a safe room big enough for everyone). The Somerset Amphitheater has 4 access/egress points and requires about 1.5 hours for full evacuation.
Other:	Red Cross shelters identified in Village EOP. Village uses Facebook and webpage to keep public informed and other preparedness outreach.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the St. Croix 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 St. Croix 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. Continue joint emergency planning and exercises with Somerset Amphitheater ownership and security staff. Particular emphasis should be given to severe weather, active threats/civil disturbance, preparedness messaging, and evacuation/reunification management. Explore options for adding another access/egress point, perhaps for emergency use only. Include joint debriefs at the end of each concert season.	High; Ongoing	Somerset Amphitheater, Village Police Chief	County Emergency Management and/or WEM may have some resources to assist if needed.
2. Explore designation or development of a community safe room (storm shelter), <u>if</u> there is increased community demand. The shelter may not necessarily be owned by the Village, but could target a specific user group (e.g., campers, concert staff, certain slab-on-grade subdivisions). If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location. For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.	Medium-to-Low; 3-5 years No public demand for safe room to date.	Residents should express need; Village Board	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) WCWRPC and Wisconsin Emergency Management can provide grant-related guidance
3. Every 2-4 years, conduct a brief tabletop exercise of the City's Emergency Operations Plan with persons identified in the EOP and Village officials so everyone has a basic understanding of roles and responsibilities.	Medium-to-High; 1-3 years	Police Chief and Village Board	County Emergency Management may be able to provide some support. Online ICS/NIMS training and courses through WEM are also available.

4. As funding allows, install emergency power generators for Village liftstations.	Medium; 3-5+ years as resources allow	Village Board & Public Works	Would likely require Village funding. Very few grant resources for such generators, unless part of a larger infrastructure grant project.
5. Integrate mitigation plan recommendations as part of the next comprehensive plan update, including re-assess floodplain management measures and participation in the NFIP program.	Medium-to-Low; 1-3 years	Plan Commission and Village Board	CDBG Planning Grant, if income-eligible; WDNR for technical support if needed
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 RAVE or related smart phone apps, awareness of emergency siren use and warning systems, and public preparedness in general. Special outreach and messaging should be considered for visitors and concert-goers; this may require special signage and web-based/social medial approaches to reach the younger audience.	Medium-to-High; ongoing	Village Clerk & Board; Police/Fire Department Somerset Amphitheater	County Emergency Management & partners have educational materials Could implement local outreach 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:

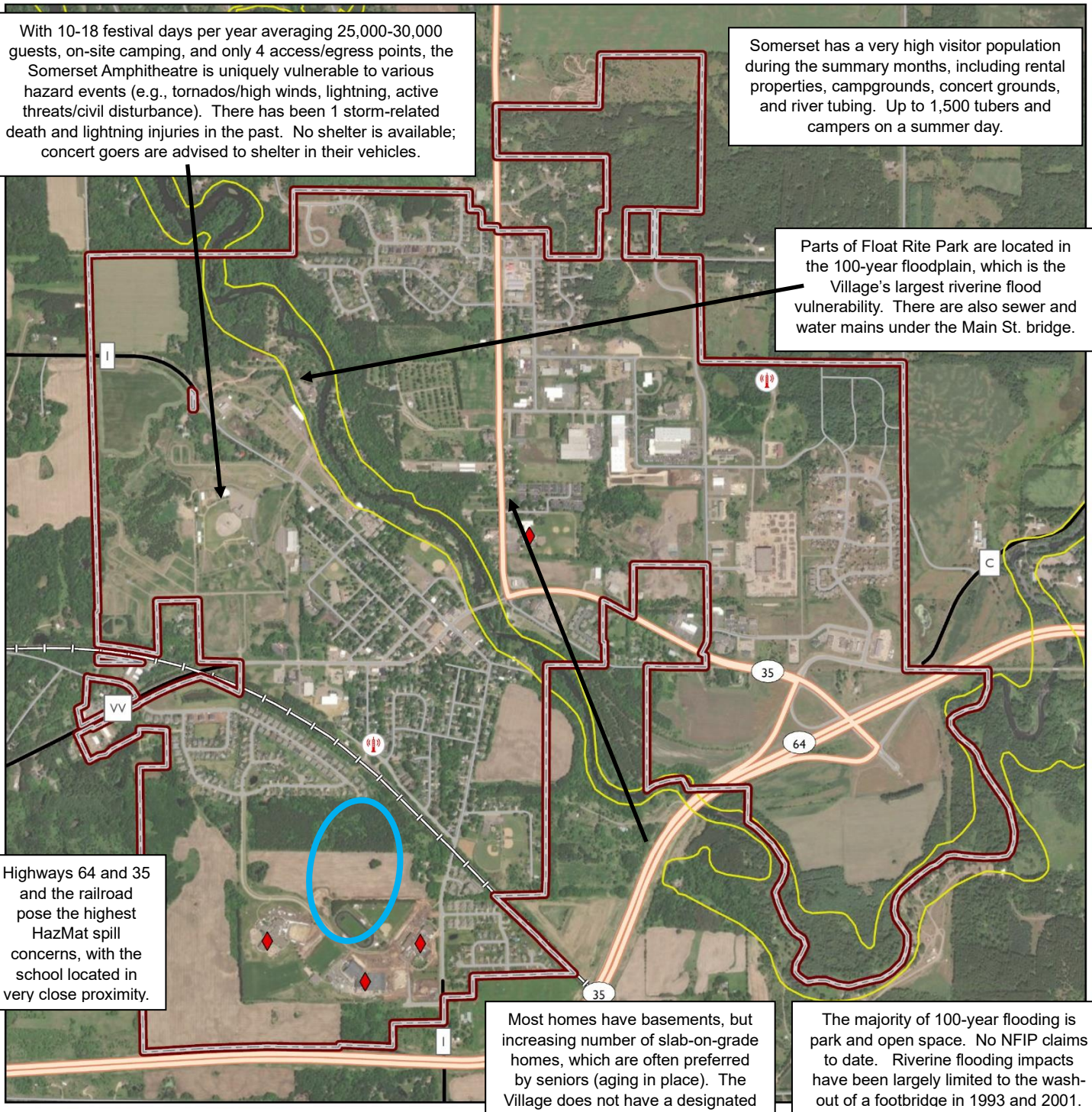
- The Village maintains a 5-year capital improvements plan (CIP) and a stormwater management plan that integrate mitigation projects are needed and resources allow.
- Continued emergency planning and exercises with Somerset Amphitheater ownership and security provide opportunities to explore further preparedness and mitigation measures.
- Future Village comprehensive plan updates provide an opportunity to integrate mitigation strategies, including obtaining public input on the need for a community safe room.
- 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	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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 SOMERSET - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



VILLAGE OF STAR PRAIRIE HAZARD MITIGATION SUB-PLAN

Primary Contact:	Village Administrator-Clerk/Treasurer
Planning Meetings:	• Primary planning meeting with WCWRPC staff occurred on 9/11/23 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	678 (Village believes this may be overestimated)
Median Age	39.4 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors; Housing Authority housing units (some 55+ and disabled)
Assessed Improvements (2023)	Residential: $47,009,300; Commercial: $3,621,600; Manuf.: $0
# of Housing units	289
# of Mobile Homes	0
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

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 St. Croix County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	No tornado history in the Village. Occasional high winds, but no unique or significant damage noted. Several trees and some power lines were blown down in the area due to high winds in July 2017 and May 2018.	Most homes have basements and no mobile home park. No public safe room/storm shelter.
Hail & Lightning	No unique history noted. Hail storm in 2010 and June 2017; some roof and vehicle damage. Lightning strike at Village Shop in 2012.	No unique concerns noted.
Winter Storm, Ice, &	No critical issues. Some water lines froze in Winter 2014-2015, but no breaking; encouraged water dripping. Some past	No unique concerns noted. Power loss is the biggest concern. 5th Street reconstructed, which may help with travel when slippery. No designated warming shelter;

Extreme Cold	drifting on Highway 64 and "H". Hills can be dangerous if icy.	Village Hall/Community Center could serve as, but lacks generator.
Extreme Heat	No unique history noted.	No unique concerns noted. No cooling shelter.
Long-Term Power Outage	No unique issues or areas uniquely prone. Summer 2016 high winds resulted in power loss in some areas for about 5 hours. Heavy snow and wind caused power loss for less than 24 hours in December 2022.	Village Hall/EOC/Community Center and Fire Hall lacks generator. Portables used for well, wastewater plant, and 2 liftstations.
Flooding – Riverine or Overbank	Apple River flows through the Village. No NFIP claims or recent damage. Flood water can infiltrate manholes near river, which contributes to wastewater treatment loading and operation challenges. A beaver dam resulted in flooding over the Saratoga Avenue bridge and within the Village park.	Most of the 100-year floodplain is Village park or forested. Wastewater treatment costs and challenges if high floodwater infiltration into the system. Of significant concern is the accuracy of the floodplain maps (D-FIRMs). The Village does not have engineered floodplain maps (Zone A only; not AE). Lack of detailed data and concerns over the accuracy of the current maps have made it difficult to obtain mortgage, conduct site planning, and communicate with landowners.
Flooding – Stormwater or Overland	Stormwater ponding of streets and yards just east of Village Hall (Bridge-Jewell intersection) have caused some street damage, but no structures significantly impacted to date.	Concerned that stormwater flooding challenges near Village hall could increase in the future and begin to impact nearby structures.
Dams	WDNR identifies 2-3 small dam structures within the Village; two on the Apple River and one on a small tributary. These are very small, unrated structures.	These unrated dams have minimal storage and very low vulnerability. No significant dam related concerns noted.
Drought	No significant impacts within the Village from past droughts.	No unique concerns noted. Good well capacity.
Hazardous Materials Spills	No significant events in the community.	Truck traffic on Highway 65 is the most significant risk. Trucks will sometimes use incorrect route.
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?	Increasing need for emergency power generators, better NFIP floodplain maps, and interest in retrofit of community center as safe room and heating/cooling shelter.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Heavy rain events and high wind events in region have been increasing.

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 a 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.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	Adopted; does incorporate mitigation or preparedness
Community Evacuation Plan and/or Exercises	Not sure; unknown
Continuity of Government Plan	Adopted; does incorporate mitigation or preparedness
Comprehensive Plan	Adopted; does incorporate mitigation or preparedness
Stormwater Management Plan	Adopted; does *not* incorporate mitigation or preparedness
Historic Preservation Plan or Ordinance	No
Capital Improvements Plan or Similar Budget	Outdated; 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	No
Zoning Ordinance	Adopted; does incorporate mitigation or preparedness
Subdivision Ordinance	Adopted; does incorporate mitigation or preparedness
Site Plan Review Requirements	Adopted; does incorporate mitigation or preparedness
Floodplain Management	
Initial Flood Hazard Boundary Map:	12/28/73
Initial FIRM Identified:	03/16/09
Current Effective FIRM Date:	03/16/09
Date Community First Joined NFIP (Reg-Emer)	11/19/09
NFIP Participation Status (and reason if not participating):	Participant
Floodplain Regulations w/ NFIP standards:	Has a floodplain ordinance, but may not be consistent with the latest WDNR model.
Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:	Village Engineer and Building Inspector, then Plan Commission
Other ongoing floodplain management activities:	Will reassess NFIP participation as part of upcoming comprehensive plan update.
Stormwater Management Ordinance	Adopted; does incorporate mitigation or preparedness
Stormwater Utility	No
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)	Partially complete
Emergency Operations Center designated with generator/back-up power	No, but has Community Center that could be utilized as such
Public Storm Shelter/Community Safe Room designated	Not sure; unknown

Public Heating/Cooling Shelter designated with generator/back-up power	No
Storm/warning siren on back-up power	Yes. Annually inspected and good coverage.
Storm/warning siren that can be activated remotely	Yes
Active shooter/threat plans and/or security hardening for municipal buildings	No. Camera installed at Village Hall/Community Center.
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	Partially complete
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
Adopted emergency contracting and purchasing policies	Yes
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Yes. Data backed-up offsite.
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	None identified or noted
Other:	More training on public official roles during a disaster event may be beneficial. While emergency communications have improved, mobile/cellular communications is still sub-optimal due to topography.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the St. Croix 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 St. Croix 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. As funding allows, install emergency power generators at the Village Hall/EOC/Community Center and at treatment plant, well, and liftstations.	High; 1-3+ years as resources allow	Village Board & Public Works	Grant funding for generators is very difficult to obtain; more options if part of a larger project. See countywide generator-related recommendation in Section VI.C.
2. Encourage WDNR and FEMA to reassess and update the D-FIRM floodplain maps for the Village using the County's new LiDAR data. When an update occurs, educate affected landowners of the change. In the interim, obtain guidance from County Community Development on the potential use of LiDAR-based Letters of Map Amendment if needed.	Medium-to-High; 3-5+ years	Village Plan Commission; County Community Development	As a Village, FEMA may be willing to provide a small grant to produce an engineered D-FIRM using the new LiDAR data. See related countywide flood mitigation strategy in Section VI.C.
3. Explore the retrofit or hardening of the Village Hall/Community Center as a community safe room (storm shelter). This may include actions such as storm shutters, missile-rated doors, battery back-up lighting, and remote unlock. If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location.	Medium-to-Low; 3-5 years	Residents should express need; Village Board	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) WCWRPC and Wisconsin Emergency Management can provide grant-related guidance
4. Work with County Highway and WDOT to encourage truck traffic to remain on Highway 65.	Medium; 1-3 years	Village Clerk & Public Works; County Highway; WDOT	As a State Highway, Wisconsin DOT may be able to provide additional signage, markings, etc.
5. Exercise the Village's Emergency Operations Plan (EOP), including the roles of elected officials, public information officer responsibilities, and crisis communications.	High; 1-3 years	Village Board; Village Emergency Team & Responders	St. Croix County Emergency Management can provide assistance.

6. Continue to monitor, study, plan for, and address stormwater flooding in the community. Consider and encourage low impact development design and nature-based solutions (e.g., rain gardens, bioswales) for new development to limit runoff. Continue to explore flood mitigation options and funding resources to: (1) address repetitive flooding problems, with landowner consent, such as flood acquisition, flood proofing, and increased flood storage; (2) develop a community-level stormwater management plan to prioritize and improve stormwater management capacity; (3) reduce infiltration at manhole covers, perhaps with temporary covers; and (4) educate residents on flood insurance.	Medium; timeline varies by activity	Village Public Works & Plan Commission Landowners	FEMA Flood Mitigation Assistance may be available to assist with flood mitigation actions if a history of repetitive losses can be demonstrated and the benefits outweigh costs for a preferred solution. FEMA mitigation Capability & Capacity Building or Advanced Assistance grant dollars may be an option if study needed. Wisconsin Municipal Flood Control Grant Program WDNR technical support
7. Integrate mitigation plan recommendations as part of the next Village comprehensive plan update.	Medium-to-Low; 3-5+ years	Plan Commission and Village Board	CDBG Planning Grant, if income-eligible; WDNR for technical support if needed
8. As opportunities allow, collaborate with County Emergency Management and other partners (e.g., Public Health, Red Cross, Electric Provider) to increase public participation in RAVE, awareness of emergency siren use and warning systems, 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 maintains an Emergency Operations Plan and can include mitigation projects in their capital projects budgeting.
- As mentioned above, the Village can integrate mitigation strategies into their comprehensive plan, including further exploring public demand for a community safe room.

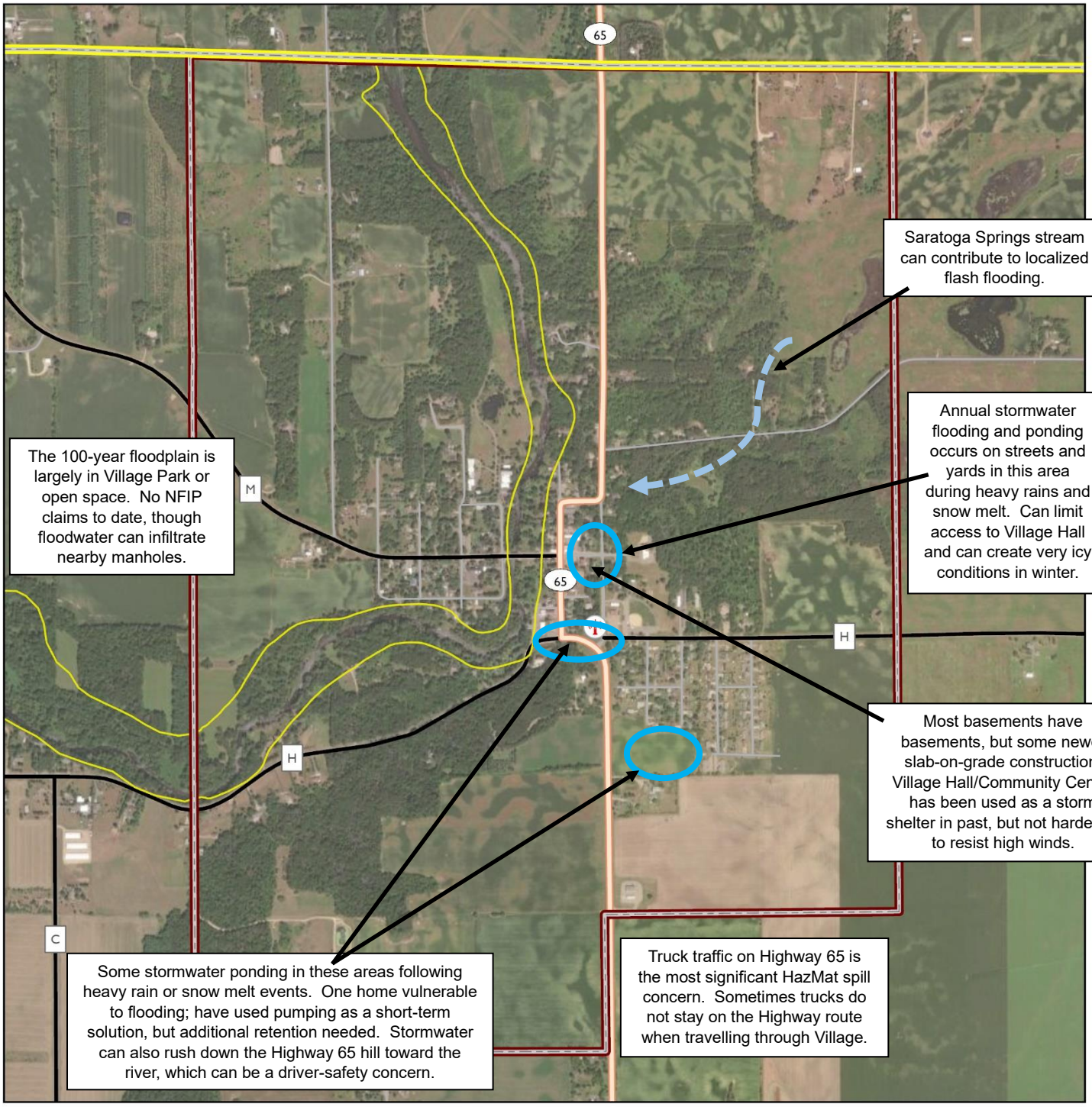
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

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	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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 STAR PRAIRIE - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



Legend

- Municipal Boundary
- 100-yr Floodplain
- Storm Siren

WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION

0 0.13 0.25 0.5 Miles

Data Sources:
St. Croix County, WDHS, WDNR, WisDOT, WDOA, WCWRPC.

N

VILLAGE OF WOODVILLE HAZARD MITIGATION SUB-PLAN

Primary Contact:	Village Clerk/Treasurer
Planning Meetings:	• Primary planning meeting with WCWRPC staff occurred on 9/11/23 at the Village Hall. Sign-in sheet excerpt in Appendix B identifies participants. • Village participated in a mitigation/preparedness capabilities assessment in November 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	1,386
Median Age	34.6 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors; Economic disadvantaged rural community
Assessed Improvements (2023)	Residential: $59,895,600; Commercial: $17,750,000; Manuf.: $17,631,600
# of Housing units	595
# of Mobile Homes	40
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

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 St. Croix County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	No tornado history in Village. Occasional high winds, but no unique damage noted. Last major wind storm was August 2007.	Increasing slab-on-grade residential construction with basements. Small, underground storm shelter at mobile home park without generator or HVAC, but no public safe room/storm shelter.
Hail & Lightning	No unique history noted. Occasional hail.	No unique concerns noted.
Winter Storm, Ice, & Extreme Cold	Village hit hard by Dec 2010 storm, but no unique problems. Some laterals froze in Winter 2014-2015, but not a widespread problem. Heavy snow in 2022-23 created removal challenges.	No designated warming shelter.
Extreme Heat	No unique history noted.	Seniors and those on certain medicines have a higher vulnerability. No designated cooling shelter.

Long-Term Power Outage	No 24+ hour outages. Overhead power lines on wooded, tree-lined streets are more vulnerable to outages, though no particular areas have been prone to power loss to date.	Village Hall/Police lacks a generator, but has connection for portable. Fixed generators at wells and maintenance shop; 2 portables for wastewater plant and liftstations. Fire Hall has generator for basic operations, but can't handle HVAC should it be used as a shelter.
Flooding – Riverine or Overbank Flooding – Stormwater or Overland	Overbank and overland flooding within the Village often occurs concurrently. Village has been experiencing 100-year floods about once per decade. Flood flows can be disrupted by bridge. During heavy rains, stream bank erosion along creek and catch basin due to flooding. Aug 2010 flash flood washed out roads & sidewalks, and damaged buildings & property, including the Fire Hall, Village Hall, and a police car. The Village was essentially split the community in half, which create islands and impacted emergency response. 1 NFIP claim; see 2010 flood summary in appendices. Significant flooding in June 2020. Basement of a home caved in. See map at end of this "mini-plan".	Most high-hazard floodplain areas along Eau Galle Creek are primarily park or forested. The 100-year floodplain maps (DFIRMs) has been modified (narrowed) to better reflect actual conditions. Increasing # of heavy rain events are contributing to significant overbank and overland flooding events and vulnerabilities. Growing community; without careful planning and best practices, this vulnerability will further increase as new development occurs. High groundwater in some areas contributes to ponding; sumps used. Heavy rain/stormwater infiltrating sewer; more backflow prevention needed. Additional public education on flood risks, prevention, backflow prevention, and insurance may be valuable; "can still flood, even if not in a floodplain."
Dams	No dams or hydraulic shadow within the Village.	No dam-related vulnerability.
Drought	No significant impacts within the Village from past droughts.	No unique concerns noted. Good well and storage capacity for fire protection.
Hazardous Materials Spills	No significant events in the community.	Truck traffic on I-94 and railroad are the most significant HazMat spill risks. Deteriorating abutment of overhead railroad bridge on CTH "B" addressed in 2023.
Active Threats	No significant events in the community.	School identified as having an elevated risk. Law enforcement exercises with school.
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?	Flooding problems continue to be a top priority. Interest in/need for a public safe room and heating/cooling shelter may be increasing.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing heavy rain events and extreme heat events. Population growth. Increasing slab-on-grade construction.

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 a 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.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	No
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 not incorporate mitigation or preparedness
Historic Preservation Plan or Ordinance	Not sure; unknown
Capital Improvements Plan or Similar Budget	No
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	No policy/code
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	
Initial Flood Hazard Boundary Map:	05/24/74
Initial FIRM Identified:	05/04/89
Current Effective FIRM Date:	03/16/09
Date Community First Joined NFIP (Reg-Emer)	05/04/89
NFIP Participation Status (and reason if not participating):	Participant
Floodplain Regulations w/ NFIP standards:	Has a floodplain ordinance, but may not be consistent with the latest WDNR model.
Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:	Zoning Administrator, then Plan Commission
Other ongoing floodplain management activities:	Will reassess NFIP participation as part of upcoming comprehensive plan update.
Stormwater Management Ordinance	Adopted; does not incorporates 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
Emergency Operations Center designated with generator/back-up power	Yes
Public Storm Shelter/Community Safe Room designated	Mobile home park has a small shelter for its residents. No Village-designated shelter. Village Hall basement (Senior Center) could be used for such, but lacks a fixed generator.
Public Heating/Cooling Shelter designated with generator/back-up power	No designated shelter with fixed generator capable of providing HVAC available, though Fire Hall and Senior Center are options.
Storm/warning siren on back-up power	Yes; 3 siren and 1 with battery backup. May need additional siren in future as the Village grows.
Storm/warning siren that can be activated remotely	Yes
Active shooter/threat plans and/or security hardening for municipal buildings	No action taken
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Partially complete
Individuals in EOP have ICS/NIMS training	Yes
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	No
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Partially complete.
Cyber-security systems and policies for municipal utilities	Strengthening systems are being explored.
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	No
Other Flood Mitigation projects or activities	Stormwater project list part of capital improvements plan. Backflow ordinance adopted. Some rip-rapping and other bank stabilization. WDNR grant was used to dredge and clean-up stream channel in past; additional such work may be needed.
Municipal Dam-related planning or actions	No dam.
Barriers to mitigation or preparedness actions	Funding to complete projects
Other:	Xcel Energy providing electric for most of Village. Remote meetings used

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the St. Croix 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 St. Croix 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. Continue to monitor, study, plan for, and address stream and stormwater flooding in the community. Consider and encourage low impact development design and nature-based solutions (e.g., rain gardens, bioswales) for new development to limit runoff. If demand warrants, explore flood mitigation grant funding to address repetitive flooding problems, with landowner consent, such as flood acquisition, flood proofing, and increased flood storage. Support efforts of St. Croix County Community Development and Land & Water Conservation to engage landowners and town officials upstream of the Village to adopt best management practices to mitigate stormwater runoff, promote flood storage, and carefully plan for the sizing of new culverts so that downstream flooding is not increased.	High; timeline varies by activity	Village Public Works & Plan Commission WDNR & WDOT Landowners	FEMA Flood Mitigation Assistance may be available to assist with flood mitigation actions if a history of repetitive losses can be demonstrated and the benefits outweigh costs for a preferred solution. FEMA mitigation Capability & Capacity Building or Advanced Assistance grant dollars may be an option if study or analysis is needed. Wisconsin Municipal Flood Control Grant Program If eligible, CDBG-Public Facilities and Planning grants may be available. WDNR technical support
2. Explore designation or development of a community safe room (storm shelter), if there is increased community demand. If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location. For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.	Medium-to-Low; 3-5 years No public demand for safe room to date.	Residents should express need; Village Board	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) WCWRPC and Wisconsin Emergency Management can provide grant-related guidance

3. In lieu of #2 above or as an interim action, consider designating the Senior Center as a storm shelter and heating/cooling shelter, if a generator is available during times of power loss. This could potentially include some "hardening" of the space, such as remote unlock, missile-rated door, battery backup lighting, and generator. Similar hardening projects may be needed at the existing storm shelter at the mobile home park.	Medium-to-High; 1-3 years	Emergency Manager to lead discussion	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) may be able to assist with a retrofit or hardening project. Also see #4 below.
4. As funding allows, install an emergency power generator and/or obtain a portable generator for the Village Hall/Police Department/Senior Center. If the Fire Hall is intended to be a safe room and shelter in the future, consider an generator upgrade to provide for HVAC power back-up.	High; 1-3+ years as resources allow	Village Board & Public Works	Very difficult to obtain grant funding for a generator if not tied to a larger project; few resources exist. See countrywide generator-related recommendation 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 RAVE, awareness of emergency siren use and warning systems, flood preparedness (e.g., risks, NFIP insurance, backflow prevention, gutters) and public preparedness in general.	Medium-to-High; ongoing	Village Emergency Manager, 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:

- As noted previously, the Village has a stormwater management plan and emergency operation plan. A 5-year capital improvements plan is maintained, that incorporates stormwater projects and mitigation actions as need and funding allows. Emergency access considered as part of subdivision plat and site review.
- The Village has a comprehensive plan, which is an opportunity to integrate mitigation strategies, including obtaining public input on the need for a community safe room and educating on flood risks.

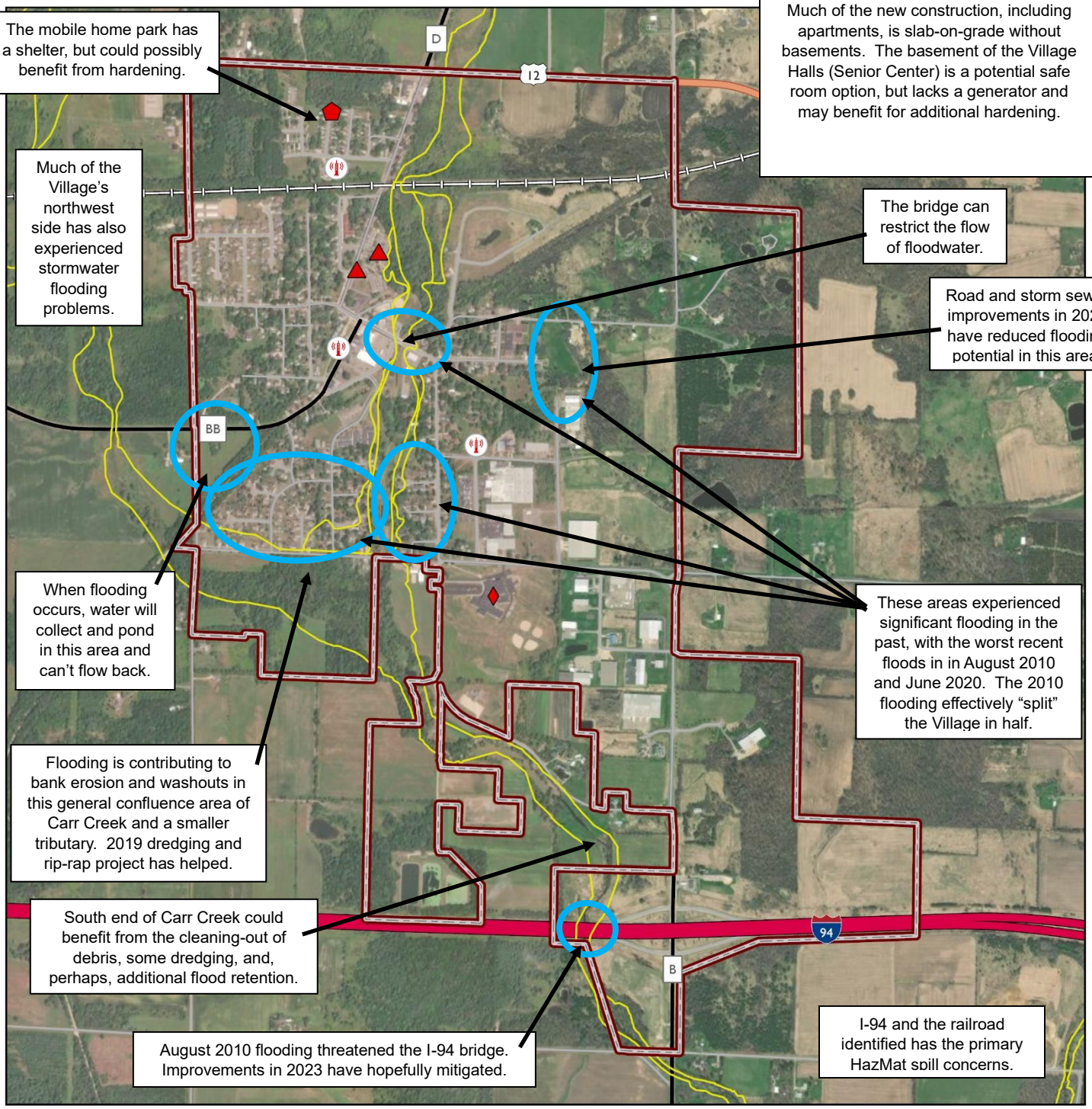
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

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	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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 WOODVILLE - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



Legend

- Municipal Boundary
- 100-yr Floodplain
- Storm Siren
- School
- Assisted Living
- Mobile Home Park

WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION

0 0.25 0.5 1 Miles

Data Sources:
St. Croix County, WDHS, WDNR, WisDOT, WDOA, WCWRPC.

N

CITY OF GLENWOOD CITY HAZARD MITIGATION SUB-PLAN

Primary Contact:	Chief of Police
Planning Meetings:	• Primary planning meeting with WCWRPC staff occurred on 8/16/23 at the City Hall. Sign-in sheet excerpt in Appendix B identifies participants. • City participated in a mitigation/preparedness capabilities assessment in November 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

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	1,306
Median Age	38.8 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors; Fairground visitors
Assessed Improvements (2023)	Residential: $69,699,800; Commercial: $13,745,600; Manuf.: $1,224,200
# of Housing units	536
# of Mobile Homes	23
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

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 St. Croix County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	No tornado history in the City. Occasional high winds that cause significant damage about once per decade; typical roof, siding, and tree damage.	Fairgrounds, mobile home park, and slab-on-grade homes/rental units are the highest vulnerabilities. Fairgrounds also has camping on site. No public safe room/storm shelter. Fairgoers instructed to "shelter in place" in block buildings that provide some protection during last storm; some have previously fled to nearby businesses, which created some problems.
Hail & Lightning	No unique history noted. Occasional localized hail; 2008 hail storm damaged roofs and cars. Some lightning strikes of municipal well.	No unique concerns noted.

Winter Storm, Ice, & Extreme Cold	Scattered occasional line breaks. Some ice damming near Syme Ave caused flooding at 3 structures in 2007; 15 evacuated. Vehicle with 5 children slid off of Glen Meadows Lane in past, which is a long, narrow, dead-end road that can be icy, but some recent improvements.	No unique concerns noted. No designated warming shelter; library an option when open, but lacks generator.
Extreme Heat	No unique history noted.	No unique concerns noted. No designated cooling shelter; library an option when open, but lacks generator.
Long-Term Power Outage	No 24+ hour power outages and no areas particularly prone.	No unique concerns noted. City Hall/Police lacks generator. Fire Hall/current EOC has generator, though City Hall is the preferred EOC. New well as a generator and a portable available for wastewater plant and liftstations. Senior living center has a generator. Fuel concerns for generators and vehicles if outages of 3+ days.
Flooding – Riverine or Overbank	No NFIP claims. Extensive floodplain, but no recent history or problems noted, except previously mentioned ice damming near Syme Avenue in 2007.	Three flood-control dams have largely mitigated overbank flooding in the community.
Flooding – Stormwater or Overland	Run-off from farm on north side of City contributed to serious stormwater concerns about 2014, but not an issue since.	No unique concerns noted.
Dams	No dam failures noted.	Glenwood City is in the hydraulic shadow of three high hazard dams owned by St. Croix County (Glen Hills #4, #5, & #6). All three dams were constructed and are maintained primarily for flood control and stormwater management with no normal storage. All are regularly inspected, emergency action plans are in place, and repairs are scheduled.
Drought	No significant impacts within the City from past droughts.	No unique concerns noted. Good well capacity
Hazardous Materials Spills	No significant events in the community.	Truck traffic on Highway 170 and nearby railroad are the most significant HazMat spill risks.
Active Threats	No significant events in the community.	School and Fairgrounds are highest concerns. ALICE training at School with law enforcement and some security hardening. Fairgrounds a concern due to numbers of people, many buildings/entrances, and on site camping; many different types of events (e.g., County Fair, rodeo, equestrian events, wedding receptions). Fairgrounds emergency plan in place, but not exercised for active threat. New City Hall provides greater security for employees.
Cyber-Attack	Experienced a keylogging attack in 2009, but thwarted by the bank before theft occurred.	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?	None noted.

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 a 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.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	Outdated plan; will consider mitigation or preparedness when updating
Community Evacuation Plan and/or Exercises	Not sure; unknown
Continuity of Government Plan	Not sure; unknown
Comprehensive Plan	Outdated plan; will consider mitigation or preparedness when updating
Stormwater Management Plan	Outdated plan; will consider mitigation or preparedness when updating
Historic Preservation Plan or Ordinance	Not sure; unknown
Capital Improvements Plan or Similar Budget	no
Involve Fire & Law Enforcement in planning & development plan review	Yes, as needed.
Special emergency notification procedures or preparedness plans for vulnerable populations	no
Policies, Codes, & Ordinances	
Building Codes	-
Building Code Efficiency Grading Schedule	-
Zoning Ordinance	-
Subdivision Ordinance	-
Site Plan Review Requirements	Not sure; unknown
Floodplain Management	
Initial Flood Hazard Boundary Map:	05/14/76
Initial FIRM Identified:	09/04/86
Current Effective FIRM Date:	03/16/09
Date Community First Joined NFIP (Reg-Emer)	09/04/86
NFIP Participation Status (and reason if not participating):	Participant
Floodplain Regulations w/ NFIP standards:	Has a floodplain ordinance, but may not be consistent with the latest WDNR model.
Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:	Zoning Administrator, then Plan Commission
Other ongoing floodplain management activities:	Will reassess NFIP participation as part of upcoming comprehensive plan update.

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)	no
Emergency Operations Center designated with generator/back-up power	No generator at City Hall, which would serve as EOC.
Public Storm Shelter/Community Safe Room designated	None, but interested in designating or constructing.
Public Heating/Cooling Shelter designated with generator/back-up power	No shelters identified or activated, but interested.
Storm/warning siren on back-up power	1 siren with good coverage. Police will also use squad car and P.A. system if available.
Storm/warning siren that can be activated remotely	Activated by County dispatch.
Active shooter/threat plans and/or security hardening for municipal buildings	New City Hall offers greater protection, but additional hardening under consideration.
Other Mitigation & Preparedness Actions	
Review EOP at least annually	yes; updated Fall 2022
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	Not currently, but planning to or considering
Community-level efforts to improve hazard preparedness among residents	Not currently, but planning to or considering
Adopted billing rates for public works labor & equipment use during emergencies	yes
Adopted mutual aid agreements for public works equipment/personnel support	Yes; informal agreements with neighboring communities.
Adopted emergency contracting and purchasing policies	Not currently, but planning to or considering
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	City has good data security and data backed-up in cloud.
Cyber-security systems and policies for municipal utilities	yes
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	Not currently, but planning to or considering
Other Flood Mitigation projects or activities	no
Municipal Dam-related planning or actions	no; dam is in good repair; low hazard rating
Barriers to mitigation or preparedness actions	Limited financial resources and rising construction costs. Potential need for increased public awareness of preparedness practices, siren purpose, warning systems, RAVE, etc. Lack of a generator is preventing the establishment of the EOC at the new City Hall, which would be the most beneficial location.
Other:	Electric service provided by Xcel Energy. FEMA grant funding previously provided for the construction of a safe room at the Fairgrounds, but the project was eventually halted when final costs came in significantly higher than the initial grant budget estimates largely due to construction inflation during COVID-19.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the St. Croix 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 St. Croix 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. Continue to explore the construction of a community safe room (storm shelter) at the Fairgrounds, if adequate funding is available. If a generator and HVAC system are provided, consider using the safe room space as a heating/cooling shelter and emergency assembly location. For new safe room construction, consider the incorporation of nature-based stormwater management systems (e.g., rain barrels, rain garden) to mitigate site runoff.	Medium; 3-5 years	Fairgrounds	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) WCWRPC and Wisconsin Emergency Management can provide grant-related guidance Potential collaboration with St. Croix County
2. As funding allows, install an emergency power at the City Hall/Police Department, which is the desired EOC location.	High; 1-3+ years as resources allow	City Council & Public Works	Grant funding for generators is very limited and difficult to obtain. See countywide generator-related recommendations in Section VI.C.
3. Update the City's Emergency Operations Plan, then review every 1-2 years Consider periodically testing or exercising the plan, including involving elected officials so they understand their roles and a PIO/crisis communications component.	High; 1-3 years	City Emergency Management; City Council	St. Croix County Emergency Management can provide planning and exercise assistance as well as provide guidance or schedule related training opportunities.

4. Integrate mitigation plan recommendations as part of the next comprehensive plan update.	Medium-to-Low; 1-3+ years	Plan Commission and City Council	CDBG Planning Grant, if income-eligible; WCWRPC may be available to provide planning assistance.
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 RAVE, awareness of emergency siren use and warning systems, and public preparedness in general.	Medium-to-High; ongoing	City Clerk & Council; 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:

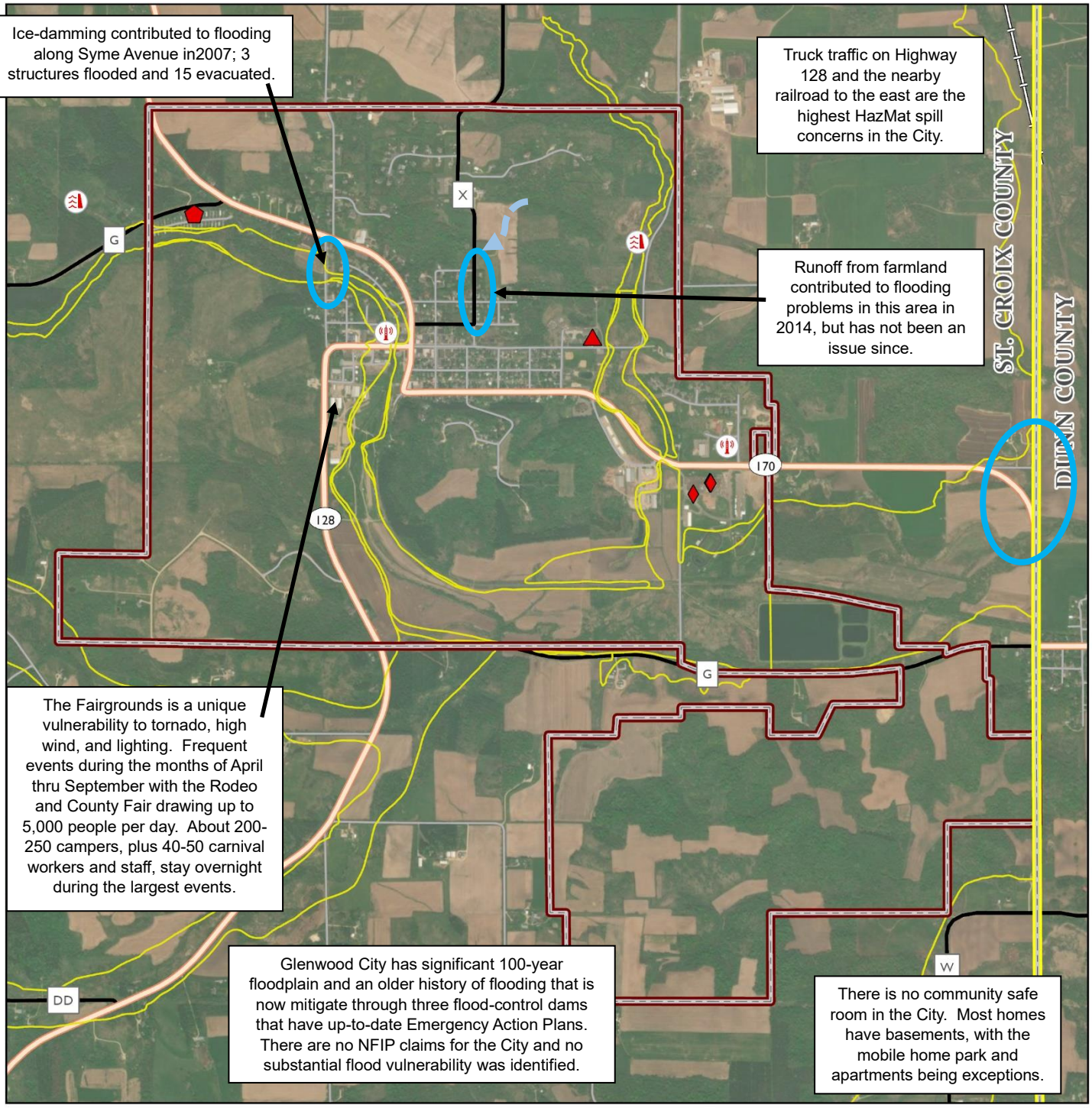
- The previous recommendations recognize that the City's emergency operations plan is outdated.
- The City can integrate preparedness and mitigation strategies into its comprehensive plan and include related projects in its capital improvements plan.
- It is important for St. Croix County to maintain emergency action plans and inspection, operation, & maintenance plans for the three Glen Hills dams upstream of Glenwood City.
- 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	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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.

CITY OF GLENWOOD CITY - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



Legend

- Municipal Boundary
- 100-yr Floodplain
- School
- Assisted Living
- Mobile Home Park
- Storm Siren
- Dam w/High or Significant Hazard Rating

WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION

0 0.25 0.5 1 Miles

Data Sources:
St. Croix County, WDHS, WDNR, WisDOT, WDOA, WCWRPC.

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CITY OF HUDSON HAZARD MITIGATION SUB-PLAN

Primary Contact:	Chief of Police / Emergency Management Director
Planning Meetings:	• Primary planning meeting with WCWRPC staff occurred on 8/29/23 at the City Hall. Sign-in sheet excerpt in Appendix B identifies participants. • City participated in a mitigation/preparedness capabilities assessment in December 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

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	14,755
Median Age	39.7 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors. Some homeless.
Assessed Improvements (2023)	Residential: $1,217,561,300; Commercial: $498,662,200; Manuf.: $58,266,600
# of Housing units	6,510
# of Mobile Homes	0
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

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 St. Croix County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	No tornado history. Seems to be increasing frequency of damage-producing high wind events over past decade. Typical damage to roofs, outbuildings, trees, overhead utilities, etc. In June 2013, the City declared a State of Emergency due to high wind and flooding debris and required protective measures; the City received FEMA funding for debris clearance and road damage. High winds (part of a system spawning 4 tornados) caused extensive damage in the City in September 2021 with numerous downed trees and power lines. Structural	City of Hudson is St. Croix County's largest community with the high concentration of community lifeline facilities and businesses. It is also a growing community, giving the City a high vulnerability to tornado, high wind, and other severe weather events in terms of potential losses. Most homes have basements, but increasing slab-on-grade for newer development(e.g., Carmichael Ridge, St. Croix Meadows). Some large span and many large structures and facilities are slab-on-grade (e.g., industries, big box stores, strip malls). No public safe room/storm shelter.

	damage to roofs, windows, siding, and vehicles was significant; the bathhouse roof was thrown over 150' and windows were blown out at the Public Library damaging contents. Total damages estimated in the millions, much more than listed in the NCDC database. July 2023 downburst resulted in additional downed trees/power lines, roof damage, etc.	
Hail & Lightning	Increased reports of hail events in recent years, including May 2015, June 2017, May 2022, September 2022, and August 2023. Some lightning strikes of traffic signals in the past and at a water tower about once a year; 1 home has been struck.	No unique concerns requiring action noted.
Winter Storm, Ice, & Extreme Cold	Occasional water line breaks; mostly laterals in 2014-2015. Large amount of snow removal required in Winter 2022-23. Over a foot of snow on April 1, 2023, required about $234,000 in City response and clean-up costs; many downed trees and some downed power lines.	Widespread, long-term power outage greatest concern. Traffic on I-94 and Cumberland & Vine are the most common concerns; on-ramp gates added since last plan, except Exit 1, though State is very reluctant to utilize. No designated warming shelter; Fire Hall is an option, but lacks a generator.
Extreme Heat	No unique history noted, but frequency of events may be increasing.	No designated cooling shelter; Fire Hall is an option, but lacks a generator.
Long-Term Power Outage	Downtown mostly overhead power lines, though newer development buried. Some trees have fallen on lines in 3rd and Vine area. Recent high wind and winter storm events (discussed previously) have resulted in power loss. The April 2023 snow storm resulted in citywide power loss with some residents, businesses, and services up to 4 days without electric.	City Hall/Police/EOC, municipal wells, and wastewater plant have generators. Portable available other utilities, but would not operate at full capacity. Fill Hall/back-up EOC lacks generator. City's urban forestry program address tree health and removes dead/dying trees; assists in mitigating potential damage to overhead utility lines and reduces storm-related damages.
Flooding – Riverine or Overbank	7 NFIP claims as of May 2017. Back-flooding from Mississippi occurs along St. Croix River about 3-4 times per decade and is mostly a nuisance. Sandbagging of 1 building is typical with 5 to 6 inches of water in Buckeye Garage every 3 years. 2021 flooding caused the wastewater plant to exceed capacity and under-treated effluent was discharged to the St. Croix River.	Typically, there is 12-15 days to prepare for a river flooding event. Much of the City's 100-year floodplain is in the City Park and a combination of existing seawalls and temporary sandbagging are used to limit flood damage. City has evaluated options for temporary levees or a tiger dam as a safe, more effective alternative to sandbagging. The City's wastewater treatment plan is located near the floodplain, but has only been significantly impacted in 2021. Access along Front Street can be restricted during flooding.
Flooding – Stormwater or Overland	As development occurs, additional stormwater flows through older neighborhoods with flooding mostly limited to yards, basements, and garages.	As a growing community, the potential for stormwater flooding increases unless planned for and managed. City is implementing its stormwater management plan, including retention areas and selective dredging.

	Due to hardscape (e.g., buildings, streets, parking lots), can be significant stormwater ponding and runoff in commercial/industrial area south of I-94. Flooding occurred in June 2013 when 2.28 inches of rain fell in less than 20 minutes; responders rescued people in disabled vehicles due to flood waters in the Hudson and Roberts areas. June 2020 flooding. See hazard map at the end of this sub-plan for additional flood history.	Past Vine St. (9th to River) improvements have helped to address some of most serious concerns identified in previous mitigation plans, though this area continues to be vulnerable to "sheet flooding" with larger concentrations of hardscape and some stormwater infrastructure without the capacity to handle extreme rainfall events.
Dams	The Lower Power Dam is a large dam creating Lake Mallalieu on the Willow River with 1,388 normal acre-feet of storage owned by the City of Hudson. Though no recent history of dam damage or failure, the dam is frequently overtopped by backed-up floodwaters on the St. Croix River, but such events have no significant impacts within the City of Hudson.	The Lower Power Dam is a low hazard dam with no significant vulnerabilities. An Emergency Action Plan and IOM Plan were updated in 2016. Concrete repairs are needed and planned. The City is within the dam failure areas of two other dams—the Little Falls Dam on the Willow River and St. Croix Hydro Dam on the St. Croix River. The dam shadows for both are very similar to or do not exceed the boundaries of the 100-year floodplain.
Drought	No significant impacts within the City from past droughts.	No unique concerns noted. New well recently constructed to provide additional water capacity.
Hazardous Materials Spills	No significant events in the community.	Truck traffic on I-94, natural gas transmission line, and railroad identified has being the greatest concerns for HazMat spills. Safety and congestion issues at I-94 & Carmichael interchange could exacerbate spill response and impacts.
Active Threats	No significant events in the community, though there have been threats at the schools.	Schools, City Hall, and community gathering places identified as highest active threat concerns. Also potential for civil disturbances that disrupt traffic or could escalate into an active threat event, especially impacting downtown or I-94 bridge.
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 attention to high winds, safe room needs, lack of heating/cooling shelter, and public awareness in this plan update.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Strong wind, heavy rain/flooding, and heavy snow events may be increasing, while the City's population continues to grow (increasing risk and vulnerability)

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 a 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.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	Adopted; does incorporate mitigation or preparedness
Community Evacuation Plan and/or Exercises	Adopted; does incorporate mitigation or preparedness
Continuity of Government Plan	No
Comprehensive Plan	Adopted; does incorporate mitigation or preparedness
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 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	Adopted; does incorporate mitigation or preparedness
Site Plan Review Requirements	Adopted; does incorporate mitigation or preparedness
Floodplain Management	
Initial Flood Hazard Boundary Map:	-
Initial FIRM Identified:	11/10/72
Current Effective FIRM Date:	03/16/09
Date Community First Joined NFIP (Reg-Emer)	11/10/72
NFIP Participation Status (and reason if not participating):	Participant
Floodplain Regulations w/ NFIP standards:	Has a floodplain ordinance, but may not be consistent with the latest WDNR model.
Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:	City Administrator, then Plan Commission
Other ongoing floodplain management activities:	Will reassess NFIP participation as part of upcoming comprehensive plan update.
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	No, but considering implementing. This may include the retrofit/storm hardening of gathering places, such as the senior center near the hospital and/or the stadium.

Public Heating/Cooling Shelter designated with generator/back-up power	No, but considering implementing
Storm/warning siren on back-up power	Yes
Storm/warning siren that can be activated remotely	Sirens are activated by County Dispatch.
Active shooter/threat plans and/or security hardening for municipal buildings	Some security hardening at the City Hall. City Police has conducted extensive training with schools, including some additional planning and security hardening. Additional educational outreach to apartments, businesses, and community groups. Has also worked across State lines to address bomb squad and crowd control support if needed.
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	Yes
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. Includes phishing testing of City employees.
Cyber-security systems and policies for municipal utilities	Yes
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	Partially complete
Other Flood Mitigation projects or activities	MS4 permitting, with related education required. Volunteer management related to sandbagging can present challenges. Interest in developing a more formal flood response plan/policy to direct monitoring, sand drop-off sites, sandbag supplies, etc.
Municipal Dam-related planning or actions	See previous discussion on the Lower Power Dam. Plans updated in 2016; some repairs needed.
Barriers to mitigation or preparedness actions	Limited financial and staff resources. Need for increased public awareness of preparedness practices and emergency systems, especially sirens and RAVE. Emergency communications challenges (e.g., FirstNet issues, only 1 fire channel)
Other:	City's urban forestry program (previously discussed). General public outreach occurs via Facebook.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the St. Croix 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 St. Croix 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. Continue to monitor, study, plan for, and address river and stormwater flooding in the community. Evaluate the benefits-costs of a temporary levee system or tiger dam. Consult with Wisconsin Emergency Management on potential eligibility for mitigation grant funding or other funding sources. Consider and encourage low impact development design and nature-based solutions (e.g., rain gardens, bioswales) for new development to limit runoff. Explore flood mitigation grant funding to address repetitive flooding problems, with landowner consent, such as flood acquisition, flood proofing, and increased flood storage. Create a basic flood response plan.	High; timeline varies by activity	City Public Works & Plan Commission Landowners	FEMA Flood Mitigation Assistance may be available to assist with flood mitigation actions if a history of repetitive losses can be demonstrated and the benefits outweigh costs for a preferred solution. FEMA mitigation Capability & Capacity Building or Advanced Assistance grant dollars may be an option if study needed. Wisconsin Municipal Flood Control Grant Program
2. Collaborate with landowners and community groups to pursue FEMA mitigation grant funding for the construction of community safe rooms (storm shelters), if there is interest. This may include the storm hardening or retrofit of existing facilities. If the safe room is a multi-use community gathering place, consider including a generator and HVAC system, so the safe room space can also be used as a heating/cooling shelter and emergency assembly location. Incorporate nature-based stormwater management systems (e.g., rain barrels, rain garden) to prevent runoff/stormwater flooding.	Medium 3-5+ years, but varies based on demand	Landowners or community organizations	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) WCWRPC and Wisconsin Emergency Management can provide grant-related guidance
3. As funding allows, install an emergency power generator at the Fire Hall so that it may effectively serve as a back-up EOC and, potentially, as a heating/cooling shelter and emergency assembly location.	High; 1-3+ years as resources allow	Fire Department	It is very difficult to obtain grant funding for generators; very few opportunities. See generator-related recommendations in Section VI.C.

4. Continue efforts to make the City of Hudson a prepared and resilient community, including: • Annually review and update the City's Emergency Operations Plan (EOP) • Continue to implement the City's stormwater management plan, educate residents on good stormwater practices, and integrate flood mitigation measures into the City's capital improvements plan. • Integrate mitigation plan recommendations into the next City comprehensive plan update. • Continue to strengthen the City's cybersecurity systems, including related training and testing. • Continue to conduct active threat and civil disturbance training and exercises for municipal buildings, schools, community events, and other gathering places. Including Fire/EMS in such training. Potentially incorporate the ALERRT system. Execute MOUs as needed for mutual support, such as the regional crowd control team. • Continue to participate in HazMat spill response exercises, with a particular emphasis on I-94. Consider evacuation and interstate re-routing scenarios.	Medium-to-Low; 3-5+ years	Various, including: City Emergency Manager City Public Works Plan Commission and City Council School District	Support and guidance are available from various resources, such as: St. Croix County Emergency Management, Wisconsin Emergency Management, WCWRPC
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 RAVE, awareness of emergency siren use and warning systems, and public preparedness in general.	Medium-to-High; ongoing	City Emergency Manager	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 previous recommendation reference multiple related plans, including the City's Emergency Operations Plan, Capital Improvements Plan, Stormwater Management Plan, and the potential creation of a Flood Response 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.

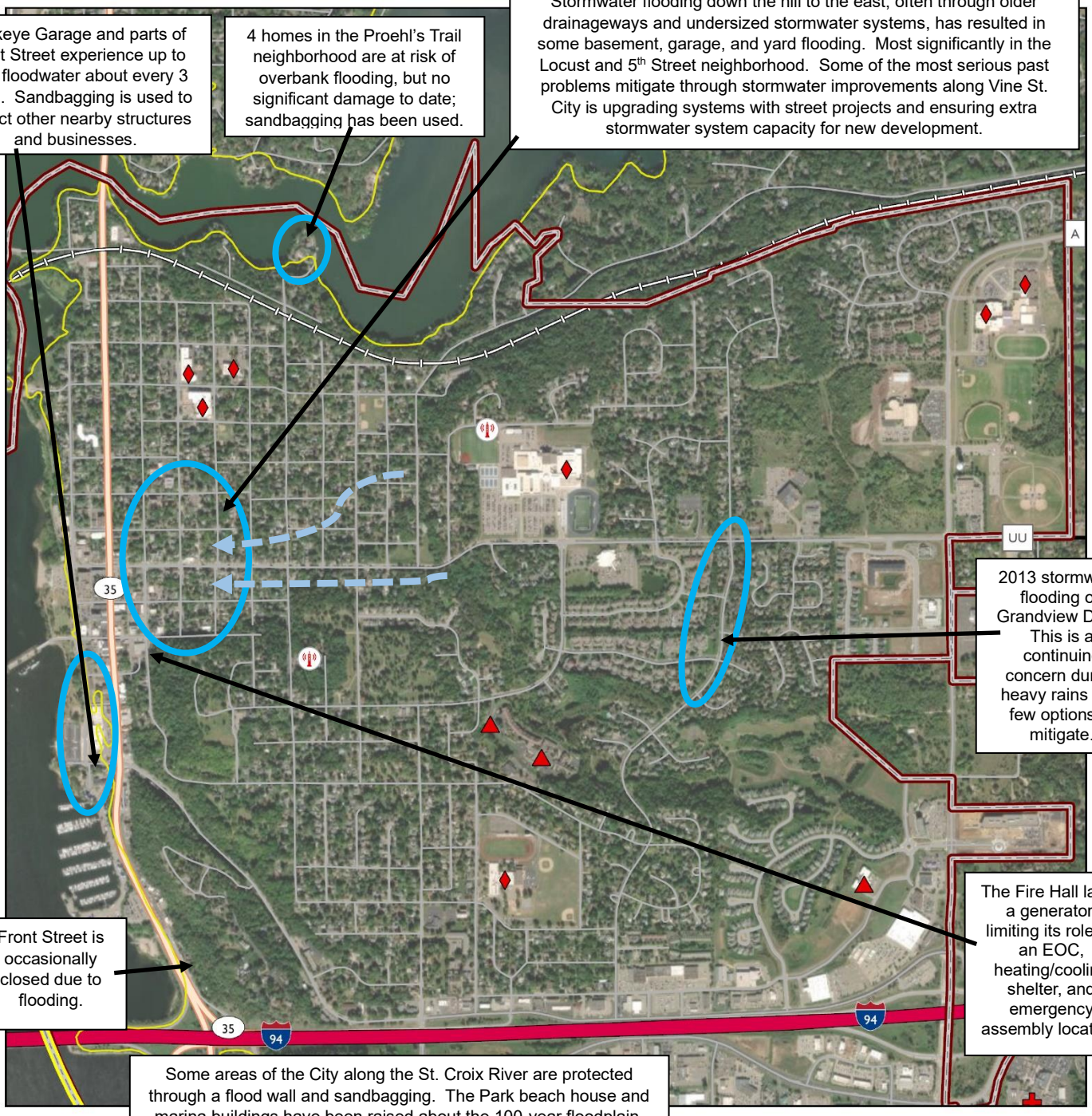
Sub-Plan Adoption and Maintenance

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	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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.

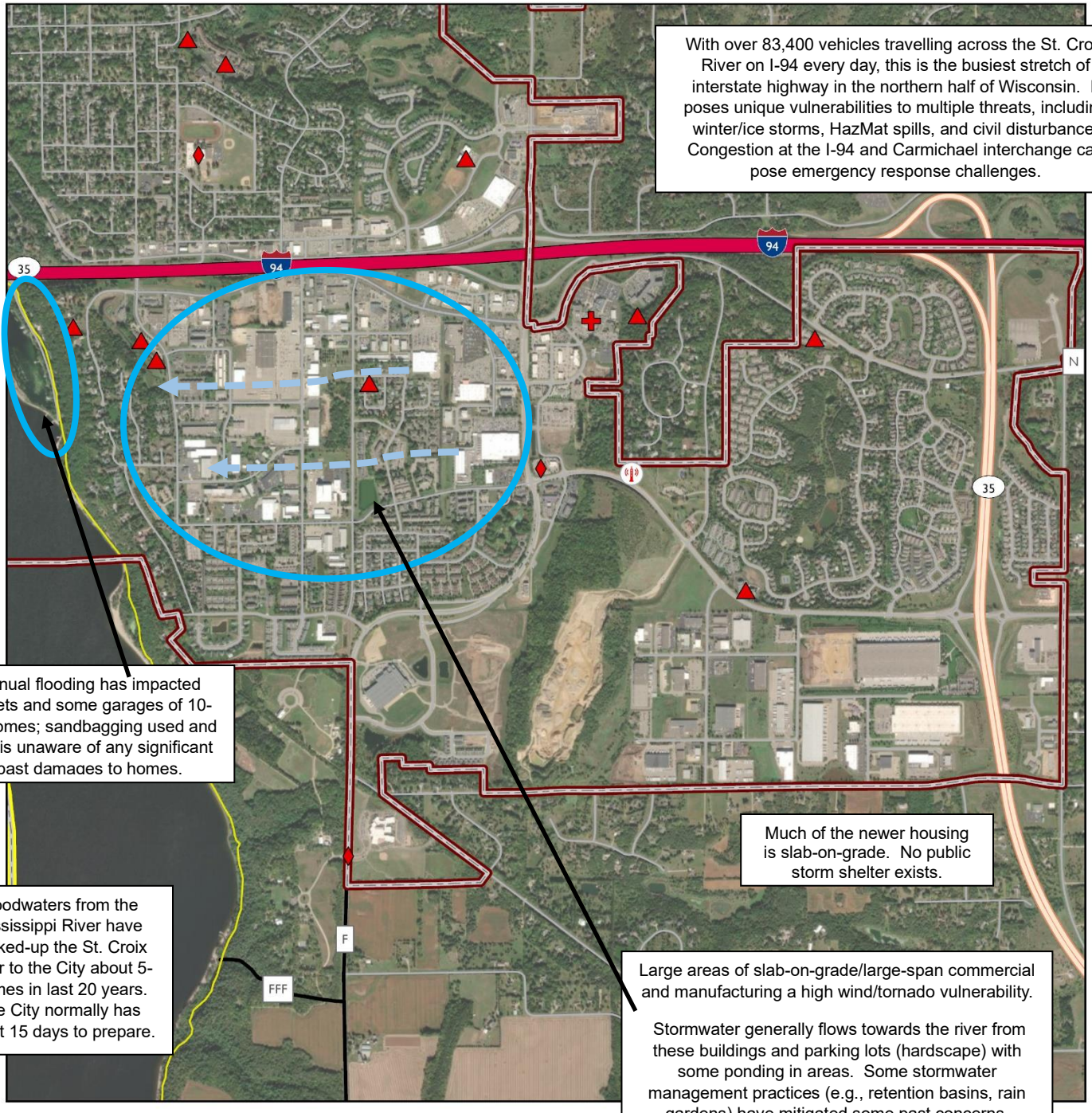
CITY OF HUDSON (North) - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



CITY OF HUDSON (South) - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



With over 83,400 vehicles travelling across the St. Croix River on I-94 every day, this is the busiest stretch of interstate highway in the northern half of Wisconsin. It poses unique vulnerabilities to multiple threats, including winter/ice storms, HazMat spills, and civil disturbance. Congestion at the I-94 and Carmichael interchange can pose emergency response challenges.

Annual flooding has impacted streets and some garages of 10-13 homes; sandbagging used and City is unaware of any significant past damages to homes.

Much of the newer housing is slab-on-grade. No public storm shelter exists.

Floodwaters from the Mississippi River have backed-up the St. Croix River to the City about 5-6 times in last 20 years. The City normally has about 15 days to prepare.

Large areas of slab-on-grade/large-span commercial and manufacturing a high wind/tornado vulnerability.

Stormwater generally flows towards the river from these buildings and parking lots (hardscape) with some ponding in areas. Some stormwater management practices (e.g., retention basins, rain gardens) have mitigated some past concerns.

Legend

- Municipal Boundary
- 100-yr Floodplain
- Hospital
- School
- Assisted Living
- Storm Siren

WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION

0 0.17 0.35 0.7 Miles

Data Sources:
St. Croix County, WDHS, WDNR, WisDOT, WDOA, WCWRPC.

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CITY OF NEW RICHMOND CITY HAZARD MITIGATION SUB-PLAN

This sub-plan includes New Richmond Utilities, which provides sanitary sewer, water, and electrical service to the community.

Primary Contact:	City Administrator
Planning Meetings:	• Primary planning meeting with WCWRPC staff occurred on 11/9/23 at the Police Department. Sign-in sheet excerpt in Appendix B identifies participants, which included City government and New Richmond Utilities representatives. • City participated in a mitigation/preparedness capabilities assessment in November 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

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	10,824
Median Age	36.4 years
Underserved, disadvantaged, or uniquely vulnerable populations	Seniors, Households with disability, Households without vehicles
Assessed Improvements (2023)	Residential: $928,005,300; Commercial: $210,934,100; Manuf.: $40,603,400
# of Housing units	4,280
# of Mobile Homes	about 20 (1 mobile home park at N. 4th Street)
Notable Community Lifelines or Critical Facilities	See map at end of sub-plan and Appendix D.

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 St. Croix County mitigation plan for general risks and vulnerabilities applicable to most or all communities.

Hazard	History & Past Impacts	Vulnerabilities & Potential Impacts
Tornado & High Winds	1899 tornado that struck New Richmond was the ninth deadliest in U.S. history; see tornado assessment in Section III.D. for description. 2007 straight-line winds damaged over 200 homes and many vehicles, collapsed hanger at airport and resulted in $1.5 mil infrastructure damage. Increasing frequency of high wind events in the area. 2021 EF1 tornado in July 2021 caused serious damage to about a dozen	1 mobile home park and much of the newer construction is slab-on-grade, including recent town homes. High growth occurring, increasing the vulnerability to storm events and increasing concern for large-span structures, community gathering places (e.g., parks, community buildings), and slab-on-grade development. 1 mobile home park immediately adjacent to the City within the Town of Stanton. No public safe room/storm shelter.

	homes and other structures to the south of the City.	
Hail & Lightning	City reported 3 thunderstorm-related deaths in recent decades (1 lightning, 1 tree falling, 1 responder heart attack) plus 1 injury. Occasional hail damage during summer months to roofs, vehicles, etc. 2017 hail storm damaged a few homes (roofs, siding) and vehicles. Lightning strike at Freedom Park resulted in about $30,000 in damage to irrigation system.	No unique concerns noted.
Winter Storm, Ice, & Extreme Cold	About 200 homes impacted by 2014-2015 Polar Vortex; mostly freezing of laterals. Used water dripping to help prevent. Some storm sewers can also freeze-up on exit to rivers. Very heavy snow events in winter 2022-2023 create snow removal challenges (e.g., where to put it, costs).	No unique concerns noted. City is addressing the freezing of shallow water lines by burying deeper as part of other construction/road projects. No designated warming shelter, but options include the civic center (has a generator) and the school.
Extreme Heat	No unique history noted.	Seniors, nursing homes, and hospital identified as having a higher vulnerability. No designated warming shelter, but options to consider.
Long-Term Power Outage	Part of City without power for 2 days in 2007 and industrial park/tech college area prone to outages in past; may have been remedied by recent substation and other electrical system improvements.	Electric lines for new development are largely underground. Most electrical service is provided by New Richmond Utilities with Xcel Energy and St. Croix Electric Cooperative also serving some areas. Municipal utility contacts customers via email during times of peak demand to encourage efficiency. Most facilities have generators, including City Hall, Police Dept, Fire Hall, wastewater plant, most wells, and main liftstation; portables used for other sewer and water infrastructure.
Flooding – Riverine or Overbank	8 NFIP claims from past flooding events. 100-year flood event in late June 2020 when heavy rains upstream produced flash flooding on the Willow River. About 12 homes on N. Shore Drive experienced basement flooding, with some damage. Two homes near golf course also experienced flooding and some electric infrastructure was underwater.	As the 2020 flooding showed, there are buildings and infrastructure within or near the 100-year floodplain that are vulnerable to overbank flooding. There are some areas along Paperjack Creek that have woody debris and vegetation that could contribute to future flooding. Changes to the dam (discussed below) mitigated most flooding issues from past 100-yr events.
Flooding – Stormwater or Overland	Past flash flooding problems in armory and Paperjack Creek areas may have been addressed; continue to monitor.	As a growing community, the potential for stormwater flooding increases unless planned for and managed.
Dams	New Richmond Mills Dam is a high-hazard dam with 826 acre-feet normal storage owned by the City of New Richmond. The dam was reconstructed in the late 1990s to allow greater control over water levels and offer some flood control.	Two residential homes lie within the dam shadow according to a 1996 dam failure analysis. Updates of the dam EAP and IOM Manual are scheduled for 2024. Dam lacks systems for remote monitoring and control; no upstream gauge or monitoring. Otherwise, the dam is in very good repair.
Drought	No significant impacts within the City from past droughts.	No unique concerns noted. Adding a new tower in future to improve water storage.
Wildfire	No significant events in the community in past 50+ years.	No unique concerns noted.

Hazardous Materials Spills	No significant events in the community. Semi-rollover, but spill contained	Railroad and truck traffic are the largest HazMat spill concerns. Condition of septic systems of nearby mobile home park noted in past mitigation plans.
Active Threats	No significant events in the community.	No unique concerns noted. Schools/Tech College, City Hall, and County building identified as having the highest vulnerabilities. Increasing attacks, including on infrastructure, across the Nation. In part due to proximity to Twin Cities, the potential for civil disturbance also 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?	No.
Are there any other trends influencing these concerns, such as changes in development, demographics, or weather patterns/climate?	Increasing heavy rain and high wind events in the area. Community growth, including more slab-on-grade construction.

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 a 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.

Planning Activities	
Community Emergency Operations or Response Plan (EOP)	Outdated plan; will consider mitigation or preparedness when updating
Community Evacuation Plan and/or Exercises	Outdated plan; will consider mitigation or preparedness when updating
Continuity of Government Plan	Outdated plan; will consider mitigation or preparedness when updating
Comprehensive Plan	Adopted; does not incorporates mitigation or preparedness
Stormwater Management Plan	Adopted; does not incorporates mitigation or preparedness
Historic Preservation Plan or Ordinance	Adopted; does not incorporates mitigation or preparedness
Capital Improvements Plan or Similar Budget	Adopted; does not incorporates 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 incorporates mitigation or preparedness
Subdivision Ordinance	Adopted; does not incorporates mitigation or preparedness
Site Plan Review Requirements	Adopted; does not incorporates mitigation or preparedness
Floodplain Management	
Initial Flood Hazard Boundary Map:	12/28/73
Initial FIRM Identified:	07/16/04
Current Effective FIRM Date:	03/16/09
Date Community First Joined NFIP (Reg-Emer)	07/16/09
NFIP Participation Status (and reason if not participating):	Participant
Floodplain Regulations w/ NFIP standards:	Has a floodplain ordinance, but may not be consistent with the latest WDNR model.
Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:	Zoning Administrator, then Plan Commission
Other ongoing floodplain management activities:	Will reassess NFIP participation as part of upcoming comprehensive plan update.
Stormwater Management Ordinance	Adopted; does not incorporates mitigation or preparedness
Stormwater Utility	Adopted; does not incorporates mitigation or preparedness
Winter Emergency Policies	Outdated policy, will consider mitigation or preparedness in update
Mitigation & Preparedness Actions for Facilities	
Debris Site identified for storm debris disposal (not just woody debris)	None currently, but considering implementation in update
Emergency Operations Center designated with generator/back-up power	Complete and active
Public Storm Shelter/Community Safe Room designated	No action taken
Public Heating/Cooling Shelter designated with generator/back-up power	Complete and active
Storm/warning siren on back-up power	Good siren coverage. Recently added a 5th siren with battery back-up to fill a gap in coverage.
Storm/warning siren that can be activated remotely	Activated by County dispatch.
Active shooter/threat plans and/or security hardening for municipal buildings	Partially; some additional hardening planned. City Police Dept. has certification in civilian response to active shooter training. ALICE training with City staff; refresher planned for future. Have provided training with churches and Civic Center. School District conducts exercises with local law enforcement participation.
Other Mitigation & Preparedness Actions	
Review EOP at least annually	Not currently, but planning to or considering
Individuals in EOP have ICS/NIMS training	Not currently, but planning to or considering
Public Information Officer designated & trained	Not currently, but planning to or considering
Municipal officials and staff participate in regular disaster or emergency response exercises	Not currently, but planning to or considering
Community-level efforts to improve hazard preparedness among residents	Not currently, but planning to or considering
Adopted billing rates for public works labor & equipment use during emergencies	Not currently, but planning to or considering

Adopted mutual aid agreements for public works equipment/personnel support	yes
Adopted emergency contracting and purchasing policies	Not currently, but planning to or considering
Cyber-security systems, off-site/cloud back-up, and recovery policies or plans for municipal records	Partially completed, including staff training
Cyber-security systems and policies for municipal utilities	yes; SCADA system upgrade planned
Municipal buildings/staff have NOAA All Hazards Radios or signed-up for Code Red	Partially completed
Other Flood Mitigation projects or activities	Continued stormwater management improvements.
Municipal Dam-related planning or actions	Dam is very well maintained.
Barriers to mitigation or preparedness actions	Limited financial resources. Potential need for increased public awareness of preparedness practices and emergency systems. Polarized political environment.
Other:	Currently beginning process of updating emergency management plan that is 5+ years old. Stop the Bleed training. AEC at Civic Center. Aging EOC equipment. New Richmond maintains a strong, city-level emergency management program, including its own RAVE-based notification system.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section VI.A. of the St. Croix 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 St. Croix 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. Collaborate with landowners and community groups to pursue FEMA mitigation grant funding for the construction of community safe rooms (storm shelters), if there is interest. If the safe room is a multi-use community gathering place, consider including a generator and HVAC system, so the safe room space can also be used as a heating/cooling shelter and emergency assembly location. Incorporate nature-based stormwater management systems (e.g., rain barrels, rain garden) to prevent runoff/stormwater flooding.	Medium 3-5+ years, but varies based on demand	Landowner or community organization	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) WCWRPC and Wisconsin Emergency Management can provide grant-related guidance

2. Continue to upgrade the municipal electric system for greater safety and reliability, including the burying of overhead power lines. Continue with the policy of proactively removing dying and dead trees near overhead power lines.	Medium; 5-10 years and ongoing	Electric utilities	FEMA Hazard Mitigation Grant Programs (BRIC & HMA) may assist with costs focused on areas experiencing past outages, especially if impacting a community lifeline facility.
3. Continue to monitor, study, plan for, and address river and stormwater flooding in the community. Consider and encourage low impact development design and nature-based solutions (e.g., rain gardens, bioswales) for new development to limit runoff. Explore flood mitigation grant funding to address repetitive flooding problems, with landowner consent, such as flood acquisition, flood proofing, and increased flood storage.	High; timeline varies by activity	City Public Works & Plan Commission Landowners	FEMA Flood Mitigation Assistance may be available to assist with flood mitigation actions if a history of repetitive losses can be demonstrated and the benefits outweigh costs for a preferred solution. FEMA mitigation Capability & Capacity Building or Advanced Assistance grant dollars may be an option if study needed. Wisconsin Municipal Flood Control Grant Program
4. Update the Emergency Action Plan and Inspection, Operation, & Maintenance Manual for the New Richmond Mills Dam. As resources allow, upgrade dam systems to allow for remote monitoring and operation as well as possible monitoring gauge upstream.	High; 1-3+ years	City Public Works; City Council	WDNR Dam Safety Program for technical assistance. WDNR Municipal Dam Safety Grant may assist with systems upgrade.
5. Update the City's Emergency Operations Plan (EOP), then review every 1-2 years. Consider periodically testing or exercising the plan and EOC, including involving elected officials so they understand their roles and a PIO/crisis communications component. Based on the exercise, prioritize EOC equipment replacement.	High; 1-3 years	City Emergency Manager	County Emergency Management may provide templates and exercise support. Periodic PIO training offered through WEM, if needed. FEMA offers online basic ICS/NIMS courses. FEMA Emergency Operations Center Grant Program and Emergency Management Performance Grant Program
6. Integrate mitigation plan recommendations as part of the next comprehensive plan update.	Medium-to-Low; 3-5+ years	Plan Commission and City Council	WCWRPC may provide guidance on plan policy options

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 Alert New Richmond and County RAVE, awareness of emergency siren use and warning systems, and public preparedness in general.	Medium-to-High; ongoing	City Emergency Manager	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:

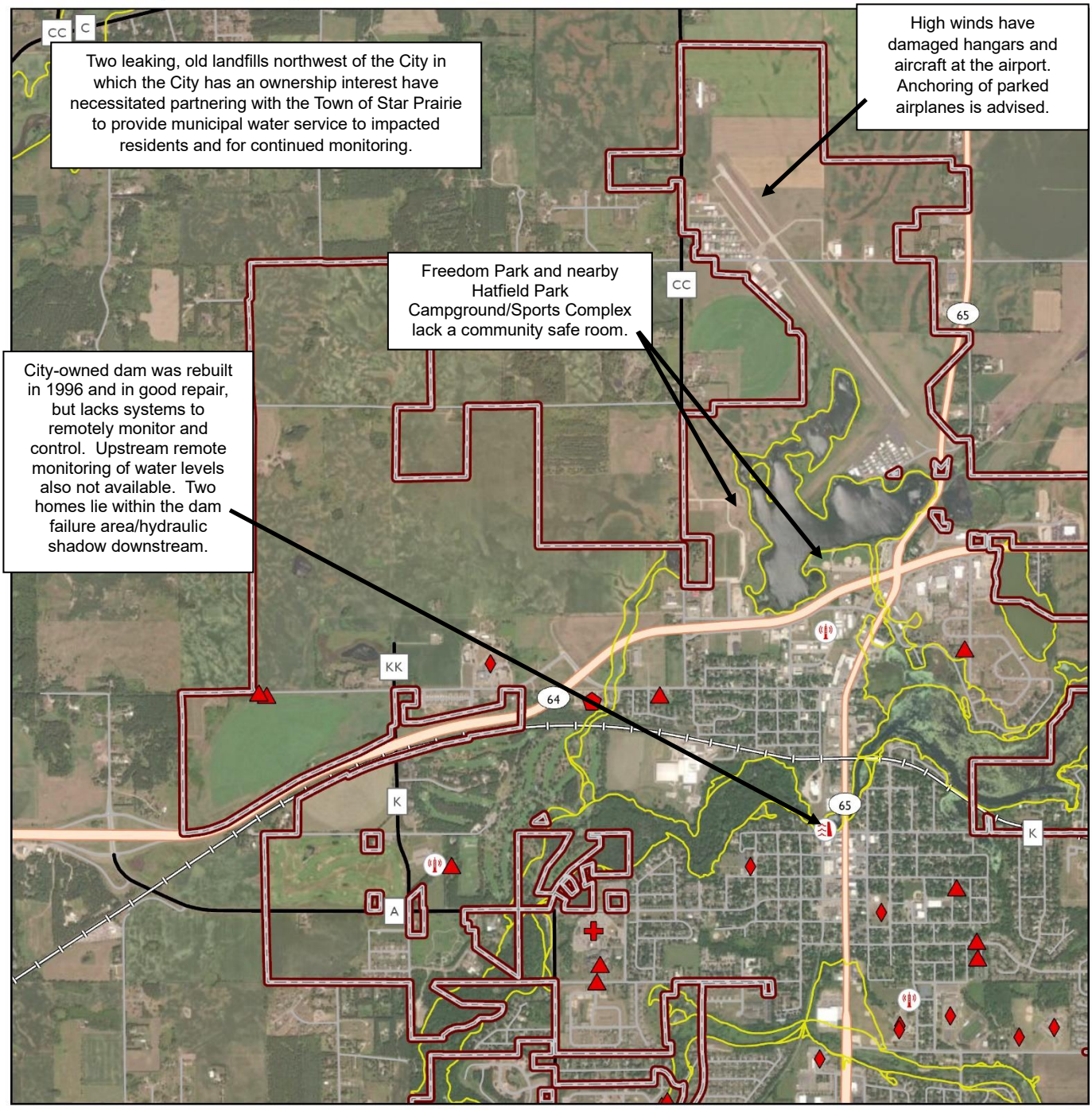
- The previous recommendations recognize that the City's emergency operations plan is outdated.
- The City can integrate preparedness and mitigation strategies into its comprehensive plan and include related projects in its capital improvements plan.
- The next section describes how this Sub-Plan will be maintained, including a periodic review of opportunities to strengthen the coordination and integration with other planning mechanisms.

Sub-Plan Adoption and Maintenance

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	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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.

CITY OF NEW RICHMOND (North West) - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



Legend

- Municipal Boundary
- 100-yr Floodplain
- Hospital
- School
- Assisted Living
- Mobile Home Park
- Storm Siren
- Dam w/High or Significant Hazard Rating

WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION

0 0.38 0.75 1.5 Miles

Data Sources:
St. Croix County, WDHS, WDNR, WisDOT, WDOA, WCWRPC.

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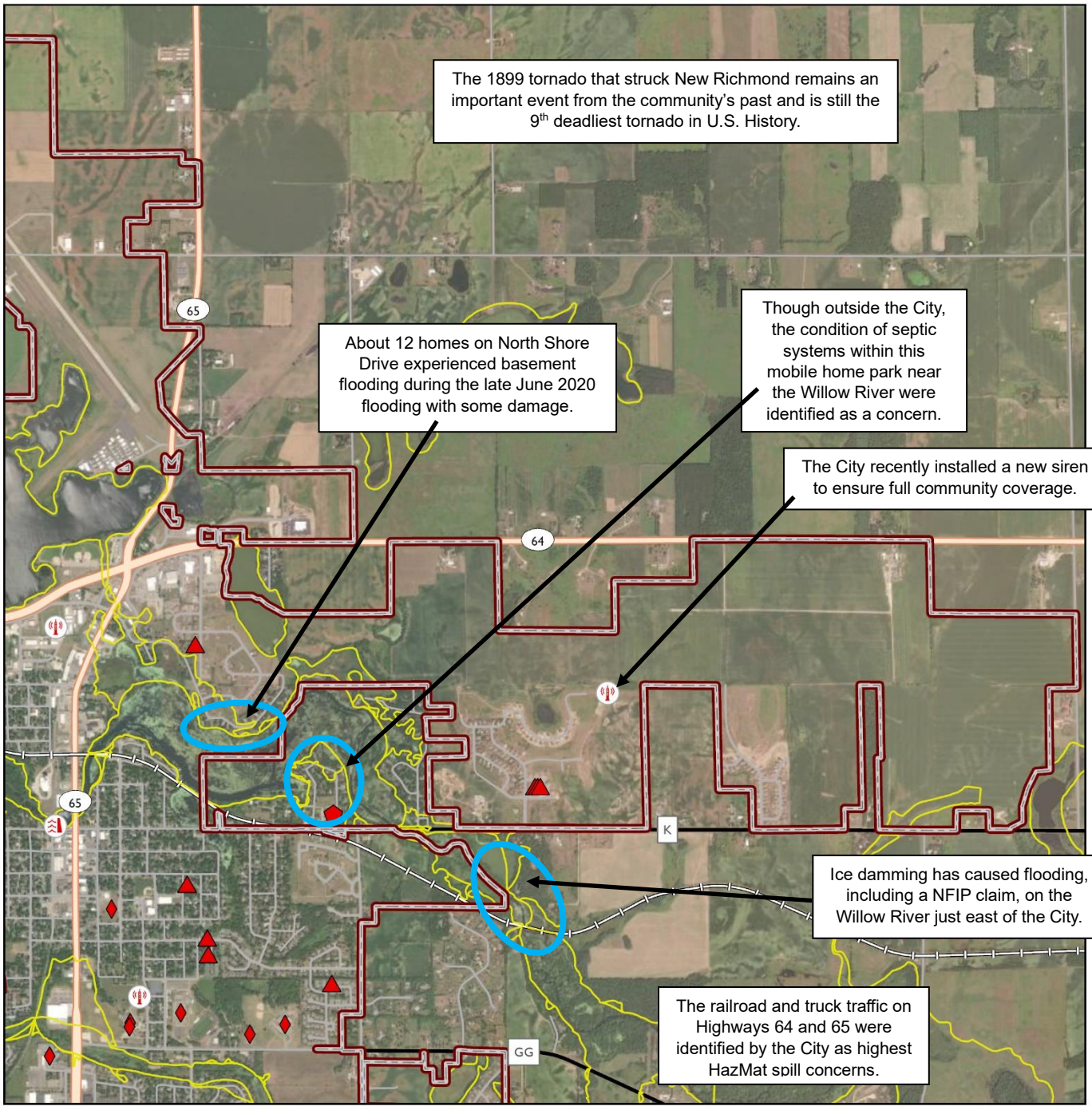
CITY OF NEW RICHMOND (North East) - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



Legend

- Municipal Boundary
- 100-yr Floodplain
- Hospital
- School
- Assisted Living
- Mobile Home Park
- Storm Siren
- Dam w/High or Significant Hazard Rating

WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION

0 0.38 0.75 1.5 Miles

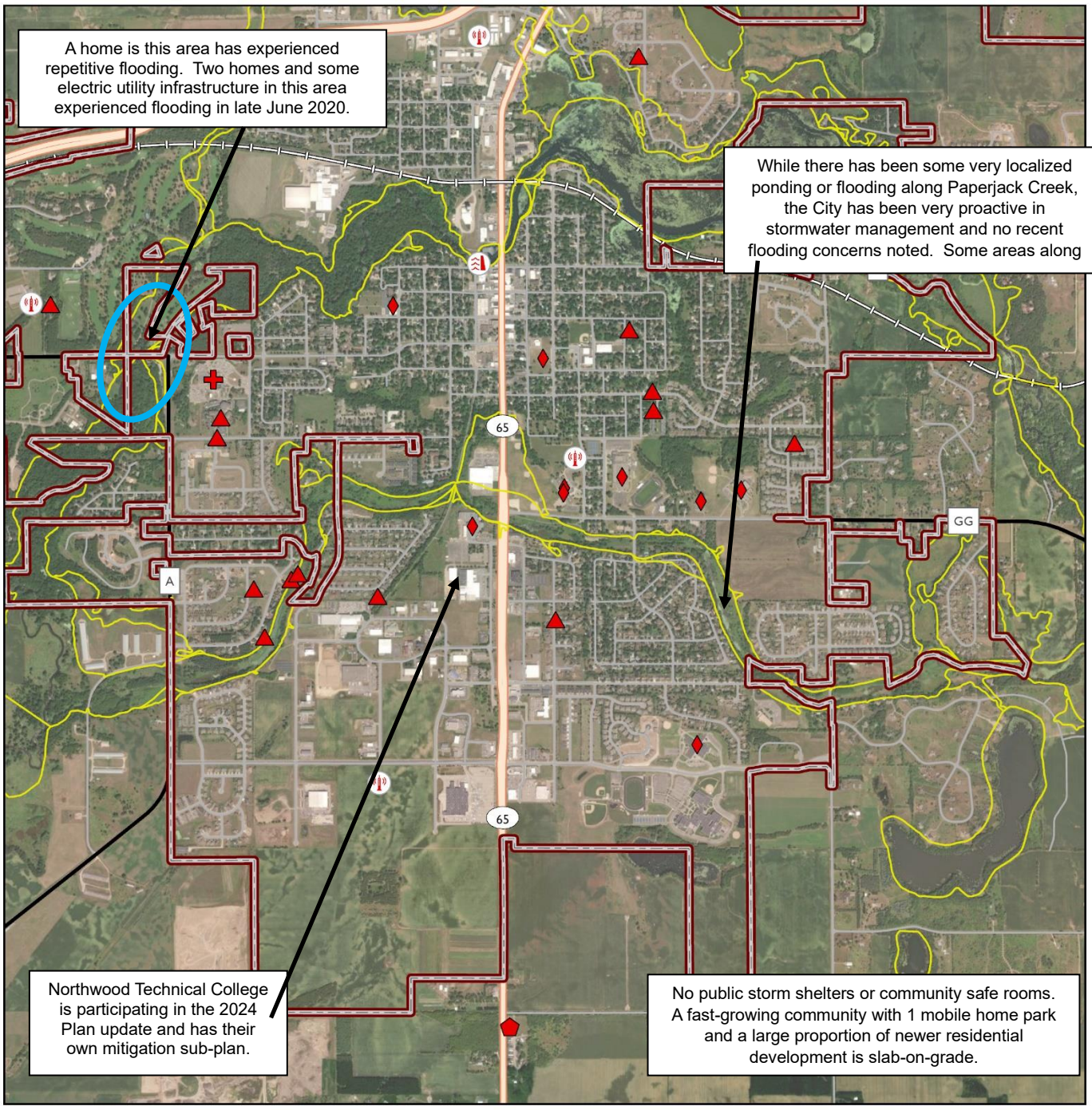
450

Data Sources:
St. Croix County, WDHS, WDNR, WisDOT, WDOA, WCWRPC.

N

CITY OF NEW RICHMOND (South) - HAZARD ASSESSMENT

St. Croix County Hazard Mitigation Plan - 2023



Legend

- Municipal Boundary
- 100-yr Floodplain
- Hospital
- School
- Assisted Living
- Mobile Home Park
- Storm Siren
- Dam w/High or Significant Hazard Rating

WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION

0 0.25 0.5 1 Miles

Data Sources:
St. Croix County, WDHS, WDNR, WisDOT, WDOA, WCWRPC.

N

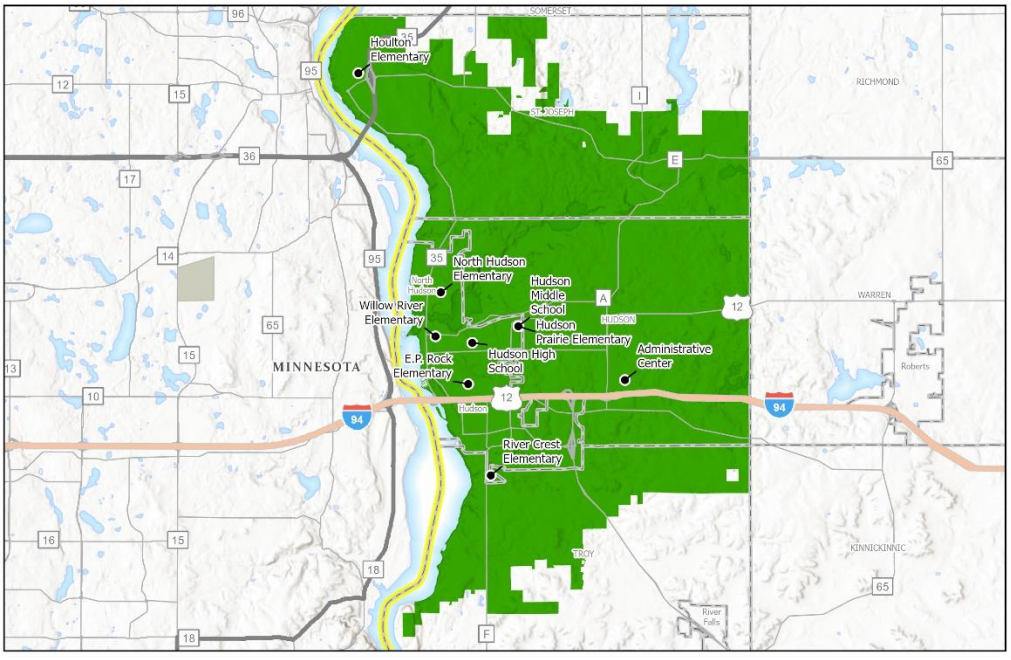
APPENDIX M.

PARTICIPATING SCHOOL & TECHNICAL COLLEGE HAZARD MITIGATION SUB-PLANS

SCHOOL DISTRICT OF HUDSON HAZARD MITIGATION SUB-PLAN

Primary Contact:	Bonnie Stegmann, Chief Financial and Operations Officer
Planning Process:	• Hazard mitigation webinar conducted by WCWRPC on February 28, 2023. • District completed a comprehensive hazard mitigation survey on March 07, 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 St. Croix County	**Address**	**approx. 2022-2023 Enrollment**	**approx. 2022-2023 Staff**
Administrative Service Center	644 Brakke Drive, Hudson, WI 54016	0	53
Hudson High School	1501 Vine Street, Hudson, WI 54016	1791	240
Hudson Middle School	1300 Carmichael Rd, Hudson, WI 54016	1135	171
Houlton Elementary School	70 Houlton School Circle, Houlton, WI 54082	229	39
North Hudson Elementary	510 Lemon Street, Hudson, WI 54016	310	80
Willow River Elementary School	1118 Fourth Street, Hudson, WI 54016	342	82
River Crest Elementary School	535 County Rd F, Hudson, WI 54016	381	81
EP Rock Elementary	340 13th St S, Hudson, WI 54016	437	84
Hudson Prairie Elementary	1400 Carmichael Rd, Hudson, WI 54016	506	84



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 St. Croix 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	No Significant Impact	No
Hail & Lightning	Moderate	No Significant Impact	Low
Winter Storm, Ice, & Extreme Cold	Low	Significant Impact, 3+ Events	Low
Extreme Heat	Low	No Significant Impact	No
Long-Term Power Outage	Moderate	Limited Impact, 1-2 Events	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	No	No Significant Impact	No
Hazardous Materials Spills	Low	No Significant Impact	Low
Active Threats	Low	No Significant Impact	Low
Cyber-Attack	Low	No Significant Impact	Low
Pandemic or Infectious Disease	Low	Significant Impact, 3+ Events	Low
Landslides / Sinkholes	No	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
3. Facilities covered by flood the National Flood Insurance Program or other flood insurance.	None, no flood insurance needed.
4. Existing or needed flood mitigation activities.	None
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.	Hail / wind storm in spring of 2022 extensively damaged district facilities.
6. Facilities with storm shelters or safe rooms.	None currently, but interested in exploring grant funding for storm hardening.
7. Facilities serving as heating/cooling or other emergency/recovery shelters.	None currently, but open to consideration.

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 adopted protocols.
11. Concerns, strategies, resources, support, or training needed for the District or in partnership with others.	Communication system during an active threat. Interest in having a standard radio system for use between buildings and law enforcement during an active threat.
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.	• Established District and Building Crisis Response teams to review protocols and provide feedback. • Annual staff review of active threat protocols. • Annual lockdown drills. • Annual table-top exercises with crisis teams.
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. The pool is a potentially vulnerable location.
17. Cybersecurity / cyber-attack history, damage/impacts, repetitive losses, or concerns for District facilities and assets, including the nature/type of event.	None noted. The District has implemented detailed plans and remains attentive to cyber security.
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.	16.42% of the Districts student population is eligible for free and reduced services.
21. Preparedness, planning, mitigation or support recommendations for the above populations.	Continuation of existing programs.

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	Radios / Communication System for use during active threats. The District is willing to obtain and maintain the system in cooperation with community partners.
Training Needs	• Quarterly training with dispatch to review procedures to access security cameras. • Full-scale active threat training exercise with community partners.
Collaboration Needs	• Strong existing partnership with local law enforcement. • Development of emergency response protocols.
Communications/Outreach Needs	Need a communication system that is compatible throughout the District and with law enforcement agencies.
County Emergency Management Relationship	• Medication distribution – Point of Dispensing • Emergency response training and preparation.
Plan Coordination	
Key Plans related to hazard mitigation	None noted.
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 XX of the St. Croix 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 XX of the St. Croix County mitigation plan includes additional mitigation projects and actions that are intergovernmental in nature and not specific to the community.

The District will continue to collaborate with the St. Croix County, local communities, 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 development of a community safe room (storm shelter) as part of future facility expansions or new gym.	Low-to-Medium; 3-5+ years, if grant funds are available No specific plans at this time.	School Board; District Administrator	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.
2. If requested, collaborate to 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.	Upon Request	Requesting party (e.g., St. Croix Co. Emergency Management or Public Health)	See County-level strategy recommendations. Of part of a safe room project, FEMA mitigation grant funding for generator and HVAC system may be available.
3. 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
4. Assess crisis communications protocols and radio equipment to ensure a compatible system that provides essential communications throughout all District buildings and with law enforcement during an active threat.	Short-Term; 1-3 years Some discussion is ongoing	Crisis Response Team working with Local Law Enforcement and 9-1-1 Communication Center	Specific costs or funding sources undetermined. District is willing to obtain and maintain in cooperation with community partners.
5. Continue to collaborate with County and local emergency services and other internal and external team members. • Assess and maintain emergency and active threat plans. • Conduct regular tabletop exercises and, periodically, a larger functional active threat training exercise. • Continue to refine the system for the sharing of the District's fixed security camera surveillance with emergency partners to the extent that is feasible.	Ongoing, including annual review of plans and protocols	Crisis Response Team working with Local Law Enforcement and 9-1-1 Communication Center	Resources and involved parties/team members vary based.

Sub-Plan Adoption and Maintenance

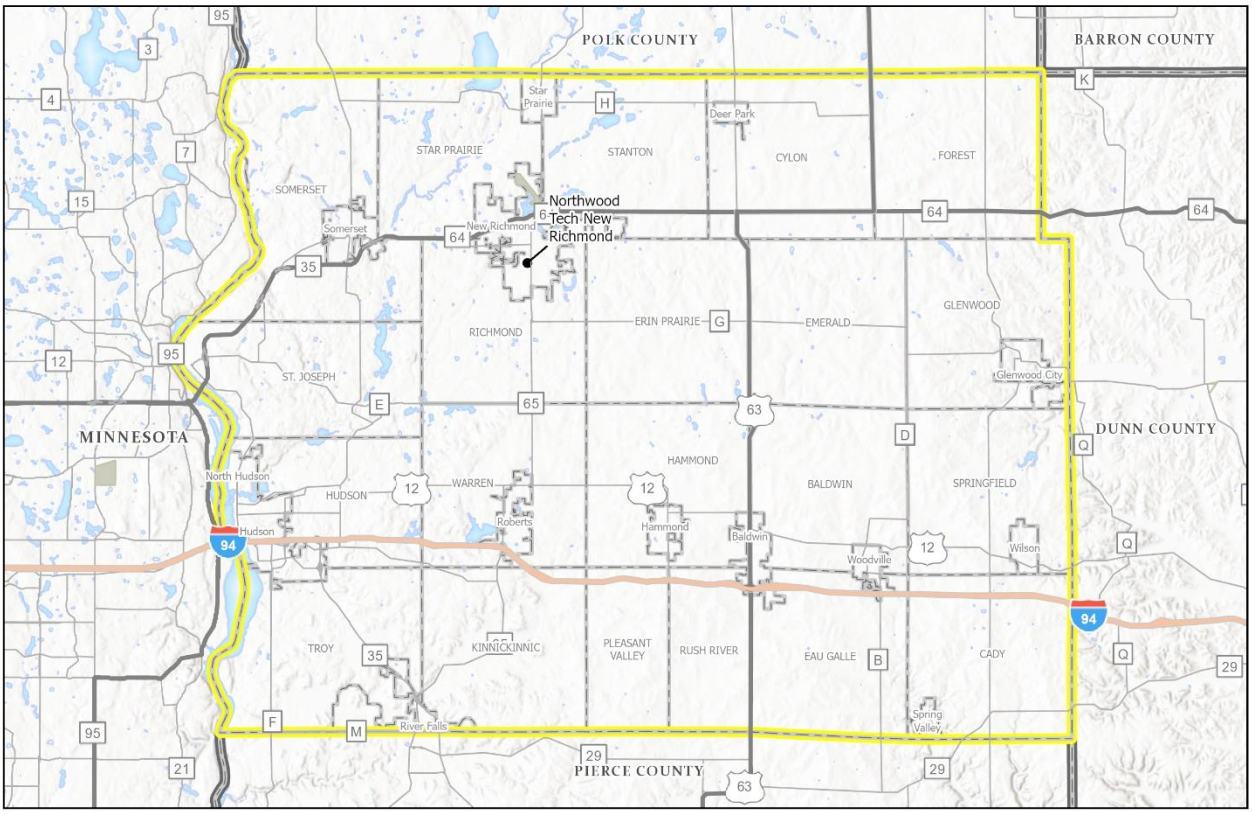
Plan Adoption	The School Board will adopt the County's overall hazard mitigation plan (and any future revisions/amendments specific to the District) by resolution during a noticed public meeting in adherence with Wisconsin Open Meetings laws. This school district-specific Hazard Mitigation Sub-Plan is 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.
Plan Maintenance	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: • 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. If potential changes to the Sub-Plan are being considered, the planning contact will: 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.
Plan Updates	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.
Continued Public Participation	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.

NORTHWOOD TECHNICAL COLLEGE HAZARD MITIGATION SUB-PLAN

Primary Contact:	Sara Nick, Vice President of Business Services
Planning Process:	• 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 St. Croix County	**Address**	**approx. 2022-2023 Enrollment**	**approx. 2022-2023 Staff**
Northwood Technical College	1019 South Knowles Ave, New Richmond, WI 54017	3,505	180



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 St. Croix 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?	None known. 100-year floodplain on some campus property, but no campus buildings or critical infrastructure is believed to be within the floodplain.
3. Facilities covered by flood the National Flood Insurance Program or other flood insurance.	Not certain.
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.	None noted.
6. Facilities with storm shelters or safe rooms.	Facility's hallways are considered tornado shelter areas.
7. Facilities serving as heating/cooling or other emergency/recovery shelters.	The facility has historically served as a shelter when needed.

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.	2 individuals are certified to train ALICE.
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.	• Table-top exercises performed with local law enforcement related to response planning. • Table-top exercises with insurance carrier.
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 previously implemented tools which 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.	• Homeless population near the campus.

21. Preparedness, planning, mitigation or support recommendations for the above populations.	• Coordination with law enforcement. On-staff academic counselors have a list of resources to provide to students or community members if requested.

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	• None noted.
Training Needs	• Incident Command to improve inhouse training.
Collaboration Needs	• Identify additional partnership opportunities within the community.
Communications/Outreach Needs	• None noted.
County Emergency Management Relationship	• Limited partnership with County. • Explore opportunities to expand relationship.
Plan Coordination	
Key Plans related to hazard mitigation	• Business Continuity Plan • Emergency Action Plan
Additional opportunities to integrate hazard mitigation plan recommendations into the above plans	• Conduct risk threat assessments to identify risks and develop goals, objectives, policies and projects accordingly.
Other:	• None noted.

Mitigation Strategy Recommendations

The overall mitigation goal statements in Section XX of the St. Croix 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 XX of the St. Croix 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. Assess the flooding risk to campus buildings and current insurance coverage. Determine whether additional flood insurance coverage is needed.	Medium; Short-term; 1-3 years	College Administration, CFO, Risk Manager	NFIP flood insurance program

2. Continue to collaborate with local emergency services and other internal and external team members on emergency, preparedness, and continuity planning. • Continue active shooter/threat plans and exercises. • 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. Annually review all hazard plans and mitigation plan recommendations. Share plans with partners when appropriate.	High; ongoing	College Administrator & the college's designated health/emergency team members Local law enforcement and fire department	Resources and involved parties/team members vary based on the focus of the planning effort. County Emergency Management can be an important liaison, resource, and training partner.
3. Maintain agreement(s) for use of Campus facilities as heating/cooling shelters or emergency shelters. • Collaborate with County and local communities to raise awareness of shelter availability when activated. • Periodically review related policies and responsibilities; update if needed.	Ongoing; formalize or expand as needed	College Administration County Emergency Management or Public Health Red Cross – NW Wisconsin Chapter	In addition to the Red Cross, County Emergency Management & Public Health departments may assist with planning and resources.
4. 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. Consider including an emergency power generator for safe room backup power as well as enhancing the facility's availability as a heating & cooling shelter.	Low; 3-5+ years, if grant funds	College Administration	FEMA Hazard Mitigation Grant Programs (BRIC & HMGP) Note: The mobile home parks are located within the maximum travel time defined within FEMA P-361, Section B4.2.2.6.

Sub-Plan Adoption and Maintenance

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