

Dunn County Multi-Hazard Mitigation Plan 2026-2031



Final Draft – 6/16/26



DUNN COUNTY MULTI-HAZARD MITIGATION PLAN 2026-2031

PREPARED BY:

Dunn County Multi-Hazard Mitigation Plan Steering Committee
Dunn County Emergency Management
Dunn County communities

WITH ASSISTANCE BY:

West Central Wisconsin Regional Planning Commission

ADOPTED **MONTH XX, 2026**
BY THE DUNN COUNTY BOARD OF SUPERVISORS

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

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DUNN COUNTY MITIGATION PLAN SUPPLEMENT

The *Plan Supplement* is a supporting document that contains additional data and analysis of the hazard threats facing the County, capabilities to mitigate these threats, and other related documentation. For purposes of meeting FEMA mitigation planning requirements, the main Mitigation Plan document and the Plan Supplement, together, constitute Dunn County's Multi-Hazard Mitigation Plan.

Note: References to *Sections* herein (e.g., Section III.C.) are referring to chapters of the main document. References to chapters within the Supplement are identified as *Plan Supplement #s* (e.g., Plan Supplement 1.C.).

SUPPLEMENT 1. COMMUNITY PROFILE

- A. NATURAL FEATURES AND ENVIRONMENT
- B. DEMOGRAPHIC AND ECONOMIC PROFILE
- C. FIRE AND FIRST RESPONDER SERVICE AREAS
- D. TRANSPORTATION SYSTEMS
- E. HISTORICAL RESOURCES

SUPPLEMENT 2. ADDITIONAL HAZARD ASSESSMENT INFORMATION

- A. DESCRIPTION OF NATURAL HAZARDS OF NO SIGNIFICANT RISK
- B. HAZARDS ADDRESSED IN OTHER PLANS
 - i. Communicable Disease
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- L. HAZARDOUS MATERIALS SPILLS
- M. ACTIVE THREATS
- N. OTHER FACTORS INFLUENCING FUTURE LOSSES

SUPPLEMENT 3. MITIGATION CAPABILITIES & STRATEGIES ASSESSMENT

- A. CAPABILITY ASSESSMENT TABLE
- B. PROGRESS ON 2020 MITIGATION PLAN RECOMMENDATIONS
- C. EVALUATING MITIGATION STRATEGY ALTERNATIVES
- D. RECOMMENDED COUNTY-LEVEL PREPAREDNESS ACTIONS

SUPPLEMENT 4. OTHER REFERENCE INFORMATION

- A. STAKEHOLDER & PUBLIC INVOLVEMENT
- B. INCORPORATION OF RELATED PLANS, REPORTS, AND DATA
- C. SUMMARY OF PLAN CHANGES SINCE 2020 MITIGATION PLAN
- D. POTENTIAL STATE & FEDERAL GRANT PROGRAMS FOR MITIGATION PROJECTS

SUPPLEMENT 5. CITY & VILLAGE SUB-PLANS

SUPPLEMENT 6. PUBLIC EDUCATIONAL INSTITUTION SUB-PLANS

SECTION I. INTRODUCTION

A. PURPOSE OF THE PLAN

The *Dunn County Multi-Hazard Mitigation Plan* has been prepared with financial support due to the County's application for, and award of, Building Resilient Infrastructure & Communities (BRIC) mitigation planning funds (Project #EMC-2023-BR-004-0008); the sub-grant was awarded in December 2024. These funds are disbursed by the Federal Emergency Management Agency (FEMA) through Wisconsin Emergency Management (WEM).

Mitigation is a long-term action that minimizes or prevents losses or damage due to a significant risk. The primary purpose of this plan is to evaluate the County's risks, vulnerabilities, and capabilities related to natural disasters and identify appropriate mitigation strategies. After evaluating the disaster threats facing Dunn County, County Emergency Management determined that the plan update should be expanded to include select non-natural hazards. This plan also includes some discussion of preparedness capabilities and recommendations.

The Code of Federal Regulations states...

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

(44 CFR Part 201.6, pp 8851)

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

The Dunn County Emergency Management Coordinator is the primary contact regarding this mitigation plan.

B. PLANNING PROCESS

To fully meet FEMA mitigation planning requirements, the mitigation planning update for Dunn County consists of two primary documents:

1. The ***Dunn County Multi-Hazard Mitigation Plan*** (this document), which covers the most important aspects of the County's trends, hazard assessment, capabilities, and strategies.
2. The ***Dunn County Multi-Hazard Mitigation Plan Supplement*** (or *Mitigation Plan Supplement*), which contains additional data, analysis, and information related to the plan update, including the sub-plans by participating jurisdictions (i.e., city, villages, public educational institutions).

Dunn County contracted with West Central Wisconsin Regional Planning Commission (WCWRPC) to facilitate this update to the County's hazards mitigation plan previously approved by FEMA and adopted by the County Board in October 2020. This previous plan will be referred to as the **2020 Plan** in this update, while the update will be referred to as the **2026 Plan**.

Update of the *Dunn County Multi-Hazard Mitigation Plan* (the “2026 Plan”) meets the planning requirements and guidance provided by the Federal Emergency Management Agency (FEMA)¹ and the Wisconsin Department of Military Affairs, Wisconsin Emergency Management at the time of the grant award.² As such, the 2026 Plan meets the requirements of the Disaster Mitigation Act of 2000. The 2026 Plan’s scope is inclusive of all of Dunn County and is considered a multi-jurisdictional plan under Federal guidelines. For this plan update, public educational institutions with facilities within Dunn County were also invited to be full participants, which is discussed in Section I.C.

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

Table 1. Dunn County Hazard Mitigation Plan Steering Committee

Name	Representative of:
Steve Senior	LEPC Chair
Matt Poliak	LEPC / Menomonie Fire
Tara Verdon	LEPC / Mayo Menomonie
KT Gallagher	LEPC / Dunn County Public Health
Lisa Olson-McDonald	WEM - West-Central Region
Melissa Gilgenbach	Dunn County Emergency Management/911 Communications
Jason Spetz	Dunn County Emergency Management
Paula Winter	Dunn County Human Services
Travis Mayer	Dunn County Sheriff’s Department
Jolene Fisher	Dunn Energy Cooperative
Mary Purvis	LEPC / Citizen
Rachel Wells	Dunn County G.I.S.
Luke Wilsey	LEPC / County Board
Randy Prochnow	LEPC / County Board
Luong Huynh	Red Cross

With the exception of some initial data gathering and discussion with the County Judiciary & Law Committee, activities on the plan update were delayed for the first half of 2025 in order to consider related programmatic and mitigation planning guidance changes from the Federal government. Update of the plan began, in earnest, in July 2025 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 2020 Plan is provided in Section

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

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

IV.D. of the *Mitigation Plan Supplement*, and includes a brief synopsis of how the Steering Committee considered each section of the plan.

The 2020 Plan was largely limited to the natural hazards of significant risk to Dunn County. County Emergency Management staff desired to expand the scope so the 2026 Plan update was a multi-hazard plan. With consideration of national, regional, and local hazard risks and vulnerabilities, the Steering Committee agreed that the 2026 Plan should continue to focus on the same natural hazard threats, except:

- The risk assessment for wind storms is combined with tornados due to the very similar vulnerabilities and the frequent inability to distinguish between the two event types at the local level.
- Expanded hazard assessment sections should be added for hazardous materials spills, cyber-attack, and active threats; there was limited discussion in the 2020 Plan on these threats.
- Communicable disease and nuclear power plant accident is largely addressed by other plans and are more briefly discussed within Section II.B. of the Mitigation Plan Supplement.

In addition to the Steering Committee meetings, community input during the planning process was gathered through meetings, interviews, surveys, and the review of other pertinent plans as will be discussed later in this section. In July 2026, the full draft plan was released for public review and submitted to Wisconsin Emergency Management (WEM) for pre-review. Copies of adopting resolutions/letters for all plan participants are included in **Appendix A**.

C. PLAN PARTICIPANTS

The *Dunn County Multi-Hazard Mitigation Plan* is a multi-jurisdictional plan and encompasses all incorporated and unincorporated jurisdictions within Dunn County, except for the Village of Ridgeland, which chose not to participate. Full plan participants are the following local entities that actively participated in the plan update and have adopted or approved the 2026 Plan:

County Government
Dunn County
Cities & Villages (incorporated municipalities)
Village of Boyceville
Village of Colfax
Village of Downing
Village of Elk Mound
Village of Knapp
Village of Wheeler
City of Menomonie
Public Educational Institutions
Boyceville Community School District
School District of Colfax
Elk Mound Area School District
Menomonie Area School District
University of Wisconsin-Stout

For the 2026 Plan update, all public educational institutions serving Dunn County were invited to be full participants for the first time. Dunn Energy Cooperative is the primary non-profit electric cooperative serving the County and also actively participated, though other electric cooperatives do provide some service within the County.

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

- The Steering Committee included representation from different areas in the County. The Committee, supplemented by the stakeholder interviews/meetings listed in Supplement 4.A. was largely responsible for providing the county-level input into the 2026 Plan update.
- WCWRPC conducted an interview meeting with each participating village and city on the planning effort, and input was obtained on changes since the 2020 Plan, including hazard issues/trends, vulnerabilities, community lifelines, progress on 2020 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.
- Dunn County and all incorporated municipalities in Dunn County with 100-year floodplains identified on Flood Insurance Rate Maps (FIRMs) are participants in good standing in the National Flood Insurance Program (NFIP), with the exception of the Villages of Downing, Knapp, and Ridgeland. The meetings and sub-plans for Downing and Knapp address this non-participating status and a County-level, related strategy is included in Section V.B.
- An introductory mailing with a project brochure was sent to each public educational institution. This was followed by a web-based mitigation planning presentation on 7/31/25, 8/5/25, and 10/20/25 by WCWRPC for interested schools, including an overview of related mitigation grants and potential grant projects. A web-based meeting was also conducted with UW-Stout representatives, in part since the University had participated in and adopted the 2020 Plan. 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 Supplements 5 & 6. The draft sub-plans were then distributed to each community for review and input. As discussed in Supplement 4.C., these sub-plans are a new approach to the 2026 Plan update.

Adopting resolutions or approving letters for all of the above participating jurisdictions are in **Section VII.**

Figure 1. Dunn 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 Profile

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

Hazard Identification

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

Risk & Vulnerability Assessment

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

Mitigation Planning

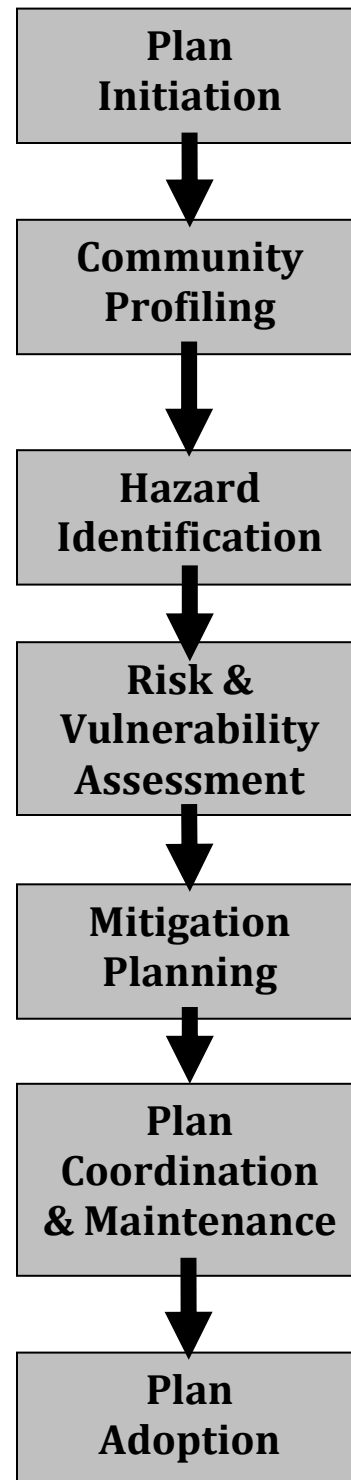
scope: goals, objectives, strategies, & action plan
 local roles: identify current activities and progress on 2020 Plan
 RPC roles: facilitation, analysis & guidance on strategies
 Cmte roles: update goals; review and prioritize strategies
 other issues: cost-benefits analysis; resource/action plan

Plan Coordination & Maintenance

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

Plan Adoption

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



SECTION II. COMMUNITY PROFILE – DUNN COUNTY

A. GEOGRAPHIC LOCATION

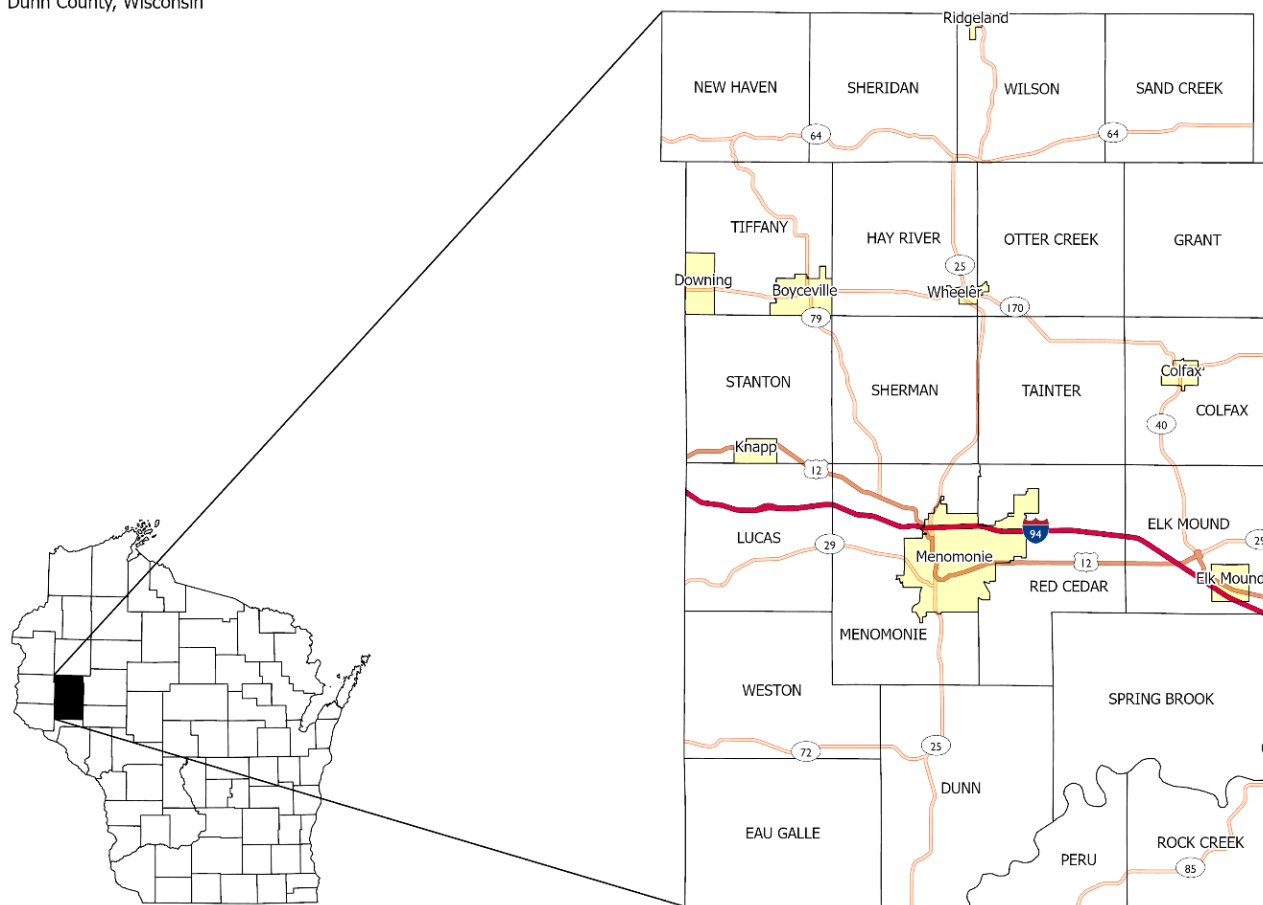
Dunn County is located in west-central Wisconsin (see **Figure 2**). The County has a total of 552,422 acres, or 863 square miles, of land, measuring approximately 37 miles north-to-south and 23 miles east-to-west. The County is bordered to the north by Barron County, to east by Eau Claire and Chippewa Counties, to the west by Polk, St. Croix, and Pierce Counties, and by Pepin County to the south.

The County is made up of 30 minor civil divisions, which includes 22 towns, 7 villages, and 1 city as shown in **Figure 2**. Dunn County lies approximately 60 miles east of the growing Minneapolis-St. Paul urban area. Interstate 94, the primary land transportation arterial between Minneapolis and the urban areas of Milwaukee and Chicago, bisects the county.

Figure 2. Dunn County Location & Civil Divisions

GEOGRAPHIC LOCATION

Dunn County, Wisconsin



B. PHYSICAL SETTING

Section I.A. of the *Mitigation Plan Supplement* provides an overview of the physical setting, natural features, and environment of Dunn County.

Dunn County's landscape is diverse with flat agricultural plains toward the east-southeast and more rugged, often wooded coulees and ridges in the west and north. Sandy soils dominate much of the County, especially in eastern and central portions of the County where agricultural irrigation is not uncommon. As shown on **Figure 3**, agriculture and deciduous forests now dominate the landscape. The County is largely rural with less than 10% of the land cover considered developed.

Dunn County contains about 6,522 acres (10.2 square miles) of surface water, which drain into two main systems. The northern two-thirds flow into the Red Cedar River subbasin, while the southern third drains into the Lower Chippewa River subbasin. Major water bodies include Tainter Lake (1,752 acres) and Lake Menomin (1,405 acres). Wetlands—key for water storage, filtration, and flood mitigation—are widespread and ecologically important.

Dunn County has humid continental weather with cold winters, warm summers, and no dry season. Average monthly temperatures range from 14°F in January to 71°F in July. Annual averages include 34 inches of precipitation and about 41 inches of snowfall. Like most midwestern communities, the County is vulnerable to range of natural hazards, including flooding.

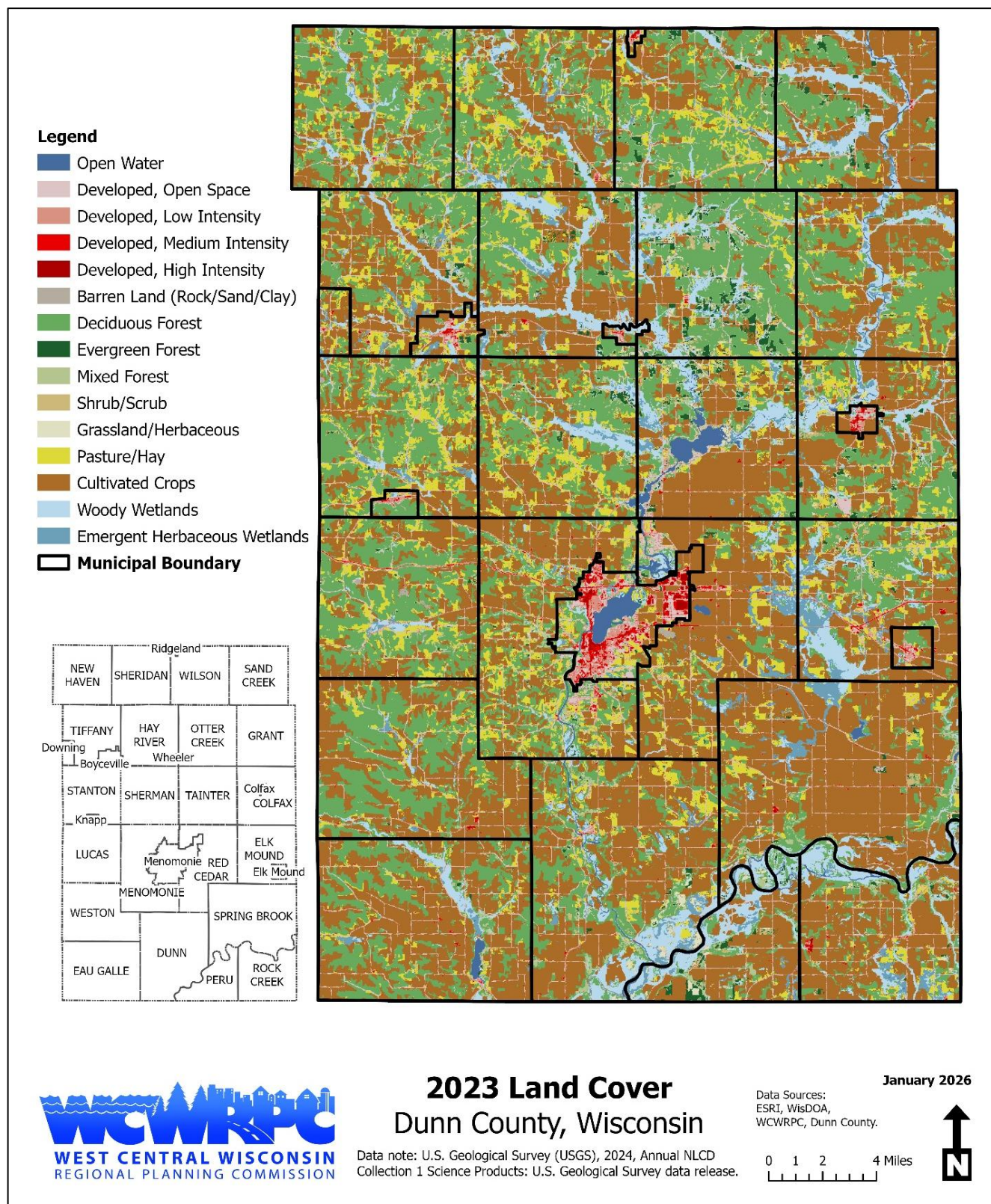
C. SOCIO-ECONOMIC SETTING

The following are highlights from Section I.B. of the *Mitigation Plan Supplement*, which provides data tables and information related to Dunn County's demographics and economy.

Population & Housing

- After seeing double-digit growth for three decades, housing unit growth slowed by 73% between 2010 and 2020. A decrease in growth is consistent with trends throughout the region.
- Growth in housing units consistently outpaces population growth. The average population per housing unit decreased from 2.87 in 1980 to 2.43 in 2020.
- While growth has occurred at all municipal levels, towns have seen the highest rate of growth over the past 10 years. Central Dunn County, around the City of Menomonie, has seen higher rates of growth while western Dunn County is experiencing stagnation or decline.
- Eight communities are considered economically rural disadvantaged communities.
- The City of Menomonie's low median age is largely due to the student populations at UW-Stout (about 6,900 students) and Chippewa Valley Technical College (about 6,100 students at all campuses, including outside Dunn County).
- Single-family detached housing is the most prevalent housing unit throughout the County, comprising roughly 65% of all housing units. The percentages are higher in towns (84%) than in the city and villages (44%).

Figure 3. Dunn County Predominant Land Cover



- There are 1,596 mobile homes and 37 assisted living facilities located within the County. These sites are more vulnerable to extreme weather events due to their
- The County is younger than the State and has a lower per capita income. Within the County, 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 differences present unique challenges and vulnerabilities for each community type.
- Between 2020 to 2040, the number of residents ages 65 and over is projected to increase from 16% to 22% of the total population while all other age groups remain static or decrease. Some communities, including the City of Menomonie, believe that the State's population projections underestimate future growth.
- For some residents, language and cultural barriers can pose challenges to education and outreach on weather awareness, available shelters, best practices, regulations, etc. The vast majority (95.3%) of Dunn County's population speak only English, making communication with non-native speakers difficult.

The potential vulnerability to hazardous events increases along with residential development and population growth. The steady increase 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.

Economic Overview

- Median net worth and household income is high and well above national averages (\$204,032 and \$74,365 respectively).
- Despite these high numbers, the percentage of ALICE (Asset Limited, Income Constrained, Employed) households has increased from 19.1% in 2010 to 25.0% in 2023.
- Wholesale trade is the predominant source of revenue within the economy. It constitutes 60% of all sales revenue within the County.
- Manufacturing is the County's largest employment sector with 3,387 jobs (18.9% of all jobs). Government is the second highest employment sector (16.1%).
- The Administrative and Support, Professional Services, and Extraction sectors all saw decreases exceeding 25% of their 2014 employment numbers. Despite these losses, the County increased its employment by almost 1,500 jobs, or 9.0%, between 2014 and 2024.

Agricultural Overview

- As noted previously and shown on Figure 3, cultivated crops and pasture/hay is the most common land cover in Dunn County.
- In 2022, the County had 1,209 farms, which is a decrease of 6% since 2017. However, the number of acres in farms increased by 7% during the same time period to 372,774 acres.

- Agriculture continues to be an important part of Dunn County’s economy with over \$381 million in market value of products sold in 2022.
- Row crops (grains), milk from cows, and cattle/calves were the largest ag sales. The County also has significant numbers of poultry farms and some larger hog operations.
- In 2019, it was estimated that agriculture supports 3,781 jobs and contributes to over \$989 million in positive economic impacts within Dunn County.
- Many of the hazards discussed later in the plan can significantly impact crops and livestock, including tornados, power loss, extreme temperatures, drought, and zoonotic disease.

D. DEVELOPMENT TRENDS

Disaster events can have many impacts, including damage to buildings and building contents. This subsection provides insight into the taxable improvements and growth patterns within Dunn 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 Dunn County was over \$4 billion.³ **Table 2** summarizes the 2024 Statement of Assessments for the County. The State repealed personal property taxes through 2023 Act 12, effective Jan. 1, 2024.

From 2019 to 2024, the County’s total assessed value of improvements grew by over \$1.15 billion (42.8% increase or +7.36% per year). **Table 3** further breaks down the 2024 assessed values by primary land uses. The largest percentage of improvement value is residential. Over 80% of the County’s commercial improvement value lies within the City of Menomonie, highlighting its significance to the County’s assessed value.

**Table 2. Dunn County
2024 Assessed
Total Values
(not equalized)**

Land	\$ 808,013,850
Improvements	\$ 3,421,955,750
Real Estate	\$ 4,229,969,600
Personal Prop.	\$ NA
Aggregate	\$ 4,229,969,600

Not included in these tables are tax-exempt properties. Dunn County has roughly 2,650 acres of public resource lands, mostly forested and wetlands, which are tax exempt. Governmental properties and schools constitute the largest portion of those existing improvements and structures not included in Tables 2 and 3, 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. 2023 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.

Table 3. Dunn County Assessed Value by Land Use • 2024

Use	Number of Parcels	Land Value	Number of Parcels Improved	Improvement Value	Total
Residential	16,341	\$406,630,900	14,219	\$2,520,901,650	\$2,927,532,550
Commercial	1,441	\$99,180,000	1,203	\$556,705,900	\$655,885,900
Manufacturing	86	\$15,416,800	65	\$128,071,000	\$143,487,800
Agricultural	13,466	\$50,707,550	-	-	\$50,707,550
Undeveloped	7,244	\$24,695,000	-	-	\$24,695,000
Ag Forest	5,761	\$104,399,100	-	-	\$104,399,100
Forest Lands	2,085	\$86,008,300	-	-	\$86,008,300
Other	1,471	\$20,976,200	1,551	\$216,277,200	\$237,253,400
Totals	47,895	\$808,013,850	17,038	\$3,421,955,750	\$4,229,969,600

Source: Wisconsin Department of Revenue. 2024 Line Summary for Final Statement of Assessment.

The land cover map (**Figure 3**) showed the generalized development pattern in Dunn County. Cultivated crops dominate the southern and eastern portions of the County with urban development occurring within the City of Menomonie, village boundaries, and along the I-94 corridor. In 2020, the County had an overall population density of 52.65 persons per square mile, which is half the State of Wisconsin's density of 108.8 persons per square mile. Based on State official population projections, the County's density is projected to decrease to 49.22 persons per square mile by 2050. Population growth and development has mostly occurred in the central region, due in part to the City of Menomonie, Lake Menomin, and Tainter Lake.

Between 2019 and 2024, Dunn County experienced a net increase of 848 improved, assessed parcels, or an average increase of 169 parcels per year. Residential parcels received the majority of improvements (932), while manufacturing and "other" property classifications saw a decrease in assessed parcels over the 5-year period. Most improved, residential parcels are in towns (67.4%), and they account for 91.3% percent of all residential assessed acreage in Dunn County. Residential development in unincorporated areas is typically at low densities within the County.

Most of the commercial development (60%) is located within cities as is the majority of improved manufacturing parcels (49.2%). The per-acre assessed value of commercial land and improvements are nearly ten times higher in cities compared to towns and over five times higher for manufacturing assessments. This indicates that commercial activity in cities is more intensive, concentrated, and includes commercial uses much larger in scale than in the towns. In general, most commercial and industrial uses tend to be located within incorporated areas or within highway corridors.

Agriculture is the most prevalent land use in Dunn County. It accounts for 60 percent of the assessed acreage in the County while agricultural forests and forest lands acreage constitute another 23 percent. Land assessed as "undeveloped" makes up 9 percent of the assessed acreage in the County. In total, 92 percent of the County's assessed acreage is agricultural, forested, or otherwise undeveloped.

E. COMMUNITY LIFELINES & EMERGENCY SERVICES

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. Dunn County's principal community lifelines are summarized in **Table 4** on the following page. The fifth column identifies the data source(s) for each lifeline:

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

During the planning process, it was noted that:

- The data for some lifelines is incomplete and some subcomponents have not been locally confirmed or mapped. Table 4 should be considered a starting point that can be built upon and improved for future mitigation plan updates.
- At least one county in the region is considering the different lifelines as a way to organize branches within the Emergency Operations Center (EOC).

For each hazard of significant risk in Section III.D., a vulnerability assessment table evaluates the potential vulnerabilities (impacts & losses) for each major category of community lifeline in Dunn County. Cities and villages, as part of their sub-plans in **Mitigation Plan Supplements 5 & 6**, also frequently identify vulnerabilities, partnerships, or strategies related to these lifelines. **Plan Supplement 1.C.** includes service area maps for two safety lifelines—Fire Districts and Emergency Medical Service (EMS)/First Responder service areas. The fire departments in particular are important to the wildfire risk assessment and strategies. Also included in **Plan Supplement 1.D.** is a brief overview of the County's transportation infrastructure, which is an important lifeline that can be impacted by winter storm/ice, high wind, HazMat spills, and flooding events in particular.

Table 4. Summary of Dunn County Community Lifelines

Lifeline	Component	Subcomponent	Count	Source/Date	Mapped	
SAFETY & SECURITY						
	Low Enforcement/Security	Police Stations & Law Enforcement Agencies	7	DUNN COUNTY 2025	Y	
		Correctional Facilities	1	NGDA 2025	Y	
	Fire & EMS Service	Fire/EMS Stations	9	DUNN COUNTY 2025	Y	
		Other Firefighting Resources			N	
	Search & Rescue	Local Search & Rescue, if separate than above				
		Government Centers & Municipal Buildings (essential services)	17	DUNN COUNTY 2025	Y	
	Government Service	Emergency Operations Centers (may also be within the above)	1	FEMA 2024	Y	
		Public K-12 Schools	16	WDPI 2025	Y	
		Private K-12 Schools	4	WDPI 2025	Y	
		Colleges & Post-Secondary Educational Institutions	1	WDPI 2025	Y	
		Public Libraries	5	WDPI 2025	Y	
		Community Safety	All Dams	53	WDNR 2025	Y
			Dams (significant to high hazard potential)	4	WDNR 2025	Y
Emergency Shelters, Heating/Cooling Shelters, & Safe Rooms	10		FEMA 2024	Y		
VOADS & Other Community Support Agencies						N
FOOD, HYDRATION, SHELTER						
	Food	Commercial Food Distribution (e.g., retail, market, school)	267	HAZUS 2023	Y	
		Commercial Food Supply Chain				
	Hydration	Food Distribution Programs (i.e., food banks)	2	WCWRPC 2025	Y	
		Bottled water distribution				
	Shelter	see Water Systems lifeline for potable water systems				
		Assisted Living Facilities & Nursing Homes	38	WDHS 2025, DUNN COUNTY 2025	Y	
		Homeless Shelters & Other Group Homes	18	WDHS 2025, DUNN COUNTY 2025	Y	
		Adult Day Care, Alcohol, Drug, Mental Health Treatment Centers	17	WDHS 2025, DUNN COUNTY 2025	Y	
Agriculture	Hotels or Other Commercial Housing Facilities	11	HAZUS 2023	Y		
	see Section II.C.iv.					
HEALTH & MEDICAL						
	Medical Care	Hospitals	1	DUNN COUNTY 2025	Y	
		Dialysis Clinics	1	WDHS 2025	Y	
		Pharmacies	4	OPEN STREET MAP 2025	Y	
		Veteran's Affairs Health System	none identified			
		Veterinary Services	6	WCWRPC 2025	N	
	Public Health	Public Health Office or Department	1	WDHS 2025	Y	
		Other Health Clinics or Treatment Centers	6	DUNN COUNTY 2025	Y	
		Clinical Laboratories	40	WDHS 2025	Y	
	Patient Movement	Ambulance Service Districts	10	DUNN COUNTY 2025	Y	
		Air Ambulance/Heli-Pad	1	WISDOT 2025	Y	
Fatality Management	Funeral Homes/Morgue Spaces/Crematories	not inventoried				
ENERGY						
	Electrical Power Grid	Power Plants & Generation Systems, incl. hydroelectric & natural gas	7	HIFLD 2025, EIA 2025	Y	
		Electric Transmission Systems	93 miles	HIFLD 2024	Y	
		Distribution Systems	not inventoried			
	Natural Gas, LP, & Other Fuels (same also qualify as HazMat lifelines)	Refineries/Fuel Processing	none identified			
		Fuel Storage Facilities & "Tank Farms"	none identified	HIFLD 2024	Y	
		Natural Gas Pipelines	41 miles	HIFLD 2024	Y	
COMMUNICATIONS						
	Infrastructure	Towers & Fixed Wireless	8	HIFLD 2024	Y	
		Cable Systems & Wireline	not inventoried			
		Broadcast Facilities (TV & Radio)	7	HIFLD 2024	Y	
		Data Centers	not inventoried			
	Responder Communications	ARES/RACES Base or Infrastructure	1	DUNN COUNTY 2025	N	
		Alerts, Warnings & Messages	Emergency/Storm Sirens	12	DUNN COUNTY 2025	Y
	Finance	Siren Types: ? weather, ? fire, ? dam failure				
911 & Dispatch	FDIC Insured Banks & Credit Unions	70	HIFLD 2024	Y		
	Dispatch & Public Safety Answering Points (PSAP)	1	FCC 2024	Y		
TRANSPORTATION						
	Highway/Roadway/Motor Vehicle	Roads	1,557 miles	WISLR 2025	Y	
		Bridges	242	HIFLD 2023	Y	
	Mass Transit	Bus	1	DUNN COUNTY 2025	Y	
		Rail	none identified	HIFLD 2023		
	Railway	Freight	87 miles	NARN 2024	Y	
		Passenger	none identified			
	Aviation	Bridges	38	HIFLD 2023	Y	
		Commercial (cargo/passenger)	none in the County			
General	6	WISDOT 2024	Y			
HAZARDOUS MATERIAL						
	Facilities	HAZMAT-EPCRA Tier 1 EHS Planning Facilities	23	DUNN COUNTY 2025	Y	
		HAZMAT EPCRA Tier 2 Reporting Facilities	39	DUNN COUNTY 2025	Y	
		EPA Active Hazardous Waste Facilities	115	HIFLD 2024	Y	
		EPA Hazardous Waste Treatment, Storage and Disposal Facilities	none in the County	HIFLD 2024	Y	
	Spill Response	Spill Response Agencies or Resources, excluding fire depts	none identified		Y	
WATER SYSTEMS						
	Potable Water Infrastructure	Wellhead Protection Areas	77	WDNR 2025	Y	
		Community Wells, Towers, & Distribution Systems	14	WDNR 2025	Y	
		Private High Capacity Wells	195	WDNR 2025	Y	
		Water Bottling Facilities	none identified			
	Wastewater Management	Community Wastewater Treatment Plants & Systems	6	HIFLD 2024	Y	

SECTION III.

ASSESSMENT OF HAZARD CONDITIONS

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

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

i. Disaster and Emergency Declarations

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

Month & Year	Federal Disaster Declarations	Public Assistance	Individual Assistance
April 1965	Tornados, severe storms, flooding	X	X
May 1969	Flooding	X	X
April 1973	Severe storms & flooding.	X	X
July 1980	Severe storms & flooding	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, High Winds & Tornados, Heavy Rain, Flooding	X	
July 2001	Flooding	X	
June 2002	Severe storms & flooding	X	
Sept 2002	Severe storms, tornados, & flooding		X
April 2020	COVID-19 was declared a nationwide disaster on April 4, 2020.	X	X

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

Month & Year	State or Federal	State or Federal Emergency Declarations
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
Aug 2010	State/USDA	Agricultural Drought + Late Frost/Freeze
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. The Winter 2014 Polar Vortex is one such event that caused major damage to water lines for many communities in the region, but this disaster was not declared. Such events can be especially hard on small communities when Federal assistance is not available.

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



During the period from January 1, 1993, through December 31, 2024, there were 429 extreme weather hazard events reported to the National Climatic Data Center for Dunn County on 271 different dates as will be discussed in the remainder of Section III. These events included:

- Three deaths and 14 injuries are in the database, with 8 of the injuries associated with a single tornado event in May 1998.

- Over \$9.36 million in property damage was reported (unadjusted for inflation). The seven largest damage-causing events were all tornados or high winds constituting 75% of the total property losses.
- Hail (121 events) and Thunderstorm Wind/High Winds (132 events) were the most frequently reported natural hazard events.

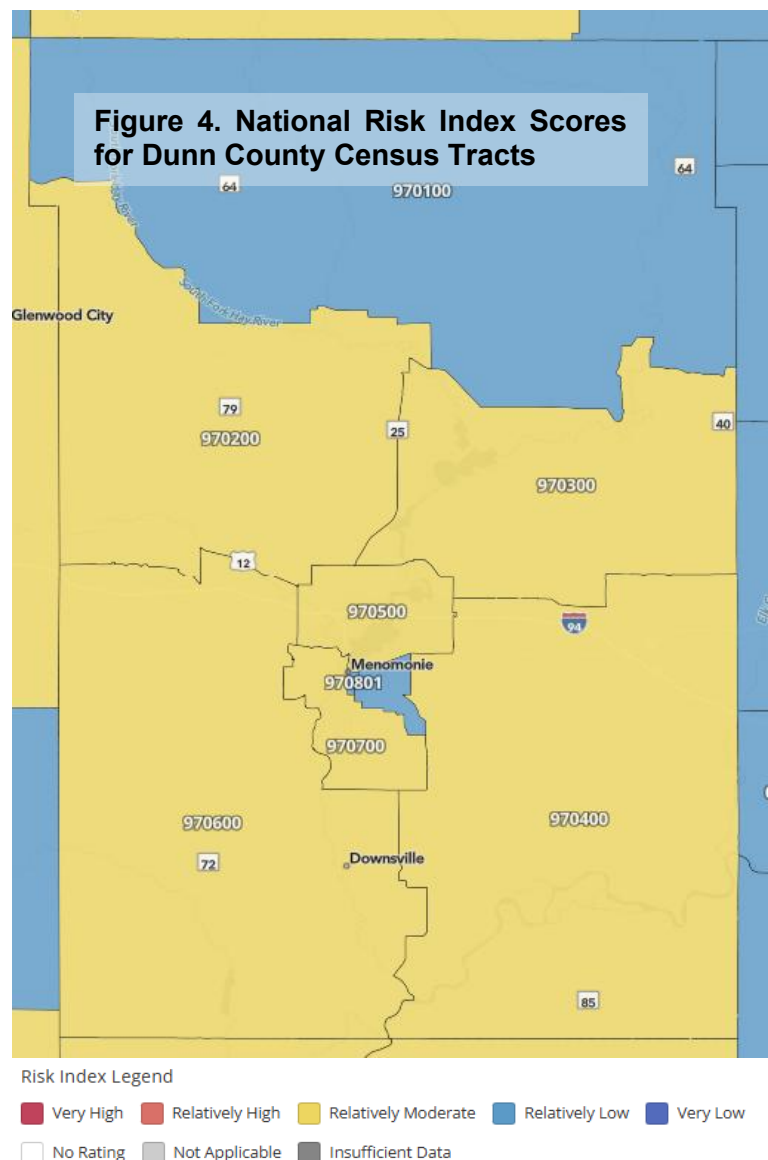
While being the best, accessible source of historical storm data, the NCDC database is far from complete and most types of hazard events are not included in the database for years prior to 1993. Damages in the NCDC database are frequently under-reported and some damage estimates represent a single event impacting multiple counties.

ii. Dunn County Overall Risk Assessment & Priorities

FEMA National Risk Index

FEMA utilizes the vulnerability analysis, 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:

- Dunn County ranks in the 60th percentile for Nationally for risks and 65th percentile within the State, suggesting it has a relatively lower hazard risks overall in comparison to the rest of the State and Nation.
- **Figure 4** shows the risk index classification for each census tract. Two census tracks have slightly lower risks due to relatively lower socio-economic vulnerabilities, while a part of eastern Menomonie was estimated to have relatively lower annual losses.
- Overall, all census tracts are classified as having a moderate community resiliency.
- Relative to other counties nationally, Dunn County had high hazard risk ratings for Strong Wind (95.1 out of 100), Cold Waves (92.5), and Ice Storms (86.7).



- Expected Annual Losses for the County were the highest for Tornado and Strong Wind events.
- Surprisingly, the County had a relatively moderate rating for Landslides, likely due to areas with steep slopes and river banks. In comparison, the Plan Update Steering Committee did not believe that landslides were a significant risk for the County. This is a good example of how a hazard may have a relatively higher risk when compared nationally versus how the threat is perceived or experienced locally.

Steering Committee Hazard Assessment & Priorities

During the update of the 2026 *Dunn County Multi-Hazard Mitigation Plan*, Steering Committee members discussed natural hazard trends and concerns. This included reviewing the National Risk Index data for Dunn County, the 2025 Health Vulnerability Assessment results (HVA) completed by the Northwest Wisconsin Healthcare Emergency Readiness Coalition, and the hazards included in the 2020 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 Dunn County. A composite overall average risk rating for each hazard was then calculated by totaling the average risk rating from each respondent and divided by the total

PROBABILITY VS. VULNERABILITY

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

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

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

number of respondents. The compiled results of the updated survey are shown in **Table 5**. An additional column is included in Table 5 identifying those hazards that the Committee recommended should be addressed as part of the 2026 Plan update and how best to organize those hazards in Section III.D.

Table 5. Dunn County Hazards Probability & Vulnerabilities Survey Results (Fall 2025)

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

Hazard	Probability	Vulnerability	Ntnl Risk Index	NWHERC HVA	in 2020 Plan?	section of 2025 plan
Natural Hazards						
Riverine or Overbank Flooding	2.6	2.4	V. Low	58-61%	x	flooding
Overland or Stormwater Flooding	2.6	2.9			x	flooding
Heavy Snow Storm and Blizzards	3.7	3.7	Moder.	33-55%	x	winter storms & extreme cold
Ice Storms and Sleet	3.9	3.7	High	43-53%	x	winter storms & extreme cold
Lack of Snow Cover During Cold	2.9	2.9			x	winter storms & extreme cold
Extreme Cold/Cold Wave	4.0	3.4	High	68%	x	winter storms & extreme cold
Forest or Wild Fire	2.0	2.3	V. Low	61%	x	wildfire
Tornados	2.9	4.1	Moder.	48%	x	tornados
High Winds	3.9	4.3	High		x	thunderstorms & high winds
Thunderstorms, Lightning, Hail, etc.	4.1	3.4	Low-Mod	35%	x	thunderstorms & high winds
Extreme Heat/Heat Wave	3.0	2.3	Low	67%	x	extreme heat
Drought	2.4	2.3	Low	48%	x	drought
Landslides or Sinkholes	1.3	1.4	Moder.	18%		excluded
Earthquakes	0.4	0.9	V. Low	24%		excluded
Fog	2.8	1.3				excluded
Technological Hazards						
Haz Mat Incident - Fixed	2.4	2.9		38%		hazardous materials section providing an overview of risks, vulnerabilities, and potential actions
Haz Mat Incident - Transportation	2.9	3.3		55%		
Groundwater Contamination	2.6	3.4		38-40%		
Animal Waste Management	2.1	2.1				
Long-Term Power Outage	2.7	3.7		43%	x	long-term power outage
Nuclear Power Plant Incident	1.1	2.7		22%		very brief overview referencing related plans & preparedness
Dam Failure Flooding	1.9	3.7			x	flooding
Airline Accident	1.6	2.7		37%		excluded
Railroad Accident	2.2	3.3				
Other Hazards						
Pandemics/Zoonotic Disease	2.7	3.7		65-68%		brief communicable disease section referencing Public Health plans
Livestock Flu and Diseases	3.1	3.1				
Invasive Species & Diseases	2.6	3.0				excluded
Active Shooter/Active Threats	2.4	4.0		64%		brief active threats section providing an overview of risks, vulnerabilities, and potential actions
Terrorism, Domestic (all)	1.7	3.3		29%		
Terrorism, International (all)	1.3	3.0				
Terrorism, Critical Infrastructure	1.9	3.6				
Cyber Attacks	3.6	3.9		71%		brief section providing an overview of risks, etc.
Civil Unrest or Institutional Riot	1.7	2.3		28%		excluded

Hazards highlighted in orange in Table 5 were identified as top disaster threats facing Dunn County identified during the 2025 Community Preparedness and Mitigation Survey conducted concurrently with this mitigation plan update. Community members responding to this survey overwhelmingly identified natural disasters/severe weather and long-term power failure among their top two hazards facing Dunn County and their communities; hazards such as HazMat spills, active threats, and cyber attack were ranked significantly lower.

The **National Risk Index** in Table 5 compares Dunn County to rest of the U.S. based on expected annual losses, social vulnerability, and community resilience for each hazard. The 2025 **Northwest Wisconsin Healthcare Emergency Readiness Coalition's Hazard Vulnerability Assessment (NWHERC HVA)** is the relative risk and vulnerability for each threat in the region from a public health perspective based on a detailed assessment of various threats based on probability, potential impacts, and current capabilities.

Reflecting Table 5, Dunn County determined that the 2026 Mitigation Plan update should be a multi-hazard plan and not primarily limited to the natural hazard threats of greatest concern. More robust sections were added to Section III of this plan on:

- Hazardous Materials Spills
- Active Threats
- Cyberattack

The Steering Committee felt that the scope of the 2025 hazard mitigation plan update should be modified in one additional way when compared to the previous 2020 Plan:

- High winds are discussed with tornados due to similar vulnerabilities and impacts.

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

Hazards Addressed in Other Plans

The Steering Committee discussed how best to approach zoonotic and communicable disease in light of the COVID-19 pandemic, and agreed that the 2026 Plan update should refer to and support, but not duplicate or supplant, the *Public Health Emergency Preparedness Plan*. As such, **Communicable Disease** is included in the *Hazard Mitigation Plan Supplement 2.B*, along with **Nuclear Power Plant Accident**; both of these are hazards of concern addressed in other plans.

Natural Hazards of No Significant Risk

Table 5 notes which hazards are excluded from the scope of this plan update, largely reflecting their lower probabilities. The reason for excluding certain natural hazards is further discussed in *Mitigation Plan Supplement 2.A.*, though some concerns with shoreland bank erosion are discussed in the Flood assessment later in this section.

B. CHANGING WEATHER PATTERNS & NATURAL HAZARD RISK

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

How the Region's Weather Patterns are Changing

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

“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... 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.”⁴

Regardless of the debate over the causes of such changes, there is clear evidence that Wisconsin's weather patterns are indeed changing. The 2003 report entitled *Confronting Climate Change in the Great Lakes Region* published by the Union of Concerned Scientists and the Ecological Society of America projected that by 2030, summers in Wisconsin may resemble those in Illinois overall, in terms of temperature and rainfall, and by 2100 the summers will generally resemble that of current-day Arkansas, and the winter will feel much like current-day Iowa. And a University of Maryland model suggests that by 2080, the long-term weather of Menomonie will be similar to that of northern Oklahoma.⁵

To further document these changes in weather patterns 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.

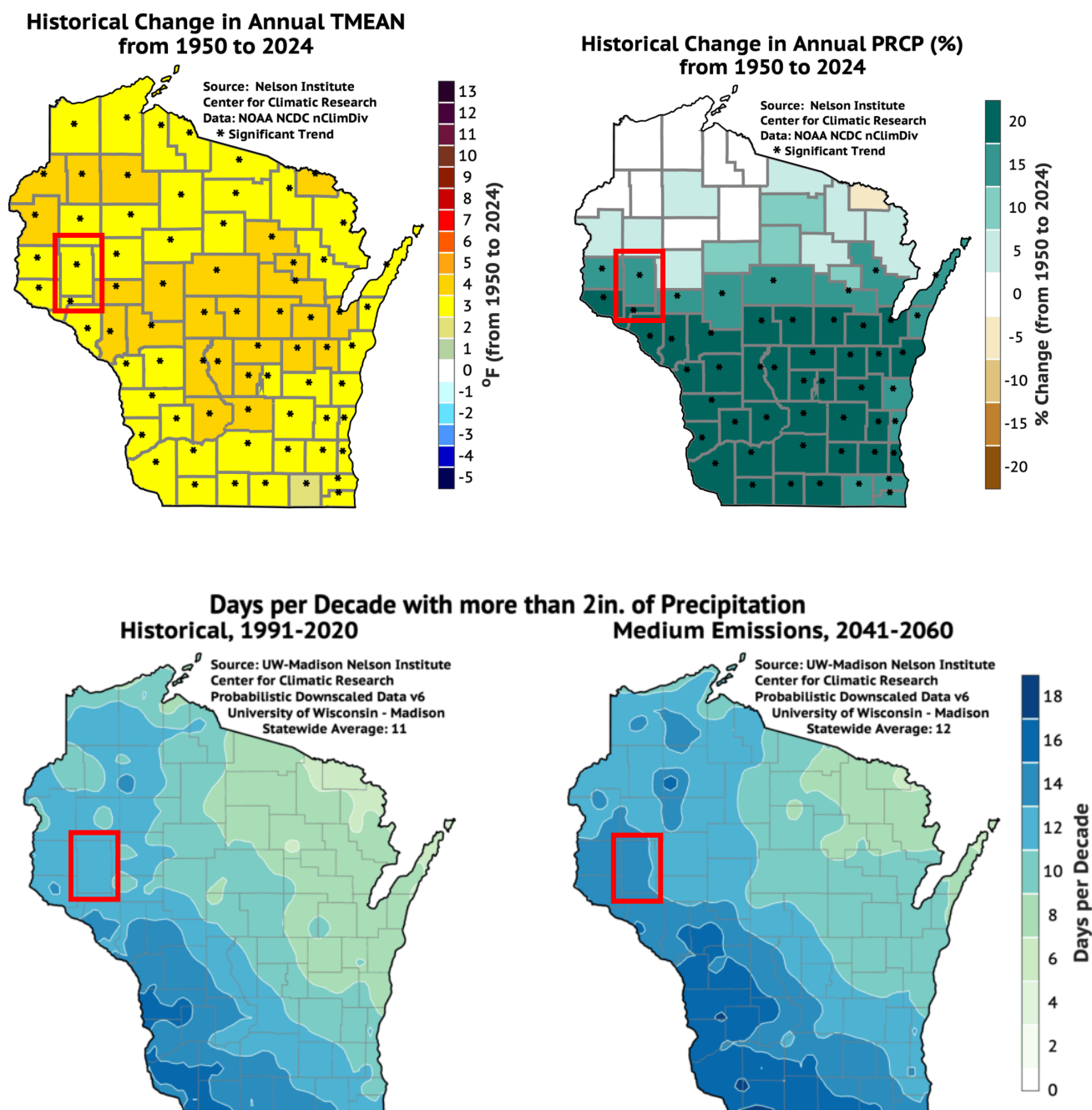
⁴ U.S. Environmental Protection Agency. <http://yosemite.epa.gov/oar/globalwarming.nsf/content/impacts.html>

⁵ <https://www.umces.edu/futureurbanclimates>

- Very extreme precipitation events will increase in the future.
- 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 Dunn County. **Figure 5** below includes WICCI maps indicating longer-term weather trends for Wisconsin with Dunn County outlined. The data suggests that the County must anticipate increased extreme precipitation events annually, as well as greater severity within individual events.

Figure 5. Selected WICCI Maps



Potential Long-Term Weather Pattern Impacts on Natural Hazard Risk

The following summarizes the primary, potential impacts of long-term shifts in weather patterns for those natural hazards of significant risk to Dunn County.

Tornados, Thunderstorms, and High Winds

The link between long-term changes in weather and tornadoes, high winds, and thunderstorms is unclear. While extreme storm events are increasing, scientists are uncertain what role such long-term shifts in weather have, if any.⁶ However, warmer temperatures will increase the number of weeks that Dunn County experiences severe thunderstorms and tornadoes. And during the 2026 Plan update process, some local officials expressed concern with a perceived increase in the frequency of high wind events over the past decade. The County needs to be prepared for an increase in tornadoes, severe thunderstorms, and episodes of high winds that are associated with strong storms.

Flooding

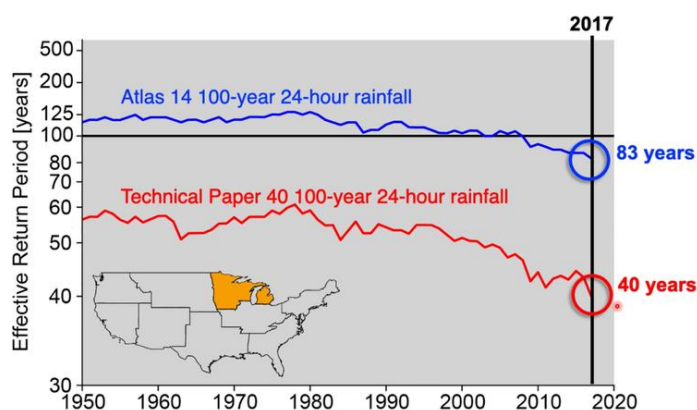
From 1958-2012, extreme rainfall events increased 37% in the Midwest.⁷ WICCI projects that the frequency of extreme rainfall events (2+” within 24 hours) will increase from about 10-12 per decade to 12-14 per decade. The data reports that Dunn County is already experiencing an increase in 100-year rainfall events and by 2060 will be experiencing ten 4”+ rainfall event days every 100-years.

Increased precipitation and heavy precipitation events are 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.

These increasing heavy rainfall and flooding events are not reflected in current floodplain maps and stormwater management models. For example, most stormwater modeling and design standards for Wisconsin municipalities use the precipitation frequency data from NOAA’s Atlas 14 (based on 1900-2010 trends) and the older Technical Paper 40 (published in 1961). A 2019 study summarized by the graphic to the right shows that a 100-year rainfall event in based on Atlas 14 was occurring every 83 years by 2017 in the upper Midwest, and the frequency of such events has been increasing significantly since 2010. A separate National Weather Service-funded study from 2019 suggests that today’s 100-year rainfall event will be a 20-year storm by the late 21st century. Atlas 15

How are existing rainfall statistics holding up?

Wright et al., U.S. hydrologic design standards insufficient due to large increases in frequency of rainfall extremes, *Geophysical Research Letters* (2019).



⁶ <http://blogs.ei.columbia.edu/2016/12/01/increasing-tornado-outbreaks-is-climate-change-responsible/>

⁷ <https://nca2014.globalchange.gov/highlights/regions/midwest#statement-16934>

reflecting more recent trends is not expected to be released before 2027. In the interim, some Wisconsin municipalities are already considering these trends. As an example, Dane County continues to use Atlas 14 data, but in 2021 it updated its erosion control and stormwater management ordinance to require peak rate control based on 200-year storms, instead of 100-year storms.

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 have been contributing to localized flash or stormwater flooding.

Winter Storms, Ice Storms, and Extreme Cold

Per WICCI, winter precipitation has increased more than 20% and winter nights have been 6° F warmer in Dunn County since 1950, and these trends are projected to continue. By 2060, Dunn County will experience 10% more winter and spring precipitation and a 5% increase in fall. 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 longer-term weather pattern changes may contribute to an increase in extreme temperature events (both hot and cold).⁸ However, WICCI data suggests that extreme cold reports should decrease in frequency. Such long-term changes in weather could have some positive natural hazard impacts. For instance, the winter season would be shorter overall with fewer days of sub-freezing temperatures. But other problems may also be exacerbated, such as plant and animal diseases and infestations, Lyme's disease, air quality changes, change/impact natural habitats, and impacts to water quantity. During the 2026 Plan update, the Plan Update Steering Committee discussed the potential for increased ice storm events with high winds, which exacerbates the potential for power loss during periods of low temperatures or extreme cold. The need for warming shelters with emergency power received significantly greater attention during this plan update.

Extreme Heat

The number of extreme heat event days is projected to continue to increase. By 2060, the WICCI report projects that the number of 90-degree heat days will grow from about 7-14 to 28-35 per year for most of the County. An increase in extreme heat occurrences and higher summer temperatures will have a significant impact on the elderly and others. The majority of deaths and emergency room visits during heat waves are from persons over 65 years old. As Dunn 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 vulnerabilities.

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 2026 Plan update, some service providers expressed concern was expressed over recent increases in extreme heat events and there was increased discussion on the need for designated cooling shelters with emergency power.

⁸ <https://www.climaterealityproject.org/blog/perfect-storm-extreme-winter-weather-bitter-cold-and-climate-change>

Drought, Wildfire, and Forest Resilience

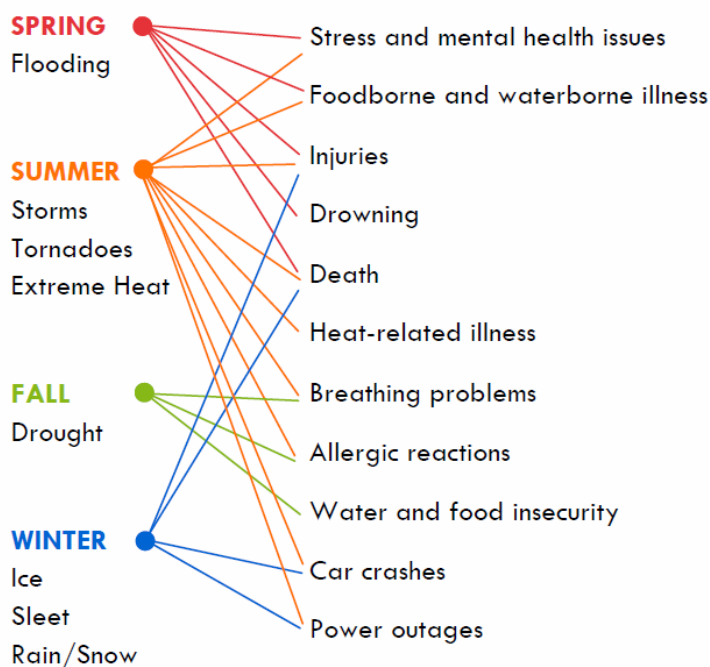
Projecting the impact of weather pattern changes on drought and wildfire is complicated. While precipitation is projected to increase, this will be offset by higher evapotranspiration and longer growing seasons. When and how this precipitation occurs is also important. Heavy rainfall events and fast snow melts can result in increased runoff and less soil infiltration, especially if the ground is frozen. Weather patterns can also influence wildfire potential and forest health.

Human Health

According to the Wisconsin Department of Health Services—Climate & Health Program⁹, it is also important that we keep in mind the potential impacts of long-term weather changes 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
- **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** – wetter, warmer weather could be more favorable to mosquito- and tick-borne diseases (e.g., West Nile, Lyme)
- **surface water risks** – see flooding risks, contamination of water supplies, toxic algae blooms
- **groundwater risks** – reduced availability, contamination of water supplies

CONNECTING CLIMATE TO HEALTH OUTCOMES



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

⁹ <https://www.dhs.wisconsin.gov/climate/index.htm>

important that local disaster recovery integrate public health principals, including providing mental health support and treatment when needed.

Adaptation as a Natural Hazard Mitigation Strategy

Weather pattern 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 longer-term patterns. Below are examples of what some other communities are doing to address such trends, and will be considered as Dunn 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 weather changes 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 Dunn 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 and explore micro-grid alternatives, specifically at critical facilities (e.g., municipal 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. Utilize updated stormwater modeling that considers the increasing frequency of heavy rainfall events.
- 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. Complete riparian/stream restoration plans and projects.
- Reevaluate all water-related infrastructure (e.g., bridges, levees, dams, culverts, stormwater system) for structural integrity.
- Promote solutions that support natural systems and low impact development policies to reduce stormwater runoff and encourage flood/stormwater storage. Incorporate permeable surfaces in new and existing development, including pavement systems and green roofs. Encourage rain barrels, bioswales, and rain gardens. Install, preserve, and maintain wetlands, natural flood retention areas, and stormwater basins.
- Increase focus and effort on eliminating debris from entering the water bodies (e.g., increase street cleaning operations, expand promotion of Rain-To-Rivers programming, provide community lawn waste pickup).

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

Conclusion

Given the ongoing debate in the scientific community, this plan does not debate the causes of these longer-term weather patterns. 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 also important that communities and residents keep informed of these changes in weather patterns 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, related materials on at their webpage, including a community engagement toolkit: <https://www.dhs.wisconsin.gov/climate/index.htm>

D. RISK AND VULNERABILITY ASSESSMENT

This section is organized by the hazards that are a significant disaster threat to Dunn County not primarily addressed in other plans. The assessment for each hazard is generally structured into the following sections, which are consistent with FEMA planning guidance, though there are some differences for the non-natural hazards:

Defining the Hazard – Describes the hazard, including related definitions.

Hazard Location – Describes the geographic extent or unique boundaries that may be affected by the hazard type. This may include or reference county, state, or other maps illustrating the geographic extent of any hazard areas. For most hazards in Section III.D., there is no geographic area uniquely at risk; most hazard events facing County residents often affect large areas, or are even county-wide, such as a drought, active shooter, cyber-attack, or an ice storm.

Hazard Extent (Potential Intensities) – Identifies the range of anticipated intensities that can occur within Dunn 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 may differ, but for most natural hazards includes:

- **National Climatic Data Center Event Summary or other data source(s) depending on the nature and type of hazard.**
- **Significant Dunn County (and/or Regional) Events** – Highlights any significant or notable events that are particularly important for assessing capabilities or exploring mitigation alternatives.

Hazard Probability – Discusses and, if possible, estimates the probability of the hazard occurring or reoccurring in the future. FEMA guidelines require that probability must consider the impacts of long-term weather changes.

Vulnerability Assessment – Includes a table summarizes the vulnerabilities (potential impacts/losses) for residents and different aspects of the County, including community lifelines.

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

Hazard Mitigation Plan Supplement 2 (Additional Hazard Assessment Information) includes additional information for each hazard, including an expansion of definitions, supplementary event history and data, and, often, related preparedness information.

Hazard Mitigation Plan Supplement 5 & 6 (Sub-Plans) include subplans for participating city, village, and public educational institutions. While this section often includes key or commonly shared findings from cities, villages, and schools, the sub-plans include an expanded event history, probability, vulnerability, capability, and mitigation strategies for each.

i. TORNADOES & HIGH WINDS

Tornadoes are typically linked with severe thunderstorm events. It is sometimes difficult to determine the difference between the impacts of a tornado versus very high winds. This sub-section highlights key tornado-related information and the effects of winds during thunderstorm events. Section II of the *Dunn County Hazard Mitigation Plan Supplement* provides additional details. **For tornado and high wind risks and vulnerabilities specific or unique to the participating villages, cities, and school districts, please refer to Supplements 5 & 6.**

Defining the Hazard —Tornadoes & High Winds

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.

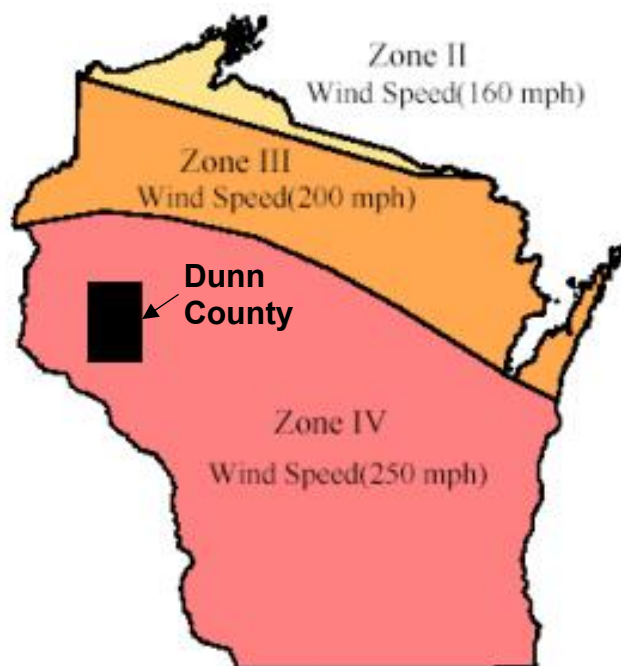
Downbursts (straight-line winds) – A downburst is a strong, violent downdraft, initiated by rapidly descending rain and/or rain-cooled air beneath a thunderstorm.

Hazard Location & Extent

Tornadoes and high winds occur throughout the State of Wisconsin and have no defined hazard area within Dunn County. All Dunn County jurisdictions are equally at risk of experiencing a tornado or high wind event. The *Mitigation Plan Supplement* describes how tornado and high wind intensities are measured, most notably the Enhanced Fujita Scale.

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 Dunn County (see **Figure 6**). However, this design wind speed map may be outdated. While very rare, Wisconsin has one documented tornado with winds exceeding 250 mph. On July 18, 1996, the F5 Oakfield tornado was estimated to have had winds of 265 mph. Oakfield is located in the eastern part of the State near Fond du Lac; no documented tornado in west central Wisconsin has exceeded 250 mph.

Figure 6. 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

As detailed in the *Dunn County Hazard Mitigation Plan Supplement*, from 1980 to 2015, Wisconsin experienced 44 significant tornado events, including twelve EF-3, three EF-4, and one EF-5 tornado. Tornadoes may occur throughout the year, but are most frequent during May-August. Dunn County has had a moderately high number of tornadoes with 35 reported tornadoes between 1844 and 2015. No areas of the County were identified as being particularly prone to experiencing tornado or high wind events in the past.

National Climatic Data Center (NCDC) Event Summary

The table below summarizes tornado and high wind events reported by the National Climatic Data Center (NCDC) in Dunn County. Tornadoes have been well documented since 1950, allowing for the review of a larger time horizon (74 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 2023.

Tornado Event Summary 1/1/1950 - 12/31/2024	
Total Events: 24	Number of Events Per Year: 0.32 (.517/year from 1993-2022)
Total Event Days: 21	Number of Event Days Per Year: 0.28
Total Injuries: 77	Total Deaths: 21 (20 deaths and 54 injuries are from the F5 tornado event that struck the County in June 1958)
Total Event Days with Property Damage: 19	
Property Damage (from NCDC): \$ 60,759,000 (2 events on same event day reported \$25,000,000 in damage)	
Property Damage (adjusted for inflation): \$ 592,402,243	
Funnel Cloud Reports: 8 reports on 7 event days between 1997 – 2010.	

Note: Though this table includes some pre-1990 data, tornadoes were reported less consistently prior to 1993.

High/Strong Wind & Thunderstorm Wind Event Summary 1/1/1993 - 12/31/2024	
Total Events: 138	Number of Events Per Year: 4.45
Total Event Days: 83	Number of Event Days Per Year: 2.68
Total Injuries: 4	Total Deaths: 1
Total Event Days with Property Damage: 26	
Property Damage (from NCDC): \$ 4,649,800	
Property Damage (adjusted for inflation): \$ 8,774,419	

Significant Dunn County Events

The following briefly describes significant tornado and high wind events impacting Dunn County. For insight into additional potential experiences, the *Mitigation Plan Supplement 2.C.* also includes some key tornado and high wind events for the broader region.

1958 Colfax Tornado

The 1958 Colfax tornado was part of a larger tornado outbreak which struck the region over a roughly four-hour period in the late afternoon and early evening of June 4th. An F5 tornado initially touched down near Baldwin in St. Croix County causing great destruction in its path before dissipating near Bloomer in Chippewa County. The Village of Colfax was hardest hit with about one-half of the buildings destroyed and many others seriously damaged. The number and deaths associated with this tornado varies since the same storm front spawned two to three lesser tornados which also resulted in deaths and destruction in other areas of the region. According to Wisconsin Emergency Management, the Colfax tornado resulted in 20 deaths and 110 injuries. Estimated damages from this tornado in today's dollars are approaching \$200 million. The "Colfax Tornado" is one of only three F5 tornados officially recorded in Wisconsin over the past 50-60 years

September 2019 Tornado

A late season tornado occurred on September 24, 2019, and began on the south side of Elk Mound, near the intersection of I-94, and South Holly Road. The tornado moved northeast, crossing I-94, and continued into Chippewa County as it crossed 10th Street, south of 560th Avenue. For most of Dunn County, the tornado was given an EF0 rating; a barn lost its roof and trees were uprooted or blown down. The path length in Dunn County was 2.3 miles long, with a maximum width of 250 yards. Property damage in Dunn County was estimated at \$250,000. In Chippewa County, the tornado continued for another 4.7 miles and developed into an EF3, causing damage to 29 homes and several businesses. Three people were injured. The damage was estimated at \$3 million, bringing the damage for the entire tornado to \$3.25 million.

Recent High Wind Events

Three injuries were reported due to thunderstorm wind in **June 1990** when wind tore the roof off of a trailer home in Knapp; damage was reported for 25 barns/sheds, 22 homes, and 4 trailer homes within the County. Four individuals were injured in a **May 1998** thunderstorm event at two separate locations, two in Menomonie and two in Elk Mound, all when mobile homes were heavily damaged or destroyed. A fatality is associated with a **May 2012** thunderstorm with high winds when a tree fell on an individual near Boyceville. In terms of damage, a **May 19, 1996**, thunderstorm with high winds, that also included heavy snow and ice at times, was the most significant in recent decades; over \$2.2 million in property damages were reported, primarily in the Connorsville area.

Hazard Probability – Tornadoes & High Winds

The Dunn County Plan Steering Committee rated tornadoes and high winds as the County's highest natural hazard vulnerabilities in terms of potential impacts. While tornadoes have a moderate risk (probability of occurrence), the probability of high wind events was significantly higher. Based on the number of reports since 1993, **it is probable that one or more tornados will continue to touch down and be reported for Dunn County on a given day about every 2 years on average (multiple tornados may occur in a single day). High wind events will occur much more frequently, with about 4.5 events or 2.5 – 2.75 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 in Barron County suggests that sufficient time is often available for residents to find adequate safe shelter in order to mitigate deaths and injuries.

A recent study, published in January 2023, modeled several potential effects of long-term weather patterns 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 indicate 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

The following provides an overview of the primary tornado and high wind vulnerabilities facing Dunn County and its communities. While all individual plan participants in Dunn County (i.e., villages, cities, educational institutions, electric cooperatives) are equally at risk of experiencing a tornado event, the potential impacts and vulnerabilities increase 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).

General Vulnerabilities	
People	• 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. • Residents of Mobile Home Parks - Most frequently identified population of concern. 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 • Seniors and residents needing support - Lower-income apartments and facilities/apartments for seniors, including CBRFs and nursing homes, and other group homes. Dunn County has 4 nursing homes and 33 licensed assisted living facilities primarily concentrated in the urban area. • 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. • Visitors and staff of parks, campgrounds, festivals, and other large gatherings are also a frequently identified vulnerability since most of these facilities lack safe rooms or storm shelters, and out of town visitors may not have access to an alternative. • While the County is not projected by the State to grow in population, it continues to experience new development, thus increasing overall exposure to tornados and high winds. • Volunteer management and storm clean-up poses its own challenges. Injuries and deaths during cleanup have occurred in the State.
Above-Ground	• Damaged buildings may pose additional safety concerns due to structural instability, damage to

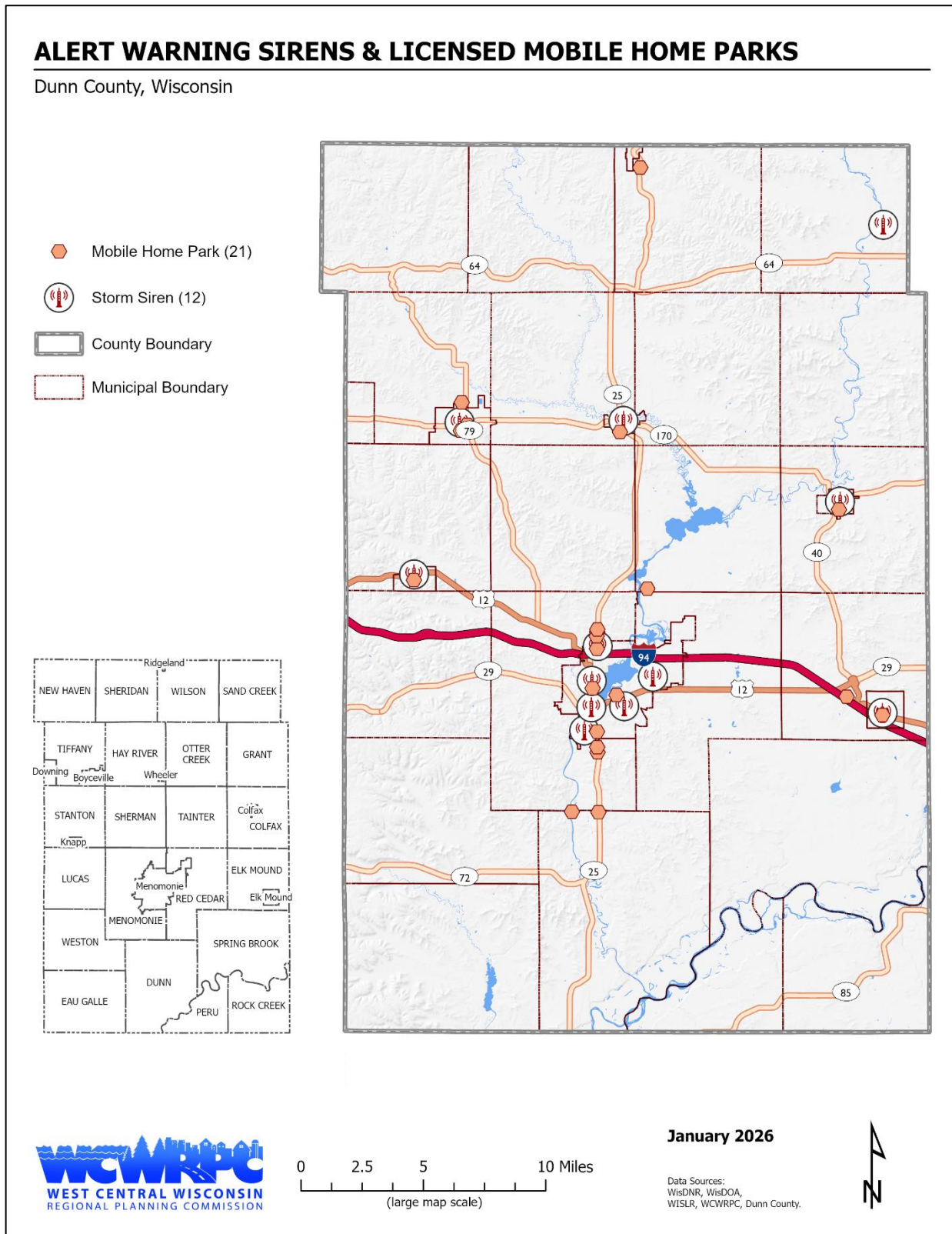
Structures	electrical systems, or gas leaks. • Building with large spans (e.g., airport hangars, pole barns, gyms, factories) have a higher structural vulnerability. Data on the number of large-span structure in the County is not available; most of these large-span buildings tend to be large storage buildings, garages, or barns which are common throughout the County. Of greater vulnerability, due to contents and risk of injury or death, are industries or big-box commercial buildings that are large-span structures, or school gymnasiums. Most of these are located near or within the incorporated areas of the County. • Nearly all structures are vulnerable to damage. As of 2024, Dunn County has over \$3.4 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. ○ Towns: \$2,110,271,650 ○ Villages: \$242,302,500 ○ Cities: \$1,069,381,600
Above-Ground Utilities	• Above-ground power lines, especially in wooded areas, are a frequently identified infrastructure vulnerability. This extends to facilities, services, and oxygen-dependent populations without access to emergency power generators. This vulnerability is further explored in the <i>Long-Term Power Outage</i> threat sub-section. The lack of power can become deadly during periods of extreme temperatures.
Mobile Homes	• Mobile homes, especially those that are unanchored, are the most frequently mentioned vulnerability. • 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 is estimated to have 1,596 mobile homes in 2023, constituting about 8.5% of the total housing supply, a ratio that has been decreasing over the past several years. • As of January 2026, Dunn County had 21 licensed manufactured/mobile home parks, though some of these parks may be used for recreational or seasonal purposes. • The number of mobile homes as full-time residences and licensed mobile home parks have been slowly decreasing in the County. • It is not known whether many 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. • 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 under zoning or as part of a licensing ordinance.
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 in some areas.
Campgrounds, Cabins, & Resorts	• The Summer 2010 windstorm that struck Cumberland's municipal campground in nearby Barron County provides an excellent example of this elevated vulnerability. • 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. • 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.

	- County campgrounds lack sirens, though caretakers are equipped with NOAA all hazards radios. The County owns and operates three campgrounds: - Myron Park in the Town of Sand Creek (Dunn County; operated by Town) - Boyceville Airport Park in the Village of Boyceville (Boyceville) - Stuart Park in the Village of Colfax (Colfax) - Block restroom structures provide some shelter options at Myron Park. A number of other precast concrete structures are available at other County parks that also provide a shelter option. Lake Menomonie Park, owned and operated by the County, does not have camping, but does have a playground, ball fields, picnic shelter and popular trailhead. - Event camping is also allowed at the Dunn County Recreation Park (Fairgrounds) owned and operated by Dunn County. The Recreation Park also includes a picnic area, race track, grandstand, arena (ice hockey), exhibition buildings, and lighted ball fields. The Park is heavily used during the summer storm season, including races on most weekends and the County Fair. - A number of private campgrounds and resorts exist in the County, but not at the numbers of neighboring counties to the north. In previous County mitigation plans, the Town of Tainter identified Elk Point Resort and the Town of Menomonie identified Irvington Campground as two such private campgrounds that could be vulnerable during severe weather and may be candidate for safe room projects.
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	- 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. - There are no natural areas or environmental characteristics within the County that are uniquely less or more vulnerable to tornadoes or high winds.
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. - Grain and milk production are significant contributors to the County's economy and play a very important role in the food supply chain.
Health & Medical	- All above-ground structures are vulnerable. - Hospitals and larger facilities have emergency plans and generators. - Mayo-Red Cedar Hospital in Menomonie was mentioned as being a significant concern due to their potentially patients, emergency response functions, and importance to the community, though it was noted that the hospital collaborates with the County and City on preparedness planning and training. - Senior care facilities and group homes are frequently mentioned as having a higher vulnerability. Most of these structures serve persons who are ill/injured and are single-story, slab-on-grade for ADA accessibility. Dunn County has 4 nursing homes and 33 licensed assisted living facilities.
Energy	- Above-ground utilities are especially vulnerable in wooded areas due to falling trees or limbs. - See <i>Long-Term Power Outage</i> section.

Communications	• Tornadoes and high winds can destroy above-ground communications infrastructure, including emergency communications towers. • Also see the Capability Assessment in Section IV, which discusses the status of current emergency communications infrastructure and systems. • The tornado assessment in Section III.C discusses and maps the community-owned warning sirens for tornado and severe weather warnings. The sub-plans in Supplement 6 describe the siren status for each city and village participating in this plan update.
Transportation	• The City of Menomonie has a municipal airport 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	• Often multiple buildings at a single campus. All above-ground structures are vulnerable (serve children and can host large events), 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. • There are 5 public school districts with school facilities in Dunn County, in addition to the University of Wisconsin-Stout and Chippewa Valley Technical College campuses in the City of Menomonie. • Dunn County also has 4 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 Boyceville, Colfax, Elk Mound, and Menomonie school districts and the University of Wisconsin-Stout. A sub-plan for each of is included in Supplement 6
Vulnerability to Future Assets	
Population Growth & Development	• All existing and future populations and development in the County are equally at risk of experiencing a tornado or high wind event. • While the County is not projected by the State to grow in population, it continues to experience new development, thus increasing overall exposure to tornadoes and high winds. • 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. • While mobile home development has been decreasing, it continues to be an affordable housing option. • Dunn – The City of Menomonie has a large, concentrated student (and faculty) population associated with UW-Stout who may not be actively monitoring warning systems or may not take preparedness or sheltering actions.
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 tornado or high wind events. No such future assets were identified.

Mobile homes, in particular, are vulnerable to tornado and high wind events. **Figure 7** on the following page shows the location of active mobile home parks in Dunn County; not all park locations have been mapped. Many of these parks are located in the incorporated communities and within the range of sirens for weather warnings, but not all. Most are believed to not have convenient, quick access to safe rooms or other storm shelter.

Figure 7. Alert Warning Sirens and Licensed Mobile Home Communities



Projected Loss Estimates

Table 6 provides tornado and high-wind loss estimates for Dunn County. The County has experienced some very devastating tornados, though such events have been relatively infrequent. Since 1950, the County has experienced over \$590 million in tornado damages when adjusted for inflation, though the far majority of these losses were from the June 1958 tornado. Using FEMA standards, the 77 injuries and 21 deaths from tornado events between 1950-2023 resulted in an additional \$167,076,000 in total tornado losses (an average of \$6,961,500 per tornado event). High wind losses for the County have been much lower with little or no damages reported for most of the 83 event days from 1993-2024. One death and four injuries were reported for these high wind events for an additional \$8,052,000 in high wind losses (or \$92,012 per reported event day); the annualized losses from high wind deaths and injuries are about equal to property and crop losses.

Table 6. Dunn County Tornado & High Wind Loss Estimates

Tornado Loss Estimates			
Avg. Damage per Tornado (1950-2024)	Annual Probability	Estimated Future Annual Loss (property & crop)	Estimated Future Annual Loss (injury, death, & property)
\$24,683,428 (24 events)	0.32	\$7,898,697	\$10,126,377
Thunderstorm High Wind Loss Estimates			
Avg. Damage per T-Storm Wind (1993-2024)	Annual Probability	Estimated Future Annual Loss (property & crop)	Estimated Future Annual Loss (injury, death, & property)
\$105,716 (83 event days)	2.68	\$283,319	\$543,311

Source: 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*.¹⁰ The number of reported events, property damage, event probability, and past losses are all based on the NCDC storm event data previously summarized, including inflation for damages. 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.

There are some important limitations to the above numbers:

- The tornado loss estimates are greatly influenced by the June 1958 tornado, which accounts for over 90% of all property losses between 1950-2024 once inflation is added. Further, this event also accounts for the far majority of tornado-related injuries and deaths. In comparison, average damage per tornado event since 1993 is around \$350,000, which would result in estimated future annual property and crop losses around \$175,000.

¹⁰ State of Wisconsin Homeland Security Council THIRA & SPR, updated January 2017.

- The estimates in Table 6 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 previously noted, the damages from many events were greatly under-reported and some significant events not reported at all.
- On the flip side, the damages, injuries, and deaths reported for some earlier events in the NCDC database may have included impacts from outside the County.
- High winds can also occur as part of a tornado event but are often reported as part of the tornado.

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 362.92k	1 per 546.97k
EAL Rate – Buildings	\$1 per \$7.31k	\$1 per \$7.71k
EAL Rate – Agriculture	\$1 per \$44.56k	\$1 per \$2.50k
Total EAL	\$3,016,904	\$2,538,238
Exposure	\$538.41 billion	\$538.41 billion
Events per year	0.5	3.5
Historic loss ratio	Relatively Moderate	Relatively High
Overall Loss Score	79.1 (Relatively Moderate)	95.3 (Relatively High)

According to the NRI data, tornadoes have the highest estimated annual losses of any natural hazard event (\$3 million), followed by strong winds (\$2.5 million), and cold waves (\$909,325). Compared to the loss estimates on the previous page, the NRI data includes high probabilities (events per year) and significantly higher annual high wind losses. However, the estimated annual tornado losses are much lower; perhaps the NRI data does not consider the 1958 tornado or include an inflation adjustment.

Other Factors Influencing Future Losses

1. **Population Growth & New Development.** As noted previously, Dunn County is continuing to grow, which increases the exposure to tornado and high wind events.
2. **Long-Term Changes in Weather.** The annual probability of tornado and high wind events will likely increase due to long-term weather patterns, but we are unable to confidently quantify the extent of this increase at this time. While initial studies suggest that changes in weather patterns 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.B.** for additional discussion on the related effects of such changes in weather patterns.
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.

ii. THUNDERSTORMS, LIGHTNING, 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.C.i.) and are not repeated here. Flooding as a result of heavy rains is analyzed as part of the *Flooding* sub-section (III.C.v.). For thunderstorm, lightning, and hail risks and vulnerabilities specific or unique to the participating villages, cities, and educational institutions please refer to Supplements 5 & 6.**

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.

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.

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.

An expanded definition is located in *Mitigation Plan Supplement 2.D*.

Hazard Location & Extent

There are no geographic boundaries or locations within Dunn County uniquely affected by or from thunderstorm, heavy rain, lightning, or hail events; all Dunn County jurisdictions are equally at risk of experiencing these types of severe weather.

Heavy rain intensities for 100-year rainfall events for Dunn County were previously identified in the definitions. The *Mitigation Plan Supplement* describes how lightning strike and hail intensities are measured.

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.

Event History – Thunderstorm, Lightning, & Hail

Since 1982, Dunn County has experienced a low number of reported lightning events (8). In comparison, Dunn County has been a hotspot for hail events (110). *Mitigation Plan* Supplement 2.D. includes maps showing the distribution of lightning and hail events statewide since 1982.

National Climatic Data Center (NCDC) Summary

The table below provides a summary of the thunderstorm events that have been reported to the National Climatic Data Center for Dunn County since 1993. From 1993 to 2024, Dunn County experienced 259 severe thunderstorm, lightening, and hail events of varying magnitude, for an average of approximately eight to nine events reported each year.

Thunderstorm, Heavy Rain, Lightning, & Hail Event Summary					
1/1/1993 - 12/31/2024					
Total Events:		259	Number of Events Per Year:	8.35	
Total Event Days:		126	Number of Event Days Per Year:	4.06	
Total Injuries:		5	Total Deaths:		2
Total Event Days with Property Damage:		29			
Property Damage (from NCDC):		\$ 4,977,500			
Property Damage (adjusted for inflation):		\$ 9,319,880			

- 259 events were reported on 126 event days, reflecting that many of the events reported are for the same storm cells recorded for different parts of the County.
- The 259 events include (*reported damages are 2024 dollars when adjusted for inflation.*):
 - 2 heavy rain events on two event days with no reported damage
 - 121 hail events on 66 days with \$182,909 in reported property damage, \$69,233 in reported crop damage, and no injuries or deaths.
 - 4 lightning events on 4 different event days with 1 death and 1 injury, and \$293,776 in reported property damage and no reported crop damage.
 - 132 thunderstorm wind events on 78 event days with \$7,715,496 in property damage, \$1,058,466 in crop damage, 4 injuries and 1 death. The death occurred in May 2012 in

Boyceville as a result of a large tree limb that broke off and fell on and individuals causing fatality.

- A May 19, 1996, thunderstorm that include snow and ice at times was the most significant in recent decades. Over \$2.2 million in property damages were reported, primarily in the Connorsville area.

Significant Dunn 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.

As reported in the NCDC, an **August 2021** lightning event included one death and one injury. According to the event report, two individuals that were working at a construction site of a pole shed under a partial roof on ladders in Menomonic were struck by lightning.

Hazard Probability—Thunderstorms, Lightning, & Hail

The Plan Steering Committee rated thunderstorms, lightning, and hail events as having the highest probability of occurrence in Dunn County and a moderate vulnerability (impact). The *Tornado & High Winds* section discusses the probability of high wind events, which were rated by the Plan Steering Committee as having a moderately high probability of occurrence and a high vulnerability.

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

- **4 thunderstorm event days per year, with strong winds causing the most damage.**
- **1.5 to 2 hail event days per year, with serious hail damage being relatively rare.**

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

Based on stakeholder and local official input throughout the region, the NCDC data 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 long-term weather patterns as discussed in Section III.B.

Vulnerability Assessment—Thunderstorms, Lightning, & Hail

General Vulnerabilities	
People	- Those attending festivals, fairgrounds, and outdoor recreation events are more vulnerable to lightning. On average 25-30 people die each year from lightning strikes in the United States. 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. - The County has persons without housing who may lack sufficient shelter during lightning and hail events.
Above-Ground Structures	- Tall structures and towers – lightning usually strikes the tallest thing on the landscape. While Dunn 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. - Buildings, especially siding, windows, and roofs, are vulnerable to hail storms.
Campgrounds	Limited shelter in the event of a thunderstorm or hailstorm.
Local Economy	Power outages may disrupt or shutdown electronic business transactions / communications.
Natural, Historic, & Cultural Resources	- Forests – tall trees, especially on hillsides, are good lightning targets. - 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	- Farms - the National Board of Fire Underwriters reports that lightning is the top cause of farm fires. Lightning is also responsible for more than 80 percent of all livestock losses due to accidents and millions of dollars in damage to farm buildings and equipment annually. In Wisconsin, insurance records show that one out of every fifty farms are struck by lightning or has a fire that may be caused by lightning each year. - 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. People and livestock can be injured, though deaths are rare. - Lightning can trigger wildfires in agricultural areas. See <i>Wildfire</i> 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	Lightning is a concern during outdoor gatherings, such as sporting events and parades.
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	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 thunderstorms and hail. No such future assets were identified.

Potential Loss Estimates

FEMA National Risk Index (NRI) Estimated Annual Losses

FEMA's National Risk Index (NRI) suggests that Dunn County's losses to lightning 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 2.06m	1 per 14.05m
EAL Rate – Buildings	\$1 per \$464.13k	\$1 per \$296.21k
EAL Rate – Agriculture	--	\$1 per \$35.78k
Total EAL	\$280,462	\$82,808
Exposure	\$538.17 billion	\$538.41 billion
Events per year	33	4.1
Historic loss ratio	Relatively High	Very Low
Overall Loss Score	79.9 (Relatively Moderate)	49.3 (Relatively Low)

The above table suggests that Dunn County is projected to experience annual lightning losses 3.4 times greater than hail losses. Based on \$3.4 billion in 2024 assessed improvements, annual hail damage to Dunn County's buildings would be over \$11,500 each year once tax-exempt structures are included. The NRI data also shows that the risk of injury to Dunn County's residents from lightning is much higher than that of hail, and a single lightning death would significantly increase the projected total lightning losses.

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



iii. WINTER STORMS AND EXTREME COLD (including blizzards and ice storms)

This sub-section highlights key winter storm and extreme cold-related information and the effects of these events. Supplement 2.E. of the *Dunn County Hazard Mitigation Plan Supplement* provides additional details. **For winter storm and extreme cold risks and vulnerabilities specific or unique to the participating villages, cities, and educational institutions, please refer to Supplements 5 & 6.**

Defining the Hazard – Winter Storms & Extreme Cold

Heavy Snowfall - The accumulation of six or more inches of snow in a 12-hour period, or eight or more inches in a 24-hour period.

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

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

Ice Storm - An occurrence where rain falls from a warm and moist upper layer(s) of the atmosphere to colder and dryer layer(s) at or near the ground, freezes upon contact with the ground, and accumulates on exposed surfaces.

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

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

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

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

Hazard Location & Extent

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

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 8 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 *Mitigation Plan Supplement 2.E.* describes how ice accumulation and wind chills are measured.

Figure 8. Winter Storm Impact Scale

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

Event History – Winter Storms & Extreme Cold

Regional trends on local winter storms and extreme cold events are detailed in Supplement 2.E. of the *Hazard Mitigation Plan Supplement*. These winter-season events are typically regional in nature and are not limited to a localized area or Dunn County. However, levels of snowfall or ice accumulation 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 Climatic Data Center (NCDC) Event Summary

The table below summarizes winter weather events reported by the National Climatic Data Center (NCDC) in Dunn County from 1993 to 2024.

Winter Weather Event Summary	
Total Events: 115	Number of Events Per Year: 3.71
Total Event Days: 115	Number of Event Days Per Year: 3.71
Total Injuries: 1	Total Deaths: 2
Total Event Days with Property Damage: 1	
Property Damage (from NCDC): \$ 50,000	
Property Damage (adjusted for inflation): \$ 67,557	

From 1993-2024, Dunn County has experienced 115 winter storm event days or about 4 event days per year. These events were further characterized by 3 blizzards, 16 heavy snowfall events, 81 winter storm/winter weather events (mix of snow, ice, wind), 6 cold/wind chill events, 6 extreme wind chill or cold, and three ice storm/freezing rain events. Most events occurred between November and April, with a few events in April and October.

Significant Dunn County Events

According to the Midwest Regional Climate Center, the annual snowfall for Dunn County from 1991-2024 has been between 25 to 100 inches. In the 2015-2016 season the County was reported having an average snowfall of 25.5 inches while in 2022-2023 it reported 100.5 inches. Below is a description of some of the worst snow storms in the State of Wisconsin since 2010 to present that potentially included Dunn County; more historical events are described in the *Hazard Mitigation Supplement*.

- **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 Dunn County area 18 to 22 inches fell. 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. There were also reports of thundersnow. I-94 was closed during this storm. Official snow totals for Menomonie were slightly less than Eau Claire with 18 inches.
- **March 22-23, 2011** – Northern and central portion of the State – This late season winter storm resulted from a strong area of low pressure interacting with a cold air mass in place across the upper Midwest. Moderate to heavy snow fell late the 22nd, continuing into much of the day on the 23rd, bringing 5-10" of snow to the northern half of the state. Thunderstorms developing in Iowa moved northeast into colder air, resulting in locally heavy snow with numerous reports of thunder and lightning. This resulted in higher totals across northeast parts of the state where 12-18 inches fell. Sleet and freezing rain mixed in for central parts of the state with some heavy ice accumulations. Gusty easterly winds produced near blizzard conditions for northeast parts of the state and also helped to bring down a 2,000 foot media broadcast tower near Fairchild in combination with heavy ice accumulations. Green Bay recorded a single-day storm total of 17.8 inches, the biggest snowstorm in over 120 years and the 3rd largest recorded snowstorm.

- **May 2013** – A late, heavy and wet snowfall resulted in heavy snow loads across the region, with severe damage to roofs and structures in some neighboring counties. About 400 buildings impacted in nearby Barron County with many of the collapsed buildings being arm building or accessory structures; some animal deaths did occur. 12” of snow reported in the Baldwin area. Some power loss due to falling branches in Dunn County. Excessive damage at Highland Ridge Campground at Eau Galle Dam. Roof collapses from heavy snow loads and ice damming would again cause damages to many buildings in the region in **February 2014**.
- **Winter 2014-2015 Polar Vortex** - In winter 2014-2015, 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 the region 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. A number of communities in Dunn County (e.g., Colfax, Knapp, Menomonie) experienced considerable damage and service disruptions from water utility freeze-ups than many of their neighboring communities in Polk and Barron counties.
- **April 2018 Heavy Snows & Blizzard** – Two storm systems produced several rounds of snowfall across northern Wisconsin on April 2-3, dropping 5-7 inches in west-central Wisconsin. This was soon followed by a blizzard with sleet, snow, and high winds that pummeled northeast and north-central Wisconsin on April 13-15, 2018. Snow totals in west-central Wisconsin ranged from 8-15 inches, breaking snowfall total records for the month of April. Some areas of the region also experienced small hail and sleet accumulations of up to 2 inches with wind gusts of 30 mph.
- **January 2019 Extreme Cold** – Winter 2018-2019 would not only bring record-breaking snowfalls, but in late January a surge of Arctic air moved into the region dropping temperatures and wind chills to levels not seen since Winter 1995-1996. Temperatures in the 20s and 30s below zero were experienced in the County. The coldest measured wind chill of -59F in west central Wisconsin was at the Menomonie airport. A number of warming shelters were activated in the County and the County’s Aging and Disability Resource Center received many inquiries regarding the health of clients from family members and others. United Way was also getting inquiries for assistance, but this information was not necessarily passed along to 2-1-1 or local resources. As a result of this event, some County officials noted a need for more engagement of non-community partners and better use/awareness of 2-1-1, including the potential review and update of related MOUs.
- **February 2019 Snow Storms** – Five different winter storm/heavy snow events during this month would pummel west-central Wisconsin and break records for snow accumulation. Each of these storm events would average 5-12 inches of snow over much of the region. By February 12th, the region’s record for the snowiest February had already been broken. By the end of February 201, it

would be the snowiest month on record all-time for Eau Claire with 53.7 total inches, shattering the previous monthly record of 28.2 inches from 1936. Winter 2018-2019 would also go on to set the record for the snowiest winter season with 98.8 inches total in Eau Claire.

- **March 14-15 Snow Storm** – This winter storm resulted in southern Dunn County receiving up to 18” of snowfall with high winds causing the drifting of some roads. 25” of snow was reported in Granton, Clark County. Motorists on Interstate 94 between Black River Falls and Osseo were stranded for about 5 hours with the National Guard going vehicle-to-vehicle distributing food and water.

Hazard Probability – Winter Storm & Extreme Cold

The Plan update Steering Committee ranked heavy snow storms, ice storms, blizzards, and extreme cold as moderately high overall in terms of combined risk (probability) and vulnerability. During the plan update, social services and health providers were generally more concerned with extreme cold than local officials; the 2025 NWERC Health Vulnerability Assessment identifies extreme cold as the region’s top natural hazard from a public health perspective.

The reoccurrence of winter storm events for Dunn County is expected to be consistent with recent trends, with three to four severe winter storm events, on average, occurring each year. Snowy, slushy, or icy conditions on roadways from less severe events would be much more frequent. Should Wisconsin’s weather patterns continue to change as discussed previously, Dunn County could experience warmer, shorter, and wetter winters overall, which could mean fewer extreme cold events, but with increased potential for heavy snow and ice storms.

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

Vulnerability Assessment – Winter Storms & Extreme Cold

General Vulnerabilities	
People	• According to the National Weather Service, approximately 70 percent of serious injuries resulting from winter storms are vehicle accidents, with prolonged exposure to the cold constituting another 25 percent. It does not require a disaster event to incur traffic-related or exposure injuries during the winter months. • 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. • The County has persons without housing who are exposed to extreme weather events, which can lead to illness, injury, and death. Compared to more urban counties, such as Dane, Milwaukee, Brown, and Eau Claire, the numbers of chronic homeless in the County is significantly lower. • Seniors - Prolonged exposure to extreme cold temperatures can result in hypothermia, frostbite, and death. Dangerous travel conditions may limit or prevent access to goods, services, needed treatments (e.g., dialysis), needed medicines, and other medical facilities. Slipping on ice can cause serious injury or death. With a growing number of seniors in the County, this vulnerability will continue to grow. • Struggling Households - Excessive cold spells drive up energy expenses, which could be a financial challenge for struggling households and seniors on fixed incomes. Residents of mobile home parks; see previous mobile home discussion.
Above-Ground Utilities & Emergency Communications Infrastructure	• 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 <i>Long-Term Power Outage</i> threat sub-section. • Ice and heavy snow can damage electric infrastructure and topple trees, which can take down power lines. Of greatest concern is the long-term loss of power due to ice storms, winds, and/or heavy snows, especially during extremely cold temperatures. • Ice and frost can accumulate on, damage, and sever overhead power lines and above ground communications lines and towers.
Underground Utilities	• Underground utility lines, including water and sanitary sewer lines, can freeze and / or burst. These are especially vulnerable where there are very cold temperatures or inadequate insulating snow cover. The winter 2014-2015 Polar Vortex demonstration the vulnerability of water utilities, especially laterals and poorly insulated plumbing systems, to extreme cold.
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. • 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.
Mobile Homes	• Mobile homes or temporary structures that may lack adequate insulation or heating systems, making them more vulnerable to extreme cold temperatures. Frozen or burst pipes due to prolonged exposure to extreme temperatures. Potentially leading to water damage or water supply issues. • Section II.C. and the tornado/high winds assessment in Section III.C.i. document the number of mobile homes and distribution of mobile home parks. • 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. • There can be economic impacts from the closure of businesses due to lack of mobility or power loss, but these are almost always very short-term impacts.
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. • 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.

	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.
Food, Water, Shelter	- Resident populations may be vulnerable to exposure / cold temperatures due to power outages. - 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 potentially costly repairs and cleanups. - 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 in some communities. - Crops and animals are vulnerable to cold temperatures. Fruit crops are particularly vulnerable from early or late freezes. - 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 requiring supplemental feed purchases 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. - Grain and milk production are significant contributors to the County's economy and play a very important role in the food supply chain. Freezing and winter kill can be especially hard on fruit crops and alfalfa. - Dunn County farmers have experienced some livestock deaths due to extreme cold as well as the collapse of barns and pole structures during heavy snow loads, such as during Winter 2018-2019. - A prolonged period of snow cover can also limit the ability of farmers to spread manure, which can result in manure storage capacity challenges. - Heavy snow or accumulated ice can cause the structural collapse of buildings; most structures in Dunn County were built to standards that considered snow loads and needed insulation. - Many homes could become too cold either due to a power failure or because the heating system isn't adequate for the weather. Water lines can break. When people use space heaters, wood stoves, and fire places to stay warm, the risk of household fires increases, as well as the risk of carbon monoxide poisoning.
Health & Medical	- Hazardous road conditions can 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 persons who are more vulnerable 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. - Mayo-Red Cedar Hospital in Menomonie was mentioned as being a significant concern due to their clientele, emergency response functions, and importance to the community, though it was noted that the hospital collaborates with the County and City on preparedness planning and training. - Hospitals and larger facilities have emergency plans and generators.
Energy	Ice and heavy snow can topple trees and take down power lines and communications infrastructure. See <i>Long-Term Power Outage</i> section.
Communications	Ice and heavy snow can topple trees and take down power lines and communications infrastructure.
Transportation	Behind power loss, Interstate 94 was the most frequently mentioned winter-related concern during the process due to the speeds and traffic volumes involved, as well as snowy and icy conditions that can form at "Knapp Hill" resulting in accidents and shutdowns of the roadway. Such road

	conditions can also impact the function of critical facilities (e.g., staffing at hospitals or schools) and increase emergency response time. • Roadways, bridges, and transportation systems may be affected by icy conditions, snow accumulation, or reduced visibility, resulting in hazardous driving conditions, accidents, and restricted mobility. Ice and snow can result in accidents and restrict travel. It is suspected that icy conditions caused a three-vehicle crash with one fatality and one serious injury. • Not only can hazardous roads conditions and closures due to ice, snow pack, and drifting snow cause injuries, but can also disrupt a range of services, hinder emergency responses/law enforcement, require school closures, and temporarily interrupt shipping. • Roads in shaded, wooded areas can be especially icy and hazardous. • Sudden freezing and thawing events can deteriorate roadways. Winter maintenance costs of roadways can be very expensive and burdensome. • Culverts and other stormwater systems can be prone to ice-damming resulting in localized flooding, which is further discussed in the <i>Flooding</i> threat sub-section. • Menomonie has a municipal airport with hangars, structures, and aircraft that can be particularly vulnerable to winter storms.
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 there are multiple buildings at any single campus. All above-ground structures are vulnerable, especially gyms or theaters. • 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 are also vulnerable. • See subplans in Section VII.B. for any unique concerns for participating institutions.
Vulnerability to Future Assets	
Population Growth & Development	• While the County is not projected by the State to grow in population, it continues to experience new development, thus increasing overall exposure to winter storms. • The number of seniors in the County is increasing, 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 unique concerns were noted.

Projected Loss Estimates

Overall, there is a low vulnerability to structures in Dunn 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 Dunn 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.

FEMA National Risk Index (NRI) Estimated Annual Losses

As a substitute, the National Risk Index provides the following expected annual losses (EALs) for Dunn County and suggests that winter weather, ice storm, and cold wave events in the County have similar loss exposures:

Risk Factor	Winter Weather	Ice Storm	Cold Wave
EAL Rate – Population	1 per 4.06m	1 per 1.24m	1 per 689.28k
EAL Rate – Buildings	\$1 per \$1.73m	\$1 per \$1.22m	\$1 per \$3.68m
EAL Rate – Agriculture	\$1 per \$146.87k	--	\$1 per \$1.72k
Total EAL	\$137,897	\$433,386	\$909,325
Exposure	\$538.41 billion	\$537.44 billion	\$538.41 billion
Events per year	5.9	0.4	1.5
Historic loss ratio	Relatively Low	Relatively Moderate	Very Low
Overall Loss Score	75 (Relatively Moderate)	87.1 (Relatively High)	92.8 (Relatively High)

The above loss estimates further suggest that agriculture is the County largest winter-related vulnerability financially, though ice storm events poses a substantial risk to residents. Based on Dunn County's 2020 population of 45,440 and the above EAL rate, one County resident will be seriously injured by an ice storm event about once every 27 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., Dunn County is continuing to grow and develop despite the State projecting a decrease in population within the County in the future. 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.

Cold Impacts: Vulnerable Populations

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

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

- Dress in loose layers and cover all exposed skin
- Limit or avoid time outdoors
- Consume hot foods and warm drinks, but avoid caffeine and alcohol
- Check on family, friends and neighbors

weather.gov

vi. EXTREME HEAT

This sub-section highlights extreme heat information and the effects of these events. Supplement 2.F. of the *Dunn County Hazard Mitigation Plan Supplement* provides additional details. **For extreme heat risks and vulnerabilities specific or unique to the participating villages, cities, and educational institutions, please refer to the subplans in Supplements 5 & 6.**

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 *Hazard Mitigation Supplement* details the National Weather Service heat-related announcements and advisory warnings.

Hazard Location & Extent

There are no geographic boundaries of locations within Dunn County uniquely affected by extreme heat events. All Dunn County jurisdictions are equally at risk of experiencing an extreme heat event. The *Mitigation Plan Supplement 2.F.* describes how heat events (potential intensities) are measured using the National Weather Service (NWS) heat index.

Event History – Extreme Heat

Regional trends on local extreme heat events are detailed in the *Dunn County Hazard Mitigation Supplement 2.F.* 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.

National Climatic Data Center (NCDC) Event Summary

The table below summarizes extreme heat events reported by the National Climatic Data Center (NCDC) in Dunn County from 1993 to 2024. During this period, Dunn County experienced eight extreme heat events, though the 1999 and 2001 events could be considered part of a single heat wave lasting multiple days.

The July 2011 heat wave that struck Wisconsin increased local awareness of extreme heat risks and vulnerabilities and prompted the inclusion of this assessment subsection in the County's Hazard Mitigation Plan. During the 4- to 5-day stretch, maximum heat indices peaked in the 105°F to 115°F range over much of the State, though the heat wave was not as intense in Dunn County compared to some areas of the State. Three fatalities in Wisconsin were directly attributed to this event.

Dunn County Extreme Heat Events – 1993-2024

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), 2024.

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

The NCDC data does not reflect recent community and stakeholder perceptions and experiences when it comes to extreme heat events. While still a relatively lower risk compared to the other natural hazards of significant risk, extreme heat was frequently mentioned as a growing concern during plan update meetings and stakeholder interviews. This is consistent with the National Risk Index estimate of 0.6 extreme heats for Dunn County per year, which is much more frequent than the NCDC data suggests.

Hazard Probability - Extreme Heat

The Plan Steering Committee rated extreme heat as a moderate probability and a low vulnerability in Dunn County. During the plan update, social services and health providers were generally more concerned with extreme heat than local officials; the 2025 NWERC Health Vulnerability Assessment identifies extreme heat as the region's second highest natural hazard from a public health perspective, only behind extreme cold. Based on the NCDC data, FEMA's National Risk Index, and the weather-pattern changes discussed in Section III.B., it is estimated that **Dunn County (and the greater region) will experience an extreme heat event once every 2 to 3 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

General Vulnerabilities	
People	• Prolonged exposure to high temperatures can result in dehydration, heat stroke, and death. • Persons without housing may lack access to air conditioning or shelter. • Prolonged periods of high temperatures increase energy consumption/costs placing financial strain on lower-income households. • Seniors, persons on certain medications, pregnant women, children, and outdoor workers are more vulnerable to extreme heat. • Populations residing in older structures and mobile homes may lack sufficient air conditioning/HVAC systems or insulation.

Mobile Homes	• Mobile homes can become very hot if there is a lack of sufficient air conditioning.
Campgrounds, Cabins, & Resorts	• Facilities may lack sufficient cooling stations.
Local Economy	• No significant impacts identified.
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.
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	• 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.¹¹ Extreme heat can also have along-term livestock reproductive and herd size management issues. Within confined livestock buildings, health 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.
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. • Rail lines are built with sufficient flexibility to accommodate the stresses related to most extreme heat, though buckling immediately in advance of fast-moving trains can occur. During extreme heat events, train speeds may be reduced and additional track patrols may be ordered.
Hazardous Materials	• Certain chemicals, gases, and other hazardous materials can be impacted by extreme heat results in a release, fire, or explosion. Care must be used to properly store these materials during extreme heat events.
Educational Institutions	• Students participating in sporting events/practice or marching band have an elevated risk of heat-related illnesses.
Vulnerability to Future Assets	
Population Growth & Development	• While the County is not projected by the State to grow in population, it continues to experience new development. Exposure / impact from extreme heat is consistent throughout the County but will grow as the County’s population ages and the additional development occurs. • 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.

Overall, Dunn County has one of the lowest Heat Vulnerability Index scores in the State according to the Wisconsin Department of Health Services. This score considers population density, health factors, the local environment, and other socio-economic factors.

¹¹ <http://www.wbay.com/story/19037284/2012/07/16/milk-production-takes-a-dip-with-extreme-heat>

Heat Impacts: Vulnerable Populations



PREGNANT

Extreme heat events have been associated with adverse birth outcomes such as low birth weight, preterm birth, infant mortality, and congenital cataracts.



NEWBORNS

Newborns are extra sensitive to heat because their ability to regulate body temperature is limited.



CHILDREN

Young children and infants are particularly vulnerable to heat, as their bodies are less able to adapt to heat than adults. Those under four are especially vulnerable.



ELDERLY

Older adults, especially those who have preexisting diseases, take certain medications, live alone or have limited mobility are at higher risk for heat illness.



CHRONIC ILLNESS

People with chronic medical conditions are more likely to have a serious health problem during a heat wave.

Source:
The Impacts of Climate Change on Human Health in the United States,
A Scientific Assessment (U.S. Global Changes Research Program)

weather.gov 

Projected Loss Estimates

FEMA National Risk Index (NRI) Estimated Annual Losses

FEMA's NRI provides a source of estimated annual losses (EALs) for Dunn County with a heat wave hazard.

Risk Factor	Heat Wave
EAL Rate – Population	1 per 1.98m
EAL Rate – Buildings	\$1 per \$63.63m
EAL Rate – Agriculture	\$1 per \$29.25k
Total EAL	\$274,527
Exposure	\$538.41 billion
Events per year	0.6
Historic loss ratio	Relatively Low
Overall Loss Score	73.1 (Relatively Moderate)

Out of eleven natural hazard types for Dunn County, heat wave is the sixth highest in expected annual losses with a value of \$274,527, primarily due to the estimated losses to agriculture. Based on Dunn County's 2020 population of 45,440 and the above EAL rate, one County resident will be seriously injured by extreme heat about once every 44 years.

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) occur. A significant urban heat island effect is not anticipated to occur in Dunn County.
2. Long-Term Weather Pattern Changes. As noted previously, the probability of extreme heat events is projected to increase.
3. Preparedness & Mitigation. Section III.B. discusses some potential adaptation strategies to mitigate extreme heat. Stakeholders during the plan update 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 Centers or Emergency Shelters. During the 2024 Plan update, there was increased interest in identifying cooling centers or emergency shelters with emergency power generators compared to previous mitigation plans. Most communities lack such centers or, in other cases, local officials were unaware if a shelter has been designated. Most of these places lack an emergency generator. This interest and concern was not equally shared among all communities.

V. FLOODING (including dam failure, riverine, & overland flooding)

This section is organized differently than the previous natural hazard assessments given that the flooding assessment followed by a brief analysis of Dunn County's dams. The *Plan Supplement 2.G* provides additional details. **For flooding risks and vulnerabilities specific or unique to the participating villages, cities, and school districts, please refer to the subplans in Plan Supplements 5 & 6.**

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 Dunn 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, which is discussed later on in this sub-section.

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.

Floodplain – Associated with a surface water (overbank flooding), a floodplain is land that has been or may be covered by floodwater during a flood event and includes the floodway and flood fringe areas. Within this plan, the use of the term "floodplain" is referring to the 100-year floodplain as officially delineated under FEMA's National Flood Insurance Program (NFIP) unless otherwise specified. *Mitigation Plan Supplement 2.G* explores the flood-related definitions in greater detail.

Hazard Location & Extent

Overbank and overland flooding occur throughout parts of Dunn County. Areas within the 100-year floodplain are most likely to experience riverine or overbank flooding, while areas prone to overland or stormwater flooding are influenced by a variety of factors (e.g., topography, high water table, stormwater

system capacity, land use). During the plan update process, communities and stakeholders have expressed increasing concerns with overland, flash flooding, which can occur throughout the County and especially in areas of hilly terrain and/or with higher groundwater tables.

The NFIP classifies flooding through the use of recurrence intervals:

Table 7. 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 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.

NFIP-designated floodplain areas are shown on maps later within this subsection. The 100-year floodplain should be considered as Dunn County’s high flood-hazard risk areas. The 100-year floodplains are shown as the “A” or “AE” zones on NFIP’s 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 for which insurance should be considered but fall outside the regulated 100-year floodplain. The remaining unshaded “X” zones on the FIRM maps should be considered the low-risk flood-hazard areas but may still be prone to stormwater or flash flooding.

The current Flood Insurance Rate Maps (FIRMs) for Dunn County were made effective on December 2, 2011, and are available in a digital format (D-FIRMs). The County’s Floodplain Zoning Ordinance has not been recently updated for consistency with the most recent State model; this is being planned for the near future.

Dunn County National Flood Insurance Program & Flood Mapping Status	
<i>Initial Flood Hazard Boundary Map:</i>	01/03/75
<i>Date Community First Joined NFIP (Reg-Emer)</i>	10/15/81
<i>Initial Flood Insurance Rate Map (FIRM) Identified:</i>	10/15/81
<i>Current Effective FIRM Date:</i>	12/02/11
<i>NFIP Participation Status (and reason if not participating):</i>	Participant in good standing
<i>Floodplain Regulations w/ NFIP standards:</i>	Adopted
<i>Designated position or committee for floodplain management, floodplain zoning, & NFIP compliance:</i>	County Zoning Administrator

The updated FIRM maps from 2011 were based on recent LIDAR topographic data that addressed most past concerns with map accuracy. A large portion of the County’s floodplain has engineered floodplain boundaries (i.e., Zone “AE”), which offers a great level of accuracy. Dunn County maintains an inventory of improvements located within the floodway, but lacks a system to track when changes or new improvements occur to those structures, particularly in the unzoned townships.

While these 100-year floodplains are most likely to experience overbank flooding, it is important to note that the geographic delineation of floodplain areas is 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. Additional high-hazard flood areas can exist that are not shown on the FIRMs; other areas prone to flooding are discussed later in this sub-section and in the city/village subplans. New and changing floodplains and flood-prone areas can also occur with changes in land cover, development, and long-term weather patterns. 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.

Event History – Flooding

Regional flooding trends are detailed in the *Hazard Mitigation Supplement*, which notes:

- Wisconsin has experienced a significant flooding event at least once every decade since 1880.
- Flood events tend to cause the most widespread damage of all Wisconsin’s natural hazards. Since 1992, flood damages from major events in Wisconsin have exceeded \$2.3 trillion.
- 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 (Polk County) washed out and caused significant damage to a mobile home park; hazard mitigation grant funding was later used to acquire these homes to prevent future flood losses.

National Climatic Data Center (NCDC) Events

The table below summarizes flooding events reported by the National Climatic Data Center (NCDC) in Dunn County from 1993 to 2024. Data for flood events is not available prior to 1993.

Flood, Flash Flood & Heavy Rain Events Summary <i>(1/1/1993 to 12/31/2024)</i>			
Total Events:	19	Number of Events Per Year:	0.61
Total Event Days:	17	Number of Event Days Per Year:	0.55
Total Injuries:	0	Total Deaths:	0
Total Event Days with Property Damage: 3			
Property Damage (from NCDC):		\$ 305,000	
Property Damage (adjusted for inflation):		\$ 456,986	

15 of the 19 reported events from 1993 to 2024 were flash flooding events. No injuries or deaths associated with these events were reported. The most recent flood-related injury in Dunn County occurred in the 1980's, when a traveler was killed on Highway 170 between Wheeler and Boyceville when a barricade was improperly moved that closed a section of the washed-out highway. No recent history of dam breaks with significant impacts in Dunn County were identified during the planning effort.

National Flood Insurance Program (NFIP) Claims

As of July 31, 2025, there were a total of 57 active National Flood Insurance Program (NFIP) flood insurance policies in Dunn County:

Community	# of Policies	Total Coverage	Total Premium + Federal Policy Fee
Dunn Co. - unincorporated towns	44	\$7,025,000	\$55,909
City of Menomonie	2	\$700,000	\$921
Village of Boyceville	9	\$1,210,000	\$4,531
Village of Colfax	2	\$290,000	\$2,493
Village of Downing	None. Village is not a NFIP participant.		
Village of Elk Mound	None. No 100-year floodplain.		
Village of Knapp	None. Village is not a NFIP participant.		
Village of Ridgeland	None. Village is not a NFIP participant.		
Village of Wheeler	None.		
Totals	57	\$9,225,000	\$63,854

This is a decrease of 32 policies since February 2020. 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 FEMA NFIP redacted claims data through August 2025, there have been 6 NFIP claims for Dunn County with 2 claims paid totaling \$22,323.74 in building damages and \$1,100 content damages. Four of the six claims were located in the unincorporated towns; exact locations are not available but they appear to be geographically dispersed (2001, 2004, 2011, 2014). One claim was made within Downing (1986) and one in Boyceville (2014). Only 2014 had multiple losses in a single year. Two of the claims were for damages outside the 100-year floodplain (Zone X). Two of the claims were due to the overflow of lakes or rivers, while one was caused by the accumulation of rainfall or snowmelt; causes for the other claims were not provided.¹² At least one of the claims were not paid due to it being less than the deductible; two claims were not paid since the damage was not the result of an actual flood as defined by NFIP rules.

Repetitive loss properties (RLPs) 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.

¹² The County's 2020 mitigation plan states that there were 13 NFIP claims paid for Dunn County totaling \$88,000 between 1978 to November 2010. Of these, eleven claims were in the unincorporated towns and one claim was paid in Boyceville and one in Downing. Six of the thirteen NFIP claims have been paid for a single property along Elk Creek in the Town of Spring Brook, totaling over \$62,000 in NFIP claims paid for building contents damage. The reason for this discrepancy with current claims data is not known.

This list is regularly compiled by FEMA and made available to the Wisconsin Division of Emergency Management. Based on available data, there appears to be two RLPs located in Dunn County:

- Six claims were paid for a single residential property along Elk Creek in the Town of Spring Brook, totaling over \$62,000 in NFIP claims paid for building and contents damage. This property constitutes a far majority of all the NFIP payments in Dunn County.
- \$2,512 was paid for residential home damages due to flooding to a home in 1996 in the eastern part of the County.

It is notable that the Village of Boyceville has participated in the buyout of one floodprone property as a past mitigation project.

Significant Dunn County Events

The Chippewa and Red Cedar Rivers have periodically flooded in Dunn County and have affected its development. Historical accounts tend to highlight the larger riverine floods where large amounts of crops are destroyed, dams are washed out, homes or farms damaged, and death to livestock and people have occurred. However, many lesser flash floods have also occurred causing localized damage, along with nearly annual riverine flooding of bottomlands and some agricultural areas, along the Chippewa River in particular.

Since 1953, there have been nine Federal Major Disaster Declarations that encompassed Dunn County – April 1965, May 1969, April 1973, July 1980, July 1993, June 1998, April-July 2001, June 2002, and September 2002. All nine of these events involved flooding, though high winds were the primary source of damages in the County for some of these events.

Hazard Mitigation Supplement 2.G. details significant flooding events in Dunn County, which include the following more recent characteristics:

- Based on recent historical trends, a major flood event has occurred in Dunn County every 10 to 12 years on average, most likely in the spring of the year (April through June) when snow melt, soils are saturated, and/or heavy spring rain occurs.
- June 1993 was the largest overbank, riverine flooding event in the recent history with over \$1.2 million in damages to property and crops, primarily along the Chippewa River. Heavy rains caused extensive infrastructure damage (i.e., roads, road shoulders, culverts, bridge abutments) and flooded structures in many areas of western Wisconsin. This event was remarkable given that smaller streams and areas in western Wisconsin also experienced flooding that were not previously known to have a flood history and about 24% of all losses covered by the National Flood Insurance Program were for damages outside the 100-year floodplain. In the larger region, about 80% of the crop damage was due to overly saturated fields unrelated to overbank flooding.

Following the June 1993 flooding, Dunn County prepared a Flood Study in 1996. Highlights from this study have been integrated into this Mitigation Plan update and Supplement 2.G. A more robust synopsis of the *1996 Dunn County Flood Study* can be found in Appendix G of the *2020 Dunn County Natural Hazards Mitigation Plan*.

- Since 1993, the most frequent flooding concerns have consisted of overland and flash flooding due to heavy rains and riverbank erosion.
- August 2010 flash flooding resulted in nearly \$1 million in public-sector costs, primarily as road and culvert washouts. This was the most serious flooding event in Dunn County since at least 1993.
- Above normal snow pack and warm weather resulted in overbank flooding in late March 2019, especially along the smaller creeks and streams that lead into the Chippewa River. At least 20 homes were affected and \$878,560 in road and bridge damage reported.

Areas Prone to Flooding

Riverine flooding over the past 25 years in unincorporated Dunn County has typically been most frequent and severe along the Chippewa River and some lower-lying lands along the Red Cedar River. Flash flooding and overland flooding is more frequent however and can occur Countywide, though the damage per event is typically less than the larger riverine and overbank floods. Stormwater entering the basements of older homes, especially in low-lying areas, is not uncommon within much of Dunn County. However, most homeowners have taken action to mitigate the impacts; and serious damage is rare.

The 1996 Flood Study provided the following insights regarding flooding concerns:

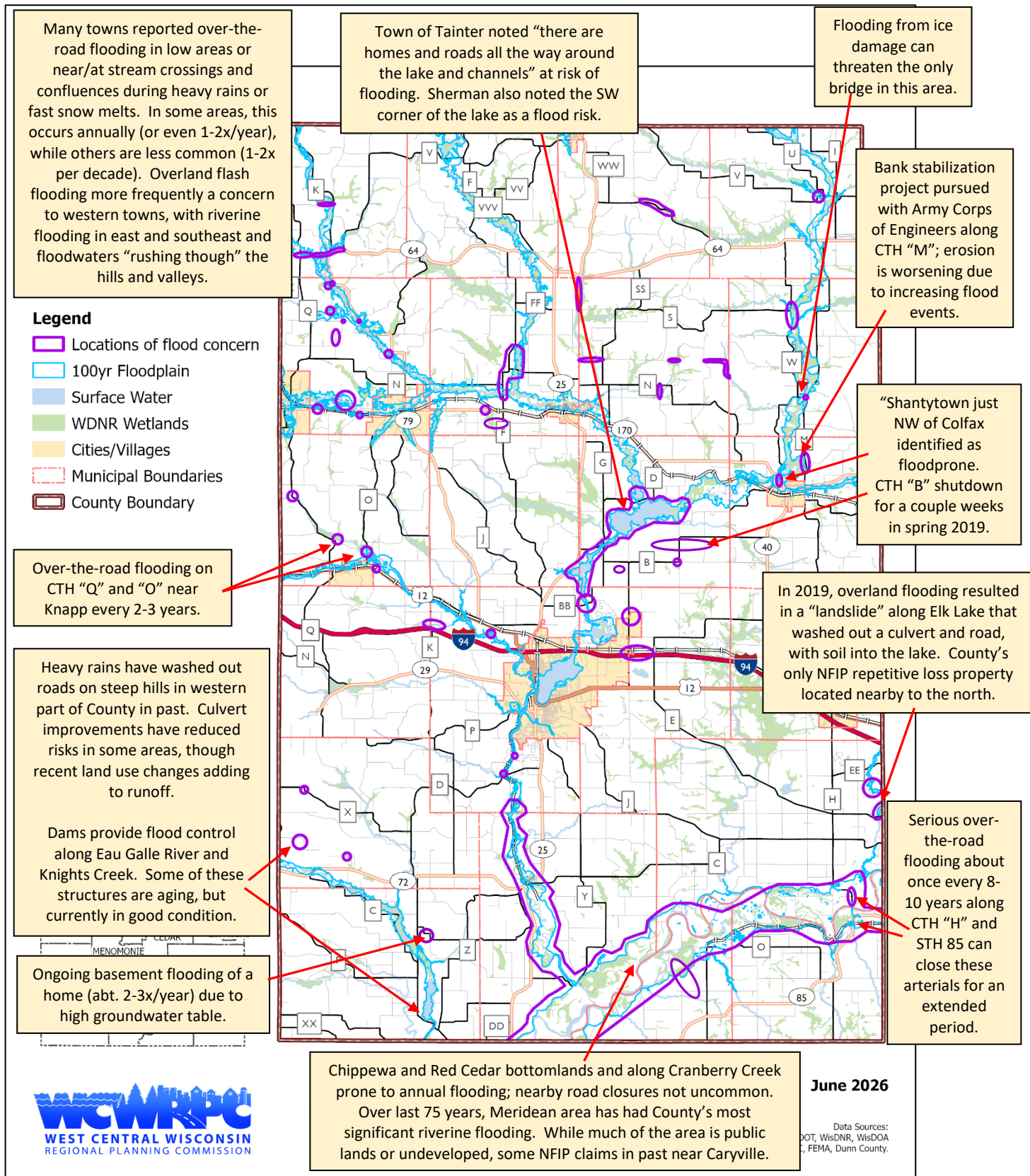
- **Town Flood Questionnaire** - Fourteen of the 22 towns in Dunn County returned a flood questionnaire. Most rated their flood risk as low (Stanton, Sherman, Sheridan, Elk Mound, Eau Galle, Red Cedar, Wilson, & Menomonie). The Towns of Tainter, New Haven, Sand Creek, Peru, and Weston rated the flood risk in their towns as moderate. Only the Town of Spring Brook in southeast Dunn County along the Chippewa River and Elk Creek rated their damage risk as being high.
- **Property Owner Survey** - The flood surveys were sent to property owners with the results organized by watershed. Overall, 23.6% of the surveys were completed and returned. Though the response was somewhat low, a few notable trends were apparent:
 - 1) Shoreline erosion due to flooding, stormwater runoff, seasonal cycles of weather, boating, etc., was the most commonly expressed concern of survey respondents.
 - 2) Many respondents acknowledged the floodprone areas of their properties, and took precautions to not build or locate personal property in these areas.
 - 3) Numerous respondents, such as many residing along Lake Tainter, stated that their home had not been flooded in the past and was elevated above flood levels.
 - 4) Numerous respondents also recognized the importance of dams in the area for flood control or felt that better dam management was needed to help prevent future flooding problems.
 - 5) Dredging or culvert projects were also suggested by some respondents as possible ways to help mitigate future flooding.

For a summary of property owner survey results by watershed, see Appendix G of the *2020 Dunn County Natural Hazards Mitigation Plan*.

During the mitigation planning process, County staff and local officials identified a number of areas in unincorporated Dunn County that are particularly prone to flooding as shown in **Figure 9**. Flooding concerns of City of Menomonie, villages, and educational facilities are detailed in the subplans.

Some of the unique aspects of the areas identified as prone to flooding in Figure 9 are further described below:

- The Chippewa River and Red Cedar bottomlands in the southern part of the County is subject to annual flooding and has expansive floodplain covering large portions of the Towns of Rock Creek, Peru, Dunn, and Spring Brook. The Meridean area was mentioned in particular during interviews. Much of the floodplain is undeveloped forests, wetlands, and croplands, with over 1,600 acres of public land owned by Dunn County immediately adjacent to the Chippewa River on its south side. Large riverine flooding events have occurred in this area in the past, requiring the evacuation of residents and causing widespread damage to buildings, infrastructure, crops, livestock, and wildlife. Numerous roads in this area are often closed each spring due to flooding, including State Highway 85 and the relatively heavily traveled County Trunk “H” north of Caryville; some culvert improvements have been completed in this area since the previous Mitigation Plan update, which provides some flood mitigation. Two homes north of Caryville have also received NFIP insurance payments in the past due to flood damage and one is frequently sandbagged. As a potential mitigation measure, public buyout of buildings in the frequently flooded, unincorporated community of Meridean has been discussed in the past. Some landowners indicated an interest in participating in the program, but the County was unable to pursue the program further at that time due to the lack of a flood mitigation plan. Such a buyout program could be expanded to include other at-risk or frequently flooded homes in the County, including those which have made NFIP claims in the past. Some dredging and channelization of Cranberry Creek in the area has occurred in the past, which offers some temporary flood relief; some additional dredging as a mitigation project is being considered. In addition to the Meridean community, the Town of Peru noted flooding “hotspots” along 770th Street near the bike trail as well as 690th and 160th. And, in addition to along the Chippewa River, the Town of Dunn identified the Downsview area along the Red Cedar River as an area prone to flooding. Flooding has also been contributing to very serious bank erosion along the Chippewa River. A stabilization project has been contemplated in the past for about 600 feet bordering the bike trail.
- A small number of homes located along Elk Creek in the Town of Spring Brook are at risk of flooding, including the County’s only repetitive loss structure. In 2019, storm runoff during heavy rains caused bank erosion and washed out a road and culvert at Elk Creek Lake.
- Flooding has been a past problem for a number of areas on Tainter Lake, though most homes appear to be elevated above flood level and improvements at the dams have helped to better regulate water levels. Historically, Oak Point on lower Tainter Lake has been a floodprone area requiring sandbagging in the 1960’s; it is uncertain if changes have occurred since which have mitigated flood problems in that area. More recently, landowners at the east end of upper Tainter Lake have been interested in a dredging project to further mitigate the potential for flooding, but the project has not been fully analyzed and funding sources have not been identified.

Figure 9. Areas Prone to Flooding (Unincorporated Towns Only)

- Residential development in the Town of Colfax, immediately northwest of the Village of Colfax, has historically had flooding problems requiring the evacuation of residents. Locally referred to as “Shantytown”, the flooding problems of the past may have been largely mitigated by removal of the dams at Colfax, but 6 to 10 homes in this area may be still located within the 100-year floodplain. The Town of Colfax also noted that they’ve “had increased rainfall related to the climate and are concerned whether the floodplain maps are still accurate. The Town also noted concerns from runoff from sand mines upstream in Chippewa County that have gotten into 18-Mile Creek as well as nitrates in runoff from agriculture.
- Flooding related to ice damming was noted as a potential concern for a bridge across the Red Cedar River in the Town of Grant. If the bridge would need to be closed, it would take substantial additional time for emergency vehicles to reach many locations in that area.
- The towns of Stanton and Tiffany were the most frequently mention “flooding hotspot” in the County due to the flooding and wash out of roads during spring flash flooding and/or following heavy rains. During most springs and after heavy rains, about a quarter-mile of State Highway 170 near Downing is covered by water, though recent improvements have reduced this to some degree. Up to 20” of flood water has flowed across State Highway 65 in the Town of New Haven and washouts have occurred on nearby County Highway “Q”. Improvements have been made to USH 12 and CTH “Q” in the Knapp area, but heavy rains in 2010 still plugged culverts, washed out roads, and came close to one home. The Town of Tiffany also noted additional areas prone to flash flooding or washouts during heavy rain events—a roller dam on 130th Street north of 1150th Avenue north of the John’s Creek Bridge and a roller dam on Tiffany Creek on 150th Street. To the north, the Town of New Haven also identified areas close to the south fork of the Hay River are subject to flooding during snow melt or heavy rain events.
- The Town of Weston had similar problems with heavy rains washing out roads, especially on steep hills. Some culvert improvements have been made which has alleviated these problems for some areas.
- The Town of Menomonie identified four flooding problem areas. Two areas along Wilson Creek (390th St/Rudiger Rd and 690th Ave/Diamond Rd) floods in the spring or following heavy rains. Two residents in the 410th Street (Paradise Rd) area experience serious flooding of years due to spring runoff. Pinewood Golf Course also floods during the spring due to the lack of an outlet for water. The Town has suggested that higher and larger bridge on 390th Street to reduce restrictions on the flow of floodwater.
- High groundwater and/or construction in “low areas” contributes to flooding in some areas. For example, a home in the Town of Eau Galle has experienced continuing basement flooding (at least 6 times in the past few years; twice in 2020 to date) and related damage, even with operating two sump pumps. No significant land use changes have been identified in the area and no feasible solution to prevent the flooding has yet been identified; this could be potential mitigation (e.g., acquisition, elevation) project.
- During the 1996 Dunn County Flood Study, many survey respondents noted a concern with soil erosion and riverbank erosion due to flooding, stormwater, wave action, and other causes. Certain soil structures along river banks can be particularly vulnerable to erosion during flood events, such as along Elk Creek. Up to 80 feet of river bank has collapsed into the river during a single storm

event. Homes that at one time were adequately setback from river banks may no longer meet setback requirements due to erosion with their drainfields exposed through the side of the riverbank. The Dunn County Land & Water Conservation Department is inventorying the shoreland erosion problem areas in the County.

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 which reduces the frequency or magnitude of flood events.

Agricultural Flooding

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

Based on 2024 predominant land cover data, about 10,220 acres of cultivated crops or pasture/hay land falls within the 100-year floodplains of Dunn County. While crop damage due to flooding has been experienced in some areas, statistics regarding crop losses in the past or future vulnerability due to flooding are not readily available. An exception is the June 1993 flooding for which crop losses were estimated at \$570,000, with floodwaters destroying 775 acres of corn, 500 acres of soybeans, 450 of kidney beans, and 200 acres of oats and forage crops. Potential agricultural 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.

Hazard Probability – Flooding

The Plan Steering Committee rated the probability and vulnerability of both riverine (overbank) flooding and overland (stormwater) flooding as being moderate. Flooding in Dunn County will continue to be a significant risk for residents, infrastructure, and improvements. 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 recent trends, it is likely that Dunn County will continue to experience a significant, damage-causing flood event every 1.5 to 2 years on average, though damage may be localized. Some localized flooding and stormwater ponding with limited impacts can be expected 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. Flash flooding due to heavy rains will be the most frequent cause of flood damage in the County and can occur any time of the year. Based on flood events since 2000, the frequency of these events may be increasing. **Riverine overbank flooding and larger flash flooding events (e.g., 1993, 2010, 2019) resulting in serious damage to structures and infrastructure can be anticipated about once every 10 to 15 years, most frequently in the spring months.** Riverine and spring snow-melt flooding of some croplands is an annual event in some locations and this is anticipated to continue in the future. Flooding on seepage lakes is very difficult to predict due to the cyclical nature of the groundwater levels and droughts.

Flash flooding due to heavy rains will be the most frequent cause of flood damage in the County and can occur at any time of the year. The increasing frequency of heavy rain events, plus warmer, wetter winters, is anticipated to increase the flooding probability over time; this is consistent with longer-term flood event trends. Those areas most prone to the typical annual riverine flooding associated with snow melt are well known and potential damages have been largely mitigated. *Dunn County Hazard Mitigation Supplement 2.G*, along with City of Menomonie and village subplans, addresses localized variance in flood frequency.

Vulnerability Assessment – Flooding

Note: Except for roads and highways, and occasional infiltration of wastewater systems in some communities, no significant flood history of community lifeline facilities was noted.

General Vulnerabilities	
People	Individuals in flooded areas may drown or be cut off from critical life-saving services. See flood assessment in main text that identifies residential properties potentially located within 100-year floodplain as well as city/village subplans.
Underground Structures/Basements	- Prolonged exposure to flood conditions can result in structural defects or other property damage. - No specific concerns noted, but at greater risk of taking on water during flood events.
Mobile Homes	- Unanchored homes are at risk of being swept away during flood events. - A mobile home park in the Village of Boyceville is partially located within a 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.
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	Croplands, livestock, and farm facilities within floodplain or stormwater drainage areas can be lost or damaged 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. Further, heavy rain events can result in runoff from feedlots and manure storage facilities

	and impact surface water quality. • Livestock can be lost to flood waters. • After a flood event, it is important that the public understands that private wells may be contaminated and testing is strongly encouraged. Sewer systems can also back-up in flooding resulting in public health concerns.
Health & Medical	• Flooded roads may limit access to essential medical services.
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 at the end of the flood assessment within Section III.C. • Some electrical infrastructure is located within floodplain and some transformers have been underwater following spring melt, especially along Chippewa River. Dunn Energy's Rock Falls substation is in a low area. No flood-related outages to date.
Communications	• None noted.
Transportation	• The washout of roads, culverts, bridge abutments, etc., have been the primary storm-related damage in recent decades. Traveling on flooded roadways or unexpectedly encountering a wash-out culvert/shoulder poses the highest risk of injury or death. • Travelers in the region (not Dunn County) have died in recent decades when attempting to cross flooded areas or when encountering an unmarked road washout at night.
Hazardous Materials	• Flooding in areas with hazardous materials may allow unencapsulated materials to flow downstream or leach into the groundwater. • No specific concerns noted.
Educational Institutions	• See subplans in Supplement 6 for any specific flooding concerns for participating institutions.
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. • 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.
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. • Of the mapped community lifeline facilities discussed in Section II.D., 8 were identified as potentially being located, in whole or part, within the 100-year floodplain, not including roads, bridges, and 8 mapped dams: ○ 2 town halls (Peru & Tiffany) ○ Williams Stadium/sports fields at University of Wisconsin-Stout ○ 2 private businesses & 1 town shop with hazardous materials on site ○ 1 emergency siren in the Village of Knapp No flooding history or unique vulnerabilities were reported for any of these locations. <i>The above flood vulnerabilities do not include the potential losses due to dam failure, which are discussed at the end of the flooding hazard assessment in Section III.C. For most dams, the potential vulnerabilities would be similar to those of the associated 100-year floodplain downstream of the dam. However, flooding due to a full dam failure at the Lake Menomin or Cedar Falls dams in particular would be dramatic, though the potential risk (probability) is very low.</i>

Projected Loss Estimates (Potential Structures in the 100-Year Floodplain)

The amount of impervious surfaces near lakes and rivers has grown significantly in recent decades. Generally, stricter enforcement of floodplain zoning, shoreland ordinances, and a decrease in available shoreland properties has limited new floodplain development.

Through the use of current D-FIRM maps and G.I.S. parcel data, those principal structures potentially located within a 100-year floodplain were identified by the Dunn County GIS staff. When supplemented by the previously discussed flood history and floodprone areas map, this analysis identifies potential floodprone structures to help guide the development and prioritization of flood mitigation strategies. A full description of the flood assessment methodology and related data challenges is included in *Dunn County Hazard Mitigation Supplement 2.G*.

Figure 10 identifies the 100-year floodplains within Dunn County along with the location of all principal structures located partially or wholly within the 100-year floodplains. Principal structures are those buildings located on a parcel within which the main use of the parcel takes place; when distinguishable, out-buildings or accessory structures within the 100-year floodplains are not included. Figure 10 is followed by **Table 8**, which provides a synopsis of those potentially floodprone principal structures by municipality. The assessed use and estimated value of improvements is based on 2025 tax data for those parcels associated with each of the principal structures identified in Figure 10.

In total there are an estimated 353 parcels in Dunn County with one or more principal structures potentially being located within the 100-year floodplain. Of these parcels, 73% are residential constituting 68% of the total assessed improvements possibly located in the floodplain. Over 58% of the principal structures are located in the Village of Boyceville, the Town of Tainter, and the Town of Spring Brook.

It must be noted that the structures identified in Figure 10 and in Table 8 may not have had flooding problems in the past. To the contrary, the majority of these properties likely have no history of flooding and may not be vulnerable to flooding in the future. And in the case of the Village of Boyceville, significant mitigation actions have been taken to reduce flooding potential. Data for individual structures is not currently available (e.g., number of stories, existence of basements, individual building values, building elevation), so we are unable to confirm if a specific building is elevated above (or below) the base flood elevation, nor can we estimate potential flood damage by individual structure. In some cases, due to topography at the building site or construction methods, the structure may actually be elevated higher than the adjacent 100-year floodplain.

Further, as discussed in the *Supplement 2.G* for properties with multiple buildings and ancillary structures, the exact use and nature of each structure within the floodplain is not known and tax assessment data is only available at the full parcel level, not for specific structures. And in some cases, an ancillary structure (e.g., barn, shed, boathouse) is located in the floodplain but is not reflected in Figure 10 or Table 8 since the principal structure on that parcel was located outside the delineated floodplain.

Figure 10. Dunn County Floodplains & Potential Structures in Floodplain

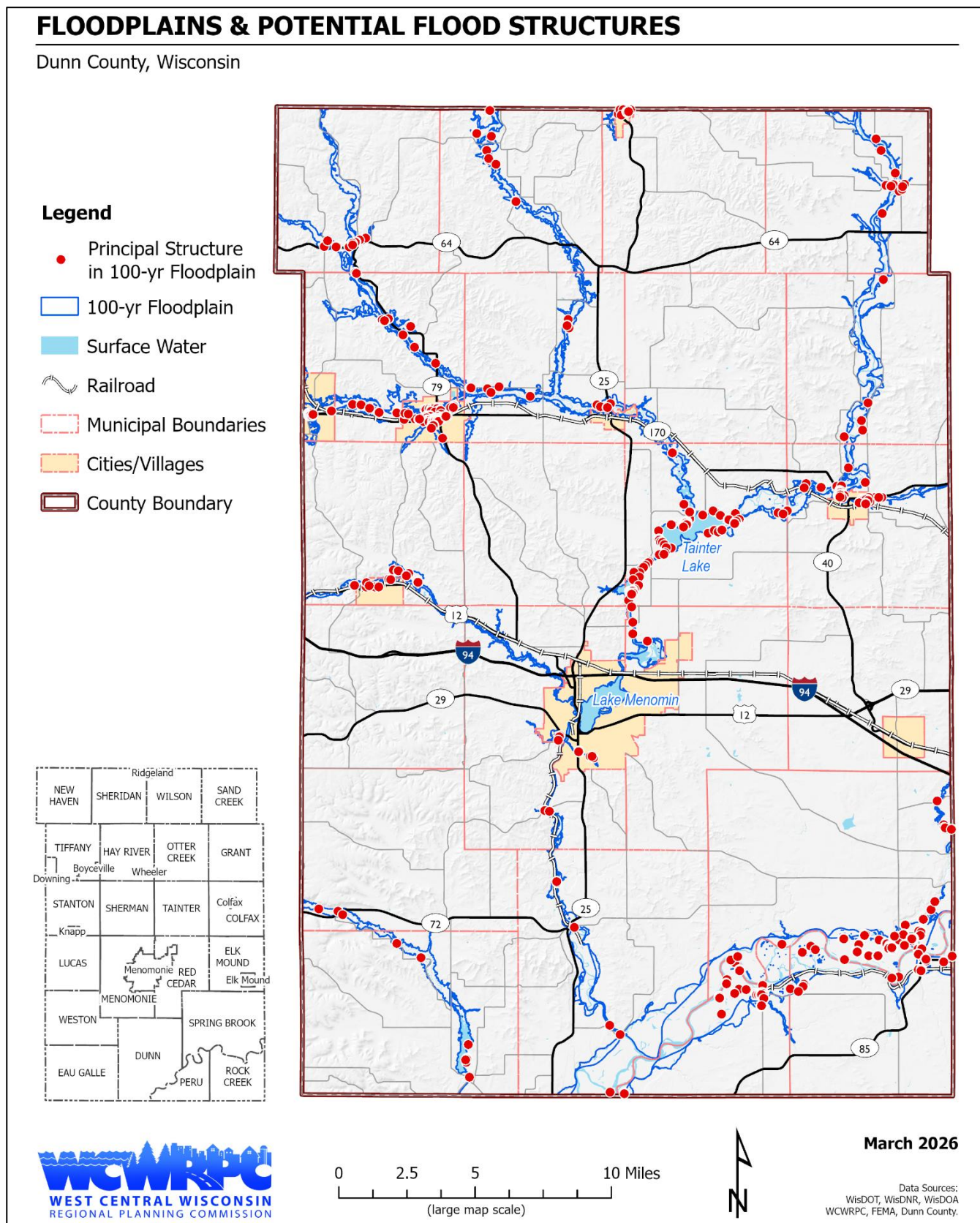


Table 8. Principal Structures potentially in 100-Year Floodplain—2025

Municipality	# of Parcels w/ Principal Buildings	# of Residential Parcels	Residential Imp Value	# of Commercial Parcels	Commercial Imp Value	# of Manufacturing Parcels	Mfg Value	# of Other Parcels	Other Imp value	Total Assessed Improv
Cities										
CITY OF MENOMONIE	9	5	\$ 950,000	3	\$ 2,133,100	1	\$ 954,400	0	\$ -	\$ 4,037,500
City Sub-Total:	9	5	\$ 950,000	3	\$ 2,133,100	1	\$ 954,400	0	\$ -	\$ 4,037,500
Villages										
VILLAGE OF BOYCEVILLE	47	33	\$ 3,539,100	9	\$ 2,121,300	1	\$ 420,300	5	\$ 210,100	\$ 6,290,800
VILLAGE OF COLFAX	10	4	\$ 493,100	1	\$ 54,800	0	\$ -	0	\$ -	\$ 547,900
VILLAGE OF DOWNING	20	12	\$ 794,900	3	\$ 236,000	0	\$ -	1	\$ 5,000	\$ 1,035,900
VILLAGE OF KNAPP	3	0	\$ -	3	\$ 683,100	0	\$ -	0	\$ -	\$ 683,100
VILLAGE OF RIDGELAND	10	2	\$ 308,400	5	\$ 2,112,900	1	\$ 778,400	0	\$ -	\$ 3,199,700
Village Sub-Total:	90	51	\$ 5,135,500	21	\$ 5,208,100	2	\$ 1,198,700	6	\$ 215,100	\$ 11,757,400
Towns										
TOWN OF COLFAX	20	18	\$ 2,471,800	1	\$ 91,300	0	\$ -	0	\$ -	\$ 2,563,100
TOWN OF DUNN	4	4	\$ 168,800	0	\$ -	0	\$ -	0	\$ -	\$ 168,800
TOWN OF EAU GALLE	6	6	\$ 492,100	0	\$ -	0	\$ -	0	\$ -	\$ 492,100
TOWN OF GRANT	1	0	\$ -	0	\$ -	0	\$ -	1	\$ 43,800	\$ 43,800
TOWN OF HAY RIVER	10	7	\$ 326,300	1	\$ 179,300	0	\$ -	2	\$ 220,700	\$ 726,300
TOWN OF MENOMONIE	2	1	\$ 193,500	1	\$ 111,400	0	\$ -	0	\$ -	\$ 304,900
TOWN OF NEW HAVEN	4	2	\$ 115,500	1	\$ 46,100	0	\$ -	1	\$ 63,600	\$ 225,200
TOWN OF PERU	31	31	\$ 1,835,300	0	\$ -	0	\$ -	2	\$ 268,600	\$ 2,103,900
TOWN OF ROCK CREEK	15	8	\$ 722,700	0	\$ -	0	\$ -	4	\$ 288,800	\$ 1,011,500
TOWN OF SAND CREEK	14	7	\$ 1,154,400	2	\$ 137,500	0	\$ -	1	\$ 527,900	\$ 1,819,800
TOWN OF SHERIDAN	4	4	\$ 522,600	0	\$ -	0	\$ -	0	\$ -	\$ 522,600
TOWN OF SPRING BROOK	34	25	\$ 4,159,300	0	\$ -	0	\$ -	8	\$ 1,105,100	\$ 5,264,400
TOWN OF STANTON	2	0	\$ -	0	\$ -	0	\$ -	2	\$ 322,200	\$ 322,200
TOWN OF TAINTER	95	85	\$ 9,681,000	4	\$ 234,900	0	\$ -	0	\$ -	\$ 9,915,900
TOWN OF TIFFANY	12	3	\$ 607,200	0	\$ -	0	\$ -	3	\$ 99,700	\$ 706,900
Town Sub-Total:	254	201	\$ 22,450,500	10	\$ 800,500	0	\$ -	24	\$ 2,940,400	\$ 26,191,400
TOTAL	353	257	\$ 28,536,000	34	\$ 8,141,700	3	\$ 2,153,100	30	\$ 3,155,500	\$ 41,986,300

Municipality	# Structures in Floodplain	Principle structures	Exempt structures	2024 Aggregate Ratio	Estimated Fair Market (Improvements Only)
Cities					
CITY OF MENOMONIE	9	8		0.70194816	\$ 5,751,849.25
City Sub-Total:	9	8			\$ 5,751,849.25
Villages					
VILLAGE OF BOYCEVILLE	140	111	14	0.667923121	\$ 9,418,449.22
VILLAGE OF COLFAX	25	10	5	0.728811427	\$ 751,771.97
VILLAGE OF DOWNING	35	18	1	0.760029346	\$ 1,362,973.69
VILLAGE OF KNAPP	6	3	3	0.736110637	\$ 927,985.50
VILLAGE OF RIDGELAND	16	13	2	0.929041174	\$ 3,444,088.47
Village Sub-Total:	222	155	25		\$ 15,905,268.86
Towns					
TOWN OF COLFAX	42	21	2	0.989937858	\$ 2,589,152.42
TOWN OF DUNN	7	4		0.798037122	\$ 211,518.98
TOWN OF EAU GALLE	10	6		0.807574127	\$ 609,355.83
TOWN OF GRANT	4	1		0.861294083	\$ 50,853.71
TOWN OF HAY RIVER	20	10		0.883008018	\$ 822,529.34
TOWN OF MENOMONIE	5	3		0.581651154	\$ 524,197.36
TOWN OF NEW HAVEN	23	4		0.638918387	\$ 352,470.68
TOWN OF PERU	84	45	1	0.910273047	\$ 2,311,284.52
TOWN OF ROCK CREEK	41	19		0.88017707	\$ 1,149,200.58
TOWN OF SAND CREEK	25	18	8	1.039013966	\$ 1,751,468.28
TOWN OF SHERIDAN	12	4		0.711804175	\$ 734,190.69
TOWN OF SPRING BROOK	120	70	2	0.912784098	\$ 5,767,409.85
TOWN OF STANTON	15	4		1.002168586	\$ 321,502.79
TOWN OF TAINTER	162	104	5	0.654028145	\$ 15,161,274.14
TOWN OF TIFFANY	28	12	2	0.923057898	\$ 765,824.12
Town Sub-Total:	598	325	20		\$ 33,122,233.29
TOTAL	829	488	45		\$ 54,779,351.40

Note: Does not include values for tax-exempt parcels. Values based on 2025 values for non-manufacturing parcels; manufacturing values from 2024. Use is based on State property tax assessment codes. Commercial parcels may include 4+ unit rental residential.

FEMA National Risk Index (NRI) Estimated Annual Losses

FEMA's NRI provides the following estimated annual losses (EALs) for Dunn County.

Risk Factor	Riverine Flooding
EAL Rate – Population	1 per 9.42m
EAL Rate – Buildings	\$1 per \$493.27k
EAL Rate – Agriculture	\$1 per \$4.21k
Total EAL	\$136,977
Exposure	\$10 billion
Events per year	0.6
Historic loss ratio	Very Low
Overall Loss Score	30.6 (Very Low)

Based on \$3.4 billion in assessed improvements, annual riverine flooding damage to Dunn County's buildings alone would be close to \$6,937 each year using NRI's estimated annual losses, not including tax-exempt structures. The NRI estimates that Dunn County has \$9.2 million in agricultural value exposure to riverine flooding, which would equate to around \$2,200 in agricultural losses per year.

Other Factors Influencing Future Losses

Three primary factors are key to projecting future flood vulnerabilities:

- 1) **Changes in Precipitation** – **The increasing frequency of heavy rainfall events was the most frequently noted flood-related concern during the plan update.** Section III.B. previously discussed long-term changes in weather patterns 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 longer-term weather pattern changes on Dunn County surface waters has been performed.
- 2) **Changes in Flood Storage** – Overall, the floodplains and wetlands of Dunn 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. Dunn County is experiencing growth. Every hardscape that is created (e.g., buildings, roads, parking lots), results in a change in potential stormwater or flood storage. This factor can be mitigated through stormwater management planning and mechanisms such as rain gardens, natural swales, rain barrels, pervious surfaces, and the creation and maintenance of flood storage areas. As suggested in Section III.B., stormwater models, standards, and storage/conveyance systems are typically based on older precipitation-frequency data (e.g., Atlas 14, Technical Paper 40) and are not designed to accommodate more recent precipitation trends and storm events. Updated modeling, such as Atlas 15, may also impact NFIP FIRM (floodplain) maps.
- 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 8 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 Dunn 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.

Dunn County Dam Assessment

Defining the Hazard

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

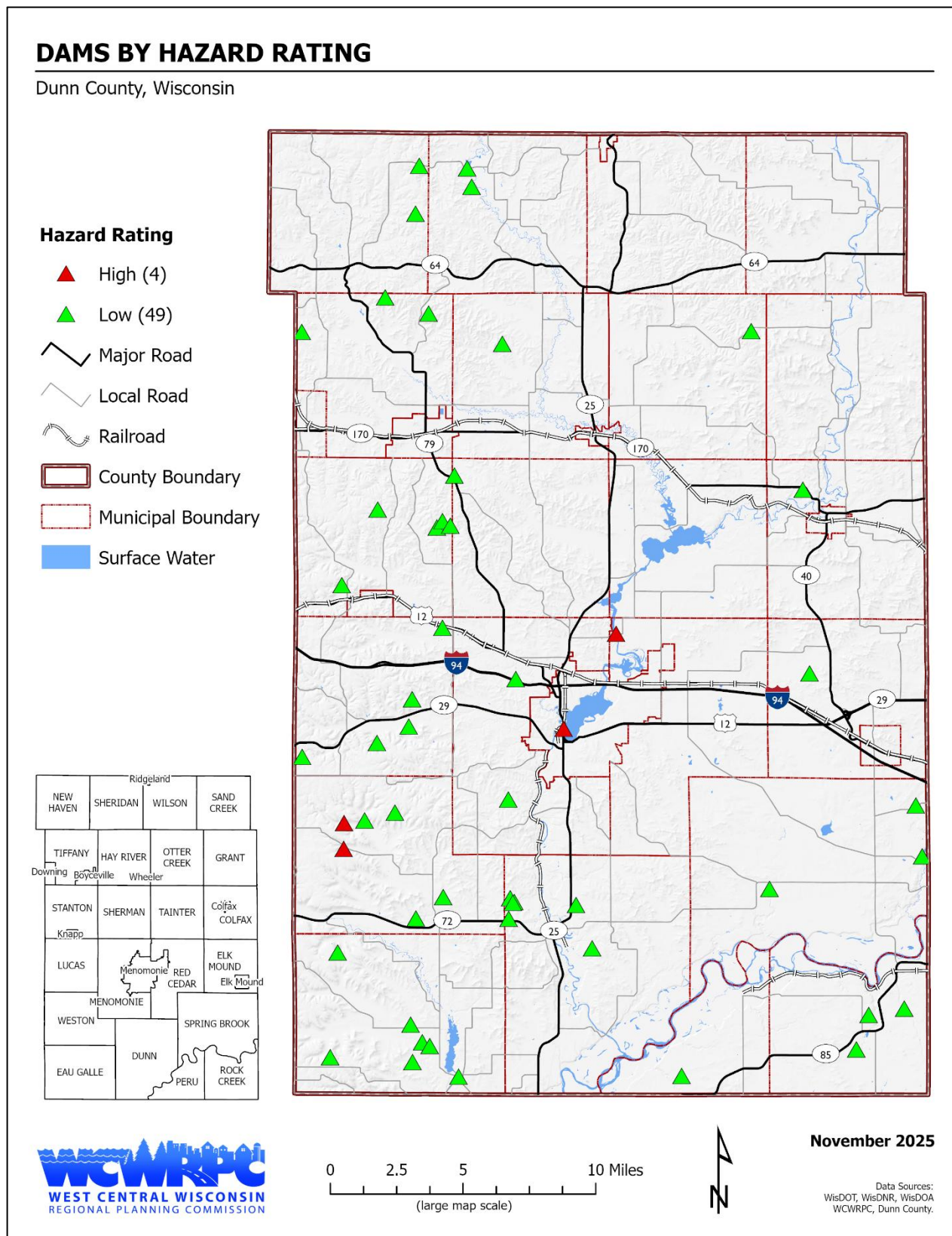
“Catastrophic type of failure characterized by the sudden, rapid, and uncontrolled release of impounded water or the likelihood of such an uncontrolled release. It is recognized that there are lesser degrees of failure and that any malfunction or abnormality outside the design assumptions and parameters 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).”

Hazard Location & Extent

There are 52 dams listed in the WDNR dam database. The dams of Dunn County are shown in **Figure 11**, along with their Wisconsin Department of Natural Resources hazard ratings. More details on each specific dam can be found in the *Dunn County Hazard Mitigation Supplement 2.G*.

Dunn County has eight (8) large dams. Four of these large dams are rated or estimated to be low hazard due to lack of vulnerabilities downstream while four (4) of the large dams have a high-hazard rating. There are no dams in the County with a significant-hazard rating. All forty-one (41) small dams in the County have a low hazard rating. There are four (4) high hazard rated dams in the County – the Knights Creek 1 and Knights Creek 5 dams are owned by Dunn County while the Cedar Falls and Menomonie dams are owned by Xcel Energy.

Figure 11. Dunn County Dams by Hazard Rating



As noted earlier, 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 (5 th year private engineer; 10 th 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 (2 nd , 4 th , 6 th , 8 th years private engineer; 10 th 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, including the failure resulting in very significant damage in Black River Falls as part of the previously discussed 1993 flooding event. And from 2000 to 2023, Wisconsin had 34 recorded dam failures, which is second highest in the United States. Several of these incidents resulted in injuries and serious property damage, but no loss of life.

Dunn County has had no significant flooding due to dam failure, at least in modern history.

Event Probability – Dam Failure

Overall, **the potential of dam failure in Dunn County is considered very low.** The Steering Committee rated the probability of a dam failure as very low, with a moderate-to-high level of vulnerability if a failure should occur.

Dunn 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 Dunn 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 occurs. 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 noted previously, Dunn County has four (4) high-hazard dams, with additional high-hazard dams located outside Dunn County, but upstream. *Hazard Mitigation Supplement 2.G.* includes brief assessments of the following high hazard dams and other dams of concern for Dunn County, including those dams that are publicly owned, requiring action, or have significant dam shadows in Dunn County, but located outside the County:

- Cedar Falls & Menomonie Dams (Xcel Energy)
- Knights Creek Dams (Dunn County)
- Eau Galle Dam (Dunn County)
- Menomonie Levees (City of Menomonie)
- Glen Hills Dams (St. Croix County)
- Chippewa River Dams outside Dunn County (Xcel Energy)

In 2021, the aging Rock Falls Dam for which ownership was in question was removed.

A G.I.S. analysis of the dam shadows was not completed as part of this mitigation plan. The 2020 Mitigation Plan recommended continuing to evaluate existing development in the shadows and comparing the mapped dam failure areas to the 100-year floodplain boundaries.

The County has dam shadows mapped for the following dams, which are regulated through the County floodplain zoning ordinance:

1. Elk Creek Dam – September 20, 1990
2. Eau Galle Dam – October 24, 1991
3. Glen Hills Watershed – December 31, 1998
4. Knights Creek Dam #1 – July, 2006
5. Knights Creek Dam #4 and #5 – August, 2006

Shadows for the Cedar Falls and Menomonie Dams are also mapped in GIS, but are not regulated by the County due to their FERC status. For those dam shadows that are digitally mapped by the County, the failure areas do not exceed the 100-year floodplain boundaries in most areas.

Additional information regarding dam planning, mitigation, and response can be found in *Hazard Mitigation Supplement 2.G.*

vi. DROUGHT

This sub-section highlights key drought-related information and the effects of these events. Supplement 2.H. of the *Dunn County Hazard Mitigation Plan Supplement* provides additional details. **For drought risks and vulnerabilities specific or unique to the participating villages, cities, and school districts, please refer to the subplans in Supplements 5 & 6.**

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.



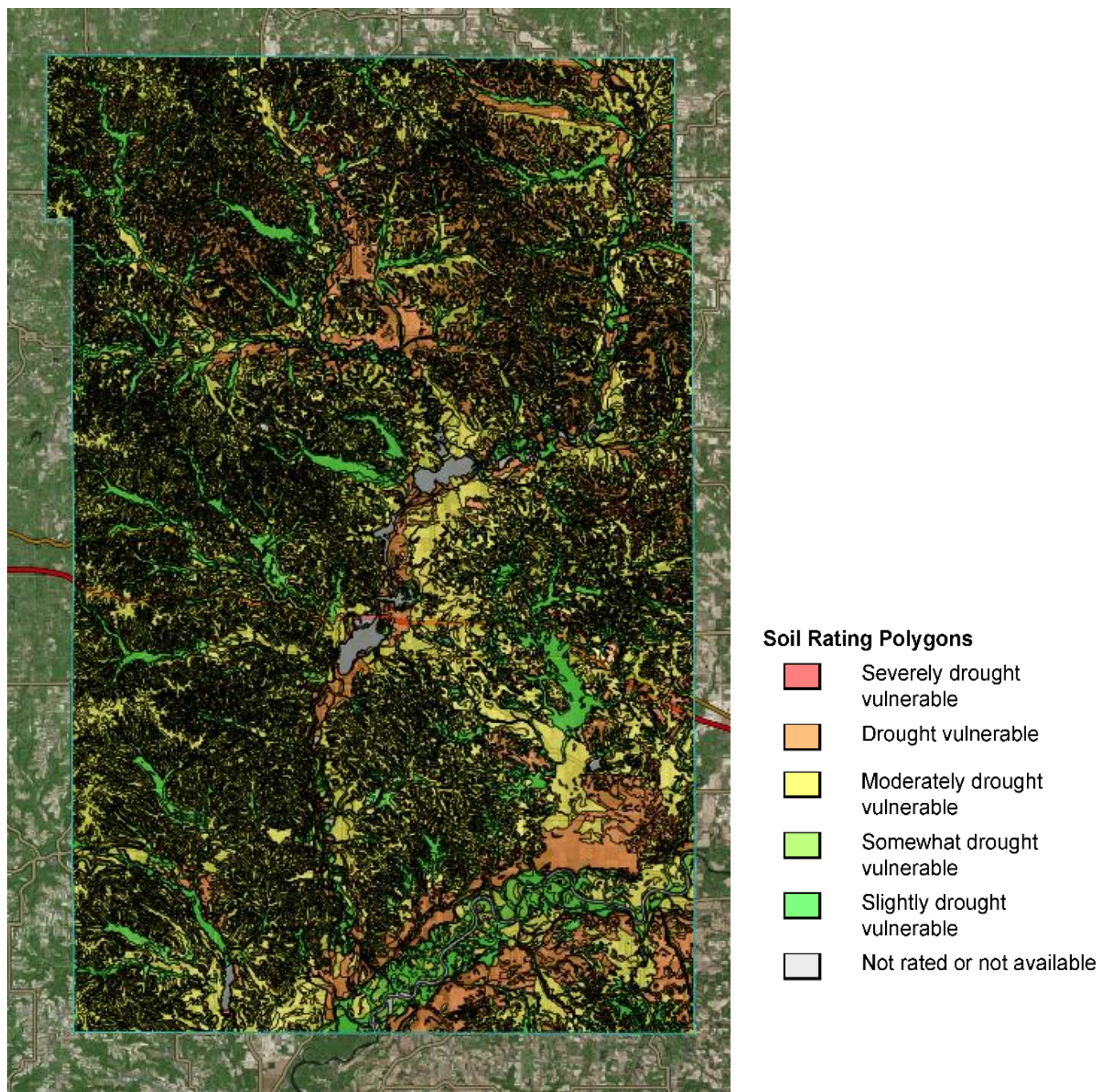
Hazard Location & Extent

Droughts can occur in all areas throughout Dunn County, including areas with high and low average precipitation. **Figure 12** and the table below show that the soils of Dunn County have some drought vulnerability, **though no soils are severely vulnerable**:

Drought Rating	% of Soils	Soil-Drought Characteristics
Slightly vulnerable	14.2%	typically low-lying areas with near-surface water
Somewhat vulnerable	1.1%	annual precipitation generally adequate for plant growth)
Moderately vulnerable	64.3%	some water stress in an average year
Drought vulnerable	18.2%	drought generally occurs every year
Severely vulnerable	0.4%	plants must be very drought tolerant even in normal years
Not rated	1.8%	e.g., lakes, rivers

Comparing this map with the *Wildfire* section maps will yield similarities since drought-prone, sandier soils in the County have more coniferous vegetation and there is less soil moisture for plants during times of drought.

Figure 12. Drought Vulnerable Soils – Dunn County

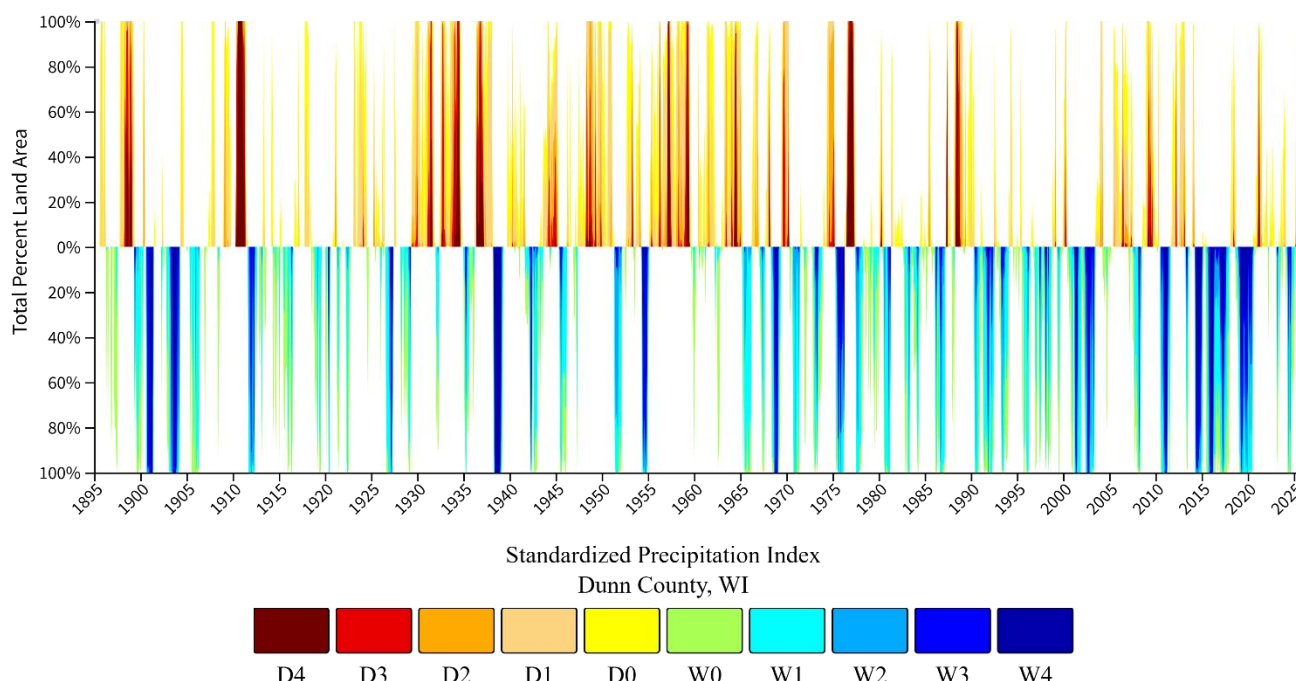


Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

Figure 13 below shows the drought trends for Dunn County utilizing the **Palmer Drought Severity Index (PDSI)**. The PDSI utilizes several factors (i.e., temperature, soil moisture, and precipitation) to calculate the magnitude of the drought conditions. More information regarding the index and the related impacts can be found in the *Dunn County Hazard Supplement 2.H*.

Figure 13. Dunn County Drought Severity Index (1895-2024)



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

Event History - Drought

Supplement 2.H. of the *Dunn County Hazard Mitigation Supplement* provides details on regional and local drought events, including the drought event from the Summer of 2023.

Dunn County Events

The following briefly describes some drought events impacting Dunn County.

- As shown in Figure 13, recorded years of severe drought for Dunn County have occurred with exceptional drought conditions reported in 1898, 1910, 1934, 1957, 1959, 1977, 1988 and others.
- Until 2000, drought conditions had been impacting corn and soybean yield to some degree in the County

about once in every five to seven years. However, beginning in about 2003, northern Wisconsin experienced ongoing drought conditions, beginning with D3 conditions in late 2003. The Governor issued five State of Emergency drought declarations between 2000 and 2010. While summer 2010 brought significant relief from the region's drought conditions, a nearly statewide drought would impact Dunn County during the 2012 summer and fall seasons, resulting in reduced crop and alfalfa yields. Drought conditions would impact much of the County through 2013.

- Since 2014, no widespread drought has occurred. About 10%-20% of the County's cropland experienced a D2-level drought in 2022-2024.
- Some of the County's more sandy and drought vulnerable soils can experience more frequent drought conditions, which is in part mitigated through the irrigation of cropland.

The table below shows the State and Federal Drought Emergency Declarations involving Dunn County for which financial assistance was provided:

Crop Year	Declaration Type
1976	Federal Drought Area Declaration under the Disaster Relief Act
2003	State Drought Emergency Declaration
2005	State Drought Emergency Declaration
2006	State Drought Emergency Declaration
2007	State/USDA Drought Disaster Declaration
2009	State Drought Emergency Declaration
2010	USDA – Drought & Late Freeze Declaration
2012	State Drought Emergency Declaration

Hazard Probability - Drought

The Plan Steering Committee rated drought probability as being of some (below moderate) concern in Dunn County, with some vulnerability. **Based on the severe drought years since 1970, a severe, countywide or regional drought year can be anticipated once every 5-7 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.B., research from the Wisconsin Initiative on Climate Change Impacts¹³ (WICCI) shows that annual precipitation in Dunn County has been increasing since 1950, though most of these increases have been occurring during the winter months. Concurrently, Dunn County's average annual temperatures have increased by around 4°F since 1950. WICCI has projected that Dunn County's weather will continue to become much wetter overall, but potentially the same or slightly 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.

¹³ Wisconsin Initiative on Climate Change Impacts website: www.wicci.wisc.edu

Vulnerability Assessment - Drought

General Vulnerabilities	
People	A prolonged drought can be especially hard on small farmers that are many times already finding it challenging to make ends meet.
Agriculture (Crops)	- Drought in Wisconsin has the greatest impact on agriculture and agriculture plays a critical role in the County's economy, as previously stated in Section II.C. - Since the severity of drought can vary, determining its financial impacts on crop and livestock operations is difficult. - The Drought assessment in Section III.C.vi provides example crop losses. 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 exacerbate flash flooding, even from an average rainfall. - Many crop farmers have used irrigation for sandy soils to help mitigate drought; see water supply discussion below.
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.
Water Supply	- 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 2026, Wisconsin DNR database identified 461 active high-capacity wells within Dunn County. - Water use bans during dry periods are still occasionally instituted in some cities and villages with municipal water systems.
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. Further risk is discussed in the Wildfire section.
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 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. Overall, groundwater is generally abundant and this was not identified during the plan update as a significant concern in the County at this time.
Health & Medical	• Drought-related conditions, such as heatwaves and poor air quality from wildfires, can have adverse health effects on seniors and others, including respiratory issues, heat-related illnesses, and exacerbation of chronic conditions.
Energy	• No related drought concerns within the County noted.
Communications	• No drought specific concerns noted.
Transportation	• Drought conditions can lead to soil instability, increasing the risk of road and highway damage.
Hazardous Materials	• No drought specific concerns noted.
Educational Institutions	• No drought specific concerns noted.
Vulnerability to Future Assets	
Population Growth & Development	• While no specific concerns noted at this time, growth increases the demand on groundwater supplies while development has the potential to impact the infiltration and replenishment of groundwater.

The *Dunn County Hazard Mitigation Supplement 2.H.* details other potential drought vulnerabilities, specifically the potential impact of drought on groundwater and wells, especially in areas where irrigation is more common.

Projected Loss Estimates

Overview of Potential Agricultural Losses

Drought can impact parts or all of Dunn County's agricultural base. The agricultural overview in Section II. discussed and quantified the importance of agriculture to Dunn 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 Dunn 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 9 provides an example of how recent drought years impacted crop yields by comparing crop production for the 2003, 2006, and 2007 drought years against the average production for 2000 to 2008. For example, during the 2002-2003 drought (and related winter kill) in Dunn County, soybean yields

were up to 20% lower and grain corn yields were up to 41% lower than the averages for 2000-2005, excluding 2003.

Table 9. Dunn County Soybeans & Grain Corn Yields

Year	Soybeans	Corn (grain)
	<i>bushels per acre average</i>	
2000	38	129
2001	27	131
2002	46	141
2003	21	109
2004	32	137
2005	35	143
2006	35	100
2007	34	114
2008	31.5	136

*drought
years*

source: USDA-NASS, Agricultural Statistics Database, <<http://www.nass.usda.gov>>.

At an average of \$2.10 per bushel for grain corn from 2000 to 2005, a 32-bushel loss per acre would be equivalent to a \$67.20 loss per acre. And even though about 5,300 more acres of grain corn was harvested in 2003 compared to 2002, the number of bushels harvested decreased by 1,538,000, or equivalent to a \$3.2 million loss using the \$2.10 per bushel average. Corn yields were even worse in 2006. Soybeans experienced similar losses in 2003, even though 4,600 more acres of beans were harvested in 2003 compared to 2002. Overall, 877,500 fewer bushels of soybeans were harvested in 2003 which would be equivalent to a \$5 million loss using a \$5.71 per bushel average. Such losses are a significant financial hardship.

Yields can vary greatly by location, with corn yields ranging as high as 200 bushels per acre in some areas to less than 100 bushels per acre in others during drought years. The lowest yields are located in the sandier and lighter soils of the County. During 2003, hay yields were also below average, driving up hay prices for livestock operators.

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 \$1,000 of additional feed per mature cow per month is not unrealistic (\$1,000 x 25,692 milk cows = \$25.7 million) resulting in many millions in required supplemental feed for Dunn County farmers under a severe, single-season drought event.

Drought conditions can also result in the build-up of nitrates in feed and silage to levels that are toxic to cattle. In recent years, there have been a small number of cattle deaths in the region due to nitrate toxicity. Extreme heat and drought can also result in the build-up of toxic gases within grain silos to lethal levels or result in fires or explosions. Extreme heat within large, confined livestock buildings has also been a concern in the past resulting in livestock deaths within the region, though no large-scale, animal mass casualty events due to extreme heat have been reported in Dunn County.

The far majority of local farmers understand and practice good management to reduce the vulnerabilities associated with drought conditions, but some knowingly take chances. Many 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. In all, only about 28% of cropland operations in Wisconsin have crop insurance according to the 2022 Census of Agriculture. Further, the demands on crop insurance are increasing and with increasing risks the current insurance system may not be sustainable.

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FEMA National Risk Index (NRI) Estimated Annual Losses

FEMA's NRI provides a source of estimated annual drought losses (EALs) for Dunn County:

Risk Factor	Drought
EAL Rate – Population	--
EAL Rate – Buildings	--
EAL Rate – Agriculture	\$1 per \$3.18k
Total EAL	\$76,857
Exposure	\$53 million
Events per year	2.7
Historic loss ratio	Relatively Moderate
Overall Loss Score	65 (Relatively Low)

The NRI table suggests drought impacts in Dunn County will largely be limited to agricultural crop losses. The data suggests that three drought events will occur annually, reflecting that some soils of Dunn County will experience drought on a near annual basis. Overall, the NRI rates the County's drought vulnerability as relatively low.

vii. WILDFIRE

This section, as well as additional data within Supplement 2.I. of the *Dunn County Hazard Mitigation Supplement*, relies heavily on analysis tools provided by the Northeast-Midwest State Foresters Alliance and a report generated utilizing these tools on October 10, 2025. The report provides data and maps that identify various factors that contribute to risk, intensity, and impact of wildfires in Dunn County. While this section summarizes several of the findings within the report, the full report provides additional depth and detail. The tools provided by the Alliance are updated as factors change and the most current data may be valued over this plan, should a conflict arise. Additional information and resources can be found at <https://northeastmidwestwildfirerisk.com/>. **For wildfire risks and vulnerabilities specific or unique to the participating villages, cities, and school districts, please refer to the subplans in *Mitigation Plan Supplements 5 & 6*.**

Defining the Hazard—Wildfire

A **wildfire**, in the context of this plan, is an uncontrollable, unwanted fire in the natural environment spreading through vegetative fuels, exposing and possibly consuming structures. They often begin unnoticed, spread quickly, and are usually signaled by dense smoke that may fill the area for miles around. Wildfires can be human-caused through arson, campfires, prescribed burns, or carelessness, or can be caused by natural events such as lightning. An expanded definition is located in *Mitigation Plan Supplement 2.I*.



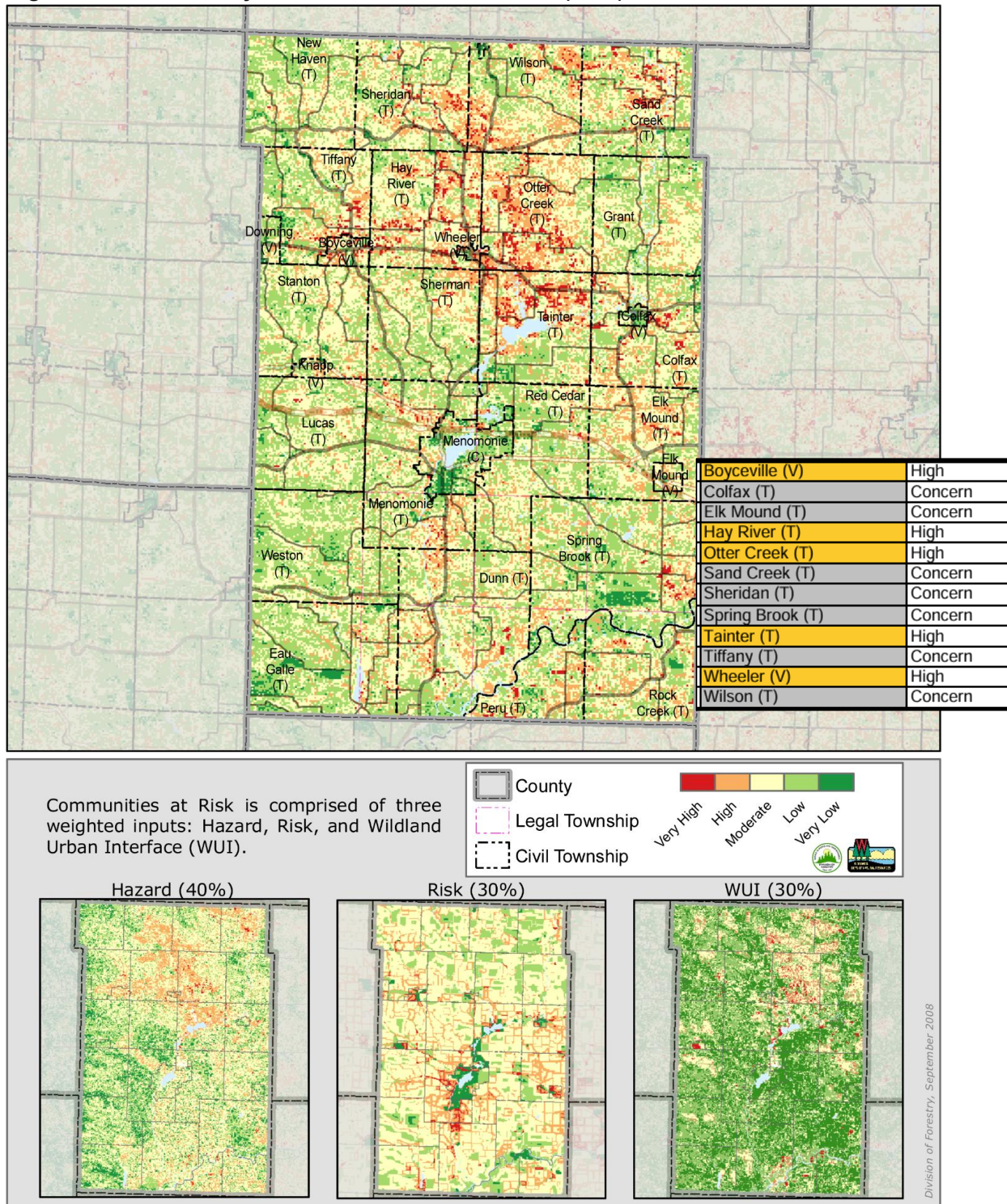
Hazard Location

As described in Section II.B., approximately 37% of Dunn County is forested and 1% is shrub and grasslands, with most woody vegetation being hardwoods. About half of the County is cultivated crops or pasture/hay. The *Mitigation Plan Supplement* dives more deeply into how these risks vary by vegetative cover and surface fuel types as well as other risk factors.

The Wisconsin Department of Natural Resources (WDNR) identified twelve communities in Dunn County with an elevated wildfire risk.¹⁴ While five communities have a high risk there are no communities identified as having a very high risk. The list of these communities was generated by a WDNR analysis completed in 2008, which considered the hazard (vegetation type), the risk (wildfire history), and the wildland-urban interface (development within forested areas). This 2008 analysis, summarized by **Figure 14**, is a bit older, but still provides important insights into how the wildfire risks vary across Dunn County.

¹⁴ <https://dnr.wisconsin.gov/sites/default/files/topic/ForestFire/communitiesAtRiskWildfire.pdf>

Figure 14. Dunn County Communities at Wildfire Risk (2008)



Hazard Extent (Potential Intensities)

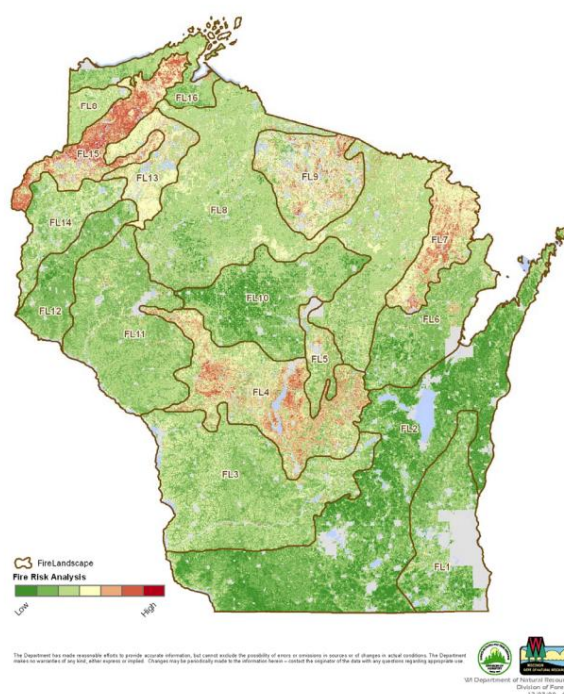
Dunn County has a low probability of experiencing a large-scale wildfire involving 1,000+ acres that is very difficult to control. As such, all of Dunn County falls within a Cooperative Fire Protection area. As further explained in the *Mitigation Plan Supplement*, no parts of the County are under Intensive Fire Protection where WDNR has a statutory responsibility for wildfire suppression.

Wildfires are capable of occurring and impacting large areas. Areas with dense pine and oak vegetation are more likely to experience wildfires. In March 2010 the Wisconsin Department of Natural Resources – Division of Forestry, completed a Wildland Fire Management Program Assessment that included identification of sixteen distinct fire landscapes throughout the State with associated management recommendations.¹⁵ The landscapes were determined based on five features:

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

Nearly all of Dunn County falls into the West Central Wisconsin fire landscape, in which wildland fires would generally be expected to remain under 500 acres and can typically be managed by local fire departments without WDNR assistance. Very limited mitigation activities for this fire landscape are suggested, such as statewide prevention messages and periodic K-3 school fire prevention programs. Certain areas of higher risk may pursue additional activities as needed. A few sections in the far northwestern corner of the Town of New Haven fall within the “Western Prairie” fire landscape which, for mitigation purposes, is nearly identical to the rest of the County. While the fire landscape approach is valuable for State- and regional-level resource planning, the communities-at-risk, as identified earlier in this section, provides a better understanding of local variations, such as development density and vegetation.

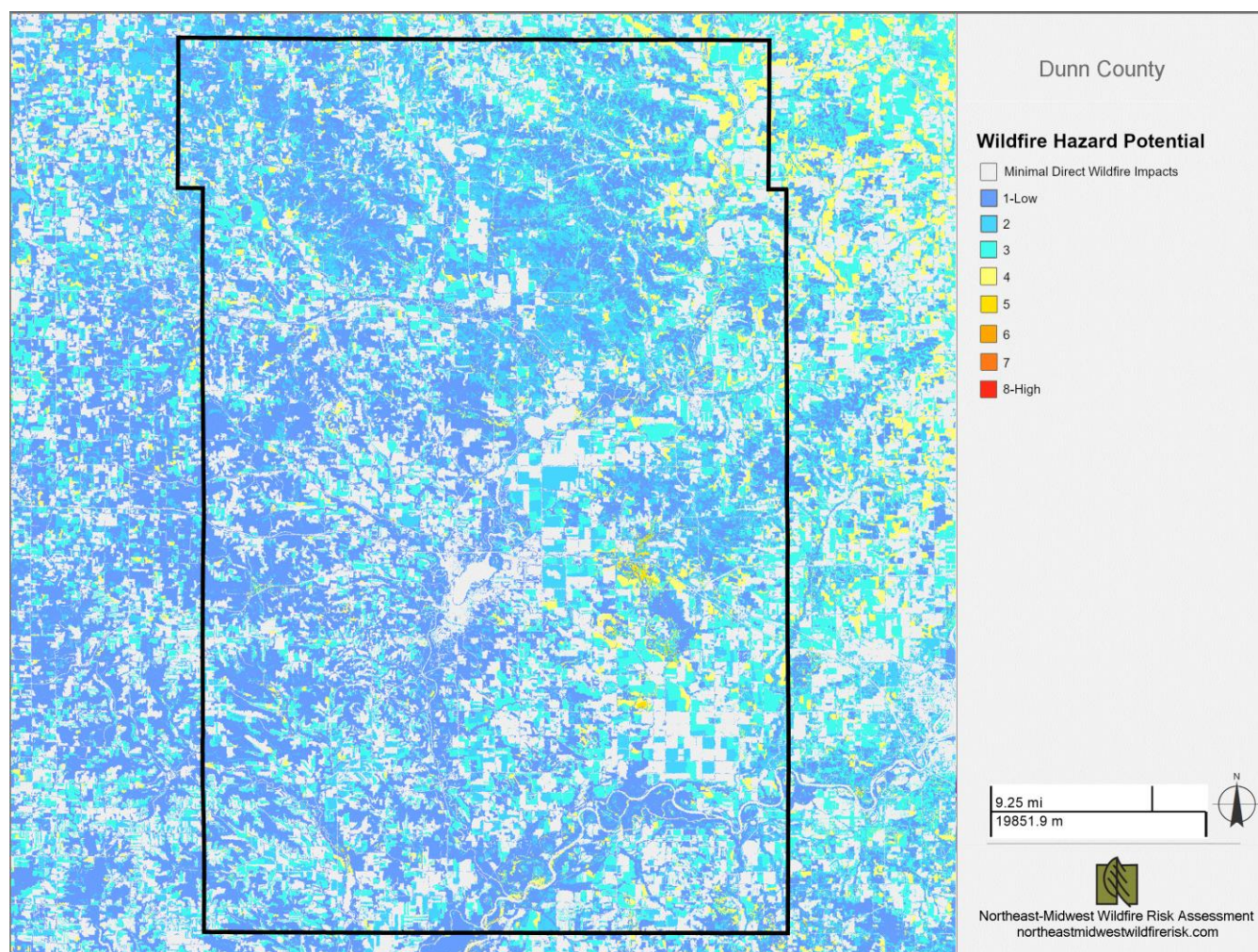
Fire Risk Analysis by WI Fire Landscape



Wildfire Hazard Potential – Difficulty to Control

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

¹⁵ https://dnr.wisconsin.gov/sites/default/files/topic/ForestFire/fireAssessment_wildlandFireMgmtFinalReport.pdf

Figure 15. Dunn County Wildfire Hazard Potential

Key takeaways from **Figure 15** include the following:

- There is a consistent trend of wildfires becoming more difficult to control when moving from west to east. This trend aligns with the overall land cover and accessibility.
- The overall potential for a large wildfire in the County that is difficult to control is low. Only 470 acres in the County are rated 5 with no areas rated 6-8.
- 50% of the County is rated 1 or 2 while the areas rated 3 and 4 account for 29% of the County.

Event History – Wildfire

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

Dunn County Events

Forest fire is not a new threat to Dunn County, though based on limited research, the neighboring counties of Polk, Barron, and Chippewa have a more devastating forest fire history.

However, one of the largest wildfires in Wisconsin history did encompass parts of Dunn County, based a contemporary news article. In 1898, an “immense sea of flames” burned over 600 square miles of pine lands in northern Wisconsin and Minnesota. Deaths and losses appear to be greatest in other nearby counties with a number of villages wholly or partially destroyed. Specific impacts in Dunn County were not mentioned. As the pine forests were logged and agriculture came to dominate much of region, the forest fire risk also changed. The potential for a large forest fire was chiefly limited to forested areas less suitable for agriculture and in the resort and seasonal housing areas typically associated with recreational surface waters.

Detailed wildfire data for Dunn County is not readily available. As discussed in the 2020 Plan, from 2008-2012, Dunn County had approximately 215 grass, brush, or smaller forest fires (or 53 per year), based on 9-1-1 calls. For nearby counties where more wildfire data is available, a few trends are notable:

- The far majority (75+%) of reported wildfires are smaller than ten acres in size.
- Wildfires in excess of 50 acres are very rare. (1-2 in 25 years)
- Wildfires can occur in every month, with about one-half of all reports occurring in April.
- 40 to 50 percent all reported wildfires were caused by debris burning, with the burning of household trash (not in containers), brush piles, and burn barrels being the most common sources.

From 2020-2025, Dunn County had 310 incidents labeled as brush fires (may include some limited wooded areas) or an average of 52 events per year.

Over the last forty-five years, there has not been a Presidential Disaster Declaration for a wildfire in Dunn County, and research for preparation of this Plan did not discover any recent serious injuries or deaths related to a large wildfire event. There have been no recent “project class” wildfires in Dunn County with an Incident Command Center and 8+ hour burns. However, we can look to Eau Claire County to see that such events can be very deadly. On April 24, 1982, Wisconsin Department of Natural Resources tractor plow operator Donald Eisberner of Fairchild was killed in the line of duty while plowing a firebreak during the Canoe Landing forest fire in the Eau Claire County Forest.

Hazard Probability – Wildfire

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

Vegetation fuel types and the fragmented forest landscape combine to make the fast-spreading, regional fires of the late 1800s very unlikely within Dunn County. **In the near term, it can be expected that Dunn County will continue to experience 45-55 wildfires per year on average. The far majority of these fires will be brush or grass fires less than ten acres in size.**

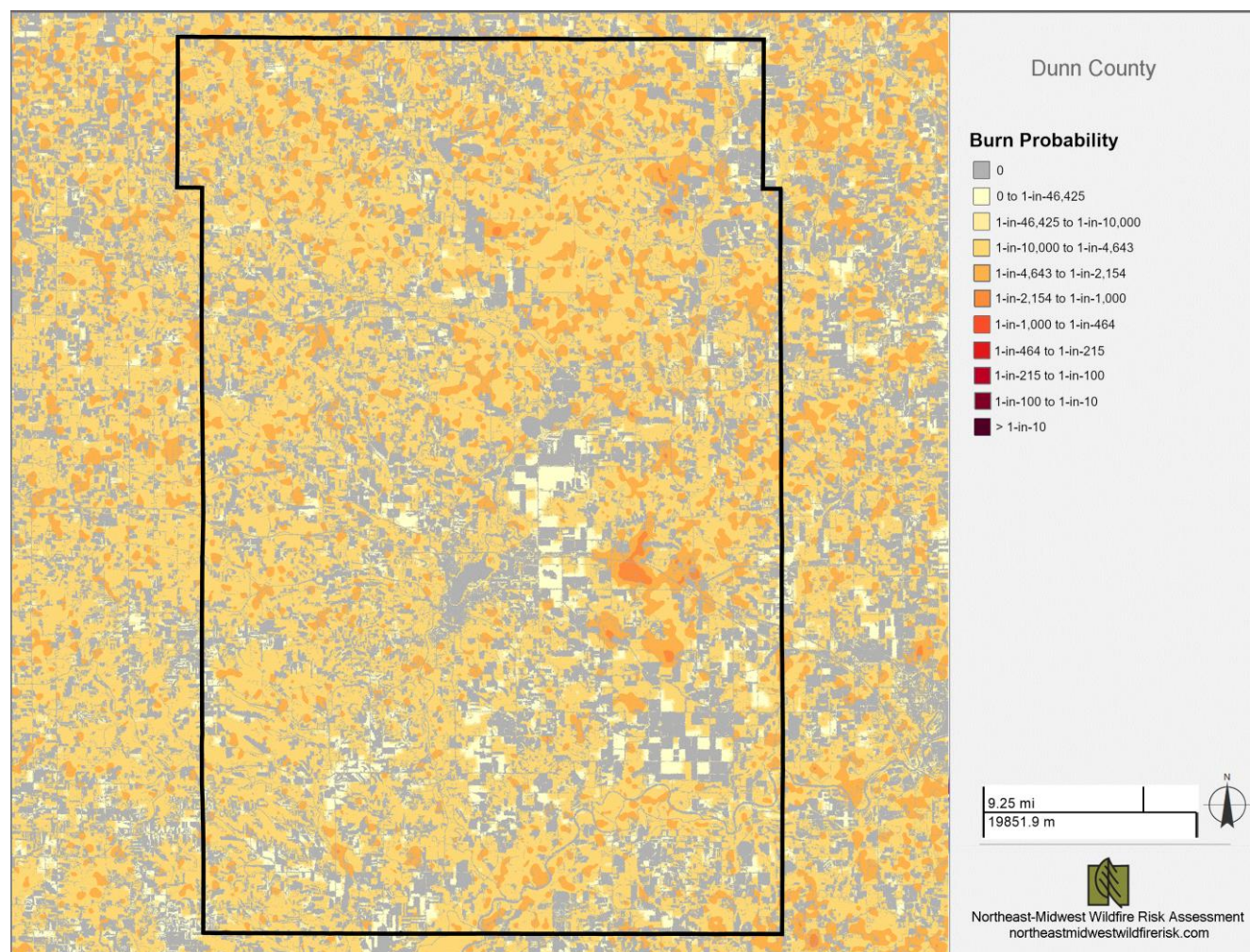
A number of factors could significantly contribute to an increase in the number and size of wildfires over the long term. Foremost, population increases, development in the wildland-urban interface, and the transition from seasonal to year-round housing has great potential to increase the frequency of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

Burn Probability

Taking several factors into account, the burn probability is an assessment of the annual probability of a wildfire burning in a specific location. **Figure 16** identifies the burn probability throughout Dunn County.

The overall burn probability in the County is low-to-moderate. The highest probability identified is in the “1-in-2,154 to 1-in-1,000” range, and this only includes 1,315 acres within the County. The top 4 ranges are not shown on the map as there are no lands in the County identified in these categories. About 32% of the County has a negligible burn probability of “0”.

Figure 16. Dunn County Burn Probability



Vulnerability Assessment – Wildfire

General Vulnerabilities	
People	- All residents and visitors are at-risk of injury or death from wildfire events. - Migrant Populations - May lack community resources / social network to efficiently relocate and rebuild during and after wildfire events. Language barriers can prevent life-saving information / orders / alerts from being efficiently dispersed within the community.
Above-Ground Structures	- All structures and personal property have varying vulnerabilities to wildfire depending on proximity to woodlands, structure building materials, and whether mitigation actions (e.g., defensible spaces) have been taken. - Over \$3.8 million in assessed improvements are located within communities under intensive fire protection.
Campgrounds	Campgrounds, tourism-related cottages, RV parks, and results are often located in more vulnerable areas. For such facilities, visitors are a potential source of fire ignition (e.g., campfires), may not understand risk factors, and are a vulnerability should a wildfire occur.
Lake Properties	Homes and cottages located on or near lakes and rivers often have an elevated vulnerability due to location within a wooded area and have limited access/egress. These properties are frequently

	identified as a concern by emergency responders due to narrow, winding private roads and driveways, sometimes with steep grade/topographical changes.
Local Economy	- Wildfires can damage businesses and cause closures or evacuations in nearby areas. - The logging and tourism industries would be affected the most within the local economy, were a wildfire to occur.
Natural, Historic, & Cultural Resources	- Forested areas, grassland, and agricultural areas are important economic assets and are susceptible to wildfires. - Historic, non-masonry structures are vulnerable to fire.
Community Lifelines	
Safety & Security	- Personnel are exposed to hazardous conditions when combating wildfires or assisting residents in wildfire areas. - If a very large wildfire was to occur within the County, fire departments and local EMS could potentially be stretched thin; delayed response times might occur.
Food, Water, Shelter	- All above-ground structures are vulnerable. However, structures located in pine plantations, forested areas, or adjacent to grasslands are potentially at risk from wildfires. - Livestock could be at risk if a wildfire starts in a grassland area, however the risk is minimal to food sources. - Large scale wildfires can impact water quality, but this scenario is of low concern. - Farms and other croplands are at high risk of wildfire ignition and spread.
Health & Medical	Hospitals and other in-patient care facilities may need to be evacuated during wildfire events, but the risk is very low for cities and villages.
Energy	- Above-ground utilities are vulnerable in wooded areas; see Long-Term Power Outage section. - Ash and debris from wildfires can damage solar panels / arrays. - Natural gas lines and storage facilities are vulnerable to prolonged heat exposure and combustion.
Communications	All above-ground structures are vulnerable, but no specific concerns noted.
Transportation	- Exposure to high amounts of heat from wildfires can damage road infrastructure. - Chemicals, smoke and airborne debris from wildfires create dangerous travel conditions. - Road closures due to wildfires. - Trains are a cause of wildfire ignition. Railway materials (steel beams, wood supports) are susceptible to damage from wildfire.
Hazardous Materials	- All above-ground structures are vulnerable, but no specific concerns noted. - Combustion of materials can create hazardous materials spills or releases. - Hazardous materials may be flammable and can be spread through wildfire smoke/winds.
Educational Institutions	None known. Evacuation planning may be advised for school facilities within or near high fuel or forested areas. Most educational facilities have large, maintained grounds that would protect buildings from being impacted by a wildfire.
Vulnerability to Future Assets	
Population Growth & Development	- Developments and populations within the Wildland Urban Interface (WUI) are at a higher risk of exposure to wildfire events. - Agricultural fields contain high levels of surface fuels that can start or spread wildfires. - While the County is not projected by the State to grow in population, it continues to experience new development, thus increasing overall exposure to wildfires.

Populations, farms, property, and infrastructure located within those previously identified communities and areas of higher wildfire risk would be more vulnerable. Wildfires and the resulting burnt landscape can also damage and contaminate the natural environments, which includes polluting sources of drinking

water, destroying habitats, exacerbating erosion and runoff to surface waters, and degrading air quality for miles.

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

DNR RECOMMENDS WISCONSINITES LIMIT TIME OUTSIDE DUE TO CANADIAN WILDFIRE SMOKE



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

Projected Loss Estimates

Forest fire can cause significant injury, death, damage to property, and loss of natural resources. As shown in **Table 9**, the five communities (Village of Boyceville, Town of Hay River, Town of Otter Creek, Town of Tainter and Village of Wheeler) with “high risk” had over \$385 million in assessed improvements on 2,476 improved parcels in 2024 as well as a combined 2020 Census population of about 5,194. Nearly all of these parcels were residential; only 92 parcels were commercial in use and five were manufacturing. The official Wisconsin Department of Administration 2024 population projections show that all 3 towns are expected to grow over the next thirty years while the two villages are expected to see a decrease in population during this same thirty-year period.

Table 9. Population and Improvements of At-Risk Communities

Community	Population			2024 Assessed Improvements			
	2020 Census	WI DOA Proj. 2050	% Chng. '20-'50	# of Imp. Parcels	# com	# ind	Total Value of Improvements
Village of Boyceville	1,100	953	-13.4%	422	44	4	\$50,519,200
Town of Hay River	627	714	13.9%	340	6	1	\$65,640,300
Town of Otter Creek	498	640	28.5%	290	3	0	\$48,867,900
Town of Tainter	2,643	2,812	6.4%	1,290	17	0	\$206,535,100
Village of Wheeler	326	274	-16.0%	134	22	0	\$14,030,500
Total	5,194	5,393	3.8%	2,476	92	5	\$385,593,000

Some local fire personnel also noted that wildfires in grasslands and fields have the potential to spread more quickly than fires in wooded areas, and may pose an even greater threat in Dunn. Homes, agricultural operations, livestock, crops (especially hay and grains), and travelers on roadways are all potentially vulnerable, depending on proximity to vegetative fuel.

FEMA National Risk Index (NRI) Estimated Annual Losses

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

Risk Factor	Wildfire
EAL Rate – Population	1 per 99m
EAL Rate – Buildings	\$1 per \$856k
EAL Rate – Agriculture	\$1 per \$28m
Total EAL	\$18,642
Exposure	\$82.76 billion
Events per year	.002% chance per year
Historic loss ratio	Relatively Moderate
Overall Loss Score	38.2 (Very Low)

According to the NRI data, wildfire has the lowest estimated annual loss of all natural hazard events (\$18,642) for Dunn County.

Other Factors Influencing Future Losses

A wide variety of preparedness and mitigation efforts can reduce wildfire losses. Active forest planning and management can reduce fuel and provide fire lanes for responders. Firewise practices, such as maintaining the home ignition zone, fire-resistant building materials, and composting, can target areas most at risk of wildfire. Residents and visitors can all benefit from fire prevention messaging, increased awareness of burning permits, etc.



viii. LONG-TERM POWER OUTAGE

Long-term power loss in Dunn County is most likely to be 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). *Dunn County Hazard Mitigation Plan Supplement 2.J.* provides additional details. **For long-term power outage risks and vulnerabilities specific or unique to the participating villages, cities, and school districts, please refer to the subplans in *Plan Supplements 5 & 6.***

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 if 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, longer-term 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 & Extent

Long-term power loss is capable of harming residents and damaging homes and infrastructure throughout Dunn County. While long-term power loss can occur throughout all of Dunn 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. Power lines for customers near water bodies (e.g., Tainter Lake) are often in wooded areas with a higher risk of damage from falling limbs. 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, common scale for evaluating the intensity or severity of a long-term power loss event.

The loss of power due to falling limbs and trees has been largely mitigated through proactive, aggressive tree-trimming and right-of-way/easement maintenance programs by the electric providers serving Dunn County. Dunn Energy Cooperative conducts such tree-trimming on a regular schedule (5-year rotation) along with pole testing and cabinet inspections for underground infrastructure. Trimming in some wooded and/or wet areas (e.g., Tainter Lake, Russian Slough) can be challenging. As part of its work

plan, the Cooperative has also been aggressive with the burying of older power lines if located in wooded areas and plans to continue such mitigation efforts when cost feasible. Most all new electric distribution lines are now buried. Following a 1998 storm event, the Cooperative partnered with towns to use FEMA funding to bury some lines. But even with such efforts, forests are the dominate land cover in nearly one-third of the County and overhead lines in such wooded areas are still at higher risk.

Event History – Long-Term Power Outage

There is a threat of having larger long-term power outage events as experienced in Montreal in 1998 where an ice storm hit and left over four million residents without power. The following are some key long-term power outage events affecting Dunn County as detailed in the *Dunn County Hazard Mitigation Supplement*:

- **August 2007** – wind storm downed trees and power lines in Menomonie area leaving some customers without power for three days.
- **May 2013** – very serious power outage event when 10-16 inches of heavy, wet snow fell across western-center Wisconsin; sixteen inches was recorded for Menomonie. The heavy snow caused some power lines to sag and trees/branches fell onto lines and local roads.

The 2007 and 2013 outages are the only events since 2000 that Dunn Energy Cooperative has requested rural electric cooperative mutual aid through the Restoration of Power in Emergency (ROPE) system. During such event, communication between road crews and electric providers is crucial in determining which downed lines are “hot” or live as part of the street and debris clean-up. Power was restored to most customers within 24-36 hours. A more limited high wind event in July 2025 downed power lines in areas of the County with most power for most customers restored within 24 hours; the few remaining customers had power restored within 36 hours.

While the focus of power loss is often on winter weather and ice storms due to their widespread nature, other natural events can also result in a sizable loss of power. In fact, high winds and falling trees appear to be a more frequent cause of loss of power in the region due to a natural hazard event. “The Big Wind” struck Dunn and Eau Claire counties on July 15, 1980, with high winds and tornados causing great damage to property, trees, and power lines, as well as one death and numerous injuries. Power on the south side of Eau Claire would not be restored for five to seven days, with electric crews putting in 16-18 hours each day.¹⁶

Dunn County Electric Providers

There are two primary electrical providers in Dunn County:

Dunn Energy Cooperative (serves approximately 81% of the County area)
Xcel Energy (serves approximately 14% of the County area).

The remaining County area is primarily served by three additional cooperatives (Barron Electric, St. Croix Electric, and Eau Claire Energy). There are no municipal electric utilities in Dunn County.

¹⁶ Hoffland, Lukas. “Spearhead Echo: The Storm of 1980”, LukasLight, Eau Claire, WI, 2005.

Electric providers maintain emergency response/recovery plans, typically with a continuity of operations component, and conduct regular exercises and training, frequently in concert with local and county agencies. Dunn Electric Cooperative has conducted electric vehicle training and a downed power line class is scheduled for local responders in 2026. Most incorporated areas of the County are provided electric service by Xcel Energy. Xcel Energy has significant redundancy built into their transmission network, and can many times re-route if needed. This, combined with a strong tree-trimming program by Xcel, has significantly mitigated the potential for long-term power loss within their system.

While Dunn County has not recently experienced a long-term power outage event, a look at the causes of unplanned power outages for Dunn Energy Cooperative from 2017-2024 provides further insight into the potential risk. The numbers in **Table 10** are for all of Dunn Energy Cooperative, which includes small areas of some adjacent counties.

Table 10. Dunn Energy Cooperative Unplanned Power Outages • 2017-2024

Outage Cause	# of outages									# customers affected	customer hours off
	2017	2018	2019	2020	2021	2022	2023	2024	Total		
Storms	61	61	129	43	66	223	33	79	695	9,843	48,616
All Other	288	389	406	380	318	387	375	372	2,915	59,123	116,406
Total	349	450	535	423	384	610	408	451	3,610	68,966	165,022

source: Dunn Energy Cooperative, 8/4/20, 12/1/25

The above table shows that about 19% of unplanned outages were directly caused by storms.

The threat of a cyber-attack on the power grid has been increasingly in the news as will be discussed further in the Cyber Attack subsection. A cyber-attack could result in a large-scale or regional loss of power, since such an attack would likely target the power generating facilities or transmission infrastructure. The vulnerabilities or impacts are significantly less for the local distribution systems. Hacking of billing systems or digital electric meters is possible, but would likely not result in a widespread, long-term outage. There has also been increasing incidents of physical attacks on substations in recent years. These man-made threats encourages strong infrastructure redundancy, site security, and communication between power providers and law enforcement as well as the implementation of Smart Grid digital technology.

In summary, a widespread, long-term power outage event covering most or all of Dunn County would be rare, but the potential does exist. Based on discussions with personnel from area electric providers, it is estimated that only about five or six long-term power outage events have likely impacted the region during the past century, but these have not approached the scale of the 1976 Wisconsin, 1998 Montreal, or 2009 Kentucky outages. A large-scale, long-term power outage, whether caused by cyber-attack or a weather event, would likely involve electrical transmission infrastructure and not just local distribution systems.

Hazard Probability – Long-Term Power Outage

The Plan Steering Committee rated the probability of a long-term power outage event as being of a moderate concern for Dunn County, with a fairly high/serious vulnerability should an event occur. The burying of power lines, infrastructure hardening, and tree-trimming efforts by electrical providers, have mitigated the probability of a long-term outage event over the past two decades.

Since 2000, it is estimated that Dunn County has only had 2-3 power outage events of 2+ days impacting a substantial number of customers, with most outages being more localized and restored within 48 hours. Based on these events and trends, **Dunn County is expected to experience a significant long-term power outage about once every 10-12 years on average.** Nearly all of these events would impact a portion of Dunn County and affect less than 15,000 customers, with power restored within 5-6 days. While a widespread, long-term power outage event covering most or all of Dunn County would be rare, the potential does exist. Past power outage events Dunn 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* sub-sections, the probability of these hazards is likely to increase due to long-term weather patterns. As such, the probability of long-term power outage events is also likely to increase. 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

General Vulnerabilities	
People	• Individuals Reliant on Medical Equipment and Seniors - Individuals that are oxygen dependent or rely on in-home medical equipment are vulnerable, especially if they lack backup power systems or reserves in medical supplies. Tele-health and in-home medical care options may be limited during the power outage. See additional information below. • Assisted living facilities, nursing homes and memory care facilities, facilities with ventilation equipment for patients, and emergency shelters are also vulnerable during long-term term power outages. • Vulnerabilities may be compounded if the power outage occurs during periods of extreme weather (heat and cold), especially for seniors who are living alone that may lack a support network. • As businesses and residents increasingly move to smart devices and the Internet of Things, the vulnerabilities from power loss increases.
Energy Utilities	• Power outages can overload the remaining, functioning portions of the power grid. • Damage to electrical infrastructure, specifically above-ground electrical infrastructure, may necessitate substantial repair costs. • Extensive power outages (in terms of area) can stretch resources thin to repair systems and restore power. • Municipal utilities and emergency fuel were identified as being especially vulnerable or important during a long-term power outage event.
Structures without Back-up Power Systems	• Structures without generators will be unable to operate until power is restored. • Maintenance systems, such as sump pumps and air filtration systems, may fail resulting in additional risks to structures and individuals. • Most commercial facilities have installed backup generators but may still be vulnerable if the duration of the power loss exceeds the capabilities of the generators and fuel supply is limited.

Community Lifelines	
Safety & Security	• Criminal activity becomes more difficult to identify and respond to when security systems are inoperable. • Emergency services experience increased demands as residents lose access to lifelines.
Food, Water, Shelter	• Food supplies may diminish during the outage as storage systems fail. • Pumps and wells will not operate without a backup power system. • HVAC systems will not operate without a backup power system, potentially exposing occupants to extreme weather (heat and cold). • Emergency shelters and food distribution sites (i.e., schools) were identified as being especially vulnerable or important during a long-term power outage event.
Health & Medical	• Most medical facilities have backup power installed. • Clinics and offices may not have backup power, limiting their ability to serve the community. • In-home services may not be able to operate • Long-term care facilities and hospitals were identified as being especially vulnerable or important during a long-term power outage event.
Energy	• Failure in one section of the power grid can overload adjacent operational sections, increasing the potential for additional outages.
Communications	• Internet and land-line telecommunications systems may be inoperable during the outage.
Transportation	• No specific concerns noted.
Hazardous Materials	• Monitoring and control systems may be incapacitated, though most facilities with hazardous materials have backup power systems in place.
Educational Institutions	• Most institutions have backup systems installed, but primarily to ensure life safety. • No specific concerns noted.
Vulnerability to Future Assets	
Population Growth & Development	• Additional development increases the demand on energy infrastructure, increasing the potential for "domino-effect" outages as the grid is overextended.

Seniors and DME-Reliant Populations

During the plan update, Dunn County seniors and persons reliant on electronic medical devices were frequently mentioned as the largest group of concern during long-term power outages. Dunn County's population is aging, as documented in Section II.C. Prolonged power outages can be life-threatening to seniors, especially those who live independently in their homes and rely on electricity-dependent durable medical and assistive equipment (DME). Those 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.

According to emPOWER data (accessed Feb 3, 2026), Dunn County has 10,284 Medicaid beneficiaries who have had an administrative claim for one or more types of electricity-dependent DME. Of these, 393 were identified as particularly at-risk because they also rely on certain essential health care services.

Medicaid Beneficiaries w/ Electricity-Dependent DME

Zip Code	Beneficiaries	At-Risk Beneficiaries
54725	714	22
54730	1,423	51
54734	229	11
54735	18	0
54737	141	11
54739	1,027	42
54749	304	11
54751	5,818	212
54763	307	11
54765	28	11
54772	275	11
total:	10,284	393

The Dunn County Aging and Disability Resource Center (ADRC) promotes individual emergency planning for senior and special needs clients, with emergency communications networks and other preparedness actions. ADRC provides emergency preparedness materials it shares with clients and works with County Emergency Management, Public Health, and other partners for the distribution of hazard awareness and preparedness educational announcements through the ADRC monthly newsletter. The volunteers with ADRC's Meal's on Wheels program are a key resource for connecting with clientele (about 120) during an emergency; these clients have "weather bags" with a supply of shelf stable food if drivers cannot make it.

Supplement 2.J. includes additional insights into related preparedness and response actions.

Projected Loss Estimates for Electric Infrastructure

Exposure estimates for all electrical infrastructure in the County is not available. However, in the entire Dunn Energy Cooperative system, there is approximately 2,065 total miles of line serving about 10,000 active accounts (customers). Approximately 54 percent (about 1,131 miles) of their electric lines are overhead.

2025 replacement costs for lines vary based on physical site conditions, but are approximated as follows:

Phase I – Overhead:	\$85,000/mile
Phase I – Underground:	\$136,000/mile
Phase III – Overhead:	\$152,000/mile
Phase III – Underground:	\$1720,000/mile

Other Factors Influencing Future Losses

As discussed in the tornado/high wind and winter storm sections, weather-related power outages may increase if the County experiences more frequent high wind or ice storm events, but we are unable to confidently quantify the extent of this increase at this time. See **Section III.B.** for additional discussion on the related effects of such changes in weather patterns. ***Mitigation Plan Supplement 2.J.*** explores additional factors influencing losses including key preparedness and mitigation actions by electric utility providers.

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. A survey or detailed analysis of cyber-preparedness for Dunn County and its community lifelines was not performed. *Dunn County Hazard Mitigation Plan Supplement 2.K.* provides additional details. **For any cyberattack risks and vulnerabilities specific or unique to the participating villages, cities, and school districts, please refer to the subplans in *Plan Supplements 5 & 6.***

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.



Hazard Location & Extent

Cyberattacks are capable of occurring in any community. There are no geographic boundaries or locations within Dunn County uniquely affected by cyberattacks. All Dunn County jurisdictions are equally at risk of experiencing a cyberattack event.

The U.S. Cybersecurity & Infrastructure Security Agency (CISA) has created the National Cyber Incident Scoring System to estimate the risk or impacts of a cyberattack incident. This system rates a cyber incident or threat on a score between zero and 100 based on a range of weighted factors. A category is then assigned that drives CISA response urgency:

Baseline (No Color) – Unlikely to affect public health, national or economic security, foreign relations, civil liberties, or public confidence. Likely to be immediately resolved.

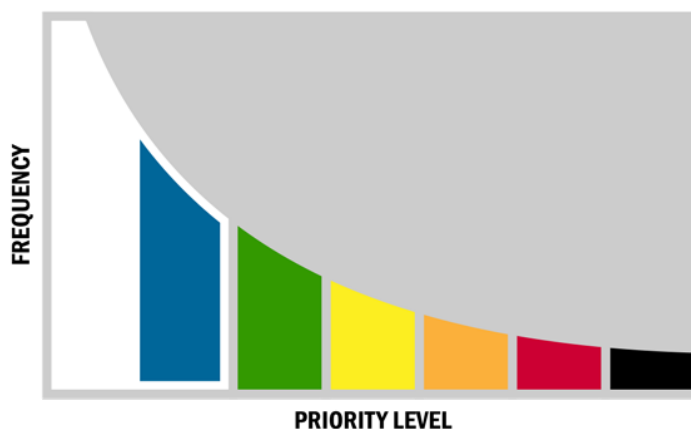
Minimal (Blue) – Same as baseline, but needs further scrutiny and could be escalated.

Low (Green) - Unlikely to affect public health, national or economic security, etc.

Medium (Yellow) - May affect public health, national or economic security, etc.

High (Orange) – Likely to result in a demonstrable impact to public health, national or economic security, etc.

Severe (Red) – Serious incident likely to result in significant impact to public health, national or economic security, etc.



Emergency (Black) – Priority incident poses an immediate threat to the provision of wide-scale critical infrastructure services, national government stability, or the lives of U.S. persons.

Hazard Mitigation Plan Supplement 2.K. provides a summary of the distribution of these incidents from FFY2022 by target partner and severity.

Event History - Cyberattack

The frequency and sophistication of cyberattacks are increasing dramatically as well as losses. National and State trends on cyberattacks are detailed in the *Hazard Mitigation Plan Supplement 2.K.* As discussed in the Supplement, major cybersecurity incidents within Wisconsin since 2020 have been experienced by Langlade and Rock counties, the City of Sheboygan, Kwik Trip, Prevea Health, and a software provider to many school districts.

No data source was identified during this Plan update that provides a complete history of attacks, impacts, and losses within Dunn County or the region. However, within west-central Wisconsin, a number of communities have experienced cyberattacks in which the public-sector was targeted:

- In 2009 St. Croix County, just west of Dunn County, encountered malicious keylogging software that 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.
- 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.
- The websites of a few communities in the region have been hacked and temporarily unavailable but local computer systems were likely not impacted.
- In March 2026, Rusk County, WI, northeast of Dunn County, discovered a cybersecurity incident impacting its county network environment.

No Dunn County municipalities reported that they experienced a significant cyberattack or data breach. Employee education is key to preventing malware, viruses, and targeted cyberattacks.

Hazard Probability - Cyberattack

The Plan Steering Committee rated both the probability of major cyberattacks in Dunn County as moderate-to-high, with a high/serious vulnerability (potential impacts). These events will continue to occur within or affect Dunn 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 of experiencing a cyberattack will also increase as our world becomes increasingly connected and reliant on broadband, smart appliances, etc. However, good cyber-security practices (cyber-hygiene) can be very effective at decreasing the probability of successful attacks. It is notable that public health agencies within northwest Wisconsin rated cyber-attack as the highest hazard threat (only behind evacuation), in part reflecting the importance of confidentiality given Federal HIPPA rules.

Vulnerability Assessment - Cyberattack

General Vulnerabilities	
People	- Any personal electronic device that connects to a network is at risk of a cyber-attack. - Over 9,600 reported cyber-security events occurred within Wisconsin in 2024 with nearly \$170 million in losses and 161.4 cyber-security complaints to FBI per 100,000 State residents. - Seniors – Seniors are a frequent target of phishing and fraud attacks. The 60+ year old age group experienced 22.3% of all reported cyber-crime within the U.S. in 2024. - Cryptocurrency users – In 2024, 1,973 cryptocurrency fraud complaints were reported in Wisconsin with over \$67.5 million in losses. These complaints have increased around 300% between 2018-2024.
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. Emergency communication systems, including 9-1-1 call centers, have been increasingly targeted by cyberattacks, including ransomware and denial-of-service attacks. As was the case in nearby Eau Claire County and Glenwood City, hackers may attempt to obtain access to bank accounts, financial information, etc. A 2023 cyberattack targeted Langlade County's 9-1-1 system.
Local Economy	- Cyber-attacks can cripple networks and shut down businesses at any time. - Elevated vulnerabilities are financial institutions, businesses conducting e-Commerce, and businesses or manufacturers utilizing computer-controlled equipment that may be remotely controlled. Data breaches will likely reduce the public's trust in any business or facility for which customer data is exposed and may result in liabilities or lawsuits. - Financial institutions - Access to personal information (bank account) at financial institutions can result in theft and/or identity theft. As more and more banking is performed online, financial institutions have been very proactive on cybersecurity issues.
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	- Services can be terminated due to an attack. - Utility infrastructure can be accessed and manipulated in a cyber-attack. There has been increasing attention to this vulnerability and related policies/protocols within local municipalities.
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. - 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.
Energy	Network can be accessed and manipulated in a cyber-attack.

	• Power can be redirected or terminated remotely. • Ability to remotely take control of critical systems that monitor and control water supplies, wastewater treatment systems, power generating facilities, dams, communication infrastructure, etc. and can cause damage to equipment. Lack of redundancy in systems and share systems can increase risks and vulnerabilities.
Communications	• Network can be accessed and manipulated in a cyber-attack. • 911 communications centers are increasingly the target of ransomware and denial-of-service attacks.
Transportation	• Public transit networks can be accessed and manipulated. • Traffic control systems can be accessed and manipulated resulting in confusion, traffic congestion and/or accidents.
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. • Cyberattacks can lead to 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. See subplans in Section VII.B. for any specific concerns.
Vulnerability to Future Assets	
Population Growth & Development	• There are no areas of higher or lower risk to cyber-attack. • As use of the internet and the Internet of Things increases at home and within businesses increases, the probability of a cyber-attack occurring increases.
Other	• 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.¹⁷ 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.¹⁸ In another case, a U.S. retailer in 2007 experienced data breaches and loss of personally identifiable information that compromised 45 million credit and debit cards.¹⁹ • 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.²⁰

Projected Loss Estimates

¹⁷ www.sans.org/newsletters/newsbytes/newsbytes.php?vol=10&issue=5, CIA presentation, SANS SCADA Security Summit, January 16, 2008.

¹⁸ www.bankinfosecurity.com/article.php?art_id=1197, February 5, 2009.

¹⁹ www.infoworld.com/d/security-central/retailer-tjx/reports-massive-data-breach-952, January 17, 2007.

²⁰ 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.

The Federal Bureau of Investigation's Internet Crime Complaint Center's 2023 Internet Crime Report provides some estimates on the financial impacts as a result of cyberattacks.

- \$12.5 billion dollars were lost to cyber crime, a 22% increase in losses suffered, compared to 2022. Business Email Compromise and Investment scams were the costliest crimes, accounting for more than 50 percent of losses.
- The age cohort of 60+ had the largest number of victims and losses.
- Wisconsin ranks 23rd overall in number of victims per state (7,683) and 29th overall in victim losses (\$92,084,459).
- The average victim in Wisconsin lost \$11,985.48. This is below the national average of \$14,197.80 per victim.
- Wisconsin's financial loss average has increased by almost 227% since 2020.

Cyberattack Preparedness & Mitigation (Cyber-Security)

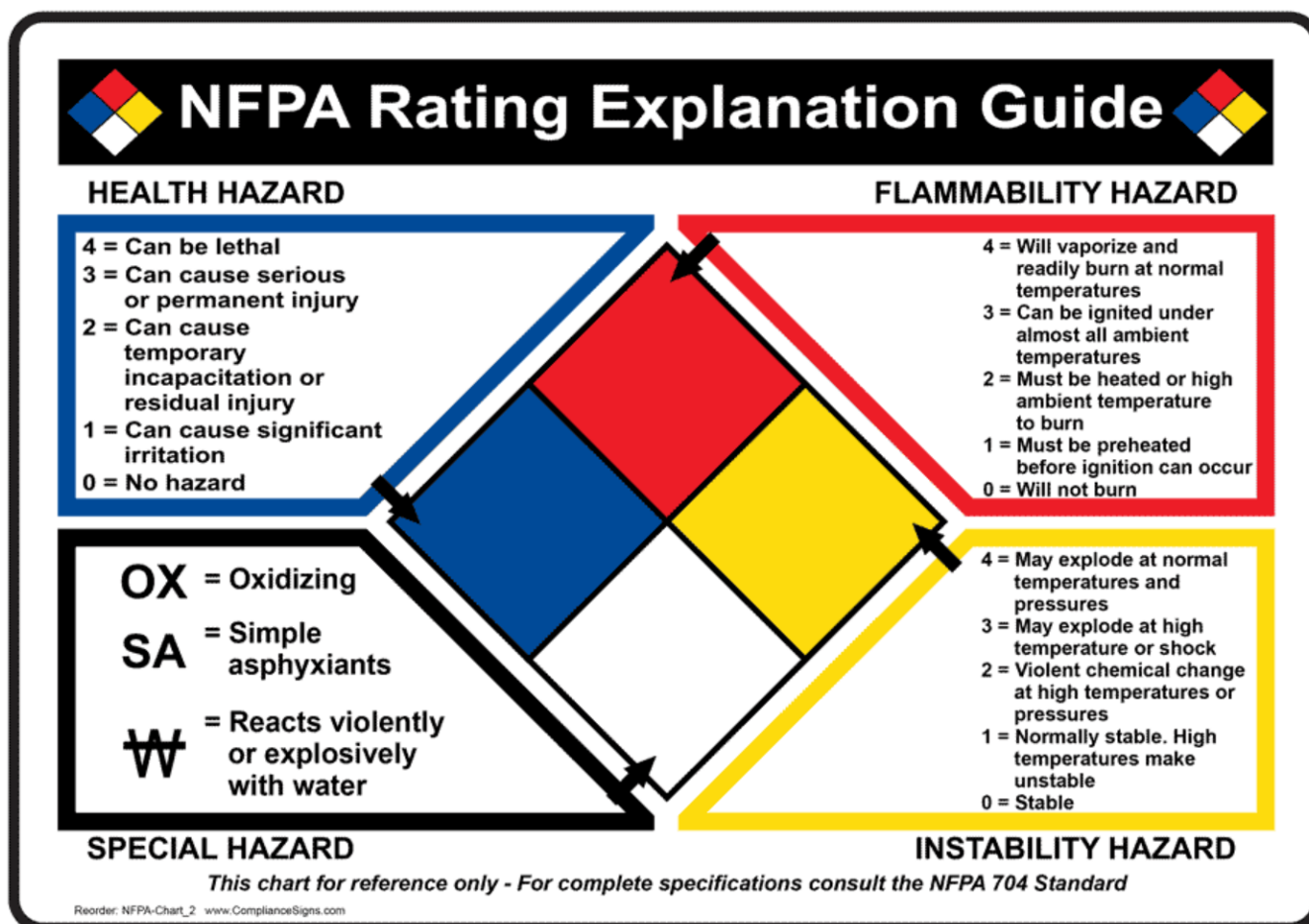
Cyberattack losses and vulnerabilities can be mitigated through cybersecurity and good cyber-hygiene. The *Hazard Mitigation Plan Supplement* includes a discussion of cyber-security preparedness at the Federal, State, and local level as well as potential preparedness and mitigation actions.

X. HAZARDOUS MATERIALS SPILLS

Note: This plan only focuses on point sources of contaminants due to an accidental or malicious hazardous materials incident, such as a hazardous materials spill or a release from a leaking tank. *Dunn County Hazard Mitigation Plan Supplement 2.L* provides additional details. **For hazardous material spill risks and vulnerabilities specific or unique to the participating villages, cities, and school districts, please refer to the subplans in *Plan Supplements 5 & 6*.**

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 *Dunn County Hazard Mitigation Supplement* describes many of the Federal definitions.



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 listed 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.

Two additional definitions are particularly important for county-level HazMat planning:

Active Reporting (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 (EHS) Facilities – These facilities have a total amount of an extremely hazardous substance present that equals or exceeds threshold planning quantity for that chemical. These facilities must also annually file Tier Two reports, in addition to submitting emergency plans for its hazardous substances for review by the Local Emergency Planning Committee (LEPC).

1. The chemical is expected to cause significant adverse acute human health effects at concentration levels which are likely to exist beyond the facility site boundaries as a result of a release. Acute (short-term) effects occur rapidly as a result of short-term exposure, usually to high concentrations of a chemical.
2. In humans, the chemicals are expected to cause cancer, birth defects, nervous system effects, gene mutations which can be passed on to the next generation, or other chronic (long-term) health effects associated with repeated exposure to a chemical over a long period of time.
3. The chemical is expected to cause significant and serious adverse effects on the environment due to its toxicity, and/or its persistence (tendency to remain in an unchanged form, rather than breaking down into smaller chemical parts), and/or its tendency to bioaccumulate (to become increasingly concentrated in plant and animal tissue).

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 & Extent

Hazardous materials are widely used, stored, and transported in Dunn County. A hazardous materials spill incident could take place almost anywhere. 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. 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.

The extent of a hazardous materials spill can be measured by its impacts such as: what has been contaminated, the area of exposure, environmental damage, the number of people injured, any required evacuation (zone size, numbers evacuated, evacuation length), economic losses, and clean-up costs. The extent of a spill event is unique for each occurrence and there is not a commonly used scale for measuring the size or intensity of most hazardous materials spills.

There are instances in which known or threatened hazardous materials releases are so extensive, posing a serious risk to human health and/or the environment, or the hazardous materials site has been largely abandoned, that Federal assistance is needed. In 1980, Congress established the Comprehensive Environmental Response, Compensation and Liability Act (**CERCLA**) or informally called the **Superfund** Program, which forces the parties responsible for the contamination to either perform cleanups or reimburse the government for EPA-led cleanup work. Those Superfund sites that pose the greatest risks to humans or the environment, and/or require EPA take a more active role during long-term response and clean-up are identified on the Superfund **National Priority List** (NPL). Many of these NPL locations are former mining sites, hazardous/solid waste dumps, chemical/fuel companies, and industrial areas which produced military ammunition.

Not all Superfund sites are on the NPL. Using EPA's Hazard Ranking System (HRS), sites with a score of 28.50 or greater are eligible for placement on the National Priority List. The HRS score is based on a range of factors, including: the likelihood of the release, toxicity and quantity of the waste, people or sensitive environments affected, and the pathways for exposure (e.g., drinking waters, surface water, soils, air).

Dunn County Superfund Sites

According to the Wisconsin DNR, Wisconsin has 36 active National Priority List (NPL) sites, 9 deleted/removed National Priority List sites, 1 proposed National Priority List site, and 10 other non-priority Superfund sites. **Dunn County has no active Superfund properties listed in the EPA Superfund Enterprise Management System (SEMS).**

Significant Dunn County Events

The *Hazard Mitigation Plan Supplement* includes a brief overview of State and regional HazMat events. The vast majority of reported hazardous materials incidents in Wisconsin result from the loading, unloading, and transportation of hazardous materials. The 1996 Weyauwega train derailment that required the evacuation of around 2,300 residents for 16 days continues to be the most dramatic HazMat incident in the State's history.

Bureau for Remediation & Redevelopment Tracking System (BRRTS) Records

The Bureau for Remediation & Redevelopment Tracking System (BRRTS) keeps data on hazardous materials releases and the clean-up of contaminated sites and is maintained by the Wisconsin Department of Natural Resources. The BRRTS system categorizes these events by activity type. As shown in **Table 11**, there are 699 BRRTS records for Dunn County with dates from 1978 to 2025, of which only 11 are still open; the remaining are assumed to be closed for which no further action is likely needed.

Table 11. BRRTS Records for Dunn County – 1978 thru 2025 report start dates²¹

Activity	1978-1999		2000-2025	
Spills	202	50.6%	205	68.3%
Leaking Underground Storage Tanks	100	25.1%	10	3.3%
Environmental Repair (non-LUST)	21	5.3%	21	7.0%
No Action Required Discharge	69	17.3%	36	12.0%
Abandoned Container or Other	0	0.0%	2	0.7%
Voluntary Party Liability Exemption	0	0.0%	1	0.3%
Offsite	7	1.8%	25	8.3%
Totals	399	100%	300	100%
Average Reports per Year	19		12	

The above suggests that hazardous materials releases in the County are decreasing in frequency. Since 2000, about 68% of all BRRTS reports were spills. **Spills** are locations where a clean-up is confirmed by laboratory analysis, generally within 60 to 90 days. 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.

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. For reference, **Figure 17** later in this assessment shows the location of the open LUST and ERP sites in the County.

Of the BRRTS records from 2000-2025:

- 51% were located in the City of Menomonie

²¹ 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.

- 12% were located in the Village of Elk Mound
- 8% were located in the Village of Colfax

Other Recent Hazardous Materials Spills

No recent, major hazardous materials spills within Dunn County were identified during the planning process. During this Plan update, transportation-related hazardous materials spills were frequently mentioned by communities as a greater concern than EPCRA-regulated fixed sites since it is not known what HazMat is being transported through the County at any given time, making it more difficult to plan for and respond to. Further, while there is a higher risk of transportation spills nearer Federal and State highways due to traffic volumes, such spills could potentially occur anywhere along roadways and railroad lines.

Hazard Probability – Hazardous Materials Spills

The Plan Steering Committee rated hazardous materials spills for fixed sites (e.g., places of business) as having a below moderate (some concern) for probability of occurrence and a moderate vulnerability (potential impacts). Transportation-related concerns were rated slightly higher for both probability and vulnerability.

Approximately 10-15 hazardous materials spills or other releases will be reported in any given year in the County based on the BRRTS data since 2000. The largest proportion of these events will be spills, for which the majority are smaller incidents that are cleaned-up with a very short timeframe. Leaking underground storage tanks (LUSTs) are expected to continue to decrease in frequency.

Of greatest concern are the environmental repair projects for contaminated sites, such as illegal dumpsites, closed landfills, buried containers, overturned trucks/rail cars, illegal drug laboratories, or large industrial spills. Such sites have the greatest potential for environmental impact; environmental repair sites have the highest likelihood of requiring a long-term investigation and significant remediation measures. **Based on BRRTS data, new environmental repair sites will be reported for the County at an average slightly less than one per year, though not all will require significant remediation activities.**

The level of risk is also influenced by growth in Dunn County. As more growth occurs, there is an increase in the potential number of contamination sources. And, as the number of industries increases, there is an increase in the general use of hazardous materials in the County for domestic, institutional, and commercial purposes. Traffic volumes are also rising, which increases the potential for accidents involving vehicles carrying hazardous materials. Further, as additional private wells are installed, more residents are potentially vulnerable to groundwater contamination. It can be expected that the frequency of hazardous materials incidents and spills in the County could slowly increase as the County's population continues to rise and development occurs. Not included in the previous probabilities is the potential for an intentional HazMat release, including as an active threat or act of terrorism.

Vulnerability Assessment – Hazardous Materials Spills

General Vulnerabilities	
People	- Residents located near highways, railroads, or facilities utilizing significant quantities of hazardous chemicals are more vulnerable. Incorporated cities and villages have the greatest vulnerabilities given the concentrations of people, businesses, lifelines, and hazardous materials facilities. - 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, including law enforcement and other emergency responders, are at an increased risk of exposure to hazardous chemicals when responding to spills. In 1999, two responders in the region did receive respiratory injuries during a transportation-related hazardous materials incident.
Food, Water, Shelter	- Hazardous material spills can infiltrate groundwater, soils, and livestock that are later used to create products for human consumption. - 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 support growth. As the population increases in the County, the number of new private well permits each year has also been significantly increasing. - Shelters near hazardous spill sites can increase the risk of exposure to toxic chemicals. - With contract spraying and local cooperatives, fewer farms are storing large quantities of hazardous materials, but some stakeholders in the regional have anecdotally suggested that this trend may be reversing.
Health & Medical	Exposure to hazardous materials can cause medical ailments, potentially increasing demand for healthcare facilities.
Energy	Natural gas and petroleum transmission pipelines transport substances that are hazardous but are also energy community lifelines. See the pipeline maps later in this subsection.
Communications	None known.
Transportation	- A wide variety of chemicals move through and within the 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. - 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	The County has 23 EHS planning facilities and 39 Tier Two reporting facilities with hazardous materials in such quantities requiring special planning and/or report under Federal rules.

Educational Institutions	Some schools have hazardous chemical on-site. Some schools are also located near railroads. See sub-plans in the Plan Supplement 6 for participating institutions for any specific concerns.
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.

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 17** 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.

Figure 17 also identifies the highways and railroad of Dunn County. During the planning process, transportation-related spills were consistently identified as the greatest hazardous materials concern for the following primary reasons:

- Traffic accidents occur with many contributing factors that can be difficult to control or mitigate, including the uncertainty of what materials and quantities being transported.
- Major highways with heavy truck traffic and the rail 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 many of these facilities, local emergency response personnel are familiar with the facilities and materials being used.

Public Officials Have An **ACTIVE ROLE** in Pipeline Safety and Security

- Be aware of pipeline facility locations in your area.
- Report suspicious individuals or activities immediately.
- Be aware of signs of leakage (e.g., sight, smells, sounds)
- Watch for and report unauthorized digging along pipeline right-of-way.
- Address pipelines in your emergency response procedures; work with your pipeline company.
- Know that pipeline company employees and contractors carry photo ID and will show it to you upon request.

*source: Pipeline Association
for Public Awareness*

Figure 18 includes two maps from the State of Wisconsin showing the locations of major energy distribution pipelines; a map with more detailed pipeline locations within the County are not included in this plan for reasons of security.

Deep-Well Casing Areas & Landfills

Also shown on Figure 17, Dunn County has one WDNR-designated deep-well casing area for potable groundwater (wells) due to groundwater contamination. This designated area is in the City of Menomonie extending into the Town of Red Cedar. Also shown on Figure 17 are the County's numerous landfills for which a special variance approval is needed prior to drilling a potable well within 1,200 feet.

Figure 17. Key Areas of Hazardous Materials Concern

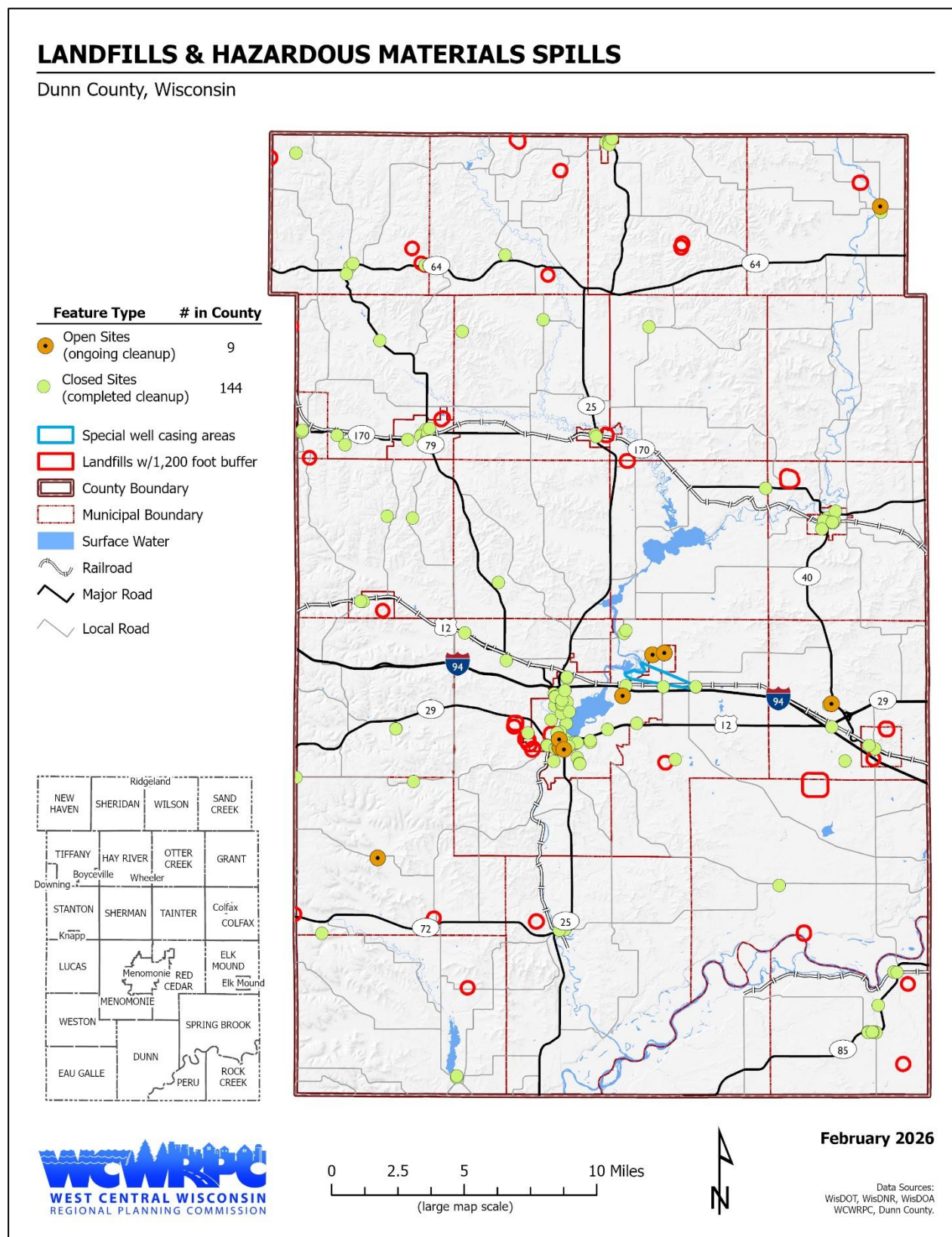
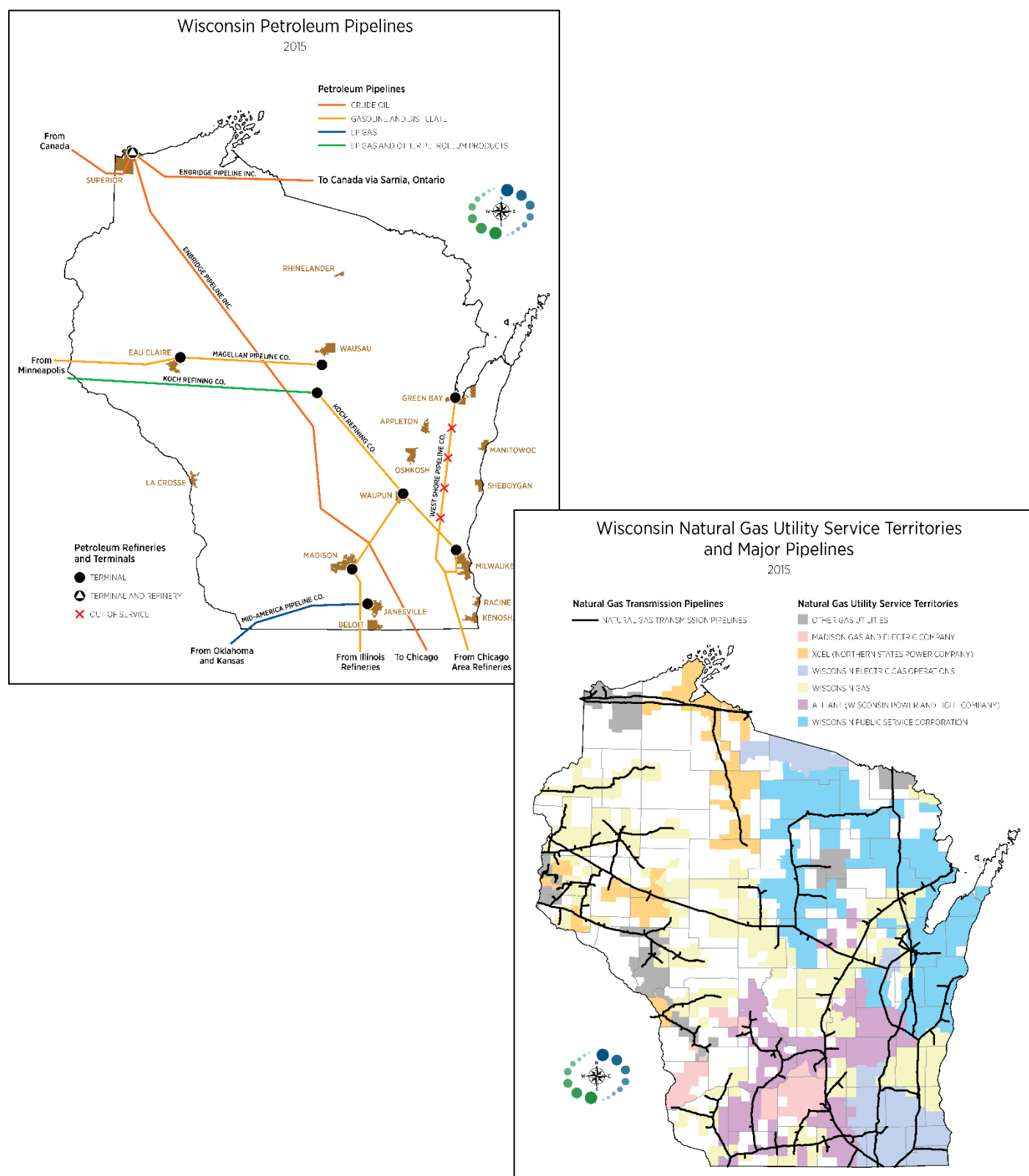


Figure 18. Wisconsin Pipeline Locations, 2015

source: Wisconsin Public Service Commission



EHS and Tier Two Facilities

As of 2019, there were 39 Tier Two Reporting facilities and 23 active EHS Planning facilities located within Dunn 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 incorporated areas, with the largest concentration within the City of Menomonie, **only three of the EHS sites are located outside Menomonie.** For reasons of security, maps showing the locations of these EHS and Tier Two facilities have not been included within this plan. During this Plan update, no unique natural hazard vulnerabilities were identified for any of the Tier Two or EHS facilities. **One EHS and three Tier Two facilities were identified as potentially being located within a 100-year floodplain or in a dam shadow; two of the Tier Two facilities were associated with non-metallic mining sites.**

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 2024, Dunn County had about 168,922 pounds of on-site releases or off-site disposal of toxic chemicals from nine locations. Approximately 37% was disposed of or released off-site while 100% of all onsite releases were to the air. 3M Co located in the City of Menomonie, accounted for much of the on-site and off-site release. Of the 1.3 million pounds of production-related waste managed in the County in 2024, 9% was recycled, 78% was treated and 13% was disposed or released. Additionally, the trend shows that the amount of production-related waste managed in the County continues to decrease.

Tier II Reports

EPCRA's Hazardous Chemical Inventory

What's In?

You must submit if your facility used or stored:

- 500 lbs of an EHS or the TPQ, whichever is less; or
- 10,000 lbs of any other hazardous chemical.

Due March 1

What's Out?

Exemptions include:

- Consumer products, as packaged for use by the public
- Food, additives, drugs, or cosmetics regulated by the FDA
- Substances in solid items, with no exposure under normal use
- Substances used in research labs and medical facilities with proper supervision

The Chemicals

EHS List: 40 CFR 355 Appendix A

Hazardous chemical: any substance that requires a facility to maintain an SDS

Some states list other chemicals or have lower thresholds

Report Submission

E-Submittal methods vary from state to state

Submit reports to the SERC, LEPC, and local fire department

Check with LEPC and fire dept. for specific reporting requirements

Common Errors

Mixtures: see EPA guidance

Lead-acid batteries: see EPA guidance

Waste products: check with state agency

Sources: <http://Enviro.BLR.com>
<http://www.epa.gov>

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It must be stressed that some type of inappropriate action should not and cannot be insinuated or implied when a facility appears in the TRI database. **In most, if not all, cases, the TRI reported releases are in compliance with applicable regulations and are consistent with the appropriate management plans. The far majority of releases in the TRI database are not accidental spills, but could be considered part of normal business practice under current regulations.** This information is provided to convey a greater sense of the risks of an accidental spill at a location using these substances or during transport. And, again, this only includes reports for facilities releasing 10,000 or more pounds.

Manure Storage and Animal Waste Management Facilities

As documented in Section II.C., Dunn 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. The *Dunn County Hazard Mitigation Plan Supplement* provides details on a statewide study of manure incidents.

During the plan update, no large manure spills or large fish kills as a result of nutrient run-off in Dunn County were identified by stakeholders. Locally, issues related to animal waste and nutrient management are primarily monitored and addressed by WDNR and the Dunn County Land Conservation Division. The Land Conservation Division enforces the *Dunn County Agricultural Performance Standards and Manure Storage and Management Ordinance*, provides related educational services, and manages a program to potential cost-share the proper abandonment of facilities that are no longer being used.

It must be noted that there is ongoing political and legal debate whether manure should be classified as a hazardous material or hazardous waste. As part of a 2015 Wisconsin Supreme Court Case (Wilson Mutual Insurance Co. v. Falk), the Court found that "just because manure may be beneficial when spread on a field, does not mean it is not a pollutant." This report does not attempt to make such legal and regulatory distinctions.

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS)

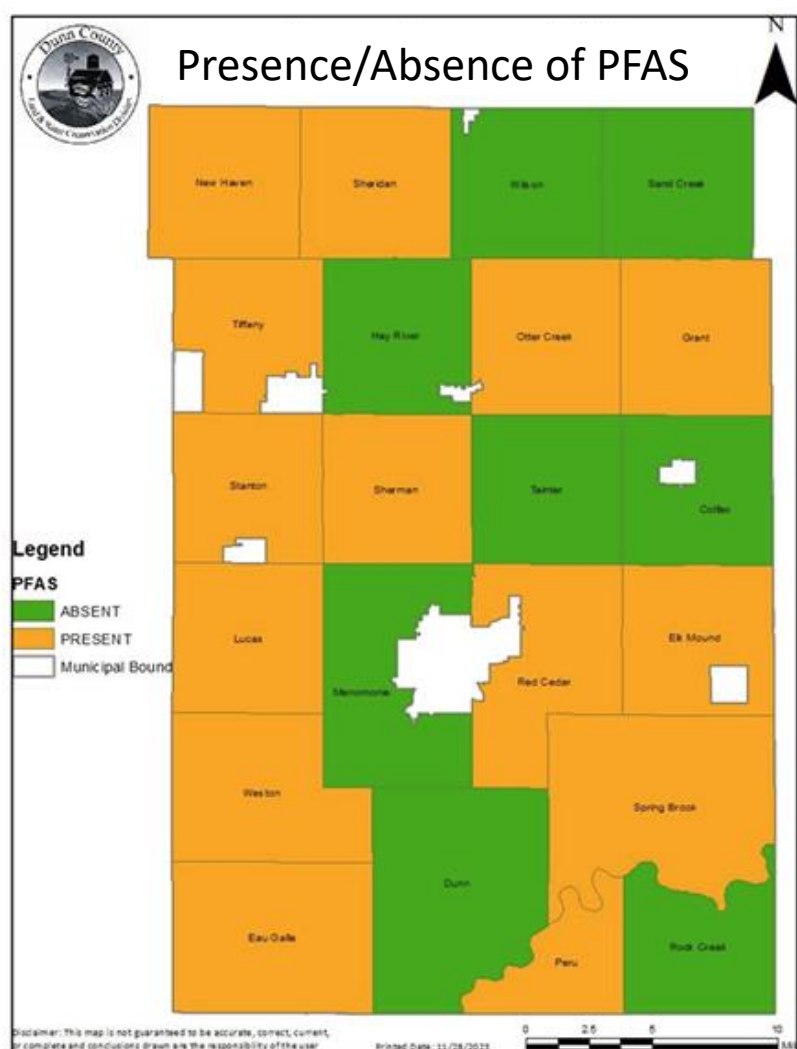
During the 2026 Plan update, PFAs were identified by some participants as a growing concern. This subsection recognizes these growing concerns, though information regarding PFA contamination is evolving, and the threat comes from many sources and not just HazMat spills.

PFAs are a large group of over 6,000 human-made chemicals that have been used in industry and consumer products worldwide since the 1950s. PFAs were widely used, long lasting chemicals. Since their components break down very slowly over time that have been nicknamed “forever chemicals”.

Most PFAS use was discontinued in the early 2000’s, but they continue to impact the environment. PFAS were used in a wide variety of products from non-stick cookware to stain resistant coatings for carpets and furniture. Because they do not decay very quickly, PFAS are able to infiltrate groundwater and water supplies through runoff and absorption. The true effects of PFAS on the environment and on people are not fully known. It has been determined that PFAS, through water infiltration, are being ingested by animals and people where they then collect in the body overtime.

PFAs continue to be studied and related regulations also continue to change. WDNR has created an interactive data viewer to identify testing areas, contamination sites and fish and game consumption advisories. In 2023 the County tested all 22 Town wells for the presence of PFAS; 14 of the 22 town samples had detectable levels of PFAS compounds but all were below the standards set forth by DHS. **Figure 18** shows the results of the 2023 PFAS testing.

Figure 18. Presence/Absence of PFAS, Dunn County 2023



What are PFAS?

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



stain-resistant carpet & fabric



non-stick cookware



firefighting foam



fast food packaging

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



infertility & low birth weight



developmental delays

What You Can Do...



Test Your Water
dnr.wi.gov/u?q=177



Check State Fish Advisories
dnr.wi.gov/u?q=176



Learn More About PFAS Health Risks
dnr.wi.gov/u?q=175



Visit **dnr.wi.gov**, search **PFAS**.



RR-114b-E

Potential Groundwater Impacts

Nearly all Dunn County residents rely on local groundwater for their source of portable water. Businesses, including agriculture and industry, also rely on groundwater. One of the potential environmental impacts of a hazardous materials release or spill is groundwater contamination. Groundwater collects or flows beneath the Earth's surface, filling the porous spaces in soil, sediment, and rocks, and is the source of water for aquifers, springs, and wells. The degradation or pollution of groundwater quality due to some substance or toxin introduced or spilled onto the soil and making its way to the groundwater can pose health risks for those using the groundwater for drinking and domestic use.

All groundwater is susceptible to contamination. Soils, geology, and depth to water table are characteristics of the natural environment that influence a location's relative susceptibility to groundwater contamination. **Figure 19** 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.

Projected Loss Estimates

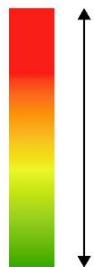
Due to the lack of comprehensive, up-to-date data and related studies, future loss estimates for hazardous materials spills in Dunn County are not included. However, basing future losses on historic spill data under-estimates the true vulnerability. A very large HazMat release is possible in Dunn County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

Figure 19. Groundwater Contamination Susceptibility

GROUNDWATER CONTAMINATION SUSCEPTIBILITY

Dunn County, Wisconsin

More susceptible



Less susceptible

Open, Environmental Repair (ERP) Site - 13

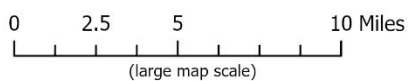
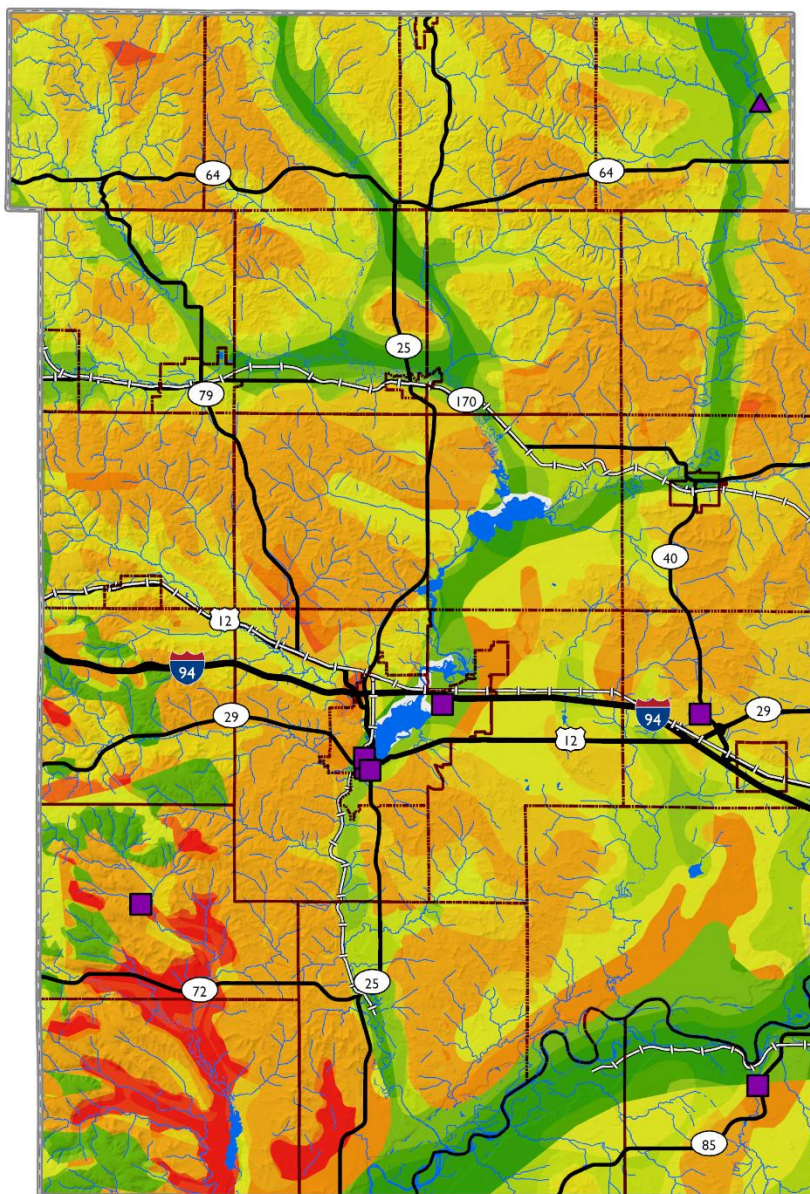
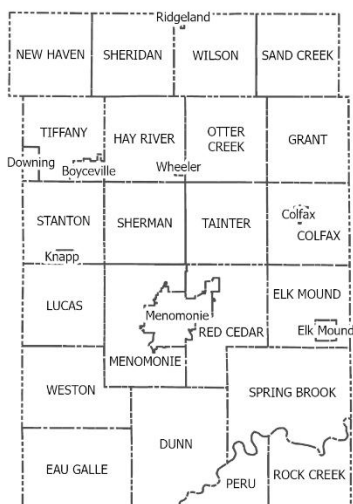
Open, Leaking Underground Storage Tank (LUST) Site - 4

Railroad

County Boundary

Municipal Boundary

Surface Water



November 2025

Data Sources:
WisDNR, WISLR,
WCWRPC, Dunn County.

xi. ACTIVE THREATS

This sub-section highlights active threats information and the effects of these events. *Dunn County Hazard Mitigation Plan Supplement 2.M.* provides additional details. **For active threat risks and vulnerabilities specific or unique to the participating villages, cities, and school districts, please refer to the subplans in *Plan Supplements 5 & 6.***

Defining the Hazard—Active Threats

For the purpose of this plan, an active threat incident occurs when an individual (or group) displays a weapon, having made threats, and shown intent to cause harm or act out violence. A weapon includes any firearm, knife, vehicle, or other instrument that can cause bodily harm, injury, or death. Such incidents can include:

- **Active shooters** – one or more subjects who participate in a random or systematic shooting spree with the intent to continuously harm or kill others.
- **Bombs and/or bomb threats** – any explosive device or bomb or bomb on or near a target, regardless of the method of delivery (e.g., pipe bomb, car bomb) or whether the threat is real or a hoax.
- **Hostage situations** – one or more subjects hold people against their will in order to hold off authorities, often threatening to harm the victims if approached. The hostage-taker(s) may issue demands, often including the release of hostages.

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. OSHA has further identified four primary categories for workplace violence events, though the perpetrator's primary intent may not also be to harm large numbers of persons: Criminal Intent, Customer/Client, Worker-on-Worker, and Personal Relationships.

Additional definitions are included in *Dunn County Hazard Mitigation Plan Supplement 2.M.*

Hazard Location & Extent

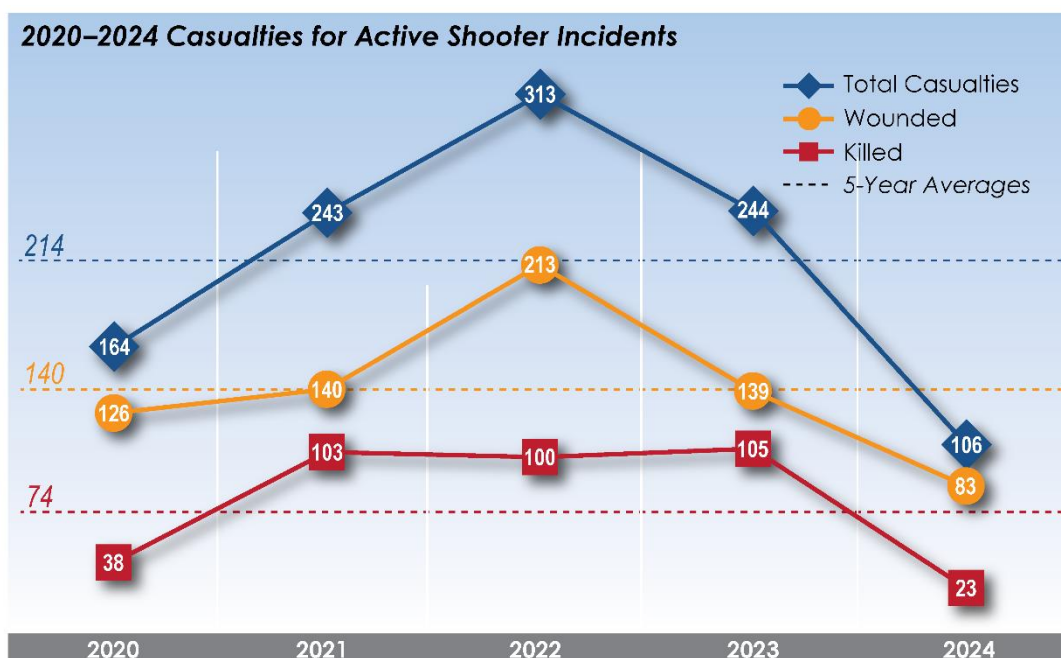
Active threat events can occur anywhere in Dunn County. *Mitigation Plan Supplement 2.M.* includes data showing that such threats occur in communities of all sizes and across a broad spectrum of socio-economic circumstances. Like Dunn County, about three-quarters of all active shootings occur in majority white communities. While active threats can occur anywhere, places and events where 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 Dunn County, such places would include churches, hospitals, schools, community events, larger employers, and other gathering spaces.

There no adopted 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). *Mitigation Plan Supplement 2.M.* describes one way to evaluate the evolution of an active threat and related pre-event, during the event, and post incident actions. Very few organizations will experience an active shooter incident that wounds or kills multiple victims; a far greater number will experience other forms of workplace violence (e.g., threats, simple or aggravated assaults, robbery, trespass, damage to property, rape).

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 Dunn 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

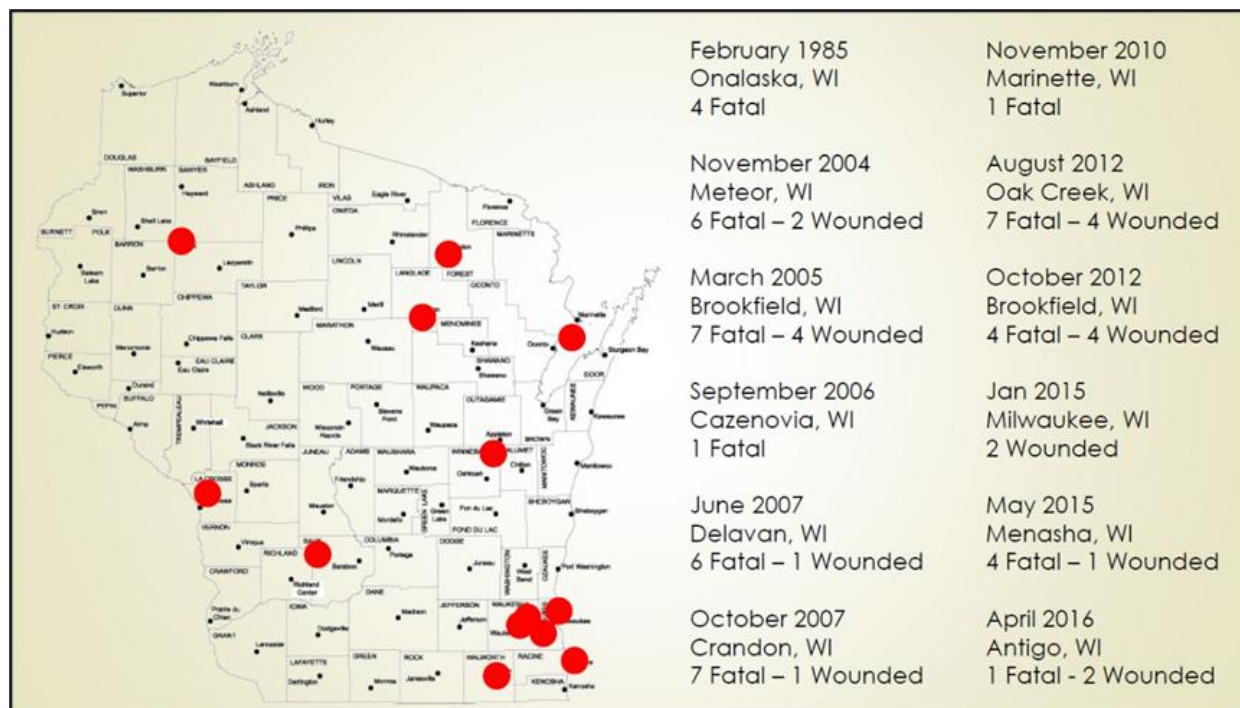
National trends on active threats are detailed in *Mitigation Plan Supplement 2.M.* Overall, the number of active shooter events in the United States almost tripled from 2000 to 2022, though there has been a significant recent decrease. The largest majority of events since 2000 occurred at places of commerce (45%), followed by open spaces (21%) and educational institutions (14%).



FBI. *Active Shooter Incidents in the United States*
2024, June 2025

Significant Dunn County Events

To date, there have been no large, active shooter incidents in Dunn 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.
- 2021 – SUV drove into a crowd, killing at least five people and injuring over 40 others during a Christmas parade in Waukesha, WI.
- December 16, 2024 – School shooting at Abundant Life Christian School in Madison, WI where three people were confirmed dead and size others were injured.

Closer to home, on August 27, 2025, a mass shooting occurred at the Church of the Annunciation in Minneapolis. Two children and the perpetrator died, and thirty other people were injured.

There is no reason to believe that active shooter events in Wisconsin (or Dunn County) would significantly differ in character than national trends. The Wisconsin events listed previously 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 north of Dunn County, the 2004 Meteor shooting involved a dispute over a hunting stand.

Hazard Probability - Active Threats

The Plan Steering Committee ranked active shooter as having a moderate-to-low probability of occurring in Dunn County (i.e., of some concern), but a high/serious vulnerability in terms of potential impacts (e.g. injuries, death) should an event occur. This is partly due to Dunn County's relatively small, largely rural population.

Predicting the active shooter risk for Dunn County (2020 population of 45,440) is difficult, if not impossible, given the national average rate of 45 incidents per year (2020-2024) for the U.S. population of over 340 million.²² Based on the Wisconsin and national trends, we can say that rural areas and smaller communities, such as Dunn County, are not immune to active shooter events, though the risk is higher in areas of higher population density.

Predicting the active threat risk for Dunn County (2020 population of 45,440) is difficult, if not impossible. In the United States from 2020-2024 each year on average there were:

- 45 active shooter incidents with 214 casualties (injuries & fatalities)
- 305.6 bombing incidents (5 in Wisconsin in 2024)

Based on the U.S. population of 340 million, the above active threat incidents are rare. Using these national averages and the County's population, **Dunn County would, on average, experience 0.0062 active shooter incidents in a year (about 1 event every 161 years) and 0.0419 bombing incidents per year (about 1 event every 23.9 years), 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 Dunn 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 Dunn 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

²² U.S. Department of Justice Federal Bureau of Investigation. *Active Shooter Incidents in the United States 2024*. <file:///C:/Users/SusanBadtkc/Downloads/Active%20Shooter%20Incidents%202024.pdf>

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 Dunn County is increasing. This trend could cause tensions between existing and new residents. It is also not surprising that the number of incidents generally increase as the 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

General Vulnerabilities	
People	All individuals are at risk of experiencing active threat events.
Gathering Places, Parades, & Festivals	- Locations with increased populations and transient populations face have an increased potential for active threat events. - Houses of worship remain a top target. Reported active shooter events at houses of worship varied in denomination and included retreat centers/camps. At least half of the incidents at houses of worship were likely motivated due to the denomination or race of the worshippers.
Local Economy	- Large employers are a frequently mentioned active threat concern. The general distribution of businesses by type are described in Section II.C. - Active threat events may result in shutdowns or closures.
Natural, Historic, & Cultural Resources	None known.
Governmental Facilities	County and local municipal building are frequently mentioned active threat targets. Section II.D. identifies the local government buildings, fire halls, and law enforcement facilities in Dunn County. Details on the active threat vulnerabilities and capabilities of cities and villages are included in the municipal subplans.
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 <i>Cyberattack</i> section. - Hospitals and healthcare facilities not only serve a persons more vulnerable to a hazard event, 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; Dunn County’s hospitals are smaller facilities.

	• There were no patterns or factors that could definitively 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. • Most involved a determined shooter with a specific target. Most shooters were neither current or former patients or employees. 91% of shooters were men. • About 40% could have been prevented using a metal detector, but such a security practice can be difficult and expensive to fully implement.
Energy	• Utility infrastructure is a potential target in threat events. See also <i>Cyberattack</i> section.
Communications	• Infrastructure is a potential target in a threat events. See also <i>Cyberattack</i> 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 <i>Cyberattack</i> section. • Most systems / organizations have increased preparedness to address active threat events. • See subplans for participating jurisdictions within Section VII.
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 if the population grows.

Projected Loss Estimates

Given the relative rarity of these events and the lack of past events in Dunn County, projected loss estimates are not provided in this plan.

Other Factors Influencing Future Losses

- Population Growth. As noted previously, Dunn 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.

As discussed in the *Mitigation Plan Supplement*, an “all threats” approach is advised that should consider: education & awareness, planning & exercises, site assessment & hardening, employee/client assistance, and collaboration with partners.



BE PREPARED FOR AN ACTIVE SHOOTER

Recent national tragedies remind us that the risk is real. Taking a few steps now can help you react quickly when every second counts.



FEMA

FEMA V-1000/March 2018

An active shooter is an individual engaged in attempting to kill people in a confined space or populated area. Active shooters typically use firearms and have no pattern to their selection of victims.



Can happen anywhere



Can happen anytime

IF YOU ARE INVOLVED IN AN ACTIVE SHOOTER INCIDENT

See something,
say something.



Learn first aid skills so
you can help others.



Before you run, know the exits.



Help law enforcement.



Find a place to hide.



Seek help to cope with trauma.





Run



Hide



Fight

SECTION IV. CAPABILITY ASSESSMENT

FEMA Resiliency Rating for Dunn County

Overall, FEMA's National Risk Index (NRI) rates Dunn County's community resilience as having a **Relatively Moderate** 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. This community resilience assessment is based on 49 social, economic, environmental, governance, and housing/infrastructure variables. When compared to the rest of Wisconsin, the County's community resilience is significantly lower (i.e., 56.71 national percentile vs. 27.78 state percentile). This data suggests that preparedness efforts are very important and that support from outside the County may be critical to response and recovery following a major disaster event.

Overview of Mitigation Actions in Dunn County

FEMA's planning guidance requires that mitigation plans document each jurisdiction's existing authorities, policies, programs, and resources and its ability (or lack of ability) to expand on and improve these existing policies and programs as they relate to the local hazard mitigation. To address this requirement, **Supplement 3.A.** includes a table of potential mitigation and preparedness activities indicating whether each activity is being carried out in Dunn County; additional notes are provided for each activity, including any opportunities to expand upon or improve local actions. **Supplement 3.B.** reviews progress on high priority recommendations from the County's 2020 Mitigation Plan. The city, village, and educational institution sub-plans in **Supplements 5 & 6** identify mitigation actions for other participating jurisdictions. The following are some key findings from this capability assessment review.

Community Planning & Regulatory Capabilities

Dunn County has a long history of FEMA-approved mitigation planning (2007, 2013, 2020) and most communities have comprehensive plans, though many are out of date. Mitigation considerations are incorporated unevenly within community plans, with strongest emphasis on floodplain and stormwater management and the delivery of core emergency services (e.g., law enforcement, fire, EMS). State-mandated building codes provide basic hazard protections, but limit local flexibility for enhanced standards. Zoning, subdivision control, driveway regulation, and address signage enforcement operate to varying degrees across communities; some fire departments have emergency access concerns with driveways. The County maintains a strong GIS program, though lacks detailed structure data, which limits a robust vulnerability assessment.

Flood Mitigation

Floodplain and shoreland zoning is well-established and development in floodplains is discouraged, though Downing, Knapp, and Ridgeland do not participate in the National Flood Insurance Program (e.g., likely have not adopted the most recent maps and/or floodplain zoning ordinance). Stormwater and drainage improvements continue, and have addressed many of the key flooding hotspots identified in past mitigation plan. There have been no recent flood acquisition, floodproofing, or similar structural flood mitigation efforts; the County has utilized FEMA mitigation flooding for a shoreline revetment project and the Village of Colfax has addressed shoreline erosion concerns threatening their wastewater treatment plant. Most dams are in good repair, with no major deficiencies reported; hydraulic shadow mapping has been completed for high hazard dams and a dam

failure exercise planned with Xcel Energy. Flood warning systems rely mainly on NWS with some Xcel warning sirens; interest exists in additional local flood gauges.

Physical Mitigation Projects

Some communities have designated storm shelters, though few, if any, meet hardened safe-room standards. Power line burial, tree trimming, snow fencing, and transportation hazard controls are regularly implemented. Many critical facilities lack generators and formal emergency fuel agreements. Fire protection and related water access is generally good; some equipment needs identified by fire departments. The County lacks formal warming/cooling centers, though libraries and municipal buildings are commonly used informally and demand has been low. Capital improvement planning supports mitigation efforts, and recent hazardous waste disposal programs demonstrate proactive coordination.

Emergency Operations Planning & Training

The County maintains an updated Emergency Operations Plan and coordinates it with the Public Health Emergency Preparedness Plan. Most municipalities have emergency plans, but updates are inconsistent. Regular training occurs at the County level. HazMat training is strong, aided by regional Type I and Type III teams. ICS training is met by most responders, but elected officials may need additional support. Except for the County, continuity of government planning is limited. Evacuation, debris management, mass-gathering planning, and volunteer management show partial development; credentialing in place. Communicable disease planning is robust.

Emergency Notification & Communications

The centralized 9-1-1 center provides strong countywide coordination. Communications gaps persist in rural and hilly terrain and remains a top concern; a radio study recently completed and improvements scheduled. Storm siren coverage is generally good, though aging equipment and battery back-up concerns exist. NOAA radio distribution is limited, but IPAWS, CodeRed, and social media are used effectively. ARES/RACES and Skywarn programs are active.

Education, Outreach, and Preparedness

Public education is relatively strong, especially during Severe Weather Awareness Week, though should continue to be supported. Outreach to seniors and other residents is well-coordinated in partnership with Public Health and ADRC. Soil health and shoreland practices are actively promoted. Wildfire education is limited due to relatively low risk.

Mutual Aid & Partnerships

Law enforcement and fire/EMS mutual aid is strong and well-coordinated (e.g., MABAS). Public works mutual aid is informal in most cases. Public health partnerships are robust, supported through regional health readiness coalitions. Limited public-private partnerships exist. County agencies maintain strong relationships with schools and higher education institutions, with regular exercises at UW–Stout. VOADs—particularly Red Cross, Salvation Army, and Stepping Stones—are active but face declining volunteer numbers.

Barriers & Opportunities

In addition to the above, barriers to capabilities and mitigation action as well as ways to strengthen, expand upon, or improve the capabilities were discussed during Plan Update Steering Committee meetings, community meetings, and stakeholder interviews. The following primary barriers and potential approaches were identified:

Barriers

- Lack of funding, limited grant availability, and increasing costs. This was the most frequently mentioned barrier, especially for the implementation of mitigation measures, such as the construction of safe rooms or additional flood/stormwater storage measures.
- Time for training, planning, and implementing mitigation/preparedness strategies.
- Lack of volunteers; volunteer fatigue and burnout. This is a challenge for many volunteer fire and EMS organizations in the County.
- Many stakeholders are uncertain of severe weather, heating/cooling, and emergency shelter availability and shelter capacities (e.g., long-term availability, generators, open to pets). The demand for different types of public shelters varies by community.
- Challenges keeping up with changing threats, such as increasing heavy rainfall events due to long-term weather patterns and increasing sophistication of cyberattacks. Emerging/changing threats require continued creation/amendment and exercising of emergency plans.
- The County could benefit from greater, inter-departmental and partner coordination of emergency preparedness and planning with additional engagement of public and private partners so there is a greater understanding of available resources and roles during a disaster event.
- Dunn County's communities differ. Menomonie and UW-Stout have a more urban population with a large student population, with associated plans and capabilities. Outside of Menomonie, many communities have an aging population, are less densely populated, and resources limit preparedness and response capabilities.

Opportunities

- Training, exercises, drills and meetings; bring stakeholders together to share understanding of trends, resources, and lessons learned.
- Continue to regularly engage local communities and the public, including educational outreach. Collaborate with employers and local organizations on public preparedness programs.
- Inventory key resources/needs (e.g., shelters, emergency generators), then share findings with key stakeholders/communities and work collaboratively to fill gaps.
- Integrate the Mitigation Plan findings and recommendations into other County and community plans.
- Continue to assess potential long-term weather change impacts to risks and encourage adaptation strategies as part of future mitigation plans and other related plans (e.g., comprehensive plans, stormwater management plan, promoting soil health practices).
- Use the County's Integrated Preparedness Plan to guide equipment & training needs.
- Advertising, engaging, and empowering volunteers.
- Pursue grant opportunities to supplement limited local funding for the implementation of recommended mitigation projects. Utilize available local resources and partnerships for in-kind cost share contributions when possible.

SECTION V. MITIGATION GOALS AND STRATEGIES

A. MITIGATION GOALS

The following mitigation goals apply to all hazards. The mitigation goals are intended to provide direction to achieve the desired outcomes and are to be used as guidelines by which mitigation activities are identified and impact is evaluated. The Plan Update Steering Committee reviewed the goals in the 2020 Mitigation Plan and determined that the 2020 goals were largely still consistent with community plans. The revised goals are not limited to natural hazards with an increased emphasis on anticipated threats and innovative solutions.

Goal One: Physical Development and Infrastructure Goal

Through collaboration, education, and capacity-building, provide for the safety of residents, ensure the continuity of essential services, and limit damage to homes, structures, and other improvements by exploring, supporting, and implementing strategies that mitigate the impacts of anticipated hazard events while providing and maintaining a strong, physical infrastructure (e.g., transportation networks, flood controls, dams & levees, stormwater management systems, critical facilities/community lifelines).

Goal Two: Planning and Policy Goal

Identify and anticipate hazard vulnerabilities and maintain appropriate, reasonable plans and policies to be implemented and enforced in an effective, collaborative, innovative, and uniform manner.

Goal Three: Communication and Coordination Goal

Provide an effective hazard warning systems and maximize available resources for emergency planning, response, and recovery, by strengthening intergovernmental coordination, private-public partnering, and through cost-effective communication.

Goal Four: Education and Capacity-Building Goal

Help make the citizenry, private sector, and local governments of Dunn County aware of appropriate strategies and tools for implementation in their homes, businesses, and communities to mitigate the impacts of anticipated hazards risks.

B. RECOMMENDED COUNTY-LEVEL MITIGATION ACTIONS

Mitigation actions reduce or prevent the loss of life and property by lessening the impacts of disasters. These strategies are long-term solutions with preventative benefits to people, property, infrastructure, community lifelines, and/or the economy by reducing vulnerabilities. Mitigation actions can include:

- planning & regulations
- structure & infrastructure projects
- natural systems protection
- education & awareness programs
- weather adaptation strategies

Plan Supplement 3.C. summarizes the process and criteria utilized by the Plan Update Steering Committee to evaluate, select, and prioritize the recommended mitigation strategies.

The recommended strategies are organized by hazard type, then further organized into:

- **Recommended Projects:** Projects are typically larger or more capital-intensive efforts that have a focused, action-oriented outcome that is achievable within a certain time period. Special grant funding or other resources are often needed for the implementation. Strategies involving physical structural or infrastructure changes likely fall into this category. Not all hazard types have a recommended project strategy.
- **Recommended Planning, Policy, and Outreach Actions:** Policies tend to be ongoing, decision-making or programmatic guidance, though they may also include smaller, less costly planning, assessment, collaboration, or educational efforts. In most cases, these strategies can be funded or performed as part of normal operating budgets and do not require the identification of new or special funding or other resources. However, some training, planning, and outreach may require additional funding.

For each recommended mitigation strategy, the following is also provided:

High Priority	High priority strategies are indicated based on the evaluation of mitigation alternatives by the Plan Update Steering Committee using the previously described criteria. These high priorities provide focus and are suggested to assist with plan implementation and monitoring.
Timeframe	The Plan Update Steering Committee was asked to help assign a timeframe 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 feasibility changes 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 include 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.

Note:

The priorities for the strategies herein were made in the context of this plan and the hazard threats facing Dunn County. There may be other good reasons to implement a recommendation.

A low priority should not necessarily be interpreted as having a lesser importance to Dunn County overall. Priorities also can vary by individual community.

The exclusion of a beneficial strategy from this plan should not prevent or defer action if the need exists and resources are available.

During the planning process, additional preparedness (non-mitigation) strategies were also recommended that are not included in this section, but are discussed in Section V.C. and Plan Supplement 3.D.

Severe Weather & Extreme Temperature Mitigation Strategies

The following strategies prevent or reduce the vulnerabilities associated with various aspects of severe/extreme weather including: **tornados, high winds, thunderstorms, winter storms, extreme temperatures, and drought**. They are combined here since some mitigation alternatives mitigate the impacts of multiple hazards.

2026 Plan Strategy Alternative	Priority & Timeline	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, including the County Fairgrounds, 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. Community safe rooms at schools, public buildings, etc., can also serve these populations.	Med-High Varies based on interest, if funding avail.	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	• \$\$\$\$ • 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 • Hardening of schools and public buildings can serve nearby mobile home parks, slab-on-grade residential, etc. • Strong interest - A number of communities and entities have expressed interest in possible safe room projects or hardening.
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.	Med Varies based on interest, if funding avail.			• \$ • 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. Conduct a survey of campgrounds and areas with concentrations of short-term rental properties to determine the status of emergency plans, storm shelter availability, and related resource needs. Consider a registration fee for limited-occupancy mobile recreational vehicles to allow for related tracking.	Low	County Planning & Zoning and Emergency Management	Existing County operational budget	• \$ • 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. 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 community lifeline facilities, shelters, public works buildings, and local emergency operations centers in Dunn County.	Med ongoing as funding allows	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.

2026 Plan Strategy Alternative	Priority	Lead Party(s)	Funding	Analysis
5. 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.	Med ongoing	Electric Provider	Electric Provider typically covers cost to bury lines, though may be FEMA BRIC or HMGP grant eligible	• \$-\$\$\$ • Lines are often buried for newer development or in conjunction with street improvements as part of electric utility capital improvement plans. • Burying lines is not physically feasible in all locations. • Cooperatives and municipal utilities may be eligible for FEMA BRIC or HMGP grant funding for projects in areas prone to outages.
6. Inventory generator (and potentially 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.	Med 3-5 years	Industry Safety Group and/or Emergency Management	Existing staff and private-sector volunteers to initiate	• \$ to evaluate; \$\$ to implement • Highway Dept larger generator likely will need replacement in near future. • Inventory could be part of next mitigation plan update. • No specific solution but, identifies needs & engages in discussion. • WI PSC Refueling Readiness Grant Program may assist with related wiring.
7. Develop a notification and monitoring strategy for at-risk populations in the event of a long-term power outage or other disaster. Considerations should include: (1) how special needs households are contacted or monitored during an extended power outage; (2) home oxygen sources and emergency oxygen availability, and potential demand during an extended power outage; and (3) how back-up oxygen may be distributed, including strategies for when roads are impassible. Coordinate between agencies to discuss how oxygen-dependent household lists (e.g., emPOWER data) will be accessed and best used during an emergency.	Med-High 2-5 years; ongoing	County Public Health & Emgy Mgmt to initiate. Involve partners such as ADRC, DME providers, and electric providers	Existing staff operational budgets	• \$ for evaluation/planning • HSS emPOWER database includes 394 County residents that are Medicare beneficiaries reliant on electricity-dependent durable medical and assistive equipment (DME) and are at higher risk due to reliance on essential health care services. • A specific plan for such events does not exist and uncertain of emergency availability of oxygen. • Electric providers have their own data and critical client lists
8. Partner with interested communities to pursue mitigation grant dollars to distribute NOAA All Hazards (Weather) Radios, with a potential priority for seniors, mobile home residents, campgrounds, and community lifeline facilities.	Med-Low if part of a larger educ grant	County Emergency Management; ADRC; communities	May be eligible for FEMA HMGP grant funding (i.e., a 5% project)	• \$; mitigation-grant eligible. • Interest has been waning as smart phones become more common. • Could partner w/ ARES/RACES, et. al., for radio programming as part of the local match contribution.

9. Identify heating and cooling centers. Include capacity, hours, policies, pet options, and availability of generators that are available for extended periods and power outages. When possible, integrate such shelters into planned community safe room projects. Increase public awareness of shelter availability and transportation options.	Med 3-5 years	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.
10. Undertake a coordinated natural- or all-hazards educational outreach project targeting rural households, including the Plain Community, on flood awareness; sirens, Code Red, and warning systems; shelter availability; home preparedness; driveway accessibility; flood insurance; and mitigation resources. May include a local official educational component.	Med 3-8 years; much is ongoing	County Emergency Management and Public Health	Varies based on scope. FEMA mitigation grant funding could be used for a more formal outreach initiative, especially if include flood-related mitigation.	• \$ • Include mitigation actions, not just preparedness. • Overlaps with some other strategies. • County be combined with the distribution of weather radios. • WCWRPC may be able to help. • Insurance providers certified to sell flood insurance could be important partners. • Potential related to continued NFIP compliance; FEMA HMGP or FMA funding could be available.

2026 Plan Strategy Alternative	Priority	Lead Party(s)	Funding	Analysis
Flood Mitigation 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 or 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.	Med Ongoing, often in conjunction with road & street improvements	County Planning & Zoning or Land Conservation, County Emergency Management, County Highway, municipalities, landowners	Stormwater utilities impact fees, & road funding are typical sources. Also CDBG-Public Facilities, TIF, FEMA Flood Mitigation Grants, Army Corps, & WI Municipal Flood Control & Flood Resilience grants.	• \$\$ to \$\$\$ • Increasing frequency & intensity of heavy rain events = more flooding. • Grant funding could mitigate a reoccurring flooding threat/vulnerability. • Often impacts transportation (a community lifeline). • Solutions are typically feasible, if funding available • Localized approach that increases drainage can increase flooding downstream. • Potentially related to continued NFIP compliance.

2026 Plan Strategy Alternative	Priority	Lead Party	Funding	Analysis
2. When new governmental construction, subdivision development, and non-flood mitigation projects (e.g., safe rooms) are being planned, consider extreme rainfall event trends, as needed, to control stormwater runoff and mitigate flooding.	Med ongoing	Developer or land owner Permitting agencies	Same as above. New development unlikely eligible for mitigation grants unless part of a mitigation project.	• \$ 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. Seek cost-sharing funding assistance to address livestock feedlots and potential sources of manure runoff during heavy rain events, especially if located near or within wetlands or floodplains.	Med ongoing; supports current efforts	County Land Conservation	TRM grant likely best source of cost-sharing for feedlot projects.	• \$\$ • Deed restrictions and buyouts may be best alternative for some sites. • Watershed and lake groups are possible partners. • Could consider creation of feedlot permit rules to guide siting and encourage design for 100+ year heavy rainfall events given rainfall trends.
4. Pursue hazard mitigation grant funding to acquire, relocate, elevate, or floodproof structures and critical infrastructure 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.	Med timeline subject to interest & need	Landowner, County Planning & Zoning or municipalities	FEMA Flood Mitigation Grant & WI Municipal Flood Control Grant programs with landowner match contributions	• \$\$ to \$\$\$ • 2 repetitive loss properties, but no specific flood mitigation projects for projects identified. • Strong grant potential if mitigating re-occurring threat or critical vulnerability. • Solutions are typically feasible, if funding is available and with the landowner's consent. • Potentially related to continued NFIP compliance.
5. Continue to pursue grant funding to address landslide and bank erosion threats to structures and infrastructure along the County's surface waters. Consider partnering with a post-secondary institution to evaluate stream bank changes and hotspots to help prioritize potential bank stabilization, revetment, or other such mitigation actions. Such threats could increase as the frequency and intensity of extreme rainfall events increase.	Med-High ongoing, subject to need	County Land Conservation, WDNR, Universities	WDNR Surface Water Grants, FEMA or WDNR flood mitigation programs, Army Corps of Engineers	• \$\$ • Shoreline erosion was the most common concern in the 1996 <i>Dunn County Flood Study</i>. • County has used FEMA mitigation grant dollars for a past revetment project. • Especially target Red Cedar and Chippewa Rivers. 2025 WDNR application submitted for engineering for a site along Red Cedar River.

2026 Plan Strategy Alternative	Priority	Lead Party(s)	Funding	Analysis
6. Explore grant funding and/or USGS partnerships to install automated water monitoring/flood gauges upstream of key flood prone areas.	Med 3-10 years	Likely Land Conservation or local lake groups	USGS or WDNR	• \$ to \$\$ for installation • Could be combined with other water quality monitoring efforts. • Consider discussing as part of dam failure TTX.
7. Continue to maintain dams, levees, and dam emergency operating plans. Continue to digitize dam failure areas and utilize GIS-mapped dam shadows as part of Reverse 911/Code Red for emergency notifications if needed. Identify roads that would be potentially closed during a dam failure as part of Dam Emergency Action Plans.	High ongoing	varies by Dam Owner; Planning & Zoning staff for code enforcement Planning & Zoning & Emergency Mgmt on Code Red coordination	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. Priority concerns in past mitigation plans addressed. • While dam maintenance can be expensive, code enforcement and educational outreach may largely be accomplished with existing resources. • Increasing heavy rain events are increasing maintenance costs.
8. Collaborate with Xcel Energy and City of Menomonie to conduct a periodic dam failure exercise; explore evacuation planning and critical infrastructure impacts as part of these exercises.	High 1-3 years	Xcel Energy	Funded by dam owner	• \$ • County participates in exercises for Xcel dams upstream of County. • Xcel dam failure exercise planned for 2027. • Could be expanded to include other high-hazard dams.
9. Update the County floodplain ordinance for greater consistency with the latest WDNR model ordinance. 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.	Med-High 1-3 years	County Planning & Zoning and County Board	County annual operating budget	• \$ • Proactive; strong mitigation strategy. • This strategy is used by County during plan review and land use enforcement. • County floodplain ordinance update planned for Winter 2026-2027. • No additional costs expected unless enforcement/compliance issues arise. • Related to continued NFIP compliance.

2026 Plan Strategy Alternative	Priority	Lead Party(s)	Funding	Analysis
10. Coordinate with all participating jurisdictions to 1) verify compliant permitting and siting of campgrounds and limited-occupancy mobile recreational vehicles within mapped floodplains/floodways; 2) require and maintain emergency evacuation plans for such facilities; and 3) establish a shared tracking protocol permitted land uses and emergency plan status.	Med	County Planning & Zoning and Emergency Management	Existing County operational budget	• \$ • Could be used to educate on safe rooms & other mitigation opportunities. • Identify strategies based on the survey results. • Could be coordinated with annual wastewater permitting through the County Sanitation Ordinance.
11. Engage in an educational effort to increase public and elected officials' knowledge 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, areas located in dam shadows, and the importance of well testing following flood events. Especially target those municipalities with the greatest assessed improvements in or near floodplain areas.	Med-High 3-5 years subject to funding avail.	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.
12. Subject to community interest, collaborate with Downing, Knapp, and Ridgeland to address their non-participating status in the National Flood Insurance Program (NFIP).	Med 1-3 years	County Planning & Zoning, WDNR, WCWRPC	Operational budgets	• \$; educational only • NFIP-sanctioned due to not adopting the current NFIP-FIRM (floodplain) maps and/or a current model floodplain ordinance. • Landowners are unable to obtain Federal flood insurance. • Related to continued NFIP status.
13. As new Federal precipitation data and modeling tools (e.g., Atlas 15) become available, evaluate potential implications and changes for existing floodplain and stormwater mapping and regulatory requirements so that future infrastructure and development decisions are based on the best available data.	Med 3-8 years	County Planning & Zoning; local communities	May be eligible for FEMA or WEM flood mitigation grant funding	• \$ • NOAA Atlas 15 anticipated to be released in 2026-2027.

14. As part of the next County hazard mitigation plan update, collaborate with Towns to include a more in-depth re-evaluation of the 1996 <i>Dunn County Flood Study</i> , completed following the 1993 flood disaster. Include a review of response capabilities, including sandbag availability and related volunteer management.	Med 5-8 years	County Emergency Management & WCWRPC	FEMA hazard mitigation grant	• \$; would be part of the grant-funded plan update. • The Study has been referenced in past mitigation plans, but have not engaged Towns in a targeted discussion. • Such a review could be educational for those unaware of the 1993 flooding and the over \$1.2 million in damages.
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Wildfire Mitigation Strategies

Larger wildfire mitigation projects and community wildfire protection planning were considered, but the costs of such alternatives outweighed the overall risk, vulnerabilities, and anticipated benefits at this time within Dunn County. Instead, it was recommended to continue smaller, often targeted, educational and outreach efforts.

2026 Plan Strategy Alternative	Priority & Timeline	Lead Party(s)	Funding	Analysis
1. Continue to educate residents and local officials in the mitigation of wildfire risks, with an emphasis on enforcement of burning regulations/burning permits and emergency vehicle access on driveways and private roads. This could include broader education on disaster-resilient construction, landscaping, and defensible spaces.	Med ongoing	Local Fire Depts & Wisconsin DNR Working w/ Town Boards, schools, & County Emgy Mgmt	Largely uses existing staff or volunteer support. Some WDNR resources available.	• \$-\$\$ • Continuing educational outreach, but could expand into additional programming and planning in highest risk areas. • Can expand on public outreach via social media by local communities and Fire Departments.
2. Work with Towns and permitting agencies to encourage the adoption of adequate driveway standards for large emergency vehicles and increase public awareness of related driveway access, grade, width/clearance, long-dead end roads, and turn-around issues. Continue to request local fire department input on proposed site plans, CSMs, and subdivision plats.	Med 3-10 years	County Planning & Zoning; local plan commissions	Operating budgets	• \$ • Growing importance as development occurs in rural areas, such as ag-tourism and event barns.

Other Mitigation Strategies				
The following are multi-hazard mitigation strategy alternatives or potential strategies to address non-natural hazards.				
2026 Plan Strategy Alternative	Priority & Timeline	Lead Party(s)	Funding	Analysis
1. MULTI-HAZARD – Explore grant funding to integrate the updated mitigation plan into a web-based Dunn County Emergency Management Dashboard (ArcGIS Hub site) and, potentially, into a future regional mitigation plan story map.	Med 3-8 years	County Emergency Management WCWRPC	Would be depended on FEMA grant funding	• \$ • Provides greater public access to the mitigation plan; given FEMA requirements, the full mitigation plan is not very “public friendly” • WCWRPC working with WEM to explore the regional-level story map
2. MULTI-HAZARD –Integrate natural hazard risks, extreme weather trends, and hazard mitigation priorities into the County’s Comprehensive Plan Update, Integrated Preparedness Plan, the Public Health Emergency Preparedness Plan, and other related County plans.	Med-High ongoing	County Planning & Zoning, Public Health and Emergency Management	As part of County operational/pr ogram budget for plan update.	• \$ • Coordination with the Mitigation Plan is stronger in the County comprehensive plan that is currently being updated. • County utilizes Mitigation Plan to help enforce land use regulations.
3. MULTI-HAZARD – Continue to collaborate with other emergency management offices, health departments, and other stakeholders in the region to explore shared mitigation and preparedness activities, including vulnerability assessments, planning, services, training, and exercises.	Med-High ongoing	WEM, County Emergency Management Offices, Public Health Consortium, WCWRPC	Various	• \$ • General policy statement supporting continued intergovernmental collaboration. • Wisconsin Innovation Grants available to study sharing of services. • County regularly participates in WEM and Public Health Consortium training.
4. 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. Potentially include as part of the next hazard mitigation plan update.	Med 5-8 years, if funding avail.	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.

2026 Plan Strategy Alternative	Priority & Timeline	Lead Party(s)	Funding	Analysis
5. MULTI-HAZARD – Collaborate with watershed/lake groups and producer-led groups to 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.	Med (High in other plans) ongoing; supports current efforts	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. • Increasing demands on Federal crop insurance programs may not be sustainable. • Can incorporate watershed-level planning and producer-led efforts.
6. MULTI-HAZARD – Encourage the execution of joint development agreements (JDAs) for all utility-scale solar and wind projects that address security, safety, any hazardous materials, decommissioning, training costs for emergency services, and related assurances.	Med-Low 1-3 years as part of local planning	Potentially County Planning & Zoning, Extension, PSC, WCWRPC	Collaborative effort focusing on education	• \$ • Can be included in a local licensing ordinance for projects less than 100MW. • Can encourage for facilities of all sizes. • Could consider similar policies for battery energy storage systems.
7. COMMUNICABLE/LIVESTOCK DISEASE – Encourage the State of Wisconsin and Federal government to conduct a regional event discussing Avian Flu threats, response procedures, and mitigation options. Include policies, procedures, and best practices related to bio-security, disease monitoring/reporting, quarantine, workforce practices, and proper disposal. May include efforts to educate farmers and the general	Med 3-5 years	WI DATCP and/or USDA; potentially Extension	If occurs, likely Federally funded	• \$ • Avian Flu is a significant threat to the County's agricultural economy and is a zoonotic disease. • Outbreaks are largely handled by the State & Federal government; there is limited local government engagement on the issue, which leads to questions and uncertainty. • More insight into options to mitigate or prevent the spread would be valuable.
8. HAZ MAT SPILLS – Utilize the findings of the updated Commodity Flow Study to customize training/exercises and other preparedness efforts to reflect the types of hazardous materials on the major highways and railroads in Dunn County.	High ongoing	County Emergency Management	U.S. DOT HazMat Emergency Planning Grant (WisDOT administers)	• \$-\$\$ • Updated study nearly complete. • Transportation-based spills on highways and by rail were a greater concern than fixed facilities. • Identifying HazMat commodity flow based solely on placards has limitations, but can provide some general insights.

2026 Plan Strategy Alternative	Priority & Timeline	Lead Party(s)	Funding	Analysis
9. 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., cyber insurance, assessment & response resources, back-up, restoration).	High ongoing	Establish a special team? Not a responsibility of Dunn County govt to take the lead ADRC for seniors	Uses existing staff or volunteer support.	• \$ • A growing concern, but limited community-level mitigation alternatives; focus is more on education and preparedness/practices. • ADRC provides related outreach to seniors via its newsletter. • Local ISPs may be good partners. • Promote availability of CISA and State Cyber Response team resources. • Disaster Ready Chippewa Valley as a possible partner for business outreach. • Perhaps a regional effort spearheaded by the West Central WI Broadband Alliance.
10. CYBERATTACK – Engage in a discussion with city, villages, and towns on cyber-security challenges and safe data storage needs, and opportunities for intergovernmental IT services agreements. If there is interest, pursue Innovation Grant funding to conduct a related feasibility study and/or implement mutually beneficial shared services.	High 1-3 years	County IT & municipalities Extension or WCWRPC facilitation assistance?	Potentially Wisconsin Innovation Grant	• \$ (\$\$, if implementing) • County and City of Menomonie have an existing IT services agreement.
11. ACTIVE THREATS - Continue to bring key partners together to conduct active shooter/active threat planning, training, and exercises for educational institutions, governmental buildings, area businesses, and other gathering places. Increase familiarity with the Rescue Task Force and standard active threats procedure among volunteer fire/EMS departments. Consider including Fire/EMS representation on the Safe School Committee. As part of exercises, include reunification planning. Encourage human resources training on de-escalation techniques for service departments interacting regularly with the public. Support expanding Menomonie Fire Dept's Stop-the-Bleed training for freshman high school health classes to other school districts.	High ongoing	County Sheriff Dept staff participate in train-the-trainer Facility Owners Rescue Task Force	Varies by facility and provider. County Emgy Mgmt may be able to include as part of IPP.	• \$ (\$-\$\$\$, if security hardening) • 3-6 trainings or TTXs per year with 1 functional every other year on average. Many partners involved, including State Patrol and hospitals. • Schools and Hospitals conduct own annual active threats/mass casualty training. • Continuing, but greater regularity for some facilities recommended. • May reduce vulnerability through recommended security hardening or improved procedures. • Encourage sharing of after-action reports from exercises among law enforcement.

C. RECOMMENDED COUNTY-LEVEL 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 meetings and discussion. 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 document and prioritize these preparedness alternatives, which can serve as a guide for programming and integrated preparedness planning. The preparedness recommendations can be found in **Plan Supplement 3.D**. Since preparedness activities are not required to be included in a mitigation plan, additional implementation details are not provided for each. For most, a variety of organizations and collaborative partnerships would be involved.

D. OTHER PARTICIPANT SUB-PLANS

Plan Supplements 5 & 6 contain sub-plans or “mini-plans” for each participating city, village, and educational institution. As full plan update participants, these jurisdictions may pursue mitigation grant funding directly for eligible projects. Section I.C. summarizes the process for engaging these other plan participants during the plan update process.

The sub-plans are part of the County’s overall mitigation plan, including its community profile, hazard assessment, capacity assessment, and mitigation goals, which apply to all participating jurisdictions. Many of the County-level mitigation and preparedness strategies 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.

When identifying the recommended strategies in the sub-plans, the same criteria and general approach were considered as described in Supplement 3.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 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 County mitigation plan as a whole. It is understood that, prior to the next full mitigation plan update, any individual plan participant may modify/amend their own sub-plan without requiring approval/adoption of the full plan by Dunn County or any other participant.

E. PLAN IMPLEMENTATION

The mitigation strategies in Section V.B. 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 prioritization of the strategies offers guidance in the implementation of this plan based on available resources and potential to reduce losses. The countywide strategies in Section V.B. also include additional implementation guidance.

Plan Supplement 4.D. 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. 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

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.

bonds, and developer contributions. 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 Supplement 4.D. 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 Supplement 4.D. for potential assistance, since available resources and related requirements frequently change, and this list is not all-inclusive.

Due to the involvement of key stakeholders 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, Dunn 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.

F. PLAN COORDINATION AND INTEGRATION

The capabilities assessment in **Plan Supplement 3.A.** summarizes how Dunn County and its communities have integrated mitigation actions into other planning tools. Further, many of the mitigation and preparedness strategies and the sub-plans reference other planning mechanisms that are vital to successful implementation, such as:

- Comprehensive & land use plans Though they vary, most comprehensive plans typically include discussion on related topics, including flooding, emergency services, and other community lifelines. The mitigation recommendations and many of the sub-plans specifically advocate for integration of this mitigation plan into future comprehensive plan updates. Dunn County is currently updating its Comprehensive Plan, which provided an excellent opportunity to ensure a high level of integration with this Mitigation Plan. Supplement 3.A. also recognizes the important role that the *Land & Water Resource Management Plan* has in addressing wildfire, stormwater management/flooding, and drought.
- Regulations, agreements, & related procedures This includes floodplain ordinances/management, subdivision ordinances, burning permits, and stormwater management ordinances. There are numerous regulatory references within the mitigation recommendations.
- Local capital improvements plans & other budget documents Most notable are infrastructure projects, such as those related to stormwater systems, water supplies, weather sirens, generators, and communications equipment, which must be considered as part of local budgets. Many of the stormwater and flash flooding hotspots in the previous mitigation plans were addressed by including these projects in the road improvement or capital improvement and stormwater management plans at the County or local level.
- Emergency preparedness & response plans Mitigation and preparedness recommendation reference County, community, and dam Emergency Action Plans, the County's Public Health Emergency Preparedness Plan (see Supplement 2.B.i), continuity of government planning, and other related efforts. Some local municipalities need to update their emergency operating plans, and Dunn County Emergency Management has been successful in championing these updates. County Emergency Management also works 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. Dunn County Emergency Management will consider the mitigation and preparedness strategies to help guide the County's Integrated Preparedness Plan (IPP), training considerations, and other work planning. The IPP provides the most significant, new way to improvement plan coordination.

To date, integrating the strategies and recommendations found in past hazard mitigation plan into local comprehensive plans has been inconsistent. Some planning consultants working with local communities are unfamiliar with the details of the hazard mitigation plan, and the State comprehensive planning law includes no specific reference to mitigation or resiliency planning, though such a State law is being considered. Further, mitigation planning is on a different schedule than comprehensive planning, with most comprehensive plans likely to be updated no more frequently than once per decade.

As the mitigation plan strategies reflect, WCWRPC and Dunn County staff will continue to work with local municipalities to encourage coordination and consistency between the hazard mitigation plan, and other community plans, and provide guidance on how to incorporate mitigation strategies into their comprehensive plans and other planning mechanisms. When made aware of local comprehensive planning efforts and updates, WCWRPC will contact municipalities to encourage them to consider the strategies found within the *Dunn County Multi-Hazard Mitigation Plan*.

Continued, active involvement of key county staff, local jurisdictions, and other stakeholders during hazard mitigation plan updates is critical to ensuring incorporation of mitigation strategies into other planning mechanisms.

Since key County staff were actively involved in the development and update of the County mitigation plan, many of the mitigation strategies are based on staff recommendations and provide confidence that a high level of coordination between these various planning efforts will continue.

SECTION VI. PLAN ADOPTION & MAINTENANCE PROCESS

A. PLAN ADOPTION

Each participating municipality and educational institution, including Dunn County, considered and adopted this plan. Governmental jurisdictions in Wisconsin are required to take such formal 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. Dunn Energy Cooperative also actively participated in and approved the 2026 Mitigation Plan update. Copies of the adopting documents are included in **Section VIII**.

B. PLAN MAINTENANCE & CONTINUED PUBLIC PARTICIPATION

Past reviews of the County's mitigation plan were primarily limited to a periodic internal review by the County Emergency Management Coordinator. No special plan reviews or plan amendments were needed. The Steering Committee for this plan update (2026 Mitigation Plan) discussed continued 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

The County Emergency Management Coordinator has the duty to monitor and recommend any revisions to the county emergency operations plan, all hazards mitigation plan, and the integrated preparedness plan for county board action.

Each year, starting in Fall 2027, Dunn County, through its Emergency Management Coordinator, will complete an annual review of the Mitigation Plan, unless a plan update is already in progress. This review may be performed concurrently with other work planning, such as Integrated Preparedness Plan (IPP) updates. The annual plan review should consider aspects such as:

- Progress on mitigation plan recommendations, including the suggested timelines and the pursuit of related mitigation grant funding. Regularly, update the IPP to reflect any changes in needed education, training, and outreach. See Subsection VII.B.iv below.
- Any significant changes in vulnerabilities, priorities, or trends, including threats to 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 the Emergency Management Coordinator’s annual review of the plan, the Emergency Management Coordinator will provide a brief report to the County Judiciary & Law Committee. The Committee will recommend any revisions to the plan, if necessary, which would then be forwarded to the County Board for its consideration and action. The Emergency Management Coordinator 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 Judiciary & Law Committee and County Board meetings are subject to the Wisconsin Open Meeting Law and will be properly noticed as required by State Statute, including at the County’s website. Through these public notices, the public, local communities, and other stakeholder organizations are invited to attend and actively participate. Public announcements (e.g., press releases, social media posts) are encouraged when mitigation projects are implemented and the mitigation plan used.

ii. Special Plan Reviews (Post-Disaster or New Project)

Disaster events, emergency trends/needs, and funding opportunities may also necessitate plan amendments. Within six months following a significant disaster event, the Emergency Management Coordinator, 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 Coordinator. If a mitigation plan amendment is potentially needed, this information will be provided to the County Judiciary & Law Committee for their review and recommendation during a public meeting. As appropriate, recommended changes to the plan will be forwarded to the County Board and potentially the municipal contacts of the participating jurisdictions for their action and consideration.

iii. Plan Updates

Every five years, the hazard mitigation plan will be comprehensively reviewed, current data collected, and the plan updated. However, the 2026 Mitigation Plan was significantly restructured and included the city/village/school subplans. While this required additional time for this update, this is anticipated to “streamline” and simplify future plan updates. As such, **it is envisioned that the five-year update of this Mitigation Plan may be more strategic and limited in scope focusing on key data, significant trends, and priority projects, with a more comprehensive, robust update every 10 years.**

It is recommended that the plan update process begin no later than June 2030 to allow for completion and adoption prior to the expiration of the 2026 Mitigation Plan. All future plan updates shall 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.

Each update of Dunn County's mitigation plan has strengthened weaknesses or incorporated opportunities since the previous plan. Some potential changes for the next County mitigation plan update include:

- Strive to include additional private-sector and smaller community participation on the Plan Update Steering Committee.
- During the planning for future plan updates, engage in a discussion with County Public Health on opportunities for data collection and public engagement.
- As part of the next plan update (or the more robust 10-year update), the Steering Committee will be asked to identify specific sub-group meetings and public outreach activities targeting certain vulnerabilities or threats (e.g., ag/avian flu, cybersecurity), community organizations/VOADs, or mitigation measures.
- Work with the Plan Update Steering Committee to identify additional ways to engage the public and community lifelines as part of the mitigation planning process.
- Increase the use of digital capabilities and web-based tools during the plan update for data analysis, sharing key information, and obtaining public/stakeholder input. Create a web-based mitigation plan hubsite or dashboard.

iv. Evaluating Plan Effectiveness

As part of plan reviews and future plan updates, the effectiveness of the County's Hazard Mitigation Plan will be evaluated based on:

- Did the Plan anticipate the hazards of significant risk? Are the probabilities and vulnerabilities for each hazard reasonably accurate?
- What was the progress on implementing the strategy recommendations, with a particular emphasis on high-priority strategies?
- If a mitigation project is proposed in the future or a mitigation funding opportunity become available, did the Mitigation Plan already contemplate or support a proposed project?
- For mitigation projects that are implemented, what were the benefits vs. costs?

Section VII. Adopting Resolutions