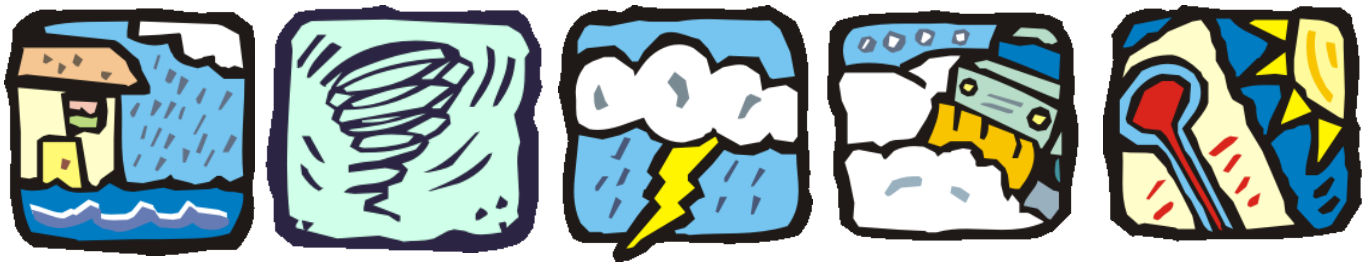

Multi-Hazard Mitigation Plan

Eau Claire County, Wisconsin

2018-2023

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10/1/18 DRAFT

EAU CLAIRE COUNTY
MULTI-HAZARD MITIGATION PLAN

PREPARED BY:

Eau Claire County Multi-Hazard Mitigation Plan Steering Committee
Eau Claire County Emergency Management
Eau Claire County communities

WITH ASSISTANCE BY:

West Central Wisconsin Regional Planning Commission

ADOPTED MONTH XX, 2018
BY THE EAU CLAIRE COUNTY BOARD OF SUPERVISORS

<ADD FEMA APPROVAL LETTER HERE>

<ADD WEM APPROVAL LETTER HERE>

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SECTION I. INTRODUCTION

A. PURPOSE OF THE PLAN

The *Eau Claire County Multi-Hazard Mitigation Plan* has been prepared as a result of the County's application for, and award of, Pre-Disaster Mitigation (PDM) Grant Program funds. These funds are disbursed by the Federal Emergency Management Agency (FEMA) through Wisconsin Emergency Management (WEM).

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

> The Code of Federal Regulations states...
>
> "The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards."
>
> (44 CFR Part 201.6, pp 8851)

Development of the plan will help the County and its communities identify its areas of risk, assess the magnitude of the risk and vulnerability, and develop strategies for reducing the risk and vulnerabilities. Through this process, the County can address issues related to the protection of life, property, and critical services, and the reduction of costs associated with disaster relief and rescue efforts. Completion and approval of the plan will also continue to make Eau Claire County and participating jurisdictions eligible to apply for future hazard mitigation project funds through FEMA.

B. PLANNING PROCESS

Eau Claire County contracted with West Central Wisconsin Regional Planning Commission to update its all hazards mitigation plan previously adopted by Eau Claire County in May 2013 and approved by FEMA in July 2013. This updated plan identifies strategies to mitigate the risks and vulnerabilities associated with hazards in the County, including its incorporated communities. As such, this plan includes the update of the City of Eau Claire Natural Hazard Mitigation Plan adopted by the City in February 2013 and approved by FEMA in November 2012. Since FEMA requires plans be updated on a five-year cycle from the date of their approval, the former plan which is being updated will be referred to as the 2013 plan.

Development of the *Eau Claire County Multi-Hazard Mitigation Plan* was based on the planning requirements and guidance provided by the Federal Emergency Management Agency[1] (FEMA) and the Wisconsin Department of Military Affairs, Wisconsin Emergency Management.[2] As such, the plan meets the requirements of the Disaster Mitigation Act of 2000. The plan's scope is inclusive of all of Eau Claire County and is considered a multi-jurisdictional plan under Federal guidelines.

To guide the plan's development, Eau Claire County formed a multi-agency, multi-jurisdictional Steering Committee. As **Table 1** on the following page shows, the Steering Committee represents a range of interests and stakeholders from throughout Eau Claire County. In addition to bringing insight on their respective roles, the committee members are also very knowledgeable of the issues and concerns of the County's residents. The committee was responsible for overseeing the development of the plan, providing input and review of information and materials, and reviewing and approving the release of the draft plan prior to the start the adoption process.

Update of the plan began in Summer 2017. A total of four (4) Steering Committee meetings were held to discuss the plan's development, identify local hazard issues, formulate strategy recommendations, and review the draft plan. Additional correspondence, including a strategy alternatives and prioritization survey, was distributed via email. As reflected in Table 1, a separate work group for the City of Eau Claire was also formed that met three times during the planning process to focus on hazard threats and mitigations strategies specific to the City and provide input on multi-jurisdictional opportunities.

The general stages of plan development included: (1) initial data collection and development of the community profile; (2) review of the hazard risks and 2013 plan strategies by the Steering Committee and stakeholders; (3) community vulnerability and risk assessment; (4) development of the mitigation plan [goals, objectives, strategies, and action plan]; and (5) development of the plan maintenance and coordination strategy. This process is summarized in **Figure 1** at the end of this section. A summary of plan changes since the 2013 plan is provided in **Appendix M**, and includes a brief synopsis of how the Steering Committee reviewed and analyzed each section of the plan. Committee members also reviewed and discussed the full draft version of the plan during the planning process.

A series of key stakeholder interviews, including both public and private sectors, was performed by WCWRPC staff to further complement the issue and strategy identification process. The Eau Claire County Emergency Management Coordinator also frequently participated in these meetings. These interviews included outreach to emergency management personnel from adjacent counties. The majority of these interviews are listed in **Appendix C**, though additional correspondence, phone calls, and follow-up e-mails often took place. Additional input was received from local town, village, and city governments as described within Section I.C. below.

---

[1] Federal Emergency Management Agency, Hazard Mitigation Planning and Hazard Mitigation Grant Program, 44 CFR Parts 201 and 206 (Washington: Government Printing Office, February 26, 2002) 8844-8854.
[2] Wisconsin Emergency Management, Resource Guide to All Hazards Mitigation Planning in Wisconsin. April 2003.

Table 1. Eau Claire County Hazard Mitigation Plan Steering Committee

Eau Claire County Plan Update Steering Committee		
Name	**Title**	**Organization**
Doug Kranig	Chair	Town of Seymour
Deb Smith	Chair	Town of Union
Mike Peterson	Chair	Town of Washington
Al Bertrang	Deputy Fire Chief	City of Eau Claire Fire Department
Jack Running	Fire Chief	Township WI Fire Department
Mark Renderman	Fire Chief	Altoona Fire Department
Jed Kaurich	Forester/Ranger	Wisconsin DNR-Augusta
Kelli Engen	Emgy Prep Specialist	Eau Claire City-County Health Department
Matt Steinbach	Environ Srvcs Mgr	Eau Claire City-County Health Department
Joel Brettingen	Captain	Eau Claire county Sheriff's Department
Rod Eslinger	Director	EC County Planning & Development
Matt Michael	Senior Planner	EC County Planning & Development
Josh Pederson	Director	EC County Parks & Forest
Brian Spilde	Operations Manager	EC County Highway Department
Chris Straight	Senior Planner	West Central WI Regional Planning & DRCV
Tyler Esh	Coordinator	EC County Emergency Management
City of Eau Claire Work Group		
John Genskow	Deputy City Engineer	City of Eau Claire Engineering Department
David Solberg	Engineering Director	City of Eau Claire Engineering Department
Calvin Miller	Sr. Building Official	City of Eau Claire Community Dvlpmt Dept
Ryan Petrie	Associate Planner	City of Eau Claire Community Dvlpmt Dept
Ned Noel	Associate Planner	City of Eau Claire Community Dvlpmt Dept
Jeff Pippenger	Cmty Srvcs Director	City of Eau Claire Community Services Dept
Chad Hoyord	Deputy Chief	City of Eau Claire Police Department
Al Bertrang	Deputy Fire Chief	City of Eau Claire Fire Department
Colleen Schian	Risk Manager	City of Eau Claire
Chris Straight	Senior Planner	West Central WI Regional Planning & DRCV
Tyler Esh	Coordinator	EC County Emergency Management

With the guidance provided by these interviews, meetings, and the previously described planning steps, the Steering Committee and City's ad hoc work group discussed and reviewed the changes to each plan section since the 2013 plan and developed the updated goals and strategies. On Month XX, 2018, the County Board considered and adopted the *Multi-Hazard Mitigation Plan* update at a duly called and noticed public meeting. A copy of the adopting resolution are included in **Appendix A**.

C. MULTI-JURISDICTIONAL PLANNING APPROACH

The *Eau Claire County Multi-Hazard Mitigation Plan* is a multi-jurisdictional plan and encompasses all incorporated and unincorporated jurisdictions within Eau Claire County, including the Eau Claire County government and the following participating, incorporated cities and villages:

City of Altoona
City of Augusta
City of Eau Claire
Village of Fairchild
Village of Fall Creek

All municipalities in Eau Claire County with 100-year floodplains identified on Flood Insurance Rate Maps (FIRMs) are participants in good standing in the National Flood Insurance Program (NFIP), with the exception of the Village of Fairchild who is working to address their non-compliance status.

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

- The Steering Committee included representation from different areas in the County and numerous organizations.
- A presentation on the planning effort was made to the Eau Claire County Towns Association on August 29, 2017. A customized risk assessment survey with hazard risk map was then mailed to each town to identify hazards and potential mitigation strategies.
- A meeting was held with each participating village and city on the planning effort, and input was obtained on issues or potential strategies. In the case of the City of Eau Claire, an ad hoc work group was formed as mentioned previously. Unique hazard-related issues or strategies for each community were identified.
- Additional follow-up contacts were made with local jurisdictions as needed. In June 2018, draft strategies were sent to each village and city for further comment, accompanied by an invitation to the public informational meeting.

Adopting resolutions for Eau Claire County and all cities and villages are in **Appendix A**. Also found in Appendix A is a letter from Eau Claire Electric Cooperative documenting their involvement in the plan's development and endorsement of the applicable plan strategies. The cooperative is potentially eligible for FEMA hazard mitigation grant funding much like a municipality. By actively participating in this plan's development, there is increased potential for the electric cooperative to pursue mitigation grant funding for projects within Eau Claire County in the future.

D. COMMUNITY INVOLVEMENT

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

- **Steering Committee Meetings.** The four (4) Steering Committee meetings were properly noticed and open to the public. Agendas for these meetings are included in Appendix C.
- **Key Stakeholder Interviews.** The key stakeholder interviews obtained input from many local public and private stakeholders who are also community members.
- **Consideration of Related Plans.** Local comprehensive plans, ordinances, and other pertinent planning documents were reviewed by the planning consultant and discussed with the Steering Committee when available and pertinent. During stakeholder interviews and meetings with the cities and villages, participants were asked to identify and consider related plans and ordinances. The results of these discussions were integrated into the appropriate assessment section or recommended strategies which were reviewed by the Steering Committee, communities, and other stakeholders.
- **Public Information and Plan Review Meeting**. On September 21, 2018, a public informational and plan review meeting was held to allow the public the opportunity to review and comment on the proposed plan update. Advertisement of this meeting included a notice in the local newspaper and posting in the standard places per County procedures and in accordance with State of Wisconsin law. Copies of the meeting notice, as well the draft plan strategies and other selected sections, were also sent to each municipality for comment. A copy of the meeting notice is included in **Appendix D**. No changes were made to the plan as a result of the public informational meeting.
- **Plan Adoption.** Following conditional approval of the plan by Wisconsin Emergency Management, this hazard mitigation plan was adopted via resolution by the Eau Claire County Board, two villages, and three cities in duly called and noticed public meetings.

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

This plan update includes information and incorporates recommendations from a wide variety of sources, not limited to the following primary sources:

- Section II includes statistics from the U.S. Census Bureau, USDA Agricultural Census, Wisconsin Department of Revenue tax assessment data, Wisconsin Department of Administration population estimates and projections, and EMSI.
- Section III includes NOAA National Climatic Data Center severe weather data as well as climate and severe weather data from the Wisconsin Initiative on Climate Change. This section also includes data and maps from the *State of Wisconsin Hazard Mitigation Plan* and the *State of Wisconsin Homeland Security Council THIRA & SPR* produced by Wisconsin Emergency Management.

- Section III includes references to specific studies for various hazard types. For example, the hazardous materials spills section included BRRTS data from Wisconsin Department of Natural Resources, references the 2012 Multi-County Commodity Flow Study and the 2018 Eau Claire County groundwater study report. The cyber-attack and active threats sections rely heavily on FBI and other federal-level data sources.
- The GIS maps and GIS-based analysis found in Sections II and III were largely produced by WCWRPC with geo-referenced data primarily from Eau Claire County Planning & Development Department, City of Eau Claire Public Works-Engineering Department, and Wisconsin Department of Natural Resources.
- Appendix C includes the list of meetings and stakeholder interviews completed during the process. These interviews frequently yielded reports and additional data that were incorporated into this plan (e.g., Eau Claire Electric Cooperative provided updated outage data; Public Health provided information regarding contagious disease).
- Sections III and IV incorporate or reference municipal & County Emergency Operations Plans and the County Public Health Preparedness Plan as well as various annexes, mutual aid agreements, and partnerships. Threat-specific plans are frequently referenced, such as Dam Flood Emergency Plans and Regional Cyber-Attack Response Teams. Where appropriate, comprehensive plans and local regulatory policies are also referenced (e.g., floodplain zoning, stormwater management, driveway regulations, festival permitting).

Figure 1. Eau Claire 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 and scope

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

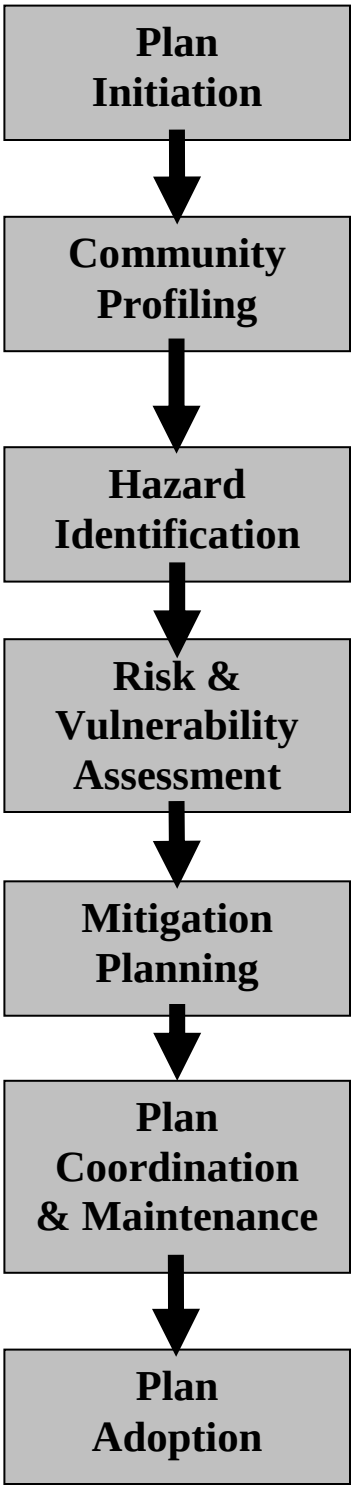
Hazard Identification
scope: update data and re-confirm key hazards
local roles: assist w/ data collection (historical records on events)
RPC roles: data collection (w/ NOAA data) & facilitation
Cmte roles: review and confirm key hazards

Risk & Vulnerability Assessment
scope: identify risks (full history & trends), and vulnerabilities (estimate potential losses to assets)
local roles: identify issues, concerns, and "hotspots"
RPC roles: data collection, analysis, & facilitation
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 2013 plan
RPC roles: facilitation, analysis & guidance on strategies
Cmte roles: update goals; review and prioritize strategies
other issues: cost-benefits analysis; resource/action plan

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

Plan Adoption
scope: Cmte/local agency review -> public info meeting-> Cmte approval if needed ->State pre-review -> County & local adoption-> formal State & FEMA approval
local roles: facilitate public meetings, notifications, & adoption
RPC roles: assist w/ public hearings & modifications to plan
Cmte roles: consider public input & approve draft plan
other issues: special mailings; media



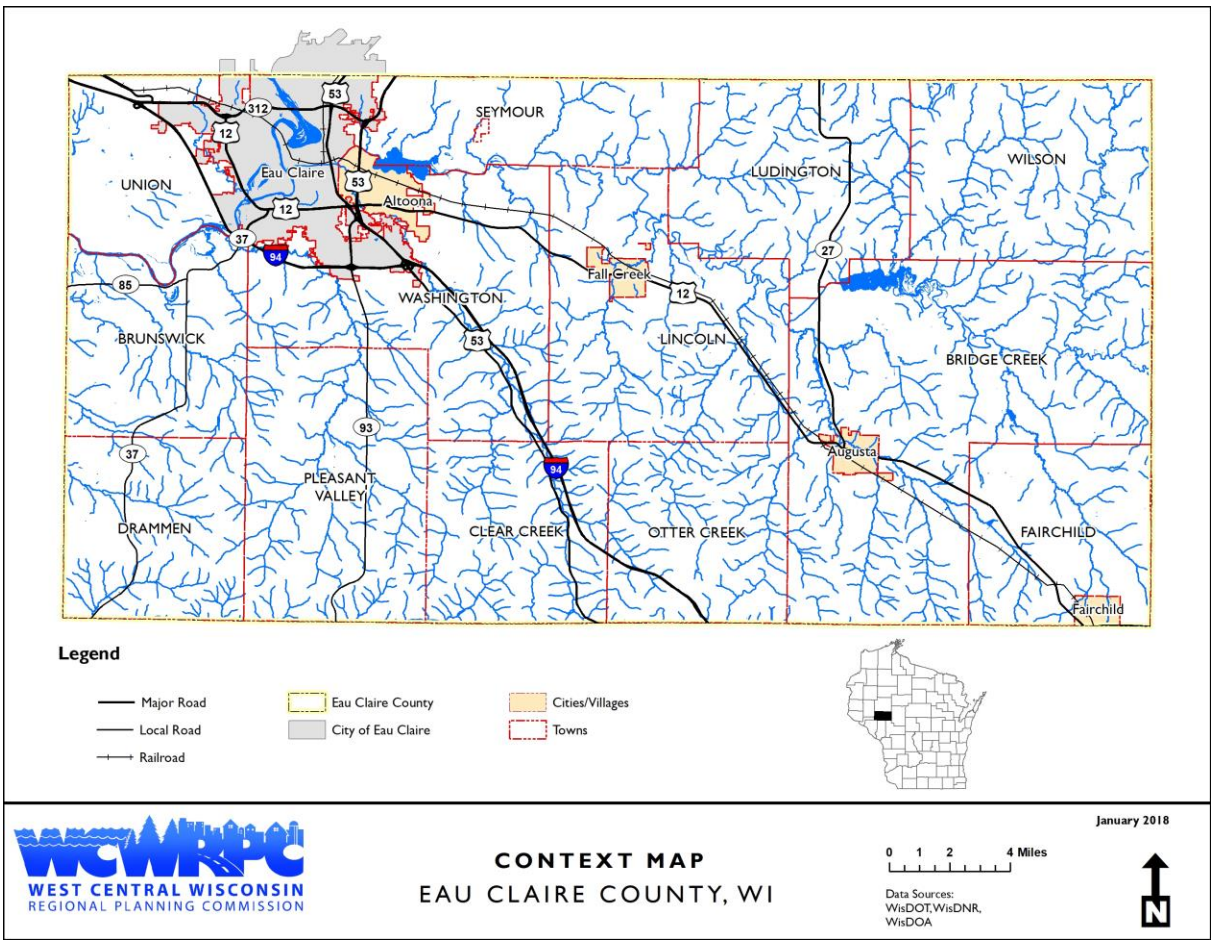
SECTION II.
COMMUNITY PROFILE – EAU CLAIRE COUNTY

The community profile section of the plan provides background data of the general characteristics of Eau Claire County. Included in this section is a description of natural and demographic characteristics, general development trends, and an inventory of critical facilities.

A. GEOGRAPHIC LOCATION

Eau Claire County is located in west-central Wisconsin (see **Figure 2**). The County has a total of 419,200 acres, or 655 square miles, of land and surface waters. The County is bordered to the north by Chippewa County, to the east by Clark County, to the west by Dunn and Pepin Counties, and by Jackson, Trempealeau and Buffalo Counties to the south. The County is made up of 18 minor civil divisions, which include 13 towns, 3 cities, and 2 villages. The City of Eau Claire, located in the northwest part of the County, is the county seat and the County's largest municipality with a 2017 population of 67,926, which includes 2,100 residents in Chippewa County. Eau Claire County is a part of the Eau Claire Metropolitan Statistical Area (MSA), which is comprised of Chippewa and Eau Claire Counties.

Figure 2. Geographic Location Eau Claire County



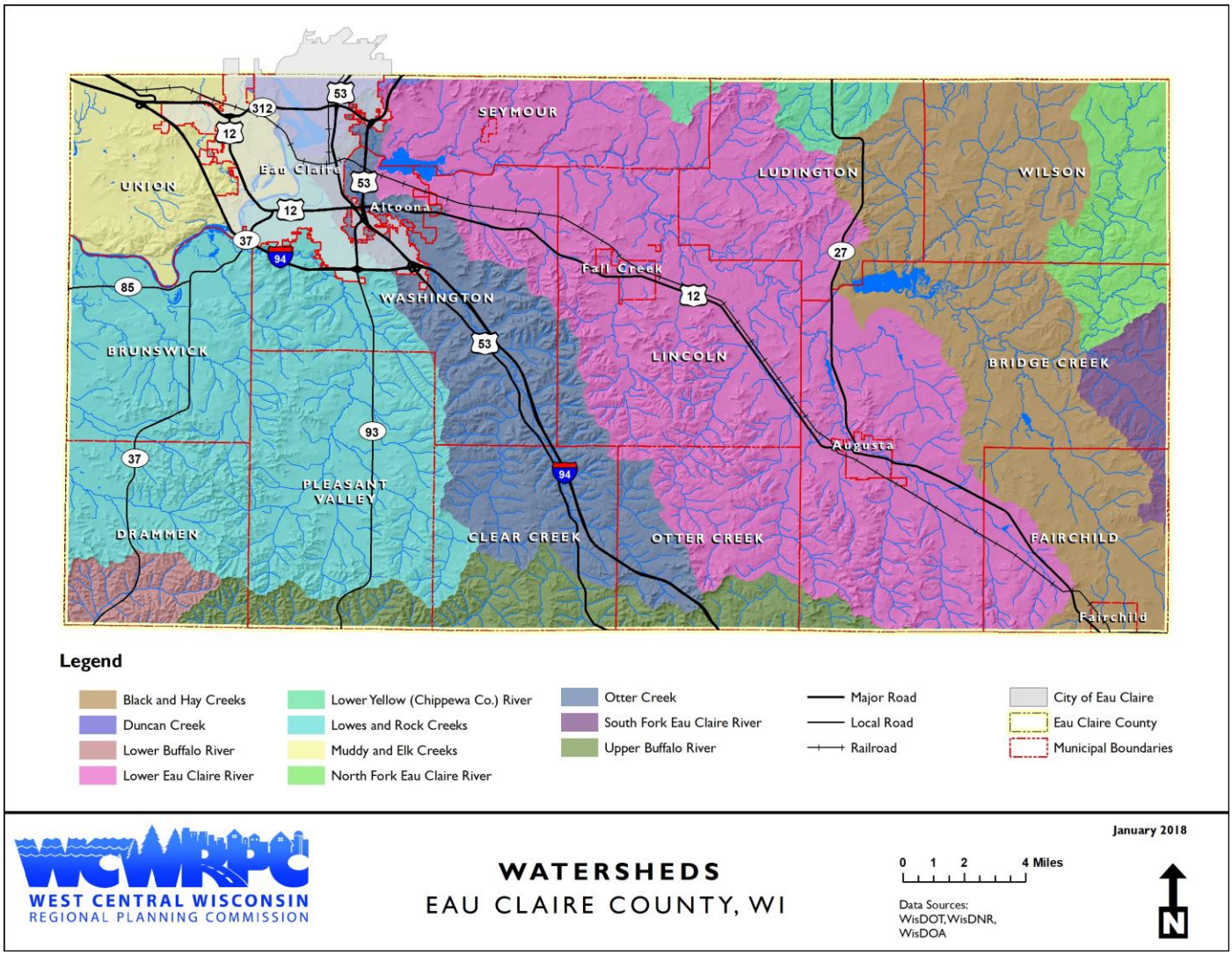
B. NATURAL FEATURES AND ENVIRONMENT

Eau Claire County consists of two physiographic areas and is a transitional zone between the more recently glaciated area to the north and east and the unglaciated Driftless Area to the south and west. The northeastern three-fourths of the County is generally of low relief, which varies from level to gently rolling terrain. As one moves south and southwest in the County, the drainage patterns become more defined with fewer swamps and numerous shale and sandstone outcrops. The southwestern quarter of the County is characterized by rolling to steep terrain.

i. Watersheds

Shown in **Figure 3** are the watersheds that are wholly or partially located within Eau Claire County. A watershed is an area of land that drains or "sheds" its water to a lake, river, stream, or wetland. Some watersheds encompass several hundred square miles, while others may be small, covering only a few square miles that drains into a lake.

Figure 3. Eau Claire County Watersheds



Watersheds are important to understand since the effects of natural and man-made activities in one area can have a direct impact on other areas. For example, runoff from a heavy rainfall upstream in a watershed will eventually reach the downstream part of the watershed. Eau Claire County is almost entirely in the Lower Chippewa River Basin with very southern portions of the County in the Buffalo-Trempealeau River Basin

ii. Surface Waters, Floodplains, and Wetlands

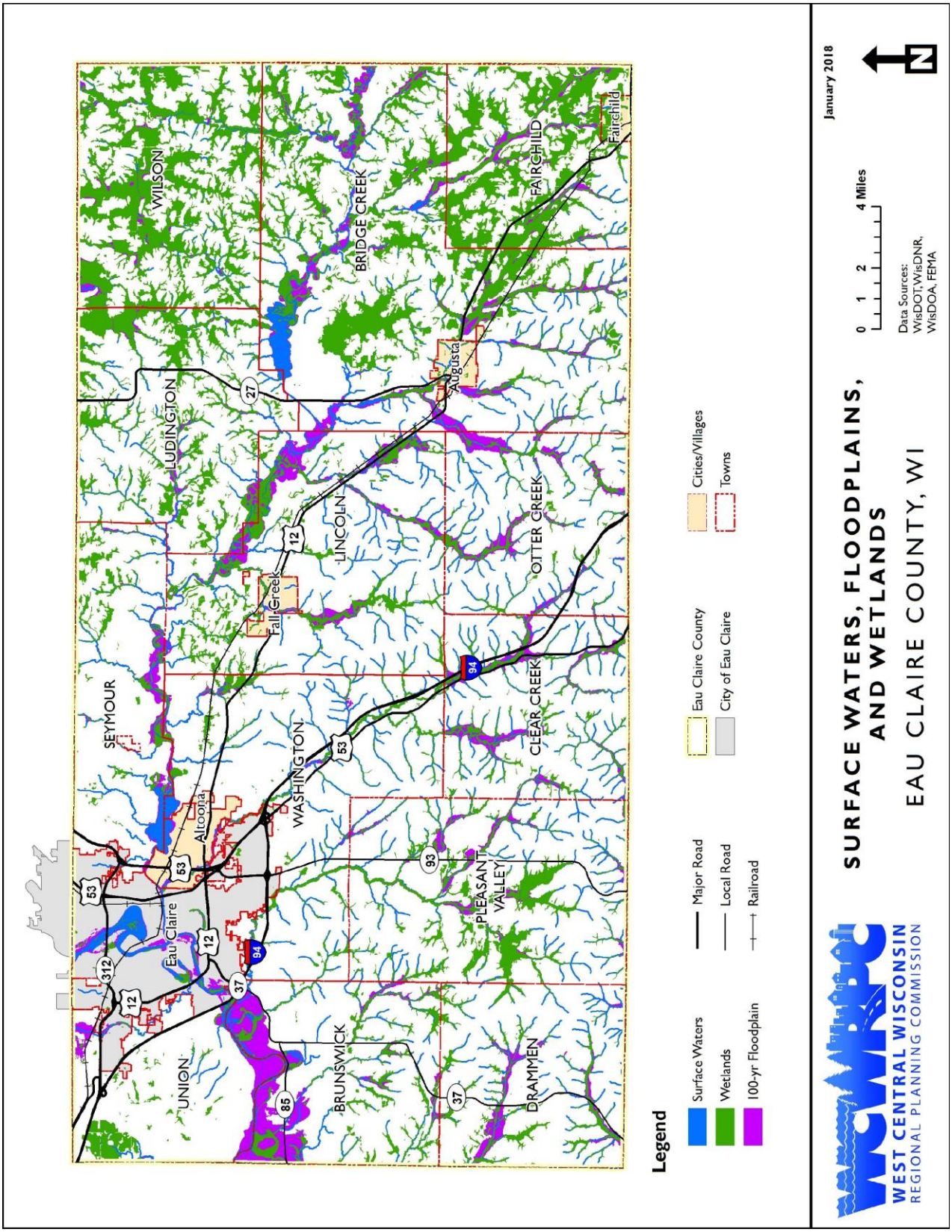
The Chippewa River and Eau Claire River and their tributaries are the County's most significant surface water features, roughly bisecting the County from east to west. Eau Claire County has a total surface water area of 5,120 acres or eight square miles as shown in **Figure 4** on the following page. A number of dams on the Chippewa River maintain reservoirs for hydro-electric power generation. Nearly all potable water in the County is groundwater, though surface waters can be a major source of groundwater recharge. The rivers and lakes of Eau Claire County are important recreational resources and have attracted significant shoreland development in many areas.

Generally, the surface waters of Eau Claire County are healthy. No waters are deemed by Wisconsin Department of Natural Resources (WDNR) as outstanding in water quality and free of pollutants, while eight others are exceptional waters (high quality, but at risk). But a number of surface waters, including various locations on the Chippewa River, have been deemed impaired by WDNR due to water quality concerns (e.g., phosphorus, polychlorobiphenyls, mercury, sedimentation).

Wetland areas within the watersheds can affect the water levels of rivers and creeks flowing through Eau Claire County. Wetlands are defined by the State Statute as "an area where water is at, near, or above the land surface long enough to be capable of supporting aquatic or hydrophytic (water-loving) vegetation and which has soils indicative of wet conditions." Wetlands may be seasonal or permanent and are commonly referred to as swamps, marshes, or bogs. Wetland plants and soils have the capacity to store and filter pollutants, replenish groundwater supplies, store floodwaters, and maintain stream flows. The wetland areas within Eau Claire County delineated on Figure 4 are identified in the WDNR Wisconsin Wetlands Inventory last updated in for Eau Claire County in 1996. Wetlands less than five acres in size are generally not identified.

Figure 4 also show the floodplain areas of Eau Claire County as identified in the digital Flood Insurance Rate Maps (D-FIRMS) which were made effective February 2009. The floodplain and flood-hazard areas within the County associated with these water bodies are discussed later within **Section III. Assessment of Hazard Conditions** of this report.

Figure 4. Eau Claire County Surface Waters, Floodplains & Wetlands



iii. General Climate

The climate of Eau Claire County is classified as mid-latitude continental. Warm, humid summers and cold, snowy winters are the main characteristics. Many factors, such as location, topography, vegetation, and water bodies, can influence climate, but the following climate data collected at the Chippewa Valley Regional Airport in the City of Eau Claire is provided as a general description of the County's climate.

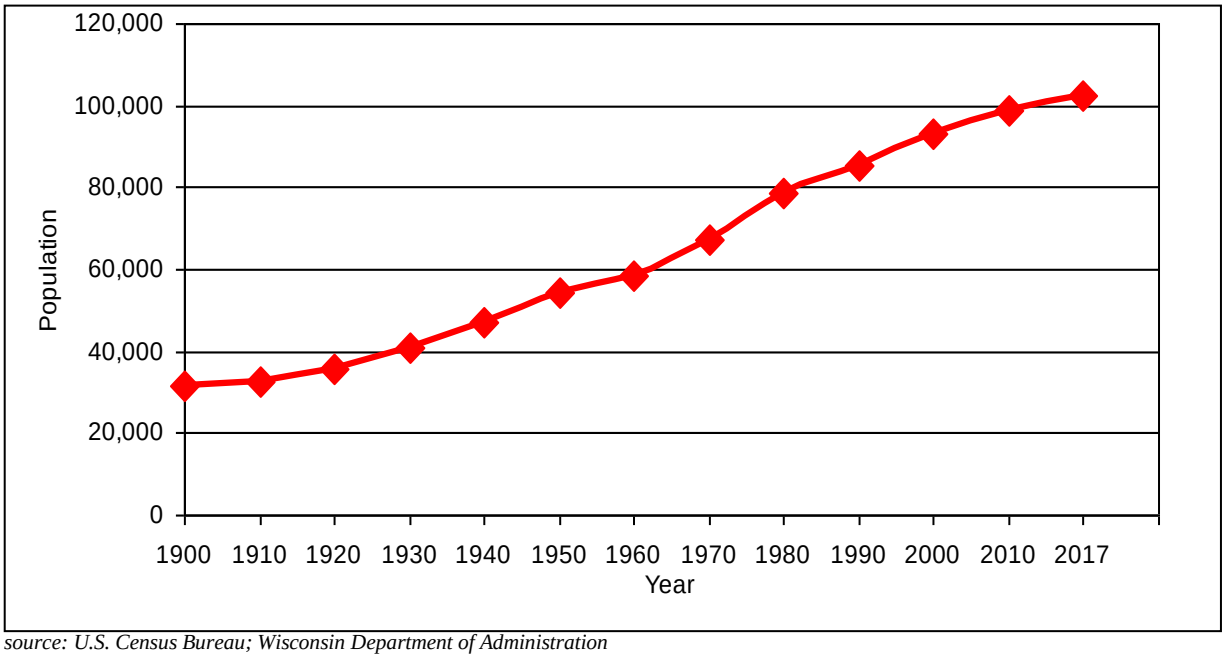
At the airport, the average monthly temperature ranged from 11.9ºF in January to 71.4ºF in July from 1971-2000 with a one day minimum of -45ºF and a one-day maximum of 104ºF. Annual precipitation averaged 32.12 inches, with the majority of this occurring as rain. The largest rain event during the time period occurred in September 2000 when 5.98 inches of rain fell within 24-hours. The average annual snowfall was 49.4 inches, almost half of which occurred during the months of December and January. In December 2010, 18 to 22 inches fell within a 24-hour period. Eau Claire County is susceptible to a range of natural hazards, including flooding. A description of these hazards, along with historical trends and current risks, is included in **Section III** of this report.

C. DEMOGRAPHIC, ECONOMIC, AND LAND USE PROFILE

i. Population

Eau Claire County had a 2017 population of 102,340 which is a 3.65 percent increase since 2010. Since 1910, Eau Claire County's population has increased at a fairly steady rate as shown in **Figure 5**.

Figure 5. Eau Claire County Historical Population – 1900 to 2017



source: U.S. Census Bureau; Wisconsin Department of Administration

Table 2 below provides population trends for 1970 to 2010 by municipality. Most notable in Table 2 is that 65 percent of the County's population resides in the City of Eau Claire. Growth among the other municipalities varies, with a number losing population from 2000 to 2010.

Table 2. Eau Claire County Population Trends – 1970 to 2010

	Year					Percent Change			
	1970	1980	1990	2000	2010	'70-'80	'80-'90	'90-'00	'00-'10
Towns									
Bridge Creek	935	1,206	1,440	1,844	1,900	29.0%	19.4%	28.1%	3.0%
Brunswick	1,092	1,411	1,506	1,598	1,624	29.2%	6.7%	6.1%	1.6%
Clear Creek	773	798	692	712	821	3.2%	-13.3%	2.9%	15.3%
Drammen	672	725	767	800	783	7.9%	5.8%	4.3%	-2.1%
Fairchild	238	278	312	351	343	16.8%	12.2%	12.5%	-2.3%
Lincoln	962	1,012	956	1,080	1,096	5.2%	-5.5%	13.0%	1.5%
Ludington	761	969	906	998	1,063	27.3%	-6.5%	10.2%	6.5%
Otter Creek	526	497	459	531	500	-5.5%	-7.6%	15.7%	-5.8%
Pleasant Valley	1,223	1,908	2,076	2,681	3,044	56.0%	8.8%	29.1%	13.5%
Seymour	2,362	2,824	2,754	2,978	3,209	19.6%	-2.5%	8.1%	7.8%
Union	2,355	2,689	2,456	2,402	2,663	14.2%	-8.7%	-2.2%	10.9%
Washington	5,757	6,489	6,269	6,995	7,182	12.7%	-3.4%	11.6%	2.0%
Wilson	430	469	477	420	485	9.1%	1.7%	-11.9%	15.5%
Subtotal:	**18,086**	**21,275**	**21,070**	**23,390**	**24,665**	**17.6%**	**-1.0%**	**11.0%**	**5.5%**
Villages									
Fairchild	562	577	504	564	550	2.7%	-12.7%	11.9%	-2.5%
Fall Creek	825	1,148	1,080	1,236	1,315	39.2%	-5.9%	14.4%	6.4%
Subtotal:	**1,387**	**1,725**	**1,584**	**1,800**	**1,865**	**24.4%**	**-8.2%**	**13.6%**	**3.6%**
Cities									
Altoona	2,842	4,393	5,889	6,698	6,706	54.6%	34.1%	13.7%	0.1%
Augusta	1,242	1,560	1,510	1,460	1,550	25.6%	-3.2%	-3.3%	6.2%
Eau Claire	43,662	49,852	55,130	59,794	63,950	14.2%	10.6%	8.5%	7.0%
Subtotal:	**47,746**	**55,805**	**62,529**	**67,952**	**72,206**	**16.9%**	**12.0%**	**8.7%**	6.3%
Eau Claire County*	**67,219**	**78,805**	**85,183**	**93,142**	**98,736**	**17. 2%**	**8.1%**	**9.3%**	**6.0%**

source: U.S. Census Bureau

*The majority of the City of Eau Claire is located in Eau Claire County; the table includes totals for the Eau Claire County portion only.

Unincorporated towns, overall, grew by 17% from 1990 to 2010, compared to 15.5% for cities and villages. In 2016, population density for the entire County was nearly 161.4 persons per square mile. As noted above however, much of the County's population resides in the cities of Eau Claire and Altoona and accounts for roughly 72% of the County's total population, but only 5.5% of the County's total land area. When calculating density without these two cities, density decreases significantly to only 44 persons per square mile. This analysis help paint a more accurate picture of the low density and rural nature of the population living outside the Eau Claire urban area.

From 2000 to 2010, the aging of the County slowed with a 2010 average age of 33.4 years. Based on recent American Community Survey estimates, median age in the County is currently 33.8 with the highest percentage of residents (13.3%) in the 25-34 age range. From 2000 to

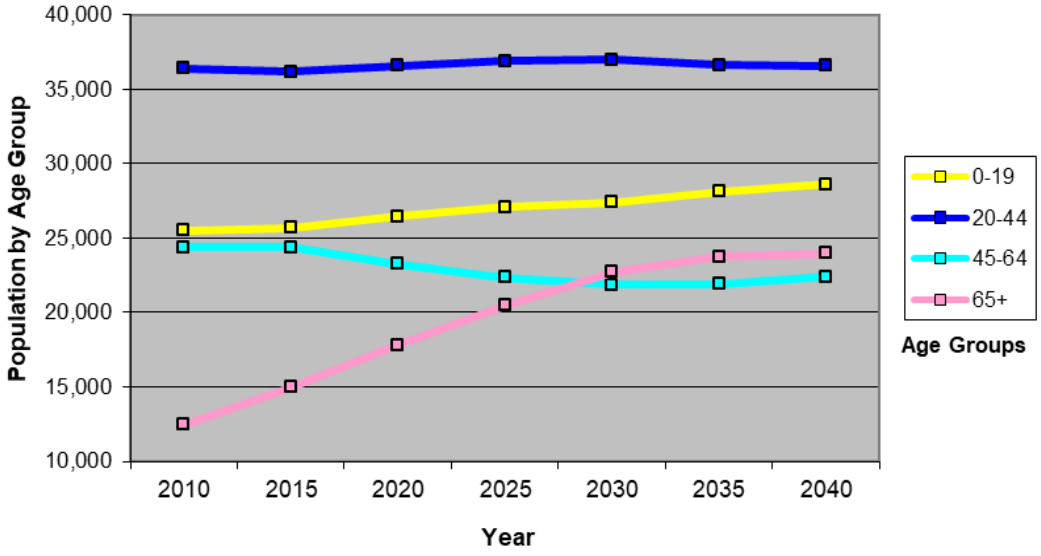
2010, those aged 60-64 increased by over 78% with a majority of population increase occurring among those aged 55 to 64 as compared to all other age cohorts.

When compared to Wisconsin and the larger region, Eau Claire County's average ages are impacted by its post-secondary educational institutions. The University of Wisconsin-Eau Claire has an annual enrollment exceeding 10,000 students. Other institutions include Chippewa Valley Technical College and Immanuel Lutheran College. Due to the student and faculty populations at these educational institutions, the City of Eau Claire's average age in 2010 was 29.7 years. Median ages for the remainder of the County would be closer to the State's 2010 average of 38.5 years given the increases in the 60-64 age cohort.

Overall, Eau Claire County's population is relatively homogenous, with 92.3 percent of the population in the white, non-Hispanic racial group in 2016. During the past decade, the population in all racial groups increased, with the Asian and White Hispanic or Latino groups increasing most to become the largest minority populations in Eau Claire County. The Hmong population of Eau Claire County accounts for roughly 2 percent of the total population with much of this ethnic minority residing in the City of Eau Claire.[3] Eau Claire County is also home to several Amish families estimated to be around 1,240 individuals or 180 families in 2012.[4] Language and cultural barriers can pose challenges to education and outreach on weather awareness, available shelters, agricultural best practices, regulations, etc.

Figure 6 below shows Eau Claire County's projected population by age group, reflecting that the baby boomer generation is dramatically becoming a larger proportion of the County's population.

Figure 6. Eau Claire County Age Group Projections – 2010 to 2040



data source: Wisconsin Department of Administration.

[3] J Christian, PSL Moua, I Vogeler. "The Cultural Landscape of the Hmong in Eau Claire, Wisconsin (2008-2009)." Wisconsin Geographer, Vol. 23, pp. 3-19.

[4] "Amish Population by State (2012)." Young Center for Anabaptist and Pietist Studies, Elizabethtown College.

From 2010 to 2040, the number of residents ages 65 and over is projected to nearly double. Meanwhile, the proportion of the population in the 45-64 age range is projected to decline. This trend has serious future implications for services, housing, and the labor force.

As shown in **Table 3**, the Wisconsin Department of Administration (WisDOA)[5] projects a 13 percent increase (+12,874 residents) in the Eau Claire County population between 2010 and 2040. Like recent trends, the percentage increases are projected to be highest in many of the cities and towns surrounding the urban areas. The largest rates of increase are expected in the Town of Clear Creek, Town of Pleasant Valley, Town of Union, and the City of Altoona.

Table 3. Eau Claire County Population Projections – 2010 to 2040

Municipality	Census 2010	Estimate 2016	Proj. 2020	Proj. 2025	Proj. 2030	Proj. 2035	Proj. 2040	% Change 2010-2040
Towns								
Bridge Creek	1,900	1,909	1,960	2,000	2,030	2,045	2,060	8%
Brunswick	1,624	1,839	1,740	1,785	1,825	1,850	1,870	15%
Clear Creek	821	847	910	950	990	1,020	1,050	28%
Drammen	783	812	805	810	815	810	805	3%
Fairchild	343	355	345	345	345	340	340	-1%
Lincoln	1,096	1,142	1,145	1,170	1,190	1,200	1,210	10%
Ludington	1,063	1,081	1,100	1,125	1,140	1,150	1,160	9%
Otter Creek	500	499	500	500	500	495	485	-3%
Pleasant Valley	3,044	3,237	3,355	3,505	3,655	3,765	3,875	27%
Seymour	3,209	3,328	3,370	3,455	3,530	3,575	3,615	13%
Union	2,663	2,806	2,920	3,060	3,180	3,280	3,375	27%
Washington	7,134	7,314	7,525	7,710	7,880	7,975	8,060	13%
Wilson	485	499	510	525	535	540	545	12%
Subtotal:	24,665	25,668	26,185	26,940	27,615	28,045	28,450	15%
Villages								
Fairchild	550	547	560	565	570	570	570	4%
Fall Creek	1,315	1,302	1,335	1,355	1,370	1,370	1,370	4%
Subtotal:	1,865	1,849	1,895	1,920	1,940	1,940	1,940	4%
Cities								
Altoona	6,706	7,345	7,265	7,485	7,695	7,825	7,945	18%
Augusta	1,550	1,537	1,550	1,555	1,555	1,540	1,525	-2%
Eau Claire*	63,950	65,332	67,200	68,850	70,200	71,050	71,750	12%
Subtotal:	72,206	74,214	76,015	77,890	79,450	80,415	81,220	12%
Eau Claire County	98,736	101,731	104,095	106,750	109,005	110,400	111,610	13%

source: U.S. Census Bureau & Wisconsin Department of Administration, Demographic Services Center.
*Portion of these communities located in Eau Claire County only.

ii. Housing

As residential growth occurs in Eau Claire County, so does the value of improvements which could potentially be vulnerable to hazard events. During the 1980s, population growth in the County was 8.1 percent, while the number of housing units increased 13 percent. Housing growth continued to outpace population growth in the 1990s, and the difference widened (i.e., +9.3% vs. +14.5%). These trends reflected in large part, decreasing household sizes and despite

[5] The WisDOA population projections are, by State Statute, the official population projections for Wisconsin.

continued population growth in Eau Claire County, recent trends show that housing growth no longer exceeds population growth. In fact, housing growth has slowed dramatically over the last several years with only a 3.21% increase from 2010 to 2016 as shown in **Table 4**.

Table 4. Eau Claire County Housing Unit Change • 1980 to 2016

Year	Number of Housing Units	Numerical Change	Percent Change
1980	28,973		
1990	32,741	+3,768	+13%
2000	37,474	+4,733	+14.5%
2010	42,151	+4,677	+12.5%
2016	43,504	+1,353	+3.21%

Source: 1980, 1990, 2000, & 2010 Census

Shown in **Table 5** are the housing unit projections for Eau Claire County for the years 2016 through 2040 based on the previous population projections. Despite the lack of local and national housing market changes during the last few years in these projections, estimates show that housing growth will likely continue at a significantly lower rate than occurred in prior decades.

Table 5. Eau Claire County Housing Unit Forecast — 2016 to 2040

	2016	2020	2025	2030	2035	2040
Population	102,965	104,095	106,750	109,005	110,400	111,610
Housing Units	43,504	43,956	45,018	45,920	46,478	46,962
Housing Unit Change		+1.04%	+2.42%	+2.00%	+1.22%	+1.04%

Source: WCWRPC based on U.S. Census, Wisconsin Department of Administration estimates

While the development of primary housing structures has slowed dramatically over the last several years, the County is seeing a significant increase in the number of seasonal or recreational housing units. In 2000, Eau Claire County had only 375 seasonal or recreational housing units, which was relatively low compared to some other area counties. However, the number of seasonal units grew to 709 by 2015, representing an 89% increase over a fifteen-year period. In 2015, about 80 percent of all seasonal units in Eau Claire County were concentrated in four towns and one city:

Town of Bridge Creek	240 units (40% of all units in the town)
City of Eau Claire	131 units (0.5% of all units in the city)
Town of Ludington	77 units (18.6% of all units in the town)
Town of Wilson	65 units (36% of all units in the town)
Town of Fairchild	55 units (43% of all units in the town)

Also of interest, 62 percent of all housing units in Eau Claire County in 2015 were owner-occupied (not rented) which is slightly below the State of Wisconsin average of 63.6 percent. **28.2 percent of the County's housing units were multi-family unit structures (e.g., apartments).** A majority of these of these multi-family units (86 percent) were located in the City of Eau Claire and reflect the student population. **A total of 1,236 housing units (3.1% of**

all units) in 2015 were mobile homes, which is slightly below the State average of 3.6 percent. Over 49 percent of these mobile homes were located in the unincorporated towns of the County while 27 percent were located in the City of Eau Claire and 18 percent were located in the City of Altoona.

iii. Economic Overview

The economy of a county is an important determining factor driving land use and development. Table 6 shows the employment trends between 2006 and 2016 by industry sector in Eau Claire County. There are over 2,700 payrolled business locations in Eau Claire County, resulting in 62,106 jobs.

From 2006 to 2016, jobs increased by 1.7% in Eau Claire County with the average Earnings Per Job around $51,306 as compared to the national average of $63,122. Industries with the greatest job increases include *Management of Companies and Enterprises*, and *Arts, Entertainment, and Recreation* as shown in **Table 6**.

Table 6. Eau Claire County Establishments & Employment By Industry Sector

Industry Sector (2-digit NAICS)	2017 Payrolled Business Locations	2006 Jobs	2016 Jobs	2006 - 2016 % Change	2017 Location Quotient
Management of Companies and Enterprises	55	1,653	2,393	45%	2.74
Health Care and Social Assistance	401	9,231	12,120	31%	1.56
Retail Trade	357	7,739	7,415	(4%)	1.15
Finance and Insurance	177	3,143	2,726	(13%)	1.14
Transportation and Warehousing	75	2,422	2,367	(2%)	1.10
Manufacturing	100	6,301	5,247	(17%)	1.07
Accommodation and Food Services	272	5,194	5,472	5%	1.04
Wholesale Trade	151	2,196	2,244	2%	0.96
Administrative and Support and Waste Management and Remediation Services	157	4,104	3,408	(17%)	0.88
Other Services (except Public Administration)	285	2,610	2,594	(1%)	0.87
Arts, Entertainment, and Recreation	36	650	877	35%	0.86
Government	77	7,779	7,857	1%	0.81
Construction	188	2,825	2,385	(16%)	0.71
Real Estate and Rental and Leasing	99	676	689	2%	0.67
Information	35	885	733	(17%)	0.62
Professional, Scientific, and Technical Services	194	2,303	2,297	(0%)	0.58
Agriculture, Forestry, Fishing and Hunting	26	327	391	20%	0.52
Educational Services	26	947	814	(14%)	0.51
Utilities	2	80	63	(21%)	0.29
Mining, Quarrying, and Oil and Gas Extraction	2	0	13	Insf. Data	0.06
Totals	2,711	61,066	62,106	1.7%	

Source: EMSI.

Like much of the region and the nation, the economy of Eau Claire County has been undergoing notable employment and industry sector shifts. Health Care and Social Assistance remains the largest industry by employment in the County and saw a 31% increase in jobs for this industry from 2006 to 2016. Government and Retail Trade also provide a significant number of jobs while several industries experienced job losses over the same period in *Utilities, Manufacturing, and Administrative Support and Waste Management Remediation Services*.

The 2016 median household income in the County was $50,538 compared to the State median household income of $54,610. The overwhelming majority of Eau Claire County residents work within the County, with only 34% of residents working outside the County in 2015.

Eau Claire Area Festivals and Events

In addition, to being a regional service hub, the Eau Claire area is host to many large events and attractions. The largest is Country Jam, which attracts up to 30,000 attendees per day over this three-day, annual event held in the Town of Union. Music events also held annually in Union are the Blue Ox Music Festival and the Eaux Claires Festival.

Other large gatherings in Eau Claire County include: events at Phoenix Park (Eau Claire), Snow Biz (Cleghorn), WinterFest (Lake Altoona), sporting events at Carson Park (Eau Claire), and various smaller community festivals (e.g., Bean & Bacon Days in Augusta). River Prairie (Altoona) and the Confluence Arts Center (Eau Claire) have the potential to draw large crowds in the future.

iv. Agricultural Overview

Grain production and dairy farming are the major agricultural industries in Eau Claire County. Most data in this section is from the 2012 U.S. Census of Agriculture; numbers from the 2017 Census are not yet available. Some limited county-level data is available on an annual basis for cash rent statistics and for certain products.

In 2012, Eau Claire County had approximately 1,313 farms and over 203,705 acres in crop production, in addition to an estimated 573,629 Broilers and Other Meal-Type Chickens and 31,613 head of cattle. The County ranked high among all Wisconsin counties in a number of agricultural statistics:

#3	Number of broilers and other meal-type chickens
#9	Value of sales for nursery, greenhouse, floriculture, and sod products
#9	Number of horses and ponies
#10	Value of sales for poultry and egg products
#11	Number of turkeys

Grain production accounts for $42.0 million in sales. On-farm production and milk sales account for $60.1 million. Processing milk into dairy products generates another $536.2 million. In 2012, Eau Claire County ranked 43rd in the State of Wisconsin for the total market value of agricultural products sold, at over $113 million. This includes values of over $56 million in crops including nursery and greenhouses, and over $57 million in livestock, poultry, and their products. The value of sales by top five commodity groups in 2012 was:

- Milk from cows $34.8 million
- Cattle and calves $12.8 million
- Poultry and eggs $7.8 million
- Vegetables, melons, potatoes & sweet potatoes. $2.9 million
- Hogs and pigs $590 thousand

The top five crop items based on land in acres was:

- Corn for grain 46,785 acres
- Forage-land used for hay, grass, etc. 29,250 acres
- Soybeans for beans 20,333 acres
- Corn for silage 5,864 acres
- Oats for grain 2,135 acres

Other notable agricultural trends in the County include:

- Of the 203,705 acres of farmland reported in 2012, 63.2% was cropland, 19.5% woodland, 8.8% pastureland, and 8.4% in other uses.
- The average age of the principal farm operator in 2012 was 56.2 years of age and 42.3% of principal operators were primarily employed in an occupation other than farming.
- Two plants process dairy products in Eau Claire County.
- On-farm milk production accounts for 469 jobs, and dairy processing accounts for 1,369 jobs. All farm jobs account 1,856 employees.
- At the County level, each dairy cow generates $4,705 in on-farm sales to producers.
- At the state level, each dairy cow generates over $34,000 in total sales.

According to UW-Extension's *Value & Economic Impact Brochure for Eau Claire County* (2014), agriculture provided 4,641 jobs, or 6.3 percent, of the County's workforce of 73,590. Production jobs include farm owners and managers and farm employees. Agricultural service jobs include veterinarians, crop and livestock consultants, feed, fuel and other crop input suppliers, farm machinery dealers, barn builders and agricultural lenders, to name a few. Processing jobs include those employed in food processing and other value-added industries that support food processors. Every job in agriculture generates an additional 0.93 jobs in the County.

Eau Claire County agriculture generates $1.12 billion in economic activity, over 11 percent, of the County's total economic activity. Every dollar of sales from agricultural products generates an additional $0.35 of economic activity in other parts of the County's economy.

- The direct effect of agriculture equals $827.2 million and includes the sale of farm products and value-added products.
- Purchases of agricultural and food processing inputs, services and equipment add another $184.6 million in economic activity. For example, this includes business-to-business purchases of fuel, seed, fertilizer, feed and farm machinery, as well as veterinary services, crop and livestock consultants and equipment leasing.
- This business-to-business activity then generates another $105.8 million in economic activity when people who work in agriculture-related businesses spend their earnings in the local economy.

Further, agriculture accounts for $324.6 million, or 6.2 percent, of the County's total income. This includes wages, salaries, benefits and profits of farmers and workers in agriculture-related businesses. Every dollar of agricultural income generates an additional $1.08 of County income. Economic activity associated with Eau Claire County farms and agriculture related businesses also generate $19.1 million in local and state taxes. This figure does not include all property taxes paid to support local schools. If it did, the number would increase dramatically.

Eau Claire County, though dominated by the dairy industry, raises everything from meat goats to milking sheep to apples, grapes and vegetables. The County has seen farm numbers rise, while farm acreage has declined to an average farm size of 155 acres. Migration from the city to rural areas has resulted in smaller farms producing a variety of products.

It is very unlikely that any single hazard would endanger all livestock or crops, though large proportions could be at-risk from a prolonged, severe drought or the introduction of a new a pest or disease. Large-scale impacts to crops or livestock from a hazard can also have devastating impacts on the local economy, related industries (e.g., food processing), and local service providers. The state of the agricultural economy is tenuous for the local farmer, and a hazard event may result in farmers making fewer purchases or getting out of the business altogether. Our local, small town economies are already going through significant transitions with the decreases in the number of farms. Additional farm losses would further impact local businesses (e.g., implement dealers, feed stores, granaries, food processing, banks, and general goods). To compensate for additional farm losses, the costs for such services may also be increased, or the local businesses may close, further burdening the remaining farmers in the area.

iv. Property Values

A disaster event can result in impacts to the natural environment, life and safety, the economy, structures, and personal property. This sub-section provides insight into the taxable improvements and personal property within Eau Claire County.

Table 7. Eau Claire County 2016 Assessed Total Values
(not equalized)

Land	$ 1,650,178,400
Improvements	$ 5,682,141,900
Real Estate	$ 7,332,320,300
Personal Property	$ 304,751,788
Aggregate	$ 7,637,072,088

According to the Wisconsin Department of Revenue, the aggregated assessed value for the County was over 7.6 billion.[6] **Table 7** at the right summarizes the 2016 Statement of Assessments for the County. This reflects the metropolitan nature of northwest Eau Claire County, with a relatively high proportion of the aggregate value in improvements and a lower proportion in land when compared to other counties in the region.

From 2010 to 2016, the County's total assessed value of improvements grew by over $897 million, representing a 13.3% increase. **Table 8** on the following page further breaks down the 2016 assessed values by primary land use and municipality type.

Not included in values shown in Table 8 are tax-exempt properties. Eau Claire County has approximately 56,000 acres of County and State, public resource lands, mostly forested, which are tax-exempt. Governmental facilities, non-profit institutions, and educational facilities constitute the largest portion of those existing improvements not included in Tables 7 and 8, though other facilities on tax-exempt lands owned by non-profit institutions (e.g., churches) are also not included.

[6] Wisconsin Department of Revenue, Bureau of Equalization. 2010 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 8. Eau Claire County Assessed Value by Land Use – 2016

Use	# Parcels	Land Value	# Improved parcels	Improvements	Total
All Cities					
Residential	22,590	$588,976,500	21,176	$2,391,682,000	$2,980,658,500
Commercial	2,593	$463,948,400	2,248	$1,399,163,500	$1,863,111,900
Manufacturing	83	$13,253,100	63	$132,517,500	$145,770,600
Agricultural	58	$127,900	0	$0	$127,900
Undeveloped	19	$45,700	0	$0	$45,700
Ag Forest	7	$91,100	0	$0	$91,100
Forest	3	$39,800	0	$0	$39,800
Other	5	$29,500	5	$399,100	$428,600
Totals	25,358	$1,066,512,000	23,492	$3,923,762,100	$4,990,274,100
All Villages					
Residential	739	$9,121,300	675	$59,398,500	$68,519,800
Commercial	80	$1,167,400	75	$8,540,500	$9,707,900
Manufacturing	4	$212,500	3	$6,206,200	$6,418,700
Agricultural	81	$98,000	0	$0	$98,000
Undeveloped	53	$226,000	0	$0	$226,000
Ag Forest	13	$162,200	0	$0	$162,200
Forest	38	$528,800	0	$0	$528,800
Other	5	$54,000	5	$584,700	$638,700
Totals	1,013	$11,570,200	758	$74,729,900	$86,300,100
All Towns					
Residential	10,565	$332,950,150	8,986	$1,363,477,100	$1,696,427,250
Commercial	462	$40,578,100	338	$151,944,800	$192,522,900
Manufacturing	43	$13,030,500	23	$43,906,300	$56,936,800
Agricultural	7,050	$21,983,900	0	$0	$21,983,900
Undeveloped	4,928	$20,310,950	0	$0	$20,310,950
Ag Forest	3,297	$45,650,350	0	$0	$45,650,350
Forest	2,317	$83,916,950	0	$0	$83,916,950
Other	1,218	$13,675,300	1,218	$124,321,700	$137,997,000
Totals	29,880	$572,096,200	10,565	$1,683,649,900	$2,255,746,100
All Municipalities					
Residential	33,894	$931,047,950	30,837	$3,814,557,600	$4,745,605,550
Commercial	3,135	$505,693,900	2,661	$1,559,648,800	$2,065,342,700
Manufacturing	130	$26,496,100	89	$182,630,000	$209,126,100
Agricultural	7,189	$22,209,800	0	$0	$22,209,800
Undeveloped	5,000	$20,582,650	0	$0	$20,582,650
Ag Forest	3,317	$45,903,650	0	$0	$45,903,650
Forest	2,358	$84,485,550	0	$0	$84,485,550
Other	1,228	$13,758,800	1,228	$125,305,500	$139,064,300
Totals	56,251	$1,650,178,400	34,815	$5,682,141,900	$7,332,320,300

source: Wisconsin Department of Revenue. 2016 Statement of Assessments.

v. Land Cover and General Development Pattern

Eau Claire County is located in the Eau Claire-Chippewa Falls Metropolitan Statistical Areas (MSA). The Census Bureau defines a Metropolitan Statistical Area (MSA) as a county or counties with a central city of at least 50,000 people, a total population over 100,000 people, and significant social and economic ties which exist between the central city and any outlying counties that are included. The County's location within this MSA, combined with its proximity to highway and rail arterials and the distribution of surface waters in the County, have all greatly influenced the County's general development pattern.

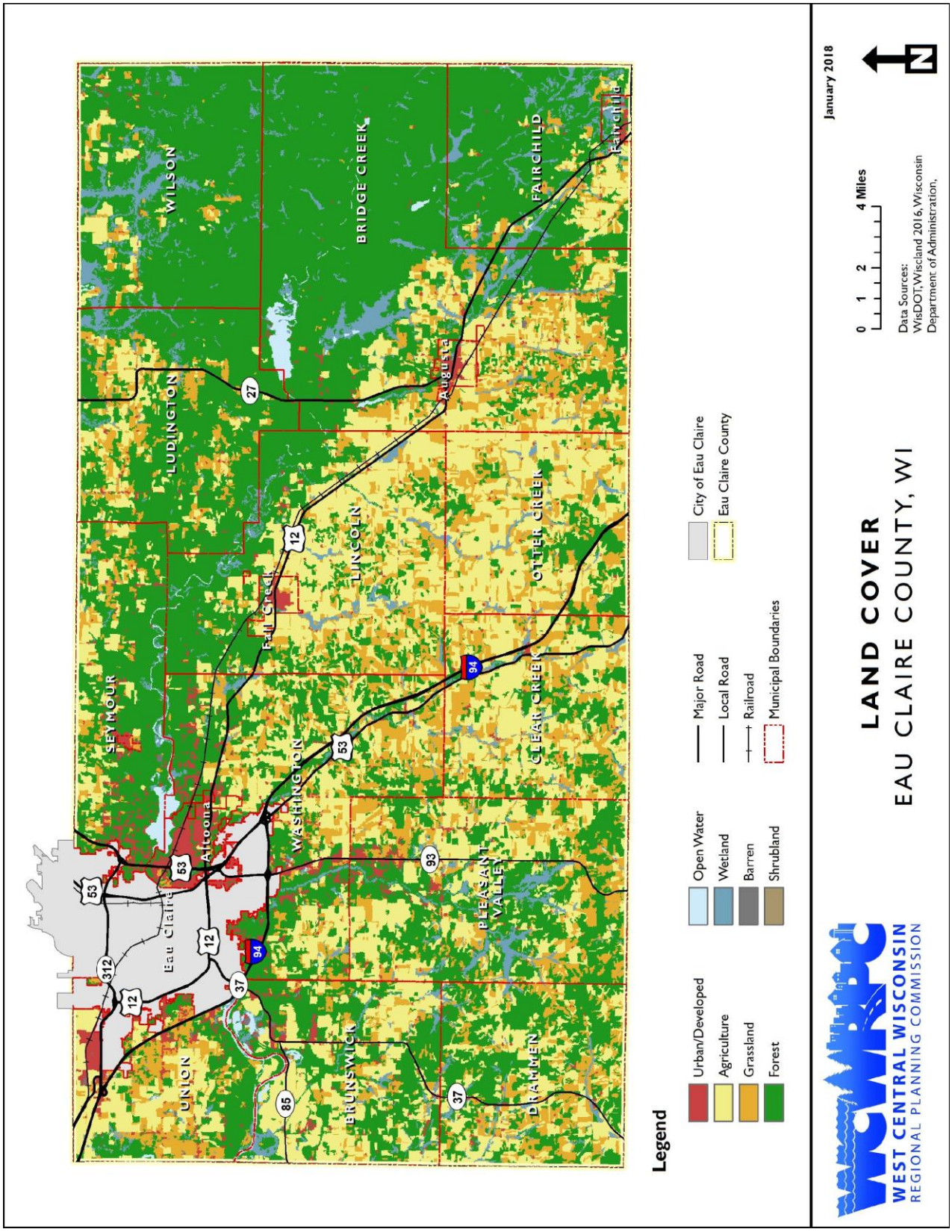
Figure 7 on the following page shows the general land cover in Eau Claire County based on 2016 satellite imagery. In 2016, the County had an overall population density of 161.4 persons per square mile, much higher than the 105 persons per square mile for the State of Wisconsin. Based on State official population projections, the County's density is projected to increase to 174 persons per square mile by 2040, compared to 100 persons per square mile statewide. Population growth and development has mostly occurred in the towns of Wilson, Clear Creek, Pleasant Valley, and the City of Eau Claire.

Residential land use accounts for over 21 percent of assessed land in the County. Over 32 percent of all residential-improved parcels and over 83 percent of all residential assessed acreage in Eau Claire County is located in the unincorporated towns. Residential development in unincorporated areas is typically at low densities with the County, with some higher concentrations of residential development occurring at the edge of forested areas and along or near rivers and lakes.

Commercial land use accounts for nearly two percent of assessed land in the County with manufacturing accounting for roughly 0.5%. Over 80 percent of all commercial parcels and over 56 percent of commercial assessed acreage in Eau Claire County is located in the cities of Eau Claire and Altoona alone. Similarly, over 50 percent of manufacturing parcels and over 27 percent of manufacturing assessed acreage is located in these same two cities. This analysis illustrates the high density of commercial and industrial development that occurs primarily in the cities of Eau Claire and Altoona.

The most prevalent land uses in Eau Claire County are agriculture and forest. In fact, almost 45 percent of the assessed land in the County is considered agriculture and over 21 percent is forest or agricultural forest. In addition, over 13% (56,000 acres) of the County is public, tax-exempt forest and other public resource lands as mentioned previously. As seen in Figure 8, much of the eastern portion of the County is forested with the majority of agricultural land located in the central and southern portions of the County. Over 5 percent of the County is assessed as "undeveloped" and when including the acres of public natural resource lands, over 75 percent of the County is agricultural, forest, wetlands, surface waters, or is otherwise undeveloped.

Figure 7. Eau Claire County Land Cover



vii. Implications

Eau Claire County's demographic and development trends have many implications for emergency services and hazard mitigation:

1. Increases in population, housing, and other new development increases the vulnerabilities to hazard risks. Growth can also increase the risk of flooding by increasing stormwater runoff, disrupting natural drainage systems, and reducing flood storage.
2. The County's increasing population and development also results in increasing demand for emergency services, which is a special challenge during current governmental budgetary conditions.
3. There is significant geographic variability in the County's population and development trends. Emergency service's needs, mitigation priorities, and local resources vary by community and area. Outside the urban area, the County is quite rural, though some rural towns are growing faster than the cities and villages. For rural areas, costs to provide services and emergency response times may be higher. In addition, communications and mitigating potential impacts are often more challenging (e.g., warning systems, public storm shelters).
4. Eau Claire County's population is aging, albeit more slowly that other area counties due in large part to the influence of UW-Eau Claire. The 65+ age cohort is projected to nearly double between 2010 and 2040. Demands for senior services in the County will only increase, including for emergency response. The aging population poses unique challenges for emergency preparedness and response services, such as sheltering-in-place, evacuation strategies, and nurturing a new base of volunteer responders. Large numbers of seniors who reside in rural areas may need special attention during a hazard event (e.g., transportation for dialysis during a winter storm, access to medicine).
5. The County has growing populations of ethnic groups (e.g., Hispanic, Asian), largely residing in the Eau Claire urban area, who may have differing expectations of emergency service levels, may not be aware of local emergency procedures or contacts, and may not have knowledge of local hazard risks or event history. For some, English is a second language. In rural areas, the growing Amish and Mennonite populations can present similar challenges in terms of understanding emergency procedures and mitigation actions.
6. Much of Eau Claire County's population has access to resources, tools, equipment, and friends or family to enable them to get through a disaster event, "weather the storm," clean-up storm damage, and offer support to their neighbors and community. For example, the day after the 2016 flooding, neighbors helping
7. Local officials report that most new single-family residential homes, especially in rural areas, have basements. For example, of the 113 new single-family homes permitted by the County in 2017, only six were on-slab constructed, six were mobile homes, and the remainder had basements. About 30% of housing units in the County were multi-family units, many of which are slab-on-grade and may not have access to a safe room or storm shelter. Large numbers of mobile homes (1,236) also exist in the County, which are more vulnerable during certain types of storm events.

8. The growing number of seasonal or recreational housing has implications for local and emergency services, as the demand for services increases sporadically in areas where this type of housing is located. Seasonal units are used or intended for use only during peak times throughout the year (e.g., lake cottages and hunting cabins) or for weekend or occasional use and are often located in areas that may not have full-time police, fire, or emergency medical services available to respond to hazard events.
9. Eau Claire County has a diverse economy and the Eau Claire urban area is critical service hub for the larger region. While Manufacturing continues to be a large part of the County's economy, the largest numbers of employees are employed in the health care, education, retail trade, and governmental sectors. Establishments with large-span buildings, large concentrations of employees or customers, and hazardous materials may have higher risks or vulnerabilities to disaster threats.
10. Eau Claire County's many farming and agricultural operations have unique hazard risks and vulnerabilities that must be considered, prepared for, and mitigated, if possible. The large amount of public and private forest lands and shoreland development, with associated outdoor recreational uses and seasonal homes, also has unique risks and challenges.
11. The number of large events and festivals in Eau Claire County pose unique risks and vulnerabilities that require special preparedness planning.

D. CRITICAL FACILITIES & EMERGENCY SERVICES

For this hazard mitigation planning effort, a critical facility is defined as either:

(1) a facility in either the public or private sector that provides essential products or services to the general public, is otherwise necessary to preserve the welfare and quality of life in Eau Claire County, or fulfills important public safety, emergency response and/or disaster recovery functions; or,

(2) a high potential loss facility (e.g., nuclear plant, military installation, extreme hazardous materials plant) with possible substantial secondary impacts resulting from a hazards event. No high potential loss facilities were identified in Eau Claire County.

The Eau Claire County Emergency Management has been developing a G.I.S. geo-database of the critical facilities in the County. Not all facilities are yet mapped. The primary critical facilities in Eau Claire County are mapped in **Figures 8 and 9** on the following pages.

- government buildings, including law enforcement, fire, EMS/ambulance, and EOCs (67 total locations based on employment data; 17 mapped)
- schools and campus buildings (74 mapped, not including Amish schools)
- licensed child care centers and pre-schools (89 unmapped; 71 w/in 2 mi. of Eau Claire)
- hospitals and clinics (6 mapped)
- radio and cell towers (not mapped)
- prisons and correctional facilities (none)
- long-term care facilities (e.g., assisted living, nursing care) (94 mapped; not complete)
- high voltage transmission lines, substations, and other regional utility lines (natural gas and electric transmission lines + 25 substations mapped)
- community drinking water systems (unmapped)
- solid waste facilities (unmapped)

Not surprisingly, higher concentrations of facilities are located in the cities and villages, especially within the City of Eau Claire. Facilities with large amounts of hazardous materials, transportation systems, electric providers, and dams can also be considered critical facilities, but are discussed in greater detail within other sections of this plan.

The risk and vulnerability assessment (**Section III.B.**) further analyzes these critical facilities to determine potential impacts by a hazard event. For reference, the boundaries for fire and EMS districts within Eau Claire County are shown in **Figures 10** and **11.**

Figure 8. Eau Claire County Critical Facilities

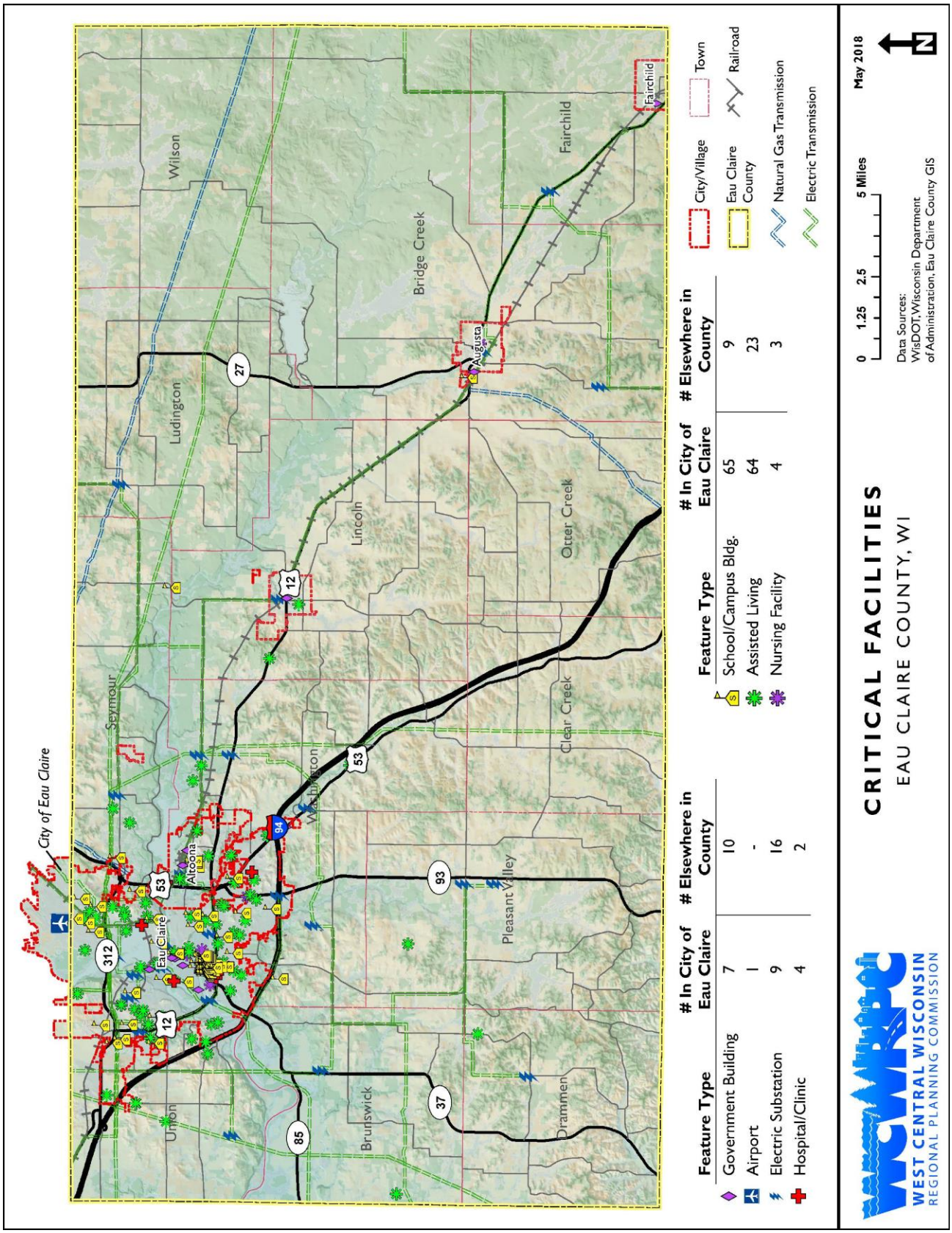


Figure 9. City of Eau Claire Critical Facilities

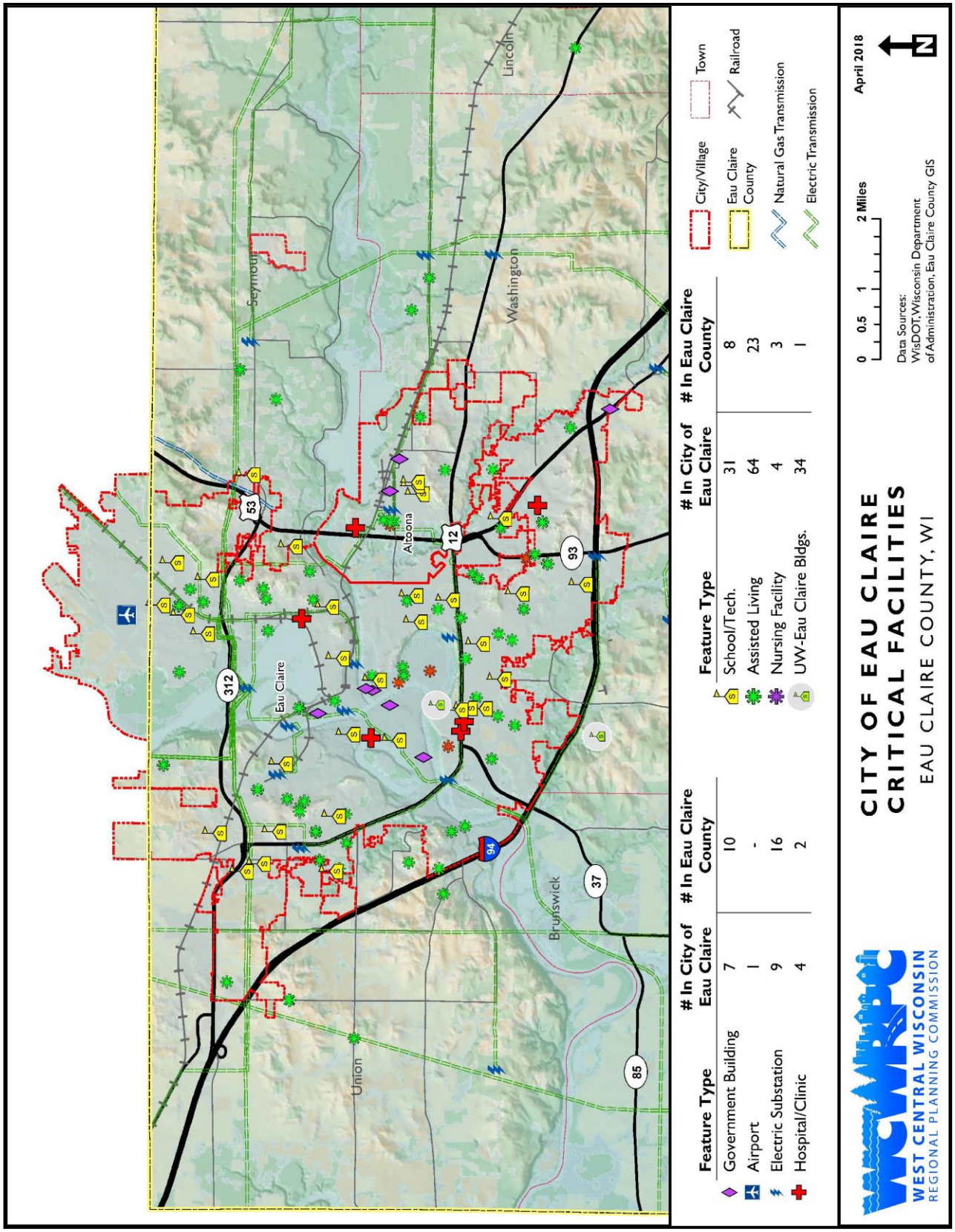


Figure 10. Eau Claire County Fire Districts

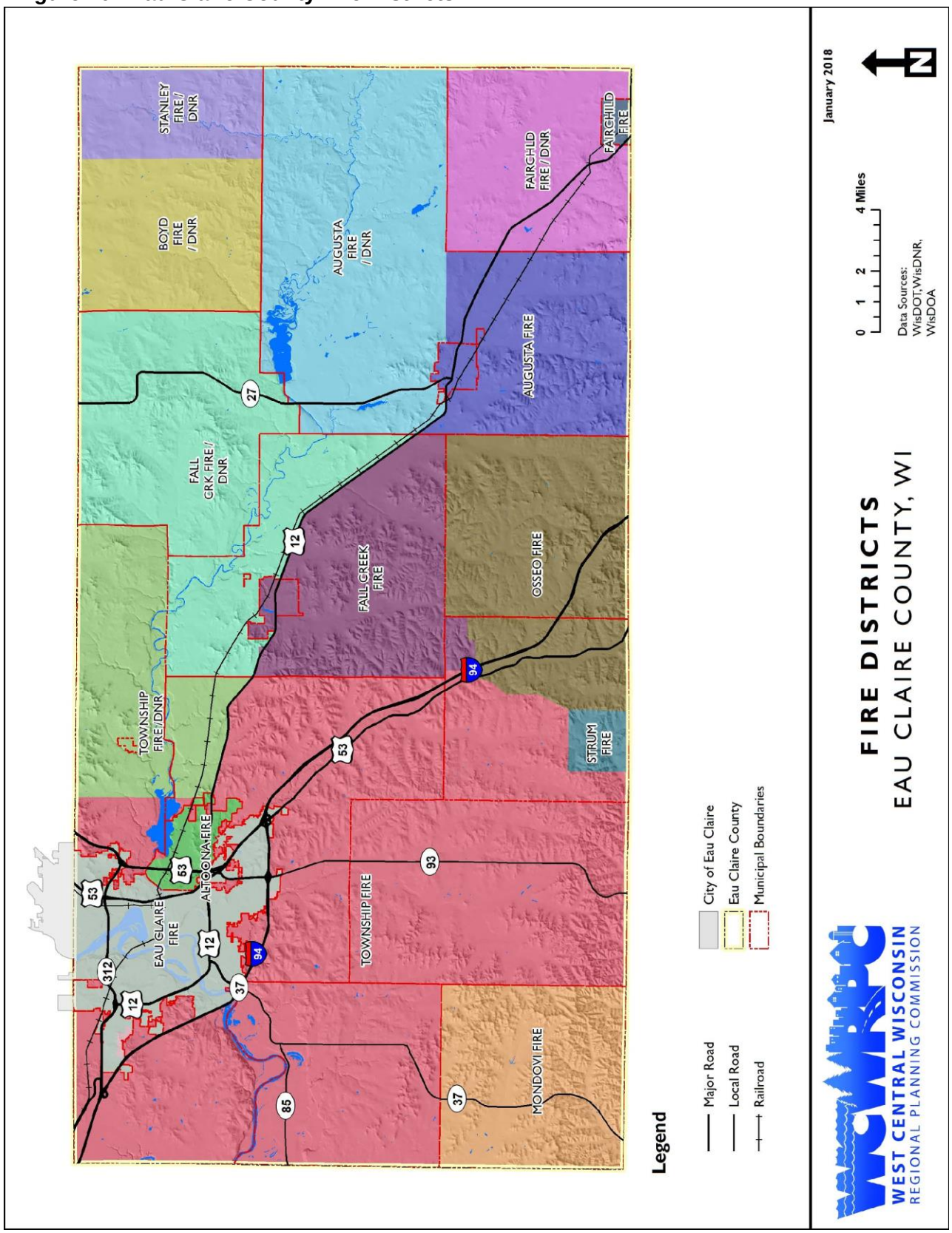
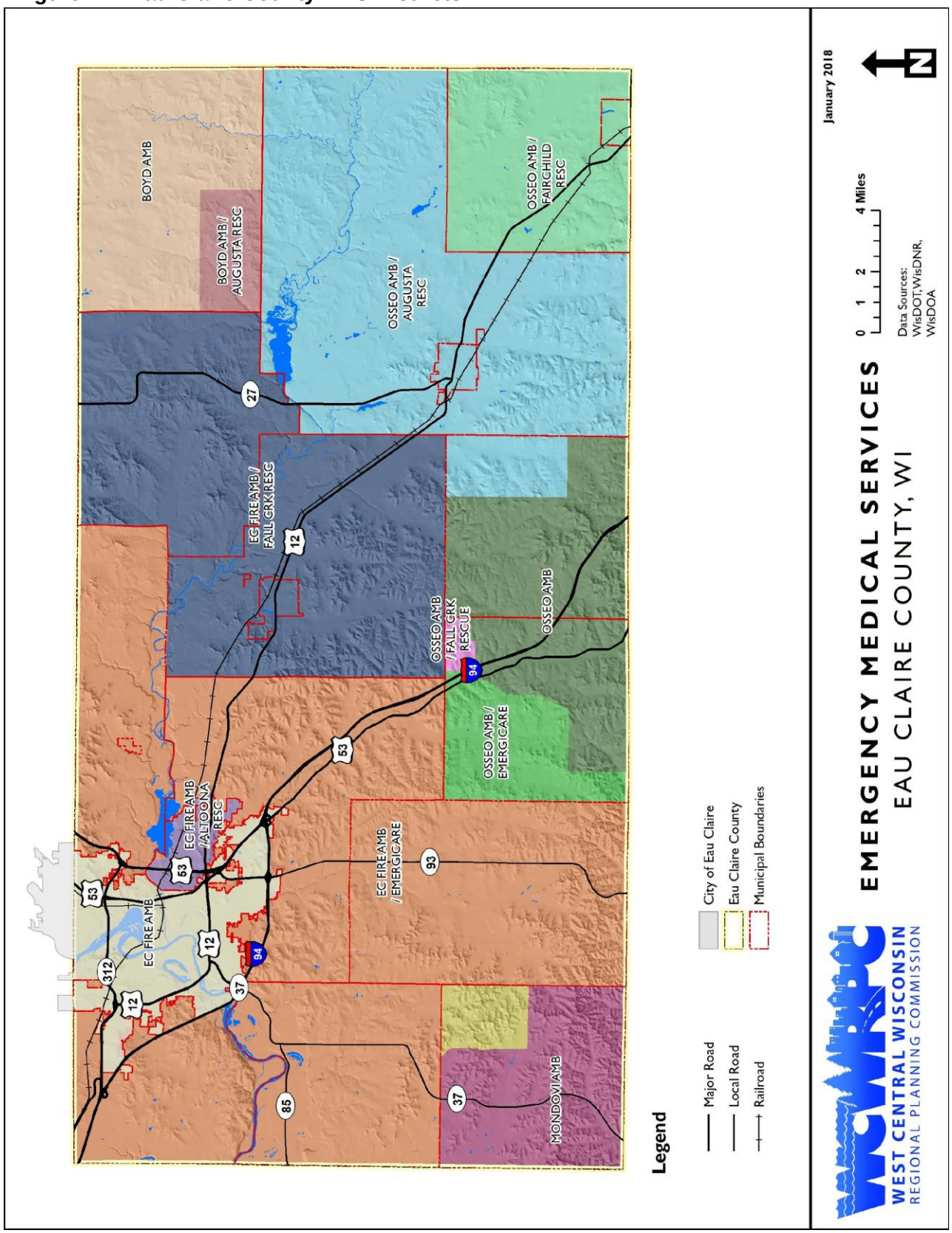


Figure 11. Eau Claire County EMS Districts



F. HAZARDOUS MATERIAL STORAGE AND USE

Hazardous materials can present special risks to humans and the environment at the time of disaster, as well as necessitate special precautions and resources for post-disaster clean-up. As of May 2018, there were 33 active Tier Two Reporting facilities and 24 active EHS Planning facilities located within Eau Claire County. A Tier Two facility, by law (SARA Title III), is required to prepare or have available a Material Safety Data Sheet (MSDS) for a hazardous chemical present at the facility and must submit annual reports to Wisconsin Emergency Management (WEM), Eau Claire County Local Emergency Planning Committee (LEPC), and the local fire department. EHS (Extremely Hazardous Substances) facilities store and/or use one of over 300 chemicals with extremely toxic properties, and must also maintain the MSDS and prepare annual reports. EHS Planning facilities have extremely hazardous substances in such quantity (thresholds vary by chemical type) that an emergency plan must be prepared by the owner/operator to WEM and the LEPC.

Of the 24 EHS Planning facilities, 17 were located in the City of Eau Claire and the remainder were located in Altoona (2), Fall Creek (2), Cleghorn (1), and Town of Union (2). Similarly, all but three of the Tier Two Reporting facilities were located within the City of Eau Claire zip code. It is also notable that 16 of the 33 Tier Two facilities were educational institutions. For security reasons, the names, addresses, and types of chemicals at each of these facilities are not included within this report, but are on file at the Eau Claire County Emergency Management Office for reference as needed.

Hazardous materials is discussed further in the Hazardous Materials Spills assessment in Section III.B.x.

G. TRANSPORTATION SYSTEMS

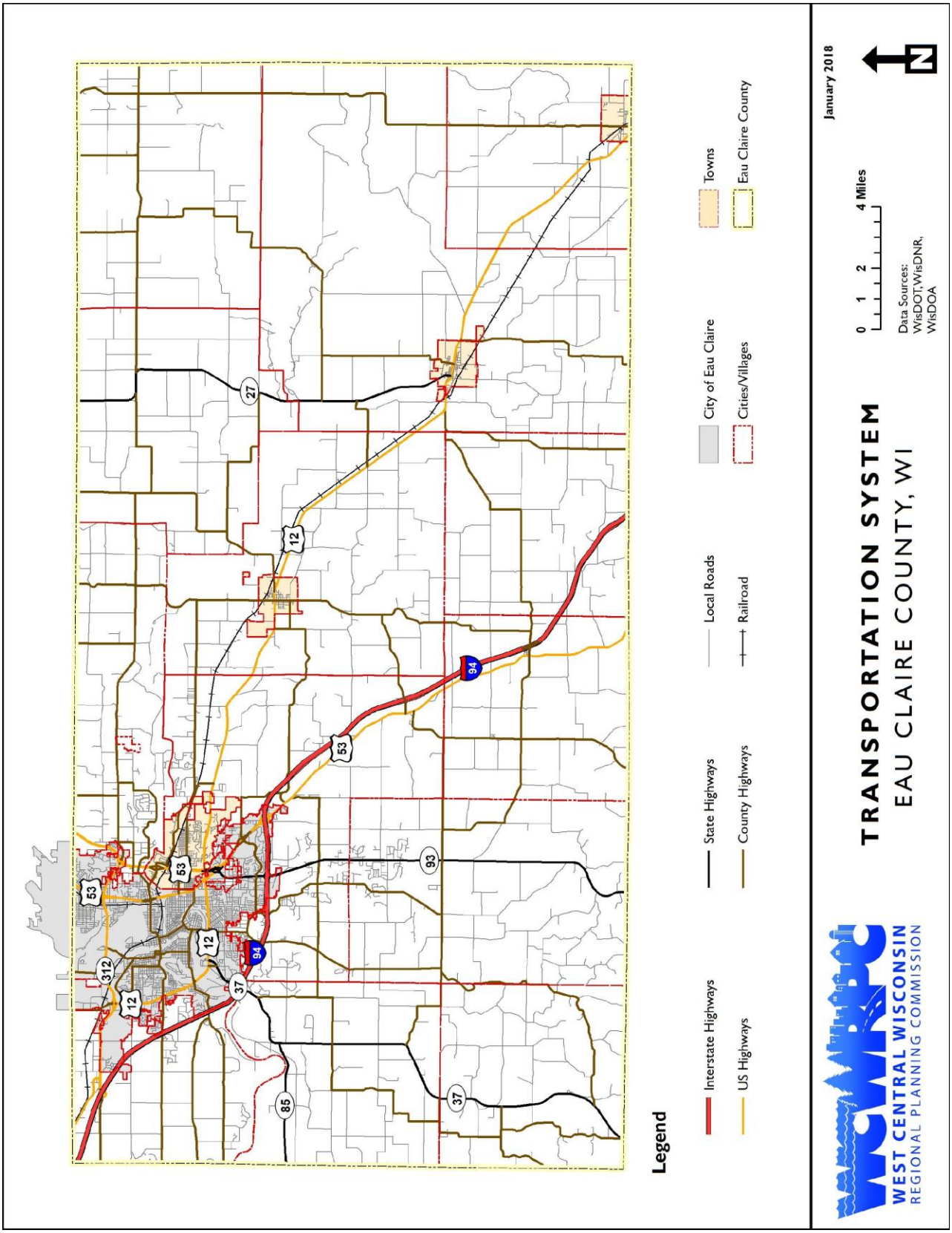
Providing an uninterrupted transportation network is critical to Eau Claire County given that residents often travel significant distances for services, critical facilities, and employment. The highway system serving Eau Claire County links residents and businesses to the employment centers and services Chippewa Falls, Eau Claire, and other area communities, as well as to other metropolitan areas in the region.

The County's size and road miles can be a challenge for road crews and emergency personnel during and after a hazard event (e.g., snow removal, downed trees, culvert washouts). Eau Claire County maintains over 420 miles of county trunk highway (see **Figure 12**), reflecting the largely rural nature of much of the County. The 150 miles of highways with State jurisdiction reflect Eau Claire County's location as an important transportation crossroads in west central Wisconsin. The remaining 995 miles of roads in the County are owned by the towns, cities, and villages. The County has a relatively high number of bridges (235), of which 72 are owned by the County and 111 owned by the State of Wisconsin.

Interstate 94, U.S. Highway 12, U.S. Highway 53 (north of I-94), and five State highways, or portions thereof, in Eau Claire County are designated as long-truck routes, in addition to portions of County Highway "R". Traffic volumes on the Interstate system average between 22,000 to 28,000 daily trips in the urban area. On the USH 53 bypass, traffic volumes exceed 47,000 daily trips in some areas.

Rail service in the County is operated by three companies—Union Pacific, Canadian National, and Progressive Rail, with the rail lines more or less paralleling USH 12 for much of the County until the urban area. The Chippewa Valley Airport is located in the City of Eau Claire (in Chippewa County) and is an air carrier/cargo facility with commercial passenger flights. Recreational transportation systems in the County have been increasing, and include the Chippewa River Trail, bicycle trails and routes within Eau Claire and Altoona, and ATV trails and routes in rural areas. Public transit service in the County includes Eau Claire Transit which serves Eau Claire and Altoona, a regional intercity bus service, and specialized transit services for adults with disability and over the age of 60 without access to other alternatives.

Figure 12. Eau Claire County Transportation System



H. HISTORIC PROPERTIES AND DISTRICTS

Historic structures, sites, and districts are sometimes targeted for hazard mitigation strategies due to their unique, often irreplaceable, social value. According to the Wisconsin Historical Society[7], 68 buildings or sites in Eau Claire County are on the National or State Register of Historic Place. Only two of these properties did not have a City of Eau Claire address:

#	Historic Site	Address	Community	Listed
1	California Wine and Liquor Store	201 Farmers Street	Fairchild	1982
2	Dells Mill	Just off STH 27	Bridge Creek	1994

The above list is not inclusive of all sites of historic and cultural significance, however. Additional structures undoubtedly qualify as National Register candidates. The Wisconsin Architecture & History Inventory (AHI) identifies 1,581 buildings, structures, or objects in Eau Claire County that illustrate Wisconsin's unique history. A detailed assessment of the vulnerability of each of these sites to hazard events is not currently available. Such sites are quite varied and include churches, cemeteries, homes, and barns, as well as various other sites. Notably, 1,503 of these sites had a City of Eau Claire address. The City of Eau Claire Landmarks Commission that has designated 109 sites in the community of particular historical interest and value.

There have been no known hazards events that have substantially impacted any of the above historic properties. Most historic buildings are very well constructed, and they continue to serve as an important vestige of Eau Claire County's past. As will be discussed later in the hazard vulnerability assessment of this plan, these structures are generally not any more vulnerable to hazard risks (e.g., tornado, winter storms) than more recent construction. A GIS database with locations of these structures is not available. Not unexpectedly, Dells Mill is located on Bridge Creek and does have some flood-related risk.

[7] Wisconsin Historical Society. National & State Register of Historic Places. https://www.wisconsinhistory.org/Records/Article/CS15299

SECTION III.
ASSESSMENT OF HAZARD CONDITIONS

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

- identify and prioritize the hazards which are thought to pose the greatest risk to the residents of the County;
- profile the extent and severity of past hazard events that have affected the County; and
- assess the vulnerability of the community to the risk of future hazard events.

A. HAZARD IDENTIFICATION

Although Eau Claire County could potentially be at risk from a number of different hazards, this plan will attempt to narrow the scope of the hazards that will be addressed to those hazards that pose the most substantial risks.

i. Federal Disaster Declarations for Eau Claire County

Since 1953, there have been five Presidential Declarations for a Major Disaster that included Eau Claire County:

May 1969 – Spring flooding due to one of the greatest snow melts of the past century impacted large areas of Wisconsin.

April 1973 – Severe storms and flooding over much of Wisconsin.

July 1980 – Severe storms and flooding in four counties in west-central Wisconsin.

July 1993 – Flooding and severe storms in Summer of 1993 resulted in a declaration for 47 counties. Statewide damages exceeded $740 million.

June 2004 – A series of heavy rain events in May and June of 2004 resulted in widespread river, urban, and agricultural flood damage exceeding $268.4 million statewide.

While the above catastrophic events were of sufficient severity to warrant major Federal assistance, there has also been a Presidential Emergency Declaration for drought in 1976 which included Eau Claire County. During an emergency declaration, Federal assistance will supplement State and local efforts. Additional agricultural drought declarations are discussed in the drought assessment.

Yet, relying on disaster declarations as a measure of risk can be misleading. To be declared a Federal major disaster, damages must exceed a certain per capita threshold for the county (e.g., dollars in damages per total county population). It is not uncommon that a flood or storm can have devastating impacts on a small area or community, but not meet the per capita threshold since it is based on the county's total population. For this reason, the risk and vulnerability

assessment later in this section must consider other data sources. For natural hazard event history, the Risk and Vulnerability Assessment in Section III.B. relies heavily on National Climatic Data Center (NCDC) severe storm event data from the National Weather Service (NWS). This data describes past, reported weather events and the resulting deaths, injuries, and damages associated with these events. NCDC data was further supplemented by other available sources, such as electric cooperative outage data, special reports and studies, community input, and key informant interviews.
and not limited to Eau Claire County.

ii. Eau Claire County Multi-Hazard Prioritization

At the August 2017 Plan Update Steering Committee meeting, the general history of hazard threads in Eau Claire County was discussed and the scope of the 2013 mitigation plan was reviewed. Committee members were then asked to participate in a hazard risk assessment survey to help prioritize the hazard risks and vulnerabilities of Eau Claire County. Identification of the hazards for inclusion in the survey was based on the hazards identified in the *Resource Guide to All Hazards Mitigation Planning in Wisconsin* prepared by WEM. This list was further amended based on the previous review of historical data for Eau Claire County and the scope of the 2013 plan.

RISK VS. VULNERABILITY

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

RISK:	*Probability and frequency of occurrence in the future.*
VULNERABILITY:	*If the event occurs, what are the impacts?*

For each hazard, each Committee member was asked to assign a risk rating of 0 to 5 (0-none, 1-low/minimal, 3-moderate or substantial, 5-very high/extreme) to reflect their opinion of which hazards pose the greatest risks and vulnerabilities. A composite overall average risk rating for each hazard was then calculated by totaling the average risk rating from each respondent and dividing by the total number of respondents. The compiled results of the updated survey are shown in **Table 9**.

After a review of available data and consideration of the relationships between many of these hazards, the hazards highlighted in yellow were identified by the Steering Committee to be the focus of the plan update assessment, goals, and strategies. Some threats were combined, including:

- winter storms includes heavy snow/blizzards and ice storms
- thunderstorms includes high winds, lightning, and hail
- flooding includes overbank, overland, and dam failure flooding
- active threats including active shooter, school violence, and potentially certain acts of civil unrest and terrorism

Table 9. Eau Claire County Hazard Risk & Vulnerabilities Survey Results (2017)

Hazard	Risk	Vulner ability	Avg	HVA relative threat	in 2013 Plan?	section of 2013 plan
Natural Hazards						
Riverine or Overbank Flooding	3.9	2.9	3.4	34%	x	flooding
Overland or Stormwater Flooding	2.8	2.7	2.7	48%	x	flooding
Heavy Snow Storm and Blizzards	3.2	2.5	2.9	45%	x	winter storms & extreme cold
Ice Storms and Sleet	3.2	3.0	3.1	68%	x	winter storms & extreme cold
Winter Kill of Crops	1.8	1.7	1.7	--	x	winter storms & extreme cold
Extreme Cold	2.7	2.4	2.5	53%	x	winter storms & extreme cold
Forest or Wild Fire	2.7	2.8	2.7	35%	x	wildfire
Tornadoes	2.3	3.8	3.1	48%	x	tornadoes
High Winds	2.8	3.4	3.1	--	x	thunderstorms & high winds
Thunderstorms, Lightning, Hail, etc.	2.8	2.0	2.4	35%	x	thunderstorms
Extreme Heat	2.1	1.9	2.0	38%	x	extreme heat
Drought	2.2	2.7	2.5	31%	x	drought; county plan only
Livestock Flu and Diseases	1.2	1.4	1.3	--		no
Landslides or Sinkholes	0.6	1.2	0.9	37%		no
Earthquakes	0.1	1.5	0.8	18%		no
Fog	1.0	1.1	1.1			no
Pandemics/Public Health Disease	2.0	2.4	2.2	40%		brief reference to other plans
Invasive Species & Diseases	1.7	1.6	1.6	--		no
Technological Hazards						
Haz Mat Incident - Fixed	2.2	3.2	2.7	20%		no
Haz Mat Incident - Transportation	2.6	3.6	3.1	40%		no
Groundwater Contamination	2.0	2.9	2.5	--		no
Animal Waste Management	1.0	1.6	1.3	--		no
Long-Term Power Outage	2.4	3.6	3.0	43%	x	special assessment
Nuclear Power Plant Incident	1.1	2.2	1.7	21%		no
Dam Failure Flooding	2.1	3.2	2.7	--	x	flooding
Passenger Air or Rail Incident	1.9	2.5	2.2	18%		no
Human-Induced Hazards						
Targeted School Violence	2.3	3.2	2.8	--		no
Active Shooter (non-school)	2.3	3.3	2.8	--		no
Terrorism, Domestic (all)	2.0	3.2	2.6	--		no
Terrorism, International (all)	1.8	2.9	2.3	--		no
Cyber Attacks	2.9	3.7	3.3	73%		no
Civil Unrest or Institutional Riot	1.6	2.5	2.0	16%		no
Terrorism – Critical Infrastructure	1.6	3.0	2.3	--		no

Though extreme heat received a relatively lower score, the Steering Committee agreed to add this threat to the plan based on feedback during interviews about growing concerns, especially in the City of Eau Claire. It was also decided to include a special analysis on long-term power outages since this is a critical vulnerability that could be related to a number of hazard events (e.g., ice storm, tornado, heavy winds).

Of the above hazards, only flooding, wildfire, and, perhaps, extreme heat and power outages have geographic areas or locations of higher risk, as will be identified later in this section. **Most of the hazards could occur anywhere in Eau Claire County and have no definable risk area,** making an event difficult to predict**.**

iii. Natural Hazards of No Significant Risk

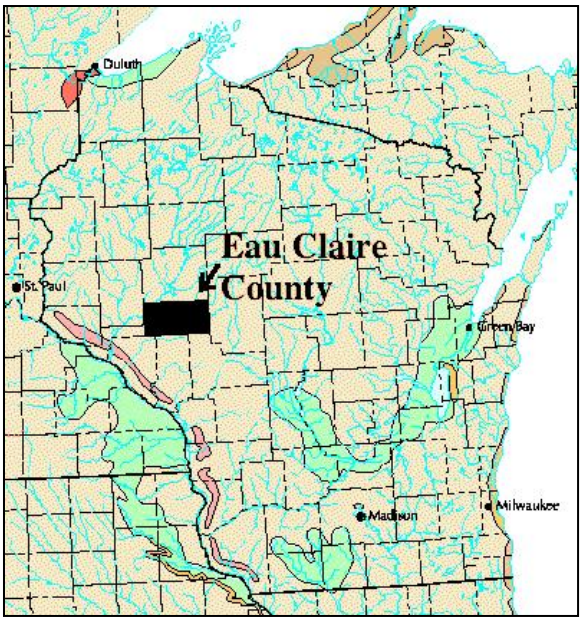
Although there are other hazards that could potentially impact the County, there are very few or no records of the following events occurring in Eau Claire County in the NOAA database or the local impacts were very low when such events have occurred. In order to meet the comprehensive requirements for developing an all hazard mitigation plan, these other natural hazards are identified and described below. It is important to note that these hazard events may still pose some threat to the community, but they were considered by the Steering Committee as either: having a minimal chance of occurring, posing a minimal widespread risk to the safety of residents or property, or only offering very limited mitigation options.

Landslides & Land Subsidence

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

The USGS *Landslide Overview Map of the Conterminous United States*[8] (excerpt for Wisconsin in **Figure 13**) identifies no large-scale landslide risks for the Eau Claire County area. Areas of steep slopes do exist in Eau Claire County. Definitions of steep slopes can vary, though slopes of 12% or 13%

Figure 13. Landslide Hazards in Wisconsin



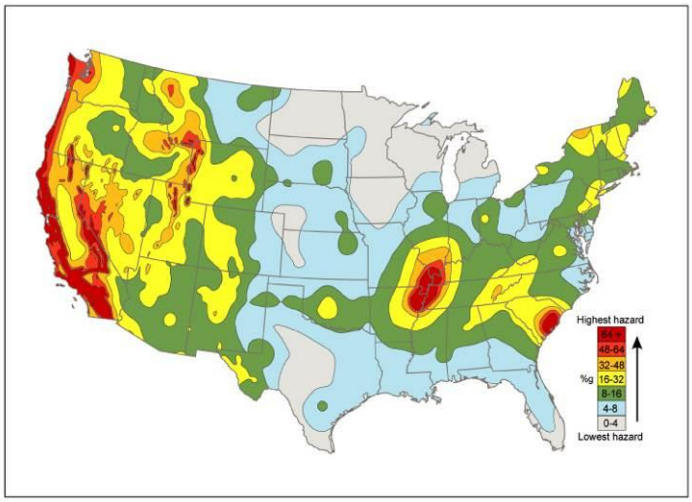
source: U.S. Geologic Service. Landslide Overview Map of the Conterminous United States. <http://landslides.usgs.gov/html_files/landslides/nationalmap/national.html>.

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

and greater are generally considered to be steep. Based on the National Resources Conservation Service (NRCS) Soil Survey for Eau Claire County, there are 144,728 acres that potentially have a slope of 13 percent or greater, representing 35.1 percent of the total land base. Of this, 90,327 acres (21.8 percent) have slopes of 21 percent or greater, and nine percent have a slope of 25 percent or greater. The portion of the County east of STH 27 is relatively devoid of steep slopes, except along rivers and creeks. The highest concentrations of steep slopes can be found in the southern portions of the County and the area lying between Altoona and Fall Creek to the south of USH 12. Additional localized and site-specific variations in topography and slope exist. Past glacial activity has created some topography in Eau Claire County that is scenic, but may also be sensitive to development in some areas. While steeper areas exist, the area's soils pose more of a gradual erosion risk, rather than the sudden, large-scale movement of ground associated with landslide hazards. Stormwater runoff can result in serious riverbank erosion and washouts concerns for some locations, which will be discussed in the flooding assessment. Wildfire events in areas of steep slope or along waters can also create landslide risks.

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

Figure 14. U.S. Geological Survey Earthquake Hazard-Shaking Map



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

Earthquakes

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

The nearest active earthquake fault outside of Wisconsin is the New Madrid Fault which has a seismic zone that stretches from northeast Arkansas to southern Illinois. As **Figure 14** shows, Eau Claire County falls within the lowest earthquake hazard-shaking area, with the different colors representing the levels of horizontal shaking that have a 1-in-50 chance of being exceeded in a 50-year period. Similarly, the County falls within a 0%g peak ground acceleration (PGA) zone as shown on the

USGS PGA values map for the United States with a 10 percent chance of being exceeded over 50 years; Eau Claire County is a non-affected area.[9]

University of Wisconsin-River Falls students and geologists have studied an ancient major fault line which is located approximately 2 miles south of Hudson and extends north towards Willow River State Park and west towards Hastings, MN. Called the Hastings Fault, it has characteristics similar to the New Madrid Fault; but there has been no evidence of any motion on the Hastings Fault for the last 400 million years. While an earthquake along the Hastings Fault could be catastrophic, geologists estimate that no significant effects on this fault will likely occur within the next few millions years. As such, the earthquake threat to Eau Claire County is considered very low.

Fog

Fog is low-level moisture that can reduce visibility. It can occur in isolated low-lying areas or be a widespread event that can cover several counties. In general, fog is often hazardous when the visibility is reduced to 1/4 mile or less. Thick fog reduces visibility, creating a hazard to motorists as well as to air traffic. Airports may close because of heavy fog. The intensity and duration of fog varies with the location and type of fog. Generally, strong winds tend to prevent fog formation. In Eau Claire County, fog occurs infrequently and is typically a short-term weather event lasting only for portions of a day. The NCDC database has one Eau Claire County record for a dense fog event, which occurred in November 2007 and included much of west central Wisconsin.

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

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

iv. Hazards of Concern Addressed in Other Plans

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

- Most are not typically included in a county-level mitigation plan.
- Most are largely addressed through other intensive planning and preparedness efforts for which Eau Claire County Emergency Services does not have a lead role. Instead of

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

duplicating and repeating these planning activities within this mitigation plan, this sub-section recognizes that these risks exist and refers to other existing plans and programming to mitigate these risks.

- The current risk for Eau Claire County is relatively low.

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

Communicable Disease

Risk and Vulnerability

According to the Federal Center for Disease Control, a **communicable disease** is an illness caused by an infectious agent or its toxins that occurs through the direct or indirect transmission of the infectious agent or its products from an infected individual or via an animal, vector or the inanimate environment to a susceptible animal or human host. An **epidemic** occurs when a disease affects a greater number of people than is usual. A **pandemic** is a global disease epidemic.

The 2017 Northwest Wisconsin Health Care Coalition Public Health HVA rated pandemics as a 40% overall risk over a ten-year period given its moderate probability (2), relatively high impacts (2.7) and substantial-to-moderate available emergency management capabilities to deal with this threat (1.5 internal, 1.5 external). The assessment used a scale of 1 to 3, with "1" being low probability/impact or having substantial management capabilities and "3" being high probability/impact or having limited/no management capabilities.

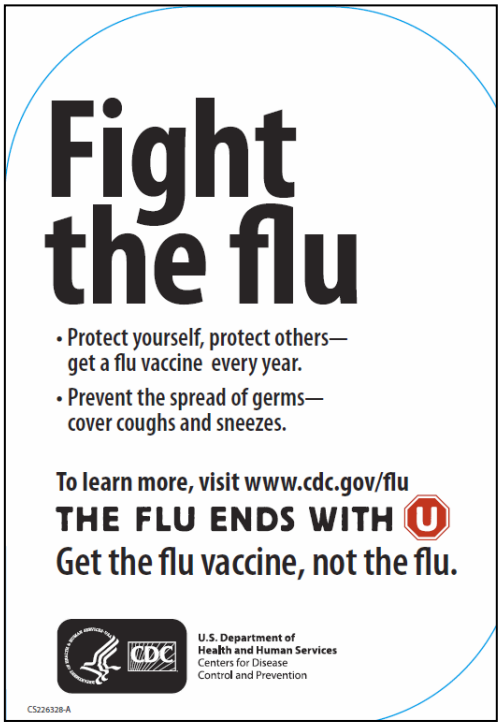
Beginning in 2009, there was significantly increased attention to pandemic flu at the state and regional level. An **influenza pandemic (or pandemic flu)** occurs when a new influenza virus emerges for which there is little or no immunity in the human population, begins to cause serious illness, and then spreads easily person-to-person worldwide. The potential risk of transmission, vulnerabilities, and impacts can vary widely by type of virus and availability of vaccines. Viruses can also mutate and increase in deadliness and spread more easily.

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

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

Swine Flu (H1N1) was declared a pandemic by the World Health Organization (WHO) in June 2009 and resulted in about 17,000 deaths worldwide before the pandemic was declared over in August 2010. During the H1N1 outbreak from April 2009 through March 2010, an estimated

43-88 million H1N1 cases and 192,000-398,000 H1N1-related hospitalizations were estimated to have occurred in the United States according to the Center for Disease Control (CDC).[10] The CDC further estimated that 8,720 to 18,050 H1N1-related deaths occurred during the same timeframe. H1N1 in the United States continues to spread and there is some concern about the long-term effectiveness of current vaccines. During the 2010-2011 influenza season, five cases of Novel Influenza A viruses were reported in the United States, including one in Wisconsin and two in Minnesota; all patients full recovered from their illness.



More recently, a highly pathogenic avian influenza outbreak (H5N2) struck the United States in April 2015. In nearby Barron County, 650,000 turkeys were euthanized as a result. A milder, low pathogenic strain of H5N2 would occur in March 2017 requiring quarantine and monitoring of poultry operations in the region. Though the H5N1 virus usually does not infect people, rare cases of human infection have been reported. There is no human immunity and no commercial vaccine is available. A recent study showed that it is possible for avian flu viruses (and bacteria like Salmonella) to enter groundwater from a large source of poultry fecal waste, though the risk of virus transmission from groundwater to people is not known.[11] To date, there has been no known human-to-human transmission of avian (or bird) flu.

As of August 2018, the United States is not currently experiencing an influenza pandemic according to the U.S. Center for Disease Control. The CDC states that it is impossible to predict when the next pandemic will occur or how bad a future pandemic will be, so advanced planning is needed.[12] A great variety of mitigation and planning measures for pandemics has been undertaken over past two decades since the SARS epidemic in 2002-2003. The Avian Fu (H5N1, H5N2) and Swine Flu (H1N1) outbreaks have further increased awareness, cooperation, monitoring, and planning for large-scale disease or viral outbreak. Activities are being undertaken at all levels of government—from international to local.

The Center Disease Control continues to monitor other communicable disease threats and issue related travel health notices. Mosquito-borne illnesses, such as Yellow Fever, Malaria, and the Zika virus have been the most common concerns over the past two years. Zika virus in particular has received increased attention due to the risk of severe birth defects and the potential to transmit the disease through sex. Mosquitoes carrying the Zika virus have been reported in a

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

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

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

large portion of the world, including most of Mexico, Central America, South America, the Caribbean, and large parts of Africa and Southeast Asia. Cases of Zika spread by local mosquitoes have also been reported in Florida and Texas.

Prevention and Control

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

- The Eau Claire City-County Health Department has developed a Public Health Emergency Plan (PHEP) specific to the County, which covers the standard 15 public health preparedness capabilities:

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

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

Community Resilience
- Community Preparedness
- Community Recovery

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

Incident Management
- Emergency Operations Coordination

Information Management
- Emergency Public Information and Warning
- Information Sharing

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

- The PHEP is based on templates developed cooperatively through the Western Regional Public Health Consortium, which can provide mutual aid if needed. The PHEP includes situational-specific components (e.g., Mass Clinic Plan, Pandemic Flu Plan) as well as general education, monitoring and response procedures under an "all hazards approach" not specific to pandemic flu or other specific threat. An At-Risk Populations Plan is a component of the PHEP and is currently being updated, including exploring strategies related to identifying and locating persons who are at greater risk during times of emergencies; certain populations are more likely to have barriers during response or recovery due to characteristics such as age, language, disability, low socioeconomic status, and social/geographic isolation. Review and update of these plans is a continuing process. The Flu Center Plan is also currently being revisited to improve the security plan and establish/update MOUs with facilities for points of distribution, mass clinic sites, and services support. The PHEP is periodically tested, in cooperation with partners, through drills and exercises. The PHEP includes an educational component with emphasis on prevention and control (e.g., recognizing symptoms, vaccinations, and personal preparedness). There is a high degree of necessary coordination between the County's Emergency Operations Plan and the PHEP. For example, the fatality management component of the EOP is under review and will be updated, but is included as one of the above 15 capabilities.

- County and local agencies and health care facilities have a very strong partnership as reflected by the County Public Health Preparedness Committee (an informal partner network that meets regularly) and the Infectious Disease Committee. These partners continue share information, plans, and policies. Most key staff and partners have ICS/NIMS training and are informed of emerging trends.
- It is important not to assume that another department or agency will be available to perform a task and to have a general idea of the resources (e.g., staff, equipment) which each department can provide. During a large pandemic, the numbers of volunteers, staff, and agencies responding may be significantly lower due to quarantine, illness, or fear of contracting the virus.
- Public panic could ensue should a public health emergency occur, such as a pandemic flu outbreak. Getting the word out quickly and providing accurate information from a trusted source is critical. Security and related enforcement could become a major issue at pharmaceutical distribution sites, area hospitals, and at other such locations.
- The City-County Health Department and other Public Health Preparedness Committee partners also monitor and prepare for other new emerging communicable diseases, not just pandemic flu. For example, Public Health conducted many activities when Ebola first appeared in the U.S., including public education, purchasing more personal protective equipment (PPE), and educating staff on response to potential cases. West Nile virus transmitted via mosquitos has been found in Eau Claire County, but there have been no human cases reported to date. Each spring/early summer, Public Health issues news releases and adds information to their website on West Nile and the importance of controlling and avoiding mosquitos. Information on both of these threats and other communicable diseases are available at the Health Department's webpage.

A wealth of information on pandemic flu and related plans can be found at http://www.pandemicflu.gov/, which is managed by the U.S. Department of Health and Human Services. The State of Wisconsin maintains a similar website focusing on State initiatives, threats, and resources at: http://pandemic.wisconsin.gov.

Groundwater Contamination

Protecting groundwater and surface water are consistently a top natural resource priorities in comprehensive planning efforts in most Eau Claire County communities. This is not surprising since groundwater is the local source of drinking water for nearly all Eau Claire County residents. This sub-section recognizes the importance of protecting groundwater from contamination.

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

In 2018, the Eau Claire County Groundwater completed a *Ground & Surface Water Quality Protection Study* that explored potential groundwater conditions, contamination risks, policies, and programs followed by recommendations. Some of these recommendations have been incorporated into the hazardous materials spills assessment and strategies of this plan. More on this study can be found at the Eau Claire County Land Conservation Division's webpage.

Invasive Species and Diseases

Most invasive species are spread due to the introduction and actions of humans, and this threat is growing. Invasive species disrupt natural communities and ecological processes. They can destroy habitat, drive out/kill native species, and be vectors for the introduction of diseases. About 42 percent of the species on the Federal Threatened or Endangered species lists are at risk primarily because of invasive species. Many invasives lack a native predator, which allows them to aggressively invade, spread, and dominate natural areas and waterways. And some invasives can cause health problems, such as Wild Parsnip that burns skin or animal species that spread disease.

Aquatic Invasive Species (AIS) have received the greatest attention in Eau Claire County to date. Various AIS have been documented in the waters the County, including Chinese Mystery Snail, Curly-Leaf Pondweed, Eurasian Water-Milfoil, Purple Loosestrife, Zebra Mussel, and Rusty Crayfish. Eau Claire County Land & Water Conservation, in partnership with local lake associations and districts, have been on the front lines combatting AIS for numerous years through volunteer monitoring, public awareness initiatives, and control efforts. The County also benefits from the advocacy and support of the Beaver Creek Reserve's Citizen Science Center. However, many lakes and rivers with public boat launches in the region do not have lake associations or districts.

There is growing attention in the region to the terrestrial invasive species threats. Buckthorn is very serious threat to the forests of Eau Claire County due to its ability to outcompete native tree growth and form large, dense thickets with little habitat, recreational, or timber value. Japanese Knotweed is another growth threat; its roots have the ability to damage pavement and penetrate building foundations. These are just two of a growing list of such threats, which also includes: Exotic Bush Honeysuckle, Spotted Knapweed, Oriental Bittersweet, Leafy Spurge, Purple Loosestrife, Wild Chervil, Wild Parsnip, and Garlic Mustard.

The WDNR requires that any person seeking to bring a non-native fish or wild animal for introduction into Wisconsin obtain a permit. Local communities can help combat exotic plant species by educating residents about non-native species, encouraging residents to use native plants in landscaping, discouraging the transport of firewood from outside the area, and reporting such species like Purple Loosestrife or Buckthorn to the WDNR.

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

- local communities and park groups
- local volunteers, scouting groups, schools, and community-based organizations
- Lake Altoona and Lake Eau Claire lake associations/districts
- Eau Claire County Highway Department
- Lower Chippewa Invasives Partnership (lcinvasives.org)
- Beaver Creek Reserve (www.beavercreekreserve.org)
- Invasive Plants Association of Wisconsin
- Midwest Invasive Plant Network
- U.S. Fish and Wildlife Service
- Wisconsin Lakes and the Wisconsin Lakes Partnership
- Aquatic Nuisance Species Task Force

The Lower Chippewa Invasives Partnership is the Cooperative Invasive Species Management Area that includes Eau Claire County and is the most active local advocacy group focused solely on the issue of invasive species. LCIP is working to identify, locate, and catalog aggressive invasive plants throughout West Central Wisconsin and develop a strategic plan that will address prevention, early detection, and rapid response to invasive plant infestations.

B. RISK AND VULNERABILITY ASSESSMENT

This section is organized by the hazards identified previously as having the highest overall disaster threat to Eau Claire County. For the purposes of this plan, some hazards have been grouped into related hazard threats in order to better organize and describe the extent of the potential risk and vulnerability.

The assessment for most hazards includes the following sub-sections:

- **Northwest Wisconsin Public Health Hazard Vulnerability Assessment (HVA)** summary of probability, vulnerabilities, and capabilities rankings completed in 2017.
- **Risk Assessment** defines the hazard, identifies past events, and discusses the probability of reoccurrence.
- **Vulnerability Assessment** analyzes the potential impacts to people, property, and critical facilities. The vulnerability assessment for critical facilities is expanded upon in **Appendix E**.
- **Unique Jurisdictional Risks and Vulnerabilities** discusses the related hazard risks and vulnerabilities for participating cities and villages which are further expanded upon by the table and maps in **Appendix F**.

As noted previously, most natural hazard events facing County residents do not have defined hazard areas and often affect large areas, or are even multiple counties, such as a drought or an ice storm.

i. Flooding
(including dam failure, riverine, & stormwater flooding)

Public Health Hazard Vulnerability Assessment

The 2017 Northwest Wisconsin Health Care Coalition Public Health HVA rates flooding as a 34% risk over a ten-year period given its moderate probability (2), low vulnerability (1.3), and moderate-to-substantial available emergency management capabilities to deal with this threat (1.8 internal, 1.5 external). The HVA give flash flooding a higher overall risk (48%), with a higher probability (3). The assessment used a scale of 1 to 3, with "1" being low probability/impact or having substantial management capabilities and "3" being high probability/impact or having limited/no management capabilities

Risk Assessment--Flooding

The Hazard

Flooding is the only serious natural hazard facing Eau Claire County that has definable areas of higher risk, with the possible exception of wildfire. As such, flooding receives the greatest level of analysis within this plan.

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

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.

Key Definition

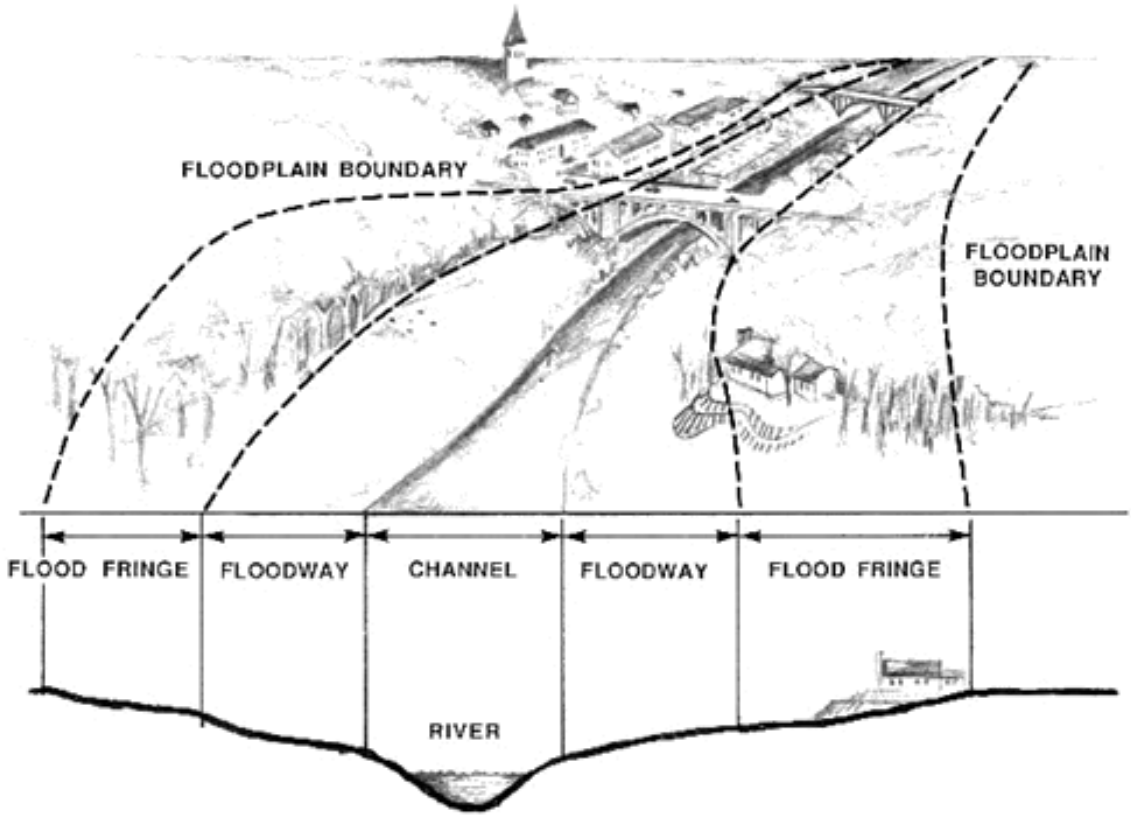
A 100-year flood has a 1% chance of being equaled or exceeded in any given year.

For regulatory purposes, the terms "100-year flood" and "floodplain" are commonly used. A **100-year flood**, often referred to as a **regional flood, special flood hazard area,** or **base flood**, is a flood that has a one percent chance of being equaled or exceeded in any given year.

This can be misleading as a 100-year flood is not a flood that will occur once every 100 years. The 100-year flood, which is the standard used by most Federal and State agencies, is used by the National Flood Insurance Program (NFIP) as the standard for floodplain management and to determine the need for flood insurance.

A **floodplain** is that land which has been or may be covered by floodwater during a flood event and includes the floodway and floodfringe areas (see **Figure 15**). The **floodway** is the channel of a river or stream and those portions of the floodplain adjoining the channel required to carry the regional flood discharge. Since it is associated with moving water, the floodway is the most dangerous part of the floodplain. The **floodfringe** is the portion of the floodplain outside of the floodway, which is covered by flood water during the regional flood and is generally associated with the storage of water rather than flowing water. The floodfringe is also that part of the floodplain in which development may be allowed in some communities, subject to floodplain development standards.

Figure 15. Elements of a Floodplain



Source: Minnesota Department of Natural Resources.

The **regional flood elevation** is the elevation determined to be representative of large floods known to have occurred in Wisconsin or which may be expected to occur on a particular lake, river, or stream at a frequency of one percent during any given year. The **flood protection elevation** is an elevation which is 2 feet above the regional flood elevation as defined by the

Wisconsin Department of Natural Resources. Development is sometimes allowed within the floodfringe if the structure is raised above the flood protection elevation. However, development in the flood fringe can decrease important floodwater storage; hydraulic analysis is often needed to ensure that the development will not result in increased flooding in adjacent areas or farther downstream.

Often, the term "floodplain" is used inappropriately by assuming that floodplains are limited to the 100-year floodplain boundary. This is not the case, and a floodplain can be identified for a 200-year flood, 500-year flood, or other such level of risk.

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

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

Also, high-hazard flood areas can exist which are not shown on the Flood Insurance Rate Maps. And floodplains can change in hazard risk and size as development occurs or with other physical changes in the environment. Municipalities can take the initiative to have new flood risks added to the FIRM maps as a Letter of Map Change (LOMC) or otherwise consider them during their planning and regulatory processes. Allowing inappropriately planned development to occur with knowledge of such potential hazards could be a source of potential liability for a community should a flood event occur which impacts the development.

Updated Flood Insurance Rate Maps (FIRMs) for Eau Claire County were made effective in February 2009 and are available in a digital format (D-FIRMs). The accuracy of the D-FIRMs remains a concern for local officials and residents. Since 2009, Eau Claire County has completed a light detection and ranging (LiDAR) remote-sensing project, which provides much improved topographical/contour data on which more accurate floodplain boundaries can be determined.

Overland or Stormwater Flooding – This type of flooding which occurs primarily from surface runoff as a result of intense rainfall is referred to in this plan as **overland flooding**, but is sometimes called stormwater 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 run off from that single home.

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

Areas with steep slopes and narrow stream valleys are more vulnerable to overland and flash flooding, as the water can achieve high velocity in a short time. Developed areas with substantial impervious surfaces can further contribute to overland and flash flooding. Flash floods often occur in smaller watersheds or are very localized, and are not necessarily reflected on FEMA Flood Insurance Rate Maps. Flash flooding can also be the result of dam failure. Generally, Eau Claire County has not had significant overland or overbank flooding problems from groundwater fluctuation and seepage compared to some other counties in the region.

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

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

Dam failure can occur from structural problems at the dam, hydrologic problems, malfunction of equipment, or human error in the monitoring or release of water. As such, dam failure can occur with little or no warning and on clear days with no rain, unlike the other types of flooding.

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

Regional Trends

Low-lying areas of those Wisconsin counties that border the Wisconsin and Mississippi rivers and many nearby tributaries, including the Chippewa River, are prone to riverine flooding. As development has increased, agricultural flooding in some areas has increased as well. Shoreline development has also increased both the risk and vulnerabilities to flooding. Since the 1960s, the number of homes along northern Wisconsin lakes has increased over 216 percent. Wisconsin Emergency Management estimated in 2011 that over 11,600 buildings in Wisconsin would be damaged from a 100-year flooding event. Nationwide, floodplains have been slowly increasing in size due to increases in runoff and decreases in flood storage areas.

Flooding is the principal cause of damage in 29 of 43 Presidential Disaster Declarations and one of six Presidential Emergency Declarations in Wisconsin from 1971 through April 2011. From 1971 until 1993, the total flood damages in Wisconsin were estimated at $352 million. In June 1993, flooding over large areas of the State, including Eau Claire County, resulted in over $740 million in estimated damages from this single event. Even worse flooding damage was experienced in Wisconsin in June 2008, with damages estimated at roughly $763 million.

There have been very few dam failures in Wisconsin that resulted in major damages or loss of life. The June 1993 flood event included the failure of an embankment associated with the Hatfield Dam on the Black River which contributed to flooding damage downstream in the City of Black River Falls. In 2002, a small privately owned dam in Osceola washed out and caused significant damage to a mobile home park. In June 2008, the Lake Delton Dam broke, which resulted in mudslides that washed out a number of homes. Many of Wisconsin's approximately 3,800 dams are small logging or milling dams built prior to 1900 and have little or no associated vulnerabilities. Between 1990 and 1995, more than 75 dam failures were documented in Wisconsin. Several of these incidents resulted in injuries and serious property damage, but no loss of life.

Flood Disaster Declarations and NCDC Data

Since 1953, there have been five Federal Major Disaster Declarations which encompassed Eau Claire County—May 1969, April 1973, July 1980, July 1993, and May/June 2004. All five of these events involved flooding, though high winds were the primary source of damages in the County for some of these events.

From 2007 to 2017, there have been 13 flood advisories, 2 flood watches, and 29 flood warnings for Eau Claire County (or an average of 2.9 warning per year). However, 9 of these warnings were issued in 2010 and 8 in 2016.

In **Table 10**, the National Climatic Data Center (NCDC) identified 16 flood event reports (on 15 different dates) for Eau Claire County since 1993; flood events were not reported prior to 1993. With the exception of the 2000 event, Table 10 also indicates that flood-related damage has been relatively low in recent years, though damages are frequently under-reported or go unreported. One injury and one death associated with the 2000 events were reported. Numerous reports of basement flooding were made. One Eau Claire business had four feet of water in its lower level.

It is notable that only one of the NCDC flood events occurred in April with the majority of reports from August and September. This trend is consistent with the growing emphasis on overland and flash flooding projects in the County over the last two decades.

Table 10. Flood Events in NCDC Database – 1993 through 2017
Eau Claire County

Location	Date	Time	Type	Property Damage	Crop Damage
Regional	4/3/1997	6:00 AM	Flood	0	0
Eau Claire	9/10/2000	9:25 PM	Flash Flood	3,300,000	0
West Portion	8/21/2002	2:45 PM	Flash Flood	100,000	0
Countywide	6/7/2005	8:10 PM	Flash Flood	1,000	0
Eau Claire	7/24/2006	5:45 PM	Flash Flood	250,000	0
Shawtown	8/13/2009	11:07 PM	Flash Flood	150,000	0
Eau Claire	8/11/2010	1:00 AM	Flash Flood	0	0
Eau Claire	9/23/2010	3:00 PM	Flood	0	0
Eau Claire	6/18/2011	8:00 PM	Flash Flood	0	0
Eau Claire	6/21/2013	9:15 PM	Flash Flood	50,000	0
Eau Claire	6/26/2013	4:45 PM	Flash Flood	50,000	0
Cleghorn	9/6/2015	8:00 PM	Flash Flood	300,000	0
Allen	9/8/2015	6:00 AM	Flash Flood	0	0
Cleghorn	8/11/2016	4:00 AM	Flash Flood	0	0
Eau Claire	9/21/2016	7:00 PM	Flash Flood	660,000	0
Ludington	9/21/2016	7:30 PM	Flash Flood	0	0
			15 event days	$4,861,000	$0

source: National Climatic Data Center (NCDC); damage estimates not adjusted for inflation.

No recent history of dam breaks with significant impacts in Eau Claire County were identified during the planning effort.

Summary of Local Events

Serious flooding in Eau Claire County has historically been primarily limited to floodplain areas along the Chippewa River, especially in the City of Eau Claire and the Town of Brunswick. Heavy rains in late April and early May of 1954 resulted in the closing of State Highway 85 between State Highway 37 and Rock Falls in eastern Dunn County. The Chippewa River is one of the largest rivers within Wisconsin and the largest river in Eau Claire County. The County lies within the Lower Chippewa River Basin, but upstream lays the Upper Chippewa River Basin which drains surface waters from 4,680 square miles, nearly the size of the State of Connecticut.

Many of the most significant flooding problems since 1990 have occurred when natural or man-made drainage and stormwater systems have been unable to handle heavy rain events, especially in low-lying areas or when the ground is already saturated. A closer review of some of the recent flood events in Eau Claire County provides a better understanding of the frequency, characteristics, and damages related to flooding in the County. **Appendix H** includes a more detailed flood history for the City of Eau Claire.

June 1993: Heavy rains in June 1993 caused extensive infrastructure damage (i.e., roads, road shoulders, culverts, bridge abutments) and flooded structures in many areas of the region. Agricultural crops were most severely impacted by flooding combined with continued wet weather. In the area, this event is best known for the extensive flooding on the Black River, including a dam failure which flooded 90 structures in the City of Black River Falls in Jackson County to the south. Eau Claire County would later undertake flood mitigation efforts, including the buy-out of some floodprone structures, as a result of this event. Due to the magnitude of this event, additional details on the June 1993 flooding are provided in a special subsection on the following page.

September 2000: On September 10-11, 2000, nearly 8" of rainfall fell in the Eau Claire area within a 24-hour period, with 6" falling within a 4-hour period. Within the City of Eau Claire, more than 50 locations experienced significant damage as discussed in Appendix H. Some residential areas outside the City also experienced stormwater flooding.

The 2000 storm resulted in increased awareness of the risks and vulnerabilities associated with stormwater flooding in Eau Claire County and related planning and mitigation efforts were undertaken as a result. In 2002, the City of Eau Claire and Eau Claire County used Flood Mitigation Program funding to complete their own flood mitigation plans then proceeded to acquire key properties and perform of significantly prone to repetitive stormwater flooding damage and perform other mitigation actions.

September 2010: This event was also the result of heavy rainfall in the Eau Claire River basin. About twelve properties were significantly impacted, mostly along Lake Altoona area and immediately upstream. Ten homes were sandbagged with a total of 2,600 bags used. A state of emergency was not declared. Comparisons to the 1993 flooding have been made, but most of the landowners impacted were not living in the area in 1993. Sedimentation on the Eau Claire River is also changing potential flood risks over time.

On February 24, 2011, a special multi-agency meeting was conducted by Eau Claire County and WCWRPC to discuss the lessons learned and recommendations from the September 2010 event. These lessons and recommendations included improved communications and call lists, resident role in monitoring, acquisition of equipment for filling of sandbags, improved mapping of inundation areas based on different flood levels, identification of sand drop sites, volunteer management policies, and promotion of flood insurance.

September 2016: Thunderstorms produced very heavy rainfall (5" to 8" in areas) resulting in flash flooding across the region. The Canadian National Railroad had 50 feet of track wash out in Stanley and near Wheaton. Several roads were closed in Eau Claire County including County Highways DD, Q, XX, and G. A mudslide also occurred near Highway 53 on the north side of Eau Claire. According to Eau Claire County Emergency Management records, 45 private properties reported flood damage, with 5-6 being classified as major damage. The Red Cross assisted those displaced in the City of Eau Claire and surrounding communities.

June 1993 Floods in Eau Claire County

The conditions for the flooding which occurred on June 20-21, 1993, were initially set by precipitation which fell over the west central Wisconsin region during the two weeks prior to the 21st of June. One the evening of Saturday, June 19th, extremely heavy rains of more than six inches occurred in eastern Eau Claire and western Clark Counties. This event caused the Eau Claire River to rise to record levels, with a record crest of 19.38 feet recorded at the Highway "K" bridge near Fall Creek on June 20th, which was the 100-year flood event. The water level at the Lake Eau Claire dam rose to its regional flood level on June 20th, which was 10.1 feet over its normal level. Lake Altoona also rose to the regional flood level.

In addition, the Chippewa River began to rise to flood levels. On June 18th (prior to the heavy rains of June 19th), the level of the river was at 764.95 feet MSL, as measured at the Grand Avenue Bridge located near the confluence of the Chippewa and Eau Claire Rivers in downtown City of Eau Claire. By 4:00 P.M. on June 20th, the river had risen above flood stage and continued rising throughout the next day to crest at 778.9 feet at 10:50 P.M. on Monday, June 21st.

In June 1993, Eau Claire County was declared a Federal disaster area due to the damage caused by the 100-year flooding event. The total flood damage suffered in Eau Claire County was estimated at over $10 million, with over $3.1 million in damage to private property, including over 250 homes and over 50 businesses, and $1.75 million in damages to public facilities. Approximately one-half of all reported damages were agricultural losses estimated at $5.3 million. Accounting for inflation, the total flood damages are nearly $14 million in today's dollars.

Damage to public facilities in the County included the washout of some smaller dams, erosion of recreational trails, damage to parks, road washouts, and damage to culverts and bridges. These infrastructure damages resulted in serious health and safety concerns as they impeded police, fire, and rescue personnel from getting to the scene of emergency situations. In addition to the direct damage to public facilities, flooded areas also had concerns for the inundation of water and sewage treatment facilities. Flooded water and sewage treatment facilities can lead to pollution of potable water sources and the promotion and transmission of disease.

The primary damage to individual residences in Eau Claire County included those structures located in the floodplain along parts of the Chippewa River, on the Eau Claire River around Lake Eau Claire and Lake Altoona, and in areas with saturated ground in and near the City of Augusta.

The main concern was for the health and safety of residents who were unwilling or unable to evacuate their premises and no longer had dry land access for emergency assistance personnel.

The agricultural industry experienced the greatest impact. The flooding affected an already depressed agricultural economy by destroying crops and causing very poor crop production for the surviving crops in some areas.

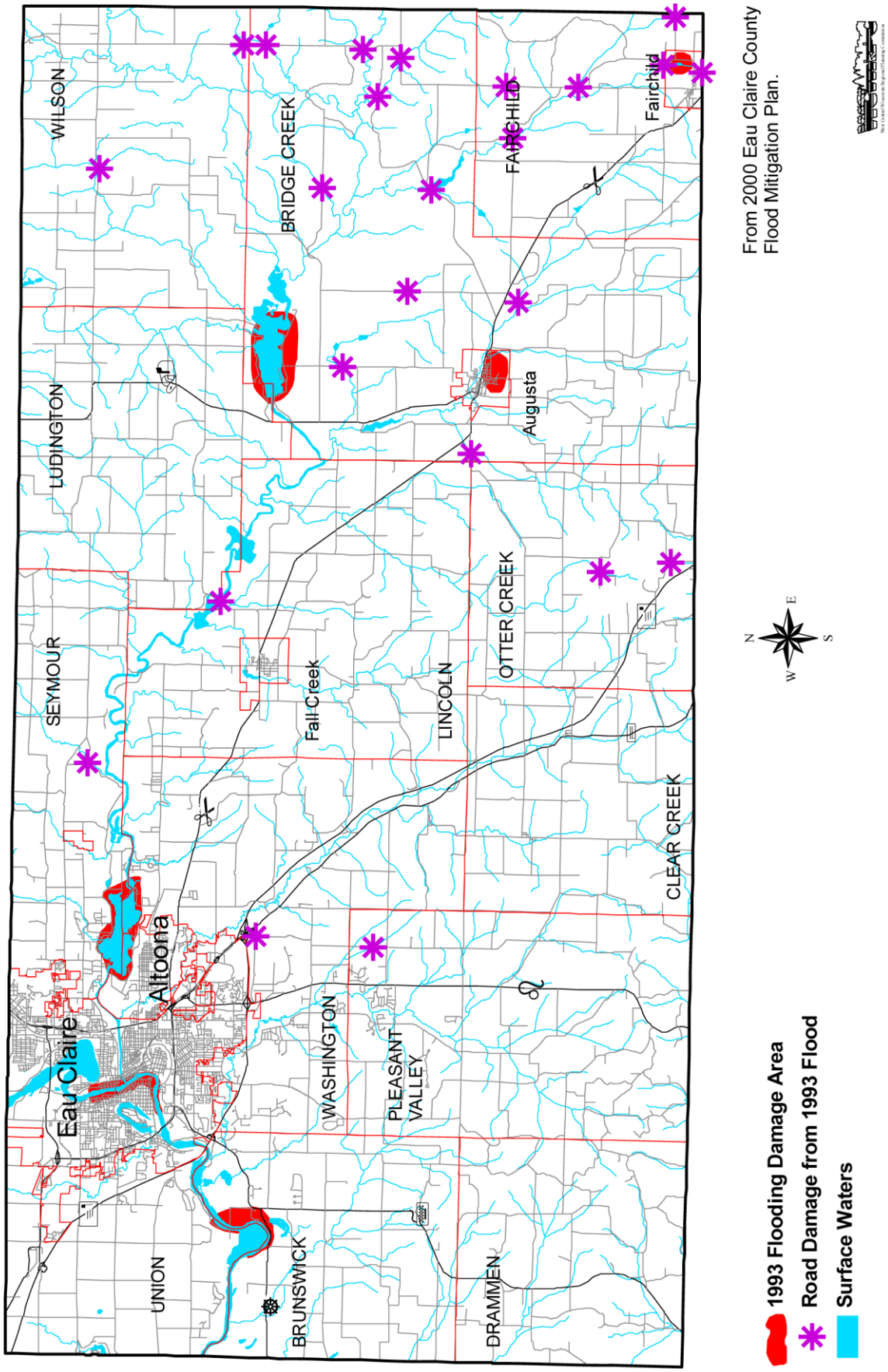
However, beyond direct crop production losses, other agricultural-related damages also resulted, such as:

- Farmers harvested lower-quality forage crops due to continued wet weather. Very little hay or haylage was harvested at the optimal growth stage. Dairy farmers found it difficult to maintain milk production on this forage.
- Beyond lost alfalfa production, additional damages to perennial forage stands resulted from harvesting on wet soils. This not only damaged the crowns of alfalfa and red clover plants causing stand losses, but also caused soil compaction that was expected to reduce yields in subsequent years.
- Alfalfa establishment suffered due to prolonged saturated soil conditions. This resulted in many farmers being forced to reestablish stands in the following years.
- The several heavy rains caused a considerable amount of soil erosion on unprotected soils. According to the Natural Resource Conservation Services (NRCS), formerly the Soil Conservation Service (SCS), severe erosion of greater than 10 tons per acre occurred on 7,500 acres in Eau Claire County. The topsoil that was lost was among the most fertile, which results in reduced production for the future.

Damages sustained by businesses in the County are primarily a direct reflection of the agricultural production losses. Farming supports a variety of farm- and non-farm-related businesses ranging from implement dealers and feed stores to local grocery stores and banking institutions. The 1993 flooding not only affected farmers, but also many businesses that support farmers.

Among the areas suffering flood damages were the Cities of Eau Claire and Augusta and the Village of Fairchild. Also flooded were areas adjacent to Lakes Altoona and Eau Claire, and the floodplain of the Chippewa River southwest of the City of Eau Claire. In the eastern half of the County, flooding also damaged numerous County and town roads. Shown in **Figure 16** are the areas of Eau Claire County that experienced substantial flooding in June 1993 and where significant road damages occurred.

Figure 16. 1993 Flood Damaged Areas
Eau Claire County



From 2000 Eau Claire County Flood Mitigation Plan.

A description of the damages from the June 1993 flooding for each of the primary flooded areas follows:

City of Eau Claire

This was the third highest flood of record for the City. Much of the flood damage occurred along First Avenue next to Owen Park and along Forest Street. Several businesses suffered flooding along Graham Avenue downtown, in the East Madison Street area, and along the north bank of the Eau Claire River where it enters the Chippewa River. In all, 75 structures had river water in their basements and the estimated cost to the City in damages and flood fighting was $750,000. In 1995, the City of Eau Claire was awarded a hazard mitigation grant totaling $3.7 million to acquire properties in the floodplain. The grant resulted in the acquisition of 50 properties and the floodproofing of two additional properties, thereby reducing the risk and vulnerability of flooding in the City. Since the completion of the grant project in December 1998, the City has acquired two additional properties through the use of general tax dollars.

City of Augusta

Overland runoff, due to heavy rains, surcharged the City's storm and sanitary sewer systems and caused water to back up into basements in much of the City. Over 60 homes and at least 21 businesses were flooded, resulting in over $550,000 in damages. As a result of the 1993 flood, the City of Augusta applied for and received Economic Development Administration (EDA) flood recovery funding to construct a larger storm drainage system. The system included upgrading 1,300 feet of existing storm sewer as well as re-grading and diking the existing drainageway in order to properly divert runoff.

Village of Fairchild

U.S. Highway 10/12 was washed out on the south side of the Village. A dike was overtopped near the Fairchild Pond dam and washed out an adjacent road. Basements throughout the Village were flooded with one-half to two feet of water. Total damages were approximately $45,000.

Eau Claire River - Lake Altoona and Lake Eau Claire

Numerous homes suffered flood damage along Lake Altoona and Lake Eau Claire. The Lake Eau Claire dam suffered damage during efforts to raise the mud gate during the flood and allow more water through. The Lake rose to within 2.5 inches of the top of the dam. If the dam had been overtopped, the sandstone abutting the dam could have been seriously eroded and the dam threatened. Since that time the dam has been repaired to proper operating standards.

Chippewa River - Town of Brunswick and Town of Union

Several homes were flooded in the Chippewa River floodplain, and a portion of U.S. Highway 85 was temporarily closed. In 1993, $1,217,277 in hazard mitigation grant funding was received by the County to acquire 17 floodprone properties and to perform floodproofing on two others. Since the completion of this grant project, flood vulnerabilities in this area have decreased dramatically.

County and Town Roads
A total of $248,000 in damages was caused to the local transportation system as a result of the 1993 storm. Much of the damage was sustained as shoulder erosion and washouts. However, as repairs to the system were reviewed and evaluated, only one of the areas was in need of major rehabilitation. In this instance, one of the washed-out culverts was replaced with a much larger bridge structure. All road rehabilitation projects are designed based on the State's design criteria. Where possible, the County works to ensure that these rehabilitation projects meet 100-year flood capacities.

While the 1993 flood demonstrated potential flooding impacts, it was not generally considered a 100-year flood for much of the County. On the Chippewa River south of Interstate 94 for instance, the 1993 flood had an estimated discharge rate of 85,000 to 90,000 cubic feet per second. By comparison, a 50-year flood in this area would have an estimated discharge rate of 100,000 c.f.s. and a 100-year flood would have a discharge rate of 112,000 c.f.s. That is a difference of approximately 165,000 gallons of water discharged per second (or about a 25% difference) between the 1993 flood and a 100-year event. Based on the 1993 experience, damages would certainly be significant if a true County-wide 100-year flood event should occur, though significant action has been taken in the interim to mitigate future flood impacts.

Unincorporated Areas Prone to Flooding
Given concerns with the accuracy of current NFIP floodplain maps and data limitations on the location and elevation of specific structures relative to the floodplain, this flood assessment was further supplemented through local meetings, a survey to Town Boards, and key informant interviews with County officials.

This research yielded that riverine and lake flooding in unincorporated Eau Claire County had historically been most frequent and severe along the Chippewa River, but in recent decades the related vulnerabilities along the Chippewa have decreased due to County and local mitigation efforts, buy-out programs, and ordinance enforcement. In contrast, there appears to be an increasing frequency of riverine and flash flooding along the Eau Claire River and its tributaries with the most frequent impacts on roads, culverts, and bridge abutments.

Overland floodwater entering the basements of older homes, especially in low-lying areas, is not uncommon within rural Eau Claire County. However, most home owners have taken action to mitigate the impacts; and serious damage is rare. Many driveway culverts of private homes are aging or are undersized and need replacement, but often fall into neglect and are not replaced due to costs to the landowner.

Overland flooding has also been a problem for some residential subdivision developments, in particular older ones located south of the City of Eau Claire during times of early snow melt. Some older subdivisions did not fully consider natural water drainageways during planning or grades were changed during development or subsequent landscaping which contributed to stormwater flooding problems. During the past decade, more attention has been given to stormwater management during the planning and site plan review process by both local governments and builders to address this.

September 2016 *(continued)*: County municipalities and agencies reported nearly $357,000 in public costs and damages to Eau Claire County Emergency Management as a result of the September 2016 flooding including:

Town of Bridge Creek ($21,355) and Bridge Creek Fire Department ($14,429)
Washout of roads and/or culverts along Channey Road (2 locations), Kelly Road (2 locations), and Horse Creek Road (2 locations). These roads would be closed 5-8 days. The Fire Department incurred costs assisting with response and rescue.

Town of Ludington ($20,463.95)
Washout of roads, culvert, shoulders, and/or ditches along Woodland Valley Road (3 locations, Town Shop Road (3 locations), Grandview Drive, 10th Avenue Dead End, Jiglum Road, Swamp Road, Scenic Drive, Rockie Road, and Oak Dale Road.

Town of Seymour ($56,567)
Washout of roads, culvert, shoulders, and/or ditches along Town Drive (6600 block), Burnell Drive, 84th Avenue, St. Bridget Drive (10300 & 11000 blocks), N. 120th Avenue, and N. 150th Avenue (2400 block).

Town of Wilson ($28,590)
Washout of road surface, culverts, and shoulders along Tower Road, Gravel Pit Road, and Hamilton Falls Road, with some roads closed for about one week.

City of Eau Claire ($30,534.19)
Damages within the City of Eau Claire were more diverse compared to the towns. Most costly was heavy erosion and washout of a bank along the Eau Claire River along S. Dewey Street. Street flooding occurred on Hastings Way and Horlacher Lane. A mudslide over along Old Wells Road requiring barricades and clean-up. A washout occurred at Phoenix Park Point. And a lightning strike at 1101 West Hamilton damaged city equipment.

County Highway Department ($43,186.10)
Washouts and culvert failures on county highways necessitated $90,153.80 in emergency repairs and $38,620.60 in permanent repairs. Highways impacted were: CTH Q (2 locations), CTH DD, CTH G, CTH H, CTH UN, CTH P, CTH XX, CTH QQ, CTH G located in the towns of Bridge Creek (2) Ludington (2), Seymour (4), and Wilson (2).

County Parks and Forest Department ($136,840.20)
Culvert washouts (2 full, 3 partial) occurred along the Hamilton Falls River ATV trail. and the road at the Pea Creek Sedge Meadow Dike washed out. The Sandusky Drive Bridge abutment washed out with loss of rip rap and some scouring. The Brown Hut snowmobile bridge was ripped from its piers and washed downstream.

Assistance through the Wisconsin Disaster Fund was received to assist with some of the above damage costs. It is believed that not all communities experiencing damage in September 2016 reported their damage to Eau Claire County Emergency Management, which impacted their eligibility for Wisconsin Disaster Fund assistance.

Figure 17 shows those unincorporated areas most prone to flooding and of concern in Eau Claire County, which includes the following highlights:

- Towns of Washington and Seymour - Lower-lying areas along Lake Altoona and immediately upstream (especially to the north) appear to be the largest concentration of

structures that are most vulnerable to flooding. This area includes the majority of the County NFIP claims and the twelve homes that were most impacted by the September 2010 flooding. Flooding of some nearby roads occurs almost annually. One recent home buyout.

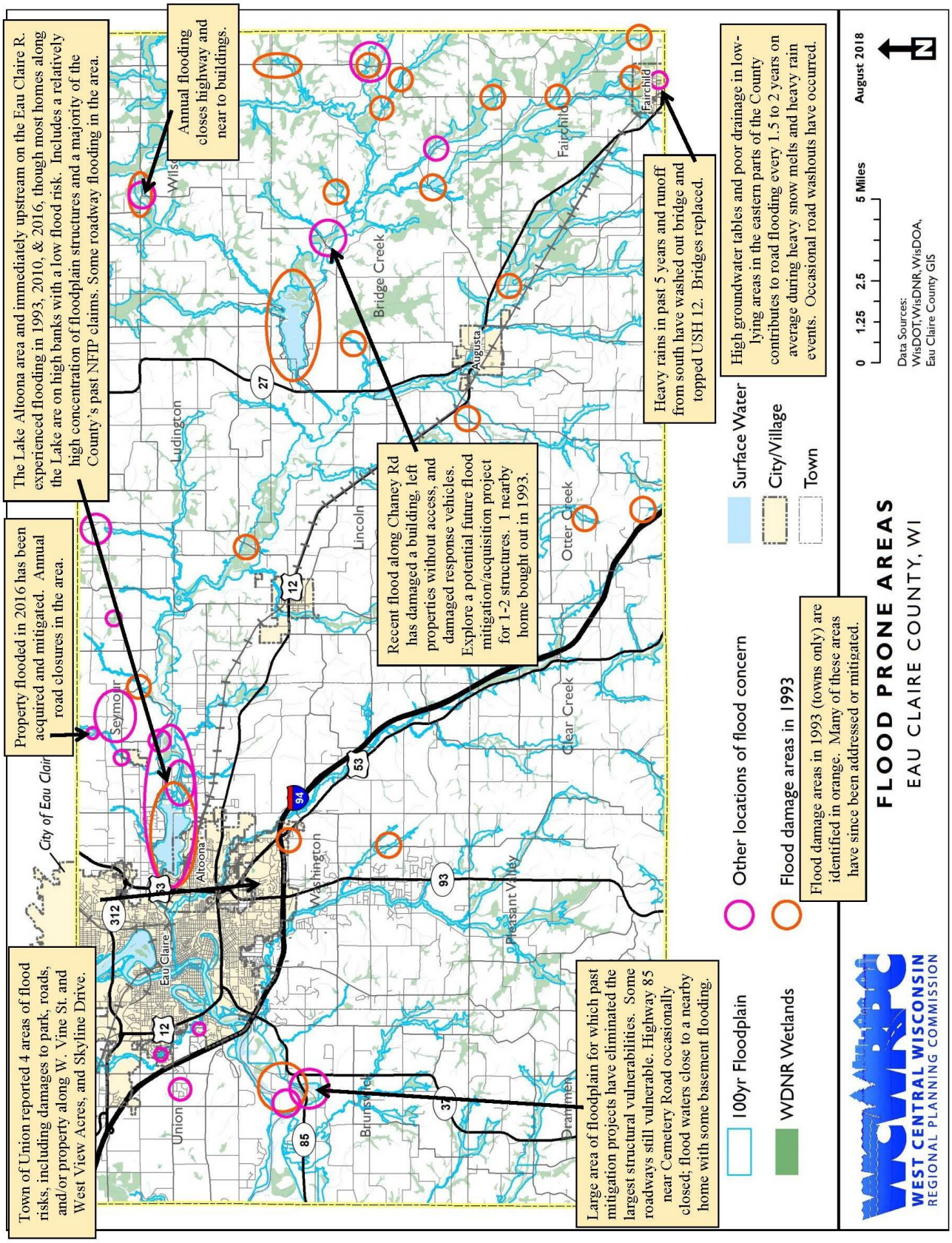
- Towns of Wilson, Bridge Creek, and Fairchild - Numerous locations in eastern part of Eau Claire County were identified which frequently experience over-the-road flooding or road flood damage over the past decade. High water tables, numerous streams, and poor overall drainage systems are common in this area. Some areas experience flooding nearly annually. One recent heavy rain event washout out a bridge in the Village of Fairchild. Two structures (a home and cabin) along Chaney Road have been landlocked during past flooding and could be considered future mitigation (acquisition) opportunities with landowner consent. Damage to the home and an emergency response vehicle occurred during 2016 flooding.
- Town of Union identified four flood risk areas. Homes along Silver Mine Drive are in or near the floodplain. Sherman Creek Park and West Vine Street have experience past flood damage. The hillside at West View Acres subdivision has been eroded during flooding, damaging a home and culverts. And stormwater drainage from development in the Skyline Drive area has damaged property on Menomonie Street.
- Town of Bridge Creek – County Highway "R" west of U.S. Highway 12 where the county road crosses Thompson Valley Creek received road damage as a result of the 1993 storm and is prone to stormwater flooding during heavy rain events. Highway 85 near Cemetery Road has also been closed due to flooding with some basement flooding of a nearby home.

The 1993 flood-damaged areas map (Figure 16) corresponds with many of the above floodprone areas identified during the interview process, but identifies some additional areas that should be monitored due to their flooding history and may necessitate mitigation projects in the future. For instance, flooding occurred along Lake Eau Claire in 1993 and there is a concentration of potential floodplain structures in the area, but no further flooding issues or mitigation actions were identified during this plan update.

Some of the worst spots for roadway flooding, such as those shown in the 1993 flood-damaged areas map, have since been remedied and the vulnerability has decreased considerably. In 1990, the Highway Department raised a portion of County Highway "Q" which is associated with the only Eau Claire County flood-related death in recent history. Similar improvements have been made along Sherman Creek and on County Highway "D" where it crosses the Eau Claire River to help prevent roadway flooding. A floodprone section of County Highway "I" in an area of high groundwater was raised in 2018.

The County Highway Department has been conducting meetings with towns on culvert design, sizing, and materials to help mitigate flooding as well as encouraging communication between towns so that culvert planning considers the larger drainage areas.

Figure 17. Areas Prone to Flooding (Unincorporated Towns Only)



Most County camping areas are on higher ground out of floodplains, and emergency plans are in place to warn campers of potential hazard threats. However, swimmers can be exposed to the hazard of shifting sand bottoms in local rivers. After a heavy rain or flood event when large discharges of water take place, the localized depths of some rivers can change as sand is deposited or displaced. This can change the extent of the floodplain over time, and make structures vulnerable which may not have experienced flooding in the past. This has become an increasing problem on the Eau Claire River.

Changing water depths can also contribute to the injury of residents or tourists might while swimming or diving off of adjacent river banks or rock features. Fatalities have occurred. These injuries and fatalities have been occurring in areas not designated for swimming, where signs have been placed to warn swimmers of this potential hazard. Placement of warning signage along the entire length of the river at all such places where swimming takes place is likely not feasible.

Relative Level of Risk

Flooding in Eau Claire County will continue to be a significant risk for residents and improvements. Some overbank flooding can be expected in certain areas along the Chippewa River and other streams nearly annually during heavy snow melts and/or wet springs Mitigation efforts and floodplain management have largely addressed such historical flooding risks. As reflected by the NCDC data and more recent events, flash flooding and overland stormwater flooding have become a greater concern since 1993. A smaller overland flood event can also be expected to occur annually in some areas, with multiple events in a single year not uncommon, such as the two events in 2010. Such flash flooding may temporarily close some streets, flood yards, or result in some basement flooding, but the flood waters typically recede in a few hours.

Based on the past two decades, it is likely that Eau Claire County will continue to experience one serious, damage-causing flood event every 1.25 to 1.5 years, on average, with the potential for multiple events in a single year. Significant overbank and flash flooding damage caused by heavy snow melt, often in conjunction with rainfall, can be anticipated less frequently (about once or twice a decade), typically in the months of March, April, or May. These events also have the potential cause significant damage, but as the 1993 floods showed, the riverine flooding risks are often greater along the smaller rivers that do not have high banks or large flood storage areas. As discussed in the thunderstorms and climate change subsections, the frequency and intensity of the heavy rainfall events appears to being increasing, which suggests that flash flooding risks will also increase if not planned for or managed.

If the dams within Eau Claire County continue to be well maintained, flooding related to dam failure should not occur and is not expected. In fact, most of the smaller, privately owned dams would cause very minimal or no damage downstream if a failure should occur. The larger dams with significant- or high-hazard ratings were built to strict engineering standards, have related emergency plans, and are more closely monitored.

Vulnerability Assessment--Flooding

Flooding can be the most destructive of hazards, affecting large areas for long periods of times. Since flooding is tied to topography, a substantial amount of flood damage is the result of basement flooding, though floods can also move or destroy entire structures. Deaths and injury are relatively rare with river and lake flooding, since adequate warning time is usually available, though flash floods or dam failures can be very deadly as they may form very swiftly.

Floods can wash out roads, hindering the flow of traffic, and can cause havoc to water supply and wastewater treatment systems. Debris carried by flooding can result in direct damage to bridges, structures, or property; or this debris can obstruct the flow of water, causing additional flood damage. The resulting moisture build-up in the home (HVAC systems, carpeting, drywall, etc.) can cause additional, long-term health problems with mold and mildew once the floodwaters have retreated. Nearly half of all reported flood damage in Wisconsin in the 1990s was to crops, though obtaining accurate crop damage estimates at the County level is difficult.

Potential Development in 100-Year Floodplains

The amount of impervious surfaces near lakes and rivers has grown tremendously in recent decades. However, stricter enforcement of floodplain zoning, shoreland ordinances, and a decrease in available shoreland properties has limited new floodplain development. This 100-year flood vulnerability analysis has two primary parts:

- **City of Eau Claire** - More detailed elevation and structural data, including engineered floodplain boundaries (Zone AE) are available. Appendix H includes the full flood assessment of the City of Eau Claire, including methodology, tables, progress on past flooding problem areas, etc. **Figure 19** uses the data from Appendix H.
- **Remainder of Eau Claire County** - Data was not readily available to perform a comprehensive, detailed vulnerability assessment of flooding in Eau Claire County outside the City of Eau Claire. Instead, through the use of D-FIRM maps and G.I.S. parcel data, those principal structures most likely located within a 100-year floodplain were identified. A full description of the flood assessment methodology and related data challenges is included in **Appendix B**. This information is further supplemented through the previously provided flooding "hotspots" map (Figure 17) to guide the development and prioritization of flood-related mitigation strategies.

Figure 18 on the following page identifies the 100-year floodplains within Eau Claire County. Areas of 100-year flood[13] were taken from Digital Flood Insurance Rate Maps (D-FIRMs), which became effective February 2009. Figure 18 also shows the location of all principal structures located partially or wholly within the 100-year floodplains of Eau Claire County (outside the City of Eau Claire) using the methodology discussed in Appendix B. Principal structures are those buildings located on a parcel within which the main use of the parcel takes place. For most parcels, the principal structure will be a home or commercial business, while ancillary structures (e.g., garages, barns, sheds) are not mapped.

[13] Also commonly known as "Zone A or AE" when referring to FEMA FIRM maps.

Figure 18. Eau Claire County Floodplains & Potential Floodplain Structures

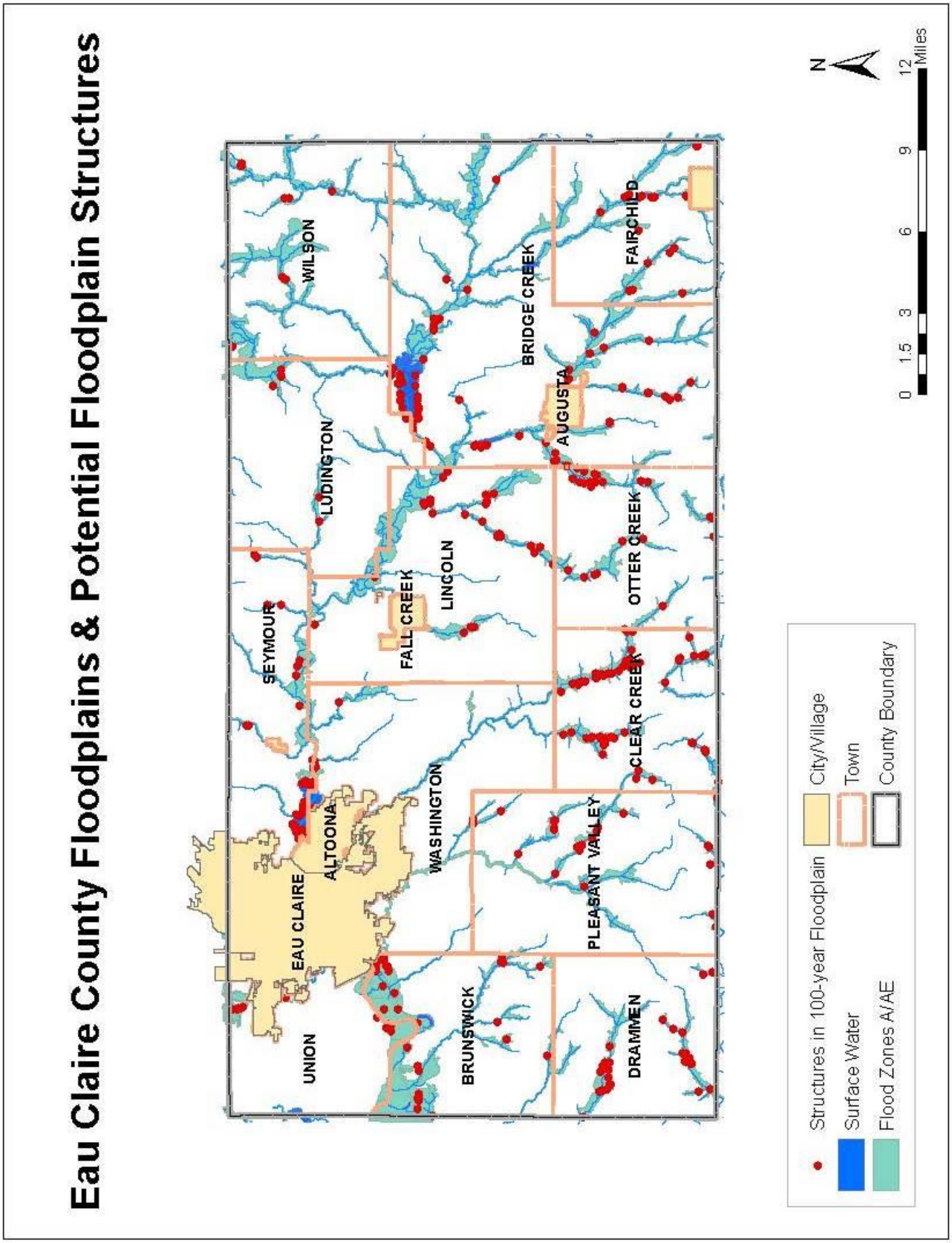


Figure 19. City of Eau Claire 100-Year Floodplains & Potential Floodplain Structures

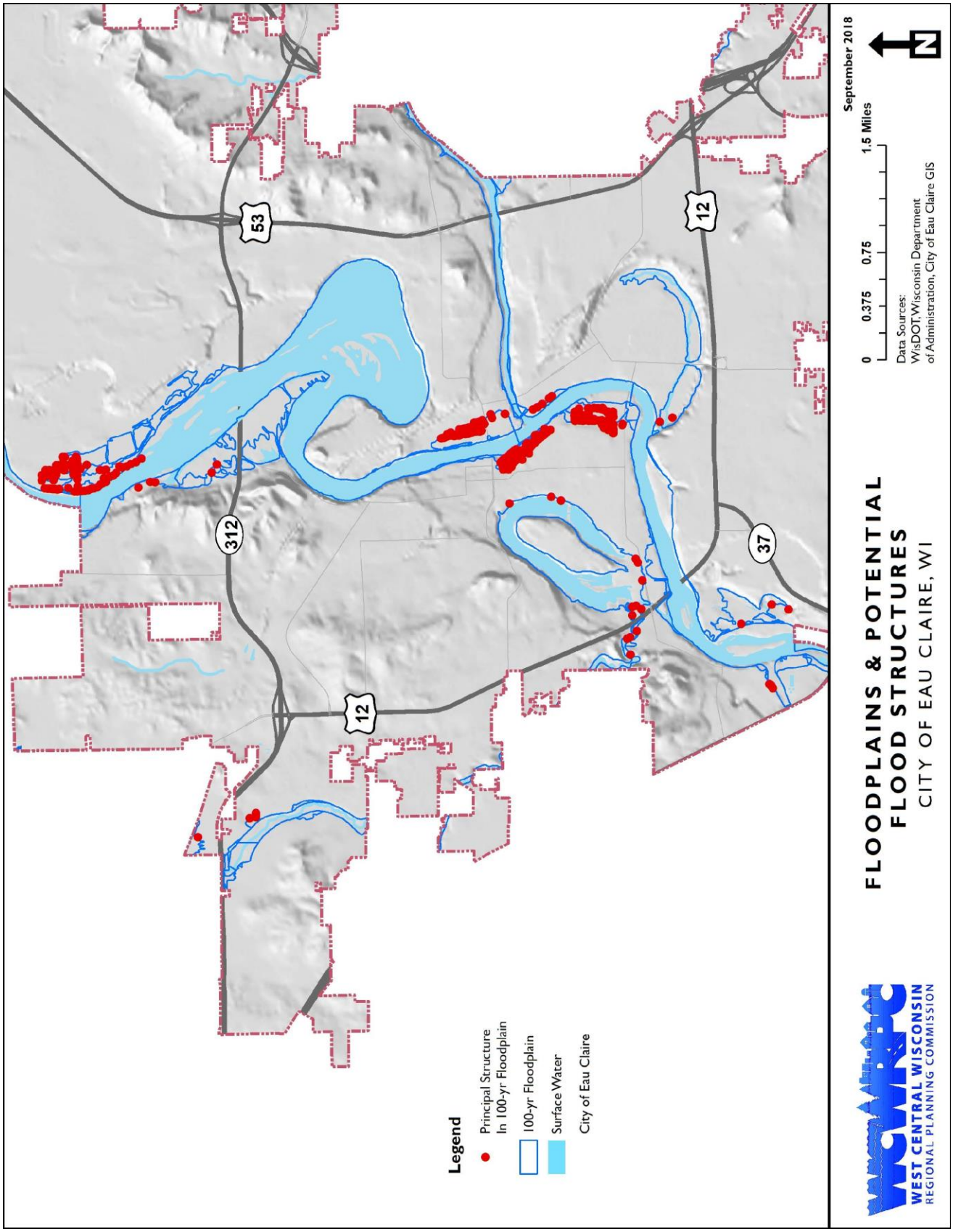


Table 11. Principal Structures Potentially in 100-Year Floodplain—2018

Municipality	# of Parcels w/ Principal Buildings	# of Residential Parcels	Residential Imp Value	# of Commercial Parcels	Commercial Imp Value	# of Industrial Parcels	Industrial Imp Value	# of Other Parcels	Other Imp value	# of Tax-Exempt Parcels	Total Assessed Improv
Cities											
Altoona	22	17	$ 2,379,400	1	$ 255,700	0	$ -	0	$ -	4	$ 2,635,100
Augusta	19	13	$ 692,300	0	$ -	1	$ 582,900	5	$ -	5	$ 1,275,200
Eau Claire	302	246	$24,591,500	44	$18,555,600	1	$ 539,000	3	$ -	7	$43,686,100
City Sub-Total:	**343**	**276**	**27663200**	**45**	**18811300**	**2**	**1121900**	**8**	**0**	**16**	**47596400**
Villages											
Fairchild	0	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Fall Creek	9	3	$ 611,300	1	$ 1,038,200	0	$ -	0	$ -	5	$ 1,649,500
Village Sub-Total:	**9**	**3**	**$ 611,300**	**1**	**$ 1,038,200**	**0**	**$ -**	**0**	**$ -**	**5**	**$ 1,649,500**
Towns											
Bridge Creek	104	78	$ 5,687,200	7	$ 590,000	1	$ 2,359,400	13	$ 517,400	5	$ 9,154,000
Brunswick	39	16	$ 2,232,300	5	$ 2,136,100	4	$ 131,200	11	$ 2,321,500	3	$ 6,821,100
Clear Creek	105	71	$ 5,220,100	9	$ 688,400	0	$ -	18	$ 1,060,200	11	$ 6,968,700
Drammen	32	21	$ 2,556,500	0	$ -	0	$ -	10	$ 846,500	1	$ 3,403,000
Fairchild	21	11	$ 577,500	1	$ 739,700	0	$ -	9	$ 165,900	0	$ 1,483,100
Lincoln	28	17	$ 2,109,000	1	$ 166,600	0	$ -	7	$ 770,700	1	$ 3,046,300
Ludington	11	10	$ 1,132,200	0	$ -	0	$ -	1	$ -	0	$ 1,132,200
Otter Creek	25	10	$ 860,300	0	$ -	0	$ -	15	$ 1,326,500	0	$ 2,186,800
Pleasant Valley	30	18	$ 2,026,400	3	$ 981,500	0	$ -	8	$ 675,200	1	$ 3,683,100
Seymour	61	59	$ 9,075,800	0	$ -	0	$ -	0	$ -	2	$ 9,075,800
Union	17	8	$ 732,600	0	$ -	3	$10,389,700	3	$ -	3	$11,122,300
Washington	22	21	$ 2,769,700	0	$ -	0	$ -	1	$ -	0	$ 2,769,700
Wilson	14	10	$ 499,300	0	$ -	0	$ -	4	$ -	0	$ 499,300
Town Sub-Total:	**509**	**350**	**$35,478,900**	**26**	**$ 5,302,300**	**8**	**$12,880,300**	**100**	**$ 7,683,900**	**27**	**$61,345,400**
Total	**559**	**383**	**$63,753,400**	**28**	**$25,151,800**	**10**	**$14,002,200**	**105**	**$ 7,683,900**	**41**	**$66,905,200**

Table 11, which follows Figure 19, provides a synopsis of those potentially floodprone principal structures by municipality. The assessed use and estimated value of improvements are based on 2018 tax data for those parcels associated with each of the principal structures identified in Figures 27 and 28.

In total, an estimated 861 principal structures have been identified as potentially being located within the 100-year floodplain in Eau Claire County. Of these 861 structures, 73 percent are on parcels assessed as non-farm residential use. Only 82 structures (about 9.5%) were assessed as commercial or industrial. An additional 12.5 percent are on parcels assessed as agricultural or other, which includes housing associated with farm operations. Forty-eight structures were public-sector owned or private-sector exempt (e.g., churches) for which an estimated value of assessed improvement are not available. The improvements on the 813 assessed parcels had a 2018 estimated assessed value of $110,591,300.

Over 35 percent of the principal structures potentially located in a 100-year floodplain were located within the City of Eau Claire. About 31% of all structures were concentrated in three towns: Clear Creek (12%), Bridge Creek (12%), and Seymour (7%). But a comparison of the assessed improvements to number of structures shows that total vulnerability varies by the type of structures at risk. For instance, the Town of Union has the second highest vulnerability in terms of estimate value ($11.1 million), though it only had seventeen potential floodplain structures; three of these being industrial parcels.

PLEASE NOTE: The structures identified on Figure 18 and in Table 11 may not have had flooding problems in the past. To the contrary, the majority of these properties has no history of flooding and may not be vulnerable to flooding in the future. In some cases, due to topography at the building site or construction e of these structures may have also received an approved Letter of Map Amendment (LOMA) or Letter of Map Revision (LOMR) which officially removed the structure or site from the 100-year floodplain.

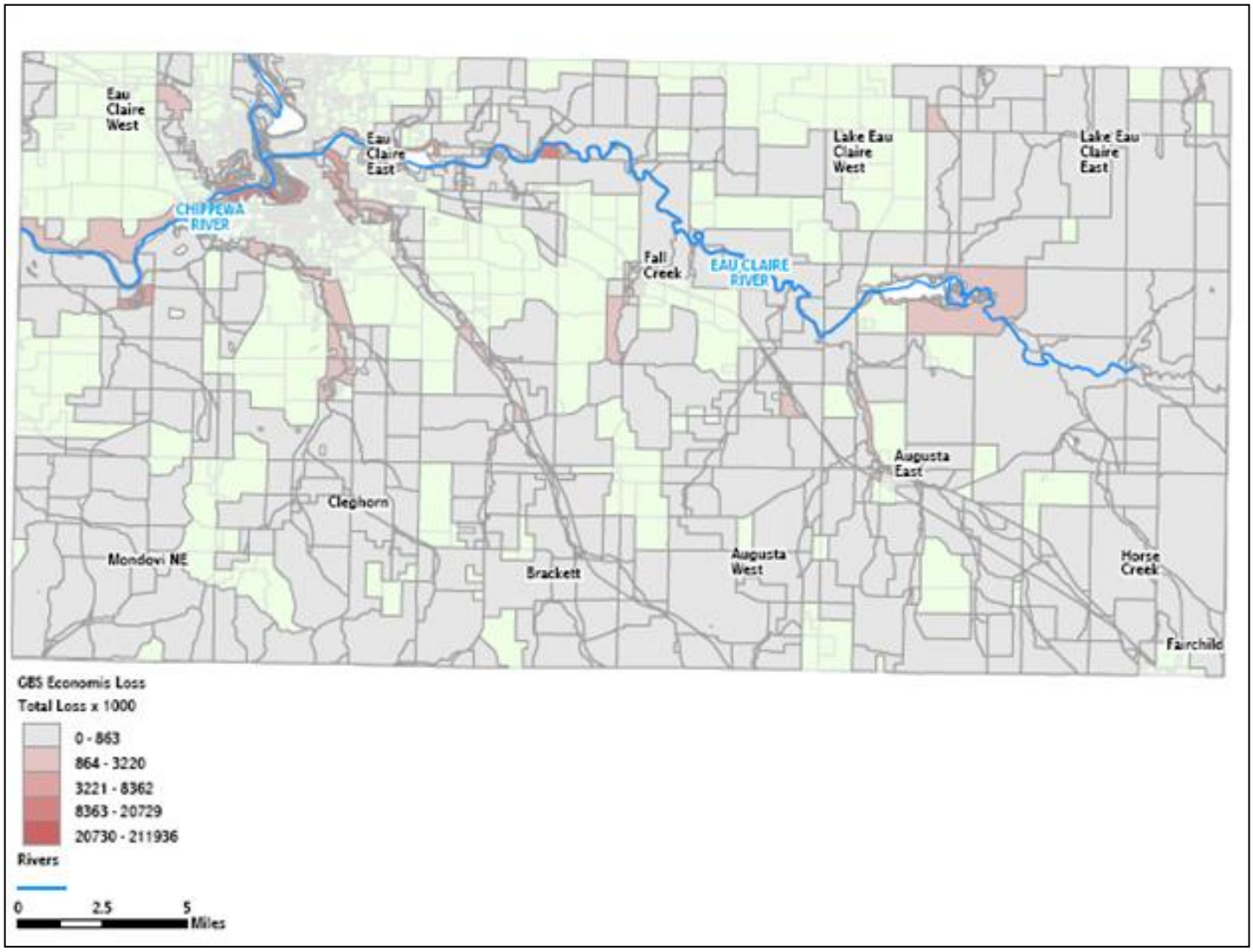
Further, as discussed in Appendix B, for properties with multiple buildings and ancillary structures, the exact use and nature of each structure within the floodplain is not known; and tax assessment data is only available at the parcel level, not for specific structures. And in some cases, an ancillary structure (e.g., barn, shed, boathouse) is located in the floodplain but is not reflected in Figures 18 and 19 or Table 11 since the principal structure on that parcel was located outside the delineated floodplain.

HAZUS Analysis of Flood Vulnerabilities

HAZUS is a natural hazard loss estimation software package which is used in conjunction with geographic information system (GIS) software to simulate potential losses due to flooding, earthquakes, and hurricanes. HAZUS is distributed free-of-charge through FEMA and is becoming the national standard for disaster modeling for these events.

In 2008, Wisconsin Emergency Management prepared flooding analysis reports for each county in the State using the latest HAZUS software (HAZUS-MH) for a 100-year flood scenario. Based on this analysis, the scenario showed that flood damages would be experienced throughout much of Eau Claire County, with more significant damages scattered along the Chippewa River and Eau Claire River. The highest loss areas are found in the City of Eau Claire and nearby areas as shown in **Figure 20**.

Figure 20. HAZUS 100-Year Flood Scenario



HAZUS estimates that 113 census blocks would experience losses exceeding $1 million. An estimated 668 buildings would be damaged for total building losses of over $363 million and total economic losses over $709 million. The far majority of these buildings were residential, but did include seven commercial buildings damaged. No industrial, critical facilities, or other structures were damaged under the HAZUS scenario, though 3,071 households would be displaced and 6,929 people were estimated to need temporary shelter in a public shelter. While the above scenario does attempt to consider flood depth and topography using the enhanced quick look (EQL) function, the analysis relies heavily on State and Federal data sources, such as census block information. The potential exists to supplement the HAZUS scenario with local data in the future, though this does require expertise and knowledge of the HAZUS-MH software package.

The estimated number of at-risk structures under the HAZUS scenario is significantly higher than the 467 structures estimated in the previous section. The HAZUS methodology relies on census block housing averages for building counts, rather than using orthophotography and parcel data to identify individual structures. For rural areas in particular, the census blocks tend to be larger in size, while structures are often concentrated nearer to shoreland areas; losses will not be evenly distributed across a census block.

Projecting Future Flood Vulnerabilities

Three primary factors are key to projecting future flood vulnerabilities and would influence the previous structure damage estimations:

1) **Changes in Precipitation** - As the local events discussion showed, the recent flooding problems in Eau Claire County have been primarily due to heavy rainfall events, not spring snow melt. And Section III.C. will show that precipitation, extreme rainfall events, and flooding have been increasing and this trend is expected to continue. The projected 23 percent increase in 2" rainfall events per decade would likewise increase flooding potential and may result in additional areas being identified as flood hazard areas in the future. No detailed modeling on the full impacts of such climate changes on Eau Claire County has been performed.

2) **Changes in Flood Storage and Stormwater Management** – Overall, the floodplains and wetlands of Eau Claire County are well-protected. Encroachment of wetlands and new development often require the creation of new flood storage or stormwater retention areas. However, the decrease of flood storage can also be the accumulated loss or disruption of smaller stormwater storage areas, natural infiltration systems, and natural drainage systems. 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, soil health best management practices, and the creation and maintenance of flood storage areas. An additional factor is if stormwater system design standards will change over time to accommodate the precipitation changes discussed in (1) above.

Flooding at Haymarket Parking Lot
September 2010

3) **Floodplain Development** – New floodplain development is well regulated and rarely allowed. The number of structures in Table 11 and vulnerability to 100-year flood events 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 structures are renovated or replaced.

In short, floodplain development vulnerabilities are projected to increase in the future not as much from new development within the floodplain, but rather from increasing precipitation (and runoff), the increasing value of existing structures, and the improvement of existing structures. If no significant floodplain development or redevelopment occurs, the increasing flood vulnerability in Eau Claire County will be from overland flooding as a result of additional heavy rainfall events and changes in natural stormwater storage and drainage patterns as new development occurs.

National Flood Insurance Program Claims and Repetitive Loss Properties

As of June 30, 2018, there were a total of 161 National Flood Insurance Program (NFIP) flood insurance policies in Eau Claire County covering approximately $27.8 million in property, including the portion of the City of Eau Claire in Chippewa County. This is a decrease from 208 claims in 2012. Of the 161 policies, 108 (67%) were located in the City of Eau Claire covering $16.7 million in property. An additional 47 (29%) policies were for properties in the unincorporated towns covering $9.1 million in property. The City of Altoona had four policies followed by Augusta and Fall Creek with one policy each. NFIP claims from 1978 to June 2018 for Eau Claire County included:

City of Eau Claire	31 claims	16 paid totaling $146,154
City of Altoona	1 claim	0 paid
Unincorporated Towns	14 claims	9 paid totaling $285,579

Repetitive loss properties are those properties participating in the National Flood Insurance Program (NFIP) that have filed two or more claims of $1,000 or more in a 10-year period. This list is regularly compiled by FEMA and made available to the Wisconsin Division of Emergency Management. **Eau Claire County has no repetitive loss properties.** This lack of repetitive loss properties may reflect the flood mitigation efforts undertaken in Eau Claire County since the 1993 floods.

NFIP Community Rating System Participation

The City of Eau Claire is the only community in west-central Wisconsin participating in the National Flood Insurance Program's Community Rating System (CRS). The CRS is a voluntary program which provides flood insurance premium discounts based as an incentive for a community to go beyond minimum floodplain management requirements. The City has been participating in the CRS system since October 1991.

The CRS program has ten classes, with the highest class (Class 1) receiving the greatest premium discounts. Class credit points are assigned for a variety of activities recognized to reduce or eliminate the exposure to flooding. The activities fall within four main categories: public information, mapping and regulation, flood damage reduction, and flood preparedness. As of August 2018, the City had a CRS Score of "7". With this score, properties within the Special Flood Hazard Area[14] receive a fifteen percent NFIP flood insurance discount. Properties outside the SFHA receive a five percent discount.

The City of Eau Claire is actively working to improve its CRS score through efforts such as:

- The City has a designated floodplain manager and key City staff members are receiving ASPFM Certified Floodplain Manager (CFM) certification.
- Floodprone properties are being maintained as open space through acquisition and deed restriction with additional acquisition opportunities being explored.
- The City continues to integrate flood and floodplain mitigation, management, and response into a variety of planning and regulatory tools, such as:

  City Comprehensive Plan, Neighborhood Plans, and Waterways Plan

  City Stormwater Management, CIP, and other utility/infrastructure plans

  City floodplain, zoning, site plan review, and other land use regulations

  City Flood Emergency Action Plan & City Emergency Action Plan

  City-County Crisis Communications Plan & Public Health Emergency Preparedness Plan

  Chippewa Falls-Eau Claire Urban Sewer Service Area Plan

  Eau Claire River Watershed 9-Key Element Plan

  Rain to Rivers of Western Wisconsin educational outreach (MS4 communities)

- Additional public education and outreach is planned, such as flyers, webpage/social media, and mailings to realtors and businesses.
- Additional floodplain mapping activities are underway, which will be integrated into public educational initiatives.

Critical Facilities Flood Vulnerability

Interviews, past event information, and floodplain maps were used to determine the vulnerability of critical facilities. Not all critical facilities in Eau Claire County have been mapped, so a

[14] The Special Flood Hazard Area (SFHA) is the land area covered by the floodwater of the base flood (or 100-year flood).

complete comparison of all facilities to the 100-year floodplain boundary is not possible at this time.

Within the City of Eau Claire
Critical facilities identified as potentially being located in the 100-year floodplain are largely limited to infrastructure (e.g., roads, bridges, dams). The City/County Jail immediately east of the County Government Center (as well as other buildings downtown) has been elevated above the floodplain and removed from the DFIRM through a Letter of Map Revision. Six UW-Eau Claire buildings along Little Niagara Creek are potentially within the floodplain, but are protected through a concrete flood control structure with gates and pumping systems to prevent floodwaters from "backing up" from the Chippewa River. An estimated 6 to 10 historic buildings are also located in the floodplain, including the Owen Park Bandshell. The City's wastewater treatment plant is in a low area, but is protected by a dike and is flood proofed; it has had some flooding problems with groundwater seepage which is managed through a pump. The City's Central Maintenance could be flooded by an event exceeding a 100-year flood.

During the planning process, no specific actions regarding any of the above properties were identified or deemed to be needed at this time. The City has used the basement of the historic bandshell at Own Park for storage in the past, but has moved the items stored there to a new restroom structure out of the flood risk area. No City office buildings or critical services were identified as having flooding problems. Some City park areas flood regularly and are used as flood storage (e.g., Owen Park, Riverside Park, trail near Hobbs), so many of these facilities are built and maintained to withstand typical flood events.

Overland, flash flooding has been a larger problem in recent years to critical facilities than overbank flooding. Lincoln Montessori School has had flooding problems when heavy rains exceed stormwater system capacities. DeLong Athletic Fields are used as flood storage. And Chippewa Valley Technical College has experienced some basement flooding at its Clairemont Campus. Luther-Midelfort Hospital has also had overland flooding problems.

Outside the City of Eau Claire
Critical facilities potentially located in the 100-year floodplain are limited to infrastructure outside the City of Eau Claire are limited to infrastructure (e.g., roads, bridges, dams). Two hazardous materials facilities near Foster were also identified as being potentially within the 100-year floodplain. During the planning process, none of these facilities were reported to have significant flooding problems necessitating recommended action within this plan at this time. No County buildings were identified as having flooding problems. Flash flooding wash-outs and damage to roads, culverts, and bridge abutments have been the most common flood-related problems in the past for most of unincorporated Eau Claire County.

Agricultural Flooding

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

agricultural impacts as well. Since many floodplains are used for forage, the loss of these crops (e.g. alfalfa) may require farmers to supplement feed for livestock. Due to the low value of forage and high insurance costs, most farmers do not have multi-peril crop insurance for forage crops. The remaining forage in flooded areas can be lower in quality, reducing milk production and complicating or reducing pregnancies and births. Feed and water quality problems which result in sick animals also increase veterinary costs. Agricultural flooding impacts can also be long-term and more difficult to quantify. The harvesting of crops in wet areas can compact soils and the loss of top soil due to runoff can reduce crop yields for years to come. Excessive gullying can increase the potential for equipment rollover. Flooding can also cause the loss of livestock or cause livestock to be stranded.

While crop damage due to flooding is occasionally experienced in some areas, statistics regarding crop losses in the past or future vulnerability due to flooding is not readily available. These potential losses can vary depending on the type of crops planted, though it is common practice to often use such floodprone areas for hay, forestry, or pasture. And while prolonged flooded conditions are not common, periods of excessive soil wetness can delay spring planting and indirectly hinder yields by shortening the growing season. Standing water following heavy rains or prolonged wet periods is not limited to floodplains. Denitrification and oxygen depletion of crops can severely reduce yields or result in plant death after prolonged water logging.

Farming land use practices, including modifying natural drainage and surface water retention areas, have the potential to exacerbate flooding and stormwater runoff. Best management practices and good soil health (e.g., grassed waterways, buffer areas, cover crops, overland flow ponds, minimizing tillage) are important tools to encourage the water infiltration and help reduce flash flooding.

An additional agricultural flood-related threat is associated with non-point pollution, such as manure, nutrient, and pesticide run-off. Heavy rains, flooding, and unexpected snow melt can result in such run-off into surface waters, resulting in high levels of contaminants. Heavy rains and ice damming can also result in the failure of improperly maintained or sited manure storage facilities. And such non-point pollution can create health concerns for swimming and fishing, thus impacting tourism. Issues related to animal waste and nutrient management are primarily monitored and addressed by local farmers and Eau Claire County Land Conservation with partnership support of the Eau Claire County UW-Extension Office and other State and Federal agencies (e.g., DATCP, WDNR, NRCS). However, it is very important to note that many sources of non-point pollution are not agricultural related, such as urban stormwater, road and parking lot run-off, and soil erosion from new development.

Unique Jurisdictional Risks or Vulnerabilities—Flooding

The number and value of structures potentially within the high-hazard floodplain areas of each incorporated community were previously discussed (see Table 11). This sub-section summarizes the specific flooding issues and areas of concern unique to each of the cities and villages in the County as further summarized in the table and maps in **Appendices F & H**. For most of these

communities, overland stormwater flooding has been of more significant concern in recent years rather than overbank flooding.

The effective date of the current Flood Insurance Rate Maps (FIRMs) for NFIP-mapped communities in Eau Claire County was February 18, 2009. The portion of the City of Eau Claire in Chippewa County has an effective date of March 2, 2010. Except for Fairchild, all cities and villages, as well as Eau Claire County, have adopted the revised NFIP maps and are fully participating in the NFIP program in good standing. The Village of Fairchild has not adopted an updated floodplain ordinance that incorporates the latest NFIP maps and has had NFIP sanctioned status since 1975. The NFIP status and effective map dates of each community's initial Flood Hazard Boundary Map (FHBM) and initial FIRM are also noted.

Village of Fairchild *(NFIP sanctioned 5/31/75; FHBM 5/31/74; initial FIRM 2/18/09)*
The Village of Fairchild has a limited amount of 100-year floodplain and no structures identified as potentially being located in the 100-year floodplain. During the 1993 flooding, most of the damages in the Village were street washouts and at the dam structure. Many parts of the Village have a high groundwater table and ponding in streets and yards is not uncommon following heavy rains. Flash flooding, washouts, and over the road flooding along School House Creek has resulted in closures and damage along U.S. Highway 10 and Humbird Street on multiple occasions, most recently in 2015. During a 3+" rainfall or following a heavy snow melt, some basement flooding does occur. The community's sanctioned status means that residents and landowners are unable to purchase Federal flood insurance and the status may impact Fairchild's eligibility for certain flood-related Federal disaster assistance.

Village of Fall Creek *(NFIP participant; FHBM 5/24/74; initial FIRM 9/1/86)*
Historically, riverine flooding has not been a concern in the Village of Fall Creek. During the 1993 floods, flooding of structures in the Village is believed to be limited to the basement of one home. Heavy rains of eight or more inches in 2005, 2006, and 2015 brought some floodwater within 10-20 feet of one home with a walkout basement, but no structural flooding occurred. Past problem areas with overland flooding and poor stormwater drainage have been addressed. Some ice damming and stormwater has occurred near the school, but no significant damage to date.

City of Altoona *(NFIP participant; FHBM 01/09/74; initial FIRM 2/18/09)*
The City of Altoona has a number of structures potentially located within the 100-year floodplain along Lake Altoona and the Eau Claire River, though high banks along most of the shorelands protect most homes. Overbank flooding in these areas was a problem for some homes in 1993 and 2010 as discussed previously; similar flooding has occurred along Lake Altoona in 2016 and 2017. Stormwater improvements have remedied some past overland flooding problem areas, but some drainage, ponding, and basement flooding problems still exist.

City of Augusta *(NFIP participant; FHBM 5/10/74; initial FIRM 5/4/89)*
No serious flooding concerns were identified for the City of Augusta. A limited amount of floodplain development may be present, though City officials expressed a belief that the designated floodplains in the current FIRM map is not accurate and is actually much smaller in extent. The wastewater treatment plant is now located outside the floodplain, unlike the older

facility. The City experienced significant damage to over 60 homes and 21 businesses during the 1993 flash flooding; substantial stormwater management improvements have been completed in the interim. Additional stormwater systems and detention improvements continue to be made as development warrants, with past problem areas believed to be largely addressed.

City of Eau Claire *(NFIP & CRS participant; FHBM 9/20/74; initial FIRM 6/1/77)*
The *City of Eau Claire Comprehensive Plan* (2003) and the *City of Eau Claire Flood Emergency Action Plan* (2008) note several significant locations that are subject to 100-year floods and/or are the focus of flood fighting during an event by the City:

- First Avenue, Owen Park, and Westside Neighborhood. This area includes the historic bandshell which has been flooded in the past. Most structures within the floodplain have been removed in this area.
- University of Wisconsin-Eau Claire and Third Ward, and large portions of Putnam Park. As mentioned previously, the construction of a gate structure and public facility at the outlet of Little Niagara Creek has significant reduced the potential of floodwater backing up the creek.
- Several blocks along the east side of Forest Street and East Madison Street; houses west of Forest Street were previously acquired and cleared as part of a flood mitigation and parkland project.
- Portions of the Central Business District west of Graham Street. The major problems are basements of buildings along the Eau Claire River.
- Several blocks east of Second Avenue in the Courthouse District, W. Grand Avenue, and east of Luther Hospital; some of this land is public open space but it also contains a number of houses.
- Riverview Drive and property inland of Riverview Park, including the park and a residential neighborhood.

Additional flood assessment for the City of Eau Claire is provided in **Appendices G** and **H**. Past riverine (overbank) flooding problems have largely been mitigated and such flooding is now mostly limited to open space and park areas; some additional acquisition is being considered for floodprone areas of the Riverview Drive neighborhood. As reflected in Appendix H, the City has invested tremendous resources over the past 25-30 years in flood preparedness, mitigation, and management, which has significantly reduced current flood risk and vulnerabilities within the community.

A 100-year flood event would top Forest Street Levee, which is an aging structure that doesn't meet current Army Corps of Engineers design standards. FEMA certification of the levee improvements would be required if the intent is to demonstrate full protection and remove landward areas from the 100-year floodplain. The levee could be reconstructed without the FEMA certification requirement, as long as the technical requirements under NR 116.17 Wisconsin Administrative Code as well as the City's Floodplain Ordinance are met.

Eau Claire County Dams—Vulnerability to Dam Failure

As of August 2018, Eau Claire County had 29 existing dams or levees in the WDNR dam database summarized in **Appendix I**. Fifteen existing dams had 20 or fewer acres feet of maximum storage. Of the 29 dams in Eau Claire County, 18 are classified as small or were unclassified; 11 were classified as large. In nearly all cases, if the smaller dams failed, the runoff and impacts downstream would hardly be noticed.

As shown in Appendix I, Eau Claire County has eleven large dams or levees. Eight of these large dams are publically owned—3 County, 3 City of Eau Claire, and one each for Augusta, Fairchild, and Fall Creek. All large dams on navigable waters are required to have an Emergency Action Plan (EAP) and an Inspection, Operation, and Maintenance (IOM) Plan, along with a dam failure analysis which shows the hydraulic shadow and structures subject to potential flooding should a failure occurs. The EAP should be brief, with a focus on contact information, actions, and alerts (e.g., needed evacuations, road closings). The geographic scope of the analysis should extend downstream until the dam failure shadow converges with the 100-year floodplain. These analyses are used to determine the hazard rating. Floodplain zoning controls can then be put into place for the dam shadow. For dams without an analysis, an estimated hazard rating is given by the WDNR Dam Safety Engineer based on development and zoning controls downstream of the dam.

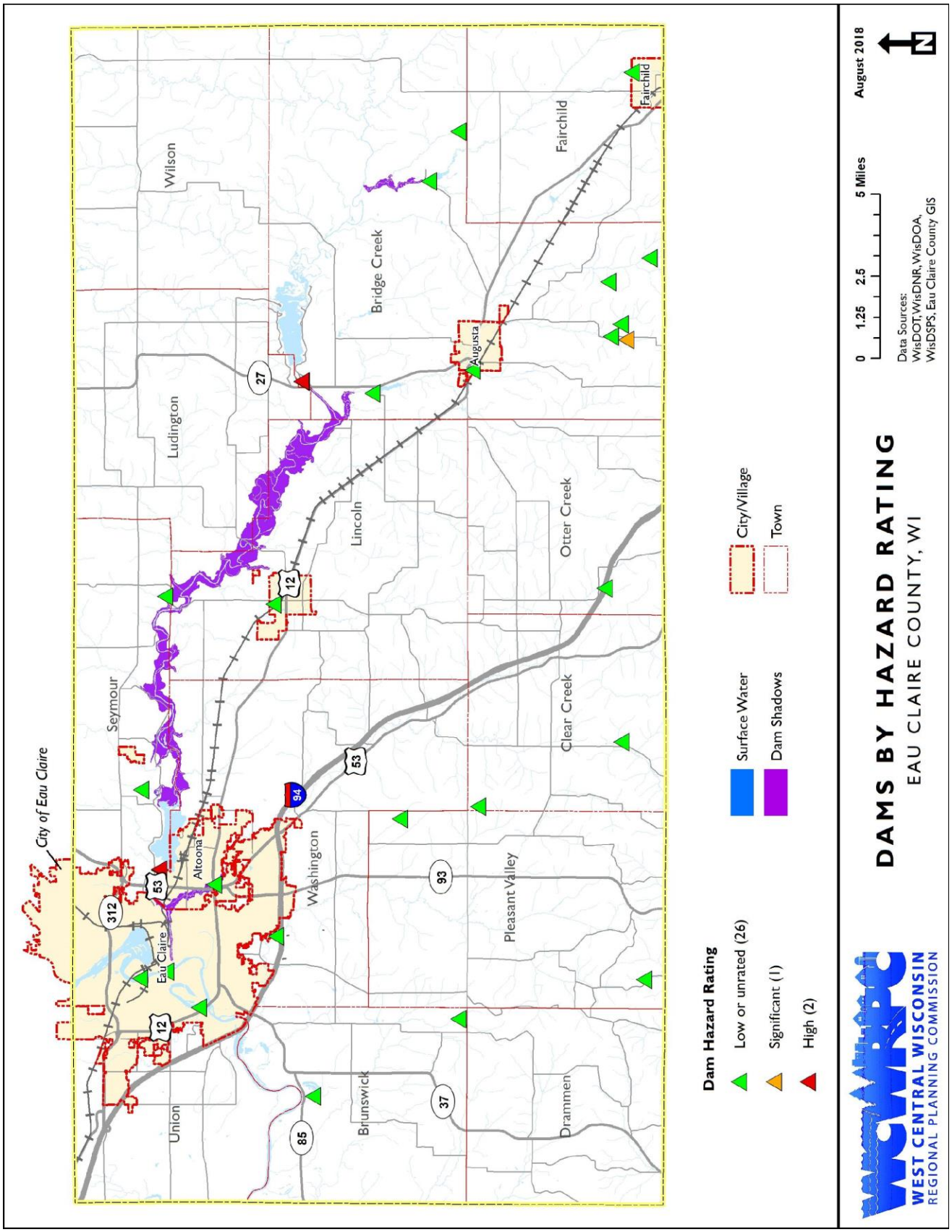
The dams of Eau Claire County are shown in **Figure 21**, along with their Wisconsin Department of Natural Resources hazard ratings and the dam shadows for County-owned dams. Dam hazard ratings are assigned by the Wisconsin Department of Natural Resources based on the potential for loss of life or property damage should the dam fail.

The dam hazard ratings are defined by FEMA as follows:

Low Hazard Dams assigned the low hazard potential classification are those where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property. Large low-hazard dams are inspected every ten years by the Wisconsin DNR Dam Safety Engineer, and the spillway must be sized to accommodate a 100-year event.

Significant Hazard Dams assigned the significant-hazard potential classification are those dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant-hazard dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure. Large significant-hazard dams must be inspected every five years (5th year private engineer; 10th year WDNR Dam Safety Engineer), and the spillway must be sized to accommodate a 500-year event.

Figure 21. Eau Claire County Dams by Hazard Rating



High Hazard Dams assigned the high-hazard potential classification are those where failure or mis-operation will probably cause loss of human life. Large high-hazard dams must be inspected every two years (2nd, 4th, 6th, 8th years private engineer; 10th year WDNR Dam Safety Engineer), and the spillway must be sized to accommodate a 1,000-year event.

High-Hazard Dams (2)

The high-hazard dams represent the only high potential loss facilities within Eau Claire County. Two dams in Eau Claire County have been given HIGH hazard ratings:

1) *Altoona Dam (owned by Eau Claire County)*
   The Altoona Dam is owned, maintained, and monitored by Eau Claire County. The dam was improved about 18 years ago to a 1,000-year even standard, and could theoretically be topped and not fail. An online/Wi-Fi water-height gauge system is monitored by an Eau Claire County Park Ranger/Dam Tender. There is very little floodplain development downstream of the Altoona Dam within the City of Eau Claire until near the confluence with the Chippewa River. The dam failure inundation area for the Altoona Dam does not extend into the City of Eau Claire. The dam is in good repair. However, the gates for this dam cannot be remotely operated and the walkway to the winch system can be dangerous under flood or winter/icy conditions.

2) *Lake Eau Claire Dam (owned by Eau Claire County)*
   This dam was also improved to a 1,000-year event standard in about 2000 with improved anchoring using steel roads and raised walkways. Previously, the dam was almost lost in the 1993 flooding when water levels were within 4”-5” of the walkway. A fixed generator is available for both the Altoona and Lake Eau Claire Dam should power be lost. A camera system has now been installed at the dam which takes pictures of water levels and sends them to the homes of the dam tenders via e-mail whenever required; an online/Wi-Fi water height gauge is also monitored. The dam is in good repair. The dam gates have experienced some freezing in the past, which has required the use of torches or Fire Dept. hose truck in the past to defrost; potential options to prevent freezing, such as a bubbler system, has been preliminarily discussed.

Significant-Hazard Dams (1)

One additional dam was given a SIGNIFICANT hazard rating by the WDNR:

1) *Behm Dam (privately owned)*
   This dam is located on a non-navigable tributary of Diamond Valley Creek. The County easement was transferred to private ownership in the past and a repair was completed several years ago to strengthen a failed area of the structure. This dam may be removed in the future.

Since the 2012 hazard mitigation plan, the Vogler Flour Mill Dam owned by the Village of Fall Creek was downgraded from an estimated high-hazard rating to a low rating. The Diamond Valley/Johnson Dam was also downgraded from a significant-hazard rating to a low rating due to major repairs to this dam by the City of Augusta.

Lake Wissota Dam (Xcel Energy)

The greatest dam failure vulnerabilities for Eau Claire County would be from a failure of the Lake Wissota Dam further upstream on the Chippewa River in Chippewa County. With 92,000 acre-feet of normal storage and 155,000 acre-feet of maximum storage, the Wissota Dam is much larger than the Altoona Dam and has much more potential to cause destruction.

The Lake Wissota Dam is one of four electric-generating dams (Holcombe, Cornell, Jim Falls, Wissota) on the Chippewa River owned by Xcel Energy. These dams were constructed during the 20th Century. The Lake Wissota Dam, which was originally a hollow "Amberson" design, was filled with concrete around 1991. The Jim Falls Dam was refurbished and expanded in the late 1990s. All four dams are in good repair, with current emergency action plans and dam shadow studies on file with county emergency management offices.

These four dams are managed primarily for electric generation. This is not a new policy and was noted by the U.S. Army Corps of Engineers in the 1970 Upper Mississippi River Comprehensive Basin Study:

> "*Some change in operation of the larger upstream power reservoirs by power companies to recognize flood control needs is another possible solution [to preventing flood damage]*."

Chippewa County has expressed in the past a desire to see improved flood control at the Wissota Dam through the installation of a system to allow for a mechanical opening of the flood gates. This is consistent with the 1970 report as well as concerns noted in a 1977 U.S. Army Corps of Engineer study:

> *"Frequently mentioned problems relating to flooding in the area include the influence of flood stages caused by the present method of regulation of the upstream Lake Wissota Dam....The method of operation currently used at the Lake Wissota Dam involves automatic opening of all tainter gates when a certain reservoir pool elevation is reached."*[15]

All four of these dams are regulated by the Federal Energy Regulatory Commission (FERC) under the Federal Power Act, which is the primary agency responsible for issuing new licenses, monitoring compliance with existing licenses, and conducting dam safety inspections. In 1986,

[15] U.S. Army Corp of Engineers, Preliminary Feasibility Report Improvement for Water & Related Land Resources—Chippewa River Basin, Wisconsin, March 1977.

Congress passed the Electric Consumers Protection Act (ECPA) requiring that the FERC consider power and non-power values and interest equally, including flood management.

Xcel Energy is currently updating the hydraulic dam shadow/inundation area maps which will provide a better understanding of the expected flood depths and potential extent of the inundation area. In the past, these dam shadow maps were not available in digital form and no vulnerability analysis has been completed to date. However, consider the following timelines for a failure at the Wissota Dam:

10 minutes	Flooding would begin in Chippewa Falls
1 hour 15 min	Flooding would begin at north end of Eau Claire Co on Chippewa R.
1 hour 20 min	Flooding would peak in Chippewa Falls
1 hour 35 min	Flooding would begin in the City of Eau Claire
3 hours	Projected time needed to fully evacuate Eau Claire's inundation area[16]
6 hours 35 min	Flooding would peak at north end of Eau Claire Co on Chippewa R.
8 hours 35 min	Flooding would peak in downtown Eau Claire

While there would be substantial time to evacuate before the flooding peaks, it is likely that not all residents would be evacuated before flooding would begin in the City. Regardless, significant flood damage is expected.

Other Dam Concerns or Notes

Badly needed repairs at Augusta Dells Mill Pond dam were recently completed in Spring 2018. As discussed previously, improvements are also needed at the Forest Street Levee in the City of Eau Claire.

Should a dam failure occur (or be imminent), law enforcement and fire department personnel would use public address systems and some door-to-door checks to evacuate persons. Local media and County cable television interrupt would also be used to reach out to residents, in addition to the County's new autodialer and RAVE systems. As part of its recent FERC re-licensing, Xcel Energy recently installed nine warning sirens on the lower Chippewa River with voice capability, including one on the north end of the City of Eau Claire. Residents with weather radios would also be informed of the situation as asked to evacuate.

It is important to keep the EAP Plans and IOM Plans up to date for the large dams and the high- and significant-hazard dams. Emergency Action Plans with current contact information should be on file with County Emergency Management and Dispatch. Should addition topographical/ elevation data become available, existing dam shadow maps should be reviewed and dam shadow areas delineated for large dams. This information can then be integrated into a Reverse 9-1-1 system to more effectively inform municipalities, land owners, and residents of conditions. The EAPs for the Lake Altoona and Lake Eau Claire dams were updated in 2016 and the County is working on the EAP for the Coon Fork Dam.

[16] In 2010, City emergency personnel estimated evacuation would require three hours.

Overall, **the potential of damage-producing dam failure in Eau Claire County is considered very low**, though the potential for damage and injury is high should failure of a larger dam occur. Eau Claire County and its municipalities continue to work with the Wisconsin Department of Natural Resources to ensure proper maintenance of the dam facilities in the County and mitigate the potential vulnerabilities should failure occur.

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

Public Health Hazard Vulnerability Assessment

The 2017 Northwest Wisconsin Health Care Coalition Public Health HVA rates ice storms as a 68% risk over a ten-year period given their high probability (3), moderate vulnerability (2.2), and moderate available emergency management capabilities to deal with this threat (2.0 internal, 2.0 external). Extreme cold and blizzards had lower risks at 53% and 45% respectively, with more substantial capabilities (1.5) to manage extreme cold events and blizzards having a moderate probability (2). The assessment used a scale of 1 to 3, with "1" being low probability/impact or having substantial management capabilities and "3" being high probability/impact or having limited/no management capabilities.

Risk Assessment—Winter-Related Events

The Hazard

Winter-related events can vary in size and strength and include heavy snowstorms, blizzards, freezing rain, sleet, ice storms, and blowing and drifting snow conditions. A variety of weather phenomena and conditions can occur during winter storms. The following are National Weather Service-approved descriptions of winter storm elements:

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

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

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

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

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

The above winter storm events may be accompanied by extreme cold. Dangerously cold conditions can be the result of extremely cold temperatures or the combination of cold temperatures and high winds. The combination of cold temperature and wind creates a perceived temperature known as "wind chill." Wind chill is the apparent temperature that describes the combined effect of wind and air temperatures on exposed skin. When wind blows across the skin, it removes the insulating layer of warm air adjacent to the skin. When all factors are equal, the faster the wind blows, the greater the heat loss. As winds increase, heat is carried away from

the body at a faster rate, driving down both the skin temperature and, eventually, the internal body temperature. Shown in **Table 12** are the calculated wind chill temperatures as a result of specified air temperatures and wind speed.

Table 12. Wind Chill Table (Wind Chill Values in Degrees Fahrenheit)

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

Source: National Weather Service

Regional Trends

Most winter storm events are typically regional in nature and are not limited to a localized area or single community. However, levels of snowfall or ice accumulations can vary significantly over relatively short distances. Much of the snowfall in Wisconsin occurs in small amounts of between one and three inches per occurrence. Heavy snowfalls that produce at least eight to ten inches of accumulation occur on average only five times per season. True blizzards are rare in Wisconsin. They are more likely to occur in northwestern Wisconsin than in southern portions of the State, even though heavy snowfalls are more frequent in the southeast. However, blizzard-like conditions can exist during heavy snowstorms when gusty winds cause the severe blowing and drifting of snow.

The following are some of the winter storm record-breaking events for Wisconsin:

Record	Location	County	Date	Magnitude
24-hour snow accumulation	Neillsville	Clark	December 27-28, 1904	26 inches
Seasonal snow accumulation	Hurley	Iron	Winter 1996-97	25.2 feet
Snowless streak	Milwaukee	Milwaukee	March 4-December 18, 2012	288 days
Coldest temperature	Couderay	Sawyer	February 4, 1996	-55° F

Both ice and sleet storms can occur at any time throughout the winter season from October into April. Early- and late-season ice and sleet storms are generally restricted to northern Wisconsin.

Otherwise, the majority of these ice storms during the winter months occur in southern Wisconsin. In a typical winter season, there are 3 to 5 freezing rain events; and a major ice storm occurs on a frequency of about once every other year. If a half-inch of rain freezes on trees and utility wires, extensive damage can occur, especially if accompanied by high winds that compound the effects of the added weight of the ice. There are also between three to five instances of glazing (less than 1/4 inch of ice) throughout the State during a normal winter.

Local Events

Since 1970, the average annual snowfall for Eau Claire County has been 45 to 55 inches, almost half of which occurred during the months of December and January. According to the National Weather Service, the worst snow storms in the State of Wisconsin from 1881 to present that potentially included Eau Claire County are:

- **March 2-4, 1881** - Southern / Central - Blizzard - 2 to 4 feet of snow. Drifts to 20 feet. Milwaukee reported 28.5 inches.
- **January 15, 1887** - Southern / Central - Snowstorm - 2 feet of snow. Huge drifts.
- **December 27-28, 1904** - Southern / Central - Heavy snow/ice. 26 inches of snow at Neillsville (Clark County).
- **January 30-February 1, 1915** - Southern / Central - Heavy snow / ice – severe glazing. 10 inches of snow in Milwaukee.
- **February 12-14, 1923** - Statewide - Blizzard - Heavy snow - severe drifting.
- **February 8-10, 1936** - Statewide - Blizzard - severe drifting.
- **November 6-8, 1943** - Statewide - Heavy snow/ice - 10 to 18 inches of snow. Roads blocked for several days.
- **January 28-30, 1947** - Southern / Central - Blizzard - 10 to 27 inches. Drifts to 15 feet. Roads blocked.
- **January 22-23, 1982** - North half - Blizzard - 10 to 20 inches. Superior had 19 inches.
- **November 30 - December 2, 1985** - Statewide (except southeast corner) - Widespread snows of 10 to 18 inches. Madison had about 10 inches.
- **October 31 - November 2, 1991** - Northwest / West Central - Blizzard - "Halloween Storm" - 15 to 30 inches, 6 to 10 foot drifts. 30 inches in Burnett, Douglas, Polk, and St. Croix counties.
- **January 26-27, 1996** - Statewide - Heavy snow - 6 to 18 inches. Localized amounts of 16 to 18 inches fell along a line from La Crosse to Green Bay. In Eau Claire County, over 11 inches of snow fell within a 24-hour period.
- **March 13-14, 1997** - West Central / Northeast - Snowstorm - 12 to 28 inches. 28 inches at Wautoma in Waushara County.

Did You Know?

The State of Wisconsin 24-hour snowfall record of 26 inches was set in Neillsville in December 1904.

- **January 21-22, 2005** - Statewide - Blizzard (gusts to 50 mph) - 6 to 15 inches. Although winds gusted up to 50 mph in some areas and visibilities were reduced to less than 1/4 mile due to falling or blowing snow, many areas didn't experience these conditions for 3 hours or more to classify as a full blizzard. Nonetheless, heavy snow and very windy conditions created near white-out conditions especially in the south and east. The heaviest totals occurred near Lake Michigan due to additional lake effect, where some areas ended up near 15 inches.
- **March 18-19, 2005** – West-central – Winter Storm – 18 to 23 inches in a swath from southern Buffalo County to western Jackson County, with 12 to 15.6 inches in La Crosse County. The maximum of 23 inches occurred in northwestern Jackson County.
- **March 13-14, 2006** – West-central to North-central– Winter Storm – 17 to 32 inch swath from St. Croix County northeast to Iron County. Thundersnow enhanced the accumulations. Very poor visibility resulted from gusty winds around 30 mph and drifting resulted in hundreds of accidents. Locals said it was the worst storm since the 1980s.
- **February 23-26, 2007** – West-central (through southern and eastern Wisconsin) – Blizzard - Two-round storm, with one overnight the 23rd to 24th, and the second round overnight the 24th into the 25th. Leftover snow accumulations continued overnight the 25th into the 26th. In counties surrounding La Crosse, 8 to 15.6 inches (Galesville) fell in round one, while round two produced 6 to 12.5 inches (Sullivan NWS office) over the southern three-fourths of the State. The leftover snow added another 1 to 4 inches, except for 6 to 14 inches from New London into Door County. Many locations totaled 20 to 25 inches for this long-duration two-punch episode from around La Crosse to Port Washington and a small part of Door County. Gusty winds generated snow drifts up to 5 to 7 feet in height.
- **December 8-9, 2009** – Nearly statewide – Winter Storm – Large area of 12 inches or more.
- **December 10-12, 2010** – Nearly statewide – Winter Storm/Blizzard – Large area of 6 to 23 inches. **In the Eau Claire area 18 to 22 inches fell.** There were reports of thundersnow. Northwest to north winds gusted 30 to 50 mph with some whiteouts reported in exposed areas. Clean-up costs for the City of Eau Claire were between $350,000 to $400,000. At least 59 vehicle crashes and 98 stalled vehicles were reported during and following the storm. In the City of Eau Claire, a number of carbon monoxide poisonings occurred, which could have been fatal when heating vents were blocked by accumulating snow. The weight of the snow collapsed the Metrodome's roof in Minneapolis.

- **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 two-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. Snowfall amounts in Eau Claire County ranged from 7 to 10 inches, which broke records. 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. 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 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. As reflected in Appendix F, the cities and villages of Eau Claire County did not experience the extensive damage and service disruptions from water utility freeze-ups than many of their neighboring communities in Clark and Barron counties.

The December 2010 event listed above represents the heaviest Eau Claire area snowfall in recent history. With 22 inches falling within 24 hours, this event broke the previous 24-hour record of 18.0 inches which fell on February 27, 1893. Snow fell at rates of 1-to-2 inches per hour and some drifted of up to five feet were reported. In all, 30 inches of snowfall was reported for Eau Claire for the month of December 2010. Surprisingly, this event did not receive a Presidential Disaster Declaration, though the costs to area communities were tremendous.

Shown in **Table 13** is a listing of winter storm and extreme cold events that have been recorded by the National Climatic Data Center for Eau Claire County since 1993. Prior to 1993, winter storm data for Eau Claire County was not available through the National Climatic Data Center.

Table 13. Eau Claire County Winter-Related Events – 1993 through 2017

Location	Date	Time	Type	Deaths	Injuries	Property Damage
Winter Storm Events						
Statewide	1/13/1993	12:00 AM	Heavy Snow	0	0	0
Regional	11/25/1993	1:00 AM	Heavy Snow	0	0	0
Regional	1/5/1994	12:00 PM	Heavy Snow	0	0	0
Regional	1/16/1994	4:00 AM	Heavy Snow	0	0	0
Regional	1/26/1994	8:00 PM	Heavy Snow/ice Storm	0	0	0
Regional	11/27/1994	9:00 AM	Heavy Snow	0	0	0
Regional	3/6/1995	12:00 AM	Heavy Snow	0	0	0
Regional	3/6/1995	10:00 AM	Heavy Snow	0	0	0
Regional	3/27/1995	3:00 AM	Heavy Snow	0	0	0
Regional	11/26/1995	8:00 PM	Heavy Snow	0	0	0
Regional	12/6/1995	8:00 PM	Heavy Snow	0	0	0
Regional	12/13/1995	6:00 AM	Glaze	0	0	0
Eau Claire County	1/17/1996	9:00 PM	Ice Storm	0	0	0
Eau Claire County	1/18/1996	5:00 AM	Heavy Snow	0	0	0
Eau Claire County	1/26/1996	2:00 PM	Blizzard	1	0	0
Eau Claire County	1/29/1996	5:00 AM	Blizzard	0	0	0
Eau Claire County	2/8/1996	12:00 AM	Freezing Rain	0	0	0
Eau Claire County	3/24/1996	1:00 AM	Heavy Snow	0	0	0
Eau Claire County	11/15/1996	1:00 AM	Ice Storm	0	0	0
Eau Claire County	11/20/1996	6:00 AM	Heavy Snow	0	0	0
Eau Claire County	11/23/1996	12:00 AM	Heavy Snow	0	0	0
Eau Claire County	12/23/1996	9:00 AM	Heavy Snow	0	0	0
Eau Claire County	2/4/1997	11:00 AM	Heavy Snow	0	0	0
Eau Claire County	3/13/1997	1:00 AM	Winter Storm	0	0	0
Eau Claire County	1/4/1998	5:00 PM	Ice Storm	0	0	0
Eau Claire County	3/8/1999	8:00 AM	Winter Storm	0	0	0
Eau Claire County	1/12/2000	10:00 AM	Heavy Snow	0	0	0
Eau Claire County	1/29/2001	7:00 PM	Winter Storm	0	0	0
Eau Claire County	2/7/2001	7:00 AM	Heavy Snow	0	0	0
Eau Claire County	3/12/2001	12:00 AM	Heavy Snow	0	0	0
Eau Claire County	1/31/2002	12:00 PM	Winter Storm	0	0	0
Eau Claire County	2/1/2002	12:00 AM	Winter Storm	0	0	0
Eau Claire County	3/8/2002	6:00 PM	Winter Storm	0	0	0
Eau Claire County	3/14/2002	8:00 AM	Winter Storm	0	0	0
Eau Claire County	1/26/2004	12:00 AM	Winter Storm	0	0	0
Eau Claire County	2/1/2004	2:00 AM	Winter Storm	0	0	0
Eau Claire County	3/5/2004	12:00 AM	Winter Storm	0	0	0

Eau Claire County	1/1/2005	2:00 PM	Winter Storm	0	0	0
Eau Claire County	1/21/2005	2:00 PM	Winter Storm	0	0	0
Eau Claire County	2/19/2005	9:00 PM	Winter Storm	0	0	0
Eau Claire County	3/18/2005	6:00 AM	Winter Storm	0	0	0
Eau Claire County	2/16/2006	7:00 AM	Winter Storm	0	0	0
Eau Claire County	11/10/2006	1:00 AM	Heavy Snow	0	0	0
Eau Claire County	1/14/2007	5:00 PM	Heavy Snow	0	0	0
Eau Claire County	2/23/2007	3:00 PM	Winter Storm	0	0	0
Eau Claire County	3/1/2007	12:00 AM	Winter Storm	0	0	0
Eau Claire County	12/1/2007	10:00 AM	Winter Storm	0	0	0
Eau Claire County	12/22/2007	12:30 PM	Winter Storm	0	0	0
Eau Claire County	10/12/2009	6:00 AM	Winter Storm	0	0	0
Eau Claire County	12/8/2009	11:00 AM	Winter Storm	0	0	0
Eau Claire County	12/10/2010	11:00 PM	Winter Storm	0	0	500,000
Eau Claire County	2/20/2011	11:00 AM	Winter Storm	0	0	0
Eau Claire County	3/22/2011	6:00 PM	Winter Storm	0	0	3,000,000
Eau Claire County	12/9/2012	4:00 AM	Winter Storm	0	0	0
Eau Claire County	12/19/2012	11:00 AM	Winter Storm	0	0	0
Eau Claire County	3/10/2013	6:00 AM	Winter Storm	0	0	0
Eau Claire County	4/10/2013	3:00 AM	Winter Storm	0	0	0
Eau Claire County	5/2/2013	6:00 AM	Winter Storm	0	0	0
Eau Claire County	1/14/2014	6:00 PM	Winter Storm	0	0	0
Eau Claire County	1/30/2014	6:00 AM	Winter Storm	0	0	0
Eau Claire County	2/20/2014	4:00 AM	Winter Storm	0	0	50,000
Eau Claire County	11/10/2014	4:00 AM	Winter Storm	0	0	0
Eau Claire County	2/2/2016	11:00 AM	Winter Storm	0	0	0
Eau Claire County	3/23/2016	12:30 PM	Winter Storm	0	0	0
Eau Claire County	12/16/2016	5:00 PM	Winter Storm	0	0	0
Eau Claire County	2/23/2017	11:00 PM	Winter Storm	0	0	0
			66 events	**1**	**0**	***3,550,000***
Extreme Cold Events						
Statewide	1/13/1994	6:00 AM	Cold	0	0	0
Regional	2/10/1995	9:00 PM	Cold	0	0	0
Regional	1/31/1996	5:00 AM	Extreme Cold	0	0	0
Regional	2/1/1996	12:00 AM	Extreme Cold	1	0	0
Regional	1/15/1997	5:00 PM	Extreme Wind Chill	0	0	0
Regional	2/10/2008	2:00 AM	Cold/Wind Chill	0	0	0
Regional	2/19/2008	10:00 PM	Cold/wind Chill	0	0	0
Regional	1/15/2009	12:00 AM	Cold/Wind Chill	0	0	0
Countywide	1/5/2014	10:00 PM	Ext. Cold/Wind Chill	0	0	0
Countywide	1/27/2014	4:00 AM	Ext. Cold/Wind Chill	0	0	0
Countywide	1/17/2016	6:00 AM	Ext. Cold/Wind Chill	0	0	0
			11 events	**1**	**0**	***0***

source: National Climatic Data Center (NCDC)

Since 1993, Eau Claire County has experienced 2.8 winter storm events and 0.5 extreme cold events per year. All events reported were regional or statewide in nature, also affecting areas outside Eau Claire County. These winter-storm events were further characterized by:

- 2 blizzards (both in 1996)
- 21 heavy snowfall events
- 21 winter storms (*mix of snow, ice, wind*)
- 3 ice storms
- 1 heavy snow/ice storm
- 2 freezing rain or glaze events.

Except for two winter storms in 2013, all of the events occurred in the months of November through March. The two deaths associated with the above events are:

- January 1996 – An Elk Mound resident died of exposure after her car had become stranded during blizzard conditions.
- February 1996 – An Eau Claire County woman died of exposure after accidently locking herself in her garage.

However, based on County Highway Department winter storm reporting to the Wisconsin Department of Transportation, salt, sand, and other de-icing and anti-icing agents are required much more frequently. For example, during the Winter 2016-2017 winter season, Eau Claire County reported 58.1 inches of snow from 22 snow, sleet, and freezing rain storms that cost the County Highway Department $1,654,632 in material, equipment, and labor for State & Federal highways. And Winter 2016-2017 was less severe compared to the previous five-year average.

Drifting of snow on many of the roads of Eau Claire County is common during winters when snow and high winds are present, though this has been less of a problem in recent years due to weather patterns and improved equipment. The snow drifting "hotspots" identified during the planning process were primarily focused in the south-central part of the County, including:

- County Highways "K" and "KK" (Towns of Clear Creek, Otter Creek, and Lincoln), with some recent improvements along "KK"
- County Highway "HH" from Ristau Road to "K" (Town of Otter Creek)
- Barka Road (Town of Otter Creek)
- County Highway "V" between "D" and Raven Drive (Town of Clear Creek)
- County Highway "T" from the North Crossing north to the county line.

Most of the above would only be closed for a partial day four to five times during a ten-year period. **The most frequently winter-related concern mentioned during meetings and interviews was winter travel on the U.S. Highway 53 bypass, Interstate 94, and the North Crossing due to the speeds and traffic volumes involved.** The multiple on-/off-ramps, bridge crossings, and speeds on U.S. Highway 53 in Eau Claire and Altoona can be especially dangerous under poor driving conditions and has resulted in numerous serious accidents. The

hills northwest of Fall Creek on U.S. Highway 12 can also be particularly dangerous under icy or slippery conditions. Overall, 144 vehicle crashes occurred in Eau Claire County during Winter 2016-2017, which is substantially more than any other county in northwest Wisconsin. The crash rate per 100 million vehicle miles of 29 was substantially higher than the Statewide average of 18, but much less than St. Croix County (70), which was the highest rate in Wisconsin.

Relative Level of Risk

The plan update Steering Committee ranked heavy snow storms and ice storms as one of the highest hazard threats facing Eau Claire County overall in terms of combined risk and vulnerability. Extreme cold was ranked lower in both risk and vulnerability.

The reoccurrence of winter storm events for Eau Claire County is expected to be consistent with recent trends, with 2.5 to 3.0 severe winter storm events, on average, occurring each year, with an extreme cold event occurring every other year. Snowy, slushy, or icy conditions on roadways from less severe events would be much more frequent, such as the 22 events reported in Winter 2016-2017. Should Wisconsin's climate change as will be discussed in Section III.C., Eau Claire 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.

Vulnerability Assessment—Winter-Related Events

Winter storms have no defined hazard area within Eau Claire County, and as the data previously showed, these storms tend to be regional in nature. Due to the lack of specific hazard areas and the rarity of serious blizzards and major ice storms, the assessment of community impacts as a result of winter storms is difficult to quantify.

Winter storms pose a serious health and safety threat to area residents and can result in significant damage to property and infrastructure. Heavy snow or accumulated ice can: cause the structural collapse of buildings; down power lines, severely affecting electrical power distribution; cause accidents (e.g., traffic crashes, slipping/falling); and restrict mobility of emergency assistance or access to services. Most structures in Eau Claire were built to standards that considered snow loads and needed insulation, so this aspect was deemed a relatively low concern. During the December 2010 snow storm, some furnace exhaust vents on private homes around the City were blocked by accumulating snow which did result in some illnesses and had the potential to be deadly. These events are often accompanied by cold temperatures, which can be deadly as the circumstances surrounding the 1996 event demonstrate.

Accidents and Exposure

It does not require a disaster to experience traffic-related or exposure injuries during the winter months. The previous pages discuss the history of winter-related vehicle accidents in Eau Claire County and locations of higher accident risk. 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. County and local road crews are continuing to explore the latest winter road maintenance techniques for effectiveness and efficiency. The County Highway Department will install snow fencing, if allowed, along areas of highway that are prone to drifting.

Prolonged exposure to the cold can cause frostbite or hypothermia and become life threatening. When exposed to cold temperatures or low wind chills, one's body begins to lose heat faster than it can be produced. The result is hypothermia or abnormally low body temperature. A body temperature that is too low can affect the brain, making the victim unable to think clearly or move well. This makes hypothermia particularly dangerous because a person may not know it is happening and won't be able to do anything about it. Hypothermia occurs most commonly at very cold temperatures, but can occur even at cool temperatures (above 40°F) if a person becomes chilled from rain, sweat, or submersion in cold water. Victims of hypothermia are most often elderly people with inadequate food, clothing, or heating; babies sleeping in cold bedrooms; children left unattended; adults under the influence of alcohol; mentally ill individuals; and people who remain outdoors for long periods such as the homeless, hikers, hunters, etc.

Frostbite is an injury to the body that is caused by freezing. Frostbite causes a loss of feeling and color in affected areas. It most often affects the nose, ears, cheeks, chin, fingers, or toes. Frostbite can permanently damage the body, and severe cases can lead to amputation.

Long-Term Power Loss

Of great concern is the long-term loss of power due to ice storms, winds, and/or heavy snows, especially during extremely cold temperatures. Long-term power loss poses one of the greatest hazard vulnerabilities facing Eau Claire County and the region. This threat is discussed within the special analysis on long-term power outages in Section III.B.v.

During a period of power loss and extreme cold, warming shelters could be activated. No such shelters have been activated in the past and the County does not maintain a list of such shelters. Having shelter space available for Interstate 94 and Highway 53 travelers during a severe winter storm was also identified as a concern, in particular for the Foster area, which has limited options. Some communities may look to the Red Cross to provide such shelters, though some shelters may not have emergency power generators.

Winter Kill and Frost Impacts on Agricultural Crops

Overall, Eau Claire County farmers are aware of the winter-related agricultural risks and most use best management practices to mitigate these risks. Winter crops are vulnerable to winter kill during periods of extreme cold without sufficient snow on the ground to help act as an insulator. Four inches of snow cover will allow up to a 20ºF difference in temperature between the soil and

air, and will prevent the premature breaking of dormancy during temporary warm spells. 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. Late-spring frosts can also damage crops, especially fruit trees.

from Wisconsin State Journal, Sept. 10,

Frosted Farmers Seek Federal Aid

By ROBERT C. BJORKLUND
State Journal Farm Editor

Farmers by the hundreds were turning to government disaster programs Monday for help after a costly frost emergency in western and northern Wisconsin.

The state's weekly crop summary was dominated by the tragic reports from nearly half of the state's counties that substantiate earlier farm loss estimates of corn and soybeans of more than $100 million.

THE WISCONSIN Farmers Home Administration (FHA) office at Stevens Point has started receiving applications for special aid programs and Henry Zech, farmer program specialist, said that the drought, followed by the unusually early frost, "will be a tremendous economic loss to Wisconsin."

Wayne Danielson, Cadott, a dairyman and also a member of the State Board of Agriculture, said that agricultural officials in Chippewa County now estimate that only 10 per cent of the thousands of acres of corn planted for grain will yield mature corn.

In the words of a Jackson County farmer, "the roof fell in on us as hard frost took care of both corn and soybeans and most everything else."

THE POLK County estimate is that more than 80 per cent of the corn and soybean crops were ruined.

Richard Webb, executive director of the Chippewa County Agricultural Stabilization and Conservation (ASC) office, said that as many as 1,600 of the county's 1,900 farms with a corn allocation will seek aid under the government's new "disaster payments" program.

The county boards in most of the frost-stricken counties are expected to have their counties designated as eligible for the emergency loan program, and thus eligible for 5 per cent interest loans.

TO BECOME eligible, the farmer must establish that he had a 10 per cent loss of his corn crop.

Webb said that up to 150 farmers a day are applying for disaster eligibility in Chippewa County.

"We're in rough shape up here and we've applied for the 5 per cent disaster loans and the emergency livestock feeding program," he said.

A Clark County farmer said that in his area there were five straight nights of frost.

To the south and east of the frost line, the corn looks good, but Marvin Heiser, crop reporting specialist, said that it needs about three weeks of favorable weather to mature for grain.

"ONLY 20 per cent of the corn intended for grain in Wisconsin has begun to dent, compared with 55 per cent last year and 50 per cent in the past 10 years," Heiser said.

Soil moisture is 50 per cent short in the state and 50 per cent adequate. The west and north central areas are the driest and the southwest, with the best corn in the United States, is in the best shape for moisture.

Bernard Chapman, of the Bloomington area in Grant County, said that much of his corn is dented and a frost won't hurt too much. However, the ears are not all filled out on the ends, indicating some pollination problems.

The big worry for many southwest Wisconsin farmers is root damage. There is a row or two in the fields where the corn is down either because the heavy rains after planting leached out the chemical protection or it was lost by erosion.

Alfalfa is especially vulnerable to winter kill, compared to other forage types. In 2002-2003, winter kill combined with drought during Summer 2004 to reduce feed for cattle and create significant hardships for some Eau Claire County producers. At about $1,500 of additional feed per mature cow for a year and with 31,600 head of cattle in the County, feed replacement costs can accumulate quickly. And since alfalfa is a relatively low-value crop, it is typically uninsured. These additional costs can result in less of revenue to the individual producer and can be added costs to manufacturers (e.g., dairies, grocery stores, food processing) and consumers. Late fall alfalfa or hay cuttings can further contribute to winter kill since time is not allowed for adequate re-growth of ground cover, which provides an additional insulating blanket. Periods of freezing and thawing in the spring can also contribute to frost heaving within certain types of soils, leading to additional crop damage.

While less frequent, early frosts can also severely impact agricultural crops. The most significant early frost in recent history transpired in September 1974. This severe frost event occurred on multiple nights, included much of northern and western Wisconsin, and stretched as far south as Kansas. Some counties in the region lost more than 80 percent of the soybean and corn crops. Combined with the impacts of a summer drought, the soybean and corn losses were near 100 percent in nearby Dunn, Chippewa, and Eau Claire counties. In today's dollars, the

total statewide crop losses as a result of the September frost were estimated at more than $520 million. And late frosts can also be a concern for different crops. In 2010, a late frost and snow in mid-May hit western Wisconsin while apple trees were blossoming. Production at some orchards in the region decreased by thirty to fifty percent. Cherry, grape, and strawberry crops were also impacted.

Summary of Potential Vulnerabilities

The following general types of facilities and community assets were determined to be most vulnerable to winter storm events:

- Residents and travelers
- Above-ground power lines, especially in wooded areas
- Vulnerable populations, such as homeless and elderly (especially during extreme cold)

Although the improvement of technology has enabled meteorologists to better forecast and track winter storms, there is no precise way to predict the location and severity of their associated risks. As shown in Table 13, there is no predictable pattern of occurrence, associated risk characteristics, and resulting damage that can be identified and used to make detailed projections on future winter storm events.

Overall, there is a very low vulnerability to structures in Eau Claire 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 $5.7 billion in assessed improvements in Eau Claire County to determine which structures may be more vulnerable to the impacts of future winter storm events.

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

Vulnerable Critical Facilities

A more robust assessment of the community's assets (critical facilities) and their susceptibility to winter storms is located in **Appendix E**. The greatest winter storm-related vulnerability for Eau Claire County's critical facilities is the widespread loss of electric power. The risks and vulnerabilities related to this threat, and the need for emergency power generation, is discussed later in subsection III.B.v.

While there are few long-term physical impacts on roads from a hazard mitigation perspective, travel upon sidewalks, roads, and bridges is hazardous under icy or heavy snow conditions as discussed previously. Such road conditions can also impair the function of critical facilities (e.g., staffing at hospitals or schools) and increase emergency response time. Roads in shaded, wooded areas can be especially icy and hazardous.

The Winter 2014-2015 Polar Vortex demonstrated the vulnerability of water utilities, especially laterals and poorly insulated plumbing systems, to extreme cold. Ice-damming is a winter or spring-melt phenomenon which is also related to flooding. Though infrequent, ice dams may occasionally contribute to flooding problems on rivers. Yet, most ice- damming problems have been limited to culverts, small bridges, and stormwater drainage systems.

Unique Jurisdictional Risks or Vulnerabilities—Winter Storms

Winter storms pose no risks or vulnerabilities unique to individual jurisdictions. These are typically large-area or regional events, occurring countywide. The level of vulnerability increases in areas of higher population, development density, and supportive infrastructure as described previously in **Section II. Community Profile**. There were few notable differences between municipalities regarding the vulnerability of winter storm events as discussed in the *Unique Jurisdictional Risk or Vulnerabilities Table* in **Appendix F.**

The City of Eau Claire, due to its size, did note the following unique challenges related to winter storm and extreme cold:

- Snow removal is an ongoing challenge in some older neighborhoods due to street widths, on-street parking, rental housing, etc.
- The City has a sizable homeless population.

Other than U.S. Highway 53, Interstate 94, and the North Crossing mentioned previously, no specific streets or highways in the cities and village were identified as being uniquely prone to ice accumulation, drifting, or winter-related hazardous travel. Overall, loss of power due to the damage of overhead power lines was the most significant winter-related concern for the cities and villages, though no municipality had neighborhoods which were more uniquely prone to such events.

iii. Tornados

Tornados are often linked with severe thunderstorm events. It is sometimes difficult to determine the difference between the impacts of a tornado versus very high winds. As such, the discussion in this sub-section includes significant overlap with the thunderstorm assessment.

Public Health Hazard Vulnerability Assessment

The 2017 Northwest Wisconsin Health Care Coalition Public Health HVA rates tornados as a 48% risk over a ten-year period given their high probability (3), moderate vulnerability (1.7), and substantial available emergency management capabilities to deal with this threat (1.3 internal, 1.5 external). The assessment used a scale of 1 to 3, with "1" being low probability/impact or having substantial management capabilities and "3" being high probability/impact or having limited/no management capabilities.

Risk Assessment—Tornados

The Hazard

Tornados are relatively short-lived local storms composed of an intense rotating column of air, extending from a thunderstorm cloud system. It is nearly always visible as a funnel, although its lower end does not necessarily touch the ground. Average winds in a tornado, although never accurately measured, are between 100 and 200 miles per hour; however, some tornados may have winds exceeding 300 miles per hour.

For reference, the following are the National Weather Service definitions of a tornado and funnel cloud:

> **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.

A tornado path averages four miles, but may reach up to 100 miles in length. Widths average 300 to 400 yards, but tornados have cut swaths a mile or more in width. Severe tornados, or groups of two or three funnels, can also travel together. On the average, tornados move between 25 and 45 miles per hour, but speeds over land of up to 70 mph have been reported. Tornados rarely last more than a couple of minutes over a single spot or more than 15 to 20 minutes in a ten-mile area, but their short periods of existence do not limit their potential devastation. Though similar in potential impact, high-wind events, straight-line winds, derechos, and downbursts are defined within the *Thunderstorms* section.

Shown in **Table 14** is the Enhanced Fujita (EF) Scale, recognized as the accepted tornado magnitude measurement rating and is based on damage estimates for a 3-second wind gust. The EF scale replaced the original Fujita scale in 2006 and takes into account 28 different damage indicators for a more accurate indication of tornado strength. The new EF scale does have higher

wind speed thresholds, and a larger percentage of reported tornados will likely fall within the EF0 category. A lower percentage will fall in each of the higher categories. None of the tornados recorded on or before January 31, 2007, will be re-categorized.

Table 14. Tornado Magnitude Measurement Enhanced Fujita (EF) Scale

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

Source: National Oceanic Atmospheric Administration (NOAA)

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

EF0 Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees.

EF1 Peels surface off roofs; mobile homes badly damaged or overturned; moving autos pushed off roads; attached garages may be destroyed.

EF2 Roofs torn off well-constructed homes; mobile homes demolished; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.

EF3 Entire stories of well-constructed homes destroyed; trains overturned; trees debarked.

EF4 Well-constructed houses leveled; cars thrown and large missiles generated.

EF5 Strong frame houses lifted off foundations and carried considerable distances; automobile-sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.

The destructive power of the tornado results primarily from its high wind velocities and sudden changes in pressure. Wind and pressure differentials probably account for 90 percent of tornado-caused damage. Tornados are generally associated with severe storm systems which are often accompanied by hail, torrential rain, flooding, and intense lightning.

Regional Trends

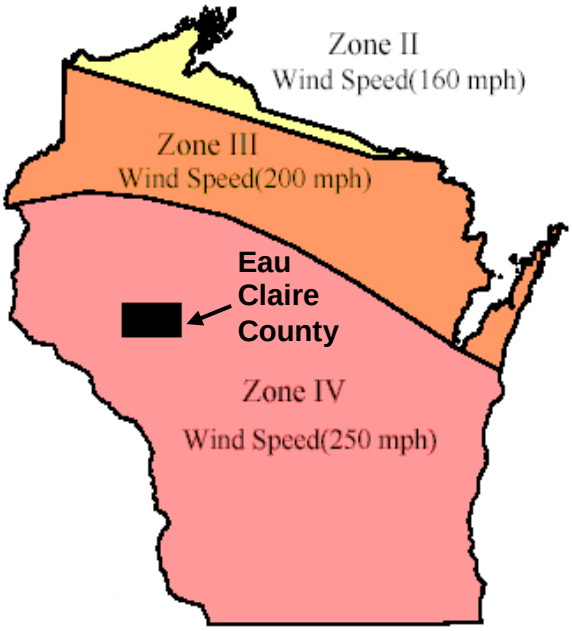
On the basis of 40 years of tornado history and more than 100 years of hurricane history, the United States has been divided into four zones that geographically reflect the number and strength of extreme windstorms. Zone IV has experienced the most and the strongest tornado activity with wind speeds of up to 250 mph, and includes all of Eau Claire County (see **Figure 22**).

Wisconsin lies along the northern edge of the nation's maximum frequency belt for tornados (known as "tornado alley") which extends northeastward from Oklahoma into Iowa and then across to Michigan and Ohio. Generally, the frequency and severity of tornado events decreases as one travels north.

Tornados have occurred in Wisconsin in every month except February, as shown in **Figure 23** below. Wisconsin's tornado season runs from the beginning of April through September. The most severe tornados typically occur during April, May, and June.

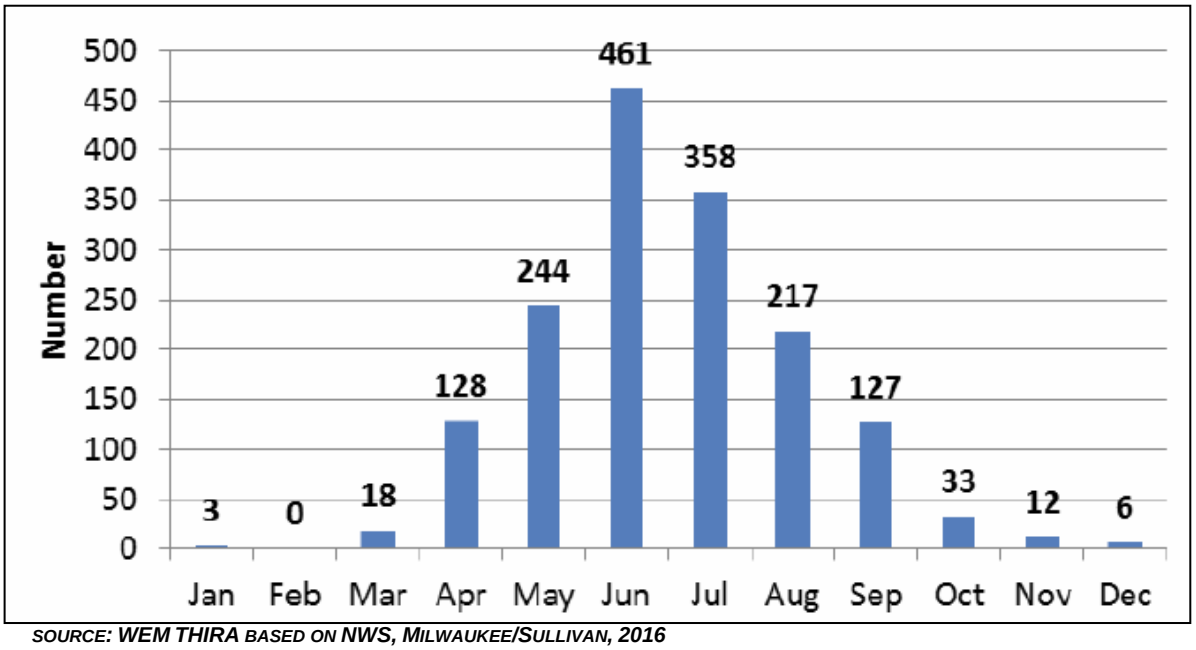
Many tornados strike in late afternoon or early evening. However, tornados have occurred during other times of the day. Personal property damage, deaths, and injuries have and will continue to occur in Wisconsin.

Figure 22. 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"

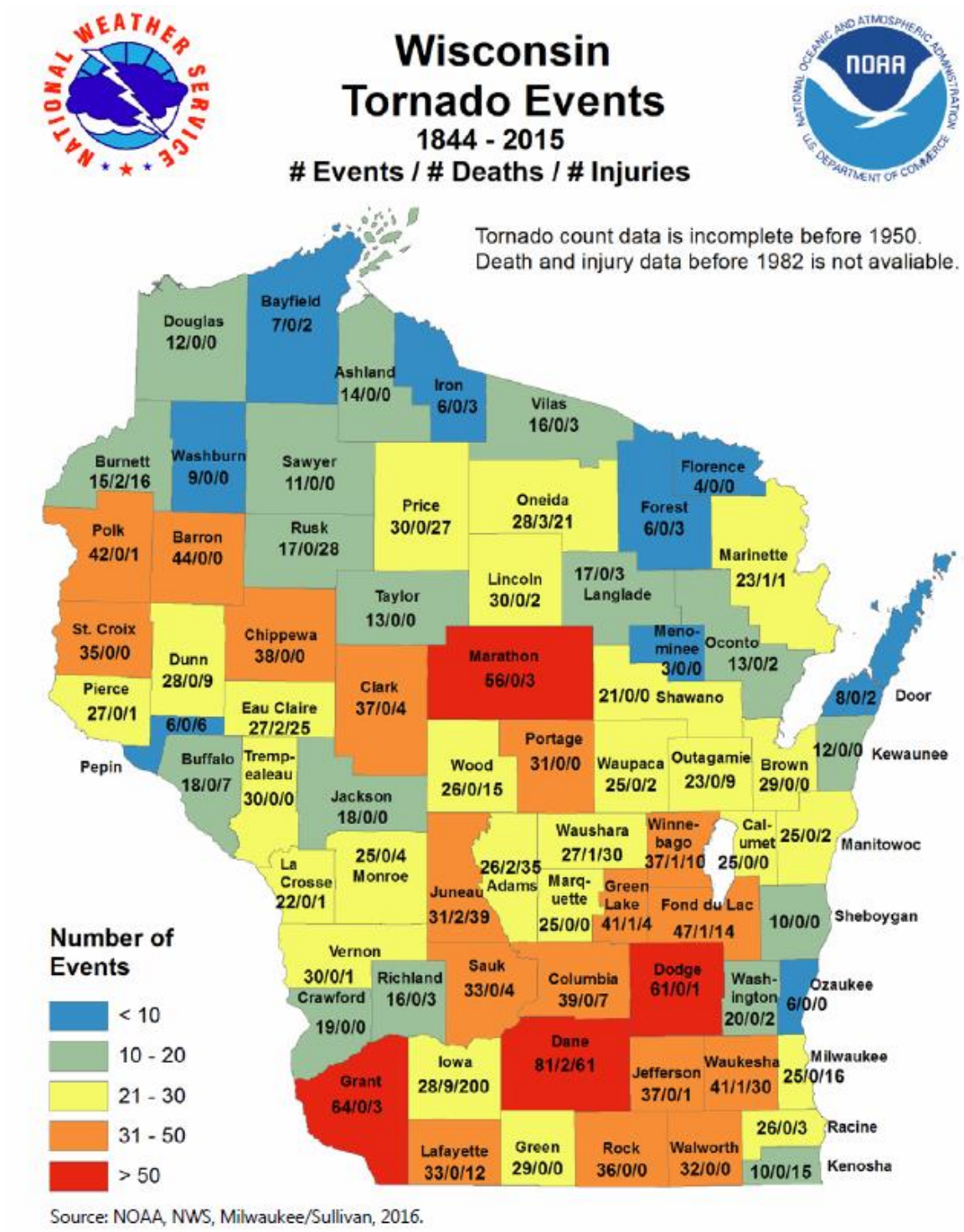
Figure 23. Wisconsin Tornado Events by Month • 1844 to 2015



SOURCE: WEM THIRA BASED ON NWS, MILWAUKEE/SULLIVAN, 2016

From 1980 to 2015, Wisconsin experienced 44 significant tornado events, including twelve EF-3, three EF-4, and one EF-5 tornado. **Figure 24** below shows that Eau Claire County has had a relatively moderate number of reported tornados between 1844 and 2015.

Figure 24. Wisconsin Tornado Events • 1844 to 2015



The potential destructiveness of tornados remains fairly fresh in the minds of many Eau Claire area residents due to three fairly recent and substantial tornado events in the region:

- On June 18, 2001, an F3 tornado with a 27-mile path hit the Village of Siren approximately 80 miles to the northwest, resulting in three deaths, 16 injuries, 167 destroyed homes, and 280 damaged homes.
- On September 2, 2002, about fifty miles north of the City of Eau Claire, an F3 tornado hit the City of Ladysmith, injuring 37 and resulting in over $20 million in damage.
- More recently, on May 16, 2017, an EF3 tornado caused over $10.1 million in damages along an 83-mile track from southeastern Polk County then northeast into Price County. 160 homes were affected, including 40 destroyed. Six businesses were also impacts, including six turkey burns with a loss of about 25,000 birds. The tornado struck a mobile home park near Chetek resulting in one fatality and at least 25 injuries. Tornado warnings were issued with adequate time for most persons to seek shelter, though the mobile home park lacked a safe room. The devastation, limited access, number of responders, and darkness all contributed to significant challenges at the mobile home park for providing services to survivors, coordinating response efforts, and centralizing command. This event also demonstrated the importance of good volunteer and donation management and tracking.

Within Eau Claire County, the 1994 Foster tornado (F3) was the most destructive and deadly in recent memory. Many long-time residents of the region also recall the devastating Colfax Tornado of 1958 which had a 32-mile path, caused at least 19 deaths, and resulted in severe damage. Farther back in time, the 1899 New Richmond tornado to the west remains one of the top 10 deadliest in United States history.

Local Events

According to Wisconsin Emergency Management, there have been 27 tornados reported for Eau Claire County between 1844 to 2015. Shown in **Table 15** are the 23 tornado and three funnel cloud events reported for Eau Claire County to the National Climatic Data Center and identified on the Geographic Techniques website. The Geographic Techniques data (followed by an asterisk) was included since the NCDC data was missing some recent events, most notably the 1994 Foster Tornado. Additional events have likely gone unreported if not confirmed or the impacts were not significant, in particular for the funnel cloud events for which data was not been kept until 1993. Given the uncertainty of older, historic data, this risk analysis focuses primarily on those events occurring in recent years.

From January 1993 through 2017, there have only been five tornado and three funnel cloud event reports for Eau Claire County, including the 1994 Foster tornado which resulted in two deaths and 25 injuries. This averages to one tornado event report approximately every 4.8 years and one funnel cloud report every 8 years, but remember that one storm system can spawn multiple tornados or there can be multiple reports for a single tornado. In fact, four of the tornado events in Table 15 are associated with a July 15, 1980 storm. The number of tornado reports was significantly down in the last two decades compared to the 1970s and 1980s, which had a combined total of thirteen reported (or one report every 1.5 years).

Table 15. Eau Claire County Tornado Events – 1950 through 2017

Location	Date	Time	Mag	Deaths	Inju-ries	Property Damage	Crop Damage
Tornado Events							
Countywide	5/10/1953	6:55 PM	F4	0	5	23,683,177	0
Countywide	6/4/1958	7:30 PM	F4	4	3	22,027,010	0
Fairchild area*	5/26/1959	4:41 PM	F4	0	2	435,707	0
Eau Claire area*	5/24/1965	11:45 PM	F1	0	0	3,455	0
Fairchild area*	6/26/1969	4:00 PM	F2	0	4	3,454,782	0
Countywide	9/21/1970	4:00 AM	F2	0	0	16,666	0
Countywide	7/18/1971	4:30 PM	F2	1	2	1,582,845	313,063
Countywide	6/9/1974	4:45 PM	F1	0	0	13,519	0
NE of Eau Claire*	8/6/1977	9:00 PM	N/A	0	1	2,092	0
Countywide	6/16/1979	3:10 PM	F1	0	0	9,223,609	0
Countywide	7/15/1980	8:25 PM	F3	1	10	8,097,333	0
Countywide	7/15/1980	8:40 PM	F1	0	0	80,973	0
Countywide	7/15/1980	8:50 PM	F2	0	0	809,733	0
Countywide	7/15/1980	11:08 PM	F1	0	0	0	0
Countywide	9/12/1982	3:18 PM	F2	0	0	6,680,514	131,389
Countywide	9/12/1982	6:27 PM	F2	0	0	6,680,514	0
Countywide	7/3/1983	4:10 PM	F2	0	0	644,144	0
Countywide	7/3/1983	4:20 PM	F2	0	0	64,414	0
Lake Eau Claire area*	7/27/1993	6:15 PM	F0	0	0	1,273	1,273
Foster area*	8/27/1994	7:45 PM	F3	2	25	855,537	85,553
Augusta	4/10/2011	3:57 PM	EF1	0	0	228,849	0
Augusta	4/10/2011	4:04 PM	EF1	0	0	286,061	0
Augusta	7/22/2013	3:45 PM	EF0	0	0	5471	10,943
Funnel Cloud Reports							
Fall Creek	6/30/1997	11:05 AM	N/A	0	0	0	0
Fall Creek	7/26/2000	1:50 PM	N/A	0	0	0	0
Foster	4/10/2011	3:41 PM	N/A	0	0	0	0
	23/3 reports			**8**	**52**	**$84,877,678**	**$542,221**

source: National Climatic Data Center (NCDC) and Geographic Techniques[17]*
Damage estimates in 2018 dollars based on Consumer Price Index by U.S. Bureau of Labor Statistics

The tornado events reported in Table 15 have resulted in eight deaths, 52 injuries, and nearly $85 million in estimated property and crop damage in 2018 dollars. Of the eight deaths, four where the result of the June 4, 1958, Colfax tornado, which also caused almost $20 million in reported damages. Nearly half of the 52 injuries and two additional deaths were reported for the August 27, 1994, Foster tornado. Care must be taken in using this data since deaths, injuries, and damages are sometimes included for areas outside Eau Claire County when an event spans multiple counties.

[17] Norgord, Douglas. Geographic Techniques. *Wisconsin Tornado Event Listings, 1950-2011*. 2012. This second source was used since included six additional tornado events not included in the NCDC data download, most notably being the 1994 Foster Tornado. Data extracted from Mr. Norgord's efforts are noted by a "*" in the location column. This data included a range of storm damage estimates, so the low end of the range (minimum) was used.

All the tornados in Table 15 occurred during the months of April through September. The far majority of the events occurred between the hours of 3:00 PM and 9:00 PM, with only two events reported for the morning hours.

Relative Level of Risk

The Eau Claire County Plan Steering Committee rated tornados as the County's highest natural hazard vulnerability in terms of potential impacts with a moderate-to-high risk (probability of occurrence). Based on the number of reports since 1993, **it is probable that a tornado will continue to touch down and be reported for Eau Claire County once about every 4.5 to 5.5 years on average**, with some years potentially having multiple tornado reports.

Although the improvement of technology has enabled meteorologists to better identify and predict the conditions that are favorable for tornado development, there is no precise way to predict the formation, location, and magnitude of a tornado. And, there is no predictable pattern that can be used to accurately predict future tornado events.

Vulnerability Assessment—Tornados & High Winds

Since the potential impacts similar to those of tornados, high wind vulnerabilities are discussed within this section, though their risk assessment (e.g. history, frequency) is discussed with thunderstorms.

Did you know?

As of 1/1/11, the eighth deadliest tornado in U.S. history occurred in the City of New Richmond in June 1899 with 117 confirmed deaths and more than 200 injured.

Potential Impacts

Tornados and high winds have no defined hazard area within Eau Claire County. Due to the unpredictable nature of tornados and lack of specific hazard areas, the assessment of potential community impacts as a result of a tornado is difficult to quantify.

Tornados and high winds are capable of killing or injuring residents and damaging or destroying homes, businesses, public buildings, infrastructure, and natural resources. This destruction can occur as a result of high winds or by airborne debris that can be carried by the tornado. Tornados can uproot trees and topple power lines, impacting the supply of electrical service to local homes and businesses. Roadways can also be blocked by debris, and debris can accumulate in rivers or stormwater systems and contribute to washouts or flooding.

All above-ground structures are vulnerable to a tornado or strong high winds. As discussed previously, Eau Claire County has about $5.7 billion in assessed improvements, plus personal property, most of which would be vulnerable during such events. This total does not include structures located on tax-exempt properties such as municipal buildings, churches, and certain utilities.

Further, damaged buildings may pose additional safety concerns due to structural instability, damage to electrical systems, or gas leaks. Specific data on the structural condition of buildings in Eau Claire County is not available. In addition to direct impacts to buildings, economic losses can be experienced when a business sustains direct damage from the event or when supporting infrastructure (e.g., utilities, services) are not available for extended periods. Such a business closure may be temporary, but could have large impacts on the local economy and related services, while some smaller or struggling business may fail.

Did you know?

25% of businesses do not re-open following a major disaster.
– The Institute for Business & Home Safety

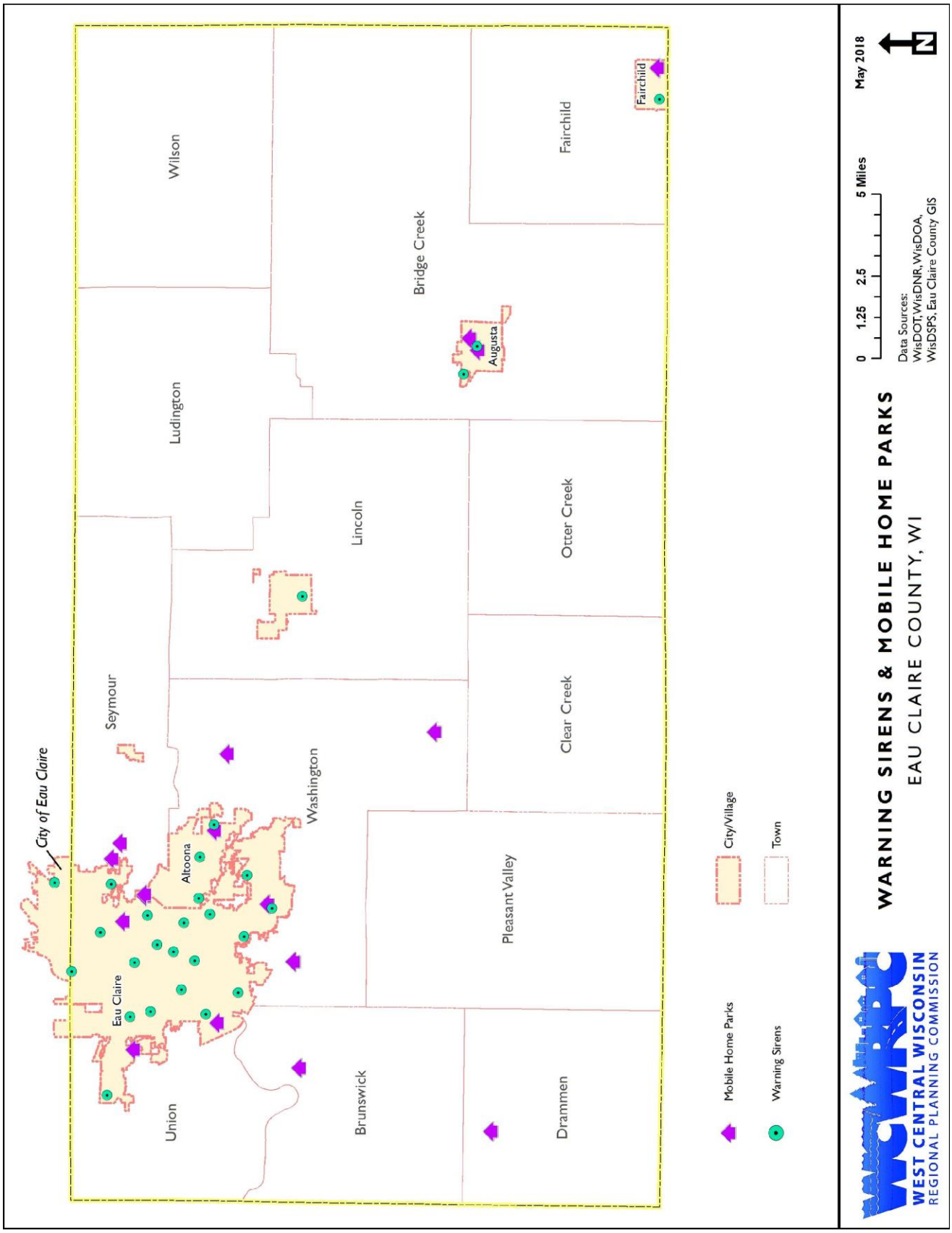
Based on a review of the community and past tornado impacts, it was determined that the following general types of properties are especially vulnerable to tornado and high wind events:

- Manufactured and mobile homes, especially those which are unanchored
- Homes with crawlspaces (elevated and more susceptible to lift)
- Buildings with large spans (e.g., airport hangars, pole barns, gyms, factories)
- Residents in slab-on-grade structures without access to a safe-room or storm shelter
- Campgrounds, trailers, and resort properties without storm shelters
- Above-ground power lines, especially in wooded areas
- Larger gatherings (i.e., fairgrounds and Country Jam grounds)
- Sites/buildings storing large quantities of hazardous materials
- Critical facilities and historic sites, due to their high value to the community

Mobile homes, in particular, are vulnerable to tornado and high wind events. According to the National Weather Service, between 1995 and 2002, there were 415 tornado fatalities in the United States. Forty-one percent (41%) of these fatalities occurred in mobile homes, which constitute just 7.5 percent of the nation's housing supply.

As discussed previously, Eau Claire County had 1,236 mobile homes in 2015 constituting 3.1 percent of the total housing supply. Over 49 percent of these mobile homes were located in the unincorporated towns of the County while 27 percent were located in the City of Eau Claire and 18 percent were located in the City of Altoona. **Figure 25** on the following page shows the location of the 18 licensed manufactured home communities (includes mobile home parks) in Eau Claire County. All but six of these parks are located in cities and villages. The largest park, with 560 licensed sites, is located in the City of Altoona; the owners of this park have expressed strong interest in renovating and hardening an on-site community center as a safe room. The average size of remaining parks is 54.4 licensed sites. To the knowledge of local officials, most of these manufactured home communities do not offer an on-site storm shelter or have convenient access to a public community safe room.

Figure 25. Warning Sirens and Licensed Manufactured Home Communities



Throughout most areas of the region, new mobile home development is minimal. In fact, the number of mobile homes in the County has decreased since 2010, with other types of manufactured or pre-fabricated homes often becoming a preferred option of affordable housing. These units are typically well-secured to a permanent foundation, but sometimes lack a basement or safe room for a storm shelter. Data on homes with crawlspaces or without basements is currently not collected as part of the Federal census and is not available. Significant numbers of new homes, apartments, and other housing facilities in the City of Eau Claire and other communities are being built slab-on-grade without a basement or crawlspace.

While few, if any, buildings can withstand the direct impact of a large-magnitude tornado, large-span structures can be particularly vulnerable to high wind damage. Data on the number of large-span structures in Eau Claire County is not available, though some, such as school gymnasiums, are addressed in the critical facilities vulnerability assessment. Most of these large-span buildings tend to be large storage buildings, garages, or barns which are common throughout the County. Many of these are relatively inexpensive to construct and are used for storage or livestock. Of greater vulnerability, due to contents and risk of injury or death, are industries or big-box commercial buildings that have large-span structures. Most of these are located near or within the incorporated areas, especially the City of Eau Claire.

Agricultural-related damages include structures (e.g., barns), livestock, and crops. Over $542,000 in tornado-related crop damage were reported since 1950 in the NCDC database. And historical documents and testimony demonstrate that the County's livestock barns and many other agricultural-related structures are quite vulnerable to high winds and tornados.

There were no historic buildings, natural areas, or environmental characteristics within the Eau Claire County that were identified as being uniquely vulnerable to tornados or high winds. Continuing changes in land-use and development patterns will influence the County's potential for future exposure to tornados. As discussed previously, Eau Claire County is continuing to grow and develop. This creates an increasing exposure to the number of residents and properties that are at risk from future tornado events.

Fairground, Festivals, and Outdoor Activities

Campgrounds and events that host large numbers of people pose significant vulnerabilities. Tents and trailers at campgrounds are particularly vulnerable to tornado and high wind events as was experienced nearby in the City of Cumberland (Barron County) during a Summer 2010 wind storm where injuries occurred. Eau Claire County owns and operates three public campgrounds:

Coon Fork Lake County Park (108 sites) located in the Town of Bridge Creek
Harstad Park (27 sites) located in the Town of Birch Creek
Expo Center Camping (36 sites) located in the City of Eau Claire

None of these County parks have storm shelters, a storm siren, or a 24-hour caretaker, though staff is available at most times during the primary camping season. County park staff use a P.A. system in park trucks to notify campers and visitors should a severe weather warning occur. Block restrooms with interior walls can offer some protection if needed.

In addition to the County campgrounds, there are seven private campgrounds in Eau Claire County—four in the Augusta area and three in the Fairchild area. The Town of Fairchild has expressed interest in partnering with private campground owners to construct a community safe room. Beaver Creek Reserve, north of Fall Creek, also offers cabin/lodge rentals and tent camping. None of these campgrounds, to the County's knowledge, has a community safe room that was built to withstand the region's design wind load.

Section II.C. summarizes the large festivals and events held in Eau Claire County. The County has one large festival ground—Foster Farms in the Town of Union. Foster Farms is the site of County Jam, which is an annual three-day event with drawing up to 30,000 attendees on a given day. The growing Eaux Claires Festival attracts an additional 25,000 attendees to Foster Farms each year. Both events utilize the 1,200-site Whispering Pines campground, which is used during festivals and not otherwise open to the public. The smaller Blue Ox Music Festival is held at the campground. On-site storm shelters or safe rooms are not available at the festival grounds or campground. Emergency plans for these events are updated annually. In June 2016, high winds struck during the Blue Ox Festival where falling trees injured one person and damaged cars and camper trailers.

Loss Estimates

The first tornado loss estimate in **Table 16** for Eau Claire County was taken from the *Wisconsin THIRA*. The *State of Wisconsin Homeland Security Council THIRA & SPR* (updated 2017) provides projected average annual county loss estimates in 2015 dollars for tornado events based on historic data from the National Climatic Data Center (NCDC). Eau Claire County ranked 20th among Wisconsin's 72 counties in terms of average damage losses per tornado event, but had fewer tornado events (17) than the State average of 20.1 per county for the time period.

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. The loss estimates for tornados and high winds developed by WCWRPC used a similar approach. The thunderstorm-high winds estimate is based on NCDC data is unadjusted for inflation.

As noted previously, the NCDC database was missing some significant local events. To account for this, Table 16 includes a revised loss tornado loss estimate produced by WCWRPC, which reflects significantly higher average damages, probabilities, and losses, in large part due to the inclusion of the 1994 Foster tornado and a 1969 Fairchild area tornado. Loss estimates for high winds/thunderstorm winds were developed by WCWRPC using a similar approach based on the NCDC data provided later in the *Thunderstorms* sub-section. While 3.3 high wind events have occurred annually during the time period, the reported losses per event were minimal compared to the average tornado damage.

It must be kept in mind that the estimates in Table 16 are largely based on those events reported to the NCDC and some damages and injuries likely have gone unreported. Crop and forest damages are often not included in the above numbers, especially if covered by crop insurance. When considering this data, keep in mind that the majority of County's population and assessed

improvements are located in the City of Eau Claire urban area, so location would have a very major impact on actual future losses.

Table 16. Eau Claire County Tornado & Straight-Line Wind Loss Estimates

Tornado Loss Estimates for Residential Units (Wisconsin Emergency Management)			
Avg. Damage per Tornado (1950-2015)	**Annual Probability**	**Estimated Future Annual Loss (property & crops)**	**Estimated Future Annual Loss (injury and death)**
$1,051,371 (17 events)	.26	$270,808	$714,546
Tornado Loss Estimates (WCWRPC)			
Avg. Damage per Tornado (1950-2018)	**Annual Probability**	**Estimated Future Annual Loss (property & crops)**	**Estimated Future Annual Loss (injury and death)**
$3,713,909 (23 events)	.34	$1,262,729	$1,047,403
Thunderstorm High Wind Loss Estimates (WCWRPC)			
Avg. Damage per High Wind (1993-2017)	**Annual Probability**	**Estimated Future Annual Loss (property & crops)**	**Estimated Future Annual Loss (injury and death)**
$29,539 (80 events)	3.33	$98,365	$12,000

Source:: State of Wisconsin Homeland Security Council THIRA & SPR, updated January 2017; National Climatic Data Center (NCDC); and West Central Wisconsin Regional Planning Commission (WCWRPC). High wind events estimates not adjusted for inflation.

Continuing changes in land-use and development patterns will influence the County's potential for future exposure to tornados. As discussed previously, Eau Claire County is continuing to grow and develop. This creates an increasing exposure to the number of residents and properties that are at risk from future tornado events.

Vulnerable Critical Facilities

All critical facilities are susceptible to being hit by a tornado. A more robust assessment of community assets (critical facilities) and their susceptibility to tornados and other hazard events is located in **Appendix E**. Above-ground electrical infrastructure is particularly vulnerable to tornados and high winds and is discussed later in the *Long-Term Power Outage* sub-section.

Though no critical facilities have been impacted by tornados in recent years, the vulnerability assessment did yield that tornados and high winds represent the highest vulnerability and risk to the critical facilities of Eau Claire County. Schools were of special concern due to:

- large numbers of individuals present, including school-age children or when being used as a storm shelter in some communities
- most having large span areas, such as gyms and theaters, which are especially vulnerable to tornados and high winds

The inventory of critical facilities identifies 24 public and 15 private schools in Eau Claire that likely meet the above criteria. Hospitals, child care, and long-term care and assisted-living facilities are also particularly vulnerable due to the age and/or health of residents.

The Chippewa Valley Regional Airport, with its airports with hangars, structures, and aircraft, can also be particularly vulnerable to tornados and high winds.

Unique Jurisdictional Risks or Vulnerabilities—Tornados & High Winds

During the planning process, each incorporated area was analyzed to provide insight into the extent of its vulnerabilities to tornados and high wind events. The extent of the vulnerabilities identified by the communities was largely limited to recent events, mobile home parks, slab-on-grade construction, and public storm shelters as summarized in the *Unique Jurisdictional Risk or Vulnerabilities Table* in **Appendix F**. **Appendix G** summarizes current mitigation efforts for each incorporated community.

Tornados pose no risks or vulnerabilities unique to individual incorporated jurisdictions (villages and cities). No city or village has experienced a direct tornado strike in recent history, though Augusta and Fall Creek noted that there have been tornado touchdowns in close proximity. The cities and villages reported that high straight-line winds are more common. Downed trees, roof damage, and scattered debris are the most commonly noted types of wind damage.

A number of communities identified community safe room needs or have expressed interest in mitigation grant funding for potential safe room projects:

- The Village of Fairchild stated that most have basements and no public storm shelter exists. The ballfield/park, campground, and mobile homes on the northeast side of the community lack access to a community safe room. The Town of Fairchild has expressed interest in a possible community safe room project for a campground located north of the Village.
- The City of Altoona identified a number of areas in the community that may benefit from a community safe room or storm shelter, such as the River Prairie development, municipal recreational facilities (Cinder City Park), and the large mobile home park (Hillcrest Estates). A privately owned community building is centrally located within the mobile home park and could potentially be hardened and retrofitted to serve as a safe room, but requires an engineering assessment.
- The Augusta Senior/Community Center is used as a public storm shelter/community safe room, but does not automatically unlock when siren activated.
- The City of Eau Claire recognized that no public community safe rooms exist within the City, including at various recreational facilities (e.g., Carson Park, sports fields, Expo Center). No specific plans for municipal safe rooms were identified.

In addition to the above, the cities of Eau Claire and Altoona noted their large concentrations of large span, metal buildings, which can be particularly vulnerable to tornados and high winds. The Town of Union noted similar concerns with large Menard facilities as well as commercial facilities that store fertilizers, chemicals, and propone on-site. In Altoona, rails cars in the large rail yard can also become missiles during a tornado. Both communities also have large numbers of critical facilities. The City of Eau Claire is also home to both the University of Wisconsin-Eau Claire and Chippewa Valley Technical College, with their student populations and various facilities/buildings. These institutions maintain their own emergency personnel, plans, and storm sheltering areas, working in partnership with Eau Claire County and other public-sector emergency response agencies. Though no specific UW-EC or CVTC storm hardening or safe room projects were identified, such mitigation actions could be needed in the future.

Overall, the level of vulnerability to the cities and villages increases with development density, population density, type of development, and value of improvements. And as more growth and development occurs, this vulnerability also increases. As such, cities and villages are the highest vulnerability areas, as well as those areas with higher populations, larger numbers of housing units, and higher assessed value per square mile described previously in **Section II. Community Profile.**

Alert Warning Sirens

The public relies on alert warning sirens for outdoor notification of potentially approaching storms or tornados. However, with increasing use of smart phones, there is some anecdotal evidence from interviews that the reliance on sirens and NOAA All Hazards Radios in Eau Claire County is decreasing.

Siren, WI - June 2001 Tornado

Figure 25 shows the location of the warning sirens in Eau Claire County. The sirens are activated selectively in Eau Claire County based on the projected path of severe weather or other hazard event. The sirens are tested monthly with field monitoring assistance provided by the local ARES/RACES group. The sirens are active for severe weather warnings through the City-County 911 Emergency Communications Center and are owned and maintained by the local community. Xcel Energy has installed nine emergency sirens with voice capability along the Chippewa River in Chippewa and Eau Claire counties, including one within the City of Eau Claire.

All of sirens were reported as being in good working condition. The City of Eau Claire noted that most of their sirens (except those installed by Xcel) are aging and lack voice capability; they are being replaced over time. During the planning process, the following were identified areas for which siren coverage may be inadequate:

- City of Altoona - 2 to 3 additional sirens for better coverage (e.g., River Prairie, 10th Street Park Neighborhood)
- City of Eau Claire – Chippewa Valley Regional Airport area was the primary need, but other areas may have siren needs as growth occurs (e.g., southeastern part of City near the USH 53 and I-94 interchange, Sherman Estates area on City's west side, industrial Park area on City's northwest side).

In addition, there are some additional unincorporated areas with population concentrations which may also benefit from nearby warning sirens, such as the Cleghorn/Pleasant Valley area. A siren was recently installed at Lake Eau Claire through an excellent Girl Scout project.

In past years, greater emphasis was placed on all hazards/weather radios in the unincorporated towns in Eau Claire County, rather than pursuing the installation of additional weather warning sirens. Eau Claire County Emergency Management has previously partnered to distribute weather radios to seniors and other residents. And during the planning process, there was some interest by the City of Augusta in a NOAA all hazards/weather radio project. As cell coverage improves, emergency alert systems through mobile devices offer additional alternatives.

iv. Thunderstorms and High Winds

Thunderstorms encompass lightning, heavy rains, high winds, and hail, and are intricately linked with some of the other hazards, such as tornados and flooding. Due to the similarities in impacts, the vulnerabilities associated with high winds are largely discussed as part of the previous tornado sub-section (III.B.iii.) and are not repeated here. Flooding as a result of heavy rains is analyzed as part of the flooding sub-section (III.B.i.).

Public Health Hazard Vulnerability Assessment

The 2017 Northwest Wisconsin Health Care Coalition Public Health HVA rates severe thunderstorms as a 35% risk over a ten-year period given their high probability (3), low vulnerability (1.2), and substantial available emergency management capabilities to deal with this threat (1.0 internal, 1.0 external). The assessment used a scale of 1 to 3, with "1" being low probability/impact or having substantial management capabilities and "3" being high probability/impact or having limited/no management capabilities.

Risk Assessment—Thunderstorms

The Hazard

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

The thunderheads formed may be a towering mass six miles or more across and 40,000 to 50,000 feet high. They may contain as much as 1.5 million tons of water and enormous amounts of energy that often are released in the form of high winds, excessive rains, and three violently destructive natural elements: lightning, hail, and tornados.[18]

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

[18] Tornados and high wind vulnerabilities (potential impacts) are discussed separately in Section III.B.ii.

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

High winds are those winds of 58 miles per hour or greater. High winds can affect much larger areas than a tornado and occur for a longer period of time. More intense types of high winds are downbursts or straight-line winds.

Straight-line winds are often responsible for most of the wind damage associated with a thunderstorm. These winds are often confused with tornados because of similar damage and wind speeds. However, the strong and gusty winds associated with straight-line winds blow roughly in a straight line unlike the rotating winds of a tornado.

Downbursts (straight-line winds) are unrelated to tornados, but can have similar impacts and destructive power. A downburst is a strong, violent downdraft, initiated by rapidly descending rain and/or rain-cooled air beneath a thunderstorm. The result is an outburst of straight-line winds on or near the ground in a single direction. They may last anywhere from a few minutes in a small scale micro-burst to periods of up to 20 minutes or longer, known as a macro-burst. Wind speeds in downbursts can reach 150 mph, which is similar to that of a strong tornado.

Downburst damage is often highly localized, typically covering 2.5 miles or less in width, and resembles that of tornados. A long-lived, widespread, and quickly travelling thunderstorm event producing numerous downbursts along its path is known as a **derecho**. The last major derecho event impacting Wisconsin in July 1995 included parts of nine states and one Canadian providence. Damages in Minnesota alone from this event were estimated at over 5 million downed trees and exceeded $30 million in 1995 dollars.[19] There are significant interactions between tornados and downbursts, and a tornado's path can also be affected by downbursts. Because of this, the path of a tornado can be very unpredictable.

High-wind risks and past events are discussed here due to their relationship to thunderstorms and the method of data collection by the National Climatic Data Center, though the destructive impacts and vulnerabilities related to thunderstorms with high, straight-line winds are at times difficult to distinguish from the concentrated cyclical winds of a tornado. It is not uncommon for there to be spirited local debate over whether damage is the result of high, straight-line winds (as officially recorded) or a tornado. Further, tornado and thunderstorm/high wind events are very

[19] National Oceanic and Atmospheric Administration. *Derecho Series in July of 1995* webpage. http://www.spc.noaa.gov/misc/AbtDerechos/casepages/jul1995derechopage.htm#2nd1995.

often part of the same storm cell, making it a challenge to distinguish the impacts. High wind impacts were discussed previously as part of the tornado vulnerability assessment.

Local Events

Thunderstorms are the most common natural hazard event for Eau Claire County. Shown in **Table 17** below is a listing of severe thunderstorms that have been reported to the National Climatic Data Center for Eau Claire County from 1950 through 2017. Data prior to 1980 is limited; more complete data is available since 1993.

From January 1993 through 2017, Eau Claire County has experienced 169 severe thunderstorm events consisting of:

- 80 high wind, strong wind, or thunderstorm wind events
- 2 heavy rain events
- 2 lightning events
- 85 hail events

As the number of lightning events reflects, many events are not reported unless damage occurs. Other risks associated with thunderstorms that have been documented with these storms include the potential for excessive rains, leading to flash flooding and the potential to spawn tornados which is discussed in other sections.

Many of the events reported in Table 17 are for the same storm cells recorded for different parts of the County; multiple reports within a single day for large storm cells are not uncommon. So while Eau Claire County averaged seven reported thunderstorm events per year, this represented 3.6 thunderstorm event days per year. Table 17 also shows that thunderstorms can occur throughout the year, with the highest frequency during the months of April through August.

Two injuries (and no deaths) associated with these storms were given in the NCDC database. In August 2005, a 54-year-old man was struck by lightning while unhooking a chain from a truck at an Eau Claire business. And, as mentioned in the tornado sub-section, high winds during the Blue Ox Festival downed trees resulting in damage to vehicles and injuring one person.

No damage data for any thunderstorm event was estimated prior to 1993. Damage was reported for 18 events, with crop damage only reported for only two events. This averages to $104,421/year in thunderstorm-related damage annually since 1993, which is not accurate. Damages to buildings and crops, as well as general debris clean-up costs, are typically covered by insurance and go under-reported except for the more significant storms in which a disaster declaration may be sought. Nearly all reported damage was wind related; no hail damage was reported. A June 2015 lightning strike caused extensive damage to an Eau Claire home. Not reflected in the table, a July 1983 lightning strike was believed to have been the cause of a fire at a local business resulting in roughly $10 million in damages.

Table 17. Severe Thunderstorm Events – 1950 through 2017
Eau Claire County

Location	Date	Time	Type	Mag	Property Damage	Crop Damage
Countywide	5/26/1959	3:00 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	4/13/1964	4:50 AM	Thunderstorm Wind	0 kts.	0	0
Countywide	7/23/1965	5:13 PM	Thunderstorm Wind	50 kts.	0	0
Countywide	8/1/1967	5:10 PM	Thunderstorm Wind	70 kts.	0	0
Countywide	8/13/1971	5:16 PM	Thunderstorm Wind	65 kts.	0	0
Countywide	8/3/1975	9:15 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	4/12/1977	7:11 PM	Thunderstorm Wind	50 kts.	0	0
Countywide	6/4/1977	9:00 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	7/24/1977	5:07 PM	Thunderstorm Wind	52 kts.	0	0
Countywide	8/31/1977	4:08 PM	Thunderstorm Wind	70 kts.	0	0
Countywide	5/27/1978	4:00 PM	Thunderstorm Wind	50 kts.	0	0
Countywide	6/15/1978	9:30 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	6/16/1979	11:16 AM	Thunderstorm Wind	0 kts.	0	0
Countywide	6/16/1979	3:32 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	6/5/1980	7:45 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	7/15/1980	8:43 PM	Thunderstorm Wind	97 kts.	0	0
Countywide	7/15/1980	10:55 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	8/6/1980	9:37 PM	Thunderstorm Wind	52 kts.	0	0
Countywide	8/8/1980	12:20 AM	Hail	0.75 in.	0	0
Countywide	6/14/1981	7:00 AM	Thunderstorm Wind	60 kts.	0	0
Countywide	7/17/1981	12:30 PM	Hail	1.50 in.	0	0
Countywide	7/20/1981	11:15 AM	Hail	1.50 in.	0	0
Countywide	7/20/1981	12:15 PM	Hail	1.00 in.	0	0
Countywide	7/29/1982	2:10 PM	Thunderstorm Wind	52 kts.	0	0
Countywide	7/3/1983	1:38 PM	Thunderstorm Wind	52 kts.	0	0
Countywide	7/19/1983	4:30 PM	Thunderstorm Wind	55 kts.	0	0
Countywide	7/19/1983	5:00 PM	Thunderstorm Wind	52 kts.	0	0
Countywide	8/16/1983	4:10 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	6/7/1984	9:10 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	6/17/1984	6:13 PM	Thunderstorm Wind	61 kts.	0	0
Countywide	8/12/1985	4:22 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	7/24/1986	3:30 PM	Hail	1.75 in.	0	0
Countywide	9/3/1986	3:45 PM	Hail	0.75 in.	0	0
Countywide	9/3/1986	4:30 PM	Hail	1.75 in.	0	0
Countywide	9/26/1986	4:00 PM	Hail	1.75 in.	0	0
Countywide	9/26/1986	4:20 PM	Hail	1.75 in.	0	0
Countywide	9/26/1986	8:35 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	5/29/1987	11:50 AM	Thunderstorm Wind	0 kts.	0	0
Countywide	6/28/1987	6:26 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	7/15/1988	3:20 AM	Hail	1.75 in.	0	0

Countywide	5/23/1989	7:00 PM	Hail	1.75 in.	0	0
Countywide	5/30/1989	2:51 PM	Hail	0.75 in.	0	0
Countywide	6/2/1990	1:25 PM	Thunderstorm Wind	65 kts.	0	0
Countywide	6/12/1990	6:30 PM	Hail	1.75 in.	0	0
Countywide	6/26/1990	12:57 AM	Hail	0.75 in.	0	0
Countywide	5/27/1991	1:11 PM	Thunderstorm Wind	0 kts.	0	0
Countywide	6/17/1992	3:15 AM	Thunderstorm Wind	0 kts.	0	0
Countywide	6/17/1992	3:20 AM	Hail	1.00 in.	0	0
Countywide	8/29/1992	5:10 PM	Thunderstorm Wind	0 kts.	0	0
Eau Claire	8/9/1993	7:15 PM	Thunderstorm Wind	0 kts.	5,000	5,000
Eau Claire	7/5/1994	6:00 AM	Thunderstorm Wind	0 kts.	50,000	5,000
Eau Claire	7/22/1995	12:10 AM	Thunderstorm Wind	0 kts.	0	0
Eau Claire	7/22/1995	12:10 AM	Thunderstorm Wind	0 kts.	0	0
Eau Claire	8/12/1995	9:09 PM	Thunderstorm Wind	0 kts.	0	0
Eau Claire	8/12/1995	9:09 PM	Thunderstorm Wind	0 kts.	0	0
Eau Claire	5/19/1996	2:00 AM	Thunderstorm Wind	67 kts.	500,000	0
Augusta	5/19/1996	2:25 AM	Thunderstorm Wind	60 kts.	0	0
Cleghorn	6/29/1996	2:57 PM	Thunderstorm Wind	55 kts.	0	0
Allen	6/29/1996	3:00 PM	Thunderstorm Wind	55 kts.	0	0
Eau Claire	8/25/1996	5:01 PM	Hail	1.75 in.	0	0
Eau Claire	8/25/1996	5:37 PM	Hail	0.75 in.	0	0
Eau Claire	8/25/1996	6:10 PM	Hail	1.75 in.	0	0
Fall Creek	6/5/1997	12:30 PM	Hail	0.88 in.	0	0
Eau Claire	6/15/1997	3:00 PM	Thunderstorm Wind	50 kts.	0	0
Eau Claire	6/15/1997	3:25 PM	Thunderstorm Wind	50 kts.	0	0
Augusta	6/15/1997	3:35 PM	Thunderstorm Wind	50 kts.	0	0
Augusta	6/15/1997	3:35 PM	Thunderstorm Wind	50 kts.	0	0
Eau Claire	6/28/1997	4:13 PM	Thunderstorm Wind	50 kts.	0	0
Eau Claire	7/1/1997	9:36 PM	Thunderstorm Wind	55 kts.	0	0
Ludington	7/1/1997	10:30 PM	Thunderstorm Wind	55 kts.	0	0
Eau Claire	7/5/1997	6:20 PM	Hail	0.88 in.	0	0
Eau Claire	7/5/1997	6:25 PM	Thunderstorm Wind	55 kts.	0	0
Eau Claire	10/6/1997	8:35 AM	Hail	1.75 in.	0	0
Fall Creek	10/6/1997	8:40 AM	Thunderstorm Wind	50 kts.	1,000	0
Eau Claire	3/29/1998	5:34 PM	Hail	0.75 in.	0	0
Eau Claire	3/29/1998	5:53 PM	Hail	1.75 in.	0	0
Eau Claire	5/15/1998	5:38 PM	Hail	1.00 in.	0	0
Eau Claire	5/15/1998	5:45 PM	Thunderstorm Wind	55 kts.	73,000	0
Eau Claire	5/30/1998	11:05 PM	Thunderstorm Wind	61 kts.	467,000	0
Eau Claire	6/25/1998	1:45 AM	Thunderstorm Wind	52 kts.	0	0
Eau Claire	6/25/1998	2:10 AM	Thunderstorm Wind	55 kts.	0	0
Eau Claire	6/27/1998	9:45 PM	Thunderstorm Wind	50 kts.	0	0
Eau Claire	9/25/1998	11:45 PM	Hail	1.75 in.	0	0
Eau Claire	6/5/1999	9:47 PM	Thunderstorm Wind	52 kts.	0	0

Foster	6/5/1999	9:47 PM	Thunderstorm Wind	52 kts.	0	0
Foster	6/5/1999	9:47 PM	Thunderstorm Wind	52 kts.	0	0
Augusta	6/5/1999	10:07 PM	Thunderstorm Wind	52 kts.	0	0
Augusta	6/5/1999	10:07 PM	Thunderstorm Wind	52 kts.	0	0
Eau Claire	6/6/1999	5:06 PM	Hail	0.75 in.	0	0
Altoona	6/6/1999	5:10 PM	Hail	0.75 in.	0	0
Eau Claire	6/6/1999	5:10 PM	Thunderstorm Wind	50 kts.	0	0
Eau Claire	7/30/1999	7:20 PM	Thunderstorm Wind	52 kts.	0	0
Fall Creek	8/12/1999	10:34 PM	Hail	0.75 in.	0	0
Allen	6/1/2000	3:55 PM	Hail	1.00 in.	0	0
Eau Claire	9/10/2000	8:17 PM	Hail	1.00 in.	0	0
Eau Claire	9/10/2000	8:28 PM	Hail	0.88 in.	0	0
Eau Claire	9/10/2000	8:50 PM	Hail	1.75 in.	0	0
Cleghorn	9/10/2000	9:30 PM	Hail	0.88 in.	0	0
Eau Claire	9/10/2000	9:30 PM	Hail	0.75 in.	0	0
Eau Claire	9/10/2000	9:30 PM	Hail	0.75 in.	0	0
Eau Claire	9/11/2000	3:12 PM	Hail	1.75 in.	0	0
Eau Claire	4/23/2001	9:23 AM	Hail	1.00 in.	0	0
Augusta	6/11/2001	5:50 PM	Thunderstorm Wind	55 kts.	15,000	0
Eau Claire	6/11/2001	6:15 PM	Thunderstorm Wind	52 kts.	0	0
Augusta	6/18/2001	7:41 PM	Hail	0.88 in.	0	0
Eau Claire	6/18/2001	8:47 PM	Hail	0.75 in.	0	0
Eau Claire	6/18/2001	9:35 PM	Thunderstorm Wind	55 kts.	0	0
Eau Claire	4/18/2002	3:10 PM	Hail	1.00 in.	0	0
Eau Claire	4/18/2002	3:45 PM	Hail	0.75 in.	0	0
Eau Claire	4/18/2002	3:52 PM	Hail	1.00 in.	0	0
Altoona	4/18/2002	3:55 PM	Hail	0.75 in.	0	0
Eau Claire	4/18/2002	4:35 PM	Hail	2.50 in.	0	0
Fall Creek	4/18/2002	4:40 PM	Hail	2.00 in.	0	0
Ludington	4/18/2002	4:50 PM	Hail	1.25 in.	0	0
Foster	4/18/2002	5:10 PM	Hail	0.75 in.	0	0
Augusta	4/18/2002	5:30 PM	Hail	1.00 in.	0	0
Allen	5/8/2002	6:27 PM	Hail	0.75 in.	0	0
Eau Claire	7/28/2002	6:55 PM	Thunderstorm Wind	52 kts.	0	0
Altoona	7/28/2002	7:10 PM	Thunderstorm Wind	52 kts.	0	0
Eau Claire	7/30/2002	5:00 PM	Thunderstorm Wind	52 kts.	0	0
Cleghorn	7/31/2003	7:25 PM	Hail	0.88 in.	0	0
Augusta	5/9/2004	7:12 PM	Hail	0.75 in.	0	0
Foster	6/23/2004	4:53 PM	Hail	0.75 in.	0	0
Eau Claire	7/31/2004	11:45 PM	Thunderstorm Wind	52 kts.	0	0
Regional	12/12/2004	8:00 AM	Strong Wind	35 kts.	100	0
Eau Claire	6/7/2005	5:47 PM	Hail	1.75 in.	0	0
Eau Claire	6/7/2005	5:55 PM	Thunderstorm Wind	52 kts.	0	0
Fall Creek	6/7/2005	6:00 PM	Thunderstorm Wind	55 kts.	0	0

Fall Creek	6/7/2005	6:05 PM	Thunderstorm Wind	52 kts.	0	0
Ludington	6/7/2005	6:15 PM	Thunderstorm Wind	52 kts.	0	0
Eau Claire	6/20/2005	2:15 PM	Thunderstorm Wind	52 kts.	0	0
Eau Claire	6/29/2005	11:05 PM	Thunderstorm Wind	52 kts.	0	0
Eau Claire	7/17/2005	10:08 PM	Thunderstorm Wind	52 kts.	0	0
Countywide	7/23/2005	11:00 AM	Thunderstorm Wind	55 kts.	592,000	0
Eau Claire	7/23/2005	11:05 AM	Hail	1.25 in.	0	0
Eau Claire	8/9/2005	3:02 PM	Lightning	N/A	0	0
Augusta	6/24/2006	12:10 PM	Hail	0.75 in.	0	0
Fall Creek	7/24/2006	4:25 PM	Hail	0.75 in.	0	0
Eau Claire	7/24/2006	5:27 PM	Hail	1.00 in.	0	0
Eau Claire	7/24/2006	5:32 PM	Thunderstorm Wind	52 kts.	0	0
Eau Claire	7/24/2006	5:45 PM	Hail	0.75 in.	0	0
Eau Claire	8/24/2006	4:10 PM	Hail	1.50 in.	0	0
Cleghorn	10/3/2006	7:20 PM	Hail	1.25 in.	0	0
Eau Claire	10/3/2006	7:21 PM	Hail	1.00 in.	0	0
Ludington	7/3/2007	3:26 PM	Thunderstorm Wind	55 kts.	0	0
Eau Claire	7/18/2007	6:31 PM	Thunderstorm Wind	55 kts.	0	0
Eau Claire	7/26/2007	4:46 PM	Thunderstorm Wind	50 kts.	0	0
Eau Claire	7/26/2007	4:48 PM	Hail	0.75 in.	0	0
Eau Claire	9/13/2007	12:03 PM	Hail	0.75 in.	0	0
Eau Claire	5/17/2008	4:45 PM	Hail	1.00 in.	0	0
Eau Claire	5/25/2008	6:30 PM	Hail	1.00 in.	0	0
Eau Claire	5/25/2008	6:35 PM	Hail	1.00 in.	0	0
Eau Claire	5/25/2008	6:37 PM	Hail	0.75 in.	0	0
Brackett	5/25/2008	6:45 PM	Hail	1.00 in.	0	0
Cleghorn	5/25/2008	6:45 PM	Hail	1.00 in.	0	0
Augusta	5/25/2008	6:51 PM	Hail	1.00 in.	0	0
Foster	7/19/2008	5:20 PM	Thunderstorm Wind	54 kts.	0	0
Porters Mills	4/24/2009	4:00 PM	Hail	0.88 in.	0	0
Altoona	4/24/2009	4:07 PM	Hail	0.88 in.	0	0
Porters Mills	4/24/2009	4:17 PM	Hail	0.88 in.	0	0
Altoona	4/24/2009	4:35 PM	Hail	1.25 in.	0	0
Fairchild	4/24/2009	5:25 PM	Hail	0.75 in.	0	0
Altoona	8/7/2009	11:30 PM	Heavy Rain	N/A	0	0
Lake Eau Claire	8/13/2009	10:00 PM	Heavy Rain	N/A	0	0
Eau Claire	7/17/2010	9:10 PM	Thunderstorm Wind	56 kts.	0	0
Fall Creek	4/10/2011	3:52 PM	Hail	1.00 in.	0	0
Strader	4/10/2011	3:55 PM	Thunderstorm Wind	78 kts.	100,000	0
Augusta	4/10/2011	4:05 PM	Thunderstorm Wind	68 kts.	0	0
Augusta	4/10/2011	4:09 PM	Hail	1.00 in.	0	0
Porters Mills	5/9/2011	2:10 PM	Hail	0.75 in.	0	0
Shawtown	6/18/2011	6:55 PM	Thunderstorm Wind	52 kts.	5,000	0
Eau Claire	7/19/2011	8:30 PM	Thunderstorm Wind	56 kts.	0	0

Foster	7/19/2011	8:45 PM	Thunderstorm Wind	50 kts.	0	0
Eau Claire	7/23/2011	9:45 AM	Thunderstorm Wind	52 kts.	0	0
Eau Claire	5/24/2012	3:25 PM	Thunderstorm Wind	65 kts.	250,000	0
Eau Claire	5/26/2012	4:50 PM	Hail	1.75 in.	0	0
Eau Claire	5/26/2012	4:58 PM	Hail	1 in.	0	0
Eau Claire	5/26/2012	5:10 PM	Hail	0.75 in.	0	0
Eau Claire	6/19/2012	4:50 AM	Thunderstorm Wind	52 kts.	0	0
Brackett	9/4/2012	4:23 AM	Hail	0.75 in.	0	0
Fall Creek	9/4/2012	4:46 PM	Hail	1.75 in.	0	0
Fall Creek	5/19/2013	5:55 PM	Thunderstorm Wind	50 kts.	0	0
Altoona	5/29/2013	3:44 PM	Thunderstorm Wind	52 kts.	0	0
Fairchild	5/29/2013	3:50 PM	Thunderstorm Wind	52 kts.	0	0
Altoona	5/29/2013	3:55 PM	Thunderstorm Wind	52 kts.	0	0
Brackett	5/31/2013	3:23 PM	Hail	1 in.	0	0
Fairchild	5/31/2013	4:14 PM	Hail	1.25 in.	0	0
Eau Claire	5/31/2013	6:11 PM	Hail	0.88 in.	0	0
Cleghorn	6/21/2013	4:25 AM	Thunderstorm Wind	52 kts.	0	0
Augusta	6/21/2013	4:40 AM	Thunderstorm Wind	52 kts.	0	0
Eau Claire	6/21/2013	8:30 PM	Hail	1 in.	0	0
Eau Claire	6/21/2013	840 PM	Hail	0.75 in.	0	0
Cleghorn	8/6/2013	8:48 PM	Hail	1 in.	0	0
Cleghorn	8/6/2013	8:50 PM	Hail	1 in.	0	0
Augusta	6/17/2014	11:10 PM	Hail	1 in.	0	0
Eau Claire	7/7/2014	2:20 PM	Hail	1 in.	25,000	0
Eau Claire	7/7/2014	2:25 PM	Hail	0.88 in.	0	0
Eau Claire	7/7/2014	2:25 PM	Hail	0.88 in.	0	0
Altoona	7/7/2014	2:27 PM	Hail	0.88 in.	0	0
Foster	7/7/2014	2:40 PM	Thunderstorm Wind	56 kts.	0	0
Cleghorn	7/7/2014	2:45 PM	Hail	1 in.	0	0
Eau Claire	8/18/2014	2:00 PM	Hail	1 in.	0	0
Eau Claire	6/8/2015	1:30 A M	Lightning		108,000	0
Eau Claire	7/12/2015	11:10 PM	Thunderstorm Wind	52 kts.	0	0
Fall Creek	7/12/2015	11:35 PM	Thunderstorm Wind	52 kts.	0	0
Augusta	7/12/2015	11:37 PM	Thunderstorm Wind	52 kts.	0	0
Ludington	7/12/2015	11:40 PM	Thunderstorm Wind	52 kts.	0	0
Eau Claire	7/18/2015	1:20 AM	Thunderstorm Wind	61 kts.	100,000	0
Eau Claire	6/10/2016	3:08 AM	Thunderstorm Wind	52 kts.	0	0
Eau Claire	6/10/2016	3:10 AM	Thunderstorm Wind	56 kts.	100,000	0
Altoona	6/10/2016	3:20 AM	Thunderstorm Wind	60 kts.	5,000	0
Altoona	9/20/2016	6:40 PM	Hail	0.88 in.	0	0
Augusta	9/21/2016	4:30 PM	Thunderstorm Wind	52 kts.	0	0
Foster	5/17/2017	7:35 PM	Thunderstorm Wind	61 kts.	100,000	0

Fairchild	6/16/2017	6:25 PM	Hail	1.5 in.	0	0
Fairchild	6/16/2017	6:27 PM	Hail	1.25 in.	0	0
	216 events (166 since 1/1/1993)				$2,496,100	$10,000

Source: National Climatic Data Center (NCDC)

Two high straight-line wind events require special mention:

July 15, 1980 "The Big Wind"
"The Big Wind" struck the Eau Claire area about 9:30 PM on July 15, 1980, with high winds causing great damage to property, trees, and power lines, as well as one death. Fewer than two dozen were injured during the event, though about 200 injuries were reported during the post-event clean-up which lasted several weeks. Winds out of the southwest were steady at 50-65 mph for about an hour with one gust measuring 112 mph. Street lights were knocked over and thousands of trees were uprooted. By the time the storm passed, only one local radio or television station remained on the air due to damage to towers or lack of generators. 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. A state of emergency was declared and lasted six days.

An excellent resource for more information on this event is the book entitled *Spearhead Echo: The Storm of 1980* by Lukas Hoffland, from which much of the information in this summary was taken. Mr. Hoffland reported that 52 homes, 85 mobile homes, and 19 apartment buildings were destroyed in Eau Claire, Dunn, Pierce, and Chippewa counties, with many more damaged. He reported total damages for Eau Claire County of nearly $61 million, which in today's dollars would be over $170 million.

May 24, 2012 High Straight-Line Wind
This event is so recent that it is not included in Table 17. During the afternoon of May 24th, winds estimated as high as 60 mph struck the Chippewa Valley with the greatest damages within the City of Eau Claire. West and north side neighborhoods were especially hit hard on a path from the southwest side of the City and northeast through the Chippewa Valley Regional Airport. No deaths or injuries were reported, but the damage was extensive. An estimated 7,250 Xcel Energy customers were left without power, of which about 5,200 were City residents. Xcel lost 23 power poles as a result of the storm. The Airport and City's wastewater treatment plant both needed to operate on emergency power generators. About 1,500

customers were without power for over 24 hours, mostly in the Shawtown neighborhood. One homeowner was without power for at least two weeks due to the inability to pay for the replacement of related equipment to meet current codes.

About fifty streets in the City of Eau Claire were partially or entirely closed and several arterial streets were closed due to debris and falling trees. A 200-foot tall radio tower serving multiple stations was knocked down. Falling trees damaged many homes, structures, and vehicles. Significant damage occurred at Lakeview Cemetery and Carson Park, and a hangar collapsed on an airplane at the airport. An estimated 600 to 1,000 trees were toppled in the City's parks and cemeteries alone. Damage estimates from this very recent event were not available for inclusion in this plan update, but clean-up is continuing a week later.

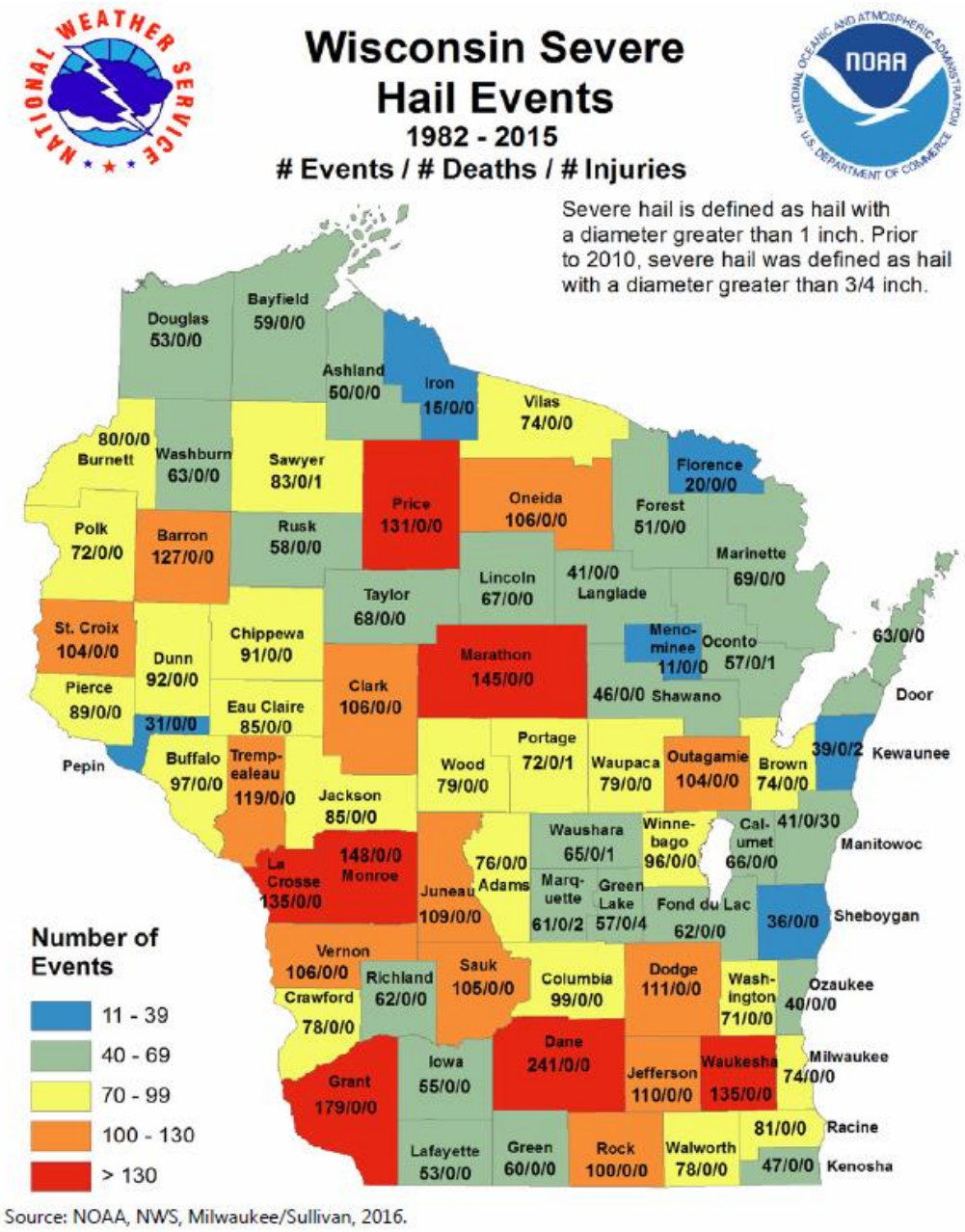
Since 1993, hail events have triggered the largest number of thunderstorm-related NCDC reports (85 total) for Eau Claire County averaging 3.5 reports per year. Compared to its neighbors in Wisconsin, Eau Claire County has experienced fewer hail events in recent decades (see **Figure 26**), though it is also geographically smaller than many of its neighbors. The majority of the hail events striking Eau Claire County were not severe and no damage was reported. Trained volunteer storm spotters and the National Weather Service (NWS) officially report severe hail, which are hailstones considered 0.75 inches in diameter or greater, which is the size of a penny.

The National Weather Service is able to forecast and track thunderstorms that are capable of producing severe weather conditions such as high winds, hail, lightning, and possibly tornados. Although the improvement of technology has enabled meteorologists to better forecast and monitor thunderstorms, there is no precise way to make long-term predictions of location, severity, and associated risks. As shown in Table 17, there are no clear trends that can be used to make projections on the impacts of future thunderstorm events.

Relative Level of Risk

Based on recent trends, it is expected that Eau Claire County will average of 3 to 4 severe thunderstorm, high wind, and hail event days each year, with many of these days yielding multiple reports. The highest frequency of these events will occur during the months of April through August. As will be discussed in Section III.C., climate change has the potential to influence the frequency and severity of storm events, though insufficient data is available to make a reliable risk prediction.

Figure 26. Reported Hail Events in Wisconsin



Vulnerability Assessment—Thunderstorms

Potential Impacts

Thunderstorms have no defined hazard area within Eau Claire County. Due to the irregular nature of these events and lack of specific hazard areas, the impacts as a result of a thunderstorm

are difficult to quantify. As Table 17 showed, most thunderstorm events occur with minimal negative impacts; and this trend will likely continue.

In general, thunderstorms, high winds, and associated hazards can cause damage to houses or property, uproot trees, and topple (or cause lightning damage to) above-ground power or telephone lines. Above-ground power lines are especially vulnerable in wooded areas with significant residential development, such as older neighborhoods and new subdivisions within pine plantation, where adjacent trees can be blown down onto the lines. Roadways can also be blocked by debris; and debris can accumulate in rivers or stormwater systems, contributing to washouts or flooding.

Note:

High wind vulnerability is further explored as part of the tornado sub-section.

Severe thunderstorms can cause injury or death from lighting, falling trees, downed power lines, and high-wind impacts. They may cause power outages, disrupt telephone service, and severely affect radio communications and surface/air transportation, which may seriously tax the emergency management capabilities of the affected municipalities. Stormwater and other flooding impacts are discussed separately as part of the flooding hazard assessment in Section III.B.i.

Hail can cause serious injury and damage to buildings, personal property (vehicles), and crops. The most significant damage occurs when hailstones reach a diameter of 1.5 inches, which happens in less than half of all such storms. Hail and high winds can also cause significant damage to trees, landscaping, and agricultural crops. Given the lack of reported hail damage in the County to date, it is not possible to reliably project future damages.

Lightning can result in injury, start fires, spook livestock, short-out electrical systems, cause widespread losses of power, and even cause death. Between 1995 and 2002, there were 364 deaths due to lightning in the United States. And in Wisconsin, insurance records show that annually, one out of every fifty farms is struck by lightning or has a fire which may be caused by lightning. Large outdoor gatherings can also be particularly vulnerable to lighting strikes that may result in injuries or death. This was certainly the case in August 2000 when one man died and others were injured at the Apple River Campground as part of the Ozzfest Music Festival near Somerset.

Based on key informant interviews, past-event history, and a review of the community, it was determined that the following general types of facilities and community assets are most vulnerable to thunderstorm (non-flooding) events:

- Mobile homes, especially those unanchored (high winds)
- Large-span buildings and buildings with many windows (high winds, hail)
- Above-ground power lines, especially in wooded areas (high winds, lightning)
- Outdoor events where large numbers are gathered (high winds, lightning)
- Agricultural crops and barns (high winds, hail. lightning)

Overall, most thunderstorms result in minor damage to most buildings and structures, though all

improvements and structures are potentially vulnerable to varying degrees. Older, deteriorating structures may be more vulnerable, though the condition of a structure is not inherently linked to age. Some more common impacts include leaks and flooding basements during heavy rains; damage to personal property or windows due to hail; or wind damage to roofs, trees, vehicles, etc. Thunderstorm damage to structures is typically remedied by the individual owner, utilizing insurance as needed, and is not officially reported to Emergency Management officials or other governmental entity. However, some high, straight-line wind events can approach tornado velocity, effectively yielding the same vulnerabilities as a tornado event, especially for mobile homes. Please refer to the vulnerability assessment for tornados in the previous section for a discussion of the potential vulnerabilities due to high winds. Lightning strikes to power lines, homes, and barns are not an uncommon occurrence.

The continuing changes in land-use and development patterns can influence the County's future exposure to thunderstorms. As discussed in the community profile, the 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 events. Although new development is managed to ensure adequate protective services are provided and construction is governed by the most current building codes, continued growth increases the vulnerability to hazard events.

Vulnerable Critical Facilities

The May 24, 2012, thunderstorm with high winds provides insight into potential critical facilities impacts. This event downed trees and power lines on the west side of Eau Claire which closed roads and damaged buildings. A radio communications tower was also damaged and a number of related radio stations were off the air. Many homes and businesses were without power, some for more than 12 hours, and the City's wastewater treatment facility was operating on its emergency power generator.

A more robust assessment of the community assets (critical facilities) and their susceptibility to thunderstorms is located in **Appendix E**. The vulnerability assessment shows that utilities and infrastructure, and, in particular, above-ground power and communication lines, have the greatest vulnerability to thunderstorm events from downed power lines and lightning strikes. Facilities with large numbers of windows or large amounts of glass are also vulnerable to hail and high winds (e.g., schools, hospitals).

High winds and lightning can also affect radio communications and antennas, potentially impacting weather warning systems and the coordination of emergency response providers. Power or communications outages as a result of thunderstorm events can indirectly affect the function of other critical facilities (e.g., hospitals, schools, government offices). Risks and vulnerabilities associated with power outages are discussed the following *Long-Term Power Outage* subsection.

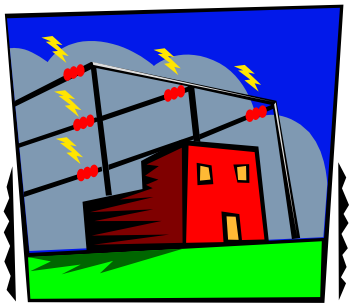
Unique Jurisdictional Risks or Vulnerabilities—Thunderstorms

Like tornados and winter storms, thunderstorms pose no risks or vulnerabilities unique to individual jurisdictions. The level of vulnerability increases with development density, population density, age/condition of structures, and value of improvements. As such, cities and villages are the highest vulnerability areas as well as those areas of with higher populations, larger numbers of housing units, and higher assessed value per square mile described previously in Section II.C. & D. of the Community Profile.

During community meetings on this project, high straight-line winds were the most frequently mentioned risks, with power loss, falling tree limbs, and damage to structures (e.g., roofs, mobile homes, siding) being the most significant concern. The vulnerabilities related to high winds were largely covered as part of the tornado section or the long-term power outage section for electric outages.

Any notable differences between municipalities regarding their vulnerability to thunderstorms are further discussed in the *Unique Jurisdictional Risk or Vulnerabilities Table* in **Appendix F**. The Village of Fairchild did note that a liftstation had problems in the past with repetitive lightning strikes, but the Village has since worked with Xcel Energy to install resistors and additional grounding which appears to have resolved this concern. The City of Eau Claire has had some repetitive strikes at the well field. Altoona has also experienced lightning strikes at the City Hall, a water tower, and at the Public Safety Building, the latter of which received computer damage, though none of these strikes have been a repetitive problem at a single site.

v. Long-Term Power Outage



Many of the highest-rated natural hazard events facing Eau Claire County have the potential to cause an extended and widespread loss of electrical power. Above-ground power lines and transmission towers can be damaged by ice storms, heavy snows, tornados, and high straight-line winds. Elevated power lines in wooded areas have the greatest vulnerability. Such infrastructure can also be damaged by wildfire, lightning, and flooding, though the impacts are typically much more localized. Human action and equipment failure can also result in power loss.

Public Health Hazard Vulnerability Assessment

The 2017 Northwest Wisconsin Health Care Coalition Public Health HVA rated power outage as a 43% overall risk over a ten-year period given its moderate probability (2.0), moderate impacts (1.8), and moderate available emergency management capabilities to deal with this threat (2.0 internal, 2.0 external). The assessment used a scale of 1 to 3, with "1" being low probability/impact or having substantial management capabilities and "3" being high probability/impact or having limited/no management capabilities.

Risk Assessment – Long-Term Power Outage

Three natural hazard threats pose the biggest power loss threat within Eau Claire County: a large ice storm, possibly in conjunction with heavy/wet snow; the high winds associated with unstable summertime weather patterns; or high winds during a blizzard. However, it is large ice storms that often 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.

According to the National Climatic Data Center database from 1993 through April 2011, there have been three ice storm or freezing rain/glaze events reported for Eau Claire County, all occurring in the mid-1990s. In January 1996, freezing rain produced ice accumulations up to three inches in some areas of the region resulting in scattered power outages that were relatively short in duration.

However, the risk of a long-term event is very real. For example, the March 1976 ice storm was one of the worst natural disasters to hit Wisconsin; Eau Claire County was not one of the 22 counties which were part of this disaster declaration. Ice accumulations of up to five inches were reported, and high winds of 60 mph made the situation worse. Up to 100,000 people were without power at the height of this storm. Serious winter or ice storms in central Wisconsin also occurred in December 1904, February 1922, February 1936, and November 1943, though data on the impacts are limited.

In January 1998, an ice storm hit the Montreal area and left over four million residents without power. Some areas were without power for over three weeks. The January 2009 ice storm which hit Kentucky resulted in $616 million in damages, 36 fatalities, and 700,000 customers without power at its peak; 50,000 customers were still without power after two weeks, and it took 38 days for full restoration. Ice and heavy snow in the late fall when leaves are still on the trees can exacerbate outages as trees and branches collapse under the combined weight. This was the case during the Halloween 2011 nor'easter which broke many snowfall records in the northeastern U.S. and left approximately 1.7 million customers without power.

from Eau Claire Daily Telegram, March 12, 1962

Fallen Tree Limbs Litter City

Heavy Snow Storm Closes Schools, Wrecks Power, Telephone Lines

The heaviest snowfall as far as the actal weight of the snow is concerned, 12 inches, and one of the heaviest in inches of snowfall of the season snarled telephone and electric power lines, roads and schools in the Eau Claire area today and people working to clear up trouble spots were slow to say when the task would be completed.

Thirteen schools in the Eau Claire system were closed today by weather, power failure and furnace trouble, giving 1,500 or more of the system's 9,200 students a day off. Schools in Altoona were also closed as were schools all over the surrounding area.

The total number of telephone and electric service customers out of service in the area was difficult to arrive at since many telephones were out of service and persons without telephone service were unable to report electricity outages. Telephone customers were in many cases driving to neighbors' if roads were passable to report telephone outages.

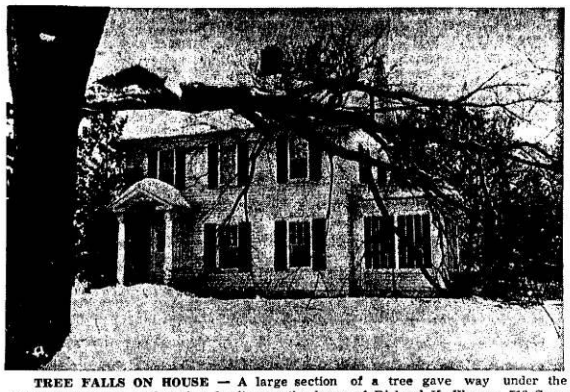
REPAIR CREWS trying to put utilities back in service were being slowed by the heavy snow that made some roads all but impassable and individuals who had telephone and electric service were calling up city officials demanding that their roads and streets be plowed out so the individual involved could get to work. A few threats of sending the city bills for losses due to snow-clogged streets did nothing to help the city crews move the snow.

City workmen were busy early in the day removing large limbs from streets after they had been broken from trees by the weight of snow. Limbs and branches that fell onto boulevards and snow-covered lawns were the householder's problem.

City plows were making slow headway against the heavy, wet snow since it was heavy enough in some cases to trip the plows. Otherwise the snow clung to plow and grader blades and resisted efforts to move it.

AROUND THE city a number of electric and telephone lines were knocked down by the weight of snow or falling branches. Two trees were knocked down, one in Eau Claire and one in Altoona, and a telephone pole was snapped by the weight of snow on wires near Menomonie.

The collapse of a barn roof near Fall Creek pointed out the warning given property owners in the city to clear



TREE FALLS ON HOUSE — A large section of a tree gave way under the weight of the snow early today, landing on the home of Richard K. Werner, 516 Summit Ave. (Staff Photo)

PHONES GO OUT

The telephone system in Eau Claire went out at 12:30 p.m. today, the victim of over-popularity. A sudden peak demand on the system resulting from calls occasioned by the weekend storm started blowing fuses in the system and the dial tone was lost. Service was restored briefly at 1:40 p.m. only to go out and be restored a few minutes later. Shortly after 1:45 the telephone company, still replacing blown fuses, was hoping to gain a little and restore normal service as the peak

The threat of extended power loss is not limited to large, regional, and multi-state winter storms. Smaller events can still have devastating and costly impacts on multiple counties or more localized areas, such as the March 1962 event which struck the Eau Claire area, leaving many without electric or telephone service.

While the focus of power loss is often on ice storms due to their widespread nature, other natural events can also result in a sizable loss of power. In fact, high winds and falling trees appear to be a more frequent cause of widespread loss of power due to a natural hazard event. "The Big Wind" struck the Eau Claire area 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.[20]

In July 1991, a particularly violent and widespread straight-line wind (or derecho) lasted 17 hours and stretched from South Dakota to western Pennsylvania, including parts of Wisconsin. This event caused over $100 million in damage and resulted in power loss to nearly one million customers. A similar event in May 1998 blew through central Wisconsin resulting in at least $500 million damage and over two million people were without electrical power, some for over 10 days.

[20] Hoffland, Lukas. "Spearhead Echo: The Storm of 1980", LukasLight, Eau Claire, WI, 2005.

More recently, in July 2005 high winds downed poles and trees fell on lines over large areas of the Eau Claire County. Eau Claire Energy Cooperative requested assistance through the Restoration of Power in Emergency (ROPE) system and several cooperatives responded. In August 2007, heavy rain and lightning resulted in the loss of power for about seven hours in the Oakwood Mall area in the City of Eau Claire, though other areas in the region were without power for a longer period.

High winds in October 2010 left about 44,000 Xcel Energy customers in the Upper Midwest without power at different times over a two-day stretch; about 300 customers lost power in the Eau Claire-Chippewa Falls area during this event. On May 24, 2012, straight-line winds hit the Chippewa Valley leaving nearly 6,700 Xcel customers (about 5,200 of which were City of Eau Claire residents) without power. Roughly 1,500 persons in the City were without power for over 24 hours. Other wind and storm events have resulted in localized power losses in the Eau Claire County, though the long-term loss of power exceeding 48 hours is quite rare and has been limited to a very small number of customers in recent history. The 2011 Burnett County straight-line wind left some areas without power for about a week. And in July 2016, severe thunderstorms left about 250,000 Xcel Energy customers in the Twin Cities metropolitan area without power.

There are two primary electrical providers in Eau Claire County:

Eau Claire Energy Cooperative (serves approximately 87% of the County area)
Xcel Energy (serves approximately 11% of the County area).

The remaining two percent of the County area is served by Jackson Electric Cooperative, Clark Electric Cooperative, and Dunn Energy Cooperative.

While Eau Claire County has not recently experienced a long-term power outage event, a look at the average length of recent power outages in Table 18 for Eau Claire Energy Cooperative provides further insight into the potential risk.

Table 18. Average Outage Length by Cause - Eau Claire Energy Cooperative

Outage Cause	2017	5-Year Average
	average minutes per customer	
Power Service Provider	17.4	13.3
Major Event (25+ customers affected)	44.1	62.7
Other (<25 customers affected)	46.9	54.5
Total	108	130.8

source: Eau Claire Energy Cooperative, 6/25/18

Power Service Provider outages are a transmission-related issue and outside the control of the Energy Cooperative. Various circumstances (e.g., storms, equipment failure) can result in a major event, though Cooperative staff estimated about 75% of the major events are weather

related. Other outages can also be caused by weather or equipment failure as well as underground faults, wildlife, etc.

The risk 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.

In summary, a widespread, long-term power outage event covering most or all of Eau Claire County would be rare, but the potential does exist. Based on discussions with personnel from area electric providers, it is estimated that only about five or six long-term power outage events have likely impacted the region during the past century, but these have not approached the scale of the 1976 Wisconsin, 1998 Montreal, or 2009 Kentucky outages.

Areas of Higher Risk

All above ground/overhead power lines have a higher risk of producing an outage due to ice, winds, tree damage, etc. The loss of power due to falling limbs and trees has been largely mitigated through proactive, aggressive tree-trimming programs by the electric providers serving Eau Claire County. The Cooperative conducts such tree-trimming on a six-year cycle with spraying in the interim. But even with such efforts, forests are the dominate land cover in nearly half of the County and overhead lines in such wooded areas are still at higher risk. Such tree trimming also reduces the wildfire ignition risk.

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

Eau Claire Energy Cooperative did not report a specific area as being prone to frequent outages, but they are concerned about overhead lines which cross Interstate 94. Ice, wind storms, tornados, and wildfire could all result in overhead lines collapsing onto the interstate which has average daily traffic counts ranging from 20,000 to nearly 30,000 in Eau Claire County. The Cooperative has made efforts to pursue mitigation grant dollars to help bury these lines without success since there is not a history of outages related to these lines (and numbers of customers affected and length of these outages); FEMA's current benefit-cost analysis approach makes it difficult for such projects to score high enough to receive funding. The Cooperative did note that some scattered single residential feeds in wooded areas do have a higher outage risk.

Power loss due to falling trees is not limited to the unincorporated areas. Residential neighborhoods with older trees or built within wooded areas of cities and villages are also vulnerable to outages. No cities, villages, or towns identified specific areas as being uniquely prone to power outages.

Vulnerability Assessment – Long-Term Power Outage

While rare, the impacts and costs of a long-term power outage event can be tremendous and the Steering Committee viewed this threat as one of the greatest natural hazard concerns for Eau Claire County. Extended power loss in Eau Claire County due to a storm event would likely involve many downed trees and power lines. Downed lines present safety hazards for residents, travelers, and emergency responders. Response can be further hampered by blocked roads from power lines and debris.

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

Single Phase – Overhead:	$85,000/mile
Single Phase – Underground:	$56,000/mile
Three Phase – Overhead:	$185,000/mile
Three Phase – Underground:	$100,000/mile

Estimated mileage of all elevated power lines in Eau Claire County is not available. However, in the entire Eau Claire Energy Cooperative system, there is approximately 1,700 total miles of line serving about 11,013 active services. Approximately 52 percent (or 897 miles) of their electric lines are underground. With forest being the predominate land cover over approximately 30-40 percent of Eau Claire County (*see Section II.*), a significant portion of these overhead lines are most at risk of damage due to falling trees or limbs.

Given the above replacement costs, the potential damages to overhead power lines from a severe storm event in Eau Claire County could easily be in the millions. While Xcel Energy serves less area, it does serve a larger percentage of total customers in the County, including most of the City of Eau Claire population.

picture from Mark Garland, Kentucky Div of Emgy Mgmt

Given recent experiences elsewhere in the United States, it is not unrealistic to imagine a significant portion of the County's population, businesses, and facilities could be without power for one to three weeks should a 50- or 100-year event occur. Following the 2009 Kentucky storm, 37 percent of affected customers were still without power after one week and seven percent were without power after two weeks. During the Kentucky event, carbon monoxide from improper generator use was the largest cause of death. But it must be remembered that the potential impacts in Eau Claire County could be much more severe—Kentucky's temperature warmed well above freezing following their ice

storm. In comparison, Eau Claire's daily mean January temperature of 11.9ºF [21] could prove quite deadly should power be lost and transportation systems hindered for an extended time. This is discussed more in the winter storms assessment.

Long-term power outage (LTPO) planning has been receiving increased attention in Wisconsin during the past decade. Realizing the seriousness of this threat, Eau Claire County Emergency Management, local officials, electric providers, and other local stakeholders participated in a series of regional-level workshops and tabletop exercises in 2010 on this topic. More recently, a number of additional critical infrastructure workshops have been locally hosted by Disaster Ready Chippewa Valley and Wisconsin Emergency Management.

Based on these workshops and exercises, the following groups and critical facilities were identified as being especially vulnerable or important during a long-term power outage event:

- Independent Special Populations (e.g., seniors, disabilities)
- Long-Term Care Facilities and Hospitals
- Municipal Utilities and Emergency Fuel
- Emergency Response Providers, Communications, & Operations Centers
- Emergency Shelters and Food Distribution Sites (i.e., schools)

The large population of the urban area and the very rural nature of many other parts of the County pose challenges to the identification and tracking of residents who may have special needs during a LTPO event (e.g., dialysis, oxygen/ventilator, medicines). Seniors living alone are of special concern.

Special Populations

Seniors living alone in rural areas are of special concern. In 2016, Eau Claire County had an estimated 19,938 residents ages 60 and over, or nearly 20 percent of its total population. Of this age group, approximately 43 percent resided outside the City of Eau Claire. However, cities, villages, and towns outside Eau Claire only had 35 percent of the County's total population in 2016, demonstrating that communities outside the City had higher percentages of older residents. As discussed earlier, the number of County residents ages 65 and over is projected to nearly double between 2010 and 2040.

The Eau Claire County Aging and Disability Resource Center (ADRC) provides nutrition and support services to seniors and disabled in the County at three meal sites and to about 400 additional residents through its meals on wheel program. Such services are an important means of tracking and reaching out to the County's special needs population during a disaster, though such services could be disrupted during a long-term power loss event.

The ADRC has been promoting individual emergency planning for senior and special needs clients, with emergency communications networks and other preparedness actions. Emergency

[21] National Climatic Data Center. Amery Station Climatography, 1971-2000. http://cdo.ncdc.noaa.gov/climatenormals/clim20/wi/470904.pdf

contact information is collected from clients upon entering the program and the County is exploring ways to best integrate such information with the new mass notification system. ADRC also works with County Emergency Services, Public Health, and other partners for the distribution of hazard awareness and preparedness educational announcements through the ADRC monthly newsletter with a circulation of about 2,400 issues. To help identify, reach out, and direct services to at-risk populations, Eau Claire County relies on coordination with various public, non-profit, and private sector service providers. This approach is outlined in the County's Special Populations Emergency Plan, which is scheduled to be updated.

Local electric providers give preference to "critical accounts" that have an important safety or health role, such as hospitals. Providers also encourage household planning. For example, the following statement is provided to Xcel Energy's "critical accounts":

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

As previous discussed in Section II.D., Eau Claire County has numerous nursing homes and assisted living facilities, the majority of which are located in the City of Eau Claire. During a long-term power outage event, most of these facilities would initially shelter-in-place, though medicine, equipment, and municipal water and sewer would become very serious concerns after the first 24-48 hours if power is not restored. Past regional power outage exercises have increased attention to these concerns.

Vulnerability of Communities, Critical Facilities, and Businesses

The availability of emergency power generators for utilities, communications, shelters, emergency operations, fuel sources, long-term care facilities, and other critical facilities is crucial to mitigating the potential impacts of a long-term power outage (LTPO) event. Many municipal buildings (e.g., city/village hall) also perform an important emergency operations center (EOC) role should disaster strike. Further, demands may be high on limited fuel sources for response vehicles, electric crews, and power generators. No formal inventory of emergency power generator availability has been performed in the County.

As part of this plan update, a web-based power outage preparedness and generator survey was distributed through County Emergency Management and Disaster Ready Chippewa Valley email lists in Spring 2018. A total 34 responses were received from many different entities—governmental (9), businesses (8), hospital/health care (7), educational/schools (5), utilities (3), and emergency response agencies (2). The key findings from this survey were:

- Due to the diversity of respondents, not everyone was familiar with all aspects of their community's or organization's generator needs and level of preparedness. For this reason, the interviews provided more reliable results than the survey, especially for cities and village) and the emergency response agencies (e.g., fire, EMS, law enforcement).
- Outside of the City of Eau Claire, most city/village/town EOCs appear to lack a generator. More follow-up and EOP review on this topic may be needed, since one

community responded "we don't have an EOC" and another suggested "we have several buildings with backup generators."

- 54% of respondents stated that they had emergency plans or procedures in place to mitigate the impacts of long-term power loss.
- 69% agreed or strongly agreed that their organization have an emergency generator adequate fuel source should power be lost for three or more days. 15.4% disagreed and 15.4% strongly disagreed.
- 38% of non-governmental critical facilities stated that they need additional power generators or connections at their facility(s) to support their critical functions and services. About one-half of the responding business also identified a potential generator need.
- 23% of respondents stated that formal agreements were needed for emergency re-fueling if power is lost for 3 or more days. 50% had such agreements. Two respondents noted they have an uninterruptible fuel supply since their generators are connected to natural gas.
- 65% stated that they have a back-up location for critical services designated that has emergency power. 4% stated their back-up location does not have emergency power. 23% stated they have no back-up location and 8% did not know. One clinic stated that they are part of the County Plan and would lean on them to designate an off-site treatment facility.

During community meeting, a number of emergency power generator needs were identified by the participating cities and villages:

Fairchild – Needs a portable generator for public utilities.

Fall Creek – The Fire Hall/Police Station/Village Shop, which would also serve as EOC/command post during an emergency event, lacks a generator. Additional generator needs were identified for utilities.

Altoona – Generators needed for the Public Safety Building, Spooner liftstation, and two wells. Wells are not set-up to run on generators. Uncertain if the long-term care facilities in the community have generators or emergency fuel plans.

Augusta – City Hall, which includes Police Station and would serve as EOC, lacks an emergency power generator.

Eau Claire – City Hall has generator, but lacks redundancy if not available; working to formalize fuel agreement. Central Maintenance (backup EOC), 4 radio towers, Fire Hall #1, wastewater treatment plant, and Library have generators. Other Fire Halls do not have generators, except new Fire Hall has 60% capacity. Hobbs does not have a generator, which could be used as a recovery site. City also studying solar for key facilities, including County Building, which would provide additional redundancy.

The survey results, community meetings, and stakeholder interviews were also used to update the critical facilities vulnerability assessment table in Appendix E. This assessment suggests that ice storms, tornados, and high winds are the largest threats to power loss, though there is a growing cyber-threat given national and international incidences in recent years (see Cyber-Attack assessment section).

Likely due to the high demand for generators, Wisconsin Emergency Management has not included emergency power generators on its priority list for hazard mitigation grant funding at this time, unless the generator is part of another eligible project (e.g., community safe room). Even less frequently common are agreements for emergency fueling should an event last multiple-days and exhaust local fuel supplies.

*Long-Term Power Outage Preparedness & Communica*tion

In short, a long-term, widespread power outage is one of the greatest natural hazard vulnerabilities facing the Eau Claire County and the region. As the Kentucky experience shows, total costs in response and damages can be in the tens of millions or greater. And significant threats to life and safety exist due to downed lines, fire, improper generator use, loss of access to medical treatments, extreme cold, and loss of food and other utilities.

Cooperation, communication, and planning with power providers and critical facilities are key to preparing for and mitigating the impacts of power loss. Based on discussions with representatives from Xcel Energy, Eau Claire Electric Cooperative, and other area electric providers, the following should be considered:

- Involving utility providers in disaster event exercises and incident command system (ICS) training is very important. It is recommended that critical facilities drill their outage plans and provide the electric provider with 24/7 contact information. Advanced notice for such trainings and workshops is required due to the time commitments involved.
- Communication between electric providers and utilities, emergency management personnel, service providers, and local communities can be vital during a LTPO event to help protect the safety of responders and residents. This includes notifying electric restoration crews of known road washouts, flooding areas, etc. For a major disaster, utilities may provide a liaison at the County Emergency Operations Center.
- Electric providers have a strong mutual aid network should it be needed, such as the Restoration of Power during an Emergency (ROPE) system for cooperatives. It is important to remember that during a large event, mutual aid support may come from

communities throughout North America. Staging, logistics, tracking, and related administration for such efforts can be tremendous challenges.

- During a disaster or power outage, electric providers can "ping meters" to help identify areas with outages, possible downed power lines, etc.
- Some utilities and electric providers maintain lists of critical clients or medical accounts (e.g., oxygen) that will be given a preference for power restoration, but the availability of this service varies by provider.
- Electric providers and utilities have a key public informational role during an outage. In addition to working with media and social media, many providers, have web-based power outage maps that are close to "real time".
- It is important that emergency response and public-sector road crews understand the risks of working near downed power lines and how power is restored.
- More public education may be needed on: safety issues during a power outage, how to get information during an outage (e.g., media, websites, mobile apps), and how power is restored.

The following websites of area electric providers is a great place to start:

https://www.xcelenergy.com/outages_and_emergencies

https://www.ecec.com/my_account/outages

The lessons learned from the recent LTPO workshops and exercises have been integrated into a state-level report which is available at the WEM website. The recommendations of the State report were considered during this hazard mitigation planning effort and, when appropriate, have been integrated into the mitigation strategies found later in this document.

vi. Drought

Public Health Hazard Vulnerability Assessment

The 2017 Northwest Wisconsin Health Care Coalition Public Health HVA rated drought as a 31% overall risk over a ten-year period given its moderate probability (2), but moderate-to-low impacts (1.5), and substantial-to-moderate available emergency management capabilities to deal with this threat (1.5 internal, 1.5 external). The assessment used a scale of 1 to 3, with "1" being low probability/impact or having substantial management capabilities and "3" being high probability/impact or having limited/no management capabilities.

Risk Assessment--Drought

The Hazard

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.

Regional and Local Trends

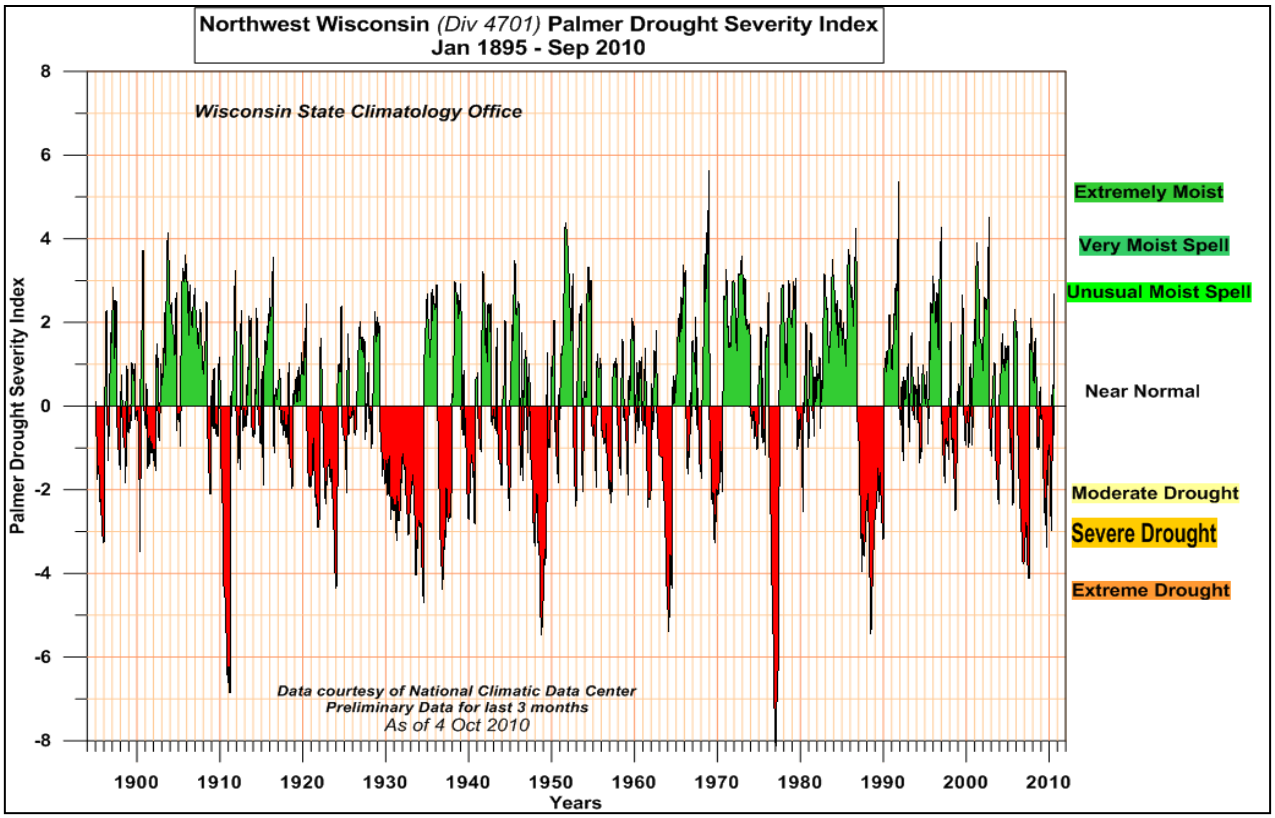
Drought is a relatively common phenomenon in Wisconsin and has occurred statewide or nearly statewide in 1895, 1910, 1939, 1948-1950, 1955-1959, 1976-77, 1987-1989, 2003, 2005, and 2006-2007, and 2012. Severe drought for Eau Claire County also occurred in 2009. The drought of 1929-1934 (Dust Bowl Years) was probably the most significant in Wisconsin history, given its duration; some of areas of the State experienced drought effects until the early 1940s.

A Presidential Emergency Declaration was issued for the statewide drought in 1976-1977, during which agricultural losses in the State were estimated at over $624 million and some private wells in the region dried up. Stream flow measuring stations recorded recurrence intervals from 10 to 30 years. Federal assistance was used to help communities drill new wells and obtain new water supplies.

The North American Drought of 1988 was one of the most severe ever recorded in Wisconsin and much of the Midwest; it was last major drought event in the County. It was characterized not only by below normal precipitation, but also by persistent dry air and above normal temperatures. Heatwaves killed an estimated 5,000 people nationwide and contributed to high livestock loss. Stream flow measuring stations indicated a drought recurrence interval of 75 to 100 years. The effects were most severe in north-central and northeastern Wisconsin. The drought occurred early in the growing season and resulted in a 30-60% crop loss with state agricultural losses estimated at $1.3 billion. 52% of the state's 81,000 farms were estimated to have had crop losses of 50% or more, with 14% of farms suffering estimated losses of 70% or more (FEMA). State and federal drought assistance programs helped Wisconsin farmers recover a portion of their losses. All Wisconsin counties were designated eligible for this drought assistance. In total, the drought in the central and eastern states between 1987 and 1989 caused an estimated $39 billion in damages (FEMA). Point wells in certain areas of western Wisconsin also dried up during the drought of 1988-1989.

Until 2000, drought conditions have been impacting corn and soybean yields to some degree in the County about once in every five to six years. However, beginning about 2003, northern Wisconsin experienced ongoing drought conditions as shown in **Figure 27**, with serious impacts to agricultural producers and hydraulic levels of surface and ground waters. As a result, the Governor has issued State of Emergency drought declarations, which included Eau Claire County, during five of the ten years between 2000 and 2010.

Figure 27. Northwest Wisconsin Drought Severity Index



Summer 2010 brought relief from the region's drought conditions as a new record for the average statewide summer rainfall was established (18.65 inches). In June through September 2010, northwest Wisconsin experienced total monthly rainfall amounts of about 2 inches or more above the mean in each of these four months. Though the rainfall provided relief for agricultural crops, water levels in many surface waters remain below average and monthly rainfall amounts were still below average for six of the months of the year.

A nearly statewide drought would again impact Eau Claire County during the 2012 summer and fall seasons, resulting in reduced crop and alfalfa yields. As feed costs rose, some farmers were forced to sell-off some livestock. There were many reports of wells in Wisconsin running dry and some well depths had to be increased in order to find water. The drought was generated by a large, warm blocking high pressure in the upper levels of the atmosphere which was centered over the middle of the nation in May and June. Part of this high pressure expanded north into the western Great Lakes region in July, forcing storms to stay mostly north of Wisconsin as the summer progressed. The drought started across the southern third of counties in June and steadily expanded north during July and August. Eventually, the southern two-thirds of the State was in severe (D2) to extreme (D3) drought status. The drought continued into December, thanks to a very dry November.

Relative Level of Risk

The future incidence of drought is highly unpredictable and may also be localized. Some sandier, well drained soils of Eau Claire County may experience drought-like conditions on a nearly annual basis. **If weather patterns return to longer-term trends, severe drought conditions can be expected to occur every four to five years on average (1 to 2 drought years per decade) in Eau Claire County.** As the drought history showed, a single drought event can span multiple years and it is these less common, longer-lasting drought events that have the greatest impacts to surface and groundwater.

Projecting the influence of climate change on drought risk is difficult. As will be discussed in Section III.C., the Wisconsin Initiative on Climate Change Impacts projects that annual precipitation will continue to increase. However, the greatest increases are expected during the winter months, not the growing season. With projected increases in heavy rain events, less of this precipitation from such events will infiltrate into the soil. The increased precipitation will also likely be offset, in part, by increased evapotranspiration due to the higher projected temperatures and longer growing season. As time goes on, higher temperatures and increased evapotranspiration have the potential to exceed the added recharge from increased precipitation, potentially resulting in lower infiltration and groundwater recharge.

Vulnerability Assessment—Drought

The impacts of drought are varied and far-reaching. Droughts may cause a shortage of water for human and industrial consumption, hydroelectric power, recreation, and navigation. Water quality may decline, and the number and severity of wildfires may increase. As land is cleared by wildfire, loss of vegetation can result in flooding, even from average rainfall following

drought conditions. Severe droughts may result in the loss of agricultural crops and forest products, undernourished wildlife and livestock, and lower land values.

Potential Impacts on Agriculture

Drought can impact parts or all of Eau Claire County's agricultural base. The agricultural overview in Section II.C. discussed the importance of agriculture to Eau Claire 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 Eau Claire County given that agriculture generates over $1 billion in economic activity each year. 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.

It is very unlikely that any single hazard would endanger all livestock or crops, though large proportions could be at-risk from a prolonged, severe drought or the introduction of a new a pest or disease. With milk production constituting a very large percentage of the total market value, yet being concentrated in an increasingly smaller number of farms, threats to this industry are particularly important.

Large-scale impacts to crops or livestock from a natural hazard can also have devastating impacts on the local economy, related industries (e.g., food processing), and related service providers. The state of the agricultural economy is tenuous for the local farmer, and a hazard event may result in farmers making fewer purchases or getting out of the business altogether. Our local, small town economies are already going through significant transitions with the decreasing number of farms. Additional farm losses would further impact local businesses (e.g., implement dealers, feed stores, granaries, food processing, banks, and general goods). To compensate for additional farm losses, the costs for such services may also be increased, or the

Table 19 provides an example of how one recent, countywide drought impacted crop yields by comparing crop production for the 2003 drought year against the average production for 1999 to 2004. During the 2002-2003 drought (and related winter kill) in Eau Claire County, soybean

yields were up to 47% lower (15.8 fewer bushels per acre) and grain corn yields were up to 16.4% lower (21.8 fewer bushels/acres) than the averages for 1999-2004, excluding 2003.

Table 19. Soybeans & Grain Corn Yields, 1999-2004
Eau Claire County

Year	Soybeans	Corn (grain)
	bushels per acre average	
1999	44	143
2000	41	131
2001	29	129
2002	45	130
2003	23	111
2004	35	131

drought years

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

At a July 2019 average corn price of about $3.00 per bushel, twenty fewer corn bushels per acre would be equivalent to a $60 per acre loss. At $8.00 per bushel for soybeans, the loss of 16 fewer bushels per acre would be equivalent to a $128 per acre loss. Depending on grain and bean prices, the 2003 drought would have resulted in $5-$15 million in lost yield. 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. Farmers will often supplement feed before allowing a drop in milk production due to drought. Additional feed purchases could also vary based on drought severity and length, but $1,500 of additional feed per mature cow is not unrealistic ($1,500 x 32,000 head of cattle = $48 million) resulting in many millions in required supplemental feed for Eau Claire County farmers under a typical, single-season drought event. Drought conditions can also result in the build-up of nitrates in feed and silage to levels that are toxic to cattle. In recent years, there have been a small number of cattle deaths in the region due to nitrate toxicity. Extreme heat and drought can also result in the build-up of toxic gases within grain silos to lethal levels or result in fires or explosions.

The far majority of local farmers understand and practice good management to reduce the vulnerabilities associated with drought conditions, but some knowingly take chances. Most farmers carry some type of crop insurance, especially in drought-prone areas, and crop insurance use has been on the rise. 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 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 is extremely cost prohibitive to carry crop insurance.

During the planning process, some fairly recent changes in agricultural practices were noted by those interviewed as possibly being reasons for concern. Due to higher corn prices during the past decade and larger equipment, more land went into production. Some of the lands returning to production are droughty, sandier soils. In other cases, fence rows and tree lines are being removed, and road rights-of-ways are being encroached upon, which have implications for moisture management and wind erosion, as well as roadway safety.

SOIL HEALTH AS A DROUGHT MITIGATION TOOL

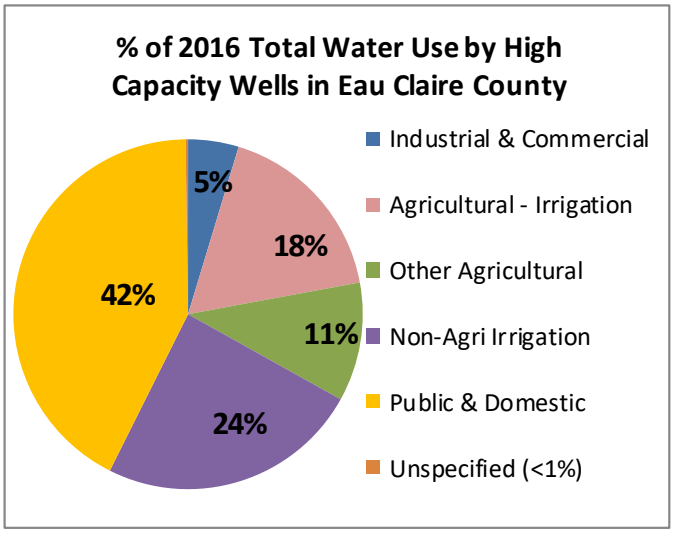
Soil health best management practices, such as cover crops and reduced tillage, can improve soil health and help make cropland more resilient to drought. Good soil health allows precipitation to infiltrate, thereby increasing moisture in the soil and helping to recharge groundwater.

The conservation of Eau Claire County's farmland soils is important to current and future generations of farmers. Soils that are physically and biologically healthy can produce higher crop yields with fewer external inputs, which is great for the pocketbook.

Healthy soils are also important to the quality of groundwater and surface waters. As precipitation infiltrates, it naturally filters the water. The soils and nutrients stay in place, rather than run-off. Healthy soils reduce erosion, flooding, and pollutant/nutrient loading to surface waters, while increasing the recharge of the groundwater.

Other Potential Drought Vulnerabilities

Drought conditions can stress forest vegetation, making it more vulnerable to certain pests and disease and increasing the risk of wildfire. Drought conditions can also dry up private wells and ponds as well as impact surface and ground water levels. Under such circumstances, shallow wells may need to be replaced at significant cost or a farmer whose livestock relied on a pond in the past may have to install a well and pump to provide water for stock. As surface waters dry up during drought periods, shoreline areas are more vulnerable to erosion, water temperatures can change, and contaminants and nutrients become concentrated, which can further contribute to toxicity, eutrophication, and fish kills.



High capacity wells have the potential to stress local groundwater supplies, especially during drought periods. As of 2016, just over 200 high capacity wells have been permitted in the County with an average of 9.5 new wells permitted annually since 2010. Agricultural irrigation has been increasing in the region, in part due to recent drought events. The 2018 *Eau Claire County State of Groundwater Report* provides insights and recommendations regarding the County's groundwater supply and

use. Some of the longer-term consequences of rising temperatures and drier summers are discussed in Section III.C.

Vulnerable Critical Facilities

No critical facilities or infrastructure in Eau Claire County are directly vulnerable to drought, with the exception of water supplies. Overall, municipal and private wells have excellent water quantity to meet demands. When an extreme drought occurs (e.g., 1976, 1988) or if prolonged droughts continue to increase in frequency, it should be expected that some private wells may need replacing and water demands for irrigation would further increase. However, the demand for water is increasing substantially and additional wells will be needed to meet this demand.

Unique Jurisdictional Risks or Vulnerabilities—Drought

The *Unique Jurisdictional Risk or Vulnerabilities Table* in **Appendix F** notes that participating cities and villages currently have good well capacity for fire protection and did not identify any unique risks or vulnerabilities related to drought.

vii. Wildfire

Public Health Hazard Vulnerability Assessment

The 2017 Northwest Wisconsin Health Care Coalition Public Health HVA rated drought as a 35% overall risk over a ten-year period given its moderate probability (2), likely low impacts (1.2), and substantial-to-moderate available emergency management capabilities to deal with this threat (1.8). The assessment used a scale of 1 to 3, with "1" being low probability/impact or having substantial management capabilities and "3" being high probability/impact or having limited/no management capabilities.

Risk Assessment—Wildfire

The Hazard

A **wildfire**, in the context of this plan, is an uncontrollable fire 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, debris burning, or carelessness, or can be caused by natural events such as lightning.

Did you know?

The 1871 Peshtigo Fire resulted in the greatest single loss of human life due to wildfire in American history.

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

This document also does not attempt to make great distinctions between the different types of wildfires, though more wildfire data is available for the WDNR Intensive Fire Protection area which has a higher predominance of forest vegetation. It is not uncommon for a large wildfire to include a mix of vegetative types. Grass fires fueled by low-lying vegetation are generally easier to control compared to a wildfire in a forest area, but also will typically spread the most quickly. Grass fires can be the most dangerous in terms of safety due to the highly variable speed, intensity, and direction.

In wooded settings, access is often the biggest challenge. In areas of hardwoods, a wildfire is typically less intense with the fire being commonly limited to the leaf litter. Wildfires in coniferous forest which climbs into the top of the tree canopy (crown fires) can be the most difficult to control and can produce spotting when large, burning embers are blown to areas outside of the main fire. Regardless of the fuel types, local topography and weather conditions also influence the characteristics of a wildfire.

Regional Trends

Wildfires are not uncommon for Wisconsin and can occur at any time of the day and during any month of the year, though the peak fire season in Wisconsin is typically from March through May, 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, such as early in the spring or during extended periods with no rain.

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

During the drought year of 1976, a total of 4,144 forest fires and wildfires occurred in Wisconsin. A year later, the Brockway and Airport Fires burned over 20,000 acres in nearby Jackson County. Likewise, 1988 was one of the driest years on record with a total of 3,242 fires occurring and 9,740 acres burned.

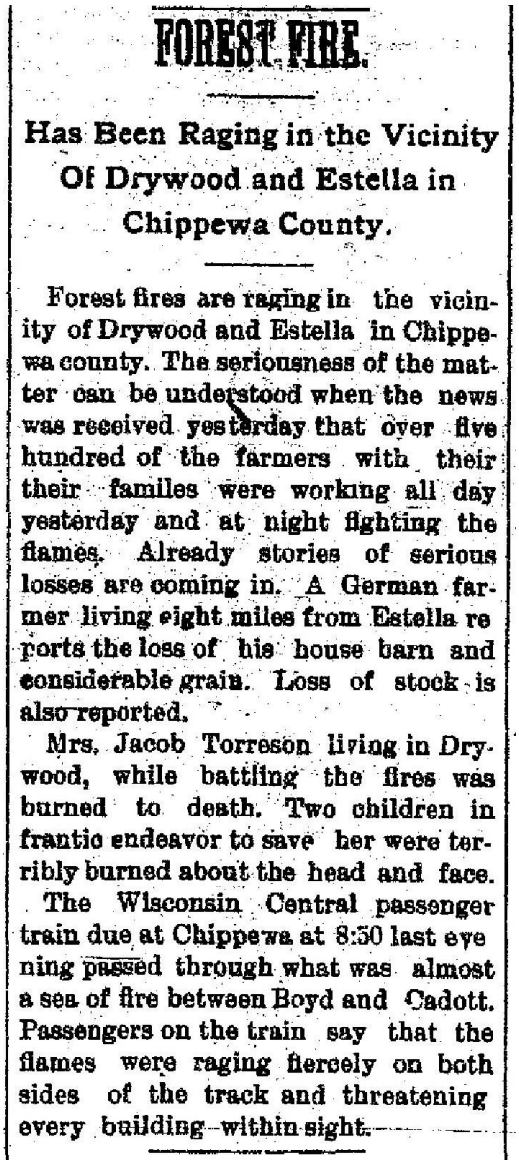
In April 1980, more than 16,000 acres were burned and over 200 buildings lost in the Ekdall Church and Oak Lake Fires. The Oak Lake Fire originated about 100 miles north of Eau Claire in the Minong area. High winds contributed to spot fires over 1.5 miles ahead of the main fire and the smoke was so heavy that street lights in Rice Lake (Barron County) came on in mid-afternoon. Within four hours' time, the fire was over six miles long and had a flaming front over three miles wide. Within six hours, the fire had burned eleven miles in length. The fire was officially declared controlled three days later and a total of 159 structures were lost during the event.

More recently, the May 5, 2005, Cottonville Fire began in northern Adams County and 3,410 acres of grass, pine, and scrub oak burned quickly before the fire was contained eleven hours later. During the fire, over 100 people were evacuated. Nine year-round residences, 21 seasonal homes, and at least 60 outbuildings were completely destroyed. Lack of access (long, narrow driveways) and a lack of defensible spaces around buildings were significant contributing factors to the loss of these structures, offering important lessons to be learned. And in May 2013, the Germann Road Fire consumed 7,499 acres and destroyed 104 structures in Douglas and Bayfield counties.

Local Events

Forest fire is not a new threat to Eau Claire County, though based on limited research, the County has not experienced extensive historical forest fires burnings hundreds of square miles such as those in the 1800s and early 1900s which raged across nearby Barron, Chippewa, and Polk counties. For instance, the 1898 article to the right describes an "immense sea of flames" which burned over 600 square miles of pine lands in northern Wisconsin and Minnesota[22]. While losses were greatest in nearby Polk and Barron counties, the fires brought destruction and death to the Cornell, Cadott, and Boyd areas. Later in 1906, the City of Stanley was partially destroyed by forest fire. And a few years later in July 1910, a forest fire fifty miles long and forty miles wide raged near Chippewa Falls resulting in at least three deaths and leaving 300 people homeless.

Eau Claire Weekly Telegram
September 29, 1898



FOREST FIRE.

Has Been Raging in the Vicinity Of Drywood and Estella in Chippewa County.

Forest fires are raging in the vicinity of Drywood and Estella in Chippewa county. The seriousness of the matter can be understood when the news was received yesterday that over five hundred of the farmers with their their familes were working all day yesterday and at night fighting the flames. Already stories of serious losses are coming in. A German farmer living eight miles from Estella reports the loss of his house barn and considerable grain. Loss of stock is also reported.

Mrs. Jacob Torreson living in Drywood, while battling the fires was burned to death. Two children in frantic endeavor to save her were terribly burned about the head and face.

The Wisconsin Central passenger train due at Chippewa at 8:50 last evening passed through what was almost a sea of fire between Boyd and Cadott. Passengers on the train say that the flames were raging fiercely on both sides of the track and threatening every building within sight.

In 1895, the entire business district in the Village of Fairchild, over twenty establishments, succumbed to fire. The City of Eau Claire has also had large fires in its history as discussed in the City's mitigation plan. But these fires were not associated with a forest fire or grass fire.

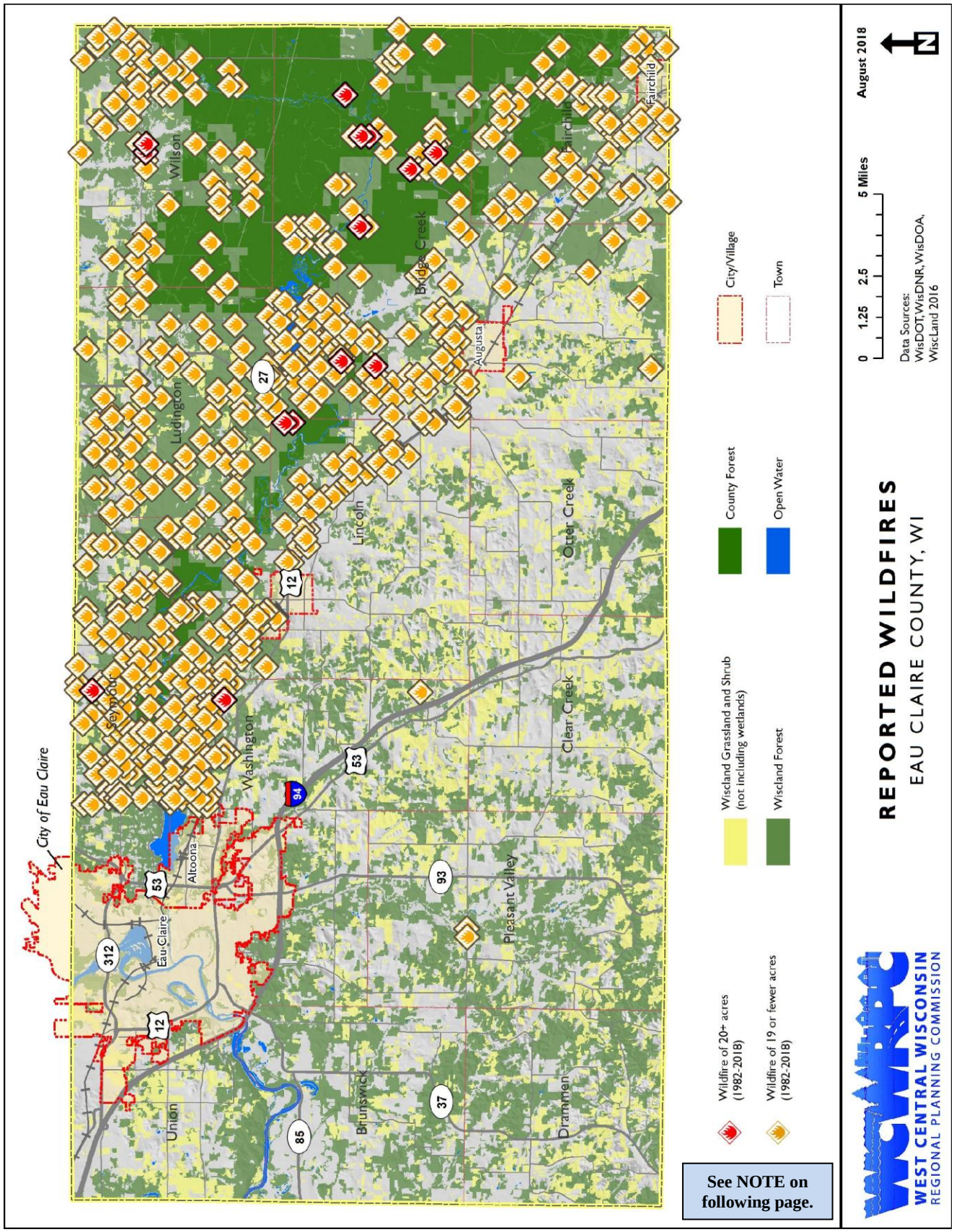
As the pine forests were logged and agriculture came to dominate much of region, the forest fire risk also changed. The potential for a large forest fire was chiefly limited to forested areas less suitable for agriculture and in the resort and seasonal housing areas typically associated with recreational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

The largest, best documented wildfire in the County's recent history occurred in April 1982 in the County Forest in the Town of Bridge Creek. Named the Canoe Landing Fire, a 274-acre forest fire was ignited from an unattended campfire. Winds spread the fire to dry grass and into a young pine plantation. WDNR fire fighter Don Eisenberner lost his life when a sudden wind shift resulted in the fire trapping Don and his tractor plow unit. Fire conditions for that weekend had been rated as extremely hazardous. This same area would be impacted by a second, larger fire in 1994.

Figure 28 on the following page shows the approximate location of the 790 reported wildfires in Eau Claire County between 1982 through 2017, which are identified in the WDNR database.

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

Figure 28. Reported Wildfires in Eau Claire County – 2003 through 2017



These fires are not limited to forest fires. For example, on Easter Sunday 1994, Robert Waskiewicz with the Augusta-Bridge Creek Volunteer Fire Department died fighting a grass fire in the Town of Bridge Creek ignited by unattended debris burning. A large gust of wind suddenly accelerated the fire and increased flame heights from 1 to 2 feet to 20 to 25 feet

NOTE: Caution should be used when interpreting this data. These wildfire reports are mostly limited to events which involved the WDNR and lie within an Intensive Protection Area. The intensive protection area roughly encompasses areas north and east of U.S. Highway 12 and east of the City of Eau Claire, which have more pine forest than other areas of the County. Wildfires do occur in the remaining cooperative protection areas, but are not typically reported. The result of this data when mapped is an appearance that wildfires only occur in the northern and eastern parts of Eau Claire County which is not true.

The greatest frequency of report occurred in the area east of the cities of Eau Claire and Altoona in the towns of Seymour, Washington, and Lincoln. A second concentration occurred in the Lake Eau Claire area. These trends are not surprising given the relatively higher concentrations of residential development in these areas. In contrast, some of the largest fires occurred in the County Forest lands of the Town of Bridge Creek east of Augusta.

As shown in **Table 20**, from 1982 through 2017, an average of 22 wildfire events and 60 total acres burned were reported per year in Eau Claire County within the WDNR database. On average, during the same timeframe, the acres burned per event was only 2.6 acres. A very positive trend is the decrease in the number of reported wildfire events in recent years. From 2010 through 2017, the number of events decreased to 10.2/year and about 10.4 total acres burned.

Table 20. Eau Claire County Wildfire Events, 1982 through 2017

Year	# of Events	Acres Burned
1982	12	301.2
1983	26	28.0
1984	20	42.0
1985	14	10.4
1986	19	13.7
1987	39	124.1
1988	52	106.0
1989	44	43.2
1990	44	71.0
1991	23	10.2
1992	18	18.3
1993	24	49.5
1994	22	605.8
1995	38	104.1
1996	17	7.8
1997	21	4.3

1998	21	260.9
1999	31	32.5
2000	27	12.0
2001	14	4.3
2002	12	22.6
2003	49	58.1
2004	14	not reported
2005	24	9.4
2006	30	9.0
2007	24	36.3
2008	25	4.8
2009	14	26.8
2010	9	6.6
2011	10	14.7
2012	18	10.2
2013	8	6.6
2014	11	2.9
2015	5	3.4
2016	5	1.3
2017	6	27.2
Totals:	**790**	**2,089**

Source: Wisconsin Department of Natural Resources, 2018

Of the 625 reported wildfires during this time period, 741 (or 93%) were less than five acres in size. Only three fires were greater than 200 acres in size, all occurring in the eastern part of the Town of Bridge Creek in areas primarily in County Forest:

- April 26, 1998 (246 acres) – T26N, R5W, Sec. 29
- April 24, 1982 (274 acres) – T26N, R5W, Sec. 16 (1st Canoe Landing Fire)
- April 23, 1994 (553 aces) – T26N, R5W, Sec. 16 (2nd Canoe Landing Fire)

Note that all three of the largest fires occurred in late April. While wildfires were reported in every month, only 17 were reported for the months of December through February. By far, the largest number of wildfires occurred in the month of April with 265 fires (34% of all reported fires). May was the next highest month in terms of wildfire frequency with 141 (or 18%) of the reported fires.

Not included in the previous table, debris burning ignited a 123-acre grassland and forest wildfire in the Town of Pleasant Valley in 2018. This is the largest wildfire in the County since 1998 and the fourth largest since 1982.

Over the last forty years, there has not been a Presidential Disaster Declaration for a wildfire in Eau Claire County and research for preparation of this plan did not discover any serious injuries or deaths, except for that of Mr. Eisenberner in 1982 and Mr. Waskiewicz in 1994. There have been no recent "project class" wildfires in Eau Claire County with an activated Incident

Command Center on an extended incident. There have been three recent smaller wildfires in the "right location" in Eau Claire County that could have resulted in a very large, damaging wildfire, but conditions (e.g., wind, dryness) weren't conducive to a large event. The County's most recent large wildfire is not included in the previous table.

As part of this plan update, all towns were sent a survey requesting the identification of any unique natural hazard and emergency management concerns or needs in their communities. Two towns mentioned wildfire concerns. The Town of Seymour recognized that the "Town is considered high risk for wildfires due to significant pine plantations" as well as other forest lands and sandy soils; the Town recently adopted an updated community wildfire protection plan, which is discussed later in this section. In the 2013 mitigation plan, the Town of Washington noted similar concerns for "East Shore Drive, CTH SS, [and] Riverview Drive to the Eau Claire River and Lake Altoona." The Town of Union noted that some residential development had occurred near pine plantation, the Youth Forest, and the Town of Union Conservancy (previously Kiwanis Forest); some related wildfire planning may be needed.

Risk Factor – Vegetative Fuels

Vegetative cover type is directly related to wildfire risk. The degree of flammability for different vegetative covers is in the general following order:

Jack Pine	**Most Flammable**
Red Pine	↓
Mixed Coniferous	
Grasslands and Shrub	
Oak	
Aspen	
Mixed Deciduous	**Least Flammable**

Approximately 47 percent (about 195,500 acres) of Eau Claire County is forested and 14.5 percent (about 60,800 acres) is shrub and grasslands. But keep in mind that many forested areas are actively managed for timber production; thus, vegetative characteristics can change from year-to-year as part of the timber growth and harvesting cycle. And this land cover data is older and does not reflect the recent development and agricultural trends, such as increased cropped land for corn production.

Based on Wiscland land cover data[23], deciduous trees (e.g., aspen, oak, maple) are, by far, the predominant forest type in the County. Around 24,000 acres of pine and other coniferous forest still exists, in particular in the County Forest and areas closest to the Eau Claire River. But forest lands in the County have been increasingly fragmented over time. This reduces the chance of a large-scale wildfire event, but does often mean that there are more homes and other structures located within forested areas.

There are also over 56,000 acres of public natural resources lands in Eau Claire County, the far majority of which is in County Forest (abt 51,000 acres). The largest concentrations of these

[23] https://dnr.wi.gov/maps/gis/datalandcover.html

public resources lands can be found in the Town of Bridge Creek (abt 25,300 acres), Town of Wilson (abt 13,500 acres), and Town of Fairchild (abt 7,900 acres). Though public forest lands tend to be more actively managed against wildfire risks, not all of these public lands are forested. Notably, there is a high degree of fragmentation of forest lands within the County which decreases the potential for a project-level wildfire. Yet, this also can mean there is more development occurring within or adjacent to remaining forested areas which increases vulnerabilities and risk of ignition.

Forest health also influences the risk of wildfire ignition and can increase the difficulty of fire suppression. Tree damage from storm events, diseases, insect infestation, and exotic species can weaken plants, making them more susceptible to storm damage, or can kill a forest stand outright. The Wisconsin Department of Natural Resources has rated large portions of Eau Claire County, especially in the Eau Claire area, as having medium or high levels of risk for experiencing 25 percent of more tree mortality between 2009 and 2024 due to native and exotic insects and diseases.[24] Wisconsin's average annual temperature has also been increasing with shorter winters and recent droughts[25], which not only affects forest health, but also increases the wildfire risk.

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

Risk Factor - Ignition

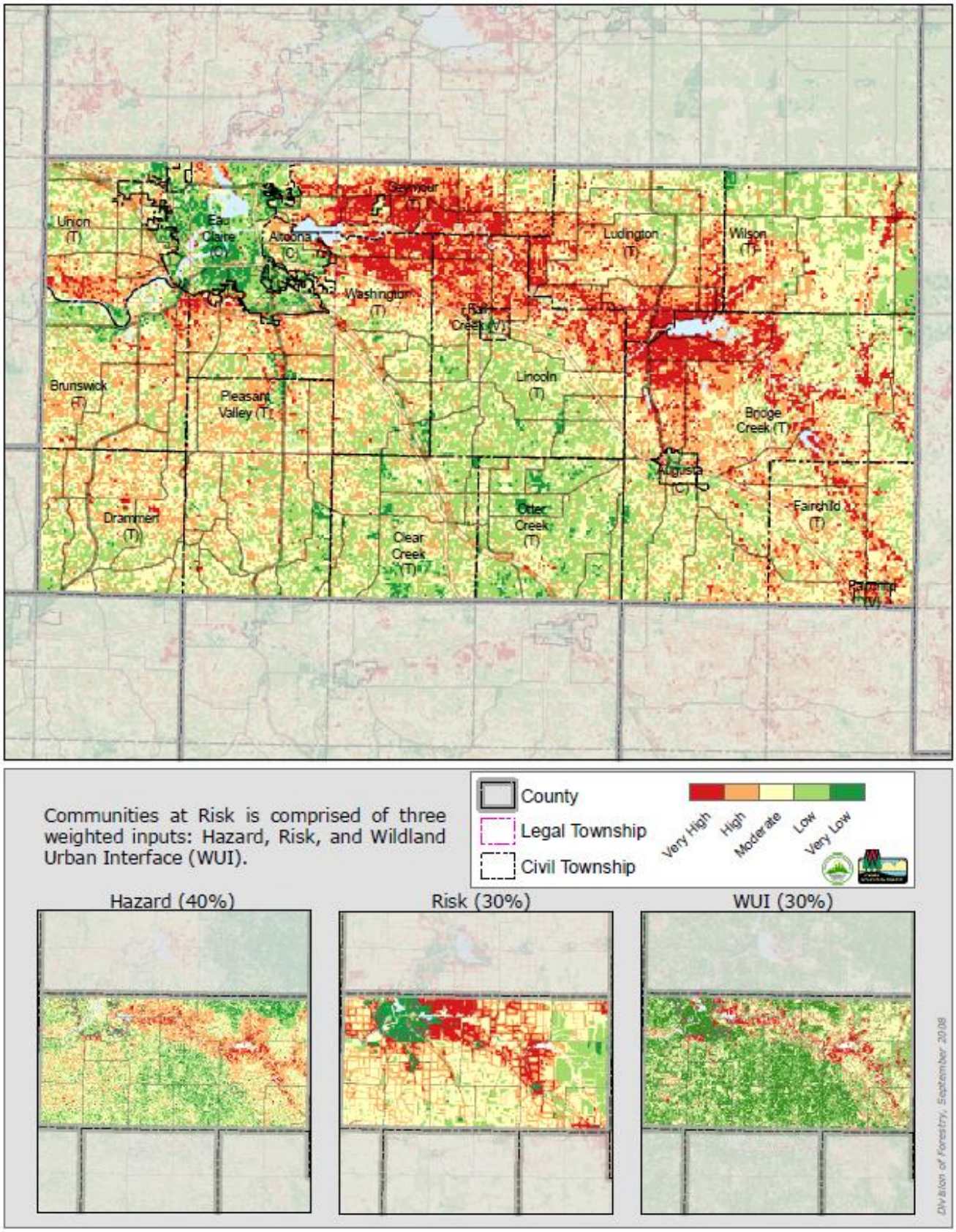
Most wildfire starts are human caused, whether accidental or deliberate. And areas of higher population within wildlands can be expected to have a higher risk of ignition. Of the 790 recorded wildfire events in Table 20, 190 (or 24%) were caused by debris burning (e.g., brush piles, burn barrels). Incendiary fires, or those forest fires started intentionally, were an additional 156 (or 20%) of the events. Various other causes include equipment-related causes (e.g., auto exhaust) with 16% of the events and railroad-related causes at 11%. Wildfires started in Eau Claire County related to campfires, fireworks, or smoking were both relatively low at about 2-3% each. For the 72 wildfires from 2010-2017, 30% were related to debris burning, 22% equipment, and only 7% were incendiary. Illegal campfires/bonfires in the County Forest, often along logging roads, is an ongoing (if not increasing) concern as well as improper ash disposal from campfires, grills, wood stoves, etc.

Review of WDNR Wildfire Risk Assessments

In 2008, the WDNR-Division of Forestry performed a statewide wildfire risk assessment to identify those communities most at risk. **Figure 29** shows the result of this risk assessment for Eau Claire County.

[24] Wisconsin Department of Natural Resources. *Wisconsin Statewide Forest Assessment 2010.*
[25] Ibid.

Figure 29. Eau Claire County Communities-at-Risk Map (Wildfire)



Three inputs were used to determine the risk as reflected by the three individual maps at the bottom of the figure:

- Hazard (Wildfire Fuels) – The hazard encompasses vegetative fuel types based on satellite imagery, historic fire regime data, pre-settlement vegetative data, and moisture index data.
- Risk (Potential for Ignition) – The risk is based on past fire occurrence data, population density, and distance from roads and railroads.
- Wildland-Urban Interface (Value) – The wildland-urban interface (WUI) reflects housing density and the proximity to flammable vegetation, thus reflecting the potential value of development (and residents) at-risk of destruction by wildfire.

The larger map in Figure 29 is a weighted composite of each of the three factors—hazard (40%), risk (30%), and WUI (30%). After weighting occurred, natural breaks were used in the model to identify the different risk ratings. Wildfire planning and preparedness resources can then be focused on those communities and areas of highest concern.

Within Eau Claire County, the Town of Seymour was identified as being a "very high" risk. In addition, two villages and six towns were rated as communities of "high risk" as shown in **Table 21**. Four additional communities not shown in Table 21 were rated as communities-of-concern: towns of Drammen, Union, and Wilson, and the City of Eau Claire.

Table 21. Communities-at-Risk (Wildfire)

Municipality	Hazard (40%)	Risk (30%)	WUI (30%)	2017 est. Popul.
Seymour (T)	VH	VH	H	3,330
Bridge Creek (T)	H	H	H	1,913
Brunswick (T)	H	H	M	1,871
Fairchild (T)	H	H	H	358
Lincoln (T)	H	VH	M	1,146
Ludington (T)	H	VH	H	1,080
Washington (T)	H	H	M	7,333
Fairchild (V)	H	VH	H	545
Fall Creek (V)	H	H	M	1,287

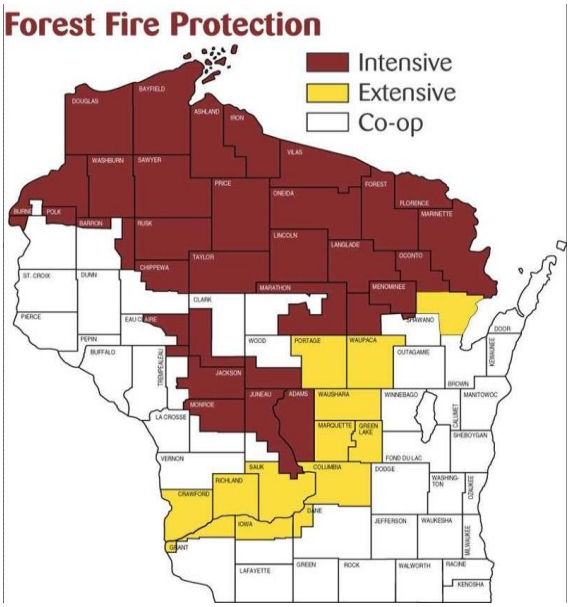
Many of the above towns are among the fastest growing communities in the County, so the risk of ignition will likely similarly grow. And as the housing discussion early in this document identifies, it is some of these same areas which have significant seasonal housing, with some homes transitioning to year-round housing, such as in the Lake Eau Claire area. Some of these landowners are absentee and may not be fully unaware of local burning permit requirements, local emergency services systems, and the wildfire risks. But as retirees and commuters begin to live year-round in these formerly seasonal homes, wildfire ignition could proportionately increase, especially during the non-summer months when populations have traditionally been lower.

The risk areas identified in Figures 31 and 32 are also consistent with the fire landscapes identified by the Wisconsin DNR in their *Wildland Fire Management Program Assessment* completed in March 2010. This assessment divided the State into 16 fire landscapes based on vegetation, ecology, soils, development, and forest sizes. The zones were then used to help guide and prioritize resources and mitigation efforts. Eau Claire County falls into two fire landscapes:

Central Wisconsin Sands - Areas east and north of U.S. Highway 12, and east of the City of Eau Claire, fall within the Central Wisconsin Sands fire landscape which has a moderate to very high wildfire risk. This area extends south and east to the Wisconsin River and some areas beyond. **This area is the one of the highest fire risk landscapes in the Wisconsin** and is characterized by extensive areas of jack and red pine, with dry, sandy, and organic soils. There is great history of, and potential for, a 10,000 acre project class fire in this area. In fact, since 1975, there have been four fires greater than 2,500 acres in this area. This is a primary mitigation area and community wildfire protection planning, Firewise outreach, targeted media messaging, and other mitigation efforts are to be supported. School fire prevention programs must be conducted in grades K-3 every three years.

West Central Wisconsin - Nearly all of the rest of the 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. A very small area of northeastern Eau Claire County falls into the "Central Ag and Hardwoods" fire landscape which has mitigation recommendations similar to those in the "West Central Wisconsin" landscape.

While the fire landscape approach is valuable for state- and regional-level resource planning, the communities-at-risk assessment (Figure 29) provides a better understanding of local variations, such as development density and vegetation.



WDNR Fire Protection Areas

All incorporated cities and villages in Eau Claire County and most of the southwestern parts of the County fall within Cooperative Fire Protection. The eastern 4/5th of the Town of Seymour and most areas of the County east of Eau Claire and north of US Highway 12, including all of the Town of Fairchild, are under Intensive Fire Protection. These are defined as follows:

Intensive Forest Fire Protection areas are the most heavily forested and contain the most fire hazards and risks in the state. Limited assignment of skilled personnel, specialized equipment, and facilities provide for an adequate degree of forest

fire prevention, detection, and suppression efficiency and effectiveness at a minimum cost. Wisconsin Department of Natural Resources (WDNR) equipment is designed to suppress fires that are beyond the capability of the local fire department. The WDNR by statute takes whatever action is necessary to suppress the fires. WDNR Fire Towers are no longer in operation. Fire detection is provided by WDNR aircraft, and there is a strong reliance on public reporting of fires. During times of elevated wildfire risk, aircraft will make a looped circuit 1-2x per day. Obtaining assistance of a second aircraft, should it be needed, can be challenging. Burning permits are required whenever the ground is not snow covered.

The intensive fire protection area in Eau Claire County falls under the WDNR Augusta Fire Response Unit headquartered at the Augusta WDNR Ranger Station. This station takes the local lead in all WDNR wildfire prevention, education, and coordination efforts in the County. These efforts in the County have been primarily been educational in nature, such as wildfire danger signage and articles in local newspapers. Wildfire flyers have been included with tax mailings within the Intensive Protection Area and some door-to-door outreach has taken place, but funding and resources are limited. WDNR staff from the Augusta Ranger Station have attempted to visit all residents in one town each year, if staff time allows. Separate mailings were distributed about four years ago. As will be discussed, the Town of Seymour has engaged in additional educational outreach through their community wildfire protection plan.

Cooperative Forest Fire Protection areas are located outside the boundaries of established intensive fire control areas for which the local municipality has legal responsibility for forest fire prevention, detection, and suppression activities, with aid and counsel from WDNR, upon request. Town Chairmen, by virtue of their office, are fire wardens. Costs of forest fire prevention and suppression incurred by a town chairman, acting in his capacity as town fire warden, are paid by the town. Burning permits are issued when the town board deems it necessary.

Local fire departments are critical partners in managing wildland fires. Eau Claire County fire departments are part of the Mutual Aid Box Alarm System (MABAS) which may be used for deploying fire, rescue, and emergency medical services personnel if assistance from other departments is needed. Though WDNR is not part of the MABAS system, WNDR resources can also be called upon for wildfires if needed. WDNR Augusta Ranger Station personnel meets with area fire departments through the Eau Claire County Fire Chief's Association and does conduct annual refresher courses and periodic larger exercises.

On September 12, 2015, WDNR Augusta Ranger Station hosted a functional simulated wildfire exercise for communications, coordination, and structural protection training with the Augusta-Bridge Creek Fire Hall serving as command post. Seventeen area fire departments and the WDNR Incident Management Team participated and the exercise was coverage by various media outlets. A follow-up exercise is being planned for about 2021 with greater emphasis on improving communications and frequency use as well as additional structural protection training.

When surveyed, no fire departments noted specific wildfire equipment needs, though multiple volunteer departments expressed challenges in attracting and retaining sufficient numbers of volunteers, especially given mandated training. The manpower needs can be especially acute during daytimes hours when many firefighters are employed outside the community. No fire departments identified potential dry hydrant needs, though this was mentioned as a need for a number of areas in the previous plan update—Town of Fairchild on CTH "H" (would service

50+ sites), southern parts of the Town of Union, Town of Brunswick, and potentially the Lake Altoona area in the Town of Seymour. WDNR firefighting staff noted that dry hydrant or water access improvements at Fairchild Pond may be valuable. Maintaining an adequate driveway clearance and driving surface for emergency response vehicles continues to be a critical concern for some departments, especially in wooded, hilly, and shoreland areas.

Relative Level of Risk

The wildfire risk is considered moderate for Eau Claire County overall, though definitely higher in the north-central and eastern parts of the County. Projecting the level of risk is very dependent on weather. **Based on recent trends, it can be expected that Eau Claire County will continue to experience 10 to 20 wildfires per year on average within the intensive fire protection area**, and perhaps greater if current droughty conditions continue or worsen. **The far majority of these fires will be small (less than 5 acres). A wildfire in excess of 200 acres will occur once every 10 to 15 years.** Estimates for wildfires in the remaining parts of the County within cooperative fire protection are not currently available. Vegetation fuel types and the fragmented forest landscape, along with gains in firefighting capabilities, combine to make the fast-spreading, regional fires of the late 1800s very unlikely within Eau Claire County for the foreseeable future, **though a fire encompassing thousands of forest acres is possible** given the large tracts of County Forest and adjacent privately owned forest lands**.**

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 potential to increase the frequency of wildfires in Eau Claire County. Climate changes, insect infestation, and plant disease are additional factors which may also increase wildfire risks.

Vulnerability Assessment—Wildfire

Potential Impacts

Forest fire can cause significant injury, death, damage to property, and loss of natural resources. As shown in **Table 22**, those communities rated as “high risk” or “very high risk” had just over $1.1 billion in assessed improvements on 7,656 parcels and nearly $20 million in assessed personal property in 2017 as well as a combined population of about 18,863. The far majority of these improvements were residential. If we exclude the City of Eau Claire, the nine municipalities table includes 28 percent of the County’s population. As reflected in the previous maps, the wildfire risk within each individual municipality varies.

It is notable that the Town of Brunswick and most of the Town of Washington lie outside the intensive fire protection area. This reflects that the fire protection areas are determined based more on large areas of contiguous vegetation types, rather than population and development vulnerabilities, which were included as part of the risk input reflected in Figure 29.

Table 22. Population and Improvements of High Risk Communities (Wildfire)

Municipality	Population			2017 Assessed Improvements		2017 Assessed Value of Personal Property
	Est. 2017	Proj. 2040	% Chng. '17-'40	# of Imp. Parcels	Total Value of Improvements	
Seymour (T)	3,330	3,615	8.6%	1,311	208,741,800	1,044,800
Bridge Creek (T)	1,913	2,060	7.7%	891	94,477,700	3,680,800
Brunswick (T)	1,871	1,870	-0.1%	734	113,449,900	819,700
Fairchild (T)	358	340	-5.0%	219	14,558,500	2,197,695
Lincoln (T)	1,146	1,210	5.6%	463	67,751,200	155,700
Ludington (T)	1,080	1,160	7.4%	510	53,058,500	101,500
Washington (T)	7,333	8,060	9.9%	2,770	483,608,000	8,390,800
Fairchild (V)	545	570	4.6%	234	10,037,100	299,100
Fall Creek (V)	1,287	1,370	6.4%	524	64,692,800	3,119,700
Totals	18,863	20,255	7.4%	7,656	$1,110,375,500	$19,809,795

For 2008, WDNR estimated that there was 7,423,000 oven-dry tons of live timber biomass in Eau Claire County, with only about 10.7 percent being a variety of pine, fir, spruce, or hemlock.[26] State and Federal harvest timber value per acre in 2009 ranged from $514 to $638 per harvested acre. To provide a rough idea of the value of the County-owned and private productive forest in the County, the 82,000 forested acres would have a timber value of about $52.3 million at $638 per acre. However, timber values vary by forest type, forest age, and market conditions.

Not only are public forest lands an important direct income source for Eau Claire County through logging, but it is an important recreational resource as well. The loss of related tourism would also reduce revenues for Eau Claire County campgrounds, resorts, and other businesses, though no such current study on the extent of potential financial impacts is available. Forest landowners would also incur significant costs associated with salvage and restoration following a large forest fire event.

The Eau Claire County Forest is intensively managed to mitigate the potential of large wildfires and a range of other forest-related hazards (e.g., drought, invasive species) through the *Eau Claire County Forest 15-Year Comprehensive Land Use Plan*. Section 605 of this plan focuses on control and mitigation of forest fire, including policies on cooperation with WDNR, slash burning, debris burning, camp fires, firebreaks, and access roads. Section 610 covers forest pests and pathogens. Privately owned woodlots are often less intensely managed than adjacent County Forest lands, especially in cases of absentee land ownership.

Within non-wooded areas, wildfires in grasslands have the potential to spread more quickly than fires in wooded areas. Homes, agricultural operations, livestock, crops (especially hay and grains), and travelers on roadways are all potentially vulnerable to wildfire depending on proximity to vegetative fuel. Large, contiguous areas of grasslands do exist within the County.

[26] http://dnr.wi.gov/forestry/um/pdf/report/TimberHarvestWisconsin.pdf

Vulnerable Critical Facilities

Any critical facility located in pine plantation, a forested area, or adjacent to grasslands are potentially at risk from wildfire. No critical facilities located outside the City of Eau Claire were identified as being uniquely vulnerable to wildfire or located in an area of coniferous/pine and mixed forest.

While not technically critical facilities, Eau Claire County does have a number of campgrounds and resorts which are located within the at-risk communities and other forested areas of the County. For such facilities, the priority concern is for the visitors as a potential source of fire ignition as well as the ability to quickly notify and evacuate if needed.

Unique Jurisdictional Risks or Vulnerabilities—Wildfire

Appendix F summarizes any unique wildfire risks by incorporated municipality. All participating cities and villages currently have adequate well capacity for fire protection, though Altoona noted they are exploring additional water storage.

The City of Altoona recognized that there is some residential development within forested and pine plantation areas of the City, and that the railroad, railyard, and U.S. Highway 53 do pose some ignition risks. Altoona suggested more education on wildfire risks and mitigation would be valuable, in cooperation with adjacent towns.

The Village of Fall Creek expressed some concerns with wildfire risks on the community's northwest side, which lies adjacent to the railroad tracks (a potential ignition source).

As stated in Appendix F, the City of Eau Claire identified no unique wildfire risk areas requiring special action, though four areas were identified as being a higher concern largely due to the proximity of development near vegetative fuel types—near the Airport, Lowes Creek area, grasslands north of the North Crossing, and near Sherman Creek.

Town of Seymour Community Wildfire Protection Plan (CWPP)

CWPPs set priorities for local wildfire risk reduction projects, giving the community priority consideration for related WDNR funding.

The Town of Seymour, recognizing its very high wildfire risk, in 2013 collaborated with Township Fire Dept., WDNR, Eau Claire Co. Emergency Management, and WCWRPC to create a CWPP for the community. Completed CWPP projects include home ignition zone training, signage & banners, driveway brochures, and various other educational and outreach efforts.

In 2018, the Town Board adopted an updated CWPP, which recommends continued annual and new educational outreach projects. A notable 2022 project is the creation of MOUs with surrounding communities for evacuation needs.

WDNR staff have approached other high wildfire risk communities in Eau Claire County (e.g., Lake Eau Claire area, Altoona) to discuss potential creation of CWPPs.

viii. Extreme Heat

Public Health Hazard Vulnerability Assessment

The 2017 Northwest Wisconsin Health Care Coalition Public Health HVA rated extreme heat as a 38% overall risk over a ten-year period given its high probability (3), but moderate-to-low impacts (1.5), and substantial available emergency management capabilities to deal with this threat (1.0 internal, 1.0 external). The assessment used a scale of 1 to 3, with "1" being low probability/impact or having substantial management capabilities and "3" being high probability/impact or having limited/no management capabilities.

Risk Assessment—Extreme Heat

The Hazard

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 the extreme heat event. The National Weather Service issues the following heat-related announcements and advisory warnings in order of severity:

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

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

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

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

If such conditions persist for a prolonged period of time, it is called a **heat wave**. Excessive or extreme heat is typically a slowly evolving phenomenon that can catch many people by surprise. Unlike tornados or thunderstorms that normally develop and occur more quickly and with more observable characteristics, a heat wave typically builds slowly over time. Because of this

creeping effect, it is important for forecasters and officials to be constantly aware of heat and humidity conditions in order to properly warn and protect citizens.

The combination of high temperatures and high relative humidity makes it difficult for the human body to dissipate heat through the skin and sweat glands. Sweating will not cool the human body unless the water is removed by evaporation. High relative humidity retards evaporation and, thus, inhibits the cooling process. The National Weather Service (NWS) uses the heat index as a measure of the combined effects of high temperatures and high relative humidity, as shown in **Table 23**.

Table 23. Heat Index Table

NOAA's National Weather Service

Heat Index

Temperature (°F)

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

Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity

Caution | Extreme Caution | Danger | External Danger

Source: National Weather Service

Regional Trends

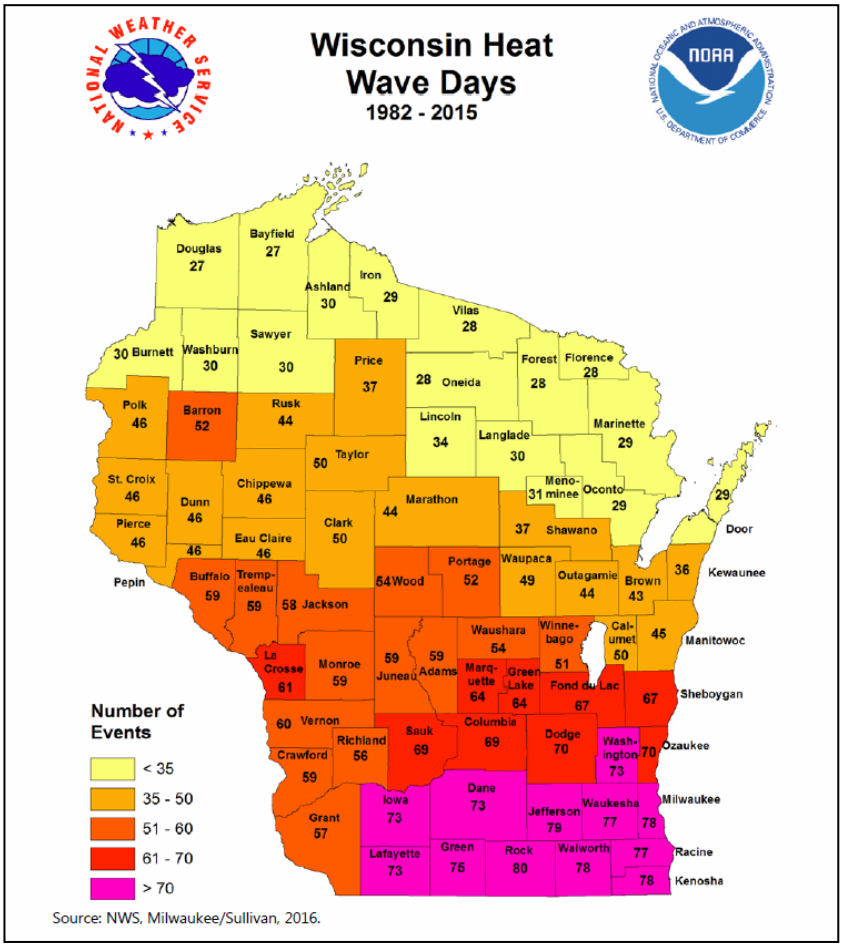
Heat is the number one weather-related killer in the United States and Wisconsin. From 1979 to 1999, excessive heat exposure caused 8,015 deaths in the United States. During this period, more people died from extreme heat than from hurricanes, lightning, tornados, floods, and earthquakes combined.

Although Wisconsin may not be thought of as a high-risk area for deadly heat waves, every year the State of Wisconsin experiences a period or series of periods in which the temperature and humidity produce a heat index which could be harmful to human health. Many of Wisconsin

record-setting temperatures were reported during the Dust Bowl years of the 1930s. The highest-recorded Wisconsin temperature was 114ºF recorded on July 13, 1936, in the Wisconsin Dells.

From 1982 to 2015, there were 137 deaths directly attributed to heat in Wisconsin and 102 indirect deaths. A death is considered direct if the medical examiner ruled that heat was the primary cause of death and not just a contributing factor. The following are examples of recent heat wave events affecting Wisconsin:

- During the summer of 1995, two heat waves affected most of Wisconsin. Together, they resulted in 154 heat-related deaths and an estimated 300 to 400 heat-related illnesses. This makes the combined 1995 summer heat waves the biggest weather-related killers in Wisconsin for the past 50 years, far exceeding tornado deaths. Nationwide, the heat waves claimed 1,021 lives.
- In 1999, heat waves occurred on in multiple weeks of July. Collectively, these heat waves were directly and indirectly responsible for 21 deaths.
- Several heat waves from mid-July through early August 2001 claimed 15 fatalities across Wisconsin. Additionally, it is estimated that 300 or more individuals were treated at hospitals for heat-related conditions.
- There were an additional 21 heat-related deaths and likely hundreds of related illnesses in July 2012, with heat indices peaking in the 100º to 115º F range, especially in the southern parts of the Wisconsin.



Local Events

Extreme heat has no defined hazard area within Eau Claire County and most times affects the entire county. A possible exception is the City of Eau Claire urban area, which has the potential to experience a heat island effect. A **heat island** describes built-up areas that are hotter than

nearby rural areas due to a number of factors, most notably more buildings, pavement and hardscape and less vegetation. The Health Chapter Policy Research document for the *City of Eau Claire Comprehensive Plan* discusses a variety of urban heat island mitigation measures, though no detailed data on this effect in Eau Claire was provided. In discussing weather for a nearby metropolitan area of similar size, a National Weather Service Meteorologist suggested the "La Crosse is probably under that size where we see an urban heat island effect."[27] And due to the irregular nature of these events and the lack of defined hazard areas, the assessment of community impacts as a result of extreme temperatures is difficult to quantify.

From 1993 through 2017, Eau Claire County experienced 12 extreme-heat weather events, according to the NCDC database as shown in **Table 24**. It is notable that the current database does not include the July 2012 event discussed previously, nor does it include the three 1995 events listed below that were previously identified as including Eau Claire County.

Table 24. Eau Claire County Extreme Heat Events – 1993-2017

Location	Date	Time	Type	Deaths	Injuries	Property Damage
Statewide	6/14/1994	12:00 PM	Heat Wave	0	0	0
Regional	6/17/1995	1:00 PM	Extreme Heat	9	0	0
Regional	7/13/1995	8:00 AM	Extreme Heat	57	0	0
Statewide	10/12/1995	2:00 PM	Record Warmth	0	0	0
Regional	7/23/1999	10:00 AM	Excessive Heat	0	0	0
Regional	7/29/1999	3:00 AM	Excessive Heat	0	0	0
Regional	7/31/2001	9:00 AM	Excessive Heat	0	0	0
Regional	8/1/2001	12:00 AM	Excessive Heat	0	0	0
Regional	8/4/2001	12:00 PM	Excessive Heat	0	0	0
Regional	7/31/2006	10:00 AM	Heat	0	0	0
Regional	7/18/2011	12:00 PM	Excessive Heat	0	0	0
Regional	7/21/2016	1:00 PM	Excessive Heat	0	0	0
			12 events	**66**	**0**	***none reported***

source: National Climatic Data Center (NCDC)

Since 1995, Eau Claire County has averaged one event every two to three years, with multiple events reported sometimes reported in a single year. For instance, three of the reports occurred in the summer of 2001; and an additional two occurred in the summer of 1999. In addition, extreme heat events commonly last multiple days. All of the extreme heat events that included Eau Claire County were reported in the months of June, July, or August, except for a record warmth event which occurred on October 12, 1995. The NCDC database identifies one death and no injuries within Eau Claire County directly related to extreme or excessive heat, though injuries often go unreported to the database. The single fatality occurred at the resident's home and was attributed to heat stroke. The majority of deaths associated with the July 1995 event occurred in the Milwaukee urban area.

[27] http://www.weau.com/content/news/Study-says-La-Crosse-is-15th-coldest-city-in-America-468512673.html

More recently, a heat wave struck Wisconsin on July 17-21, 2011, which was the most oppressive heat wave since 1995. During the 4.5 day stretch, maximum heat indices peaked in the 105ºF to 115ºF range over much of the State. Three fatalities in Wisconsin were directly attributed to this event. The heat wave was not as intense in the Eau Claire area compared to some areas of the State. Unlike some other area counties, no cooling shelters were formally designated or made available in Eau Claire County. However, this event did increase local awareness of extreme heat risks and vulnerabilities.

Relative Level of Risk

Extreme heat was identified as a moderate-to-low risk (frequency) and vulnerability (impact) for Eau Claire County by the plan Steering Committee. Based on recent trends, **it is expected that a summer period will include at least one extreme heat event every two to three years, on average.** Some of these summers will include multiple events, with a single event lasting two to three days on average. However, as discussed previously in the subsection on climate change, average temperatures in the region have been rising. If these trends continue, extreme heat events may also be increasing in frequency and any urban heat island effect could become more pronounced.

Vulnerability Assessment—Extreme Heat

Potential Impacts

Shown in **Table 25** are the potential dangers associated with heat index temperatures. Research findings strongly suggest that heat index values of 90 to 105 make sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity. Heat index values of 105 to 130 degrees make sunstroke, heat exhaustion, or heat cramps likely with prolonged exposure and/or physical activity.

Table 25. Apparent Temperature Heat Stress Index (Dangers Associated with Heat Index Temperatures)

Category	Apparent Temperature (Heat Index - °F)	Associated Dangers
Caution	80-90°F	Exercise more fatiguing than usual.
Extreme Caution	90-105°F	Heat cramps, exhaustion possible.
Danger	105-130°F	Heat exhaustion likely; heatstroke possible.
Extreme Danger	Greater than 130°F	Heatstroke or Sunstroke imminent.

Source: National Weather Service

Heat cramps are muscle spasms from the result of a large amount of salt and water, and generally cease to be a problem after acclimatization. **Heat exhaustion** may cause dizziness, weakness, nausea, or fatigue from the depletion of body fluids, and may be accompanied by slightly to moderately elevated body temperatures. **Heatstroke** is when the body is unable to regulate and prevent a substantial rise in the body's core temperature. It is usually diagnosed when the body's temperature exceeds 105º F due to environmental temperatures. **Sunstroke** is a form of heatstroke brought about by excessive exposure to the sun. Heatstroke or sunstroke are

considered medical emergencies and can be fatal. The risk of heat-related injury or death is for individuals who are suffering from chronic illnesses and for those who are not acclimated to these conditions. Most health-related illnesses involve the elderly. However, people on certain medications, isolated individuals who live alone and seldom leave their home, infants and young children, persons with chronic heart or lung problems, overweight people, persons with disabilities, homeless individuals who do not have an air conditioned place to go, and people who work outside are also at greater risk during extreme heat events. Mobile homes, campers, pole buildings, and similar construction, if not air conditioned, can also become dangerous under extreme-heat conditions.

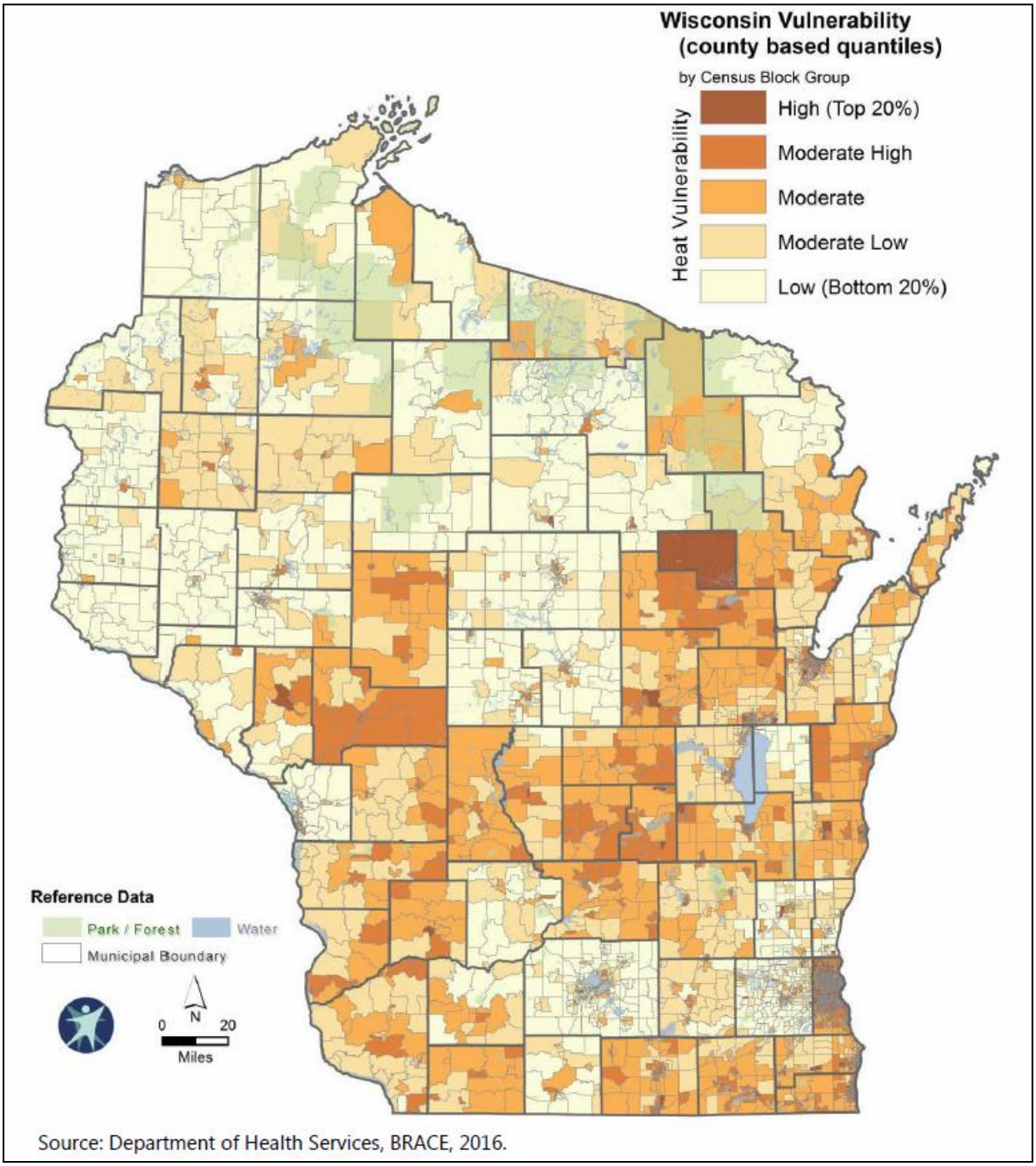
Residents in larger cities and urbanized areas can be more at risk due to the urban heat island effect. This was a factor in the large number of heat-related deaths in Milwaukee County in 1995. Concentrations of buildings can disrupt the cooling and moderating influences of winds. And large areas of concrete and asphalt retain heat. Large numbers of heat sources in urban areas are typically a secondary factor. However, other factors also influence a population's vulnerability to extreme heat.

The Building Resilience Against Climate Effects (BRACE) program in the Wisconsin Department of Health Services has compiled a heat vulnerability index map for the state based on a combination of risk factors (population density, health factors, demographic and socioeconomic factors, and the natural and built environment). **Figure 30** on the following page shows the heat vulnerability index map for Wisconsin. The vulnerability for most of Eau Claire County was rated as moderate to low.

Any time the temperature and humidity combine to produce a heat index that could cause health concerns for humans, the National Weather Service will issue various statements on heat conditions. For example, the NWS issues "Heat Advisories" when it expects the daytime heat index to equal or exceed 105° for 3 hours or more and the nighttime heat index equals or exceeds 80° for any 24-hour period. The NWS issues "Excessive Heat Warnings" when it expects the daytime heat index to equal or exceed 115° for 3 hours or more and the nighttime heat index equals or exceeds 80° for any 24-hour period. The NWS may issue an "Excessive Heat Watch" 24 to 8 hours in advance of anticipated heat wave conditions.

Few options are available for a community to mitigate extreme heat. Cooling shelters can be activated or identified for persons without air conditioning. The City-County Public Health Preparedness Committee has identified a need to designate a cooling shelter(s) and has placed the project on their "to do list". In the Eau Claire area, most efforts focus on educating the public to the risks, vulnerabilities, and how to prevent heat-related illness. Eau Claire County Emergency Management distributes educational information via social media and local media on steps to minimize the impacts of extreme heat. Local media will provide coverage and educational outreach. In addition, the Eau Claire County Aging and Disability Resource Center distributes educational information through its newsletter to the County's elderly; and its meal delivery personnel help maintain watch over elderly clients who might be more at-risk of succumbing to the impacts of extreme heat.

Figure 30. Wisconsin Heat Vulnerability Index



Beyond educational efforts and activating cooling shelters, mitigation alternatives are limited. A targeted air conditioning program, such as working with local suppliers to offer rebates, could be one alternative, but would be expensive. Some communities with significant urban heat islands have attempted to increase vegetative cover, reduce hardscape, or have consider policies to change the albedo (reflectivity) of pavement, roofs, and other surfaces. The impacts of these

policies are often difficult to model and prove. For areas experiencing an increase in extreme heat events, another approach is adaptation which considers the type of vegetation being planted, the reuse of water supplies, scheduling of activities, etc. The previously discussed City of Eau Claire Health Chapter Policy Research document includes examples of such adaptation and mitigation strategies from other cities.

Extreme heat also has impacts for agriculture. 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.[28] Extreme heat can also have long-term livestock reproductive and herd size management issues. Within confined livestock buildings, heat can also result in deaths, especially should power be lost. In nearby Barron County, some rural fire departments have been called out to provide water misting to help keep turkeys cool during the hottest of temperatures. This is a concern for Eau Claire County since the number of poultry farms and confined animal feeding operations (CAFOs) has been on the increase, and there is not a clearly defined county guideline for an animal mass casualty event. 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.

Vulnerable Critical Facilities

Extreme heat events are regional in nature, and all critical facilities would be encompassed within the same event area. An assessment of Eau Claire County community assets (critical facilities) and their susceptibility to extreme heat and other hazard events described in **Appendix E**. The vulnerability of critical facilities to extreme heat generally falls into three categories:

1) Infrastructure—Certain types of infrastructure can be impacted directly or indirectly by extreme heat. Direct impacts can include disruption of biological processes at wastewater treatment facilities, the "softening" or buckling of roadways, increased mechanical failure, water supply shortages (during times of drought), or the sagging of electrical transmission lines. Indirect impacts can include the power brownouts due to spiking demands for electricity. 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 department patrols may be ordered.

2) Services to Special Populations—Many critical facilities, such as hospitals, long-term care facilities, and schools, provide services to at-risk or special populations. Special attention is needed to mitigate heat-related vulnerabilities to these populations.

3) Hazardous Materials—Certain chemicals, gases, and other hazardous materials can be impacted by extreme heat resulting in a release, fire, or explosion. Care must be used to properly store these materials during extreme heat events.

[28] http://www.wbay.com/story/19037284/2012/07/16/milk-production-takes-a-dip-with-extreme-heat

Unique Jurisdictional Risks or Vulnerabilities—Extreme Heat

During meetings with cities and villages, no unique risks or vulnerabilities related to extreme heat were identified, with the possible exception of homeless populations in the cities of Eau Claire and Altoona. Mobile homes without air conditioning were identified as a special concern since temperatures within these structures can more easily rise to dangerous levels compared to more conventional stick-built construction. Augusta offers the Senior Center as a cooling shelter and public libraries are available when open. No cooling shelters have been formally designated in Eau Claire County. It is important that such shelters have emergency power generation if possible.

ix. Cyberattack

This brief assessment considers some of the cyberattack risks and vulnerabilities facing governmental entities and critical infrastructure that may impact Eau Claire County and its communities, businesses, and residents. It is not as robust as the other hazard assessments since the intent is to raise awareness of this threat, and there is currently insufficient data to fully assess and quantify related risks and vulnerabilities for Eau Claire County.

Risk Assessment—Cyberattack

The Hazard

For purposes of this report, **cyberattack** is defined as a malicious computer-to-computer attack through cyberspace that undermines the confidentiality, integrity, or availability of a computer (or network), data on that computer, or processes and systems controlled by that computer.

National Security Presidential Directive 54/Homeland Security Presidential Directive 23 (NSPD-54/HSPD23) defines **cyberspace** as the interdependent network of information technology infrastructures, and includes the Internet, telecommunications networks, computer systems, and embedded processors and controllers in critical industries. Common usage of the term also refers to the virtual environment of information and interaction between people.[29]

National Trends

Threats to cyberspace, or cyberattacks, pose one of the most serious economic and national security challenges of the 21st Century for the United States. The December 2008 report by the Commission on Cybersecurity for the 44th Presidency states: "America's failure to protect cyberspace is one of the most urgent national security problems facing the new administration."[30] In a 2017 survey of U.S. executives, cyberattacks was ranked as #2, misuse of technologies #3, and data fraud/theft #5 among the top global risks for doing business in the United States within the next ten years.[31] For perspective, terrorism ranked #1, natural catastrophes #6, and extreme weather events #10.

There are a growing number of individuals, such as terrorists and international criminal groups that are targeting U.S. critical infrastructure and government. These players have the ability to

[29] Cyberspace Policy Review, Assuring a Trusted and Resilient Information and Communications Infrastructure, U.S. White House.

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

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

compromise, steal, change, or completely destroy information.[32] As the Director of National Intelligence (DNI) recently testified before Congress, "the growing connectivity between information systems, the Internet, and other infrastructures creates opportunities for attackers to disrupt telecommunications, electrical power, energy pipelines, refineries, financial networks, and other critical infrastructures."[33]

Nationally, cyberattacks on the Federal government's IT systems are increasing, rising 680 percent from 2006 to 2011, according to an official from the Government Accountability Office (GAO).[34] Federal agencies reported 42,887 cyberattack incidents in 2011, compared with just 5,503 in 2006. The incidents reported by the agencies included unauthorized access to systems, improper use of computing resources, and the installation of malicious software, among others. An official with the GAO said the sources of the cyberattacks included criminal groups, hackers, terrorists, organizational insiders, and foreign nations. The GAO official warned,

> "The magnitude of the threat is compounded by the ever-increasing sophistication of cyberattack techniques, such as attacks that may combine multiple techniques. Using these techniques, threat actors may target individuals, businesses, critical infrastructures, or government organizations."[35]

The Federal government's IT systems continue to suffer from "significant weaknesses" in information security controls, he said. Eighteen of 24 major Federal agencies have reported inadequate information security controls for financial reporting for fiscal year 2011, and general inspectors at 22 of these agencies identified information security as a major management challenge for their agency. He warned,

> "Reported attacks and unintentional incidents involving Federal, private, and infrastructure systems demonstrate that the impact of a serious attack could be significant, including loss of personal or sensitive information, disruption or destruction of critical infrastructure, and damage to national and economic security."[36]

The 2018 Government Outlook issued by the non-profit Center for Internet Security, Inc. and its Multi-State Information Sharing and Analysis Center[37] included the following regarding cyberattack threats for the near future:

- Financial gain will remain the most prevalent cybercrime motivation and the majority of cyber incidents affecting local governments will continue to be opportunistic in nature. One area of growth will be in profit maximization per attack, rather than increasing the number of attacks.

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

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

[34] April 25, 2012 Infosecurity – (National) Cyberattacks on U.S. Federal IT system soared 680% in five years, http://www.infosecurity-magazine.com/view/25393/cyberattacks-on-us-Federal-it-system-soared-680-in-five-years/.

[35] Ibid.

[36] Ibid.

[37] https://www.cisecurity.org/white-papers/2018-sltt-government-outlook/

- Risks are expanding beyond traditional computer networks to include apps, Internet of Things, social media, public engagement tools, smart cities, cloud computing, mobile devices, point-of-sales systems, etc.
- Third parties are playing an increasing role in local government cybersecurity, and cybersecurity workforce demand is outstripping supply. Use of third-party storage and outsourcing has the potential to increase data breaches.
- There is growing need for cybersecurity staff to communicate to executives in business (non-technical) terms and having good, soft people skills. Mitigation efforts are moving beyond basic cybersecurity hygiene to more detailed efforts and protocols.
- Cyber threat actors are highly likely to continue using malspam, malvertising, and, while rare, remote desktop protocol attacks as initiation vectors, though tactics can shift.
- Cybercrime is increasing in sophistication and includes well-crafted social targeting and engineering (e.g., more accurate phishing emails and scams).
- Extortion and ransomware attacks will continue to increase.
- Industrial control systems are a wildcard. Known vulnerabilities exist in some systems, though such systems have not been a major target.
- Health care is a popular target, including for ransomware and extortion attempts.
- The 2018 mid-term elections will re-focus attention on security of election systems.

But it is also important to keep these numbers in perspective. One commonly referenced survey (Ontrack Data International, 2002) estimates that 44 percent of data loss is from hardware malfunction and another 32 percent from human error. Only seven percent was reported to be from computer viruses.

In March 2018, the U.S. Department of Homeland Security and Federal Bureau of Investigation released an alert that since at least March 2016 Russian government cyber actors targeted government entities and multiple U.S. critical infrastructure sectors, including the energy, nuclear, commercial facilities, water, aviation, and critical manufacturing sectors. In particular, sophisticated attacks were made against power infrastructure (electrical grid) including companies that manage U.S. nuclear facilities. Gaining access to such networks is extremely difficult, but does have the potential to cause significant damage and severe disruptions in service. The DHS/FBI alert includes technical recommendations to improve cyberdefense from such attacks.[38]

[38] https://www.us-cert.gov/ncas/alerts/TA18-074A; https://www.cnn.com/2018/03/15/politics/dhs-fbi-russia-power-grid/index.html; https://www.symantec.com/blogs/threat-intelligence/dragonfly-energy-sector-cyber-attacks

Regional and Local Trends

The *State of Wisconsin Homeland Security Council THIRA & SPR* completed by Wisconsin Emergency Management in 2016 includes a cyber incident section that states "*the cyber incident hazard is rapidly evolving and any attempt to describe recent historical occurrences will be limited*." On the following pages is a summary of the latest (2016) Internet Crime Report for Wisconsin produced by the FBI's Internet Crime Complaint Center (IC3).[39] It shows that victims can come from any age group and the types of crimes are wide ranging.

No data source was identified during this plan update that provides a history of attacks, impacts, and losses within Eau Claire County or the region. However, within west-central Wisconsin, a number of communities have experienced cyberattacks. For instance, Eau Claire County has been targeted twice. During the second attack in January 2010, overseas hackers acquired credentials through a computer virus which allowed the hackers to attempt to transfer nearly $800,000 from the County's accounts. The County's financial institution helped thwart the robbery attempts in both cases, demonstrating the importance of security partnerships with those providing such services to municipalities. Eau Claire County has taken additional security steps to further help prevent such crimes. In April 2012, the City of Eau Claire's website was hacked and temporarily unavailable, but no computer systems were impacted.

Within nearby St. Croix County, in 2009, a malicious keylogging software was used to track keystrokes on a City of Glenwood City computer which allowed hackers to gain access to banking account information; like the Eau Claire County cases, the theft was prevented by the bank. Some area communities have experienced non-targeted attacks, such as malware and viruses that were acquired through web-surfing and email "phishing"; employee education is key to preventing such attacks. Some communities and local organizations have experienced non-targeted attacks, such as malware and viruses that were acquired through web-surfing and email "phishing"; employee education is key to preventing such attacks.

[39] https://www.ic3.gov/media/annualreports.aspx

FBI's 2016 Internet Crime Complaint Summary for Wisconsin

Crime Type by Victim Count			
Crime Type	*Victim Count*	*Crime Type*	*Victim Count*
419/Overpayment	512	Health Care Related	1
Advanced Fee	244	IPR/Copyright and Counterfeit	26
Auction	231	Identity Theft	201
BEC/EAC	135	Investment	15
Charity	3	Lottery/Sweepstakes	85
Civil Matter	11	Malware/Scareware	39
Confidence Fraud/Romance	177	Misrepresentation	61
Corporate Data Breach	43	No Lead Value	49
Credit Card Fraud	164	Non-payment/Non-Delivery	927
Crimes Against Children	13	Other	118
Criminal Forums	0	Personal Data Breach	304
Denial of Service	12	Phishing/Vishing/Smishing/Pharming	417
Employment	127	Ransomware	45
Extortion	224	Re-shipping	9
Gambling	1	Real Estate/Rental	150
Government Impersonation	230	Tech Support	190
Hacktivist	1	Terrorism	2
Harassment/Threats of Violence	180	Virus	25
Descriptors*			
Social Media	231	Virtual Currency	22

*These descriptors relate to the medium or tool used to facilitate the crime, and are used by the IC3 for tracking purposes only. They are available only after another crime type has been selected.

Crime Type by Victim Loss			
Crime Type	*Loss Amount*	*Crime Type*	*Loss Amount*
419/Overpayment	$1,110,574	Health Care Related	$570
Advanced Fee	$293,649	IPR/Copyright and Counterfeit	$57,093
Auction	$188,654	Identity Theft	$151,382
BEC/EAC	$2,546,776	Investment	$531,300
Charity	$77	Lottery/Sweepstakes	$216,980
Civil Matter	$40,289	Malware/Scareware	$38,930
Confidence Fraud/Romance	$2,326,051	Misrepresentation	$233,650
Corporate Data Breach	$1,409,706	No Lead Value	$0
Credit Card Fraud	$1,834,394	Non-payment/Non-Delivery	$1,188,741
Crimes Against Children	$10	Other	$128,785
Criminal Forums	$0	Personal Data Breach	$807,361
Denial of Service	$278	Phishing/Vishing/Smishing/Pharming	$38,507
Employment	$261,882	Ransomware	$6,965
Extortion	$129,937	Re-shipping	$7,052
Gambling	$2,600	Real Estate/Rental	$374,710
Government Impersonation	$131,959	Tech Support	$276,828
Hacktivist	$0	Terrorism	$0
Harassment/Threats of Violence	$368,275	Virus	$42,024
Descriptors*			
Social Media	$313,673	Virtual Currency	$4,897

*These descriptors relate to the medium or tool used to facilitate the crime, and are used by the IC3 for tracking purposes only. They are available only after another crime type has been selected.

Victims by Age Group		
Age Range	*Count*	*Amount Loss*
Under 20	111	$45,040
20 - 29	471	$358,944
30 - 39	548	$2,220,569
40 - 49	570	$1,897,526
50 - 59	978	$2,571,333
Over 60	627	$2,178,595

Crime Type by Subject Count			
Crime Type	*Subject Count*	*Crime Type*	*Subject Count*
419/Overpayment	78	Health Care Related	0
Advanced Fee	32	IPR/Copyright and Counterfeit	8
Auction	94	Identity Theft	59
BEC/EAC	20	Investment	6
Charity	2	Lottery/Sweepstakes	3
Civil Matter	8	Malware/Scareware	1
Confidence Fraud/Romance	39	Misrepresentation	21
Corporate Data Breach	5	No Lead Value	26
Credit Card Fraud	46	Non-payment/Non-Delivery	245
Crimes Against Children	3	Other	20
Criminal Forums	0	Personal Data Breach	79
Denial of Service	3	Phishing/Vishing/Smishing/Pharming	22
Employment	32	Ransomware	1
Extortion	36	Re-shipping	1
Gambling	0	Real Estate/Rental	29
Government Impersonation	14	Tech Support	5
Hacktivist	0	Terrorism	2
Harassment/Threats of Violence	61	Virus	2
Descriptors*			
Social Media	54	Virtual Currency	3

*These descriptors relate to the medium or tool used to facilitate the crime, and are used by the IC3 for tracking purposes only. They are available only after another crime type has been selected.

BEC/EAC is business email compromise or email account compromise. This scam is carried out when a subject compromises legitimate business email accounts through social engineering or computer intrusion techniques to conduct unauthorized transfers of funds. The scam began to evolve in 2013 when victims indicated the email accounts of Chief Executive Officers or Chief Financial Officers of targeted businesses were hacked or spoofed, and wire payments were requested to be sent to fraudulent locations. BEC/EAC can be linked to other types of scams, such as lottery, rental, and romance.

Crime Type by Subject Loss			
Crime Type	*Loss Amount*	*Crime Type*	*Loss Amount*
419/Overpayment	$82,672	Health Care Related	$0
Advanced Fee	$75,383	IPR/Copyright and Counterfeit	$28,966
Auction	$56,747	Identity Theft	$80,613
BEC/EAC	$1,676,693	Investment	$5,280,717
Charity	$0	Lottery/Sweepstakes	$0
Civil Matter	$1,014,513	Malware/Scareware	$0
Confidence Fraud/Romance	$1,546,476	Misrepresentation	$44,093
Corporate Data Breach	$10,122	No Lead Value	$0
Credit Card Fraud	$145,219	Non-payment/Non-Delivery	$1,313,904
Crimes Against Children	$0	Other	$12,987
Criminal Forums	$0	Personal Data Breach	$100,918
Denial of Service	$0	Phishing/Vishing/Smishing/Pharming	$65,861
Employment	$57,349	Ransomware	$300
Extortion	$65,546	Re-shipping	$3,000
Gambling	$0	Real Estate/Rental	$422,451
Government Impersonation	$38,045	Tech Support	$260
Hacktivist	$0	Terrorism	$0
Harassment/Threats of Violence	$126,251	Virus	$246
Descriptors*			
Social Media	$941,850	Virtual Currency	$600

*These descriptors relate to the medium or tool used to facilitate the crime, and are used by the IC3 for tracking purposes only. They are available only after another crime type has been selected.

Vulnerability Assessment—Cyberattack

All computers, networks, and many other computerized devices share general vulnerabilities to viruses, Trojans, malware, denial of service attacks, and data loss. But the primary vulnerabilities of public concern to cyberattack may also vary by those being attacked as summarized in **Table 26**.

The growing sophistication of cyberattacks could cause serious problems, such as:

- **Failure of critical infrastructures**. The CIA reports malicious activities against information technology systems have caused the disruption of electric power capabilities in many regions overseas. For example, in December 2015, three Ukrainian power companies experienced power outages impacting approximately 225,000 customers for 1-6 hours due to remote cyber intrusions. This was the first known, successful cyberattack on a power grid. A year later, a similar attack resulted in a power cut for part of Kiev. In today's world, broadband technology is a path of attack to utilities and communications. 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.[40] 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.[41]
- **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.[42]

Losses due to cyber-security are increasing. According to the Internet Crime Complaint Center:

- U.S. Losses = $265 million in 2008
- U.S. Losses = $4.63 billion 2016
- Online fraud grew 22% from 2008 to 2009
- Non-delivery = 20% of all complaints; ID theft = 14.1%
- 55% of the victims were aged 40 or older
- In 2016, Wisconsin ranked 24th in the nation in number of victims (3,662) and 26th in losses ($10.3 million).

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

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

[42] 16 www.mcafee.com/us/about/press/corporate/2009/20090129_063500_j.html. See also http://resources.mcafee.com/content/NAUnsecuredEconomiesReport, McAfee, "Unsecured Economies: Protecting Vital Information", January 2009. Projection based on survey by Purdue's Center for Education and Research in Information Assurance and Security.

Table 26. Cyberattack Vulnerabilities by Attackee

Type of Attackee	Primary Vulnerabilities of Public Concern
Government	Access to confidential data to possibly steal, alter, or delete information. Website hacking and other disruption of public services or voting systems. As was the case in Eau Claire County and Glenwood City, hackers may attempt to obtain access to bank accounts, financial information, etc.
Power Grid and Utilities	Short- or long-term power outage. Damage to equipment. Lack of redundancy in systems and shared systems can increase risks and vulnerabilities.
Transportation	Disturbance of traffic signals resulting in confusion, traffic congestion and/or accidents.
Financial Institutions	Access to personal information (bank accounts) resulting in theft and/or identity theft. As more and more banking is performed on-line, financial institutions have been very proactive on cyber-security issues.
Schools Districts	Access to confidential data to possibly steal information or alter/delete it. Disruption of educational services. For public schools, cyber-security issues are frequently addressed in cooperation with CESA. Given that students are increasingly using computers and mobile devices in the classrooms, the risk of viruses, malware, etc., is high.

National Level of Preparedness

Nationally, the Department of Homeland Security National Cyber Security Division has a program called the Control Systems Security Program (CSSP), which works to reduce industrial control system risks within and across all critical infrastructure and key resource sectors by coordinating efforts among Federal, state, local, and tribal governments as well as industrial control systems owners, operators, and vendors.[43] The program coordinates activities to reduce the likelihood of a successful cyberattack and attempts to reduce the severity of impacts from a successful cyberattack against critical infrastructure control systems through risk-mitigation activities. Further, the Department of Homeland Security's United States Cyber Emergency Readiness Team (US-CERT) strives to improve the nation's cybersecurity, coordinate information sharing, and manage cyberattack risks.[44] US-CERT partners with private and public sector critical infrastructure owners and operators to enhance cybersecurity. Cyber-security assessment tools are available through US-CERT and businesses that provide critical infrastructure may be eligible for additional audit and planning support. Visit: https://www.us-cert.gov/ccubedvp/assessments

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

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

State of Wisconsin Level of Preparedness

The State of Wisconsin's Cyber Incident Annex "discusses policies, organizations, actions, and responsibilities for a coordinated, multidisciplinary, broad-based approach to prepare for, respond to, and recover from cyber-related incidents."[45] The Annex describes the framework for Wisconsin State Agencies to support local units of government during a cyber incident response. This support is coordinated with State and Federal agencies. Wisconsin is a home rule state and "the role of any state agency, including the Department of Military Affairs and the division, in an emergency declared under this chapter, is to assist local units of government and local law enforcement agencies in responding to a disaster or the imminent threat of a disaster."[46]

The Wisconsin Department of Justice (DOJ)/Wisconsin Statewide Information Center (WSIC) serves as the state's primary fusion center, which shared information and intelligence among numerous partners and stakeholders. The State of Wisconsin Department of Administration, Division of Enterprise Technology's Office of Security provides information to Wisconsin residents, educators, and businesses on cyber risks and ways to stay protected online as well as monitoring the State cyber-domain on a 24-hour basis. This office has also established regional-level cyber-response teams should a local government or business require technical support due to a significant data breach; Eau Claire County is part of the northwest Wisconsin team. The Wisconsin National Guard (WI NG) also plays a key role in the State's overall cyber strategy and maintains a Computer Network Defense Team that collaborates with other cyber-security professionals across industries.

Electric Cooperatives

As previously described, cooperatives provide electric service to a large part of Eau Claire County. Electric cooperatives have worked with the Department of Energy (DOE), the North American Electric Reliability Corporation (NERC), the Federal Energy Regulatory Commission (FERC), the U. S. Department of Homeland Security, the Obama administration, and the electric industry to strengthen cyber-security. In 2011, NERC performed an exercise called "GridEx" to identify any issues of cyber security and to encourage utilities and governments to work together on the issues. The test showed that most utilities have adequate response plans in place but need updated guidelines, more training, and better communication.[47] It is important to understand that cyber-attack vulnerabilities for the electric power infrastructure are greatest for the points of generation and the transmission system. The potential risks for local electrical cooperatives are relatively low since most of their infrastructure is limited to the distribution of power, not producing and transmitting power from generating facilities across the grid to substations. A cyber-attack directed at a local electrical cooperative could impact administrative and monitoring

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

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

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

systems (e.g., billing, metering) but would likely not result in widespread or long-term power loss.

Health and Social Services Providers

Hospitals, clinics, and many other entities, including some Eau Claire County departments, are entities that must comply with HIPPA rules. HIPAA (Health Insurance Portability and Accountability Act of 1996) is United States legislation that provides data privacy and security provisions for safeguarding medical information. 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 $2.5 million.

Other Local Jurisdictional Risks or Vulnerabilities—Cyberattack

The level of preparedness in terms of both policy and level of protection varies significantly among the governmental entities in Eau Claire County, but, anecdotally, appears to have improved significantly since the 2013 mitigation plan. During this planning process, cities and villages were asked about their current policies and protections, which are summarized in **Appendix G**. For reasons of security, specifics are not included in this plan. Eau Claire County and an increasing number of local communities frequently back-up their data off-site or to the cloud, which is also important for fire or other disaster events during which information can be destroyed.

Eau Claire County and the City of Eau Claire have a strong IT partnership, including the backup of critical applications and data off-site, which lessens the vulnerability to ransomware threats. IT staff from the County and City are also members of the regional Cyber Response Team and the Government Information Processing Association of Wisconsin (GIPAW). These ongoing partnerships are critical to the ongoing exchange of ideas, techniques, and support should a serious cyberattack occur. The remaining cities and villages contract for IT support and security services. During the plan update, the importance of vetting of IT contractors was discussed, potentially with background checks similar to those required for law enforcement. It was also noted that the City of Altoona conducts an annual cyber-security assessment, which includes spoofing (mock attack).

Cyberattack Preparedness and Mitigation

How an entity responds to a cyberattack can limit or increase its liabilities. During this plan update, a number of community staff suggested that increased public education, including for businesses, critical facilities, and residents is needed on the types of cyberattacks, preventing and recognizing threats, and when to report attacks. It is likely that the far majority of potential risks can be avoided if the following measures are taken by government offices, critical facilities, businesses, and residents to keep their computers safe:

- perform daily and a separate weekly data back-up
- keep the firewall on constantly

- set virus and malware detection to automatically update daily
- migrate to the most recent version of the Windows operating system
- ensure that the Windows operating system is automatically updated

There are additional actions and policies that can be taken to reduce cyberattack risks as discussed at April 2011 and May 2017 Disaster Ready Chippewa Valley cyber-security workshops, such as:

- use of hardware firewalls and how web servers are managed
- multi-factor authentication
- IDS/IPS real-time monitoring in both directions
- data and password encryption, including encrypted tunnels for transport
- password policies and procedures
- policies for the use of computer equipment, Internet, and downloading
- segregation of certain duties
- safeguarding and proper disposal of old equipment, including copiers
- safeguarding and proper disposal of paper reports
- training of staff in risks, guidelines, and security measures
- know what is covered under insurance in terms of cyberattack damages and liabilities
- request assistance from law enforcement, State, and Federal government when needed

Even with the best email filters, some spam and cyber threats will still get through. Employees are an integral part of any organization's cybersecurity system and the last line of defense. Employees should be trained to recognize suspicious emails, web sites, billings, and other identity theft threats. Warning flags include: differences in shipping, billing, and return addresses; similar (but slightly different) business names and web links; and many large orders from a new customers. If a business is uncertain, it is important to follow-up with phone calls, web searches, and other due diligence.

It can be valuable to have a cyber-security and response plan with a technical team and a separate executive team, with clear roles and responsibilities for each. Regular exercising of the plan will minimize stress and allow increasing focus on decisions, rather than the process and procedures. Such exercises can include cyberattack vulnerability assessment, including evaluating employee awareness through fake phishing.

Continuity planning is also important, though most governments in Eau Claire County have not completed such plans. Continuity planning is the identification of strategies for the preservation and/or restoration of critical business functions during or following a disaster or other disruption of service. Not only should data be frequently backed-up off site, but organizations should consider how this data is to be recovered following an event

and, should disaster strike, does the recovery location meet the organization's technology needs. Larger municipalities may need a secondary data and operations center and/or a back-up server. These systems should be tested regularly. Such measures can be addressed in a continuity plan and/or as part of a cyber-security plan. The business continuity planning template available at the Disaster Ready Chippewa Valley website (www.disasterreadychippewavalley.org) includes a section on data protection, storage, and recovery which may be helpful. Local governments should obtain technical assistance in addressing their risks, if needed.

In short, the risk and sophistication of cyberattack continues to grow, and the level of protection and preparedness among the communities and businesses in Eau Claire County varies significantly. Some actions, such as off-site data back-up, also mitigate risks associated with fires, tornado, flooding, equipment failure, accidental data deletion, etc. The following websites offer a starting point for exploring this topic further:

https://www.dhs.gov/topic/cybersecurity

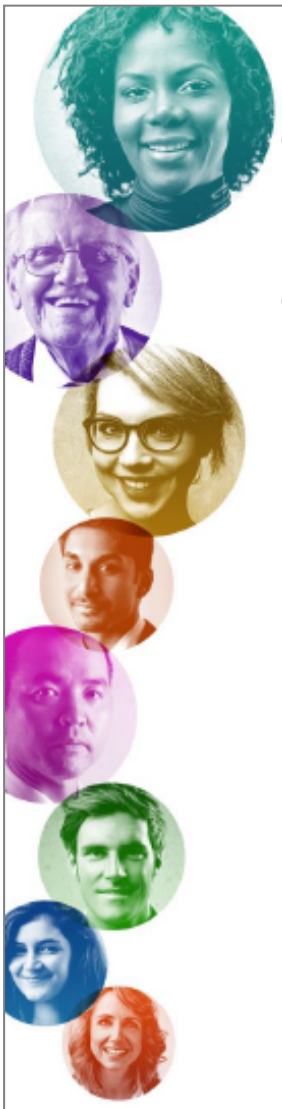
https://www.dhs.gov/stopthinkconnect-toolkit

http://www.readywisconsin.wi.gov/cyber/default.asp

https://blogs.sans.org/securingthehuman/files/2012/12/STH-SecurityAwarenessRoadmap-Email.jpg

https://www.nw3c.org/

https://www.nist.gov/cyberframework



FIVE WAYS TO BE CYBER SECURE AT WORK

Businesses face significant financial loss when a cyber attack occurs. Cybercriminals often rely on human error – from employees failing to install software patches to clicking on malicious links – to gain access to systems. From the top leadership to the newest employee, cybersecurity requires the vigilance of every employee to keep data, customers, and capital safe and secure.

SIMPLE TIPS

Follow these simple tips from the Stop.Think.Connect.™ Campaign to help foster a culture of cybersecurity in your organization.

1. **When in doubt, throw it out.** Stop and think before you open attachments or click links in emails. Links in email, instant message, and online posts are often the way cybercriminals compromise your computer. If it looks suspicious, it's best to delete it.
2. **Back it up.** Make electronic and physical back-ups or copies of all your important work. Data can be lost in many ways including computer malfunctions, malware, theft, viruses, and accidental deletion.
3. **Guard your devices.** In order to prevent theft and unauthorized access, never leave your laptop or mobile device unattended in a public place and lock your devices when they are not in use.
4. **Secure your accounts.** Use passwords that are at least eight characters long and a mix of letters, numbers, and characters. Do not share any of your usernames or passwords with anyone. When available, turn on stronger authentication for an added layer of security, beyond the password.
5. **Report anything suspicious**. If you experience any unusual problems with your computer or device, report it to your IT Department.

Stop.Think.Connect. is a national public awareness campaign aimed at empowering the American public to be safer and more secure online. The Campaign's main objective is to help you become more aware of growing cyber threats and arm you with the tools to protect yourself, your family and your community. For more information visit www.dhs.gov/stopthinkconnect.

Homeland Security

www.dhs.gov/stopthinkconnect

STOP | THINK | CONNECT™

x. Hazardous Materials Spills

Note: This plan only focuses on <u>point sources</u> of contaminants due to an accidental or malicious hazardous materials incident, such as a hazardous materials spill or a release from a leaking tank.

Public Health Hazard Vulnerability Assessment

Consistent with the Steering Committee and other findings in this section, the 2017 Northwest Wisconsin Health Care Coalition Public Health HVA rated transportation-related hazardous materials releases/explosions higher than fixed-site incidents. The HVA gave transportation-relation incidents a 40% risk over a ten-year period given their moderate probability (2), low vulnerability (1.3), and moderate available emergency management capabilities to deal with this threat (2.0 internal, 2.0 external). Fixed sites received a 20% overall risk rating with a low (1) probability of occurrence. The assessment used a scale of 1 to 3, with "1" being low probability/impact or having substantial management capabilities and "3" being high probability/impact or having limited/no management capabilities.

Risk Assessment—Hazardous Materials Spills

<u>The Hazard</u>

Hazardous materials and substances can present special risks to humans and the environment at the time of disaster as well as pose substantial difficulties and necessitate special precautions for post-disaster clean-up.

There are many definitions and descriptive names being used for the term "hazardous material," each of which depends on the nature of the problem being addressed. Unfortunately, there is no one list or definition that covers everything. The United States agencies involved, as well as state and local governments, have different purposes for regulating hazardous materials that, under certain circumstances, pose a risk to the public or the environment. The following are some of these Federal definitions.

Hazardous Materials - The United States Department of Transportation (DOT) uses the term "hazardous materials" which covers eight hazard classes, some of which have subcategories called classifications, and a ninth class covering other regulated materials (ORM). The DOT includes in its regulations hazardous substances and hazardous wastes, both of which are regulated by the Environmental Protection Agency (EPA), if their inherent properties would not otherwise be covered.

Hazardous Substances - The EPA uses the term "hazardous substance" for the chemicals which, if released into the environment above a certain amount, must be reported and, depending

on the threat to the environment, Federal involvement in handling the incident can be authorized. A list of the hazardous substances is published in 40 CFR Part 302, Table 302.4.

Extremely Hazardous Substances - The EPA uses the term "extremely hazardous substance" for the chemicals which must be reported to the appropriate authorities if released above the threshold reporting quantity. Each substance has a threshold reporting quantity. The list of extremely hazardous substances is identified in Title III of Superfund Amendments and Reauthorization Act (SARA) of 1986 (40 CFR Part 355).

Toxic Chemicals - The EPA uses the term "toxic chemical" for chemicals whose total emissions or releases must be reported annually by owners and operators of certain facilities that manufacture, process, or otherwise use a listed toxic chemical. The list of toxic chemicals is identified in Title III of SARA.

Hazardous Wastes - The EPA uses the term "hazardous wastes" for chemicals that are regulated under the Resource, Conservation and Recovery Act (40 CFR Part 261.33). Hazardous wastes in transportation are regulated by the DOT (49 CFR Parts 170 - 179).

Hazardous Chemicals - The United States Occupational Safety and Health Administration (OSHA) uses the term "hazardous chemical" to denote any chemical which is a physical hazard or a health hazard. Hazardous chemicals cover a broader group of chemicals than the other chemical lists. There is no list of hazardous chemicals, but they are any substance for which OSHA requires a facility to maintain a Material Safety Data Sheet.

Hazardous Substances - OSHA uses the term "hazardous substance" in 29 CFR Part 1910.120, which resulted from Title I of SARA and covers emergency response. OSHA uses the term differently than EPA. Hazardous substances, as used by OSHA, cover every chemical regulated by both DOT and EPA. [48]

At any one time, the EPA has an average of 300 new chemicals under review that are being proposed for commerce.[49] Originally, the United States Congress compiled a list of specific toxic chemicals (approximately 300) and chemical categories (approximately 20) based on two existing lists in use by the States of New Jersey and Maryland. Since that time, the toxic chemical list has grown to 595 chemicals in 32 categories.[50] The criteria that the EPA uses to define and evaluate toxic chemicals for addition to the list are specified in Title III of SARA and are listed below:

1. The chemical is expected to cause significant adverse acute human health effects at concentration levels which are likely to exist beyond the facility site boundaries as a

[48] Ingham County Emergency Planning Committee, Hazardous Materials Page, http://www.orcbs.msu.edu/AWARE/pamphlets/hazwaste/HazMatdef.html, as of Feb 2004.

[49] U.S. Environmental Protection Agency. https://www.epa.gov/reviewing-new-chemicals-under-toxic-substances-control-act-tsca/statistics-new-chemicals-review

[50] U.S. Environmental Protection Agency. https://www.epa.gov/toxics-release-inventory-tri-program/tri-listed-chemicals

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).

A solid waste may be a "listed hazardous waste" if it appears in one or more U.S. Environmental Protection Agency tables that list hazardous wastes. Other solid wastes are "characteristic hazardous wastes" because they exhibit any of the four hazardous-waste characteristics: corrosiveness, reactivity, toxicity, or ability to ignite. If the waste is hazardous, then it must be managed in compliance with the applicable sections of NR 600-685, Wisconsin Administrative Code (DNR Pub SW-232). Within this plan, we apply the term "hazardous materials" broadly to include…

> *…any substance or combination of substances (including wastes of a solid, liquid, gaseous, or semi-solid form) which, because of its quantity, concentration, physical chemical, or infectious characteristics, may cause or significantly contribute to an increase in mortality, an increase in serious irreversible or incapacitating illness, or pose a potential hazard to human health or the environment.*

This definition encompasses the hazardous substances and wastes definitions provided previously, including those chemicals required to be reported under Title III of SARA, otherwise known as the Emergency Planning and Community Right-to-know Act (EPCRA). Companies across a wide range of industries (including chemical, mining, paper, oil and gas industries) that produce more than 25,000 pounds or handle more than 10,000 pounds of a listed toxic chemical must report it to the Toxic Release Inventory.

Given the hazard mitigation and disaster preparedness context of this planning effort, this plan 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. Risks and impacts from non-point sources or potentially created during normal, permitted activities are not included in the plan scope.

State & Regional Trends - Overview

Nearly 58 percent of all spills in Wisconsin are petroleum-related; and 49 percent of all spills occur at industrial-related facilities, automotive-related facilities, or on the roadways.[51] Spills at

[51] Wisconsin Department of Natural Resources. "Hazardous Substance Spills in Wisconsin". July 2014.

private properties account for nearly twelve percent of all spills. More than fourteen percent of spills each year in Wisconsin are contained and/or recovered before they impact the environment. Surface water spills account for more than fifteen percent, while spills to groundwater occur more than seven percent of the time. The vast majority of reported hazardous materials incidents in Wisconsin result from the loading, unloading, and transportation of hazardous materials.

State Trends – Hazardous Materials at Fixed Facilities

The use of chemicals and hazardous materials is part of daily life. As could be expected, the largest site-specific toxic releases in Wisconsin are at heavy industrial facilities, power plants, military installations, and paper/pulp mills. However, non-point pollution of surface and ground waters from agricultural run-off, contaminants in stormwater, and improper disposal of household chemicals (e.g., bleach, used motor oil, paints) can also cause environmental harm.

Under the Emergency Planning and Community Right-to-Know Act (EPCRA), there are thousands of facilities in Wisconsin that plan and report the use/storage of certain potentially hazardous chemicals. The EPCRA Program requires communities to prepare for hazardous chemical releases through emergency planning and by maintaining hazardous chemical information that is submitted to them by the facilities covered under the law. This does not include practices which are exempt from such reporting, such as routine agricultural operations and retail gas stations.

According to the Wisconsin Department of Natural Resources, there are over 11,000 businesses, schools, and government institutions in Wisconsin that generate varying quantities of hazardous wastes each year. Overall, the number of hazardous waste generators and the quantity of hazardous waste that they generate are declining each year as everyone learns how much it costs to generate wastes and manage hazardous wastes according to the strict requirements that apply. The number of largest generators has been decreasing significantly in recent years while the number of very small generators has been increasing slowly. While much of the solvent-type hazardous wastes that are generated in Wisconsin are recycled here, many other hazardous wastes are handled out of state.

Wisconsin currently has 37 active Superfund sites on the National Priority List (NPL), one additional site with NPL-status pending, and eight sites that have been removed or deleted from the NPL. There are an additional 196 sites in Wisconsin that are listed in the Superfund database that have been or are currently being considered for Superfund NPL status. A Superfund site is any land in the United States that has been contaminated by hazardous waste and identified by the Environmental Protection Agency (EPA) as a candidate for clean-up because it poses a risk to human health and/or the environment. There are tens of thousands of abandoned hazardous waste sites in our nation, and accidental releases occur daily. At the core of the Superfund program is a system of identification and prioritization that allows the most dangerous sites and releases to be addressed within the confines of limited Federal funding and human resources.

The first step in the Superfund process is to identify abandoned or uncontrolled hazardous waste sites. All sites where releases or potential releases have been reported are listed in the Superfund

Enterprise Management System (SEMS), which recently replaced the Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS). Those Superfund sites determined to pose the greatest risks to humans or the environment 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.

Wisconsin also is home to fourteen licensed hazardous waste management facilities, which have also been decreasing in number.[52] Many of these facilities are privately operated, serving the needs of that particular facility's hazardous wastes. The commercial hazardous waste facilities in Wisconsin primarily focus on recycling of hazardous waste solvents and mercury, fuel blending of hazardous wastes for energy recovery, storage of hazardous wastes prior to the treatment at licensed hazardous waste facilities in other states, and treatment of hazardous wastes to facilitate disposal. There are no operating hazardous waste disposal facilities (i.e., landfills) in Wisconsin, but there are three incinerators (two private and one commercial) and two non-commercial open burning/open detonation facilities for reactive (explosive) hazardous wastes.

State & Regional Trends – Hazardous Materials Spills on Transportation Facilities

From 1971 to 2016, Wisconsin has had a total of 10,958 reported hazardous materials transportation incidents. This total is comprised of 10,498 highway incidents (95.8%), 266 rail incidents (2.4%), 188 air incidents (1.7%), 2 other incidents (>0.1%), and 0 water incidents (0.0%). The total cost for all reported incidents is approximately $57 million dollars. These incidents included 175 involving a crash or derailment, 68 causing or contributing to personal injury, 59 causing or contributing to an evacuation, 38 closing a major transportation arterial or facility, and seven causing or contributing to a fatality.

Approximately half of the above reported costs ($26.6 million) were from the 1996 Weyauwega Train Derailment. In March 1996, a train consisting of two locomotive units, 68 loaded freight cars and 13 empty freight cars derailed at Weyauwega, Wisconsin. The train included sixteen cars with hazardous materials—seven cars of liquid petroleum gas, seven cars of propane, and two cars of sodium hydroxide. A fire engulfed many of the cars themselves as well as an adjacent feed mill. About 3,155 residents were immediately evacuated, with approximately 2,300 residents evacuated for sixteen days due to the fire and leaking chemicals. Two U.S. highways were also closed as well as several county highways. Additional issues arose when numerous residents illegally began to re-enter the evacuation area to retrieve pets left behind.

Source: National Transportation Safety Board Report, CHI 96 FR 010, Derailment/Hazardous Material Release, Wisconsin Central, LTD, Weyauwega, Wisconsin, August 16, 1997.

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

Sometimes, hazardous materials spills can be the result of natural hazard events. For instance, on June 7, 1980, a Chicago & Northwestern train derailed in Chippewa County due to a flash flood which washed out the tracks. Three cars of #6 fuel oil were torn open, and 86,000 gallons spilled. Containment dikes were built and most of the oil was recovered.

Eau Claire County - Hazardous Materials at Fixed Facilities

Eau Claire County has 24 Extremely Hazardous Substance (EHS) planning facilities that have one or more extremely hazardous substance or chemical in such quantities that they are required to provide plans to the County's Local Emergency Planning Committee (LEPC) for review. All of these facilities are located in the City of Eau Claire, except 2 in Altoona, 2 in Fall Creek, 1 in Cleghorn, and 2 in the Town of Union. Any additional 31 Tier Two facilities store or use one or more than 300 extremely toxic chemicals on site and must provide an annual report to the LEPC and local fire department. All but 3 of the Tier Two facilities are located in the City of Eau Claire and about one-half of these facilities were educational institutions. For reasons of security, maps showing the locations of these EHS and Tier Two facilities have not been included within this plan.

Tier-Two facility reports are submitted annually, by law (SARA Title III), for any facility that is required to prepare or have available a Material Safety Data Sheet (MSDS) for a hazardous chemical present at the facility. EHS (Extremely Hazardous Substances) facilities store and/or use one of over 300 chemicals with extremely toxic properties identified within Title III of SARA. In addition to the MSDS reporting requirements, EHS facilities must cooperate with Eau Claire County Emergency Management and the Local Emergency Planning Committee (LEPC) to develop an emergency response plan.

The MSDS must identify any hazardous chemical present at the facility at or above 10,000 pounds at any given time or for each extremely hazardous substance (EHS) at or above 500 points (or the threshold planning quality, whichever is less) at any given time. There are a number of exemptions from these reporting requirements, including retail gas stations, hazardous wastes regulated under the Resource Conservation and Recovery Act, substances used in routine agricultural operations by the end-user, tobacco products, wood products, food products regulated by the Food & Drug Administration, and hospitals.

During the planning effort, no unique, inherent characteristics (e.g., location, type of construction) that make them any more vulnerable to the hazards covered within this plan when compared to other facilities were identified, and thus were not individually analyzed. However, the hazardous nature of the chemicals and substances used or stored at these locations can pose unique vulnerabilities to local residents and the environment, and the majority of these facilities are located within populated cities and villages.

Eau Claire County - 2012 Multi-County Commodity Flow Study

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

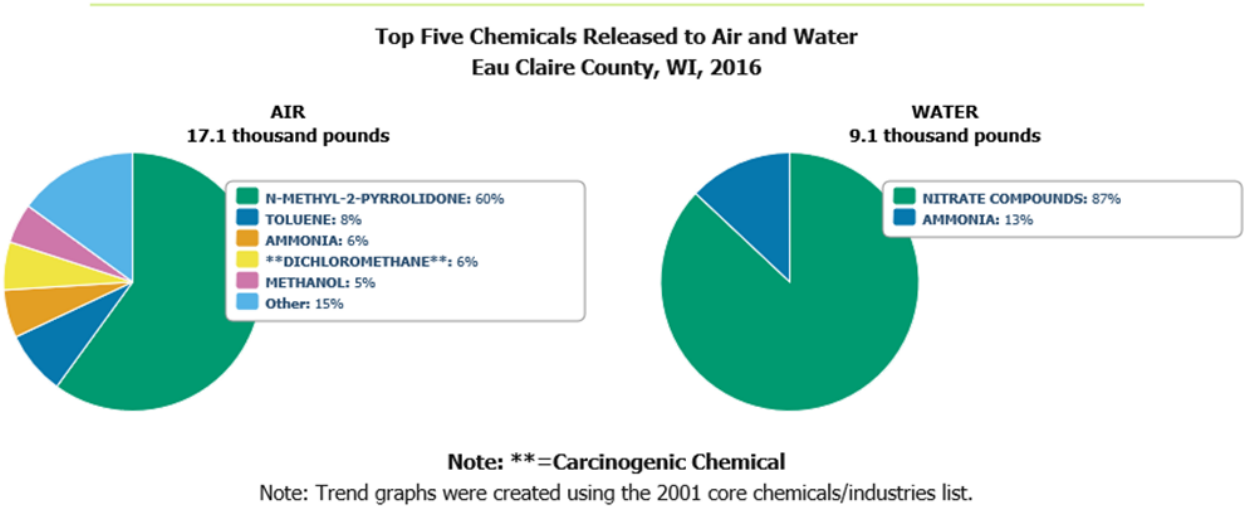
Chippewa, Dunn, Eau Claire, and St. Croix counties. As part of the study, 10 hours were spent observing HazMat placards at five locations on Interstate 94, and Highways 53, 93, and one other highway, typically at key intersections. Based on placards, 66 different types of EPCRA Tier Two hazardous materials were identified as being transported via these highways during the study period. The study suggests that the "majority of hazardous materials being transported…is either not placarded or not listed in the Tier II report" being provided to County Emergency Management. A complete list of hazardous materials transported by rail was not available.

The study also included a Fire Department survey that showed that all of the departments had a percentage of their personnel trained at the haz mat awareness level. The typical department trains six hours or less a year on haz mat response, with over half never having trained with the regional haz mat response team. The vast majority would like to see additional training made available to them. The detailed results of this study are not published here for reasons of security. Over the past year, Wisconsin Emergency Management has been completing a comprehensive, statewide HazMat Capabilities survey. The results of this survey could be very useful for assessing local training and equipment needs, but the results were not available prior to completion of this draft mitigation plan update.

Local Events – Toxic Release Inventory (TRI) Sites

Facilities in certain industries which manufacture, process, or use significant amounts of toxic chemicals are required to annually report on their releases of these chemicals. More specifically, facilities with ten or more employees that process more than 25,000 pounds in aggregate or use greater than 10,000 pounds of any toxic chemical in a given year are required to report releases each year to the Toxic Release Inventory (TRI) database. Releases include any toxic chemicals spilled, discharged, injected or otherwise released into the air, land, water, or underground. These releases are not accidental hazardous materials spills, but are an indicator of potential risk.

In 2016, Eau Claire County had 12 facilities that released significant amounts of one or more toxic chemicals into the environment and required reporting by the EPA. About 65% of the on-site releases were airborne, while the remaining releases were into surface waters as reflected in the charts below.



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 releases reported 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.

Local Events – CERCLIS (Superfund Database) Sites

Two locations in Eau Claire County were previously on the Superfund National Priority List due to severe contamination that posed a risk to human health or the environment. The Eau Claire Municipal Well Field had elevated levels of volatile organic compounds (VOCs) in the mid-1980s due to a nearby industry. While some VOCs are natural, most VOCs in the environment come from gasoline, solvents, pains, refrigerants, cleaners, pesticides, and other human activity. VOCs can have very serious health consequences, including cancer, harming the liver and kidneys, and nervous system disorders. The clean-up has been completed and water levels at the wells have been in compliance for over five years.

Soil, surface water, and groundwater contamination from various VOCs were discovered at the Waste Research Reclamation site in the 1980s. Long-term remediation at the site continues and activities/uses are restructured. In 1993, the site was moved from the Superfund program to the Resource Conservation and Recovery Act (RCRA) program and deleted from the National Priorities List.

Local Events – Recent Hazardous Materials Spills

Spills are defined as a discharge of a hazardous substance that may adversely impact, or threaten to impact, public health, welfare, or the environment. Spills are usually cleaned up quickly when reported, though many smaller spills likely go unreported. As discussed in the previous subsection, spills have been an increasing percentage of the hazardous materials incident activities in the County.

Federal data collection for spills and leaks of toxic substances changed in 2010 with the implementation of the new National Toxic Substance Incidents Program (NTSIP) managed by the Center for Disease Control. The spills in the NTSIP database are accidental or illegal in nature, as opposed to the majority of releases in the TRI database. This data source not only includes releases at fixed sites, but transportation-related spills as well.

From 2010 to 2014, 21 hazardous materials spills in Eau Claire County were reported to the NTSIP database through the Wisconsin Department of Health & Family Services or other sources as shown in **Table 27.** It is unknown to what extent this list includes all such spills of public health concern. Of those spills reported, they were nearly evenly split between fixed and transportation facilities. Three spills required the evacuation of a facility or limited area.

Table 27. Reported Hazardous Materials Spills – 2010 through 2014[53] Eau Claire County

Year	# of Reports	Fixed Facilities	Transportation Related	Notes
2010	7	5	2 (both truck)	1 event req'd evac of 22 people
2011	2	0	2	1 agri/forestry related
2012	5	2	3 (all truck)	1 event req'd evac of 50 people
2013	4	2	2 (1 truck, 1 rail)	rail spill was propane related
2014	3	1	2 (1 mining)	1 event req'd evacuation
Total	**21**	**10**	**11**	

Local Events – BRRTS Records

The Bureau for Remediation & Redevelopment Tracking System (BRRTS) keeps data on hazardous materials releases and the clean-up of contaminated sites and is maintained by the Wisconsin Department of Natural Resources. The BRRTS system categorizes these events by activity type. As shown in **Table 28** below, there are 1,274 BRRTS records for Eau Claire County from 1978 to 2017, of which 703 (55%) are closed; and no further action or monitoring is currently planned.

Table 28. BRRTS Records for Eau Claire County – 1978 thru 2017 report dates[54]

Activity	1978-1999		2000-2017	
Spills	373	44.1%	271	67.6%
Leaking Underground Storage Tanks	250	29.6%	20	5.0%
Environmental Repair (non-LUST)	62	7.3%	26	6.5%
No Action Required Discharge	158	18.7%	75	18.7%
Removed from Database	2	0.2%	1	0.2%
Abandoned Container	1	0.1%	8	2.0%
Totals	**846**	**100%**	**401**	**100%**
Average Reports per Year	**40.3**		**23.5**	

Since 1976, slightly less than half of all BRRTS reports were spills. **Spills** are locations where a clean-up is confirmed by laboratory analysis, generally within 60 to 90 days. The proportion of spills has increased to 67.6 percent of all reports since 2000, largely due to a significant decrease in the proportion of leaking underground storage tank reports in recent years.

There are many properties—often industries or fueling stations—that have multiple reports, typically related to accidently spills. Many of these reports were closed within days, indicating that they were minor spills requiring no significant clean-up or monitoring efforts. At least twelve locations in the County have had five or more such reports.

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

[54] 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.

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 after significant contamination occurs. For reference, **Figure 31** shows the location of the open LUST and ERP sites in the County.

Local Events — 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 31 identifies past and current sites in the County where contamination has occurred according to the BRRTS database. All of these sites have had some level of contamination to soil, groundwater, or both, to varying degrees, but often limited to the site itself.

Landfills and historic waste sites also have the potential to contaminate groundwater, especially if built prior to more current regulations in the 1980's. The map on the following page shows the location of known landfills in Eau Claire County including the 1,200 foot buffer area for each landfill in which a WDNR variance approval is required prior to construction of a water supply well. The map also includes one WDNR-designated special well casing depth area in the Town of Washington associated with a closed paper sludge waste site. In this area, any new water supply well shall be sampled upon completion and tested for volatile organic compounds (VOC's) to determine required casing depth prior to use.

Figure 31. Key Areas of Hazardous Materials Risk

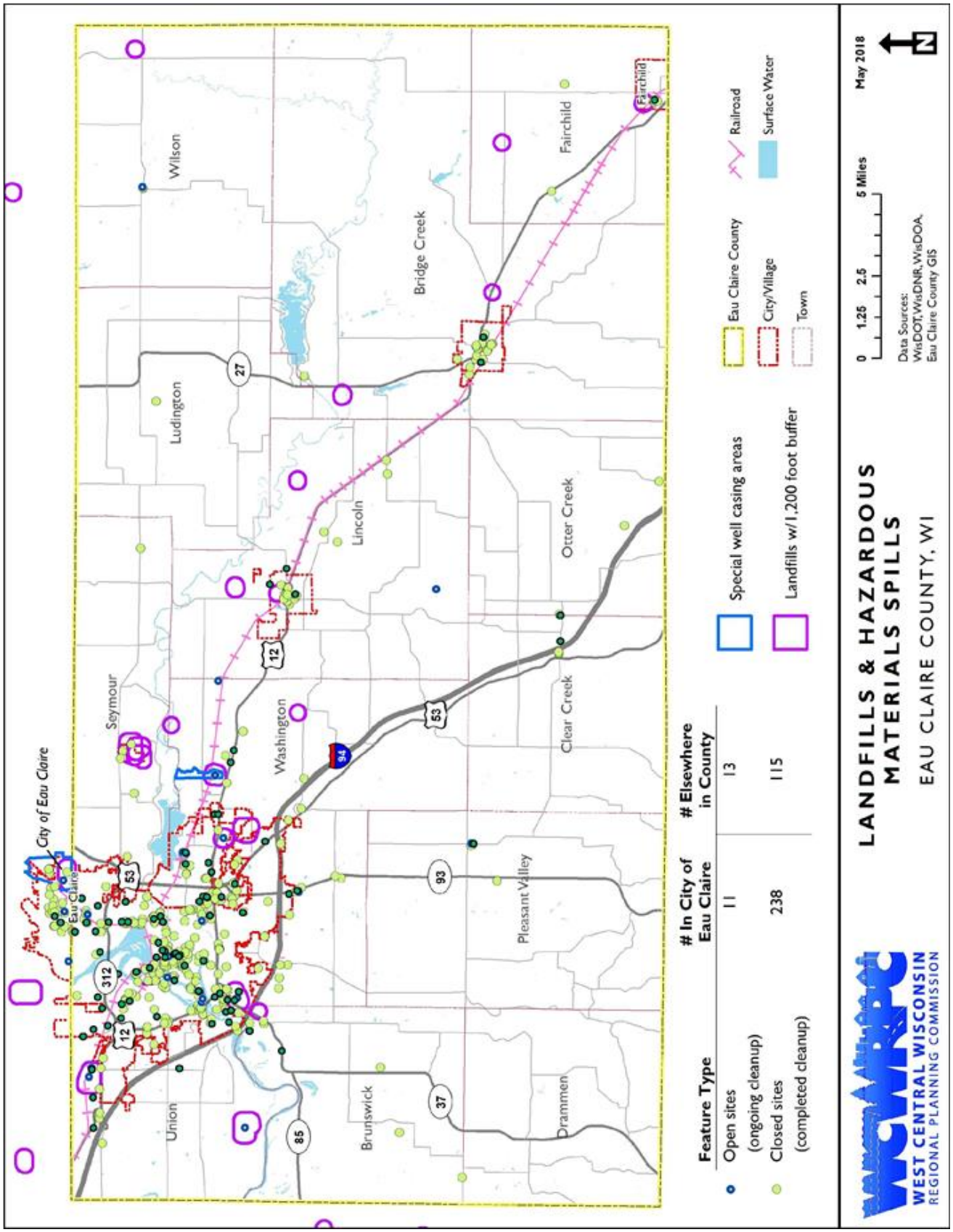


Figure 31 also identifies the highways and railroads of Eau Claire County. During the planning process, transportation-related spills were consistently identified as the greatest hazardous materials concern for the following reasons:

- Traffic accidents occur with many contributing factors that can be difficult to control or mitigate.
- The uncertainty of what materials and quantities being transported.
- Major highways with heavy truck traffic and rail lines pass through residential areas and near schools, hospitals, and other critical facilities.
- Most fixed facilities using hazardous materials have security measures, plans, and procedures in place to monitor, mitigate, and response to spills. For EHS and Tier Two facilities, local emergency response personnel are familiar with the facilities and materials being used.

Larger transmission pipelines that carry larger quantities of energy resources (e.g., petroleum products, natural gas) were also identified as a hazardous materials spill concern by some communities. Smaller distribution pipelines can have similar threats, but typically at a smaller scale, such as a person accidently hitting a pipeline while digging. Natural disasters, like tornadoes and earthquakes, can place pipelines at risk for leaks and service disruptions. Pipeline providers are required to have emergency response plans for such disasters. More information on pipeline safety and preparedness can be found at www.pipelineawareness.org. County Emergency Management maintains records, contact information, and plans for the pipeline transmission lines in Eau Claire County.

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

Manure Storage and Animal Waste Management Facilities

As documented in Section II.C, Eau Claire County is home to large numbers of livestock. Manure and other animal waste is a natural by-product of the County's agricultural economy. For example, on average, an adult dairy cow produces 20-21 tons of manure per year. Most farms that have livestock also have manure management or storage facilities. If not properly designed and maintained, such facilities can be a source of contaminated runoff to groundwater and surface waters, as discussed previously in the flooding assessment.

Manure and other animal waste is a potential source of nitrates, phosphorus, bacteria, and pathogens that can impact public health with exposure or due to the contamination of drinking

water. If not properly managed, animal waste has the potential to contaminate wells, kill fish, and pollute lakes and rivers. Pathogens in manure can make water unsafe to drink or use for recreation. Nitrogen and phosphorus in manure runoff to surface waters can create toxic algae blooms that can block out sunlight, starve the water of oxygen, and destroy habitat. This risk is not limited to spills at fixed sites (barnyards, storage facilities) or transportation spills. For many areas, non-point sources (e.g., landspreading, pasture management, poor nutrient management) are of equal or greater concern.

To date, there have been no large storage facility failures or large fish kills as a result of manure spills or nutrient run-off in Eau Claire County. A study of 300 reported manure incidents in Wisconsin showed that forty percent of manure incidents from 2005 to 2009 occurred on the main farmstead, such as the storage pit overtopping or a line break. About thirty percent of manure spills occurred during transportation between the storage facility and application site. Another thirty percent occurred during or after land application, such as movement following a rain event.

The study also stated that there is increasing awareness of risks from snowmelt- and precipitation-driven runoff, which appears to have decreased manure applications on frozen soil. Forty-three percent of the incidents had a surface water impact, though manure released to road ditches was included in this category. Only four percent of the incidents in this study resulted in a fish kill.

To discourage spreading in high-risk areas, the Wisconsin DNR and Eau Claire County Land Conservation Division provide maps online to landowners showing nutrient management restrictions, winter spreading risk areas, and "safe" manure stacking areas. WDNR also manages the web-based Runoff Risk Advisory Forecast that identifies the daily runoff risk by subwatershed.

Issues related to animal waste and nutrient management are primarily monitored and addressed by local farmers with the support of the Eau Claire County Land Conservation Division and various other partners (e.g., Eau Claire County UW-Extension Agricultural Agent, WDNR, DATCP, NRCS, FSA). The Land Conservation Division enforces the *Eau Claire County Manure Storage Ordinance*, provides related educational services, and manages a program to properly abandon facilities that are no longer being used. County staff have also attended manure spill training seminars.

The Wisconsin Department of Natural Resource has regulatory authority related to nutrient management and water quality and operates a Spill Hotline that dispatches the local Conservation Warden should an event occur. The larger concentrated animal feeding operations are required to have a nutrient management plan and obtain State wastewater discharge permits from Wisconsin DNR prior to operation. The National Resource Conservation Service, Wisconsin DATCP, and UW-Extension provide additional education and support programs regarding nutrient and animal waste management.

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

Relative Level of Risk

The Plan Steering Committee rated hazardous materials spills as having a low-to-moderate risk (frequency), but having a moderate-to-high vulnerability (impact) should an event occur. Transportation-related events were of slightly higher concern compared to fixed sites.

There is no area of Eau Claire County which is immune to hazardous materials incidents, and such incidents will continue to occur. **Based on past trends, approximately 20-25 hazardous materials spills will be reported in any given year in the County based on the BRRTS data.** The largest proportion of these events will be spills, for which the majority are smaller incidents that are cleaned-up with a very short timeframe. Leaking underground storage tanks (LUSTs) are expected to continue to decrease in frequency.

Of greatest concern are the environmental repair projects for contaminated sites, such as illegal dumpsites, closed landfills, buried containers, overturned trucks/rail cars, illegal drug laboratories, or large industrial spills. Such sites have the greatest potential for environmental impact; environmental repair sites have the highest likelihood of requiring a long-term investigation and significant remediation measures**. Based on BRRTS data, new environmental repair sites will be reported for the County at an average of one to two per year, though not all will require significant remediation activities.** Based on the NTSIP data, spill events that threaten public health will continue to be split between fixed sites and transportation facilities with agricultural activities, manufacturing facilities, and illegal drug production being among the top types of incidents.

The level of risk is also influenced by growth in Eau Claire County. As more growth occurs, there is an increase in the potential number of contamination sources. And, as the number of industries increases, there is an increase in the general use of hazardous materials in the County for domestic, institutional, and commercial purposes. Traffic volumes are also rising, which increases the potential for accidents involving vehicles carrying hazardous materials. Further, as additional private wells are installed, more residents are potentially vulnerable to groundwater contamination. It can be expected that the frequency of hazardous materials incidences and

spills in the County will slowly increase as the County's population continues to rise and development occurs.

Vulnerability Assessment—Hazardous Materials Spills

Potential Impacts

Hazardous substances and materials can have a wide variety of harmful impacts to people, property, and the environment. These substances can be in solid, liquid, gaseous, or semi-solid form, which can often be difficult to detect or contain if a release does occur. Impacts may be immediate, as in the case of fire, explosion, or physical harm to bystanders (e.g., fire, inhalation, chemical burns, radioactivity). And some impacts can be longer-term, such as degraded water quality, illness among wildlife, corrosion, or increases in health problems (e.g., cancer, birth defects). The magnitude of the vulnerability zone and potential for fire or explosion also varies by substance type (e.g., gas vs. solid) and by environmental conditions (e.g., wind speeds, access to surface or groundwater, temperature). In extreme cases, contamination of buildings and soils can be at such levels as to make a property unusable or uninhabitable for lengthy periods. Evacuation of nearby residents may be needed. Recovery and clean-up costs can also vary widely depending on the type of hazardous material, amount released, and conditions at the site (e.g., soil type, temperature).

There are many available resources which discuss the potential impacts of the release of hazardous substances. One such source is the Agency for Toxic Substances and Disease Registry's Toxic Substances Web Portal (www.cdc.gov/Features/ToxicSubstances) which provides information about toxic chemicals and related health effects.

Vulnerability to Surface Water and Groundwater

One of the greatest 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 relying on local groundwater as a potable water supply.

Due to this groundwater threat, there was a high degree of coordination between this mitigation plan update and the creation of the *State of Groundwater in Eau Claire County* report completed in July 2018. The groundwater report included recommendations to better understand, monitor, and protect groundwater quality.

Contamination of surface waters can also occur, either through direct runoff from a spill or through groundwater sources as part of the hydrologic cycle. Surface water contamination can destroy aquatic life, increase toxicity in fish (and the animals that feed on them), and make water-based recreation unsafe (e.g., swimming restrictions, fish consumption advisories). The surface waters of the County are also used as a drinking water source for livestock and wildlife. In addition to such impacts, contamination of surface water and groundwater can be very difficult and costly to clean-up.

Vulnerable Critical Facilities

As summarized in **Appendix E**, all critical facilities have some related vulnerability to the release of a hazardous or toxic substance. Three types of critical facilities, in particular, were identified as being most vulnerable to the impacts of hazardous materials releases:

- Community wells, private wells, and wastewater treatment systems.
- Transportation infrastructure, especially highways and rail.
- Critical facilities located near hazardous materials facilities, tank farms, railroads, and major highways.

Wells and Wastewater Treatment Systems

Wells for potable drinking water are especially vulnerable to groundwater contamination, especially private ones which are typically tested less frequently than their public counterparts and do not have associated wellhead-protection programs. Contamination may be from point sources (a spill or release) or may be more indirect, such as the application of atrazine pesticides over time within a wellhead draw area. This vulnerability, including related well testing results, is discussed at length in the 2018 *State of Groundwater in Eau Claire County* report.

Transportation Systems

While transportation infrastructure may not be physically impacted by a hazardous materials spill, the use of the infrastructure and nearby land uses can be impacted. And, as discussed previously, a wide variety of chemicals move through and within Eau Claire 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.

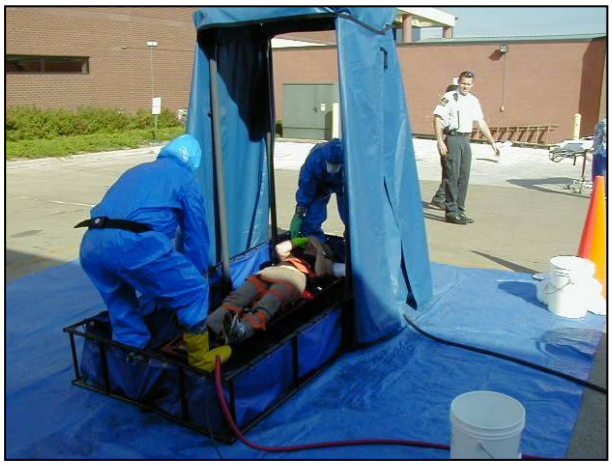
Other Utilities and Services

As identified in Section II.D., several natural gas transmission pipelines cross the County that can be hazardous. During the planning process, a number of communities identified pipelines, transfer stations, and tank farms as special hazardous materials risks. Continued planning with tank farm owners is advised to help mitigate risks. It must be noted that law enforcement personnel and emergency response providers are also vulnerable to the potential impacts of toxic releases as they respond to an incident or situation. In 1999, two responders in the region did receive respiratory injuries during a transportation-related hazardous materials incident.

Hazardous Materials Response Teams

All fire departments have had some training at the operations level for hazardous materials response. When a chemical incident exceeds the capabilities, gear, or expertise of a local fire department, the Wisconsin Hazardous Materials Response System can be activated. As mentioned previously, the West Central Wisconsin Regional Response Team, based in the Chippewa Falls and the Eau Claire fire departments, is a Type I Team. The type of team (Type I through IV) varies by level of capability. The Type I team is available to respond to the most

serious of spills and releases requiring the highest level of skin and respiratory protective gear. This includes all chemical, biological, or radiological emergencies requiring vapor-tight Level A gear with self-contained breathing apparatus.



WC WI Regional Response Team Practice Drill

Unique Jurisdictional Risks or Vulnerabilities

As reflected in **Appendix F**, the cities and villages of Eau Claire County reported no significant hazard materials events requiring mitigation and, overall, had very similar concerns.

All five cities and villages identified heavy truck and rail transportation as their primary haz mat-related concern. The Village of Fairchild included a nearby natural gas pipeline as a risk, while the Village of Fall Creek also noted the suppliers and transport of agricultural chemicals. The cities of Altoona and Eau Claire included additional fixed sites, most notably educational institutions and industry, which is not surprising given that the far majority of the County's EHS and Tier Two facilities are located in these two communities. The municipalities of Eau Claire County generally defer to County Emergency Management and the local fire department to address hazardous materials risks.

vi. Active Threats and Workplace Violence

Public Health Hazard Vulnerability Assessment

The 2017 Northwest Wisconsin Health Care Coalition Public Health HVA does not include a rating for active shooter or workplace violence-type threats. The HVA does include the following specific hazards, which are potentially related to active threats:

- 52% overall risk of Improvised Explosives attack, with a high probability (3).
- 30% overall risk of Radiological attack, with a low probability (1), but moderate impact (2) and limited internal and external ability to manage (3).
- 28% overall risk of Aerosol Anthrax attack, with a low probability (1), but high impact (2.7) and limited internal ability to manage (3).
- 16% overall risk of Civil Disturbance, with a low probability and impact (1).

The assessment used a scale of 1 to 3, with "1" being low probability/impact or having substantial management capabilities and "3" being high probability/impact or having limited/no management capabilities.

Risk Assessment—Active Threats and Workplace Violence

The Hazard

For 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 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 the hostages.

The U.S. Department of Homeland Security defines **active shooter** as "a person or persons actively engaged in killing or attempting to kill people in a confined and populated area." In most cases, active shooters use a firearm, though they may be using other weapons as well (e.g.,

explosives, knife), and there is no pattern or method to their selection of victims. Three or more killings in a single incident is the federal definition of **mass killing**.

An active shooter incident at a work site can be a type of workplace violence. According to OSHA, **workplace violence** is any act or threat of physical violence, harassment, intimidation, or other threatening disruptive behavior that occurs at the work site. It ranges from threats and verbal abuse to physical assaults and, in the case of an active shooter, even homicide. It can affect and involve employees, clients, customers and visitors.

According to OSHA, workplace violence typically falls into one of four categories, which generally also apply to most active shooters:

Type I: Criminal Intent. The perpetrator(s) has no legitimate relationship to the business or victims, but the violence is incidental to another crime, such as robbery or terrorism. The vast majority of workplace homicides (85%) are Type I. A workplace may be at a higher risk of Type I violence if the business handles cash or drugs.

Type II: Customer/Client. The violent person(s) has a legitimate relationship with the business, such as a customer, client, patient, student, or inmate. A large portion of the Type II incidents occur in the health care and social services industry, and the victims are often patient caregivers. Less than five percent of all workplace homicides are Type II, though this category accounts for the majority of nonfatal workplace violence incidents.

Type III: Worker-on-Worker. The perpetrator(s) is an employee or past employee that targets another existing or past employee. Type III incidents account for approximately seven percent of all workplace homicides. An employer that is downsizing or reducing their workforce may have a heightened risk of this category.

Type IV: Personal Relationship. The perpetrator(s) usually does not have a relationship with the business but has a personal relationship with the primary intended victim(s). This category includes domestic violence in the workplace and accounts for about five percent of all workplace homicides. Prevention of this type of violence can be very difficult in workplaces that are accessible to the public during business hours, such as retail establishments. A disgruntled partner may not know where their former lover now lives, but they likely know where he/she works.

An active shooter incident at an educational institution is a workplace violent event that is often referred to as targeted school violence. **Targeted school violence** is defined by the U.S. Department of Education as "any incident where a current student or recent former student attacked someone at his or her school with lethal means (e.g. a gun or knife); and, where the student attacker purposely chose his or her school as the location of the attack."[55] The Safe School Initiative examined incidents of "targeted violence" in school settings where the school was deliberately selected as the location for the attack and was not simply a random site of opportunity. The term "targeted violence" evolved from the Secret Service's five-year study of

[55] Combating Targeted School Violence: Inside & Outside Attackers, 2007.

the behavior of individuals who have carried out, or attempted, lethal attacks on public officials or prominent individuals. For purposes of this report, targeted school violence will include any incidents of targeted violence, as described above, brought forth by anyone whether or not connected with the targeted school and may not be limited to active shooter threats.

According to the Federal Emergency Management Agency (FEMA), **Civil Disturbance** is defined as a civil unrest activity such as a demonstration, riot, or strike that disrupts a community and requires intervention to maintain public safety. Civil disturbances, like riots, interfere with the normal functioning of a community, can disrupt critical services, and require the actions of law enforcement, emergency services, and/or the military to restore peace. While the vast majority of protest is peaceful, the right of citizens to protest must be balanced against the rights of non-protesting citizens to conduct their own business. Despite the peaceful nature of most protest and civil disobedience, such events are disruptive, can be costly for local governments, and have the potential to degenerate into violence resulting in property damage, injury, and death.

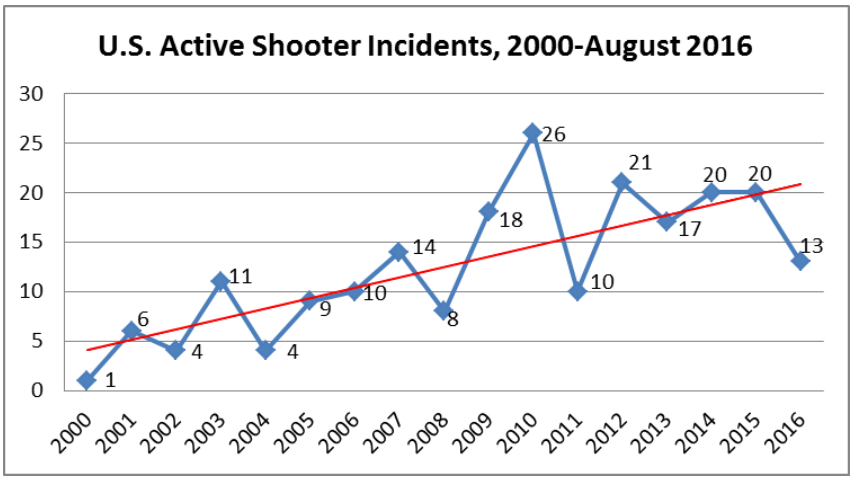
Active threats can include acts of terrorism, but not all active threats are performed for reasons of terrorism. The FBI defines two categories of terrorism:

> **International terrorism**: Perpetrated by individuals and/or groups inspired by or associated with designated foreign terrorist organizations or nations (state-sponsored). For example, the December 2, 2015, shooting in San Bernardino, CA, that killed 14 people and wounded 22 involved a married couple who radicalized for some time prior to the attack and were inspired by multiple extremist ideologies and foreign terrorist organizations.
>
> **Domestic terrorism**: Perpetrated by individuals and/or groups inspired by or associated with primarily U.S.-based movements that espouse extremist ideologies of a political, religious, social, racial, or environmental nature. For example, the June 8, 2014, Las Vegas shooting, during which two police officers inside a restaurant were killed in an ambush-style attack, was committed by a married couple who held anti-government views and who intended to use the shooting to start a revolution.

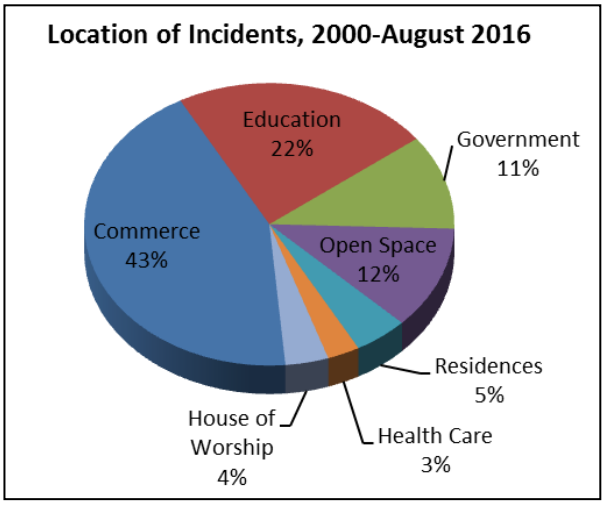
Further, there are types of terrorist attacks that would not be classified as a traditional active threat, such as cyber-attacks, a critical infrastructure attack, vandalism, or intimidation.

National Trends

Active Shooter Trends – The Federal Bureau of Investigation identified 212 active shooter incidents in the United States between 2000 and August 2016.[56] The number of incidents will vary depending on one's definition of active shooter. For example, the FBI does not include gang or drug violence, or individuals who shoot family members in their own homes. Based on the FBI data, the frequency of active shooter events has clearly been increasing, with an average of 19 events per year from 2010 to August 2016.



The largest majority of these 212 events (43%) occurred at commerce locations, such as retail stores, malls, non-profit organizations, and manufacturing plants. While not technically meeting the Federal active shooter definition of occurring in a "confined space," 25 of the incidents (12%) occurred in open spaces, such as on public roadways, in parking lots, or involving multiple locations.



Other notable facts regarding active shooter events in the United States from 2000 to 2013 are[57]:

- While they can occur any day of the week, the largest percentage occurs on Mondays.
- 99% of incidents involve a single shooter.
- 97% of shooters are male.
- 60% of shooters are white. An additional 15% are black, with the remaining divided among various other races.
- Motivation or intent can vary (e.g., close relationship, notoriety, upset at government, workplace revenue, religious affiliation, mental instability).

[56] Federal Bureau of Investigation. Active Shooter Incidents in the United States from 2000-2016. https://www.fbi.gov/file-repository/activeshooter_incidents_2001-2016.pdf/view

[57] Federal Bureau of Investigation. A Study of Active Shooter Incidents in the United States Between 2000 and 2013. https://www.fbi.gov/file-repository/active-shooter-study-2000-2013-1.pdf/view

- Most shooters generally share one or more common characteristics that can be warning signs (e.g., depression, dramatic personality swings, makes threats, fascination with weapons).
- 68% of active shooters only had a handgun.
- 70% of incidents last less than five minutes.
- 67% of incidents are over before law enforcement arrives. On average, law enforcement arrives within 5 to 6 minutes, so it is typically critical for bystanders to commit to an action.
- 63% of incidents are resolved by action of the shooter, while law enforcement resolves the remaining 37% of incidents.

The number of active shooter casualties jumped from 231 (92 killed and 139 wounded) in 2014/2015 to 943 (221 killed & 722 wounded) in 2016/2017.[58] The October 2017 Las Vegas Strip massacre—with 58 fatalities and 546 injured—is largely responsible for this increase and is the largest mass shooting in modern U.S. history. This was soon followed by the Texas First Baptist Church massacre in November with 26 dead and 20 injured, which was the fifth deadliest in modern times. In fact, 2017 had the highest total number of reported active shootings in modern history.[59] However, the number of mass killings (3+ persons killed) in 2016 vs. 2017 remained the same at 20.

As of May 21, 2018, there have been at least eight mass shootings, including two very prominent school shootings in Parkland, FL, and Santa Fe, TX. In 2018 to date, there have been 22 school shootings in the United States where at least one person was shot (not including the shooter) or more than one shooting per week.[60]

It is important to remember that very few organizations will experience an active shooter incident involving a shooting spree that wounds and kills multiple victims. However, a far greater number will experience other forms of workplace violence [e.g., threats, simple assaults (no weapon), aggravated assaults, robbery, intruder or trespassing, rape].

Profiles of Communities with Mass Shootings

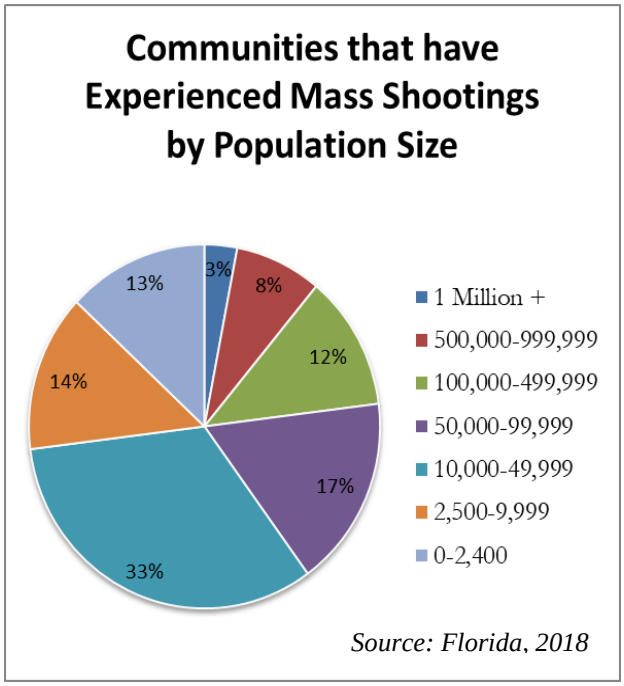
Using Stanford University's data base on Mass Shootings, Patrick Alder at the Martin Prosperity Institute analyzed demographic data of the communities where mass shootings happened from 1971 to 2016.[61] The database included 307 mass shootings in 223 places, occurring between

[58] Federal Bureau of Investigation. Active Shooter Incidents in the United States in 2016 and 2017. https://www.fbi.gov/file-repository/active-shooter-incidents-us-2016-2017.pdf/view

[59] https://www.usatoday.com/story/news/2018/05/04/fbi-active-shooter-increase-2017-high-death-toll/581198002/

[60] https://www.cnn.com/2018/03/02/us/school-shootings-2018-list-trnd/index.html

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



1971 and 2016. Alder's conclusions were that mass shootings were experienced by communities of all sizes, income levels, and racial diversities.

Although mass shootings were spread across communities of different sizes, a plurality of mass shootings, 33 percent of the total 307 mass shootings, happened in communities of 10,000 to 49,000 people. According to 2015 census data, communities of this size comprised 11.7 percent of incorporated municipal governments in the United States, or 2,281 municipal governments total. This means that 4.4 percent of municipalities of this size (101 total) have experienced a mass shooting. At the same time, 27 percent of mass shootings (83 total) took place in communities of less than 10,000 people. There are 16,470 incorporated places of this size and .5 percent have experienced mass shootings from 1971 to 2016.

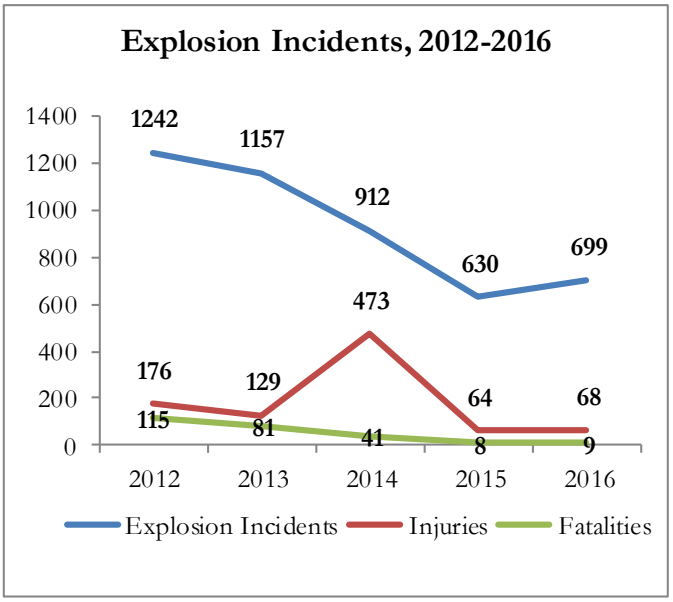
Three percent of mass shootings have taken place in cities with populations of more than one million people. The cities of Chicago, Illinois, Los Angeles, California, and Phoenix Arizona have each seen five mass shootings. Killeen, Texas, with a population of 127,921 in 2010, has experienced four mass shootings, including Luby's Shooting in 1990 and the Fort Hood Shooting in 2014.

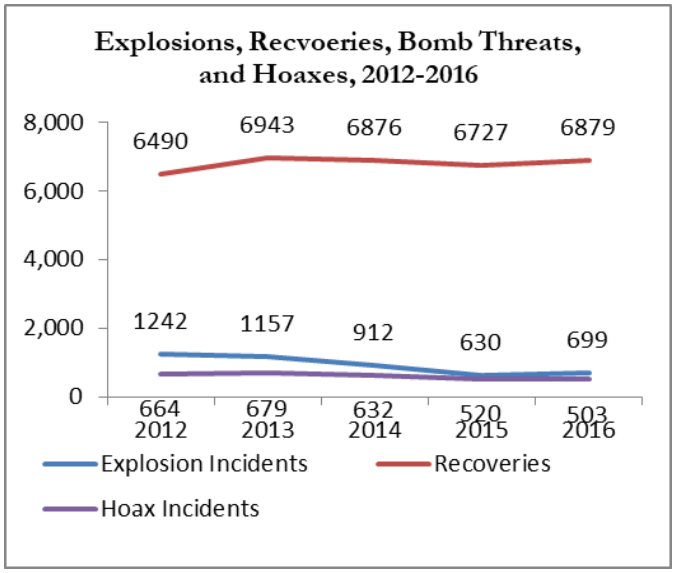
Mass shootings happen in communities across the spectrum of economic circumstances. Only six percent of mass shootings occurred in communities that had mean household incomes of less than $40,000. In general, mass shootings happened in middle class America. The mean household income for communities which had experienced mass shootings was $65,900 while the United Sates mean household income was $77,866. Seven percent of mass shootings took place in communities with average household incomes of $130,000 or more.

Mass shootings occurred in the least racially diverse communities in America as well as in the most racially diverse communities. However, only 24 percent of mass shootings happened in white-minority communities. 76 percent of mass shootings were experienced in communities with majority white populations.

Explosives Incident Trends

The *2016 Explosives Incident Report*, prepared by the United States Bomb Data Center, examines the incident data reported in the *Bomb Arson Tracking System* and analyzes trends from 2012 to 2016.[62] Explosive incidents refer to bombings, accidental explosions and undetermined explosions. Additionally, the report inventories bomb recoveries, reports of suspicious packages, bomb threats, and hoaxes.





As indicated in the figure to the right, the number of explosive incidents has been declining over the five-year period from 2012 to 2016. Resulting injuries and fatalities are also falling. Most of the victims are injured or killed in accidental explosions rather than intentional explosions. In 2016, accidents made up 25 percent of the explosive incidents; and undetermined incidents comprised 12 percent. An undetermined incident is used in ongoing investigations where the cause was either unidentified, pending further investigation, or awaiting laboratory results. Intentional bombing incidents made up 63 percent of the 699 incidents in 2016 and the majority of these bombs were explosives, as opposed to IEDs or over pressure devices.

In 2016, the top three explosive device main charges were: consumer fireworks (32%), display fireworks (11%), and homemade (3%). Explosive devices were most likely to be contained by pipes (25%), bottles /jugs (23%), and end cap/plugs (21%). Over 40 percent of the intentional bombing targets were residential structures in 2016. There were two bombings of churches and 22 school bombings. The majority of reported school bombings took place at high schools and middle schools as opposed to elementary schools, universities, or technical colleges.

While there were 699 bombings in 2016, there were 6,879 explosive or explosive device material recoveries, including instructions. Most recoveries happened in residential areas, law enforcement & emergency offices, and open areas. There were a total of 1,536 bomb threat

[62] United Sates Bomb Data Center. (2017). *2016 Explosives Incident Report.*

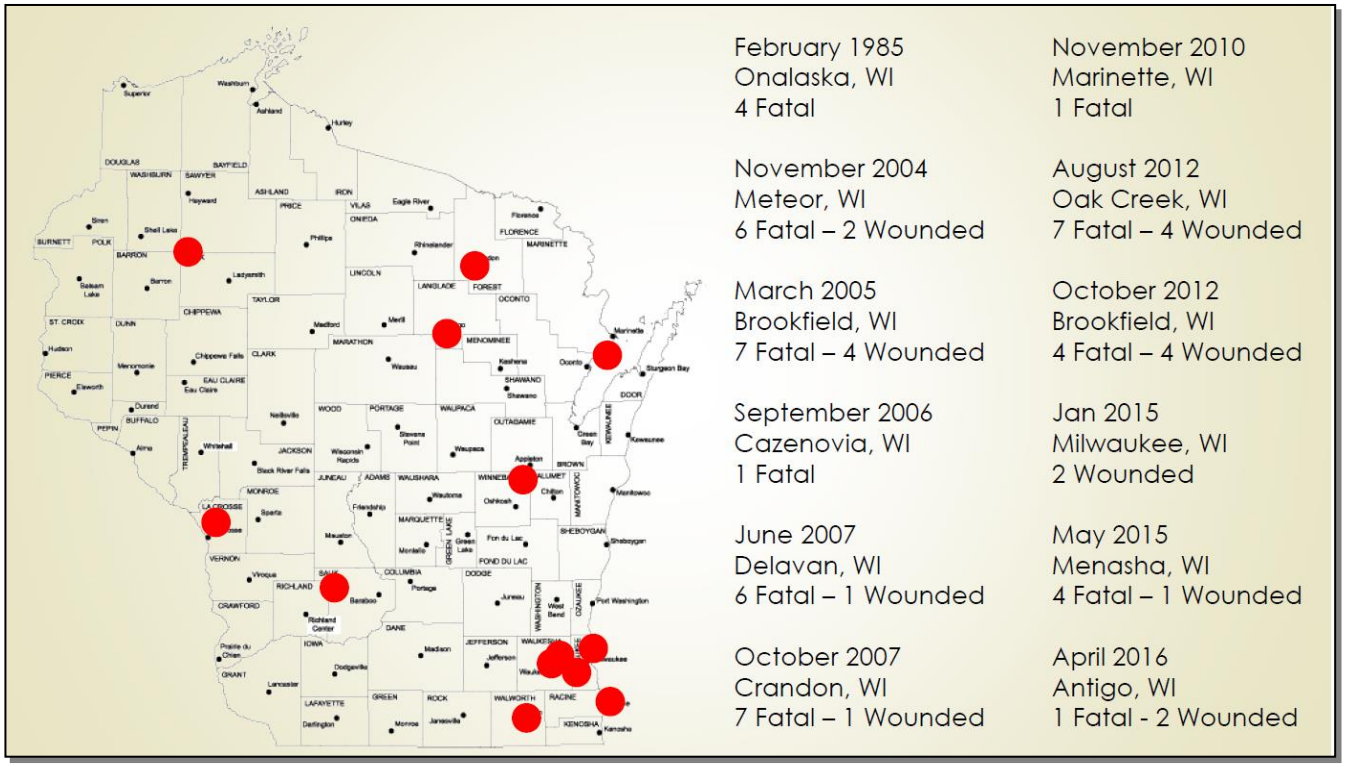
incidents in 2016. Education (34.4%), Office/Business (16.5%), and Residential (12.1%) were the top targets for bomb threats. Of the 529 bomb threats at education sites, 74.5 percent occurred at middle schools or high schools. 14.7 percent happened at elementary schools while 5.7 percent were at universities or colleges. 2.5 percent happened at career and vocational training colleges.

Terrorism and Other Active Threats

Long-term trend data from a single governmental source on terrorism and other types of active threats is limited, and it is likely that some thwarted attacks have not been publically announced. According to one database.[63] of 201 incidents between 2008 -2016, far-right extremists were behind 115 of the incidents (35% foiled) with nearly a third involving fatalities, while Islamist domestic terrorism resulted in 63 cases (76% foiled) and 13% involving fatalities. Left-wing ideologies, including ecoterrorism and animal rights, were relatively rare with 19 incidents. In recent years, we have also seen the growth of new threats, such as the use of a vehicle as a weapon (e.g., Berlin-December 2016, New York Times Square-May 2017, London Bridge-June 2017, Barcelona-August 2017, New York-October 2017). Such data demonstrates the importance of remaining objective and alert to potential warning signs.

Local Events

To date, there have been no active shooter incidents in Eau Claire County in contemporary history involving a large number of casualties. 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.



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

The list does not include the 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.

There is no reason to believe that active shooter or active threat events in Wisconsin (or Eau Claire County) would significantly differ in character than national trends. The 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). The closest, located north of Eau Claire County, was the 2004 Meteor shooting, involving a dispute over a hunting stand.

In 2018, four 15-year old Eau Claire Memorial students were referred to Juvenile Intake Court after threatening violence (e.g., mass shooting) targeting Eau Claire Memorial High School in March. The dialogue occurred over several days and included the sharing of photographs of firearms, which the students had access to. The threats were made through social media and reported by a student to a parent who contacted school authorities. In November 2017, Memorial had been evacuated after a student left a bomb and loaded gun threat message on a bathroom wall. In response to such threats, the Eau Claire School District Board reviewed school safety plans and, in July, received a School Safety Initiative grant to provide security hardening and staff training to bolster the District's Safety Intervention Team.

Relative Level of Risk

The Plan Steering Committee ranked active shooter as a relatively moderate risk of occurring in Eau Claire County, but significantly higher in terms of potential impacts (e.g. injuries, death) should an event occur. Predicting the active shooter risk for Eau Claire County is difficult, if not impossible, given the national average rate of 19 events per year for the U.S. population of over 323 million. Based on the Wisconsin and national trends, we can say that rural areas and smaller communities, such as Eau Claire County, are not immune to active shooter events, though the risk is higher in areas of higher population density.

The previous pie chart also shows 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 an Eau Claire 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. And within these groups, certain locations will be at higher risk than others. For example, 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 events per 1,000 hospitals compared to 6.7 events per 1,000 hospitals among smaller 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**—Information is passed to others quickly online and has resulted in copycat behavior (e.g. a bomb threat in a school resulting in a bomb threat in

nearby school soon thereafter). Further, the internet provides a plethora of information, including instructions on how to carry out illegal activities as well as social discourse among individuals and groups that are considering potentially violent behavior.

2. **Population trends**—The population of Eau Claire County is increasing and becoming more ethnically diverse. This trend could cause tensions between existing and new residents. It is also not surprising that the number of incidents generally increases as population increases, as reflected by the concentration of Wisconsin events in the southeast corner of the State.
3. **Mental Health Programming**—The rate of active shooter incidents can be decreased by improvements in access to mental health programming and the public's acceptance of such services without the social stigmas.
4. **Preparedness Efforts**—A variety of potential mitigation and preparedness efforts are discussed later in this subsection.

Vulnerability Assessment— Active Threats and Workplace Violence

Potential Impacts

An active shooter incident can have a variety of negative impacts on people and property. The primary vulnerability of an incident is the injury or death of any persons, regardless if a primary intended target exists or was event present. This vulnerability includes the residents of Eau Claire County as well as the many thousands of students, workers, visitors, and travelers who come from outside Eau Claire County.

The incident and response can also cause damage to property and buildings, potentially resulting in extended or even permanent closures. The victims, their family members, and other witnesses (e.g., facility managers, emergency responders) can be traumatized in the aftermath of these intense, horrific events, resulting in mental and physical stress, memory loss, etc. And the location and community can be stigmatized by the event or experience a loss of reputation that can impact future business or discourage future use. Lawsuits and other financial costs may also result.

Vulnerable Locations and Critical Facilities

Based on the previous pie chart, the following are the primary vulnerable locations in Eau Claire County. The greatest concentration of businesses and critical facilities are located in the cities and villages, as discussed in Section II.D.

Places of Commerce

In 2017, Eau Claire County had approximately 10,888 places of business with about 62,593 total employees. The general distribution of businesses by type are described in Section II.C., though non-payrolled locations (self-employed; no other employees) are not included. Not only do these places of commerce vary in type, but they also vary in size; about 70.3% of businesses have fewer than 10 employees and only 2.1% have more than 100 employees.

Wisconsin State Statute 118

Health and Safety Requirements for Schools

Wisconsin State Statute 118 requires that schools conduct drills in the proper method of evacuation or other appropriate action in case of a **school safety incident** at least twice a year. The public and private school safety drill shall be based on the school safety plan. A school safety plan shall be created with the active participation of appropriate parties and shall include general guidelines specifying procedures for emergency prevention and mitigation, preparedness, response, and recovery. The plan shall also specify the process for reviewing the methods for conducting drills required to comply with the plan.

The school board or governing body of the private school shall determine which persons are required to receive school safety plan training and the frequency of the training. The training shall be based upon the school district's or private school's prioritized needs, risks, and vulnerabilities. Each school board and the governing body of each private school shall review the school safety plan at least once every 3 years after the plan goes into effect.

Educational Facilities

Improving security, plans, and protocols as well as continued training are ongoing activities for all public educational institutions in Eau Claire County. For 2017-2018, total enrollment at the four public school districts with facilities located in Eau Claire County was:

Altoona	1,622
Augusta	617
Eau Claire	11,367
Fall Creek	844
	14,450 students

Due in part to State safety requirements, the public schools of Eau Claire County have been taking a lead role in active threat and targeted school violence preparedness. All of the public school districts have adopted some type of active shooter or ALICE (Alert Lockdown Inform Counter Evacuate) policies or are developing such plans. All schools have partnered with local law enforcement to conduct tabletop and/or functional exercises; integrating fire, EMS, and the County Tactical Team has occurred in some cases. For example, Altoona Police have helped conduct four multi-disciplinary active shooter/crisis situational exercises at Altoona Schools in the past four years, with additional drills and emergency planning meetings. One smaller district expressed the importance of additional support should mass casualties occur. Improving security when school facilities are used by outside groups, sporting events, etc., can be especially challenging.

Some schools have completed some security hardening or have numbered doors and/or windows for emergencies, though not all have floor plans are on file with law enforcement. As mentioned previously, the Eau Claire School District recently received a School Safety Initiative grant to provide security hardening and staff training to bolster the District's Safety Intervention Team. Cameras at the Altoona Schools can be remotely viewed by Altoona Police squad cars, phones, and computer and the Police Department has two additional school radios at their office if needed.

Some schools, such as Altoona and Eau Claire, also have assigned School Resource Officers through the local police department.

Chippewa Valley Technical College (CVTC) and the University of Wisconsin-Eau Claire are additional public educational institutions with significant student populations; undergraduate enrollment at UW-Eau Claire is approximately 10,000 students. According to EMSI estimates based on Federal employment data, in 2018, Eau Claire County had an additional 4,770 persons employed at public primary and secondary educational institutions. Both CVTC and UW-Eau Claire have plans and emergency communications protocols in place (based on Run-Hide-Fight or similar) with regular training and exercises in partnership with local emergency response agencies. CVTC has camera coverage of all campuses and door control systems to facilitate locking all exterior doors quickly. All exterior doors are numbered inside and outside. UW-Eau Claire has similar security coverage and hardening in place with its own police force and building floor plans on file with response providers.

Governmental Facilities

Appendix E briefly discusses the County and local governmental buildings in Eau Claire County. Additional buildings (e.g., maintenance facilities, Federal/state offices) exist that are not included in the inventory. According to EMSI estimates based on Federal employment data, in 2017, Eau Claire County had 67 Federal government, State government, and County/Local government places of employment with approximately 2,844 total employees, excluding any public hospitals and schools. Eau Claire County provided active threat/shooter to all County government employees in 2016. The County is in the process of developing an active shooter plan based on the Avoid-Deny-Defend model and assessing/mapping all County facilities. Additional employee training will occur once the plan is complete.

Houses of Worship

Based on the previously reviewed national trends, houses of worship have not experienced active shooter incidents as frequently as the previous locations. The eight reported events at houses of worship varied in denomination and included retreat centers/camps. It is notable that of the eight events, at least half were likely motivated by hate due to the denomination or race of the worshippers. Not surprisingly, a higher concentration of churches and other houses of worship exist in the cities and villages.

Health Care Facilities

As identified in Appendix E, Eau Claire County has five hospitals, numerous clinics, 9 nursing homes, and 85 other assisted living facilities (e.g., CBRFs). These facilities not only serve a potentially vulnerable population, but also have a large number of employees. According to the previously referenced study on hospital-related shootings:

- There were no patterns or factors that could help profile vulnerable sites and situations. Nearly 60% of shootings happened in the hospital building, with the rest on the grounds or parking structures. 34% of shootings happened in the Emergency Department and 32% in patient rooms.
- 91% of shooters were men. Most involved a determined shooter with a specific target.

Most shooters were neither current or former patients or employees.

- About 40% could have been prevented by the use of metal detector, but such a security practice can be difficult to put into place.

Prevention and Mitigation Alternatives

Due to the great variety in the type and sizes of these locations, there is no "one size fits all" solution to mitigating active-shooter risks. **It is advisable to take an "all threats" approach rather than focusing on a single type or profile of active threat.** Preparedness and mitigation activities generally fall into one of the following categories.

Education and Awareness

It is important to recognize that Eau Claire County and Wisconsin are not immune to active shooter events and to increase public awareness of warning signs as well as what to expect and what to do should an event occur. Without education and preparedness, initial reactions are often disbelief, denial, shock, or failure to act. It is also important for bystanders to know how to act once law enforcement arrives on the scene. The Eau Claire County Sheriff's Department has a couple of trained active threat instructors that give presentations to community organizations and businesses; some city police departments have provided similar presentations and training.

Planning and Exercises

Given that the related risks, vulnerabilities, opportunities, and regulatory requirements can vary greatly by location, most preparedness planning occurs at the business, facility, or school district level. Active shooter preparedness planning can encompass:

- preparedness actions (e.g., education, site assessment, security measures, public announcement systems, related employee assistance or mental health programming);
- incident mitigation and response planning and training (e.g., recognizing and reporting a potential threat, de-escalation and conflict resolution techniques, what do we do when the event occurs, regular exercises and training in ALICE techniques and any location-specific procedures, train-the-trainers efforts); and
- post-event actions (e.g., can be an all-hazards approach, employee/client counseling, legal team, public relations, business continuity).

Various guides and materials are available to assist with the above, including materials for the general public and pertinent to most place of employment, with additional preparedness and response guides for specific types of businesses and facilities (e.g., health care, schools, retail establishments). The Disaster Ready Chippewa Valley (DRCV) website has a collection of active-shooter and workplace-violence guides, pamphlets, and weblinks from sources such as FEMA, OSHA, and others at: www.disasterreadychippewavalley.org

Site Assessment, Security Hardening, and Communications

Many of the above guides include ideas and recommendations for security hardening and other control measures. For example, OSHA's *Recommendations for Workplace Violence Prevention Programs for Late-Night Retail Establishments* includes security checklists and workplace

control checklists (environmental, engineering, and administrative practices); this guide is available at the above link. The above webpage also includes the results of a group exercise with attendees at a May 2003 workshop in Eau Claire on different actions that attendees stated they will be considering for their place of business based on the workshop presentations earlier that day. Many of these recommendations were related to security and control, such as installing fish-eye cameras, changing how office hours are posted, improving access control on doorways, installing security cameras and buzzer systems, and better parking lot lightning. Significant security hardening and similar preparation has been completed at various schools and businesses across the County in recent years, though opportunities for improvement (e.g., numbering doors, sharing floor plans) still exist.

Employee/Client Assistance Programs and Policies
Awareness and preventing an incident is always preferred. A robust active shooter strategy for a place of business will include programming and policies regarding access or required referrals to mental health services, encouraging reporting of concerns or suspicious activity in an appropriate manner, tracking/monitoring systems, and other "pre-event" de-escalation techniques (e.g., dealing with a disgruntled client, employee firing). For schools, this includes policies and programming to discourage bullying.

Partnerships and Continued Coordination
Key to all of the above are effective partnerships and repetition. The excellent working relationships between local law enforcement and school administrative staff serve as a model for their entire community. Such training should be extended to other emergency responders, such as fire and EMS as well as any specialized roles (e.g., PIO, 9-1-1 communication, evacuation/sheltering, crowd control). Some local law enforcements, such as Fall Creek, have extended such awareness efforts to local organizations and businesses, such as churches and child care facilities. It is important to nurture such relationships and create them before disaster strikes. And equally critical to response (and preventing panic) is repetition in training, exercises, and drills to ensure everyone knows their roles and how to respond.

Unique Jurisdictional Risks or Vulnerabilities— Active Threats

There are no unique city, village or town risks associated with active shooter events. Generally, the communities with larger populations, more businesses, and more critical facilities have slightly higher risks, but no location is immune. As discussed in **Appendix F**, schools, businesses, and municipal offices were typically identified by the communities as being the greatest active shooter concern. Most communities did not have a specific active shooter policy or plan for their governmental facilities, but some did find value in encouraging the participation of municipal staff in active shooter training. Some cities and villages were exploring ways to further harden municipal offices. As previously discussed, local law enforcement are very active partners with local educational institutions in active threat preparedness and some police departments have begun to expand such preparedness and educational efforts to other local businesses and organizations.

C. CLIMATE CHANGE AND NATURAL HAZARD RISK

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

How the Region's Climate is Changing

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

> "According to the National Academy of Sciences, the Earth's surface temperature has risen by about 1 degree Fahrenheit in the past century, with accelerated warming during the past two decades. There is new and stronger evidence that most of the warming over the last 50 years is attributable to human activities.... Rising global temperatures are expected to raise sea level, and change precipitation and other local climate conditions. Changing regional climate could alter forests, crop yields, and water supplies. It could also affect human health, animals, and many types of ecosystems.... Most of the United States is expected to warm, although sulfates may limit warming in some areas. Scientists currently are unable to determine which parts of the United States will become wetter or drier, but there is likely to be an overall trend toward increased precipitation and evaporation, more intense rainstorms, and drier soils."[64]

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

To further document these climate changes and explore their impacts on our State, the Wisconsin Initiative on Climate Change Impacts (WICCI) was formed as a collaborative effort of the University of Wisconsin and the Wisconsin Department of Natural Resources.

The following are some of the key climatic trends being experienced in Eau Claire County according to the WICCI analysis (www.wicci.wisc.edu):

1. **RISING TEMPERATURES.** Eau Claire County's average temperatures are rising and are projected to continue to rise. **Figure 32** shows that the annual average temperature in Eau Claire County has increased between 1.5º F and 4.0º F between 1950 and 2006, with the greatest increases in the City of Eau Claire area. Between 1980 and 2055, annual average temperatures are projected to increase by about 6.5º F in the County. More extreme heat events are also projected. **Figure 33** shows that the number of days projected

[64] U.S. Environmental Protection Agency. http://yosemite.epa.gov/oar/globalwarming.nsf/content/impacts.html

to be 90º F or greater will increase by 18-26 days in Eau Claire County between 1980 and 2055.

2. **MORE PRECIPITATION**. Eau Claire County is experiencing more annual precipitation, and is expected to get wetter in the future, but there is significant seasonal and geographic variation to the precipitation. **Figure 34** shows that the annual average precipitation has increased in Eau Claire County over the past fifty years overall, with the greatest increases in the southeastern portions of the County in the Fairchild area. **Figure 35** shows that changes in summer precipitation have not been decreasing like many areas to the north. Overall, WICCI projects Eau Claire County's annual average precipitation to increase by 1.5 inches per year between 1980 and 2055.

3. **HEAVIER PRECIPITATION EVENTS.** Heavy precipitation events are expected to increase in Eau Claire County. Currently, the region experiences heavy precipitation events of two or more inches about ten times per decade (once every year). **Figure 36** shows that Eau Claire County is projected to experience about two additional heavy precipitation events per decade by 2055. However, based on the frequency of heavy rainfall events over the past 5-10 years, this projection is very likely underestimated.

Figure 32. Wisconsin Temperature Change

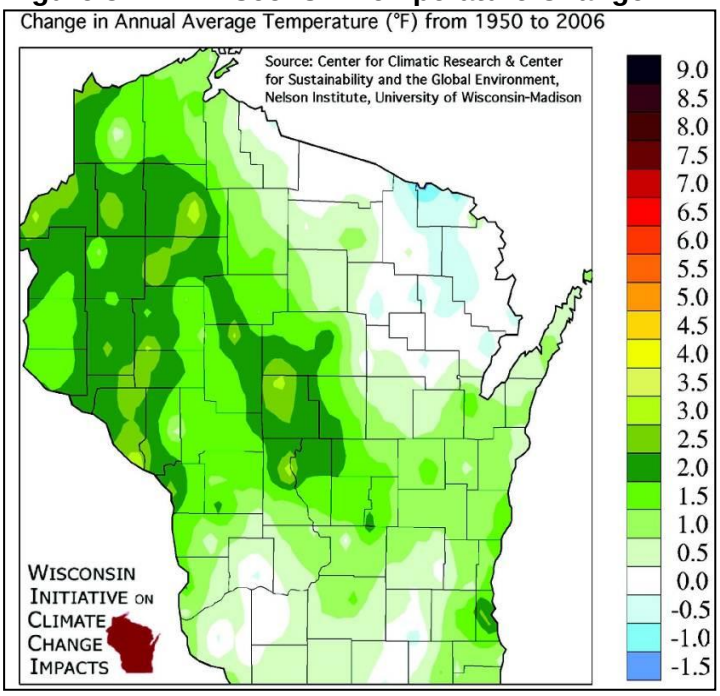


Figure 33. Change in # of 90+ Degree Days

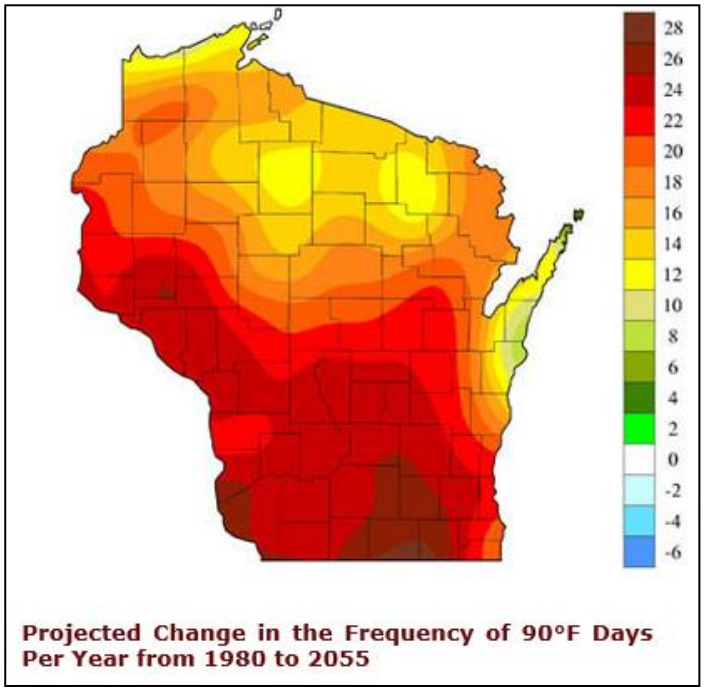


Figure 34. Wisconsin Precipitation Change

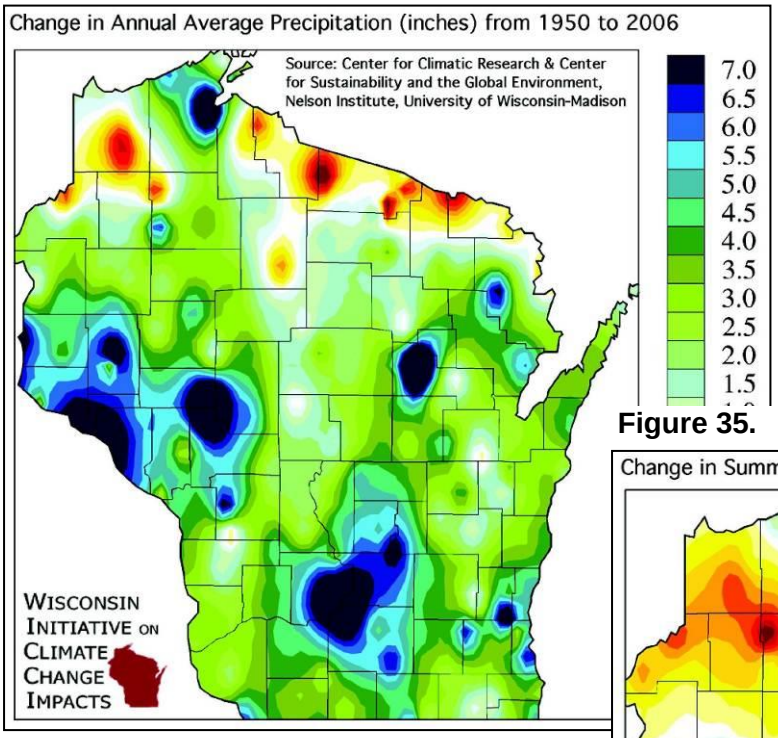


Figure 35. Wisc. Summer Precipitation Change

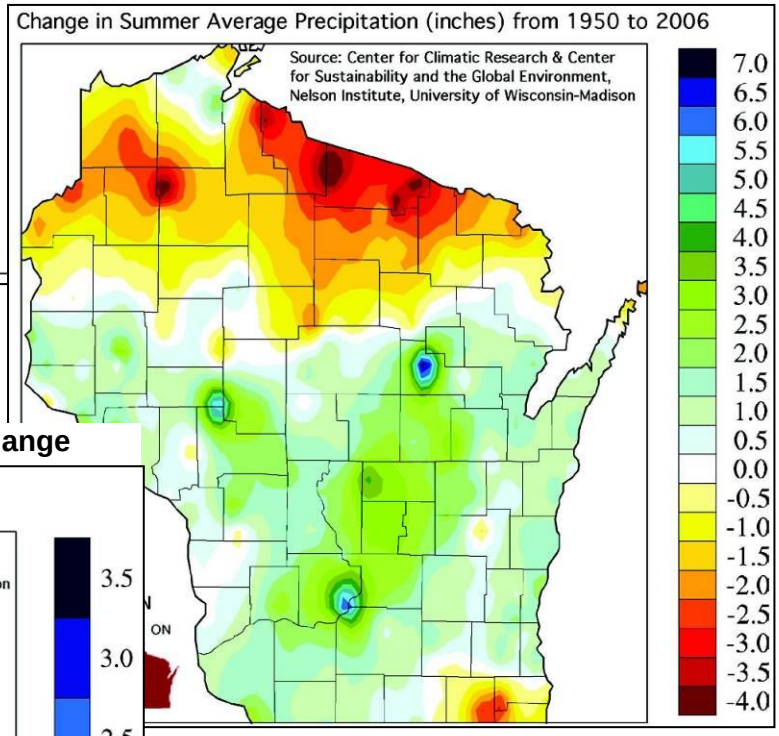
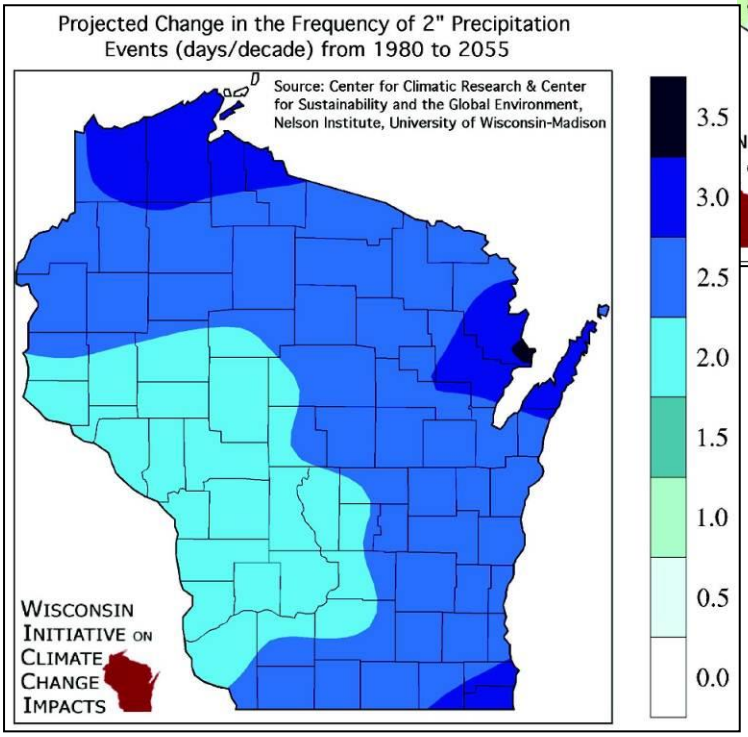


Figure 36. Wisc. Heavy Precipitation Change



Potential Climate Change Impacts on Natural Hazard Risk

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

Tornados, Thunderstorms, and High Winds

The link between climate change and tornados, high winds, and thunderstorms is unclear. While extreme storm events are increasing, scientists are uncertain what role climate change has, if any.[65] However, warmer temperatures will increase the number of weeks that Eau Claire County experiences severe thunderstorms and tornados. Eau Claire County needs to be prepared for an increase in tornados, severe thunderstorms, and episodes of high winds that are associated with strong storms.

Flooding

From 1958-2012, extreme rainfall events increased 37% in the Midwest.[66] Increased precipitation and heavy precipitation events would likely result in more flooding. Extreme rain fall events in particular have the potential to increase overland (stormwater) and flash flooding with severe consequences (e.g., road/culvert/bridge washouts, building damages, bank erosion, habitat destruction) if infrastructure is not able to manage such increased flows. The majority of existing flood mapping is becoming incorrect and in some cases unusable, due to the increase in the number of floods and the increase in the severity of floods. An increase in flooding will not only impact the built environment, but it will also impact the natural environment. Riparian areas will be more vulnerable to damage with increases of flooding intensity. In addition, more opportunities will exist for debris to enter water bodies.

Winter Storms, Ice Storms, and Extreme Cold

More precipitation during the winter months increases the potential for heavy snows and ice storms and possibly flooding due to a large snow melt. Since winters may be warmer overall, ice storms could be a greater concern. Some scientists suggest that climate change may contribute to an increase in extreme temperature events (both hot and cold).[67]

Such changes in climate could have some positive natural hazard impacts. For instance, the winter season would be shorter overall with fewer days of sub-freezing temperatures. But other problems may also be exacerbated, such as plant and animal diseases and infestations, Lyme's disease, air quality changes, change/impact natural habitats, and impacts to water quantity.

Extreme Heat

The number of extreme heat event days is projected to continue to increase. An increase in extreme heat occurrences and higher summer temperatures will have a significant impact on the elderly and other vulnerable populations. The majority of deaths and emergency room visits

[65] http://blogs.ei.columbia.edu/2016/12/01/increasing-tornado-outbreaks-is-climate-change-responsible/

[66] https://nca2014.globalchange.gov/highlights/regions/midwest#statement-16934

[67] https://www.climaterealityproject.org/blog/perfect-storm-extreme-winter-weather-bitter-cold-and-climate-change

during heat waves are from persons over 65 years old. As Eau Claire County continues to experience warmer temperatures and the number of individuals over 65 years old continues to increase, it is going to be extremely important to develop plans and standard operating procedures to deal with extreme heat and vulnerable populations.

High temperatures will result in increased evapotranspiration and longer growing seasons. Over time, these trends have the potential to impact surface and groundwater as well as increase the risks of drought and wildfire. In addition, hotter temperatures and longer extreme heat episodes will increase stress on public infrastructure like road surfaces.

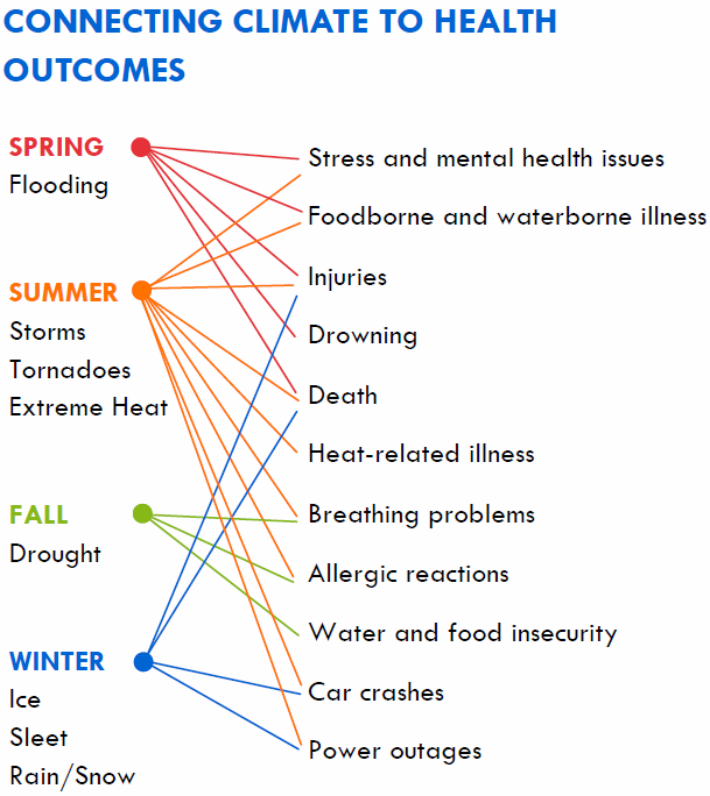
Drought and Wildfire

Projecting the impact of climate change on drought and wildfire is complicated. While precipitation is projected to increase, this will be off-set 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.

Human Health

According to the Wisconsin Department of Health Services—Climate & Health Program[68], it is also important that we keep in mind the potential impacts of climate change on human health as summarized by the graphic to the right and list below:

- flooding risks – stress & mental health disorders, flood-related food and waterborne illnesses, injuries, and drowning.
- extreme heat risks – increased loss of life, especially among elderly and socially isolated individuals, air quality degradation and increases in pollen resulting in respiratory distress and allergic reactions
- drought risks – reduced drinking water, food insecurity, and respiratory distress from dust,



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

pollen, and airborne particulates

- winter weather risks – traffic accidents, injuries, and deaths, power loss that place chronically ill patients on medical devices at higher risk
- disease vectors – a wetter, warmer climate could be more favorable to mosquito- and tick-borne diseases (e.g., West Nile, Lymes)
- surface water risks – see flooding risks, contamination of water supplies, toxic algae blooms
- groundwater risks – reduced availability, contamination

Climate Adaptation as a Natural Hazard Mitigation Strategy

These climatic changes can have serious natural hazard implications. Most of our existing best practices and infrastructure are based on historic events and do not fully accommodate these climatic trends. Below are examples of what some other communities are doing to address climatic trends. Many of these adaptation strategies are not new mitigation tools (e.g., safe rooms, burying power lines, cooling shelters), but with climate change there may be an increasing need to expand the use of these tools and best practices.

Tornados, Thunderstorms, and High Winds

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

Flooding

- Map areas where flooding is predicted to happen in the future and use those maps for land use decisions.
- Create outreach programs to educate the public on the need for flood insurance.
- Implement land-use policies that prohibit building in areas that are predicted to be susceptible to future flooding, including beyond the current 100-year floodplain.
- Acquire property that is in future flood prone areas.
- Reevaluate all water-related infrastructure (e.g., bridges, levees, dams, culverts, stormwater system) for structural integrity.
- Incorporate permeable surfaces in new and existing development. This includes landscaped areas, parking lots, and green roofs.
- Increase focus and effort on eliminating debris from entering the water bodies (e.g., increase street cleaning operations, expand promotion of Rain To Rivers program, provide community lawn waste pickup).
- Complete riparian/stream restoration plans and projects.

Winter Storms, Ice Storms, and Extreme Cold

- Research best management practices to deal with the potential increasing frequency of ice storms.
- Implement smart salting/sanding best management practices.

Extreme Heat

- Create programs to check on and communicate with vulnerable populations during extreme heat occurrences.
- Start a public outreach program to educate the public how to deal with extreme heat
- Designate community cooling centers.
- 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. This is most important in the City of Eau Claire.
- Incorporate policy that reduces street pavement widths.

Drought, Wildfire, and Water Conservation

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

The City of Eau Claire in March 2010 passed goals of carbon neutrality and 100% renewable energy for the City and municipality. There are also incremental drawdown carbon targets of 5% by 2020, 25% by 2030, 30% by 2040 and 40% by 2050. The City currently tracks its greenhouse gas contributions every other year to see trends. These goals were advanced so the City could do

its part to help meet the Paris Agreement's goal of "holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial level". The City will begin to develop in 2018 or 2019 an action plan that addresses meeting these goals on both City-wide and municipal operational levels. They envision a climate and energy planning process that will reflect community values and stakeholder participation to develop low-carbon means to reach these goals. Mitigation and adaptation strategies will be included in the plan. This hazard plan addresses likely impacts of a changing climate for the Eau Claire area and will serve well for the City's future planning effort.

Conclusion

Given the ongoing debate in the scientific community, it is not appropriate to debate the causes of climate change within this document. Regardless of the cause, it is important that local officials and residents remain aware that the hazard trends presented in this report will mostly likely change in the future; and, in some cases, the frequency and magnitudes of disaster events will most likely intensify. Many of these changes will increase the chance of loss of life and damage to infrastructure.

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

SECTION IV.
CURRENT MITIGATION ACTIVITIES

Eau Claire County residents value disaster/emergency planning. As part of the 2017 County budget survey, "disaster/emergency planning" tied for 17th among over 90 County programmatic areas. It is important to consider the mitigation activities and strategies already implemented in Eau Claire County. This section is arranged as a "checklist" of potential mitigation activities with related notes summarizing the current mitigation activities that are being carried out within the County and demonstrating a strong tradition of communication and inter-agency cooperation. Potential mitigation actions may not be completed for a variety of reasons, such as low priority (risk is low), limited resources, or availability of alternative strategies.

The focus of this section is on natural hazards, partnerships, and general hazard mitigation and preparedness activities. Mitigation activities related to specific non-natural hazards, such as hazardous materials, school violence, nuclear accident, pandemics, and cyberattack, are primarily discussed previously in their respective subsections. **Appendix G** provides additional insight into recent or current mitigation activities for each of the participating cities and villages in the County, along with some of the related challenges for these communities. Section V discusses those mitigation activities completed for each of the strategy recommendations from the County's 2013 mitigation plan.

Community Planning and Regulatory Activities

Mitigation Action	Yes	Some	No	Notes
1. Mitigation planning has previously occurred in the County.	x			• Eau Claire County adopted a flood mitigation plan in 2000 and a natural hazards mitigation plan in 2007, which was updated in 2013. • City of Eau Claire adopted a flood mitigation plan in 2002 and a natural hazard mitigation plan in 2004, which was updated in 2013
2. County and communities have incorporated mitigation strategies into their comprehensive plans.		x		• The County, all cities & villages, and the majority of towns have adopted comprehensive plans. • Varies by community, primarily limited to floodplain management and emergency services.
3. Construction standards mitigate natural and other hazard risks.		x		• All municipalities enforce State Uniform Dwelling & Commercial Building Codes. While these codes include standards appropriate for Wisconsin climate (e.g., design wind & snow loads), State rules limit ability to include some additional mitigation-related standards
4. Local zoning and subdivision controls mitigate natural and other hazard risks beyond floodplain zoning. (e.g., Are emergency plans or safe rooms required? Long cul-de-sacs avoided? Police or fire consulted during site plan review?)		x		• Most of County is zoned under County Zoning or by the local municipality, but not all. Emergency planning/mitigation can be addressed as part of conditional use permitting to extent allowed by State law. No safe rooms or emergency plans required for manufactured home parks, but could be a condition of permitting. Most campgrounds

				likely lack such plans. • County subdivision regulations apply to unincorporated towns. Includes road design standards. County consults with police/fire during plan review as needed. • See Appendix G for city and village discussion.
5. Land information and GIS data is available to accurately delineate hazard risks.		x		• County GIS and land information coordinated through County Planning & Development Department. • Some data layers for mitigation planning improved since 2007 plan. • Countywide GIS data for individual structures (e.g., # stories, value/structure, BFEs) not available for detailed hazard assessment. • Concerns over accuracy of D-FIRMs.
6. Improvements or updates to emergency management or services mapping are needed.	x			• Working with FEMA to improve accuracy of D-FIRMs is the greatest priority, now that LIDAR is available. • Emergency Map Books last updated in 2013.
7. A Comprehensive Land Use Plan has been adopted to maintain healthy County Forest Lands and mitigate wildfire risks.	x			• County Forest Comprehensive Land-Use Plan is maintained in accordance with the State of Wisconsin County Forest Law (Wis. Stats. 28.11).
8. Driveway regulations or other actions are used to encourage adequate design and maintenance for access by emergency vehicles.		x		• Driveways regulated by the governmental entity who owns the public roadway being connected to. County has basic standards for private roads/driveways if under county zoning, subdivision rules, or access to County highways. • A number of Fire Departments remain concerned with emergency vehicle access on some driveways due to width, height/tree canopy clearance, condition, or grades, especially in hilly, waterfront, and/or wooded areas.
9. Address signage standards have been adopted for consistency of placement, replacement with flag-style signs in towns, and standards for multiple homes on dead-end roads/drives.			x	• Determined by the city, village, or town. No countywide standards exist, except that the numbers themselves are assigned by the County.
10. Community wildlife protection planning or related projects have occurred.		x		• Town of Seymour has an updated wildfire protection plan and has implemented related projects. • Need for similar planning may exist for other high risk areas of the county.
Other community planning and regulatory activities or notes: • See Appendix G for a summary of city and village mitigation activities. • Also see flood mitigation discussed in the "flood mitigation" table below.				

Flood Mitigation

Mitigation Action	Yes	Some	No	Notes
1. Floodplain ordinances have been adopted and communities are NFIP participants good standing.		x		• Floodplain ordinances consistent with the current state model have been adopted and all municipalities are NFIP participants in good standing, except for the Village of Fairchild, which is on the NFIP sanctioned list due to lack of floodplain zoning. County floodplain and shoreland zoning applies to all unincorporated towns. See flood assessment in Section III.
2. Development is strongly discouraged in 100-year floodplains and dam shadows.	x			• Local floodplain zoning and comprehensive plans discourage floodplain development. • All permit applications reviewed to determine whether proposed building sites are reasonably safe from flooding. • County regulates Eau Claire River, Vogler, Johnson, & Dells Lake Dam shadows as part of floodplain zoning.
3. Stormwater management planning and regulation occurs.	x			• As a federally-designated urbanized area, Eau Claire County and many of its municipalities have been required to obtain a MS4 permit to reduce polluted stormwater runoff by implementing stormwater management programs with a variety of educational, enforcement, and best practices activities. • Construction site erosion control measures under the uniform dwelling code (IHLR 20-25) and WDNR rules (NR 151, NR 216) • See Appendix G.
4. Stormwater system improvements have been completed.	x			• Ongoing. Significant improvements have been made since the 1993 flooding. • See Appendix G. • Also see flood risk and vulnerability assessment in Section III.
5. Flood acquisition, floodproofing, and/or flood elevation projects have been implemented.	x			• Eau Claire County and City of Eau Claire have used mitigation grant dollars to acquire and floodproof many floodprone buildings as discussed in the flood assessment in Section III. An additional project is proposed for 2018. • Many floodplain areas are designated as public parks or open space.
6. Dams offer flood control, dam shadows are mapped, and dams are in good repair.		x		• Dams are generally in good repair, though not all dams are managed primarily for flood control. • GIS dam shadow data is not available for all high and/or significant hazard dams.
7. Flood monitoring systems are used.	x			• USGS gauge on Eau Claire River funded by City of Eau Claire and monitored by NOAA/NWS and City. Also a USGS gauge between Dells Dam and

				the confluence funded by Xcel. NOAA/NWS has been requesting replacement of gauge on Eau Claire River near Fall Creek since its failure several years ago. Perhaps being addressed as part of a proposed water quality monitoring project.
8. Flood emergency planning has occurred.		x		• City of Eau Claire maintains a flood emergency plan, including notifications and response based on flood risk and height. Eau Claire County has considered similar. • Emergency action plans for large and high-risk dams on file at the County Emergency Management Department and Emergency Communications Center. • Emergency plans for County dams reviewed annually, and updated as needed.
9. Public education regarding flood risks and insurance has occurred.	x			• Largely limited to plan review and permitting processes. • City of Eau Claire conducts additional public education as a CRS community.
10 Communities participate in the NFIP Community Rating System.		x		• The City of Eau Claire is a CRS community and is exploring additional educational efforts in order to improve its rating. • Most other communities lack sufficient concentrations of floodplain structures to make CRS participation feasible; costs outweigh benefits.
11. Other special flood prevention or mitigation activities occur.		x		• City of Eau Claire has integrated their floodplain management goals into additional plans (e.g., parks plan, waterways plan).

Other flood mitigation activities or notes:

- See Appendix G & H for a summary of city and village mitigation activities related to flooding.
- See flood risk and vulnerability assessment in Section III.B.i.
- Eau Claire County maintains a limited stock of sandbags (8,000-15,000) to assist in flood containment.
- County Code Administrator designated as NFIP Coordinator for Eau Claire County.

Other Physical Mitigation Projects

Mitigation Action	Yes	Some	No	Notes
1. Community safe rooms have been designated or constructed.		x		• See Appendix G for city and village discussion. Only Augusta has formally designated public shelter (e.g. Community Center). Interest in Fairchild and Altoona. • No formal safe rooms at County Fairgrounds or County parks/campgrounds.
2. Power lines have been buried in some areas prone to outages.		x		• Limited. See long-term power outage assessment in Section III.
3. Regular tree trimming near power lines occurs.	x			• Electric providers do a good job of regular tree trimming near power lines.

4. Snow fencing, berming, crop rows, or other efforts are used for drifting in prone areas.	x			• County Highway Department uses snow fencing and piling/rowing of snow to help control drifting.
5. Special traffic calming, traffic controls, and/or notifications system have been installed on highways.		x		• Some on-ramp gates and remote monitoring cameras have been installed on I-94 and USH 53. Message board added on I-94. • Portable message boards needed.
6. Emergency power generators have been obtained for critical facilities.		x		• A survey of emergency power generator needs was included during this plan update, though no complete inventory exists. See long-term power outage assessment in Section III for additional discussion. • Appendices H & G discuss the need in cities and villages.
7. Emergency fuel agreements have been executed for critical facilities.		x		• 2018 Generator Survey suggests that some larger critical facilities have fuel agreements; likely room for improvement.
8. Convenient access to water supplies is available for fire protection.		x		• See Appendix G for city and village discussion. • Most fire department have convenient access to water supplies. Some need for dry hydrants.
9. Warming or cooling shelters have been designated.			x	• No formal list of warming and cooling shelters or related agreements exists. Issued press releases. City of Eau Claire has identified cooling sites in past, though no formal shelters are designated.

Other physical mitigation projects or notes:

- See Appendix G for a summary of city and village mitigation activities related to the above.
- County Planning & Zoning Department manages the County's Clean Sweep Program, which collects and disposes of hazardous waste 3-4 times/year for residential and small quantity commercial. 1 agricultural Clean Sweep per year and pharmaceutical drop-off available through Sherriff's Department.
- Some schools and other critical facilities are believed to have taken some security hardening measures in recent years, but no comprehensive preparedness assessment available.
- Local ISO insurance ratings can be impacted (or reduced) by building code standards and enforcement, fire department capabilities, and even emergency communications, which have the potential to provide insurance credits for residential and commercial policies. Not all municipalities may know their ISO BCEG rating and understand how insurance costs can be impacted.

Emergency Operations Planning and Training

Mitigation Action	Yes	Some	No	Notes
1. The County has an Emergency Operations Plan (EOP) with annexes for various hazard events.	x			• Continuing to update EOP and add annexes. • County is in the process of developing an active shooter plan based on Avoid/Deny/Defend model.
2. The cities, villages, and towns have updated EOPs or emergency policies.		x		• Varies. Most have plans, but some require updating, especially to contact info & roles. • See Appendix G for city and village discussion.
3. The County and municipal EOPs are regularly exercised.		x		• Regular training organized by County Emergency Management, but not all municipalities regularly test their emergency plans; many have some type of drills.

				• County E.M. is developing a Multi-Year Training & Exercise Plan (MYTEP) to test and reinforce plans, procedures, and capabilities. • See Appendix G for city and village discussion.
4. The County EOC has been activated or exercised in the last 5 years.	x			• Yes, for 2016 Presidential election. City of Eau Claire has activated for flooding. • Mobile command center is County's backup EOC.
5. HazMat planning and training occurs and gear is available.	x			• County emergency response protocols in place. Regular training organized by County Emergency Management. • WEM survey recently completed assessing capability, gear, etc. See hazardous materials assessment in Section III.
6. Individuals identified in EOPs, including elected officials, have a minimal level of ICS training suggested for their roles.		x		• No official minimum NIMS/ICS standards for non-emergency services set. Additional training required or suggested depending on role. • Varies. Most emergency personnel and responders and many public works staff meet minimum standards. • County does not have a trained, designated P.I.O. (and back-up) for disasters. • More training for elected officials and P.I.O./crisis communications suggested.
7. Other stakeholder groups, including other County departments, public works/highway, VOADs, critical infrastructure, and private-sector businesses participate in exercises.	x			• Regular participants include other County departments, public works/highway, VOADs, critical infrastructure, and some private-sector businesses depending on the exercise scenario. • Increasing participation by other partners so they understand their potential roles during a disaster, so they may strengthen their own plans, was a concern expressed in the 2013 mitigation plan
8. The County and some municipalities have developed continuity of government plans.		x		• County has adopted a basic continuity of government plan last updated in 2003 and intends to revisit, update, and expand. • Most municipalities do not have a COOP/COG plan, but most have off-site data back-up and some have other continuity components.
9. Evacuation and access control planning has occurred.		x		• Have a basic plan for City of Eau Claire. May need to exercise and revisit. • State of Wisconsin (WEM) has been piloting a potential credentialing program.
10. Debris management sites have been designated.		x		• County has a Debris Management Plan with roles and responsibilities. Sites may be available for vegetation, but generally have not been designated for other debris. Municipalities were encouraged to begin thinking about as part of mitigation interviews.
11. Emergency planning and periodic exercises are required for		x		• Largely limited to general security, crowd control, medical, fire, & emergency vehicle access.

large festivals, fairs, and gatherings.				
12. Planning for pandemics has occurred.	x			• See communicable disease assessment in Section III for discussion on the County Public Health Preparedness Plan.
13. Highway and public works department have adopted billing rates for equipment.		x		• County Highway Department has adopted rates or State DOT rates.
14. Policies and training has been completed for volunteer management.		x		• Volunteer Reception Plan and related training completed through Public Health • Medical Reserve Corps established. • Disaster Ready Chippewa Valley hosted a volunteer management seminar in Fall 2016.
15. Policies and training has been completed for active threats and workplace violence.		x		• County government conducted active shooter training for all employees in 2016. County plan is being developed and facilities being mapped; once complete, additional County employee training will occur. • Additional law enforcement training and response has occurred for general threats.
16. School Districts and post-secondary institutions have completed active threats training and have taken actions to mitigate risks.	x			• Varies by institution. All have had some type of training.

Other emergency operations planning and training activities and notes:

- See Appendix G for a discussion of city and village emergency planning and training.
- Emergency management and hazard mitigation planning is often a low priority for communities, with the exception of maintaining basic fire, police, fire responder, and ambulance services. Local emergency response plans can quickly fall out of date due to turnover of local government officials and these plans (and associated maps, resident information, etc.) may not be readily available to local officials should a disaster occur. It is also fairly common that hazard mitigation and emergency response issues are not integrated into other local planning and regulatory efforts. Education and outreach to cities, villages, and towns on emergency management issues is an ongoing effort.
- Eau Claire County has a very strong Public Health Preparedness Committee with public- and private-sector representation.
- Continuing to improve coordination between the County's Public Health Preparedness Plan and the County Emergency Operations Plan. Both have annexes for certain types of events (e.g., radiation protection plan, CBRN, mass casualty, communicable disease, at risk populations), including the 15 core public health standard capabilities. See communicable disease subsection in Section III.
- City of Eau Claire has an employee reference guide of Emergency Action Procedures, including topics such as severe weather, active threats, fire, chemical spills, medical emergencies, and evacuations.
- Similarly, the turnover in elected officials necessitates continued, periodic outreach to local officials on resources, public safety agencies, mitigation issues, and recent events. The communities, local emergency services, and County emergency management personnel should be commended for their emergency planning efforts.
- County participates in Federally required training for Prairie Island Nuclear Generating Facility every eight years.

- Ongoing concerns with safety on U.S. Highway 53 ("new bypass") during poor weather. Response coordination and jurisdiction on USH 53 was recently clarified.
- See cyber-security assessment in Section III for a discussion on related mitigation.

Emergency Notification and Communication Systems

Mitigation Action	Yes	Some	No	Notes
1. Emergency communications in the County is centralized.	x			• The Eau Claire Emergency 9-1-1 Communication Center serves all police, fire, and rescue calls countywide.
2. Gaps or weaknesses in emergency communications and equipment have been addressed.	x			• Much improved compared to when narrowbanding was originally implemented, though some gaps in service exist on the SE side of County for portable radios and cell phones. Many public works departments rely on cell phones, but inconsistent in approach.
3. Outdoor storm sirens are used for notification of severe weather warnings. Any coverage, power, procedural, or educational concerns?	x			• See tornado assessment in Section III. • New siren installed at Lake Eau Claire as part of a Girl Scout project. • Some of public do not understand warning sirens or expect that the sirens will be heard indoors. • Good information at County website.
4. NOAA All Hazard Radios or other notification equipment have been distributed.		x		• No larger-scale, formal program implemented. Though some interest in NOAA radio distribution project in past, though mobile phones may be reducing this need.
5. A reverse-911 or similar GIS-based notification system exists.	x			• Smart911 mass notification system recently acquired. Must sign-up to be notified via cell phones. Has some GIS-based capabilities. • County has not pursued IPAWS authority.
6. Social media and the Internet is used for emergency notification and preparedness education.	x			• Facebook actively used by County Emergency Management and some municipalities. • County does not have a designated person to manage social media in a crisis. • Electric providers provide outage information at their webpages and through social media.
7. An active ARES/RACES group exists in the County.	x			• http://www.wi-aresraces.org/counties/eauclaire.htm
8. The County has an active Skywarn Storm Spotters program.	x			• Hosted by County E.M. with assistance from Eau Claire County ARES/RACES.
9. Railroad bridges, crossings, and sign posts have been mapped.			x	• Recommended in 2013 County Plan.

Other emergency notification and communications systems and notes:

- Great Rivers 2-1-1 if available as a public source of information during emergencies.

Other Educational, Outreach, and Preparedness Activities				
Mitigation Action	**Yes**	**Some**	**No**	**Notes**
1. Public education occurs are part of severe weather awareness week and during other seasons.	x			• Largest outreach by County Emergency Management via press and community organizations during Tornado & Severe Weather Awareness Week in April. • Additional press releases during times of elevated risk.
2. Outreach to seniors and special needs populations occurs.	x			• County ADRC works with County Emgy Mgmt to on preparedness-related outreach through the 2,400 ADRC newsletters distributed monthly. • When clients join ADRC Nutrition Program, client intake/emgy contact info completed that can be valuable during a disaster event. • ADRC's 3 meal sites and about 400 home-delivered meals are an excellent forum for outreach and communications. Meal sites can be a valuable resources during event recovery. • Have distributed weather radios in past.
3. Outreach and education to area businesses occurs.	x			• Involve some industry and critical facilities in exercises, depending on the scenario. • Disaster Ready Chippewa Valley provides private-sector preparedness and continuity planning education and encourages private-public partnerships.
4. Outreach to the agricultural community occurs.	x			• Local UW-Extension staff, Farm Services Agency, NRCS, and County Land Conservation work with area farmers to educate on the mitigation of various hazard threats (e.g. winter kill, drought, manure/chemical storage). • Multi-peril crop insurance and FSA Supplement Revenue Assistance Program (SURE) are available to assist with crop losses for reasons beyond a farmer's control.
5. Staff from FSA, NRCS, Co. Land Conservation, and UW-Extension meet periodically to discuss mitigation opportunities, education needs, and damage assessment procedures.			x	• Partners involved will vary based on type of disaster threat. Have ongoing working relationships. Will work together when needed during times of disaster.
6. Soil health and shoreland best practices are promoted in the County to help mitigate flooding impacts.	x			• Increasing emphasis on such techniques and best practices by County, regional, and State staff. • County LCD pursuing shoreland demonstration projection.
7. Educational efforts related to forest management and wildfire has occurred.	x			• WDNR takes the lead role in wildfire-related efforts for much of the County with local fire department assistance.

				• Community Wildfire Protection Plan completed for Town of Seymour includes additional educational efforts.
8. Planning and educational efforts related to invasive species have occurred.	x			• Various organizations working cooperatively, including Eau Claire County Land Conservation, County Highway, lake groups, municipalities, urban forestry programs, Beaver Creek Reserve, Lower Chippewa Invasives Partnership, and WDNR

Other educational, outreach and preparedness activities and notes:

- Educating elected officials on roles, responsibilities, and basic ICS is a challenge given turnover. Such education is not on a regular schedule. May be an opportunity to coordinate such with a regular review and, if needed, update of municipal emergency plans.

Mutual Aid and Other Partnerships

Mitigation Action	Yes	Some	No	Notes
1. Mutual aid between local law enforcement agencies exists and meet regularly.	x			• Statewide law enforcement mutual aid.
2. Mutual aid between local fire departments and first responders exist and meet regularly.	x			• Countywide MABAS adopted. Quarterly Fire Chiefs Association meetings.
3. Mutual aid between local public works & highway departments exist and meet regularly.		x		• A variety of mutual aid exists. No formal, regular countywide meetings. • See Appendix G for city and village discussion.
4. Public health partnerships exist.	x			• Eau Claire County Public Health Preparedness Committee • County also participates in the Northwest Wisconsin Healthcare Readiness Coalition http://www.wiherc.org/ and the Western WI Public Health Readiness Consortium. www.wwphrc.org
5. Public-private partnering occurs.	x			• Some businesses are represented on LEPC and participate in exercises. Excellent P3 partnering as part of Public Health Preparedness Cmte, Medical Reserve Corps, and through VOADs. • Some local businesses have participated in ICS 300 training. • Disaster Ready Chippewa Valley, a 501(c)3, is a private-public partnership championing collaboration, preparedness, and resiliency in the County.
6. Intergovernmental preparedness and mitigation planning occurs across county lines.	x			• Regional WEM Office provides multi-county support and participates on LEPC. • Mitigation planning and other support also

				available through West Central Wisconsin Regional Planning Commission. • Also note partnerships in #4 above.
7. VOADS are active in the community and participate in preparedness planning and training.	x			• Very good relationships with local VOADs, including American Red Cross and Salvation Army. Critical volunteer base if needed + Medical Reserve Corps. • Red Cross coordinates recovery shelters.
8. Support is provided to area educational institutions for preparedness planning and training.	x			• Eau Claire County Emergency Management, Public Health, and local municipalities have good working relationships with schools districts and post-secondary institutions. • CVTC provides required training for local emergency responders.

Other mutual aid and partnership activities and notes:

- Local houses of worship are a value resource for supporting seniors and adults with disabilities.
- Housing authorities, community action programs, and long-term care facilities are other important partners.
- New Federal CMS rule is requiring additional emergency preparedness for health care providers receiving Medicare and Medicaid. Smaller providers (e.g., assisted living, long-term care) has been providing plans to County Emergency Management or County Public Health.
- It is important that the County and emergency response agencies have input into private-sector and local community emergency plans to ensure that plans do not have unrealistic expectations for public support or assistance that may not be available.
- The 2013 mitigation plan noted a need for additional planning and exercises related to volunteer management.

SECTION V.
PROGRESS ON PREVIOUS MITIGATION PLAN STRATEGIES

This section reviews the progress on each of the high priority strategy recommendations from the *Eau Claire County Natural Hazards Mitigation Plan* and the *City of Eau Claire Natural Hazards Mitigation Plan* adopted and approved in 2013. As discussed in the previous plans, the availability of resources and changing priorities affect implementation. For instance, some strategies were contingent on grant funding. The full list of recommended strategies from these two plans was comprehensive, and there was not an expectation that all strategies would be fully addressed within five years' time.

The table below also includes a recommendation on how each high priority strategy may be addressed in this plan update plan based on the input of the responsible parties identified in the previous plans and the steering committees. Later in this report, these recommendations are further considered and analyzed for feasibility by the Steering Committee.

A. 2013 EAU CLAIRE COUNTY HIGH PRIORITY STRATEGIES

2013 Plan Strategy	Progress	Recommendation for Plan Update
Construction & Infrastructure Strategies		
1. Continue to address road washout problem areas, flooding hotspots, and shoreland erosion issues in Eau Claire County, including those areas of concern identified in the flood assessment. **(High Priority)**	County and municipalities have made substantial stormwater improvements over past decade and continue to address as need and resources allow. See flood assessment and Appendices F, G, & H. Related to a similar 2013 strategy, one flood acquisition of floodprone structure in Town of Seymour since 2013.	Keep in plan. Modify to highlight hotspots as needed.
2. If opportunities arise, pursue grant funding to address emergency power generator needs for municipal buildings and other critical facilities as identified in the long-term power outage section. **(High Priority)**	No grant funding for such a project identified. Need still exists.	Keep in plan.

2013 Plan Strategy	Progress	Recommendation for Plan Update
3. Identify or pursue grant funding to develop community safe rooms and/or storm hardening for the County Expo Center, mobile home parks, campgrounds, and outdoor event venues. **(High Priority)**	Projects have been discussed, but no action. Needs still exist.	Keep in plan.
Planning & Policy Strategies		
10. Implement a LIDAR mapping project which meets FEMA National Flood Insurance Program standards to obtain more accurate elevation data for the County, then work with WDNR and FEMA to revisit, and revise as needed, the FEMA Flood Insurance Rate Maps. **(High Priority)**	LIDAR project completed. Regional effort underway through WCWRPC to identify possible FIRM updates based on new LIDAR.	Modify to support continued efforts to improve accuracy of FIRMs. High Priority.
11. Integrate railroad mile posts, key bridges, and grade crossing identification numbers into County emergency mapping systems and explain the importance and use of these additions to emergency services and dispatch personnel. **(High Priority)**	Most data may now be accessible via the AskRail App, which emgy response agencies can request access to.	Discuss need with Steering Committee.
19. Continue the development of geographic informational systems (GIS) data for hazard mitigation and emergency management purposes, including continued development of the critical facilities data layers. Investigate options to compare or link this to the 2-1-1 database. **(High Priority)**	D-FIRMs completed, but accuracy concerns. Limited development of new data layers for hazard mitigation & emergency response.	Ongoing importance. Identify any specific needs or remove as a strategy.
20. Considering available models, municipalities should review their driveway and private road standards to ensure adequate driveway and private road access for emergency vehicles. **(High Priority)**	Varies by community. Still some areas with access concerns. Seymour CWPP included related educational strategies.	Discuss alternatives with Steering Committee, including education.
Coordination Strategies		
22. During the next hazard mitigation plan update, consolidate the City of Eau Claire's and Eau Claire County's plans into a single document. **(High Priority)**	Being completed as part of this plan update.	Remove from plan.
24. Encourage the input of fire departments and emergency response agencies during County planning and site plan review efforts, and encourage local communities to do the same. **(High Priority)**	County has been doing and appears to be improved at local level.	Continue. Discuss if needs to separate strategy w/ Steering Cmte.

2013 Plan Strategy	Progress	Recommendation for Plan Update
26. Continue to encourage cities, villages, and towns to update and maintain emergency operations plans with current contact information and advocate for basic ICS training for elected officials and key personnel. **(High Priority)**	Varies by community. Some need to revisit plans, while many elected officials do not have basic ICS training.	Modify to reflect desired prescriptive action by County E.M.
Emergency Communications Strategies		
33. Make a determination on the development of a County G.I.S.-based, Reverse 9-1-1 autodialer system for emergency warnings. **(High Priority)**	Implemented RAVE/Smart911 system, which has some GIS-based features.	Encourage Smart 911 sign-up and related education.
35. Encourage towns to adopt a more standardized design, placements, maintenance approach, and numbering system for 9-1-1 address numbers. **(High Priority)**	Countywide numbering system in place, but design & placement determined locally.	Modify strategy to focus on placement and design.
36. Once fully complete, test the new narrowbanded emergency radio communications systems. Involve highway, streets, and public works personnel in communications planning and testing. Continue efforts to address radio communications gaps in the County and ensure interoperability, while moving towards Next Generation 9-1-1. **(High Priority)**	Narrowbanding has been implemented, though interoperability does not include all local public works. New towers addressed most critical gaps. FirstNet at Federal/State level ongoing.	Remove.
Emergency Communications Strategies		
38. Increase awareness among public officials and residents of driveway access, grade, width/clearance, surface types, weight limitations, long-dead end roads, and turn-around issues for large emergency vehicles. **(High Priority)**	No specific actions implemented, except in Town of Seymour as part of community wildfire protection plan.	Include as an alternative and discuss need with Steering Committee. Combine w/ #20?
City and Village (Multi-Jurisdictional) Strategies		
45. **ALTOONA, OTHERS AS NEEDED** – Continue to monitor, plan for, and address critical overland and riverine flooding issues as identified in the flood assessment. **(High Priority)**	Ongoing stormwater management planning, floodplain regulations, etc. See flood assessment and related appendices.	Keep in plan.

2013 Plan Strategy	Progress	Recommendation for Plan Update
46. **FAIRCHILD, ALTOONA** - Pursue mitigation grant funding to construct community safe rooms (storm shelters) for areas of the community without access to such shelters. **(High Priority)**	Some discussion, but no action to date. Needs still exist.	Keep in plan.
47. **ALL INCORPORATED AREAS** -- When grant opportunities arise, address emergency power generator needs for municipal buildings and other critical facilities as identified in the long-term power outage section. **(Medium-to-High Priority)**	Not currently eligible for mitigation grant funding in Wisconsin	Keep in plan.
50. **ALL INCORPORATED AREAS** - Develop or update, as needed, local municipal emergency operating plans and encourage basic Incident Command System training for key elected officials and other key "non-emergency personnel". Identify any key resources and critical facilities, and involve them during planning. **(High Priority)**	Most have updated EOP in last 1-2 years, though some contact info may be outdated. Basic ICS training levels varies. See Appendix G	Keep in plan. Reword for annual reviews and specific ICS levels.
51. **ALL INCORPORATED AREAS** - Continue to work with Eau Claire County Emergency Communications to ensure communications interoperability, strengthen wireless broadband connectivity for emergency response, and to pursue funding support to replace and upgrade needed communications equipment. **(High Priority)**	Improved, though gaps reported gaps near Fairchild and some outdated portable radios. Public Works often using cell phones and not tied into portables.	Consolidate into a county-level strategy, if needed, possibly in conjunction with #36 above.
52. **ALL INCORPORATED AREAS** – If flooding or other emergency occurs, compile and document all damages and costs with pictures, testimony, invoices, etc., for potential future grant funding or reimbursement. **(High Priority)**	General policy statement.	Keep in plan.
53. **FAIRCHILD** - Request a presentation from WDNR and/or the County on floodplain zoning and the impacts of National Flood Insurance Program sanctioned status. **(Medium-to-High Priority)**	Not completed.	Keep in plan.

54. **FAIRCHILD, AUGUSTA** - Evaluate current community safe rooms (public storm shelters) at the school and community center, respectively, to ensure the public is aware of availability, the facilities are accessible when needed, and any appropriate agreements and use policies are in place. **(Medium-to-High Priority)**	Fairchild school not available at current time. Additional public awareness of Augusta shelter may be needed.	Keep in plan for Augusta, with possible addition of hardening and remote unlocking. Fairchild addressed in #46.
55. **ALL INCORPORATED AREAS** - Incorporate hazard mitigation and emergency preparedness activities into community comprehensive plans, stormwater management plans, capital improvement plans, and land use procedures (e.g., site plan review) as opportunities allow. Include local emergency services in site plan reviews and community planning. **(Medium-to-High Priority)**	Varies, but often limited to emergency services and floodplain zoning.	Keep in plan as a medium priority.

B. 2013 CITY OF EAU CLAIRE HIGH PRIORITY STRATEGIES

The City's 2013 mitigation plan included the limited number of high priorities listed below. As part of this plan update, any strategies from the City's 2013 mitigation plan may be recommended as countywide strategies or included as a multi-jurisdictional strategy for multiple communities. It is expected that there will be significantly fewer strategies specific to the City of Eau Claire since many of the hazard risks are equally shared throughout the County and the City will no longer have its own, standalone mitigation plan.

2012 Plan Strategy	Progress	Recommendation for Plan Update
Planning and Policy Strategies		
3. Continue to work with Eau Claire County, Chippewa County, and adjacent municipalities in the implementation of the hazard mitigation strategies found in the county mitigation plans which pertain to the City of Eau Claire. For next mitigation plan update, fully integrate the City's mitigation planning efforts into the Eau Claire County Natural Hazards Mitigation Plan. **(High Priority)**	Ongoing. City's mitigation plan being fully integrated with County's plan during this plan update.	Remove from plan, since plans are now integrated. Continued multi-jurisdiction coordination is important.
4. Maintain and exercise the City's Flood Emergency Action Plan. **(High Priority)**	Exercised/practiced every spring.	Keep in plan.

2012 Plan Strategy	Progress	Recommendation for Plan Update
5. Strictly enforce river and stream floodplain regulations. Protect the function and integrity of streams, floodplains, and wetlands during the site plan and subdivision review process. Protect and restore sensitive natural resources such as floodplains, wetlands, shorelines, and riverbanks through regulation and/or City investment. Work with Wisconsin DNR to protect the banks and floodplain of the Chippewa and Eau Claire Rivers, as well as Sherman, Lowes, and Otter Creeks by enforcing its current floodplain regulations, using natural stream edge protection techniques, and by acquiring additional land for public open space. **(High Priority)**	Enforced and protected through various regulations and plans by City and WDNR. Floodplains, wetlands, and steep slopes also regulated through the urban sewer service area plan. See flood assessment and Appendices G & H.	Keep in plan. Fine-tune as needed.
6. Work with Xcel Energy and Eau Claire County to maintain accurate dam failure inundation maps and convert to a digital GIS format so they may be used for emergency planning, Reverse 911, and flood vulnerability assessment in future mitigation plan updates. **(High Priority)**	City and County received dam failure maps each year from Xcel. Related TTX held in 2015. Not in digital GIS format.	Combine recommended future actions with a county-level strategy. Digitize and link w/ Smart 911 system for alert notification capability.
Emergency Communications Strategies		
18. Coordinate with Eau Claire County to ensure communications interoperability and implementation of Next Generation 911. **(High Priority)**	ongoing	Address any needed actions through a county-level strategy.
26. Continue to work with Eau Claire County Emergency Management to maintain adequate ICS training and certifications for City personnel and elected officials. **(High Priority)**	ongoing	Combine with county-level and/or multi-jurisdiction strategies.

SECTION VI.
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 Steering Committee reviewed the goals in the 2013 mitigation plans for the County and City of Eau Claire, determined that the 2013 goals were still consistent with community plans, and "re-endorsed" the following mitigation goals for the 2018 plan update without changes:

Goal One: Construction and Infrastructure

Maintain a safe, resilient physical and emergency response infrastructure which reduces hazard vulnerabilities to residents, property, infrastructure, and natural resources.

Goal Two: Planning and Policy

Anticipate hazard vulnerabilities and identify appropriate mitigation strategies to protect the health, safety, and general welfare of the community, its business, and its residents.

Goal Three: Coordination

Continue to collaborate and partner with other governmental jurisdictions, community members, non-profits, and local businesses to coordinate emergency preparedness efforts, mitigate hazard threats, and provide high quality emergency services in a cost-effective manner.

Goal Four: Emergency Communications

Maintain a strong, effective emergency communications network and hazard warning system.

Goal Five: Education and Outreach

Residents, businesses, and local officials will be aware of local hazard risks and the alternatives to mitigate hazard impacts in their homes, businesses, and communities.

B. EVALUATION OF ALTERNATIVE MITIGATION STRATEGIES

A comprehensive range of alternatives was considered when developing strategies to meet the plan's vision and goals. The Mitigation Toolbox in **Appendix J** was used to help identify potential mitigation options. Evaluating the alternatives and selecting the mitigation strategies for inclusion in this plan was a multi-step process:

#1 Potential mitigation strategies to address the hazard risks and vulnerabilities analyzed in Section III were identified during the key stakeholder interview process, Steering

Committee meetings, town surveys, and city and village meetings. The county-level strategies with the most potential were integrated into **Appendix K**. Some of the county-level strategy alternatives are multi-jurisdictional in nature and may be implemented in individual communities or countywide. Additional alternatives were considered, but were not included in Appendix K because they were deemed unfeasible, of questionable effectiveness, or of very low priority without additional analysis.

#2 During stakeholder interviews, the 2013 plan strategies listed in Section V were reviewed, which yielded a recommendation for this plan update. These strategies were also integrated into Appendix K and a column added which indicates whether the strategy appeared in the 2013 plan, was significantly revised, or if it is new to this update

#3 A survey with the alternative county-level strategies in Appendix K was distributed to Steering Committee members. Committee members gave each strategy a priority of "high", "medium", "low", or "exclude" based on costs vs. benefits, political acceptability, technical feasibility, etc. Average scores were then determined based on a 10-point scale to provide a relative priority and exclude the lowest scoring strategies. Members were also encouraged to write-in comments, such as barriers to implementation, which were incorporated into Appendix K. The survey results were analyzed further during the final Steering Committee meeting resulting in some additional changes. For those strategies in Appendix K that are recommended for plan inclusion, key parties to be involved (or take a leadership role) in implementation were identified.

Note:

The priorities for the strategies in Appendix K were made in the context of this plan and the natural hazards facing Eau Claire County.

A low priority should <u>not</u> necessarily be interpreted as having a lesser importance to Eau Claire County overall.

#4 The multi-jurisdictional strategy alternatives for cities and villages (not included in Appendix K) reflect the findings from the meetings with each participating community. The initial draft recommended strategies and other key plan sections were mailed to the cities and villages for review and comment in June 2018, except for the City of Eau Claire. Strategies for the City of Eau Claire were reviewed and finalized at the third City Steering Committee/work group meeting in August 2018.

#5 For priority projects recommended for implementation within the next five years, additional analysis and guidance was included in Section VI.D.

#6 Additional changes and "fine-tuning" to the recommended strategies and draft plan were made based on review of the draft plan by communities, local officials, key stakeholders, and the general public as part of the public comment period and plan adoption process.

C. RECOMMENDED MITIGATION STRATEGIES (ACTION PLAN)

Strategies are specific mitigation policies and projects selected based on their feasibility to assist the Eau Claire County in attaining the plan goals. **It must be remembered that this is an Eau Claire County plan, not a plan for the Eau Claire County government.** While County government may take a lead role in implementation of many of the county-level strategies, this is not always the case. Collaboration and partnerships are essential to a safe, resilient community.

Some strategies may also have a strong emergency preparedness emphasis, but have been included for their importance in helping to mitigate the negative impacts of hazard events when they do occur. As mentioned previously, the last section (multi-jurisdictional strategies) identifies those recommended policies and projects for the participating cities and villages.

Appendix K also includes implementation guidance for most county-level strategies including relative priority, key parties likely involved during implementation, and, sometimes, potential barriers. The relative priority (i.e., high, medium, low) is helpful in determining which projects to implement first from a mitigation perspective, but individual programs or communities may rate some of these strategies differently. As explained in Appendix K, the strategies were prioritized based on their importance to hazard mitigation, but some strategies have additional local benefits that may not have been considered. Priorities are also subject to change over time and new priorities may arise. In order to avoid too much emphasis on the prioritization, only the high priority strategies are denoted as such here.

i. Flood Mitigation Strategies

Recommended Flood Mitigation Projects

1. Continue to monitor, study, and address stormwater and flash flooding hotspots in the County as identified in the flood assessment of the hazard mitigation plan. Potential projects include, but are not limited to: creation/expansion of flood/stormwater storage areas, the installation or re-sizing of culverts, the creation or improvement of drainageways, and the protection of natural drainage and retention areas. **(High Priority)** ***related to continued NFIP compliance***
2. Pursue hazard mitigation grant funding to acquire, relocate, or floodproof structures and properties with a flood history, most at risk of flood damage, and/or following a flood event in which significant damage occurs, if the landowner agrees to participate.
3. Install automated flood gauges on the Eau Claire River, including potential replacement of the USGS flood gauge station north of Fall Creek. Continue working to improve remote monitoring reliability at County dams.
4. When funding allows, install a gate system at Lake Altoona Dam that will allow for safe use without having to use the walkway and address related freezing-up challenges.
5. Pursue opportunities to improve the accuracy of floodplain maps (D-FIRMs) now that LIDAR data is available.

Recommended Flood Mitigation Policies

1. Continue to enforce County and local floodplain regulations to: discourage future floodplain development and the storage of hazardous materials in floodplains; require dry land access for new structures; limit development in dam shadows; and maintain natural flood storage areas. **(High Priority)** ***related to continued NFIP compliance***
2. Continue to maintain dams and dam emergency operating plans. Discourage development in the hydraulic shadows (dam failure floodplains) of dams. Encourage residents and businesses within or near dam shadows to sign-up for the Smart 911 emergency notification system. Develop G.I.S. map layers for all large and high hazard dams. **(High Priority)**
3. Continue to educate the public and elected officials of flood risks, flood insurance, and alternatives to mitigate stormwater runoff (e.g., soil health, erosion controls, rain gardens, low-impact development). Especially target those municipalities with the greatest assessed improvements in or near floodplain areas.
4. Encourage collaboration during development permitting. Continue to stress the importance of culvert maintenance and sizing to municipalities. Encourage municipalities to work cooperatively to consider impacts downstream when making stormwater system improvements (e.g., resizing culverts, new drainageways) as well as consider the changing climate.
5. Develop a County Flood Emergency Action Plan. Explore the need for additional sandbagging equipment.
6. Monitor and study the need for: (i) further development standards or adaptive action to mitigate flooding beyond the official FEMA 100-year floodplain boundaries, (ii) modifying stormwater management model assumptions, and (iii) reassessing related infrastructure (e.g., culverts) due to climate trends and increasing heavy rain events.

ii. Severe Weather & Power Loss Mitigation Strategies

1. If funding opportunities become available, work with communities to pursue grant dollars for emergency power generators for critical facilities and emergency operations centers in Eau Claire County. **(High Priority)**
2. Partner with area electric providers, oxygen providers, and ADRC to review the County's Special Populations Emergency Plan to identify the roles of electric providers within the County's emergency operations systems and lines of communication. Identify how special needs households are contacted or monitored and how back-up oxygen is distributed if needed. Collaborate with hospitals, clinics, and home health care providers, to identify patients and develop a notification and monitoring plan in the event of a long-term power outage or other disaster. Encourage these households to sign-up for Smart 911 system and to notify their electric provider to be added to their emergency contact lists. **(High Priority)**
3. Based on landowner and/or community interest, pursue grant funding to make cost-sharing available for the installation of safe rooms (storm shelters) at mobile home parks,

campgrounds, RV parks, recreational properties, slab-on-grade residential developments, festival grounds, and other areas and communities where no existing shelter alternatives exist, including public-owned facilities (e.g., campgrounds, parks, Expo Center).

4. Continue to work with local power providers to bury overhead electrical lines in areas prone to outages due to falling trees/limbs or high winds or for service to critical facilities. For areas prone to flooding, transformers or other such power infrastructure may require floodproofing, elevating, relocation, or other flood mitigation.

5. Work with area utilities to encourage public- and private-sector planning for long-term power loss and pursue other mitigating activities recommended during the 2010 regional long-term power outage planning effort and more recent workshops, as deemed feasible. Encourage local governmental offices, businesses, emergency shelters, and critical facilities to develop a basic long-term power outage plan and continuity strategy that inventories and addresses power generation and emergency fuel needs and provide 24/7 contact information to their electric provider. Increase public awareness of electrical-related risks and power outage preparedness as part of Electrical Safety Month and National Safety Night Out.

iii. Hazardous Materials Spills Strategies

1. Continue Hazardous Materials Emergency Preparedness training. Regularly rotate HazMat exercises and training throughout Eau Claire County with a particular focus on those chemicals commonly transported by rail or highways or at fixed facilities and pipelines within the local host community. Consider having EHS facilities give presentations on their hazardous materials, facilities, and plans at Fire Chiefs' meetings.

2. Implement the recommendations of the 2018 State of Groundwater in Eau Claire County report, including additional groundwater testing and mapping of areas of high vulnerability.

3. Update the 2011 Commodity Flow Study to provide a better understanding of the types of hazardous materials being transported by highway and rail in Eau Claire County.

4. Work with local communities to increase public awareness and support of available "Clean Sweep" programs and other methods for the proper disposal of hazardous waste. Encourage State legislators to provide additional funding support for such programming.

5. Explore development of urgent response protocols for manure and agricultural spill events, then provide related training to area farmers and rural fire departments. Increase responder awareness of common agricultural chemicals.

iv. Active Threat Strategies

1. Develop an active threat/shooter plan for County facilities and events, then continue related training and exercises. **(High Priority)**

2. For large businesses and critical facilities with significant numbers of employees and clients, encourage the numbering of interior and exterior doors (and windows if appropriate) and provide copies of floor plans with door numbers to local emergency

responders and County Emergency Communications. Designate a secure, web-based storage area for such plans at the County level.

3. Continue to encourage ALICE (or similar), situational awareness, and crisis intervention training for schools, government buildings, businesses, community organizations, and critical facilities. Encourage the creation of basic active threat plans and periodic drills.

4. Conduct periodic active shooter exercises at school, government buildings, large businesses, and other critical facilities to test response plans, crowd control, and assess security hardening. Include all response agencies (law enforcement, fire, EMS, other) as part of these exercises so that roles and responsibilities are understood.

5. Provide businesses and critical facilities checklists for workplace violence preparedness and prevention. OSHA, FEMA, and other organizations have a variety of checklists and guides available, some of which are customized to certain types of businesses or facilities.

v. Agricultural-Related Mitigation Strategies

1. Support the efforts of County Land Conservation staff, NRCS, and UW-Extension to promote nutrient management, soil health, and other best practices that can increase infiltration, which helps reduce flash flooding, protects groundwater, and makes croplands more resilient to drought and wind erosion.

2. Work with livestock producers, processers, veterinarians, and DATCP to educate on and evaluate current procedures for the monitoring, reporting, response, and quarantine for livestock viral/disease outbreaks and animal mass casualty incidents. Update and exercise these plans and policies as needed.

vi. Wildfire & Emergency Access Strategies

1. 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.

2. Consider adoption of a county addressing ordinance for standard design and placement of address signs in towns. Encourage replacement of older signs with newer flag style signs through attrition.

3. Encourage the creation and maintenance of community wildfire protection plans or FireWise strategies for the highest wildfire risk areas in the County, such as near Lake Eau Claire, Town of Seymour, and the Lowes Creek area.

4. Continue to cooperate with the Wisconsin DNR, local Fire Departments, and school districts in the education of residents and local officials in the mitigation of wildfire risks, including high risk factors, fire-adapted communities, reducing hazard fuel loads, protecting the home ignition zone, emergency vehicle access, and general fire safety through presentations, public service announcements, social media, and signage. Outreach should especially target areas of highest risk and could include educational mailings.

5. Eau Claire County, municipalities, and fire departments in the Intensive Fire Protection areas should continue to advocate for and participate in WDNR wildland training exercises. Plan and conduct another large-scale forest fire exercise including training on use of a radio operations/structure branch, evacuation, and structural protection.
6. Update the Emergency Map Books in 2019-2020.

vii. Other Private-Public Partnership Strategies

1. Partner with emergency services providers and critical facilities to develop and exercise a mass evacuation, access, and temporary shelter protocol. **(High Priority)**
2. Form a work group to explore options and best practices for retaining volunteers for smaller Fire and EMS departments, especially given recent changes in training requirements. **(High Priority)**
3. As part of the County Multi-Year Training and Exercise Plan (MYTEP), continue to involve electric providers, County Land Information/G.I.S., County health and aging services, private-sector resources, and local non-profits (e.g., housing authorities, long-term care facilities) in preparedness and training exercises, including discussions on their roles within the incident command system (ICS).
4. Review and, if needed, develop emergency action protocols, evacuation planning requirements, and additional security standards for large assembly events, festivals, etc. Consider additional permitting conditions related to natural and active threats. Explore safe room alternatives for such events.
5. Partner with the Northwest Wisconsin Healthcare Emergency Readiness Coalition to encourage and provide technical assistance for emergency preparedness and continuity planning by long-term care facilities and other health care service providers, including sharing information with public-sector emergency responders as needed.
6. As opportunities allow, partner with local responders and Volunteer Organizations Active in Disaster (VOADs) to engage the media and increase public awareness of the volunteerism needs in the county for local fire departments, first responders, and other local emergency response and volunteer organizations.
7. Continue to partner with Disaster Ready Chippewa Valley to encourage preparedness, continuity planning, and private-public partnering among County businesses and non-profit organizations.
8. Work with partners to identify and execute MOUs for designated cooling and warming shelters for residents, homeless, visitors, and travelers. If possible, such shelters should have emergency power generators.
9. Work with critical infrastructure to explore opportunities to raise awareness of cyber security threats, the importance of employee education to mitigate these threats, and available resources to assist with vulnerability assessment.
10. Support participation by Eau Claire County, City of Eau Claire, and other area critical infrastructure staff in the Regional Cyber Response Team and other such intergovernmental

cooperative efforts, such as the Government Information Processing Association of Wisconsin.

viii. Other Planning & Policy Strategies

1. Review and ensure coordination, clarity, and consistency between the County Emergency Operations Plan, County Public Health Emergency Preparedness Plan, and other related plans and protocols. Likewise, clarify roles and responsibilities of various committees, such as the LEPC, Public Health Emergency Preparedness Committee, and Infectious Disease Committee. **(High Priority)**
2. Continue the development of geographic informational systems (GIS) data for hazard mitigation and emergency management purposes. Continue to explore Reverse-911 capabilities, the ability to provide real-time mapping as part of the EOC or at the incident command center, and emergency mapping of railroad mileposts, key bridges, and grade crossings for emergency use. **(High Priority)**
3. County Emergency Management should continue to maintain an up-to-date list of the status of local Emergency Operations Plans (EOPs) and work with local communities to practice/drill and update these plans regularly. Municipalities are encouraged to incorporate continuity planning, data backup, debris management, and mutual aid into their plans and to notify the County when plan changes or updates are completed. **(High Priority)**
4. Review and update the Eau Claire County Continuity of Government Plan. Encourage other local municipalities to consider similar continuity planning efforts for the recovery of critical business functions.
5. Continue to work with partners to maintain and exercise the Mass Clinic, Communicable Disease, Special Populations, and other components of the Eau Claire County Public Health Emergency Preparedness Plan.
6. Encourage the county and municipalities to integrate hazard and flood mitigation issues and strategies into their comprehensive plan updates.
7. Replace the County’s aging mobile command unit, which serves as the County back-up EOC and can be very difficult to transport and set-up.
8. Continue planning and preparedness efforts that would enable Eau Claire County's emergency management program to obtain Emergency Management Assessment Program (EMAP) certification.

ix. Other Communication, Coordination, & Outreach Strategies

1. Encourage Eau Claire County residents, businesses, and organizations to enroll their cell phone numbers for the County's Smart 911 mass notification system. Educate residents and critical facilities on the capabilities of Smart 911, such as severe weather, hazardous spill locations, missing persons, evacuations, road closures, etc. **(High Priority)**

2. Update and exercise the City-County Risk Communications Plan, including the relationship and roles of local municipalities and key partners. Designate and train a County team to use the County webpage and social media to keep the public informed of recovery status, recommended actions, etc. following an emergency or disaster event. Link such announcements to the social media of communities and other key partners.
3. Work with WDOT to obtain portable digital message boards for use on Interstate 94 and other roadways during emergencies or severe weather.
4. Once every two years, or as needed, Eau Claire County Emergency Management will continue to provide presentation(s) to the Towns Association on basic roles/responsibilities of town officials, emergency operations planning, available resources, hazard event reporting, emerging issues, and training opportunities. Also, look for opportunities to educate elected officials in the County on factors that influence ISO ratings (e.g., Fire Dept capability, building inspections, 9-1-1 Center) and the relationship to local insurance costs.
5. Encourage local officials, public works personnel, and key municipal/county staff with a role EOP or EOC role to have a minimum of ICS 100, 200, 700, and 800 training, with additional training for any specialized roles. Encourage each municipality and emergency response agency to designate one or more trained PIOs.
6. Undertake a small-scale initiative to encourage County employees to be prepared at home.
7. Increase County resident awareness of Great Rivers 2-1-1 as a source of information during a disaster event. Work cooperatively to strengthen the Great Rivers 2-1-1 disaster resource list for Eau Claire County and adopt procedures to keep Great Rivers 2-1-1 updated during and following a disaster event.

x. Other City and Village (Multi-Jurisdictional) Strategies

The priorities for multi-jurisdictional strategies vary by community. **While priorities are suggested, implementation of these strategy recommendations is at the discretion of each community.** In some cases, Eau Claire County Emergency Management may be able to provide guidance or coordinate a multi-jurisdictional project, but the responsibility and decision for putting these strategies into action lies with each community. Countywide strategies are not repeated here.

Recommended Projects

1. **ALL INCORPORATED AREAS** – Continue to monitor, plan for, and address critical overland (stormwater) and overbank (riverine/lake) flooding issues as identified in the flood assessment and Appendix F as well as Appendix H for the City of Eau Claire. Explore flood acquisition, floodproofing, flood/stormwater storage, and other such mitigation efforts when needed and feasible. Assess the impacts of future land use changes and new development on stormwater runoff, drainage systems, and flood storage, including upstream outside the community; then plan accordingly. **(High Priority)** ***related to continued NFIP compliance***

2. **FAIRCHILD, ALTOONA, EAU CLAIRE -** Explore mitigation grant funding to construct community safe rooms (storm shelters) for parks, recreational facilities, and areas of the community without access to such shelters, including partnering with manufactured home parks, campgrounds, etc. **(High Priority)**

3. **EAU CLAIRE** – Commence with an engineering study and design for needed improvements to the Forest Street Levee, then complete such improvements. Explore replacement of pneumatic plugs for storm sewers below the 100-year floodplain elevation with backflow prevention. **(High Priority)** ***potentially related to continued NFIP compliance***

4. **ALL INCORPORATED AREAS --** When grant opportunities arise, address emergency power generator needs for municipal buildings, emergency operations centers, storm shelters, and other critical facilities and infrastructure as identified in the long-term power outage section. Consider proactive emergency fuel agreements in case of extended outages or petroleum shortages. **(Medium-to-High Priority)**

5. **ALL INCORPORATED AREAS** – As needed, work with law enforcement to identify and take action on opportunities to improve active shooter safety and security at municipal buildings, including related policies/procedures and potential physical changes. **(Medium-to-High Priority)**

6. **ALTOONA, EAU CLAIRE, OTHERS AS NEEDED IN FUTURE -** Install additional alert warning sirens for full community coverage. **(Medium Priority)**

7. **AUGUSTA** – As part of severe weather awareness week, increase resident awareness of availability of community center as a storm shelter. Potentially pursue grant dollars for storm hardening and automatic/remote unlocking. **(Medium Priority)**

8. **EAU CLAIRE** – Install a P.A. or communication system at specified City Parks for emergency announcements. Explore MOUs with nearby structures for use as a storm shelter or grant funding for construction of a community safe room. Continue to require Park users to submit an emergency plan. **(Medium Priority)**

9. **EAU CLAIRE** – Explore funding options for installation of additional cameras on bridges over the Chippewa and Eau Claire Rivers. **(Medium-to-Low Priority)**

10. **AUGUSTA, OTHERS AS INTERESTED -** Pursue hazard mitigation grant funding for a NOAA all hazards radio project, with possible related educational outreach to on warning systems and appropriate actions. **(Medium-to-Low Priority)**

Recommended Policies

11. **ALL INCORPORATED AREAS** – Annually review, and update if needed, local municipal emergency operating plans (EOPs) and continue to encourage basic Incident

Command System training (ICS 100, 200, & 700) for key elected officials and other municipal staff identified in the EOPs. **(High Priority)**

12. **ALL INCORPORATED AREAS** – Continue to partner with Eau Claire County Emergency Management, the local fire department, law enforcement, and other partners to regularly exercise the community's EOP (e.g., every 2-3 years). Periodically include a tabletop scenario for a hazardous materials spill (rail, highway, or fixed site), including how a large evacuation would be managed. **(High Priority)**

13. **ALL INCORPORATED AREAS** – If flooding or other emergency occurs, compile and document all damages and costs with pictures, testimony, invoices, etc., for potential future grant funding or reimbursement. **(High Priority)** ***related to continued NFIP compliance***

14. **EAU CLAIRE -** Continue to maintain and exercise the City's Flood Emergency Action Plan. Protect the function of and restore sensitive natural resources such as streams floodplains, wetlands, shorelines, and riverbanks through regulation, plan review, and/or City investment. Work with Wisconsin DNR to protect the banks and floodplain of the Chippewa and Eau Claire Rivers, as well as Sherman, Lowes, and Otter Creeks by enforcing its current floodplain regulations, using natural stream edge protection techniques, and by acquiring additional land for public open space. **(High Priority)** *related to continued NFIP compliance*

15. **FAIRCHILD -** Request a presentation from WDNR and/or the County on floodplain zoning and the impacts of National Flood Insurance Program sanctioned status. **(Medium-to-High Priority)** ***related to continued NFIP compliance***

16. **ALTOONA, EAU CLAIRE** – Work with Eau Claire County to designate, and activate as needed, heating and cooling shelters in the community for residents, homeless, and travelers. **(Medium-to-High Priority)**

17. **EAU CLAIRE** – Complete the City Continuity of Government Plan with recovery and contingency strategies for essential business services, and exercise the plan to ensure staff familiarity with roles and responsibilities. Integrate a debris management plan into the City's Emergency Operating Plan. **(Medium-to-High Priority)**

18. **EAU CLAIRE** – Integrate natural hazard mitigation and climate adaptation strategies into the City's climate and energy sustainability/carbon-neutrality plan, which is scheduled to begin development in 2019. For example, explore how to pair back-up generation needs with solar electric plus battery storage. Once complete, explore mitigation grant funding opportunities for plan implementation when opportunities arise. **(Medium-to-High Priority)**

19. **ALL INCORPORATED AREAS** – As deemed necessary, develop and maintain public works mutual aid agreements to cover various levels of potential support (e.g., utilities, debris clean-up, generators, equipment sharing, administrative) during or following an

emergency. Encourage periodic meetings among public works and highway offices to discuss mutual aid, preparedness, emergency planning, etc. **(Medium Priority)**

20. **ALL INCORPORATED AREAS** – Encourage the participation of municipal staff in active shooter/threat training. Develop related security and response plans for municipal offices, if needed. Explore opportunities to encourage or share such training with area businesses and critical facilities. **(Medium Priority)**

21. **ALL INCORPORATED AREAS -** Incorporate hazard mitigation and emergency preparedness activities into community comprehensive plans, stormwater management plans, capital improvement plans, and land use procedures (e.g., site plan review) as opportunities allow. Include local emergency services in site plan reviews and community planning. **(Medium Priority)** ***related to continued NFIP compliance***

22. **ALL INCORPORATED AREAS –** Continue to monitor and protect critical information and services from cyberattacks through Internet security systems, employee policies and training, systems testing/cyber-audit, background security checks of IT contractors, and the off-site back-up of important data. **(Medium Priority)**

23. **ALL INCORPORATED AREAS** – If the community has not done so to date, consider adoption of Wisconsin Department of Transportation third-party billing rates for equipment use, or its own equipment rate schedule, by resolution or other administrative policy. **(Medium Priority)**

24. **ALL INCORPORATED AREAS** – Ensure that streets and driveways are designed in a manner that allows access by emergency vehicles. Consider the use of official mapping and subdivision standards to avoid the creation of long, dead-end streets. **(Medium-to-Low Priority)**

25. **ALTOONA, FALL CREEK -** Coordinate with WDNR, adjacent towns, and local fire departments to increase wildfire-related mitigation, community education, and planning efforts. Work with the local fire departments to install dry hydrants if needed. **(Medium-to-Low Priority)**

D. IMPLEMENTATION OF PRIORITY PROJECTS

As discussed previously, **Appendix K** included implementation guidance for recommended County-level plan strategies, including relative priority, key parties, and potential barriers to implementation. This section focuses on the high-priority project recommendations; planning, policy, and coordination recommendations are not included here. Projects typically have a focused, action-oriented outcome that is achievable within a certain time period and often require significant resources not available in typical operations budgets.

Implementing Priority Projects

The following provides guidance for the implementation of each of the high-priority projects. These projects are potentially eligible for FEMA Hazard Mitigation Grant Program or FEM Pre-Disaster Mitigation Grant Program dollars. A full cost-benefits review should be performed prior to implementation.

Project	Logistics	Potential Funding Sources	Other Guidance and Estimated Costs
1. Continue to monitor, study, and address stormwater and flash flooding hotspots in the county as identified in the flood assessment of the hazard mitigation plan. Potential projects include, but are not limited to creation/expansion of flood/stormwater storage areas, the installation or re-sizing of culverts, the creation or improvement of drainageways, and the protection of natural drainage and retention areas. **(Also see City & Village Strategy #1, which included overbank and overland flooding)**	timeline: ongoing & varies by project; no firm deadlines; future flood events may increase need lead party: municipalities and Highway Department	Most are funded locally through normal budgets, stormwater utilities, or road aids. If significant history of damage or critical risks to safety, may be eligible for FEMA mitigation dollars. Otherwise, CDBG, transportation grants, or other grant funds may be available depending on the nature of the project and benefits.	Significant progress since 1993 floods. Projects typically approached individually or by community. Costs will vary by project. Continue to integrate into Capital Improvement Plans and work schedules. Be certain to document all instances for flooding or flood damage. Changes in rainfall frequency and intensity, as well as new development, have the potential to increase flooding.
2. **FAIRCHILD, ALTOONA, EAU CLAIRE** - Explore mitigation grant funding to construct community safe rooms (storm shelters) for parks, recreational	timeline: ongoing & varies by project and community	FEMA Hazard Mitigation Grant & Pre-Disaster Mitigation Grant Programs are two primary sources.	Must be designed to FEMA requirements for very high wind loads; not uncommon for $175-$235/sq. foot.

facilities, and areas of the community without access to such shelters, including partnering with manufactured home parks, campgrounds, etc. **(Also see County Strategy ii.#3)**	lead party: municipalities and landowners	Competitive and cost-benefits considered, but provides 75+% of project costs. County or municipality must be applicant.	Could potentially include hardening of existing buildings. See tornado assessment section for additional details and discussion.
3. **EAU CLAIRE** – Commence with an engineering study and design for needed improvements to the Forest Street Levee, then complete such improvements. Explore replacement of pneumatic plugs for storm sewers below the 100-year floodplain elevation with backflow prevention.	timeline: ongoing lead party: City of Eau Claire	Possibility of funding assistance through Army Corps of Engineers, WI Municipal Flood Control grant, and FEMA Mitigation grant.	City has unsuccessfully attempted to secure grant funding in past to assist with study and design. Remains a high priority.
4. If funding opportunities become available, work with communities to pursue grant dollars for emergency power generators for critical facilities and emergency operations centers in Eau Claire County. **(Also see City & Village Strategy #4)**	timeline: will vary by community & funding availability lead party: Municipality or owner of critical facilities, unless a multi-juris. grant opportunities arises	Grants for generators could include FEMA HMGP and HUD CDBG. Certain facility types may have related grant programs. USDA-CF may be a source depending on applicant financial situation. Generators are currently not an eligible FEMA mitigation grant project in Wisconsin unless part of a community safe room project, though some generators have been funded in other states.	This is currently not a high priority project for funding agencies, unless part of larger building project. Coordination with electric providers recommended; may be a source of funding support and/or competitive purchase price. Unless the need is addressed, it is recommended that this continue to be a plan strategy in case State mitigation grant priorities change. In the interim, municipalities and facilities continue to address as resources allow.

E. ADDITIONAL IMPLEMENTATION GUIDANCE

As discussed previously, **Appendix K** includes implementation guidance for all recommended plan strategies, including relative priority, and the key parties likely to be involved. **Appendix L** 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. Some infrastructure improvements may also be funded locally through the establishment of a stormwater utility district or ordinance fee system, tax incremental financing (TIF), general obligation bonds, and developer contributions or exactions. Capital improvements planning can be a valuable tool to assist communities in the planning and prioritizing of major infrastructure investments and identifying the best financing approach.

Additional sources of financial support are also often available following a disaster event, such as U.S. Small Business Administration (SBA) loans for the repair or replacement of property. The U.S. Department of Agriculture, through its local Farm Service Agency office, provides disaster assistance for crop losses and livestock emergencies. Grant funding for additional emergency measures, such as the rehabilitation of flood control works, may be available through the U.S. Army Corps of Engineers. Non-natural hazards such as pandemics, school-based terrorism, nuclear accident, and hazardous materials spills typically have their own unique supportive services and funding resources, which are not included in Appendix L. In the event of an impending or recent disaster, municipalities and County Emergency Management offices are encouraged to contact WEM and the agencies identified in Appendix L for potential assistance, since available resources and related requirements frequently change, and this list is not all-inclusive.

This Mitigation Plan is a guide.

- Actions should be prioritized based on need, potential of loss reduction, benefits-costs, and availability of resources (e.g., funding, staff).
- Actions and priorities may change as threats and opportunities change.
- Some recommended actions may require additional feasibility analysis.
- Individual municipalities may have different priorities.
- Partnerships and collaboration are encouraged to leverage resources and maximize results.
- It is recognized that not all strategies will be completed prior to the next plan update in five years.

The prioritization of the strategies offers guidance in the implementation of this plan based on available resources and potential to reduce losses. Appendix K also suggests key parties to be involved and other implementation guidance for the countywide strategies. But with such challenges also come opportunities to form or strengthen strategic partnerships to share and leverage existing resources, which is a primary theme within the plan goals.

Most policy strategies can utilize existing program budgets for implementation, though funding would be required for many of the recommended projects. Some of these policy strategies may involve the amendment of an ordinance or the adoption of new procedures. Examples and model language for some of these strategies may be available through WCWRPC or the County Planning and Development

Department. Further, due to the involvement of key officials and County departments during the planning process, the strategy recommendations are known to these stakeholders and can be integrated into, or coordinated with, other work programs and planning efforts.

Like many municipalities, Eau Claire 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 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.

SECTION VII.
HAZARD MITIGATION – EMAP CROSSWALK

Eau Claire County Emergency Management has begun taking initial steps towards obtaining EMAP certification. The Emergency Management Assessment Program (EMAP) is an independent, non-profit organization that provides a standards-based voluntary assessment and peer review accreditation process for government emergency management agencies. EMAP looks at a jurisdiction's entire emergency management program, encompassing all organizations, agencies, and individuals, and assesses that jurisdiction's or community's systems and capabilities for dealing with disasters. The assessment should not be limited to County or other public-sector plans and services. The EMAP standards are a framework to ensure a solid emergency management program, but do not prescribe how a program is provided and managed.

Emergency Management Program Elements

An accredited emergency management program will include the following elements:

1. Administration and Finance
2. Laws and Authorities
3. Hazard Identification, Risk Assessment and Consequence Analysis (HIRA)
4. Hazard Mitigation
5. Prevention
6. Operational Planning
7. Incident Management
8. Resource Management and Logistics
9. Mutual Aid
10. Communications and Warning
11. Operations and Procedures
12. Facilities
13. Training
14. Exercises, Evaluations and Corrective Actions
15. Crisis Communications, Public Education and Information

An accredited program will meet the standards in 15 program elements (shown to right) in Chapter 4 of the EMAP standards as well as meet additional program administration and coordination standards in Chapter 3. It should be noted that Eau Claire County has a robust emergency management program that already addresses many (if not most) of the EMAP standards.

The *Eau Claire County Multi-Hazard Mitigation Plan* incorporates findings and recommendations involving a number of the program elements in Chapter 4. For example, the plan suggests that Mutual Aid (4.9) agreements between public works/highway departments should be explored and notes that a number of municipalities need to update their emergency operations plans.

The crosswalk on the following pages focus on two program elements of EMAP in particular—HIRA (4.3) and Hazard Mitigation (4.4). For these two elements, the crosswalk identifies:

i. how each standard is addressed within the Hazard Mitigation Plan update; and,

ii. any further actions suggested to more fully address each standard that are generally in addition to the strategy recommendations in Section VI.

4.3 Hazard Identification, Risk Assessment, and Consequence Analysis (HIRA) An accredited Emergency Management Program should have a Hazard Identification, Risk Assessment (HIRA) and Consequence Analysis. The section includes responsibilities and activities associated with the identification of hazards and assessment of risks to persons, public and private property and structures.		
Standard	**How Addressed in the Mitigation Plan**	**Pages**
4.3.1 The Emergency Management Program shall identify the natural and human-caused hazards that potentially impact the jurisdiction using a broad range of sources. The Emergency Management Program shall assess the risk and vulnerability of people, property, the environment, and its own operations from these hazards.	Section III.A. of the *Eau Claire County Multi-Hazard Mitigation Plan* identifies and prioritizes those hazards that pose a significant risk in Eau Claire County.	36-39
	Section III.B. of the *Mitigation Plan* defines and further identifies the natural and human-caused hazards that pose a significant risk for Eau Claire County using a broad range of sources. For each hazard of significant risk, this Section also assesses the risk (frequency or potential of an event) and vulnerabilities (impacts or consequences) to people, property, the environment, critical facilities, and emergency management operations from these hazards.	41-209
	In addition, the emergency management operations in Eau Claire County are frequently discussed and evaluated in the context of critical facilities, including the following sections of the *Mitigation Plan*: • Section II.C.vii - Implications of trends noted. • Section II. D. – Profile of critical facilities and emergency services. • Section IV. – Review and analysis of current emergency preparedness and communications activities, strategic partnerships, and other emergency management challenges. • Appendix E.– Inventory and vulnerability assessment for critical facilities and services	25 27-31 222-228 App E
	Suggested Further Action • As part of regular *Mitigation Plan* updates, reassess risks and vulnerabilities to determine emerging or changing threats.	

4.3.2 The Emergency Management Program shall conduct a consequence analysis for the hazards identified in standard 4.3.1 to consider the impact on the public; responders; continuity of operations including continued delivery of services; property, facilities, and, infrastructure; the environment; the economic condition of the jurisdiction and public confidence in the jurisdiction's governance.	Similar to EMAP Standard 4.3.1., Section III.B. and Appendix E. of the *Mitigation Plan* analyzes the vulnerability (or consequences) of those hazards that pose a significant risk for Eau Claire County for: • the public (people & property) • critical facilities and infrastructure • environment • local economy	43-209 App E
	Section IV. of the *Mitigation Plan* includes some discussion on emergency responder capabilities and continuity planning. Related action plan recommendations can be found in Section VI.C.	222-228 237-246

	Suggested Further Action
	• The next Mitigation Plan update could be restructured slightly so that the vulnerability assessment more clearly aligns with the consequence analysis standard.
	• The Consequence Analysis could also be expanded in the future to more fully evaluate:
	  ○ Consequences of different hazards for all facets of emergency response.
	  ○ Continuity of operations, including continued delivery of emergency services.
	  ○ Public confidence in emergency governance.	

4.4 Hazard Mitigation

An accredited Emergency Management Program should have a mitigation program that regularly and systematically utilizes resources to mitigate the effects of emergencies associated with the risks identified in the HIRA (4.3).

Standard	How Addressed in the Mitigation Plan	Pages
4.4.1 The Emergency Management Program shall develop and implement its mitigation program to eliminate hazards or mitigate the effects of hazards that cannot be reasonably prevented. The mitigation program identifies ongoing opportunities and tracks repetitive loss. The Emergency Management Program implements mitigation projects according to a plan that sets priorities based upon loss reduction.	Section III.A. of the *Eau Claire County Multi-Hazard Mitigation Plan* identifies and prioritizes those hazards that pose a significant risk in Eau Claire County.	36-39
	Sections IV and V and Appendix G of the *Eau Claire County Multi-Hazard Mitigation Plan* identifies current and recent mitigation activities undertaken in Eau Claire County.	218-234 App G
	Section VI of the *Mitigation Plan* identifies mitigation strategies to eliminate or reduce the effects of those hazards that pose a significant risk as well as provides additional implementation guidance. Strategies are prioritized based on need, impact (loss reduction), cost-benefits, and feasibility (technical, legal, political).	237-246 App K

	Suggested Further Action • Implement the recommendations identified in the *Eau Claire County Multi-Hazard Mitigation Plan* update.	
4.4.2 The mitigation program includes participation in applicable jurisdictional, interjurisdictional and multi-jurisdictional mitigation efforts.	As noted in Section I.C., the *Eau Claire County Multi-Hazard Mitigation Plan* is a multi-jurisdictional plan that included participation by all cities, villages, and towns as described in Section I.C. of the plan. Emergency response agencies from throughout Eau Claire County participated on the Steering Committee and during meetings with cities and villages.	4
	As identified in Appendix C., during the update of the *Mitigation Plan,* the planning process included meetings and interviews with various other key agencies.	App C
	Suggested Further Action • Continue existing multi-jurisdictional relationships and implement the mitigation efforts as envisioned in the *Mitigation Plan*.	
4.4.3 The Emergency Management Program provides technical assistance consistent with the scope of the mitigation program such as implementing building codes, fire codes, and land-use ordinances.	Eau Claire County Emergency Management regularly meets with and coordinates initiatives on behalf of the emergency response agencies and local communities of the County. Section IV and Appendix G of the Mitigation Plan discusses current mitigation efforts in Eau Claire County, including multi-jurisdictional relationships and related technical assistance support. In Eau Claire County, many technical assistance efforts related to mitigation is provided by non-emergency management staff. For example, County Planning and Development and its various divisions administer land use ordinances (e.g., floodplain zoning, manure management) dam emergency planning, and G.I.S. mapping that are important to mitigation hazard threats.	218-228 App G

	The recommended mitigation strategies in Section VI.C. include a number of strategies for which technical assistance should be continued or increased, such as: • Enforcement of floodplain regulations and educating elected officials on flood risks. • Stress the importance of culvert sizing and maintenance and related planning. • Promoting soil health and stormwater management best practices. • Working with communities and area businesses to explore grant opportunities for community safe rooms. • Working with communities and fire departments to ensure adequate driveway standards for emergency vehicles and clearly visible address/fire signage. • Continuing current active threat and hazard materials planning, exercises, and awareness efforts. • County Emergency Management should continue to work with local communities to maintain, drill/exercise, and expand the scope of local Emergency Operations Plans. • Continued support of Disaster Ready Chippewa Valley, a private-public partnership, to champion the preparedness of area businesses.	237-246
	Suggested Further Action • Technical assistance for emergency preparedness and hazard mitigation in Eau Claire County will continue to be a team effort with various agencies having a lead role. County Emergency Management should continue to advocate for such partnerships and coordinate such efforts. The Mitigation Toolbox in Appendix J of the *Mitigation Plan* includes additional potential technical assistance activities for future consideration. • Implement the *Mitigation Plan* recommendations, such as those noted above.	

4.4.4 The Emergency Management Program shall implement a process to monitor overall progress of the mitigation strategies, document completed initiatives, and resulting reduction or limitation of hazard impact in the jurisdiction.	Section VIII.B. of the *Eau Claire County Multi-Hazard Mitigation Plan* describes the process for monitoring and evaluating progress on implementation of the mitigation plan strategies.	259-260
	Section V of the *Mitigation Plan* documents and assesses progress on priority mitigation plan strategies identified in the previous plan.	229-234
	Section VIII.C.. of the *Mitigation Plan* describes the process for updating the Plan, which includes documenting and assessing the progress on the recommended mitigation initiatives.	260
	Suggested Further Action • Implement the annual plan review and special review maintenance processes described in Section VIII.B. of the *Eau Claire County Multi-Hazard Mitigation Plan* update. • Continue to update the *Mitigation Plan* on a five-year schedule as described in Section VIII.C. As part of the updates, continue to include an evaluation of progress on mitigation efforts completed in the interim. • For future *Mitigation Plan* updates, further quantify (to the extent reasonably possible) risk and vulnerability reductions for mitigation strategies that have been completed.	
4.4.5 The mitigation plan shall be based on the natural and human-caused hazards identified by the Emergency Management Program and the risk and consequences of those hazards. The mitigation plan for the jurisdiction is developed through formal planning processes involving Emergency Management Program stakeholders and shall establish interim and long-term strategies, goals, objectives, and actions to reduce risk to the hazards identified. The Emergency Management Program implements a process and documents project ranking based upon the greatest	The *Eau Claire County Multi-Hazard Mitigation Plan* is a multi-hazard plan including those natural and human-caused hazards identified and prioritized by the plan update Steering Committee.	37-39
	Section III.B. of the *Mitigation Plan* provides data, maps, and a description of the risks (frequency or potential of an event) and vulnerabilities (impacts or consequences) for those hazard threats identified by the Steering Committee to pose a significant risk in Eau Claire County. While communicable diseases were also deemed a substantial hazard threat, this threat is more fully analyzed and addressed through other planning efforts, as referenced in Section III.A.iv. of the *Mitigation Plan*.	43-209 41-49

opportunity for loss reduction and documents how specific mitigation actions contribute to overall risk reduction.	Sections I.B., I.C., and I.D. of the Mitigation Plan described the formal planning processes used to develop the plan and stakeholders involved.	1-7 App C
	Section IV. of the *Mitigation Plan* provides an overview of the current mitigation activities and related strategic partnerships of Emergency Management Program stakeholders.	218-228
	Section VI of the *Mitigation Plan* identifies mitigation goals and prioritized strategies for Eau Claire County. A variety of alternative mitigation actions were considered (Appendix J) based on their ability to address the hazard risks and vulnerabilities identified in Section III.B. as well as gaps or opportunities in current mitigation activities identified in Section IV. Strategies were then individually analyzed based on feasibility and the greatest opportunity for loss reduction (Appendix K).	235-248 App J App K
	Suggested Further Action • As discussed in Section VI.D., implementation of the Mitigation Plan should prioritize efforts that have the greatest potential for loss reduction, while considering the relative level of hazard risk and feasibility (technical, political, financial).	

SECTION VIII.
PLAN ADOPTION & MAINTENANCE PROCESS

A. PLAN COORDINATION

Many of the strategy recommendations in the previous section have relationships to other plans and policies for which coordination and consistency is vital. These related plans tend to fall within the following general categories:

- Local capital improvements plans and other budget documents. Most notably are infrastructure projects, such as those related to stormwater and culvert systems, community safe rooms, and various equipment, which must be considered as part of local budgets. Many of the flash flooding hotspots in previous plans have been addressed by including these projects in the transportation or capital improvement plans at the County or local level.
- Regulations, agreements, and related procedures (e.g., subdivision ordinances, official mapping, shelter agreements). For example, one flood mitigation strategy stresses the importance of continued enforcement of floodplain regulations, while another suggests that development standards and adaptive actions may be needed to account for changing climate.
- Existing emergency operating or response plans. This plan update references numerous emergency planning efforts at the State, County, and community or critical-facility level as reflected in the strategies. For example, at the County-level, the plan recommends a review for greater clarity and consistency between the County Emergency Operations Plan and the Public Health Emergency Preparedness Plan. At the local level, some municipalities need to update their emergency operating plans and Eau Claire County Emergency Management is taking the lead to encourage these updates. County Emergency Management and other County offices will also work cooperatively with stakeholders as resources allow regarding plans, procedures, and grant applications related to threats and concerns identified in this plan.

To date, integrating the strategies and recommendations found in the County's 2013 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. 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. Even so, some mitigation recommendations are included as comprehensive plan policies. Most communities with 100-year floodplains included strategies in their comprehensive plans to discourage or not allow any floodplain development. Stormwater management and emergency services are other common themes in many local comprehensive plans.

As the mitigation plan strategies reflect, WCWRPC and Eau Claire County Emergency Management will continue to work with the Eau Claire County Planning and Development Department and local municipalities to encourage coordination and consistency between

comprehensive planning and the hazard mitigation plan, and provide instruction on how to incorporate mitigation strategies into their comprehensive plans and other planning mechanisms.

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.

As Sections IV and V showed, past hazard mitigation plan strategies have been integrated into various work plans, ordinances, and project budgets. Since key County staff were actively involved in the development and update of this mitigation plan, many of the strategies are based on staff recommendations and provide confidence that a high level of coordination between these various planning efforts will continue.

B. PLAN MAINTENANCE

Reviews of the existing County hazard mitigation plan were primarily limited to a periodic internal review by the Emergency Management Coordinator. No special plan reviews or plan amendments were needed.

i. Plan Monitoring and Annual Plan Reviews

The *Eau Claire County Multi-Hazard Mitigation Plan* will be monitored by the Emergency Management Coordinator, including an annual review of the progress on plan implementation. These reviews will be integrated into the County's Emergency Management Plan of Work to be provided to the Wisconsin Emergency Management Regional Director.

Each year, begging in the first quarter of 2020, the Emergency Management Coordinator will complete an annual review of the plan, unless a plan update is already in progress. The annual plan review should consider plan progress, such as the following:

1. Any changing conditions impacting hazard risk or vulnerability.
2. Review of any new mandates, rules, etc, as well as any input from Wisconsin Emergency Management (WEM) and The Department of Homeland Security--Federal Emergency Management Agency (FEMA) regarding plan implementation.
3. Review of the plan's recommended strategies, emphasizing completed priority projects and their effectiveness as well as priority projects yet to be completed and funding sources.
4. Coordination of plan strategies with other County or local planning mechanisms.
5. Potential new mitigation projects.
6. Any public or community input received on the plan and activities.

If any critical issues or potential plan amendments are noted during this review, the Emergency Management Coordinator will provide a brief report to the appropriate Eau Claire County Board committee. The Committee will recommend any revisions or amendments to the plan if

necessary. The proposed revisions will be forwarded to the County Board for their consideration and action. The Emergency Management Coordinator may also need to follow-up with participating jurisdictions, various County offices, or other partners during this process.

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

Within twelve months following a significant disaster event as determined by the Emergency Management Coordinator, a special post-disaster review will occur. A municipality or the County may also request a special plan review for the consideration of a plan amendment to incorporate a new project which was not included in the original plan, perhaps due to unforeseen circumstances or an increased hazard risk.

Information regarding the recent disaster or new project will be collected by the Emergency Management Coordinator from local law enforcement personnel; fire department personnel; Eau Claire County disaster response personnel; involved municipality(s); DNR, WEM, and FEMA personnel; affected citizens; and any other relevant entity. This information will be provided to the appropriate County Board committee for their consideration.

At a duly called and posted public meeting, the Committee will analyze factors which contributed to any impacts of the hazard risk, the likelihood of the event reoccurring, and any strategy alternatives. The Emergency Management Coordinator will have primary responsibility for establishing special plan review meeting dates, distributing related materials, and facilitating the meetings. The Emergency Management Coordinator will also advertise these special meetings to affected department heads, citizens, or community groups, so additional input and comment can be received. Special plan review meetings will be subject to the Wisconsin Open Meeting Law and properly noticed to allow for public involvement and comment.

The Committee may recommend revising or amending the existing plan. As appropriate, recommended changes to the plan will be forwarded to the County Board and the municipal contacts of the participating incorporated municipalities for their action and consideration.

iii. Plan Updates

Subject to potential change in Federal requirement, every five years, the Hazards Mitigation Plan will be comprehensively reviewed, current data integrated, and fully updated. This planning effort should be robust and incorporate opportunities for public involvement to meet all requirements of 44 CFR Part 201.6 and/or any applicable requirements or regulations developed in the interim.

For the update, the Emergency Management Coordinator will re-form an ad hoc plan update Steering Committee to include representatives of participating jurisdictions. The plan update Steering Committee meetings will be subject to the Wisconsin Open Meeting Law and properly noticed to allow for public involvement and comment.

C. PLAN ADOPTION

Each participating municipality, including Eau Claire County, considered and adopted this plan in a duly posted and held public meeting. A copy of the adopting resolutions are attached (see **Appendix A**). This approval process is described in detail in Section I.B at the beginning of this plan.

APPENDIX A.

ADOPTING RESOLUTIONS AND LETTERS OF SUPPORT

<INSERT ONCE ADOPTED FOR FINAL VERSION>

APPENDIX B.

FLOOD ASSESSMENT METHODOLOGY

Eau Claire County Flood Assessment Methodology

Note: This methodology only describes the flood assessment approach for those areas of Eau Claire County located outside the City of Eau Claire. The City of Eau Claire methodology is described in the City's natural hazard mitigation plan and takes advantage of more detailed topographic data.

Flood Assessment Data Challenges

1. The accuracy of County G.I.S. land information and parcel data continues to improve. However, LIDAR-produced, detailed topographical data was not available when the Flood Insurance Rate Maps (D-FIRM) for Eau Claire County were being updated, so local officials continue to point out inaccuracies in the current floodplain maps.

2. G.I.S. data for individual structures is not available for most of Eau Claire County and no geographic database exists which identifies the characteristics of individual improvements and structures (e.g., basements, number of stories, base flood elevation) in the county. As a result, the flood assessment methodology uses a top-down, "birds-eye" perspective which does not account for site-specific topographic variation. A structure might appear to be located within the 100-year floodplain on a map, but could it have been landscaped or otherwise elevated above the base flood elevation.

3. Assessed values for improvements and tax records are linked to the parcel database, but are not linked to building point data. Based on orthophotography, we are able to identify which buildings may potentially be located in a 100-year floodplain, but the use and value of each individual building are not available. Since our assessment information is for the entire parcel, this becomes a problem in cases where not all of the buildings within a single parcel are within or intersect the 100-year floodplain or in case where only a portion of a building may intersect the floodplain boundary.

4. Estimated values of improvements are not available for all parcels. Tax data does not include a value of improvements for municipal buildings (e.g., town halls, fire stations), public infrastructure (e.g., wastewater treatment plants, water towers), and other non-taxable structures (e.g., churches, public housing, electric cooperatives, non-profits).

5. Local topographic variation exists and floodplains change over time. It is important to keep in mind that a serious flood could exceed the estimated 100-year limits, as well as being impacted by other factors which may change over time, such as reduced flood storage or increased stormwater runoff.

6. Related to #4, most designated 100-year floodplain areas in Eau Claire County fall within Zone A which have no base flood elevations (BFEs) established, making it more difficult to determine the actual vulnerability to individual structures.

Flood Assessment Methodology

It is cost prohibitive to perform the detailed survey work of structural characteristics and attaching tax assessment data to the individual structures (versus parcel) necessary to make definitive conclusions in many cases. And structural footprint data is not available at time. However, it is critical to remember that the purpose of this assessment is to identify potential flooding risks to structures during a 100-year flood event for general mitigation planning. The assessment methodology used here is sufficient to identify those structures which may be most at risk of flood damage and those areas which may be a priority for flood mitigation activities.

For the assessment of riverine and lake flooding in Eau Claire County the following methodology was used by Eau Claire County G.I.S. staff:

1. The D-FIRM G.I.S. shapefiles were used to identify the 100-year floodplain boundaries (shown by the green shading and green line on the map below).

2. The G.I.S. parcel data provided by Eau Claire County Land Information in Spring 2018 was linked to the 2016 tax assessment data, thus providing information on municipality, assessed uses, and assessed values for those areas were parcel mapping was complete.

3. Those improved parcels which were within or intersected the 100-year were identified for guidance. This made it easier to determine where improvements may potentially lie within the floodplain.

4. The principal structures were identified by visual inspection of 2018 orthophotography overlaid with the 100-year floodplain. Structures (e.g., garages, barns, boat houses) were excluded if it could be reasonably determined that they were not the principal structure on the parcel.

   This approach was used to create a G.I.S. point data layer of all principal structures, taxable and exempt, which intersect or are contained within the 100-year floodplain (shown as the orange

dots on the previous map). As the previous map demonstrates, it can be difficult to determine if a building intersects the floodplain or if a building is the principal structure. The point file includes structures which partially intersect the floodplain. WCWRPC staff used their best judgment and buildings were marked if in doubt.

5. By overlaying the parcel and building point G.I.S. data, an estimated value of improvements for buildings potentially in the floodplain was identified. However, situations with multiple structures on a single parcel can be a challenge as noted previously. In such cases, the assessed value of all improvements was used, rather than attempting to further assign values to individual structures. In many cases, those ancillary structures on a parcel which are likely outside the 100-year floodplain boundary are still close enough to the boundary to potentially be vulnerable to flooding should a large event occur. For non-taxable parcels, improvement estimates are not available.

   Though it has its weaknesses, this approach provides a good picture of which principal structures are most likely to be impacted by a 100-year flood in Eau Claire County. However, this should not be relied upon as an accurate indicator of flood depth or damages during flood events since elevation, flood depth, and assessed value for each individual structure is not currently valued. Many of the structures likely have no recent flood history and may not have a significant vulnerability to a flood event. In some case, local action (e.g., sandbagging, backflow prevention) can prevent flooding.

6. For comparison, the Eau Claire County HAZUS Risk Assessment distributed by Wisconsin Emergency Management in February 2009 is summarized in the plan.

7. Utilizing key informant interviews, discussions with local officials, a survey to each Town Board, and available records (e.g., NFIP flood insurance claims), floodprone areas and hotspots were also identified in the plan where infrastructure or improvements may be vulnerable to riverine or lake flooding.

Taken together, this approach provides an understanding of the overall flooding risks and vulnerabilities in Eau Claire County, while providing insight into the distribution of potentially vulnerable structures within the county and the location of past flooding events.

APPENDIX C.

STAKEHOLDER INTERVIEW LIST

Prior to the scheduling of the city and village meetings, a letter of introduction regarding the effort and the project brochure was sent to each community. The planning consultant (West Central Wisconsin Regional Planning Commission) then telephoned the clerk or administrator of each city and village to schedule their assessment and strategy development meeting. Who attended the meetings on behalf of each city or village was at the discretion of the individual community. All community meetings were facilitated by the planning consultant, with assistance by the County Emergency Management Coordinator.

Most of these meetings were informal and did not include a quorum of elected officials. As such, official minutes were typically not maintained or later approved. This was also a cost-savings measure since keeping official minutes for every meeting is time consuming and this was a plan update.

In addition to the stakeholder interview list, the agendas from the County steering committee meetings and City of Eau Claire work group meetings are also included in Appendix C for reference.

Eau Claire County Natural Hazards Mitigation Plan
Key Stakeholder Interview List

The following constitute the key stakeholders who were interviewed and provide input during the development of the draft plan. Brief additional phone and e-mail contacts were made, but are not listed here, such as contacts made to emergency management offices in adjacent counties, other electric providers, or for clarification on issues. Municipalities, the steering committee, and other stakeholders also provided additional input not listed here during the review of the draft plan and during plan adoption process. Chris Straight, WCWRPC, and Tyler Esh, Eau Claire County Emergency Management, were also in attendance at all or most meetings, but are typically not included in the list or number of attendees.

Interviewee	Title/Notes	Date
Plan Steering Committee	Meeting #1 - 13 attendees	8/3/17
Plan Steering Committee	Meeting #2 – 8 attendees	1/10/18
Plan Steering Committee	Meeting #3 - 8 attendees	4/18/18
Plan Steering Committee	Strategy Alternatives Survey & Plan Review	Summer 2018
Plan Steering Committee	Meeting #4 - 6 attendees	7/11/18
City of Eau Claire Work Group	Meeting #1 – 9 attendees	11/14/17
City of Eau Claire Work Group	Meeting #2 – 4 attendees	5/9/18
City of Eau Claire Work Group	Meeting #3 – 6 attendees + review of draft sections	9/5/18
Village of Fairchild	2 in attendance	11/14/17
Village of Fall Creek	5 in attendance	11/17/17
City of Altoona	3 in attendance	12/18/18
City of Augusta	3 in attendance	11/27/17
Public Health Emergency Preparedness Cmte	20 in attendance	6/28/18
Eau Claire Co Fire Chiefs	14 attendees at meeting + survey	3/21/18
Town's Association	presentation at meeting and follow-up town survey	8/29/18
Tyler Esh	EC County Emergency Mgmt Coordinator	various meetings & support
Peter Strand	EC County G.I.S. Coordinator; provided data and flood analysis support	various meetings & support
John Genskow, Shana Harmsen	City of Eau Claire Engineering/GIS; provided data and flood analysis support	various meetings & support
Rod Eslinger, Matt Michels, Jared Grande	EC Co. Planning & Development	4/9/18
Kristi Mandel	County Executive Director, FSA	7/3/18
Greg Leonard	EC Co Land Conservation Department	7/9/18
Josh Petersen	Director, EC Co. Parks & Forest Department	4/19/18
Amy Luebke	WUI Specialist, WisDNR	6/5/18
Jed Kaurich	Forest Ranger, WisDNR Forestry Division	6/18/18

Mike Rogney	WI DNR, Dam Safety Engineer	4/12/18
Colleen Schian & Rod Bonesteel	City of Eau Claire Risk Manager and Property Manager	5/7/18
Ryan Petrie	City of Eau Claire Planner	5/4/18 + various
Ned Noel	City of Eau Claire Planner	3/27/18 + various
Disaster Ready Chippewa Valley	6 attendees	4/2/18
Ben Bella	Eau Claire Energy Cooperative + data & review	4/2/18
Jon Johnson, Brian Spilde	Eau Claire Co Highway Commissioner & Operations Manager	4/5/18
John Genskow, Jeff Pippenger, Steven Thompson	City of Eau Claire Deputy Engineer, Community Services Director, and Street Manager	1/12/18
John LeBrun, Dave Hayden	City of Eau Claire & Eau Claire County IT Directors	12/1/17
Paulette Magur, Kelli Engen, Marisa Stanley	City-County Public Health Department	4/11/18
Matt Steinbach	City-County Environmental Services Division Manager	7/9/18 + draft review
Jennifer Speckien	Eau Claire County ADRC Director	7/9/18
William Henning	CVTC Public Safety Manager	7/9/18
David Livingston	City of Altoona Police Department	7/11/18
Joel Brettingen	Captain, Eau Claire County Sheriff's Department	7/11/18
Additional interviews and outreach occurred as part of other meetings and in conjunction with similar planning activities within the region, including UW-Eau Claire, Red Cross, Northwest Wisconsin Healthcare Emergency Readiness Coalition, Hillcrest Estates owners, and Xcel Energy. In Spring 2018, two web-based surveys were also distributed to gain input on long-term power outage preparedness and to obtain input from school districts.		

Eau Claire County
Multi-Hazard Mitigation Plan Steering Committee

Meeting #1 – Plan Update
3:00 PM August 3, 2017
Eau Claire County Government Center
712 Oxford Ave., Eau Claire, WI
Room 3312

AGENDA

I. Call to Order

II. Introductions

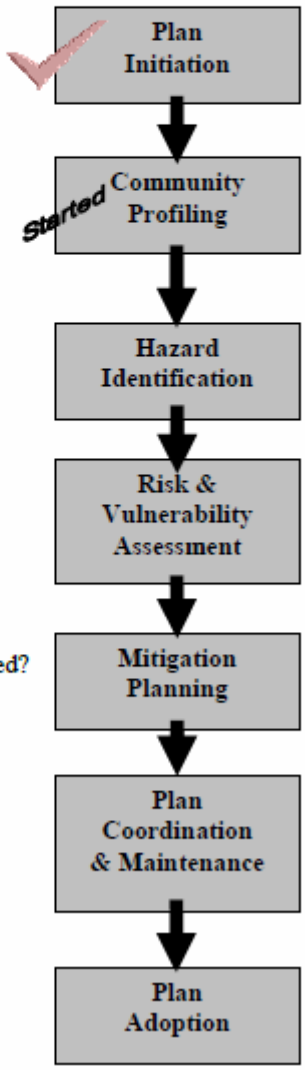
III. Review Project Scope & Related Brochures
- what is hazard mitigation planning and why do it?
- expanding the plan beyond natural hazards
- integrating the City of Eau Claire and County plans

V. Planning Process for Eau Claire County
a. planning process/timeline & Committee's role
b. approval and adoption process (local, state, & federal)
c. discuss multi-jurisdictional involvement
d. discuss public involvement

VI. Plan Scope & Risk Prioritization Survey
- hazards in previous City and County plans
- any trends, issues, or opportunities that need to be addressed? (what has changed since previous plans?)
- risk prioritization survey

VII. Next Steps in the Process

VIII. Adjournment



Eau Claire County
Multi-Hazard Mitigation Plan Steering Committee

Meeting #2 – Plan Update
3:30 PM January 10, 2018
Eau Claire County Government Center
712 Oxford Ave., Eau Claire, WI
Room 3312

AGENDA

I. Call to Order

II. Introductions

III. Project Scope and Status Update

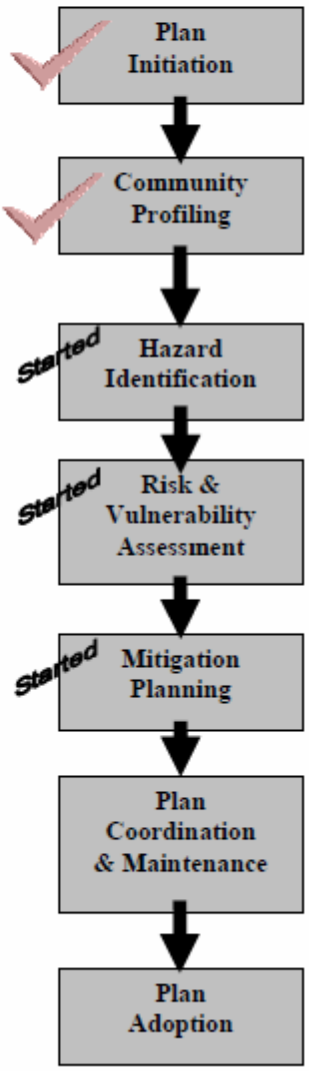
IV. Community Profile, Trends, & Implications

V. Discuss Hazard Risks & Vulnerabilities
- input received to date from interviews, Town surveys, etc.
- initial risk and vulnerability assessment results
- other Steering Committee comments

VI. Discuss Current Mitigation Activities
- progress on previous plan recommendations, as needed
- current mitigation activities summary homework

VII. Next Steps in the Process

VIII. Adjournment



Eau Claire County
Multi-Hazard Mitigation Plan Steering Committee

Meeting #3 – Plan Update
3:30 PM April 18, 2018
Eau Claire County Government Center
712 Oxford Ave., Eau Claire, WI
Room 3312

AGENDA

I. Call to Order

II. Introductions

III. Project Status Update

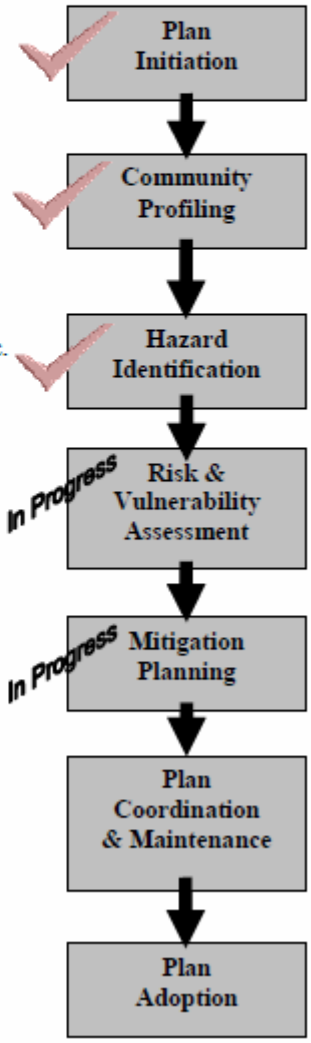
IV. Discuss Hazard Risk & Vulnerability Findings
- input received to date from interviews, Town surveys, etc.
- initial risk and vulnerability assessment results
- other Steering Committee comments

V. Review Current Mitigation Activities

VI. Review Plan Goals

VII. Next Steps in the Process
- review strategy alternatives survey homework
- draft plan to be distributed prior to next meeting

VIII. Adjournment



Eau Claire County
Multi-Hazard Mitigation Plan Steering Committee

Meeting #4 – Plan Update
3:30 PM July 11, 2018
Eau Claire County Government Center
712 Oxford Ave., Eau Claire, WI
Room 3312

AGENDA

I. Call to Order

II. Introductions

III. Project Status Update

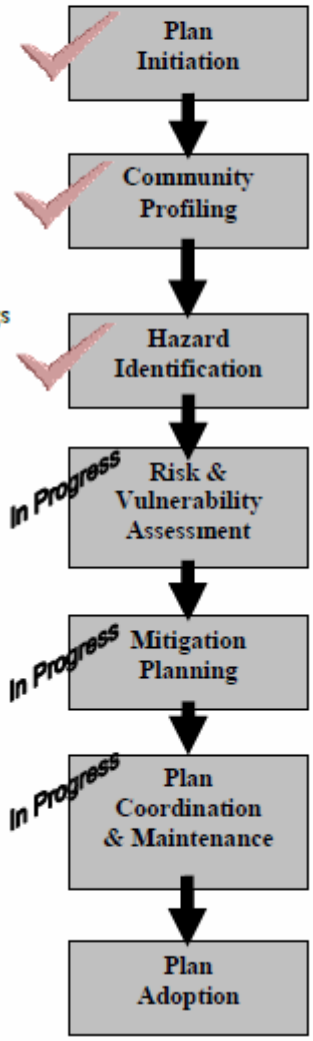
IV. Discuss Remaining Hazard Risk & Vulnerability Findings
- active threats
- drought/agricultural threats
- wildfire
- generator & school survey results

V. Finalize Strategy Recommendations

VI. Discuss Plan Maintenance & Update

VII. Next Steps in the Process
- draft plan to be distributed for Cmte review
- public informational meeting
- pre-review & adoption process

VIII. Adjournment



11/14/17

Eau Claire County Multi-Hazard Mitigation Plan Update

City of Eau Claire Ad Hoc Advisory Committee

Meeting 1 – November 14, 2017

- review plan purpose and scope
- discuss integration of City/County plans
- review hazard risks/vulnerabilities
- discuss flood assessment
- logistics moving forward (e.g., needed interviews?, set next meeting)

Meeting 2 – Jan/Feb 2018

- review other maps, data, and findings
- review results of flood assessment and
- progress on strategies in last plan
- key issues & priorities
- set next meeting date

Meeting 3 – March/April 2018

- follow-up from previous meetings as needed
- review and finalize plan recommendations
- next steps

Flooding
Winter Storms & Extreme Cold
Tornados
Thunderstorms & High Winds
Long-Term Power Outage
Wildfire
Drought
Cyber Attacks
Hazardous Materials Spills
Active Threats & Workplace Violence

Draft Plan must be provided to WEM by 9/1/18

WEM and FEMA pre-reviews draft plan to ensure FEMA planning standards are met

Plan is adopted by resolution by County, cities, and villages.

City of Eau Claire
Multi-Hazard Mitigation Plan Ad Hoc Work Group

Meeting #2 – Assessment & Activities
1:00 PM May 9, 2018
Eau Claire City Hall – North Conference Room
712 Oxford Ave., Eau Claire, WI
Room 3312

AGENDA

I. Call to Order

II. Introductions

III. Project Status Update

IV. Discuss Hazard Risk & Vulnerability Findings to Date
- review risks & vulnerabilities by hazard
- critical facility assessment

V. Review Current Mitigation Activities

VI. Review Progress on Previous Plan Recommendations

VII. Next Steps in the Process
- additional meeting on findings & progress desired?
- county-level strategy alternatives survey
- draft plan recommendations meeting

VIII. Adjournment

Flooding

Winter Storms & Extreme Cold

Tornados

Thunderstorms & High Winds

Long-Term Power Outage

Wildfire

Drought

Extreme Heat

Cyber Attacks

Hazardous Materials Spills

Active Threats & Workplace Violence

Impact of Climate Change

Reference

Communicable Disease

Nuclear Accident

City of Eau Claire
Multi-Hazard Mitigation Plan Ad Hoc Work Group

Meeting #3 – Assessment & Activities
1:00 PM September 5, 2018
Eau Claire City Hall – North Conference Room
712 Oxford Ave., Eau Claire, WI
Room 3312

AGENDA

Mtg #1 – discuss scope/process, identify issues/trends, & identify interviews
Mtg #2 – review key findings & current mitigation activities
Mtg #3 – review key sections & discuss/prioritize mitigation strategies

I. Call to Order

II. Introductions

III. Project Status Update

IV. Review & Comments on Key Sections
- draft tables, maps, etc. for key City sections to be provided 1-2 weeks prior to meeting for review

V. Discuss & Prioritize Mitigation Strategy Recommendations for City of Eau Claire

VI. Next Steps in the Process
- documenting local match contributions
- draft plan available for comment
- 9/21/18 public information meeting
- pre-review & adoption process

VII. Adjournment

Flooding
Winter Storms & Extreme Cold
Tornados
Thunderstorms & High Winds
Long-Term Power Outage
Wildfire
Drought
Extreme Heat
Cyber Attacks
Hazardous Materials Spills
Active Threats & Workplace Violence
Impact of Climate Change

Reference
Communicable Disease
Nuclear Accident

APPENDIX D.

PUBLIC INFORMATIONAL MEETING NOTICE

September 12, 2018

PUBLIC NOTICE

PLEASE TAKE NOTICE that Eau Claire County Emergency Management is inviting comment and input from residents, businesses, area organizations, and communities regarding the draft *Eau Claire County Multi-Hazard Mitigation Plan* and any needed projects to reduce or eliminate hazard risks to residents and property.

Eau Claire County is in the process of updating the County's Multi-Hazard Mitigation Plan, which is a pre-requisite for certain FEMA grant funding. Hazard mitigation actions are essential to creating a disaster-resilient community and breaking the disaster cycle of damage, reconstruction, and repeated damage, thus saving taxpayer dollars. Example mitigation activities include not building in floodprone areas, constructing community safe rooms for tornados, and burying power lines in areas prone to outages.

A copy of the draft plan is available for review at the County Emergency Management offices in Room 1301/1302 at the County Government Center or is available for download at: http://wcwrpc.org/Documents.html.

The public is invited to attend and provide comment on the draft plan during a public informational meeting to be held on Friday, September 21, 2018, at 4:00 P.M. in Room 1401 of the Eau Claire County Government Center, 721 Oxford Avenue, Eau Claire, Wisconsin. Any questions or written comments on the draft plan should be directed to Tyler Esh, Eau Claire County Emergency Management Coordinator no later than October 10, 2018, at 715-839-4736 or tyler.esh@co.eau-claire.wi.us.

_____

Tyler Esh
Eau Claire County Emergency Management Coordinator

cc: News Media
Public Bulletin Board/County Clerk's Office

APPENDIX E.

VULNERABILITY ASSESSMENT FOR CRITICAL FACILITIES

Eau Claire County Multi-Hazards Vulnerability Assessment for Critical Facilties

SCORE: 1 = Low, 2 = Medium, 3 = High

Critical Facility Type	Quantity (if avail.)	Riverine/Lake Flooding		Overland or Stormwater Flooding		Tornadoes		Thunderstorms/ High Winds		Winter Storms and Extreme Cold		Drought		Cyber Attack		Active Threat		Hazardous Materials Spills		Total Score
		score	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*assessment*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	
Government Buildings (includes emergency response)	67 total Fed, State, County, & local govt locations, but most not mapped. 3 county govt + 12 city/village halls + 21 town halls + 13 fire halls + law enforcement + misc. other	**1.5**	No history of overbank flooding problems at any government building, except for some parks. City/County Jail (and some downtown buildings) elevated above 100-yr floodplain. Eau Claire Central Maintenance could be flooded by an event exceeding a 100-year flood and floodwater couple impact access.	**1**	No governmental buildings were identified during the planning process as having significant or unique stormwater flooding concerns, though a number of incorporated communities reported past problems with stormwater.	**2**	All vulnerable to varying degrees depending on construction type. Performs important emergency response and recovery roles; many buildings are EOCs.	**1**	Some vulnerability to pole structures from very strong winds. Many of these facilities do not have storm shelters or emergency power generation.	**2**	A number of governmental buildings, including some that serve as EOCs, lack emergency power generators or electrical hook-ups.	**1**	None Known.	**2**	Govt operations have been a target of attacks in the region for financial gain. Cyber-security much improved since 2013 mitigation plan and no immediate concerns identified.	**2**	6.9% of active shooter incidents between 2000-2013 occurred at non-military governmental buildings, including municipal buildings, courthouses, airports, a museum, and a post office. Law enforcement and responders can be targets, regardless of location.	**1.5**	Hazardous materials spills on roads and rail frequently mentioned as a concern by local officials. A spill, release, or explosion at nearby industry also a potential concern in some communities. Employee safety and continuity of government operations could be impacted.	**14**
Utilities & Infrastructure (sewer, water, transportation, electric, telephone, etc.)	linear & site specific	**1.5**	Overall, the overbank flooding vulnerability to utilities and infrastructure is low. Some roadways may be occassionally flooded, which can prevent access to other utilities. Flash flooding has been a more significant issue in the past. Private wells can become contaminated if flooded.	**3**	During heavy rains, some communities have problems with stormwater entering the wastewater system through manholes, lifstations, or basements. The washout of roads, culverts, bridge abuttments, etc., have been the primary storm-related damage in recent decades.	**2**	Above ground utilities vulnerable, especially power and communications lines.	**2.5**	Loss of power due to high winds toppling trees is the greatest risk frequently mentioned during the planning effort. Lightning strikes and related power surges also pose threats to utilities, liftstations, communications equipment, and airport runway lights.	**3**	Ice and heavy snow can topple trees and take down power lines and communications infrastructure. Ice and snow can result in accidents and restrict travel, especially on I-94 and USH 53. 2014 Polar Vortex caused some breaks of water lines and laterals.	**1.5**	Current vulnerability is low. Water quality and quantity can be impacted during prolonged droughts. Communities currently have adequate supply to meet demand, though some have anticipated the need to expand in future as growth occurs.	**2.5**	While not targeted in the region to date, cyber threats have the potential to disrupt critical infrastructure resulting in major incidents.	**1**	Utilities and infrastructure are not typically directly impacted by active shooters, though can be terrorism targets. However, 9.4% of active shooters incidents between 2000-2013 occurred in open spaces, often including streets and highways.	**2**	Transportation-related haz mat spills on roadways have occurred Transport of haz mat on I-94 and state and federal highways, in addition to rail, most frequently identified concerns. Some utilities also use hazardous materials as part of their operations.	**19**
Schools, Head Starts, and Day Cares	74 school and campus buildings (including UW-EC & CVTC) + 89 licensed day cares + pre-school programs	**1.5**	No principal structures associated with a school, Head Start, or day care is believed to be located in a 100-year floodplain. 6 UW-Eau Claire buildings potentially within floodplain but protected by concrete flood controls with gates and pumps.	**1.5**	No significant issues or concerns noted. Some past stormwater flooding problems at CVTC's Clairemont campus building.	**3**	Vulnerable, especially those buildings with large spans. Contains a large concentration of vulnerable population during school hours. Some schools also serve as storm shelters.	**1.5**	Large span structures may be vulnerable to high winds.	**1**	Potential vulnerable population to extreme cold.	**1**	None Known.	**1.5**	Due to number of facilities and large numbers of students and staff using computers, public schools have a high risk of malware, computer viruses, etc. Vulnerability (impacts) likely lower compared to many other critical facilities.	**2.5**	24.4% of active shooter incidents between 2000-2013 occurred at educational facilities, with 16.9% at preK-12 schools (includes 2 school board meetings) and 7.5% at post-secondary institutions.	**2**	Haz mat releases on roads or rail, as well as site-specific sources (e.g., industry), varies by location, though all facilities have some risk. These facilities have a concentration of a vulnerable population.	**15.5**

Critical Facility Type	Quantity (if avail.)	Riverine/Lake Flooding		Overland or Stormwater Flooding		Tornadoes		Thunderstorms/ High Winds		Winter Storms and Extreme Cold		Drought		Cyber Attack		Active Shooter		Hazardous Materials Spills		Total Score
		score	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	*score*	*risk & vulnerabilities*	
Hospitals & Clinics	6 hospitals & additional clinics	**1**	None Known.	**1.5**	Some stormwater flooding problems at Luther-Midelfort Hospital in the past.	**3**	Vulnerable. Often high value facilities in terms of monetary value and importance to communities with a large concentration of vulnerable population. Important to disaster response and recovery.	**1**	Vulnerability to potential loss of power mitigated through availability of on-site generators at hospitals.	**1**	Potential vulnerable population to extreme cold. Hospitals have generators if needed.	**1**	None Known.	**3**	Cyber-security and confidentiality of patient records is a paramount concern for hospitals and clinics due to HIPPA rules, potential for identity theft, critical systems, etc.	**2**	2.5% of active shooter incidents between 2000-2013 occurred at health care facilities, such as hospitals. High concentrations of vulnerable populations. Frequently mentioned as a potential target during community interviews.	**2**	Haz mat releases on roads or rail, as well as site-specific sources (e.g., industry), varies by location, though all facilities have some risk. These facilities have a concentration of a vulnerable population.	**15.5**
Long-Term Care Facilities (CBRFs, assisted living, nursing care)	94 nursing homes and assisted living facilties	**1**	None Known.	**1**	None Known.	**2.5**	Vulnerable. Performs an important community function. Like hospitals, such facilities contain potentially vulnerable populations, some with limited mobility.	**2**	Some facilities may be vulnerable to power loss should the event occur during periods of cold or heat. Many facilities likely do not have emergency power generators.	**2**	Potential vulnerable population to extreme cold.	**1**	None Known.	**2**	Some HIPPA rules also apply to nursing homes. May have less cyber-security compared to larger hospitals.	**1.5**	High concentrations of vulnerable populations. The above health care incidents includes one N. Carolina nursing home where a man shot residents, a nurse, and a police officer when he was unable to find his estranged wife, who was an employee.	**2**	Haz mat releases on roads or rail, as well as site-specific sources (e.g., industry), varies by location, though all facilities have some risk. These facilities have a concentration of a vulnerable population.	**15**
Historic Buildings	68 properties on National Register	**1.5**	6-10 historic buildings within City of Eau Claire potentially within 100-year floodplain, including Owen Park Bandshell.	**1**	None Known.	**2**	Vulnerable. Important social value to the community.	**2**	High winds and heavy rains may cause damage to older structures and historic sites.	**1**	None Known.	**1**	None Known.	**1**	None known.	**1**	Historic buildings are not uniquely vulnerable, though places where people gather can be potential targets.	**1**	No unique risks or vulnerabilities noted.	**11.5**
Hazardous Chemical Use & Storage Facilities	33 Tier 2 and 24 EHS facilities	**1.5**	Two haz mat facilities near Foster potentially in 100-year floodplain, but no flood history reported.. Some industry along Chippewa River.	**1**	None Known.	**2**	Vulnerable. A tornado event could potentially result in a release.	**1**	None Known.	**1**	None Known.	**1**	None Known.	**2**	No known events in the region. Such facilities could potentially be the target of malicious activity with the intent to cause a release.	**1.5**	14.3% of active shooter incidents between 2000-2013 occurred at places of business that were closed to pedestrian traffic. Facilities with hazardous materials are not inherently uniquely vulnerable.	**3**	Given the location of hazardous materials on site, these facilities have the highest risk, but EHS and Tier 2 facilities also have plans and safety measures in place. Some of these facilities have large numbers of employees.	**14**
		9.5		**10**		**16.5**		**11**		**11**		**7.5**		**14**		**11.5**		**13.5**		

Scoring Factors

Past Impacts: Has facilities of this classification within Eau Claire County been impacted by this hazard type in the past?
Unique Vulnerabilities: Does a facility of this classification have unique vulnerabilities or risks associated with it in respect to the hazard type?
Relative Value: Relative to other facilities in the community, what is the value of a facility of this type?
Disruption of Critical Services: If a facility of this type was disabled due to a hazard, what would be the relative level of disruption to services most needed for disaster response and recovery?

Note: Active shooter percentages based on a FBI study of 160 incidents in U.S. between 2000 to 2013, which is further discussed in the active threat subsection of this Hazard Mitigation Plan update.

APPENDIX F.

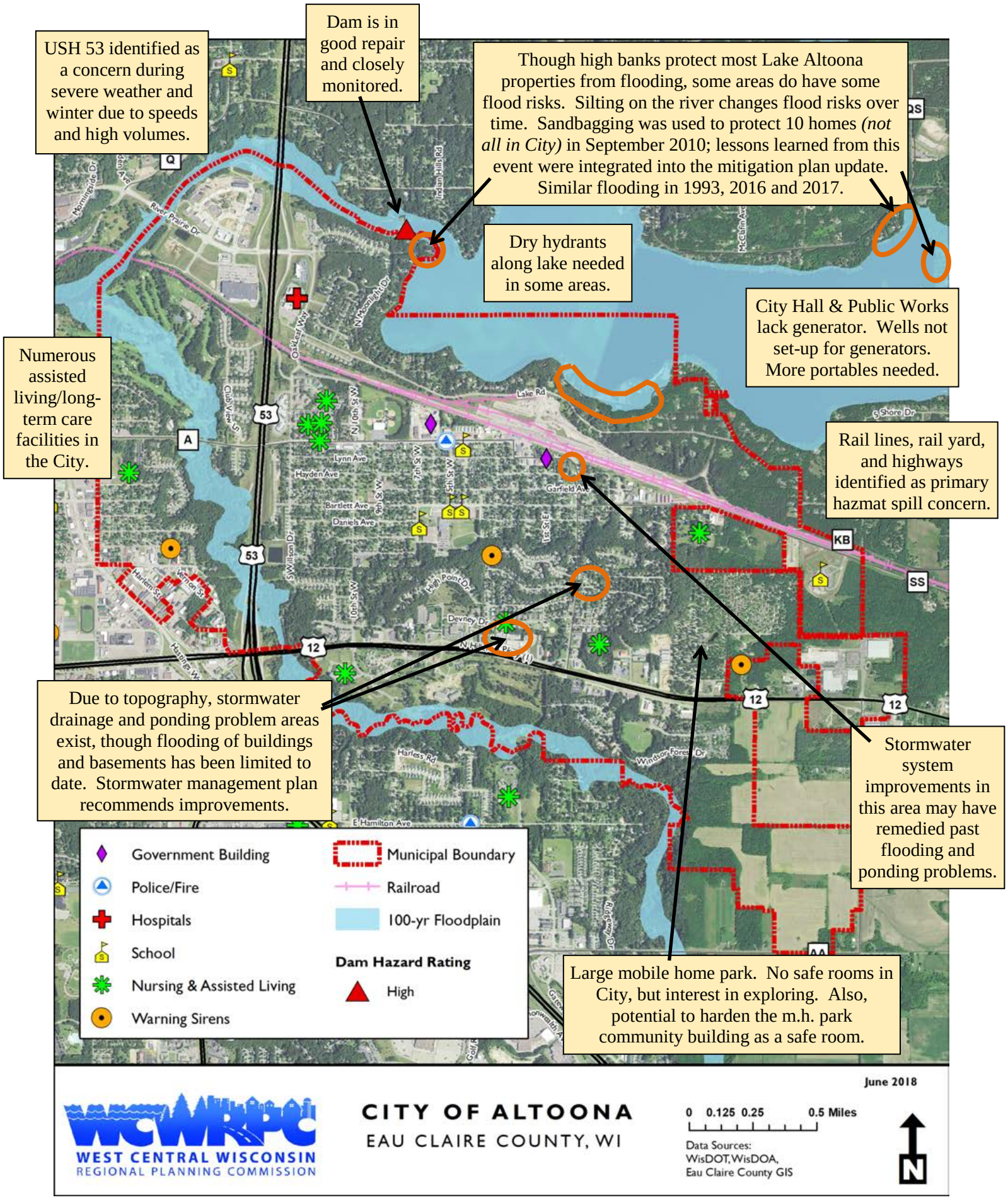
UNIQUE RISKS AND VULNERABILITIES BY INCORPORATED COMMUNITY

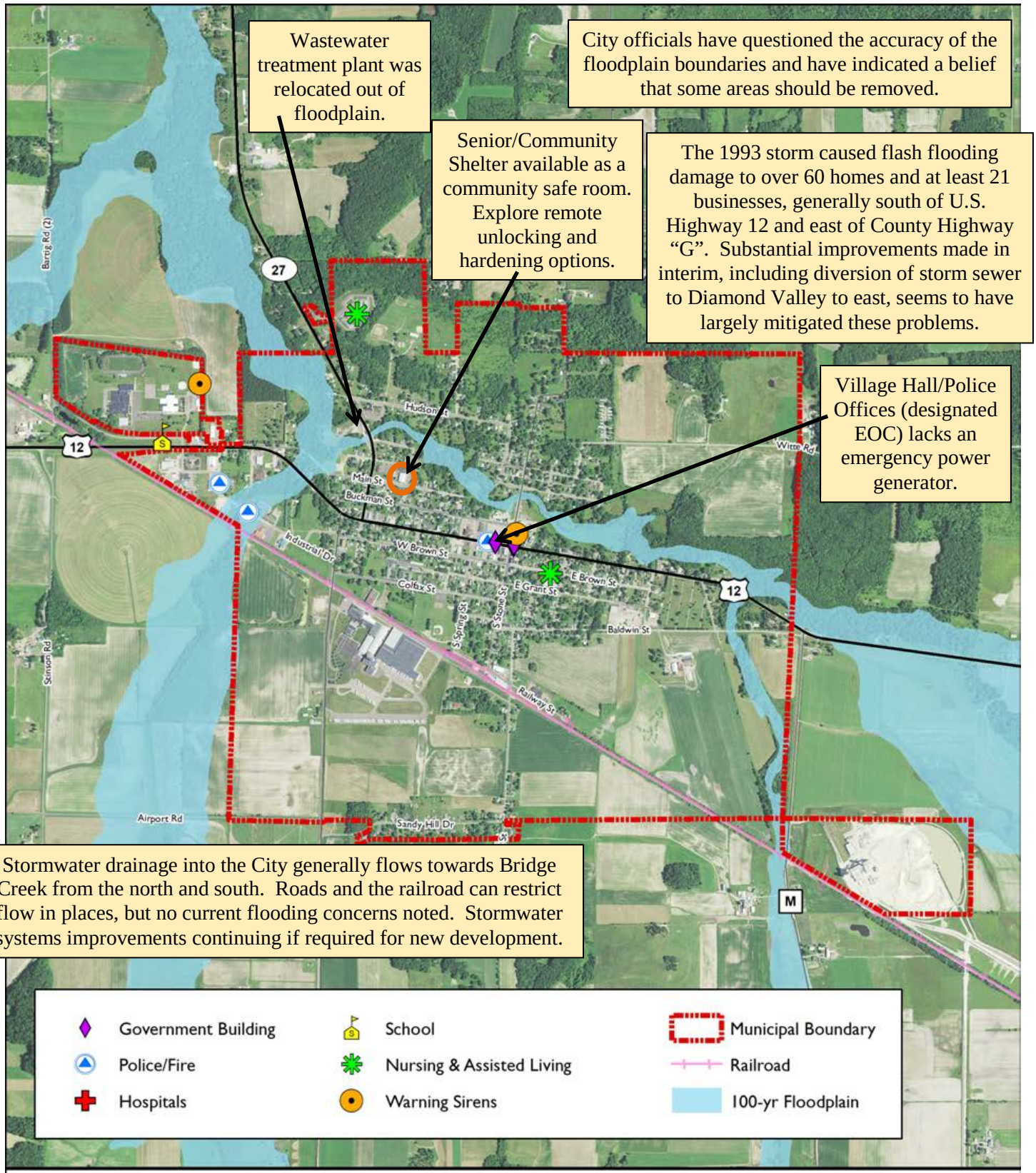
Unique Hazard Risks and Vulnerabilities by Incorporated Jurisdiction

Municipality	Population (2017 est.)	Tornadoes, High Winds, and Thunderstorms	est. # mobile homes	Winter Storms and Extreme Cold	Riverine or Lake Flooding (Overbank)	Stormwater or Flash Flooding (Overland)
Village of Fairchild	545	No direct tornado strikes. Typical high wind damage to roofs, trees, etc. June 2017 hail storm damaged roofs, siding, and vehicles. Most homes have basements. In northeastern part of the Village is a ballfield, ATV park/campground, and 13 mobile homes; this area also has high groundwater, so few or no basements available. No community safe room(s) designated. Worked with Xcel Energy for new resistors and grounding for liftstation which has been damaged by lightning in the past, so likely resolved.	59 (+/-23)	Recent ice storm with strong winds knocked down large TV tower north of Village, but no other unique issues noted. A few water main breaks per year in the past.	Floodplain development is very limited. Heavy rains in Spring 2015 caused damage and road closures along Schoolhouse Creek, including over U.S. Highway 10 at the railroad bridge, washed out the Humbird St. bridge, and damage to Pond Road. Road and culvert also washed out in 2015 on Tioga Road as well as damage to a nearby business outside the village in Jackson County. Dam was recently inspected and is in good repair; no structures in the village in the dam shadow.	High groundwater contributes to some ponding and water in basements following 3 to 5+" rain events, such as in 2010 and 1993, especially near pond. 1993 flood damages primarily were road washouts and the dam structure. Stormwater run-off was a factor in the 2015 flooding along Schoolhouse Creek described previously.
Village of Fall Creek	1,287	Has been tornados in area, including one of the longest in Wisconsin history. No mobile homes and nearly all homes have basements, so low interest in a public safe room. Retirement home has safe area. No camping at park, except workers during FunFest; weather monitored and law enforcement uses P.A. to notify and open Village Hall if shelter needed.	0 (+/-9)	No unique issues or concerns noted. Will request some residents to leave water dripping to prevent freeze-ups if needed.	8" rain in 2005 had floodwaters within 10' of one home w/ walkout basement. 10" rain in 2006, but still no structural flooding. Heavy rains in 2015, but still 20'-30' from the home. One wet basement in big 1993 storms.	10" of rain in 2006 storm caused some ponding, but no significant damage. Past flash flooding on streets appear to have been mitigated through stormwater improvements. Continue to monitor stormwater systems and catch basin in school area that has had some ponding and minor flooding due to ice damming, but no significant damage to date.
City of Altoona	7,420	No history of tornado damage. Hillcrest Estates (560 licensed sites) is unique given its size; about 270 units currently on site. Lower level of community building storm shelter potentially available as shelter, but not hardened. Many, if not most, mobile homes in the community are not anchored or strapped down; some modular homes also on slab. Also, some industry with metal/large span buildings vulnerable. Large rail yard; cars could be tossed. Lightning strikes at City Hall, water tower, and computers knocked out at Public Safety Bldg, but not a repetitive issue at single site.	233 (+/-103)	Extended electrical power loss is primary concern. Traffic volumes and speeds on USH 53, especially at bridges, a concern in icy or winter conditions; County applying more pre-treatment to remedy. Periodic water main/line freeze-ups, but no areas particularly prone. 260-270 water laterals and a few water mains froze in Winter 2014-15 due to lack of ground cover; had not occurred at this scale in the past. Services now being insulated.	High banks along most of the shoreland areas. About 12 properties (not all in City) were significantly impacted along lake by flooding on 9/25/10. Sandbagging used for 10 homes in City and some in adjacent towns. Comparable to 1993, 2016, and 2017 flooding. Silting on river changing flood risks over time. Multi-jurisdictional meeting on 2/24/11 discussed the event, lessons learned, and recommendations. Volunteer management for sandbagging has been a challenge at times.	Stormwater system improvements may have remedied past problems at corner of Lynn and 3rd Street. Due to topography, other drainage and ponding problems still exist, such as in the High Point Dr area. In 2007, Highway 12 by Happy Hollow flooded; volume mitigation considered. Some short-term flooding and pooling in nearby streets, buildings, and basements.
City of Augusta	1,516	Tornados seems to pass close to the City fairly frequently. Tornado just missed the City in Summer 2011, which downed trees and caused some structural and vehicle damage in the City, along with partial power outage. July 2017 tornado caused damage near Lake Eau Claire. Most homes have basements. Community expressed some interest in weather radio project.	0 (+/-9)	Periodic water line breaks, but uses a water dripping program with credit to bills if needed. No unique issues identified.	Old WWTP flooded in past, but moved to new location. No other river flooding concerns identified. Concerns expressed over the accuracy of the new floodplain maps.	Heavy rains in 1993 caused flash flooding damage in many areas of City (see map), but substantial stormwater management improvements completed since then, including storm sewer diversion from Diamond Valley to the east. City continues to monitor, but no structural flooding or road/culvert damages from more recent heavy rain events. No culverts, roads, or property identified as floodprone. No large projects proposed, unless driven by new development.

Unique Hazard Risks and Vulnerabilities by Incorporated Jurisdiction

Municipality	Long-Term Power Outage & Emergency Power	Wildfire, Extreme Heat, or Drought	Hazardous Materials	Active Threat	Local Government Cyber Security & Cyber Attacks	Other Notes
Village of Fairchild	No unique issues. Need a portable generator for public utilities.	No unique concerns noted. Dry hydrant available at the pond.	Highway 10/12 traffic, railroad, and natural gas pipeline (and feeder line to Village) identified as primary risks.	Nothing unique identified. Elementary school closed and no large public gathering places.	Village has I.T. contract for Internet security and cloud backup storage of important data; no history of cyberattacks on Village.	Significant portion of the Village's housing stock are mobile homes. A relatively large percentage of households are moderate-to-low income.
Village of Fall Creek	No unique history. Only recent, lengthy outage was due to a semi-truck hitting power lines. Fire Hall/Police/Village Shop is in need of a generator; this site would serve as EOC/command post during an event. Portable generator available for public works; wells and wastewater plan covered. A portable generator is available for Village Hall if needed.	New water tower; has good water quantity for fire protection. Some wildfire concerns in forested area in NW area of the community along railroad tracks (which could be an ignition source).	Highway 12 truck traffic, railroad, and two agricultural product suppliers are primary risks. Fire Department depends on assistance from Eau Claire and Township Fire if needed. Anhydrous exercise conducted about 10 years ago.	School is primary risk and has been discussing ALICE policies and has performed some hardening. Additional measures possible (e.g., numbering doors/windows, sharing flood plans). Village Police has received training and has been working with area churches and a day care.	Village has I.T. contract for Internet security and cloud backup storage of important data. Had an identity theft incident involving a forged check. During interview, discussed how communities can improve vetting of IT services, how can Wi-Fi be protected in a public setting, how to protect credit card transactions/equipment, and the testing of cyber-preparedness.	During previous plan, expressed concerns over evacuation and traffic control plans and the resources that would be required. Wireless communications improvements since last plan have improved coverage and redundancy.
City of Altoona	No event history, but lacking generators for City Hall and Public Works Building, Spooner liftstation, and 2 wells. Has 5 liftstations; 1 with emergency power. Has 2 portables and looking to buy more. Wells not set-up to run on generators. Uncertain if long-term care facilities all have generators. New development required to bury power lines. Some redundancy in electrical service.	Newer well and upgraded well ensures adequate water quantity for current, but looking at additional water storage. Mobile homes can be dangerous in extreme heat if no AC. No formal cooling shelter identified; library? Railroad (along rail corridor and railyard) can be an ignition source for wildfire in addition to the corridor along USH 53. Some development in pine plantation.	Railroad, Highways 53 & 12, schools, and some industry are primary concerns. Training is ongoing, including with railroad every 2 years; interested in more. Local staff may not be aware of chemicals at fixed sites. Not sure if an evacuation plan exists; hasn't been exercised.	School and city offices identified as primary public facilities risks. Schools have had some active shooter training and city/library employees have also had some training. Exploring ways for security hardening of municipal offices.	Altoona recognizes cyber-attack as a growing threat for the region. The City contracts for I.T. security and conducts an annual cyber-security test, which has included spoofing. More public education on the risks and things individuals and small businesses can do to prevent data and identify theft would be valuable.	More education on wildfire risks and mitigation is important, in cooperation with Town of Washington. One wildfire out of control in 2010 during construction. Multiple dry hydrant needs in area. Some dead-end streets in need of alternative access/egress. HazMat due to railroad.
City of Augusta	City Hall (includes police station) lacks a generator. Portable generator available for community/senior center if needed, which would serve as EOC during outage. Generators at wastewater plant, 1 well, and nursing home; can operate other well if needed with power take-off.	No unique concerns and good water quantity. Senior Center available as a cooling shelter if needed. City identified no significant areas of wildfire risk within the community.	Railroad identified as primary risk. Controls/drop gates installed at railroad crossings since last mitigation plan. Potential interest in a hazmat-related exercise/training scenario with nearby fire departments and communities.	City Police worked with School District to complete ALICE training, including outreach to parents. May be growing need and interest in similar training for large employers in County, such as Bush's Beans.	City has I.T. contract for Internet security and cloud backup storage of important data; no history of cyberattacks on City.	Significant Amish population in the area. As needed, emergency response entities (e.g., police, fire) reach out to Amish community through their Bishops and Elders.


USH 53 identified as a concern during severe weather and winter due to speeds and high volumes.
Dam is in good repair and closely monitored.
Though high banks protect most Lake Altoona properties from flooding, some areas do have some flood risks. Silting on the river changes flood risks over time. Sandbagging was used to protect 10 homes (not all in City) in September 2010; lessons learned from this event were integrated into the mitigation plan update. Similar flooding in 1993, 2016 and 2017.
Dry hydrants along lake needed in some areas.
City Hall & Public Works lack generator. Wells not set-up for generators. More portables needed.
Numerous assisted living/long-term care facilities in the City.
Rail lines, rail yard, and highways identified as primary hazmat spill concern.
Due to topography, stormwater drainage and ponding problem areas exist, though flooding of buildings and basements has been limited to date. Stormwater management plan recommends improvements.
Stormwater system improvements in this area may have remedied past flooding and ponding problems.
Large mobile home park. No safe rooms in City, but interest in exploring. Also, potential to harden the m.h. park community building as a safe room.
Government Building
Police/Fire
Hospitals
School
Nursing & Assisted Living
Warning Sirens
Municipal Boundary
Railroad
100-yr Floodplain
Dam Hazard Rating
High
WCWRPC
WEST CENTRAL WISCONSIN
REGIONAL PLANNING COMMISSION
CITY OF ALTOONA
EAU CLAIRE COUNTY, WI
June 2018
0 0.125 0.25 0.5 Miles
Data Sources:
WisDOT, WisDOA,
Eau Claire County GIS
N



June 2018

WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION

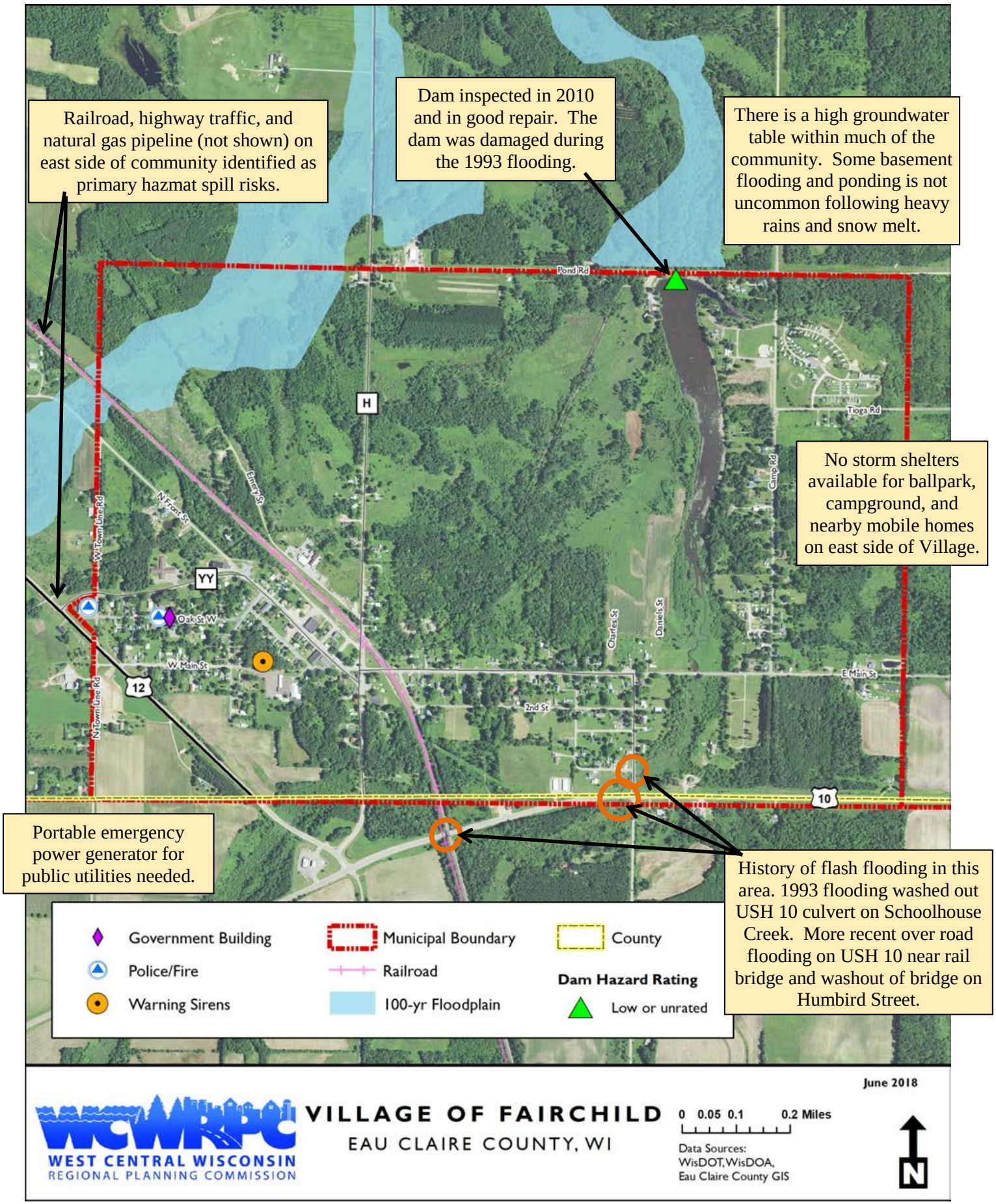
CITY OF AUGUSTA

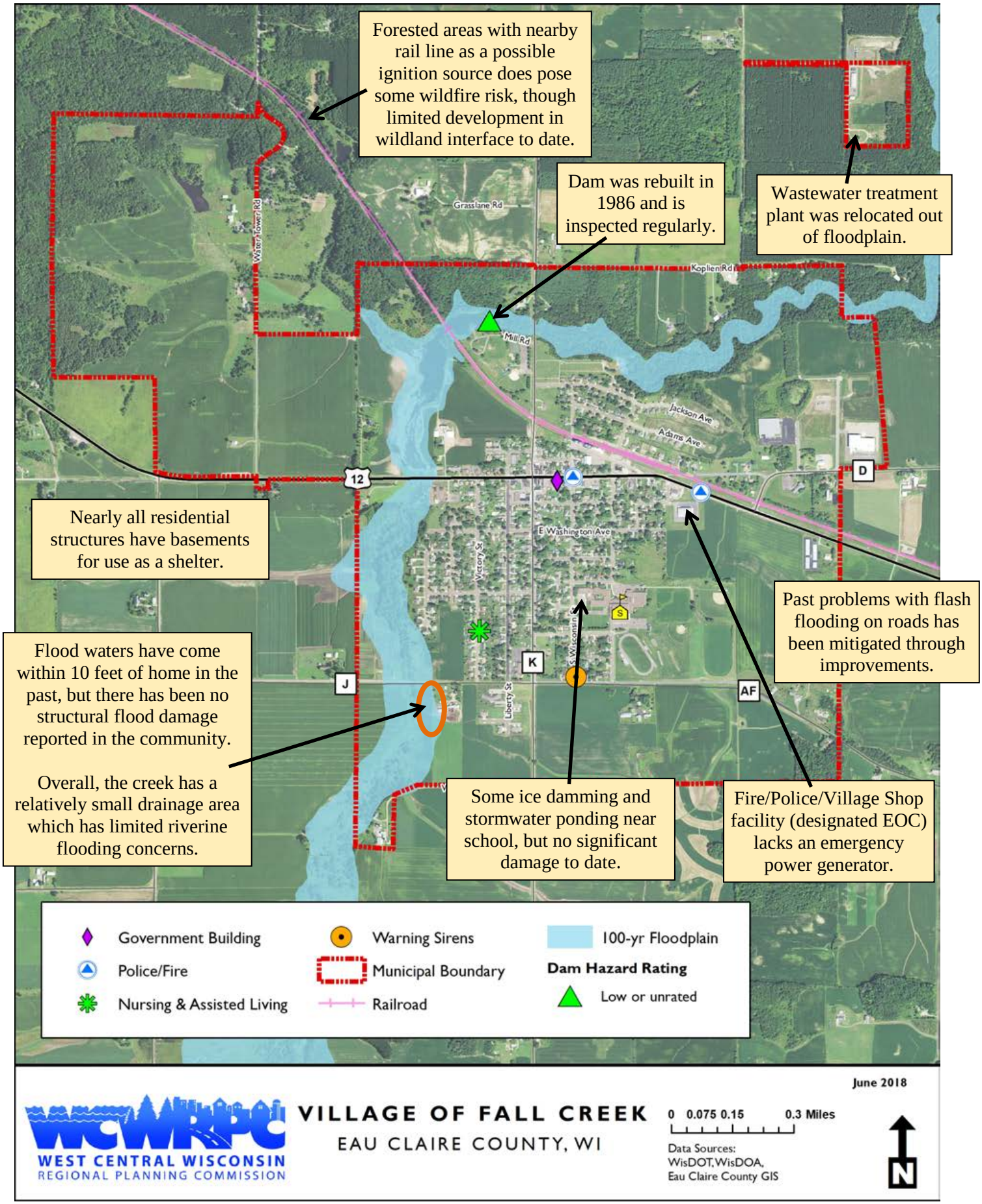
EAU CLAIRE COUNTY, WI

0 0.1 0.2 0.4 Miles

Data Sources: WisDOT, WisDOA, Eau Claire County GIS

N


Railroad, highway traffic, and natural gas pipeline (not shown) on east side of community identified as primary hazmat spill risks.
Dam inspected in 2010 and in good repair. The dam was damaged during the 1993 flooding.
There is a high groundwater table within much of the community. Some basement flooding and ponding is not uncommon following heavy rains and snow melt.
No storm shelters available for ballpark, campground, and nearby mobile homes on east side of Village.
Portable emergency power generator for public utilities needed.
History of flash flooding in this area. 1993 flooding washed out USH 10 culvert on Schoolhouse Creek. More recent over road flooding on USH 10 near rail bridge and washout of bridge on Humbird Street.
Pond Rd
H
YY
12
10
Tioga Rd
Camp Rd
Emery St
N Front St
W Town Line Rd
N Town Line Rd
Oak St W
W Main St
E Main St
2nd St
Charles St
Daniels St
Government Building
Police/Fire
Warning Sirens
Municipal Boundary
Railroad
100-yr Floodplain
County
Dam Hazard Rating
Low or unrated
June 2018
WEST CENTRAL WISCONSIN
REGIONAL PLANNING COMMISSION
VILLAGE OF FAIRCHILD
EAU CLAIRE COUNTY, WI
0 0.05 0.1 0.2 Miles
Data Sources:
WisDOT, WisDOA,
Eau Claire County GIS
N


Forested areas with nearby rail line as a possible ignition source does pose some wildfire risk, though limited development in wildland interface to date.
Dam was rebuilt in 1986 and is inspected regularly.
Wastewater treatment plant was relocated out of floodplain.
Nearly all residential structures have basements for use as a shelter.
Past problems with flash flooding on roads has been mitigated through improvements.
Flood waters have come within 10 feet of home in the past, but there has been no structural flood damage reported in the community.
Overall, the creek has a relatively small drainage area which has limited riverine flooding concerns.
Some ice damming and stormwater ponding near school, but no significant damage to date.
Fire/Police/Village Shop facility (designated EOC) lacks an emergency power generator.
Grasslane Rd
Water Tower Rd
Koplien Rd
Mill Rd
Jackson Ave
Adams Ave
E Washington Ave
Victory St
Liberty St
S Wisconsin
12
D
K
J
AF
S
Government Building
Police/Fire
Nursing & Assisted Living
Warning Sirens
Municipal Boundary
Railroad
100-yr Floodplain
Dam Hazard Rating
Low or unrated
WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION
VILLAGE OF FALL CREEK
EAU CLAIRE COUNTY, WI
June 2018
0 0.075 0.15 0.3 Miles
Data Sources: WisDOT, WisDOA, Eau Claire County GIS
N

City of Eau Claire Unique Hazard Risks & Vulnerabilities

With a 2017 population of 67,926, the City of Eau Claire is the ninth-largest city in Wisconsin. The City has about two-thirds of Eau Claire County's total population. As reflected by the maps in Section II.D, the City is also home to the far majority of critical facilities in the County, including Chippewa Valley Technical College, University of Wisconsin-Eau Claire, five hospitals, and most County governmental facilities. It is also the regional economic and service hub. For example, there are over 3,100 businesses (with employees) located in the City of Eau Claire, compared to 4,200 such businesses countywide. It is important to note that a small portion of the City is located in Chippewa County, including about 2,100 residents and Chippewa Valley Regional Airport. Due to these facts, this City of Eau Claire's risk and vulnerabilities summary requires more detail than the other cities and villages in the County.

Tornadoes, High Winds, and Thunderstorms

No history of tornado damage in the City. The July 15, 1980, "The Big Wind" and the May 24, 2012 high wind events both resulted in significant damage within the City, including injuries and one death; see Thunderstorm assessment in Section III.B.iv. Some repetitive lightning strikes at well field in the past.

Due to the concentration of residents, critical facilities, and improvements, the City has a very high vulnerability should a tornado or straight-line wind strike. The City also has six licensed manufactured home communities; it is not known if these communities have designated storm shelters. There are no public campgrounds within the City, though there are numerous City parks and recreational facilities where large groups of people occasionally congregate. Storm and lightning emergency action plans are required for events within the City. The City of Eau Claire does not have a public storm shelter or community safe room.
Estimated # of mobile homes: 427 (+/- 115)

Winter Storms and Extreme Cold

Travel and long-term power loss are greatest risks. Speeds and traffic volumes during poor road conditions make travel especially dangerous on Highway 53, the North Crossing, Interstate 94, and associated bridge crossings. No other local streets or roads were identified as being particularly prone to drifting or icing problems.

The City of Eau Claire has identified ice control routes, which receive priority attention to prevent ice and snow accumulations if possible. A lesson learned from the December 2010 event was to pair a plow with emergency vehicles (e.g., police, fire, ambulance) as needed. Law enforcement has since purchased some four-wheel drive vehicles. Snow removal in older neighborhoods and areas with concentrations of rental properties with on-street parking can be problematic. A Snow Emergency Ordinance has been adopted and modifications have been made to alternate side parking to better accommodate snow removal. City staff noted that the effectiveness of declaring a snow emergency may be limited since a portion of the public will often not heed such warnings and will still attempt to travel.

The City has over 300 miles of water pipes with only 10-15 breaks in an average year; breaks are more a function of soil and pipe conditions, rather than freezing. However, the City's infrastructure is aging, which increases the risk of potential water or sewer main/lateral freeze-ups and breakage, like during the 2014-2015 Polar Vortex. No neighborhoods or areas were identified as being particular prone to water main or lateral breakage. During the December 2010 heavy snow storm, furnace exhaust vents blocked at many homes and some illnesses reported. No formally designated warming shelters for extreme cold; the City does have a sizable homeless population. Such vulnerabilities to people and critical facilities could become disastrous should long-term power loss occur during a period of extreme heat.

River or Lake Flooding (Overbank)

The City has a long history of river flooding. However, a very strong commitment to floodplain acquisition, floodproofing, stormwater system improvements, and floodplain management has combined to significantly reduce flood vulnerabilities within the City. Since the mitigation efforts of 1990s and 2000s, overbank flooding problems in the City have been mostly limited to trails along river and the bandshell at Owen Park.

Appendix H includes a detailed 100-year flood vulnerability assessment for the City of Eau Claire. Appendix H also summarizes flood mitigation efforts in the City, including NFIP and Community Rating System participation and descriptions of the *City of Eau Claire Flood Emergency Action Plan*. The City is considering the replacement of pneumatic plugs with backflow prevention for those storm sewer outlets that lie below the regional flood elevation. A 100-year flood event would top the Forest Street Levee, which is an aging structure that does not meet current Army Corps of Engineers design standards and was identified as a concern in the local Neighborhood Plan. The City has pursued grant dollars for levee improvement in the past, but has been unsuccessful to date.

No dam-related issues posing an immediate threat to safety were identified. The dam break analysis for Wissota Dam shows a sunny-day scenario with flooding similar to a 100-year event, though a rainy-day scenario under flood conditions could be much worse. Given the significant amount of existing development and roadways in dam shadows within the City, it is important that Emergency Action Plans (EAPs) and Inspection, Operation, & Maintenances Plans (IOMs) be maintained for the Wissota and Altoona dams.

Stormwater or Flash Flooding (Overland)

Overland, stormwater, and flash-flooding damage increasingly represents the most frequent flood hazard within the City of Eau Claire given that many of the most vulnerable structures to riverine flooding have been addressed through floodproofing or acquisition,. In addition to the 100-year flood assessment, **Appendix H** shows:

- Significant stormwater system improvements have been made within the City to many problem areas since the City's 2000 flood mitigation plan.
- The remaining areas of overbank and overland flooding concern.
- Additional stormwater system improvements are underway or planned, and additional floodplain acquisitions are being considered.

A recent heavy rain did flood the lower level of City Hall; additional sealing has been completed and runoff is being addressed. As a MS4 community, stormwater management planning, education, and improvements are an ongoing, long-term commitment by the City as discussed in Appendix H.

Long-Term Power Outage & Emergency Power Generation

The long-term loss of power is one of the greatest natural hazard threats for the City. Extended outages for portions of the City in 1980, 2007, 2010, and 2012 due to high winds, though recent events exceeding 48 hours are very rare and limited to a relatively small number of customers. For example, the May 2010 wind storm caused the wastewater plant to lose power for three days; generators are now in place. No areas of the City of Eau Claire were identified as being uniquely or particularly prone to weather-related power loss.

Nearly all of the City of Eau Claire is provided electric service by Xcel Energy. A small portion of the City is served by the Eau Claire Electric Cooperative. Since the mid-1970's, the City of Eau Claire has required electrical lines in new subdivisions to be buried. Xcel also 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 in many areas of the City.

City Hall/Fire #1/Data Center, Library, Central Maintenance, wastewater treatment plant & the four City radio towers have generators. Carson has a small generator that could use replacement. New Fire Hall has generator for 60% service. Most Fire Halls lack fixed generators; some portables available. Hobbs also lacks a generator, which attracts crowds up to 2,000 and could be a recovery site. Exploring formal agreements for emergency fuel and back-up generators for redundancy. During an extended power outage, the water system could operate at half capacity with the current generator once the reservoir was emptied. The City is also assessing onsite solar power for some critical facilities, which would increase resiliency.

The hospitals and many educational facilities have generators, but back-up generator needed for School District's Facility Building that is the back-up school EOC and an important distribution center. The City is also home to the largest concentration of seniors and special needs populations as well as the majority of nursing homes and other licensed long-term care and assisted living facilities. Some critical facilities in the City have generators that are powered by natural gas, which mitigates the potential for a weather-related outages or the need for emergency fuel agreements. **See long-term power outage discussion and related power generation survey results in Section III.B.**

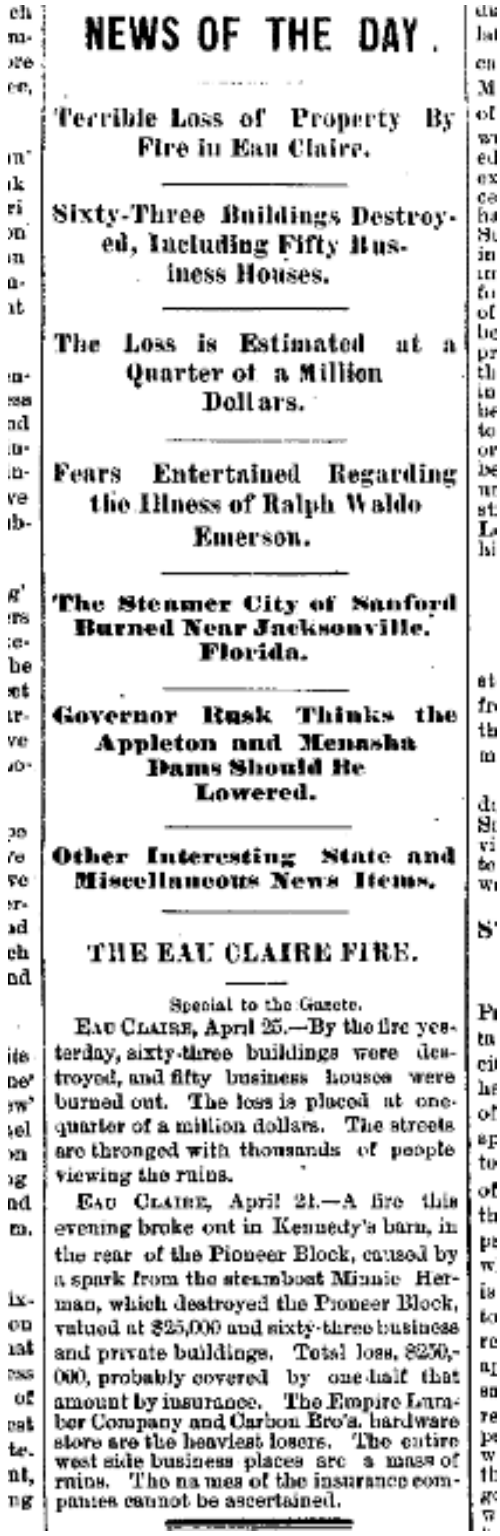
Wildfire and Drought

Historically and more recently, the large fire events within the City of Eau Claire involved the burning of buildings and industry as fuel, rather than large areas of vegetation. On May 27, 1869, a disastrous fire destroyed two blocks on the west side of Barstow Street between Main and Gibson, and one block on the east side of Barstow. The largest fire in the City of Eau Claire occurred on April 23, 1882, when three blocks of buildings situated along Water Street between Fourth and Sixth Avenues were completely destroyed (*see Janesville Daily Gazette clipping on next page*). In all, at least sixty-three buildings were burned with losses estimated in excess of $5.5 million in today's dollars. Such structural fire events are outside the scope of the wildfire events discussed in this plan. Today, large structural fire events consuming multiple blocks within the City of Eau Claire are difficult to imagine given changes in land use patterns, building codes, construction materials, fire-fighting, and emergency response in the last 150 years.

No unique drought or wildfire issues or concerns requiring action were identified, though residential development in forested areas has a higher wildfire risk. Two wildfire events within the City of Eau Claire in recent years were:

- **About 2004** A wildfire burned brush and pine plantation near the Chippewa Valley Regional Airport. No buildings were damaged.

- **April 21, 2010** A large fire near Mt. Simon worried area homeowners and destroyed about two acres of woods and



NEWS OF THE DAY.

Terrible Loss of Property By Fire in Eau Claire.

Sixty-Three Buildings Destroyed, Including Fifty Business Houses.

The Loss is Estimated at a Quarter of a Million Dollars.

Fears Entertained Regarding the Illness of Ralph Waldo Emerson.

The Steamer City of Sanford Burned Near Jacksonville, Florida.

Governor Rusk Thinks the Appleton and Menasha Dams Should Be Lowered.

Other Interesting State and Miscellaneous News Items.

THE EAU CLAIRE FIRE.

Special to the Gazette.

EAU CLAIRE, April 25.—By the fire yesterday, sixty-three buildings were destroyed, and fifty business houses were burned out. The loss is placed at one-quarter of a million dollars. The streets are thronged with thousands of people viewing the ruins.

EAU CLAIRE, April 21.—A fire this evening broke out in Kennedy's barn, in the rear of the Pioneer Block, caused by a spark from the steamboat Minnie Herman, which destroyed the Pioneer Block, valued at $25,000 and sixty-three business and private buildings. Total loss, $250,000, probably covered by one-half that amount by insurance. The Empire Lumber Company and Carbon Bro's. hardware store are the heaviest losers. The entire west side business places are a mass of ruins. The na mes of the insurance companies cannot be ascertained.

grasslands in 2010. The event took about 45 minutes to get under control and no buildings were damaged.

The following areas in the City of Eau Claire were identified by City officials as having the greatest wildfire risks during dry or droughty periods based largely on proximity to vegetative fuel types:

- Areas to the north, west, and southwest of the Chippewa Valley Regional Airport, some of which are in pine plantation.
- Southern portions of the City including the Lowes Creek area and areas which abut undeveloped unincorporated towns.
- Grasslands and forested areas north of the North Crossing.
- Sherman Creek area on City's west side.

The Putnam Park State Natural Area, which consists of 105 acres along Little Niagara Creek and adjacent to residential homes and the University of Wisconsin-Eau Claire, is dominated by wet-mesic hardwoods that reduce the wildfire risks.

Restrictions on burn barrels and debris burning reduce the City's wildfire risks, leaving incendiary and accidental ignition sources as the primary potential wildfire risks. The City's Parks Department maintains the City's parks and urban forests to help reduce the potential for wildfire. Adequate water supply for fire protection during times of drought. While WDNR has rated the City of Eau Claire as a wildfire community-of-concern, no targeted wildfire educational efforts or other mitigation activities have been proposed. As the City grows and new development occurs within the wildland-urban interface, the potential risk of wildfire will increase. Under drought conditions, more public educational and awareness may be needed, especially for those neighborhoods mentioned previously. Concerns that this risk may increase due to climate change; see Section III.C. for related discussion.

Extreme Heat

Extreme heat is a growing concern and interviewees suggested that it may be a higher risk in the City compared to more rural areas of the County due to the urban heat island effect. The City has no formally designated cooling shelters for extreme heat, but has identified potential cooling locations on occasion in the past. The City does have a sizable homeless population. Extreme heat vulnerabilities to people and critical facilities would increase during times of power loss. Some isolated buckling of roads due to heat.

Hazardous Materials (HazMat) Spills

Compared to the rest of Eau Claire County, the City is only unique in terms of hazmat risks and vulnerabilities due to its many hazard materials fixed sites (e.g., industry and hazmat facilities), its proximity to rail lines and heavy travelled trucking routes, and the concentration of residents, businesses, and critical facilities that could be impacted by a haz mat spill.

As discussed in Section II.F., there are 18 EHS Planning facilities and 21 Tier Two reporting facilities located within the City—only 9 such facilities are located outside the City. As discussed in Section III.B.x., two locations in the City were previously on the Superfund National Priority List, but have since been removed. Section III.B.x. also shows that the highest concentration of reported hazard materials spills in the County have also occurred within the City of Eau Claire. Due to the required planning and reporting at fixed sites, transportation-related spills on the railroad, Interstate 94, US Highway 53, and the North Crossing were the most frequently mentioned hazmat concern. The City is well prepared for spill response given that the Eau Claire/Chippewa Falls Fire Departments are home to one of only two Type I Regional HazMat Response Teams in the State of Wisconsin.

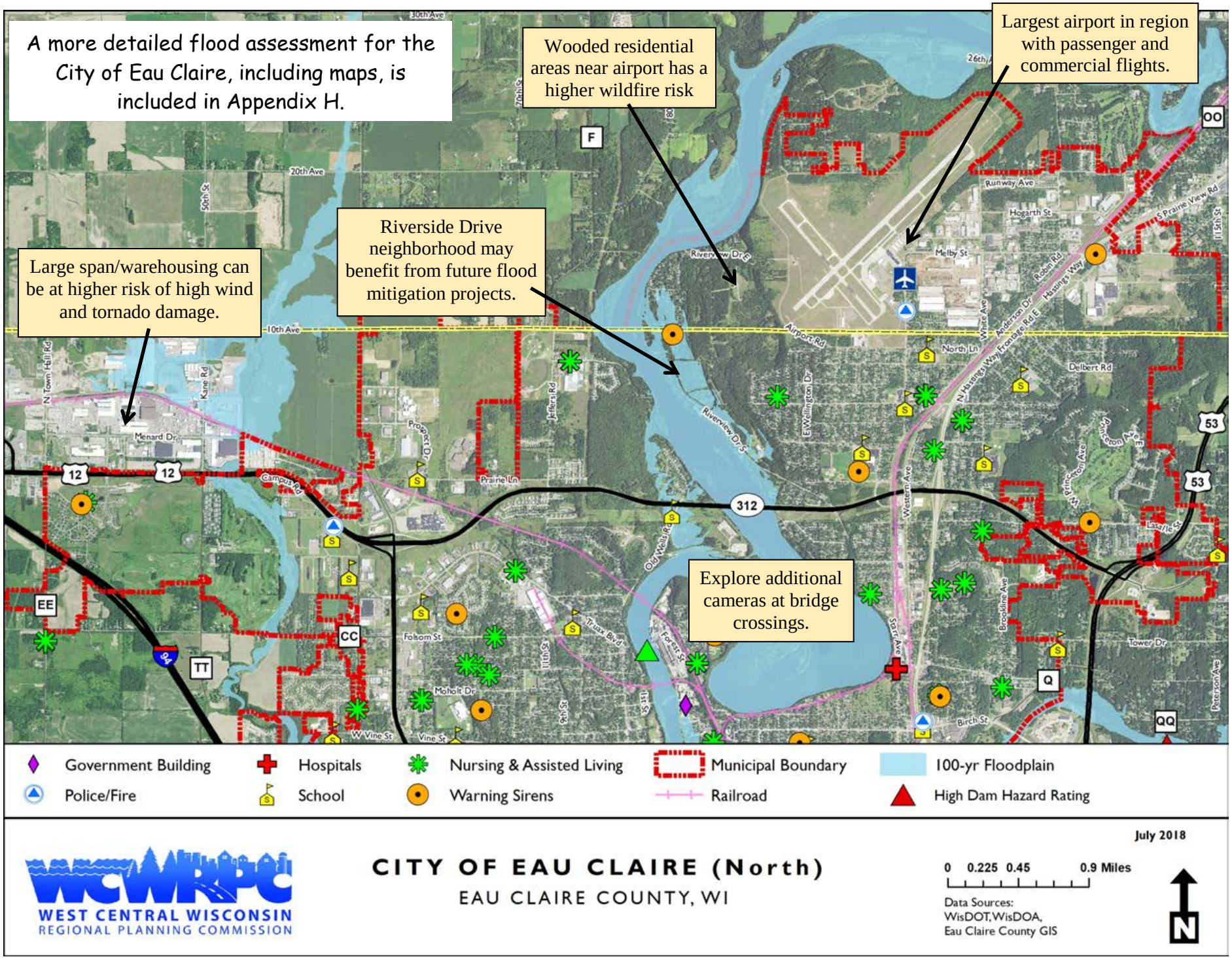
Active Threats

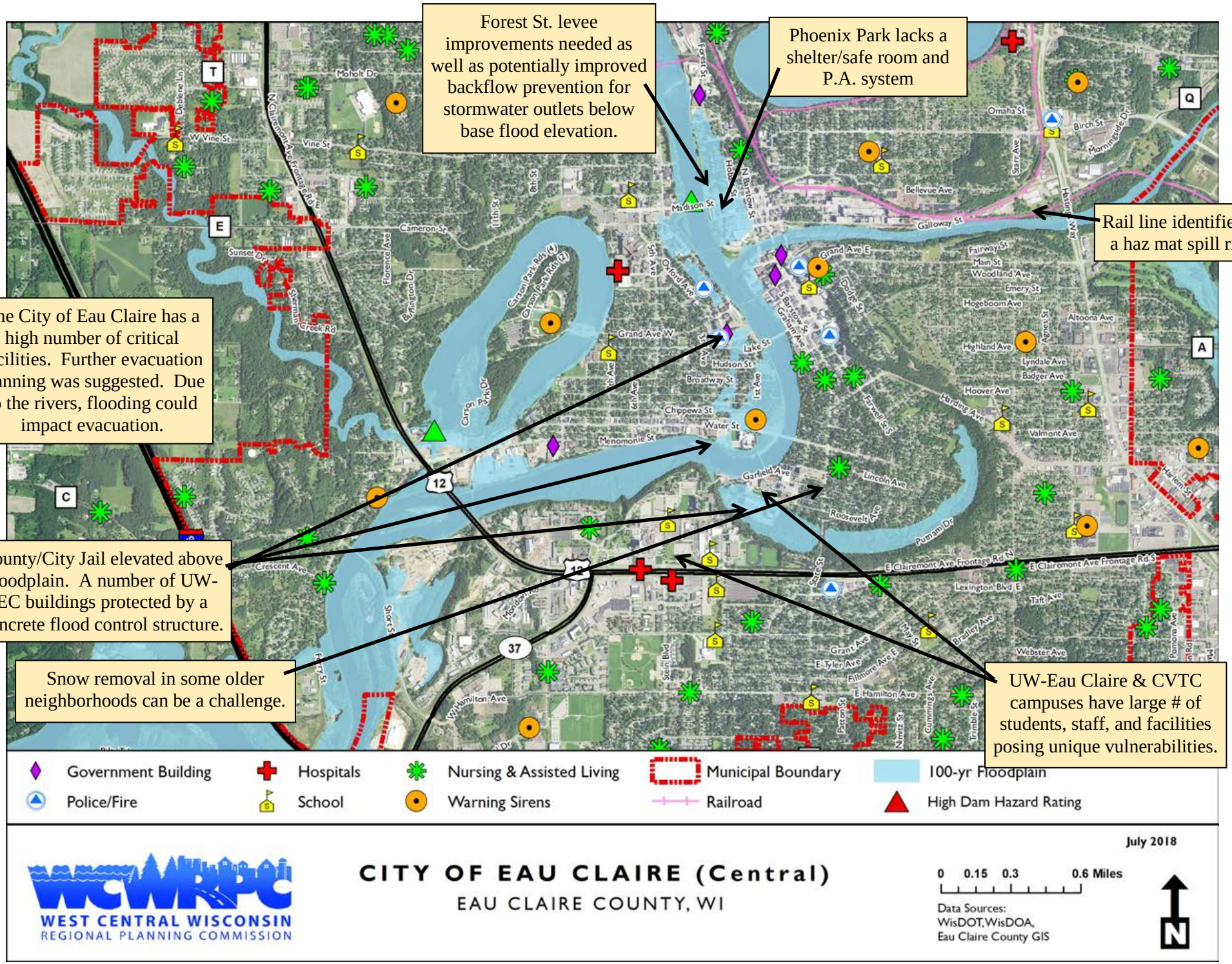
Like hazardous materials spills, the City is only unique in terms of active threat risks and vulnerabilities due to its large population, many businesses, and concentration of critical facilities. City hall, public schools, University of Wisconsin-Eau Claire, Chippewa Valley Technical College, and the hospitals were mentioned as being targets of greatest concern. Renovations underway at City Hall will increase security hardening. City has been an active member of Disaster Ready Chippewa Valley, which has partnered with local law enforcement and others to encourage active threat preparedness among area businesses. Due to national trends, there is growing concern with community gatherings (e.g. Phoenix Park), sporting events (e.g., Carson Park), and festivals as potential targets. The number of such events and gatherings within the City has been increasing exponentially.

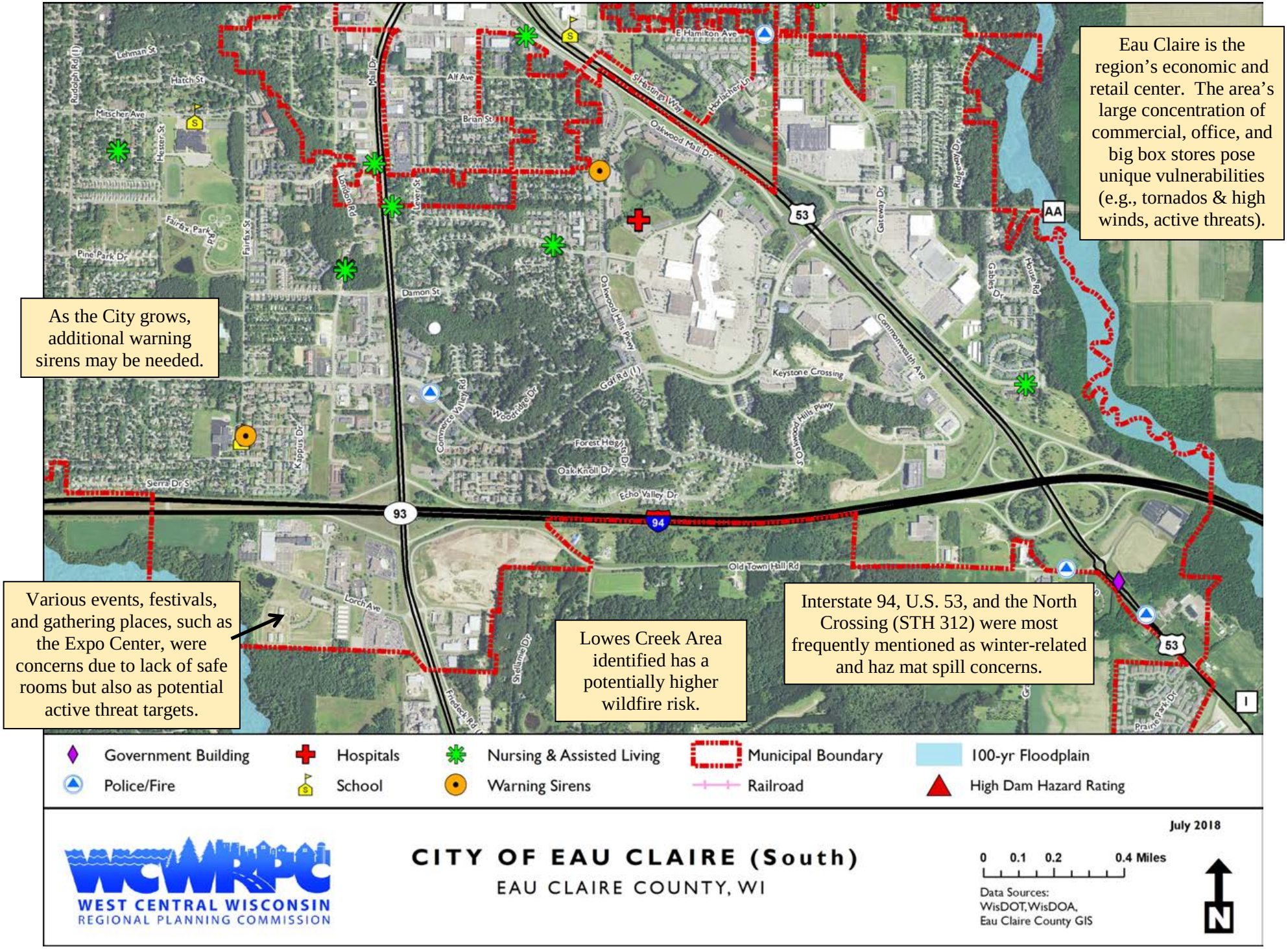
Local Government Cyber Security & Cyber Attacks

The City recognizes that cyber-attacks can potentially target city departmental data and software, communications systems, 911 Center, utilities (e.g. sewer, water, electric), river level monitoring systems, election systems, etc. Even snowplows use GPS. Growing concern as more mobile and digital; no longer need direct access.

The City has strong cyber-security policies, skilled in-house IT staff, and cyber-attack insurance coverage. City and County closely coordinates and networks, with critical apps and data back-up off site, which provides continuity while reducing any ransomware threat. Public Wi-Fi is available on a separate network than the network used for governmental functions. Public Wi-Fi___33 also provides redundancy option if cell service not available. City IT staff stressed the importance of public and employee education, partnerships, and cyber-assessment/testing for critical facilities.


A more detailed flood assessment for the City of Eau Claire, including maps, is included in Appendix H.
Wooded residential areas near airport has a higher wildfire risk
Largest airport in region with passenger and commercial flights.
Riverside Drive neighborhood may benefit from future flood mitigation projects.
Large span/warehousing can be at higher risk of high wind and tornado damage.
Explore additional cameras at bridge crossings.
Government Building
Police/Fire
Hospitals
School
Nursing & Assisted Living
Warning Sirens
Municipal Boundary
Railroad
100-yr Floodplain
High Dam Hazard Rating
WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION
CITY OF EAU CLAIRE (North)
EAU CLAIRE COUNTY, WI
July 2018
0 0.225 0.45 0.9 Miles
Data Sources: WisDOT, WisDOA, Eau Claire County GIS
N


Forest St. levee improvements needed as well as potentially improved backflow prevention for stormwater outlets below base flood elevation.
Phoenix Park lacks a shelter/safe room and P.A. system
Rail line identified as a haz mat spill risk.
The City of Eau Claire has a high number of critical facilities. Further evacuation planning was suggested. Due to the rivers, flooding could impact evacuation.
County/City Jail elevated above floodplain. A number of UW-EC buildings protected by a concrete flood control structure.
Snow removal in some older neighborhoods can be a challenge.
UW-Eau Claire & CVTC campuses have large # of students, staff, and facilities posing unique vulnerabilities.
Government Building
Hospitals
Nursing & Assisted Living
Municipal Boundary
100-yr Floodplain
Police/Fire
School
Warning Sirens
Railroad
High Dam Hazard Rating
July 2018
WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION
CITY OF EAU CLAIRE (Central)
EAU CLAIRE COUNTY, WI
0 0.15 0.3 0.6 Miles
Data Sources: WisDOT, WisDOA, Eau Claire County GIS
N


Eau Claire is the region's economic and retail center. The area's large concentration of commercial, office, and big box stores pose unique vulnerabilities (e.g., tornados & high winds, active threats).
As the City grows, additional warning sirens may be needed.
Various events, festivals, and gathering places, such as the Expo Center, were concerns due to lack of safe rooms but also as potential active threat targets.
Lowes Creek Area identified has a potentially higher wildfire risk.
Interstate 94, U.S. 53, and the North Crossing (STH 312) were most frequently mentioned as winter-related and haz mat spill concerns.
Government Building
Police/Fire
Hospitals
School
Nursing & Assisted Living
Warning Sirens
Municipal Boundary
Railroad
100-yr Floodplain
High Dam Hazard Rating
WEST CENTRAL WISCONSIN REGIONAL PLANNING COMMISSION
CITY OF EAU CLAIRE (South)
EAU CLAIRE COUNTY, WI
July 2018
0 0.1 0.2 0.4 Miles
Data Sources: WisDOT, WisDOA, Eau Claire County GIS
N

APPENDIX G.

HAZARD MITIGATION ACTIVITIES BY INCORPORATED COMMUNITY

Key Mitigation Activities for Incorporated Areas of Eau Claire County

Municipality	Planning and Regulatory	Community Safe Rooms (Public Storm Shelter)	Floodplain Zoning, Management, and Mitigation	Emergency Operations Plan, ICS, and Training	Communication and Notification Systems/Sirens	Mutual aid, Partnerships, and Other Activities & Notes
Village of Fairchild	Comprehensive plan adopted. Not zoned. Low development pressure, so limited regulations.	No community safe room(s) designated. Largest need would be on east/northeast side of community near campground, park, and mobile home park.	Did not update floodplain zoning ordinance based on newer models and incorporating the map updates, so not NFIP participating. Discuss with current Village Board. Some stormwater and culvert improvements completed in last decade. No significant flood mitigation projects proposed.	Update to emergency operating plan needed. No specific training needs noted by the community.	Newer siren with good coverage. Emergency services radio coverage lacks redundancy for SE part of County; relies on tower near Fall Creek. FirstNet may provide solution.	Mutual aid in good shape. With closure of elementary school, uncertain of its availability as a Red Cross recovery shelter. Availability of volunteers and related training are critical challenges for Fire Department.
Village of Fall Creek	Comprehensive plan, zoning, official mapping, and subdivision regulations in place with stormwater management requirements. Some limited continuity of government planning, such as doing data back-ups.	No public shelter, but most residential buildings (including CBRFs) have basements or designated safe areas, so no community safe room needs. Village Hall designated as a Red Cross recovery shelter if needed.	Floodplain ordinance enforced. No issues noted. Wastewater treatment plan previously relocated out of the floodplain. Past overland/flash flooding problem areas have been addressed. Dam inspected in 2010 and in good repair.	Good overall, though some additional ICS training needed for volunteer fire (ongoing process to maintain). EOP may require update to contact information and call list; has regular committee which coordinates emergency planning.	Two sirens in good repair with good coverage; may be moving one siren in future. Public works using cell phones; could use 2-way radios.	Good mutual aid. Has established the Village Hall as a recovery shelter in concert with Red Cross. Previous plan expressed a concern that during a regional disaster event, would most/all resources go to the Eau Claire urban area leaving little support for the smaller communities. Public work mutual aid agreement with Augusta using WI Rural Water model. Wisconsin Municipal Mutual Insurance Company has emergency equipment and continuity support available.
City of Altoona	Comprehensive plan, zoning, official mapping, and subdivision regulations in place with stormwater management requirements. Land use regulations adopted to protect floodplains and sensitive areas. Accessory structures of a certain size must be anchored.	Hillcrest Estates interested in pursuing grant dollars to harden community building for use as shelter. Potential shelters available (e.g. , school, St Mary's, City Hall), but no formal designations or agreements as storm shelters; likely more for recovery. No shelters available at River Prairie and Cinder City Park; explore opportunities.	Floodplain ordinance up-to-date and enforced. Stormwater system improvements ongoing. Recommendations from 2/24/11 meeting regarding the September 2010 flooding have been integrated into the County mitigation plan update as strategies.	EOP updated. No specific training needs identified, except ongoing ICS for City staff and exercise the EOP. Evacuation planning and exercise as a possible need.	Could use 2-3 more sirens or relocation/elevation of existing sirens for better coverage (River Prairie, 10th St. Park neighborhood, lake); replaced 3 recently. Lost one at the County Shops about 10 years ago. Need to analyze coverage areas. Potential interest in a NOAA weather radio distribution project	In very good shape for mutual aid. High coordination with City of Eau Claire. MABAS adopted for fire. Has participated in Disaster Ready Chippewa Valley in the past. Encourage more GIS sharing.
City of Augusta	Comprehensive plan, subdivision ordinance, and zoning in place.	Senior/Community Center used as a public storm shelter/community safe room, but does not automatically unlock when siren activated. Portable generator available if needed. Potential need to increase public awareness of availability, perhaps in concert with severe weather awareness week. Mobile home park owner's house available as safe room for park residents.	Floodplain ordinance is up-to-date. Updating Stormwater Management Plan and utility. Old salvage yard removed from floodplain since initial mitigation plan. WWTP also moved from floodplain location to new site. Also since initial mitigation plan, significant improvements completed to stormwater systems (e.g., Bush's new management system, new culvert on Baldwin St.). Adding steep slope regulations.	Not all elected officials may be familiar with ICS, but no critical needs identified. EOP updated in 2016; should be reviewed and contact information updated if needed.	2 sirens in good repair with good City coverage. Concern expressed with the reliability of aging portable radios due to equipment failure. Public Works using cell phones and not 2-way radios. Potential interest in a NOAA weather radio distribution project.	Mutual aid in good shape. Agreement with Fall Creek for public works using the WI Rural Water model.

Key Mitigation Activities for the City of Eau Claire

The City of Eau Claire adopted a City-specific flood mitigation plan in 2002 and a City-specific natural hazard mitigation plan in 2004, which was updated in 2013. The City's mitigation plan is fully integrated into this County plan update; a separate City mitigation plan will no longer be updated.

Planning and Regulatory

Comprehensive plan, neighborhood plans, subdivision ordinance, floodplain-wetlands zoning, and zoning in place. Comprehensive plan includes sustainability and health chapter and the City is exploring additional resiliency and climate adaptation alternatives. City also has an inspections division. See floodplain management discussion below.

Community Safe Rooms (Public Storm Shelters)

No public community safe rooms exist within the City. All City municipal buildings have designated shelter areas and procedures for severe weather as well as NOAA All Hazards Radios. Likewise, most critical facilities have shelter areas and severe weather procedures, including the hospitals, school district, CVTC, and UW-Eau Claire. Public safe room needs most acute at Phoenix Park, soccer fields, and other such gathering places. Emergency action plans with severe weather procedures and sheltering are required for public events in the City, such as activities at Phoenix Park, though a safe room/shelter is not always available.

Floodplain Zoning, Management, and Mitigation

The City enforces floodplain zoning and stormwater regulations. Site-specific surveys with elevations are reviewed as part of site plan review. Like most of west-central Wisconsin, the City has serious concerns over the accuracy of NFIP 100-year floodplain boundaries in certain areas. Elevations and/or floodproofing are required if any new development/redevelopment must occur within the floodplain. Additional plans and policies important to floodplain management and mitigation include:

City of Eau Claire Comprehensive Plan

City of Eau Claire Storm Water Comprehensive Plan

City of Eau Claire Waterways Plan

various City neighborhood plans

Chippewa Falls-Eau Claire Sewer Service Area Plan (also includes City of Altoona)

The City's most pressing overbank/riverine and overland/stormwater flooding problems have also been addressed over the past 10-20 years. In the 1990s and 2000s, the City used mitigation grant funding for flood acquisition and floodproofing projects, most typically with floodprone land preserved as park or public open space. In some cases, deed restrictions have been used to limit floodplain development on non-public land. This City is continuing to explore flood acquisition and removal as an alternative to engineered solutions during benefit-cost analysis of flooding concerns. Flooding of property in the Riverview Drive area may be one such future acquisition opportunity. See **Appendix H** for more information and ongoing flood mitigation plans.

The City periodically updates its Flood Emergency Response Plan and has significant water level monitoring infrastructure. The gauge at the Grant Street Bridge is now linked to NWS for automated monitoring and cameras have been added at some bridges in the City to allow remove viewing.

Eau Claire participates in the NFIP Community Rating System (CRS) and is currently working to improve its Class 7 rating. Additional public education is planned (e.g., flyers, website, mailings to realtors & bankers). Improved site plan review data and floodplain mapping are being explored. The City has a designated floodplain manager on staff who has received ASFPM Certified Floodplain Manager (CFM) certification. The City is also

an active member of Rain to Rivers of Western Wisconsin as part of required MS4 stormwater management educational outreach. A tabletop exercise was conducted in June 2015 with Xcel Energy to test the emergency plan for the unlikely failure at Wissota Dam.

Emergency Operations Plan, ICS, and Training

The City is currently re-writing the City's Emergency Operations/Action Plan to include a debris management component. City is also working to complete a Continuity of Government Plan. Plan to exercise both documents once completed. City requires appropriate ICS training for key staff. City employees have also participated in Run-Hide-Fight active shooter training; a related drill is being considered. The City also joins other various area partners and stakeholders in training and exercises, including emergency response and/or mass casualty exercises at UW-Eau Claire, area hospitals, Eau Claire School District, and the Chippewa Valley Regional Airport. A basic evacuation plan (focused on procedures, not exact locations) exists for the City of Eau Claire. Reviewing, exercises, and potentially updating this evacuation plan, with input from various stakeholders and partners, was identified as a priority during the plan update process.

Communication and Notification Systems

The Eau Claire Emergency Communications (9-1-1) Center was established as a joint venture between the city and the county in 1970. The Eau Claire Emergency Center handles dispatching duties for the entire population of Eau Claire County, which includes the City of Eau Claire. City is continuing to partner with Eau Claire County on the update (and exercise) of the City-County Risk Communications Plan. PIO templates have been developed and are available through Sharepoint. Social media is used to encourage family emergency preparedness and inform the public. A designated City-level social media group has received ICS training. The City has an employee reference guide of Emergency Action Procedures, including topics such as severe weather, active threats, fire, chemical spills, medical emergencies, and evacuations. The City has encouraging employees and residents to sign-up for the County's RAVE mass notification system.

As discussed in the tornado assessment, the City has 20 warning sires. Most sirens are aging (20+ years) and do not have voice capability. Xcel Energy has installed 9 sirens with voice capability along the Chippewa River in Chippewa and Eau Claire counties, including one in the City of Eau Claire at the water plant. Additional siren coverage desired near airport. Phoenix Park may benefit from installation of a P.A. system for use during emergencies.

Mutual Aid, Partnerships, and Other Activities & Notes

The City has strong coordination with Eau Claire County Emergency Management and City-County Health Department with participation on various emergency planning committees and groups. Excellent coordination also exists among area law enforcement and emergency responders. Past response concerns for USH 53 bypass (transects multiple communities) was addressed in early 2018.

The Eau Claire and Chippewa Falls Fire Departments provide Type I Haz Mat response service for the region. The City was a key partner in the formation of Disaster Ready Chippewa Valley and continues to be an active member in this private-public partnership. City has also dedicated significant funding for the remediation of contaminated brownfield sites. City IT staff participate on the Regional Cyber Response Team and the Government Information Processing Association of Wisconsin (GIPAW).

APPENDIX H.

CITY OF EAU CLAIRE FLOOD ASSESSMENT

PART 1: CITY OF EAU CLAIRE FLOOD HISTORY

PART 2: 100-YEAR FLOOD ASSESSMENT

PART 3: FLOOD MITIGATION PROJECTS SINCE 2000 AND PLANNED PROJECTS

PART 2: CITY OF EAU CLAIRE FLOOD HISTORY

The City of Eau Claire has a long history of flooding. Based on historical records from the mid-1800s, Eau Claire experienced serious floods in 1838, 1847, 1855, and 1870 on the Chippewa River. As the community began to develop further, more consistent records of flooding were kept based on measurements taken from the Grand Avenue river gauge. Although the method of recording the level of the Chippewa River has changed several times, and official records were not kept before the 1938 flood, the list of flood crest heights since 1880 are shown in **Table 16** and **Figure 25**.

Table 16. Recorded Flood Levels at Grand Ave Gauge City of Eau Claire

Date		Crest Height	Year Flood
June	1880	782.0 (est.)	100 year
September	1884	785.9 (est.)	100+ year
June	1905	781.0 (est.)	50 year
September	1938	777.0	10 year
September	1941	781.6	50-100 year
September	1942	776.1	10 year
June	1943	778.7	10-50 year
April	1951	775.0	5-10 year
May	1954	778.5	10-50 year
April	1967	779.6	10-50 year
April	1971	773.1	0-10 year
March	1973	775.4	0-10 year
April	1976	773.8	0-10 year
April	1986	774.9	0-10 year
June	1993	778.9	10-50 year
April	1996	774.9	0-10 year
April	2001	774.5	0-10 year
April	2002	776.2	10 year
May	2003	773.8	0-10 year
September	2010	777.8	10-50 year
April	2011	771.1	None

Source: National Weather Service flood levels taken at the Grand Avenue river gauge. Flood stage is 773 feet mean sea level (MSL). Year flood levels from FEMA Flood Insurance Study for Eau Claire, 2/18/2009.

NOTE ON FLOOD LEVELS:

Approximate FEMA Year Flood Levels at the Grand Avenue gauge:

10 year = 776 feet

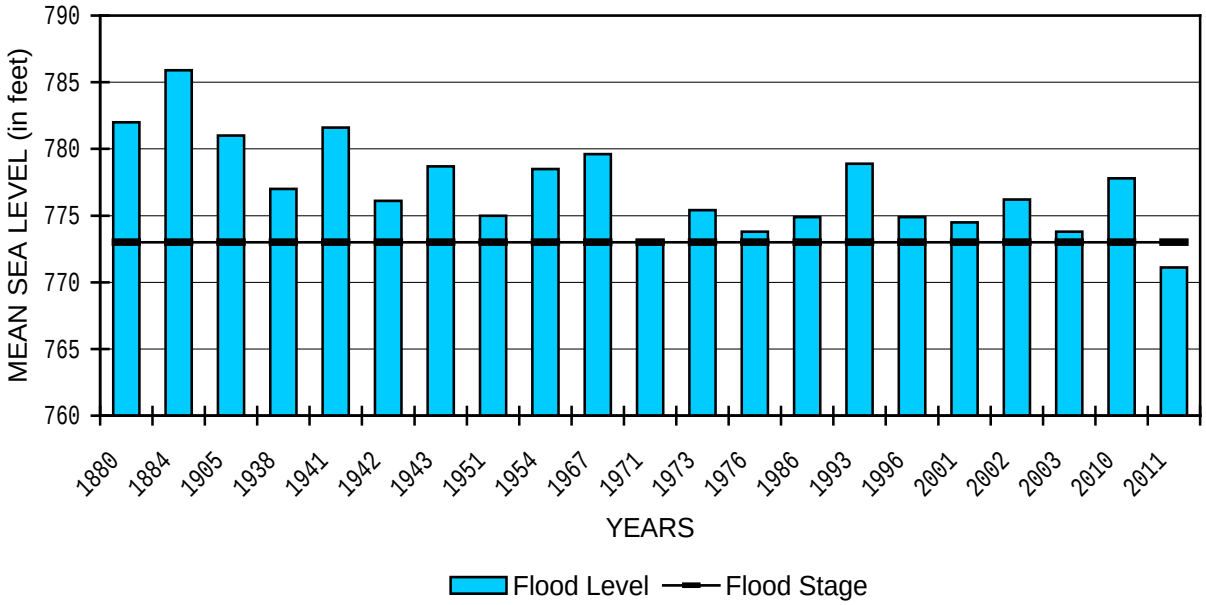
50 year = 780 feet

100 year = 781.7 feet

500 year = 787+ feet

The floods of 1880, 1884, and 1905 were made more severe due to the logging industry's use of the rivers in the region to carry logs to sawmills on the rivers. Logs along with other debris destroyed bridges and often formed jams that raised the level of the river behind them.

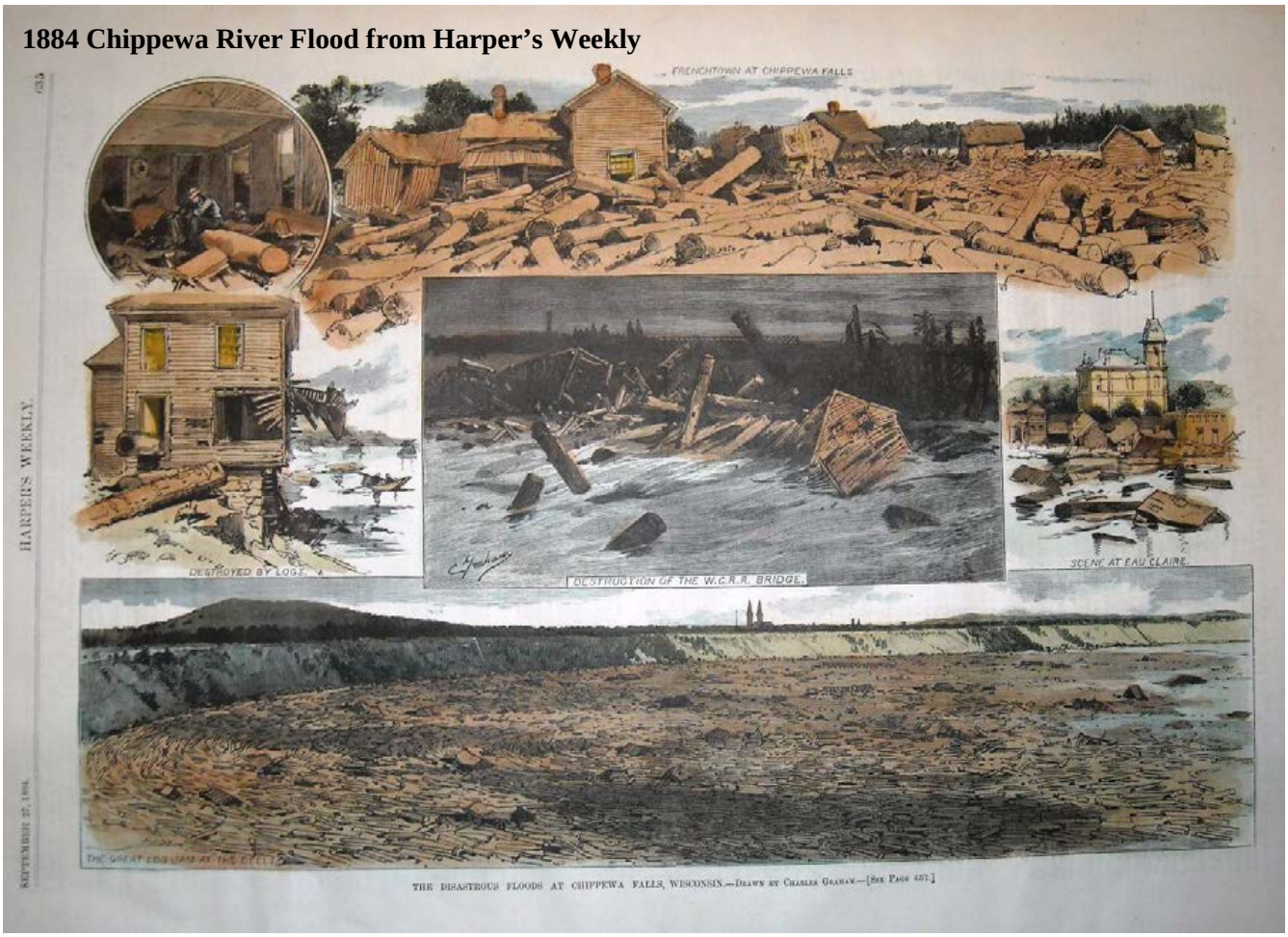
Figure 25. Recorded Flood Levels at Grand Ave Gauge



1880 Flood—A 1929 Eau Claire Telegram article described the 1880 flood as the most destructive in the City's history. "Bridges and dams on the Chippewa River, which went on a sudden rampage after a long period of rain, were carried away, and a large section of the city, including many industrial plants [and] scores of houses were inundated by the flood waters, great damages resulting". The article states that a fifth of the City was flooded. Even back then some residents were reluctant to leave their homes as the article describes an "an old Irish woman…refused to leave the shanty, which was flooded, and threatened the policeman who came to remove her with an axe."

1884 Flood—The 1884 flood was likely the largest in the City's history if unofficial records are included. It is uncertain if it was a devastating within the City of Eau Claire as the 1880 flood four-years earlier, but it did cause tremendous destruction throughout the region. Heavy rains in September 1884 resulted in the destruction of all but one bridge within the City, washed out three miles of rail lines, ruined crops, and resulted in some loss of life. Log booms broke at numerous mills releasing an estimated forty million feet of logs down the river which swept everything in their path. Homes, tenement houses, mills, businesses blocks, and landmarks were flooded, floated away, or were destroyed. The east side of the City was described as "one immense lake" and one report states that 150 homes in the City were destroyed. In today's dollars, the estimated damages in the Chippewa Valley were as high as $96 million based on an 1884 New York Times article. A 1914 history of Eau Claire County estimated damages within the City of Eau Claire at $12 million in today's dollars.

1884 Chippewa River Flood from Harper's Weekly

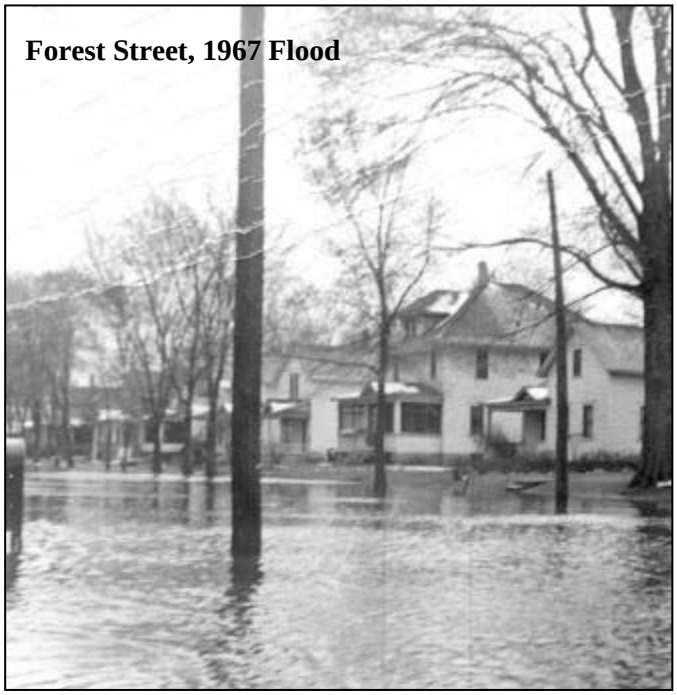


1941 Flood—The highest flood of official record occurred on September 1, 1941. The flood was caused by extremely heavy rains that fell over the region. In Hayward, fourteen inches of rainfall was recorded over 36 hours. Approximately 30 homes in the City of Eau Claire were flooded, and heavy damages occurred to businesses downtown. Industrial properties, the University, and the old wastewater treatment plant also flooded. The approaches to the Water Street and Madison Street bridges were flooded and the bridges closed. State Highway 85 was also closed.

1954 Flood—Heavy spring rains in the Chippewa and Eau Claire watersheds between April 24, and May 1, 1954 resulted in the flooding of hundreds of homes in the City of Eau Claire and flooded basements downtown. The Wisconsin State College (University of Wisconsin – Eau Claire) grounds were also flooded and Highway 85 was closed south of the city from Highway 37 to Rock Falls.

1967 Flood—The "Big Flood of 1967" was caused by unseasonably warm weather in April that resulted in extremely fast snow melting. The second highest flood recorded in the City's history, it damaged 367 homes and caused $1.5 million in damages. Flood waters covered First Avenue and flooded basements on Second Avenue; Forest and East Madison Streets were flooded; and basements were flooded in downtown businesses and on the university campus. Forty-six families were evacuated from the Forest Street area. In 1968, the Forest Street levee was constructed in an attempt to reduce future flooding in that neighborhood.

The Big Flood of 1967 was the last significant flood event to back-up Little Niagara Creek resulting in flooding of the University of Wisconsin-Eau Claire campus and southern parts of the Third Ward neighborhood east of the Chippewa River. Since that time, UW-EC has installed a pump and a levee/bulkhead at Little Niagara followed by a more recent bank stabilization about 2003. These efforts resulted in a great reduction in the flood risks for the area.


Forest Street, 1967 Flood

1980 Flood—This flood was notable due to the runoff impacts to residents along Sherman Creek, rather than along the Chippewa or Eau Claire rivers. Heavy rainfalls on June 5 and 7 produced an estimated 71-year flood on Sherman Creek. It is reported that debris build-up at bridges may have been the cause of flooding on Clairemont Avenue.

1993 Flood—The conditions for the flooding which occurred on June 20-21, 1993 were initially set by precipitation that fell over the western Wisconsin during the two weeks prior to the 21st of June. On the evening of Saturday, June 19th, extremely heavy rains of more than six inches occurred in eastern Eau Claire and western Clark Counties. This event caused the Eau Claire River to rise to record levels, with a record crest of 19.38 feet recorded at the Highway K bridge near Fall Creek on June 20th, which was the 100-year flood event. The water level at the Lake Eau Claire dam rose to its regional flood level on June 20th, 10.1 feet over its normal level. Lake Altoona also rose to the regional flood level.

The flooding in June 1993 brought a new realization that the Eau Claire River could also cause significant flooding problems in Eau Claire. Previously it was generally believed that the Chippewa River was the primary river of concern. The event is estimated to have been a 100-year flood on the Eau Claire River, but only a 40-year flood on the Chippewa River.

In addition, the Chippewa River also began to rise to flood levels. On June 18th the level of the river was at 764.95 feet MSL, as measured at the Grand Avenue Bridge located near the confluence of the Chippewa and Eau Claire Rivers. By 4:00 p.m., June 20th, the river had risen above flood stage and continued rising throughout the next day to crest at 778.9 feet at 10:50 p.m. on Monday, June 21st.

The 1993 flood would be third highest official flood on record. Residents nicknamed it the "Great Flood". The total flood damage suffered in Eau Claire County was estimated at over $10 million, with $3.1 million in damage to private property, including over 250 homes and over 50 businesses, $1.75 million in damages to public facilities, and $5.3 million in agricultural losses. The County was declared a Federal disaster areas. Flooding in the city affected nearly 200 residential and commercial properties with basement flooding in 75 structures. In addition, the city experienced damage to various

public properties including local streets, bike trails, park facilities, and water and sewer facilities. Estimated damages and flood fighting costs within the City was estimated at about $1.2 million in today's dollars.

Much of the 1993 flood damage in the City occurred along First Avenue next to Owen Park and along Forest Street, shown in **Figure 26**. Several businesses suffered flooding along Graham Avenue downtown, in the East Madison Street area, and along the north bank of the Eau Claire River where it enters the Chippewa River.

The City began concerted flood mitigation efforts following the 1993 flood when it acquired 50 properties in the five-block Forest Street neighborhood with FEMA mitigation grant financial support and in the context of a downtown revitalization strategy. The Forest Street neighborhood had been flooded on a near annual basis and many of the homes were deteriorating from successive flooding and age. The City also chose to focus on this area due to the 100-percent participation of the property owners.

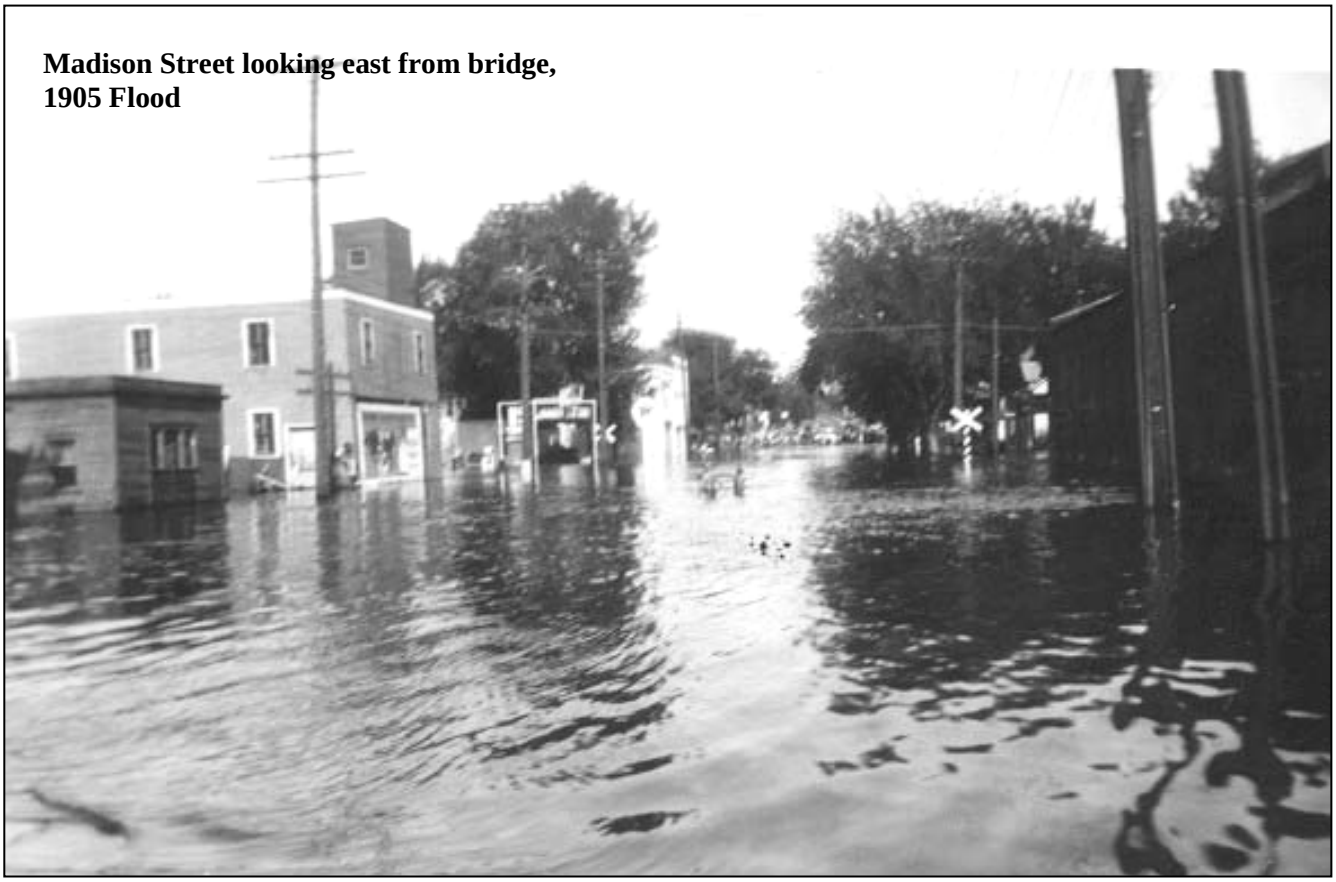
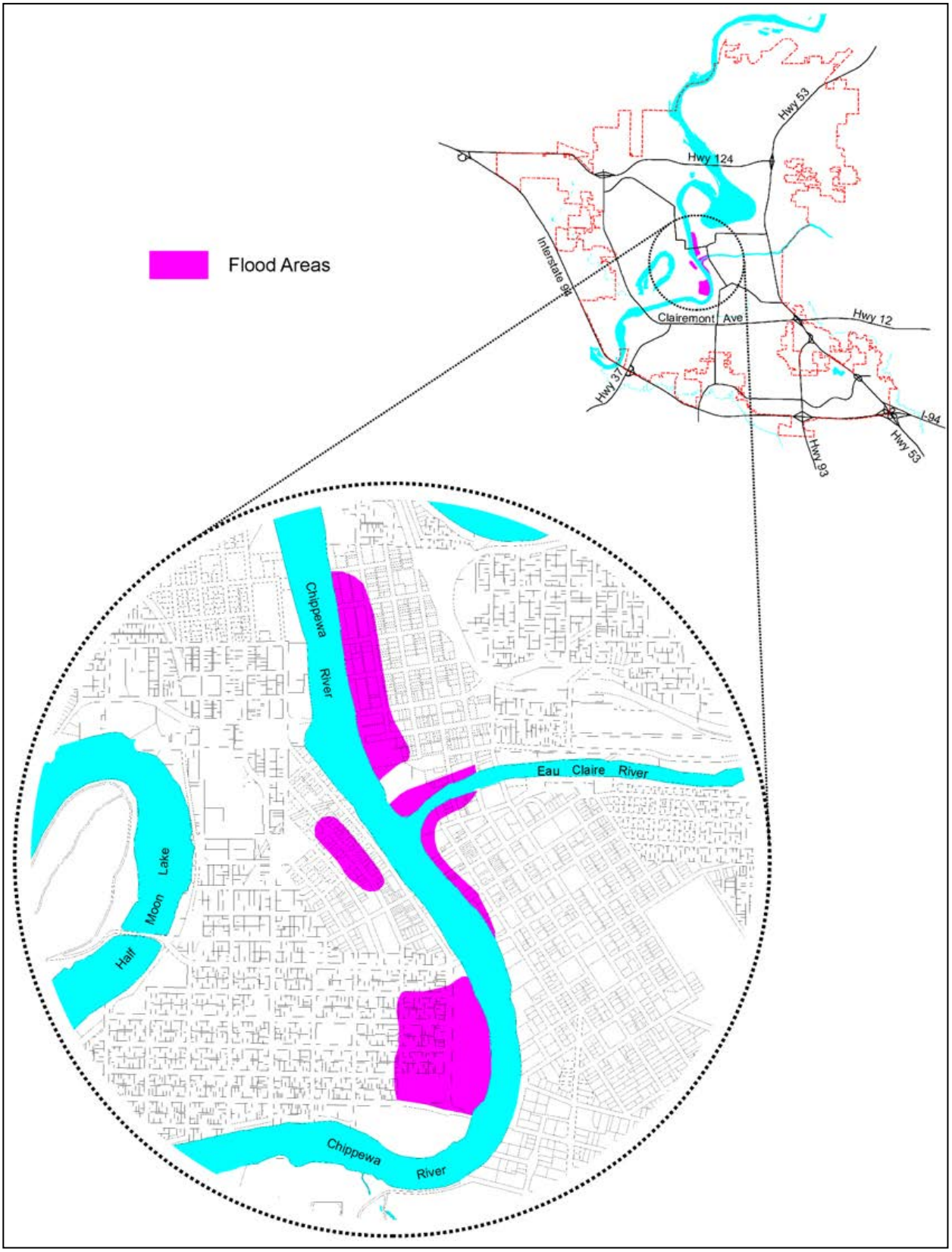


Figure 26. June 1993 Flood Damaged Areas



2000 Flood—The September 10-11, 2000 flood event was somewhat unique in that it was not riverine flooding, but was overland flooding due to heavy rains that were unable to drain properly due to a lack of natural drainage and/or adequate public facilities. The flooding resulted in damage to more than 50 locations throughout the City, shown in **Figure 27**. Three homes were destroyed, nineteen received major damage, and 351 received minor damage. There was one motorist fatality and about $5 million in personal property damage. Weather data from the Chippewa Valley Regional Airport show that this storm event resulted in nearly eight inches of total rainfall in a 24-hour period, of which approximately six inches fell in a four-hour period before midnight, shown in **Table 17**. Because the City received at least six inches of rain within a 24-hour period, this storm is considered a 100-year rainstorm. September 10th is the City's single calendar-day rainfall record with 5.98 inches.

Figure 27. September 2000 Flood Damaged Areas (shown in purple)

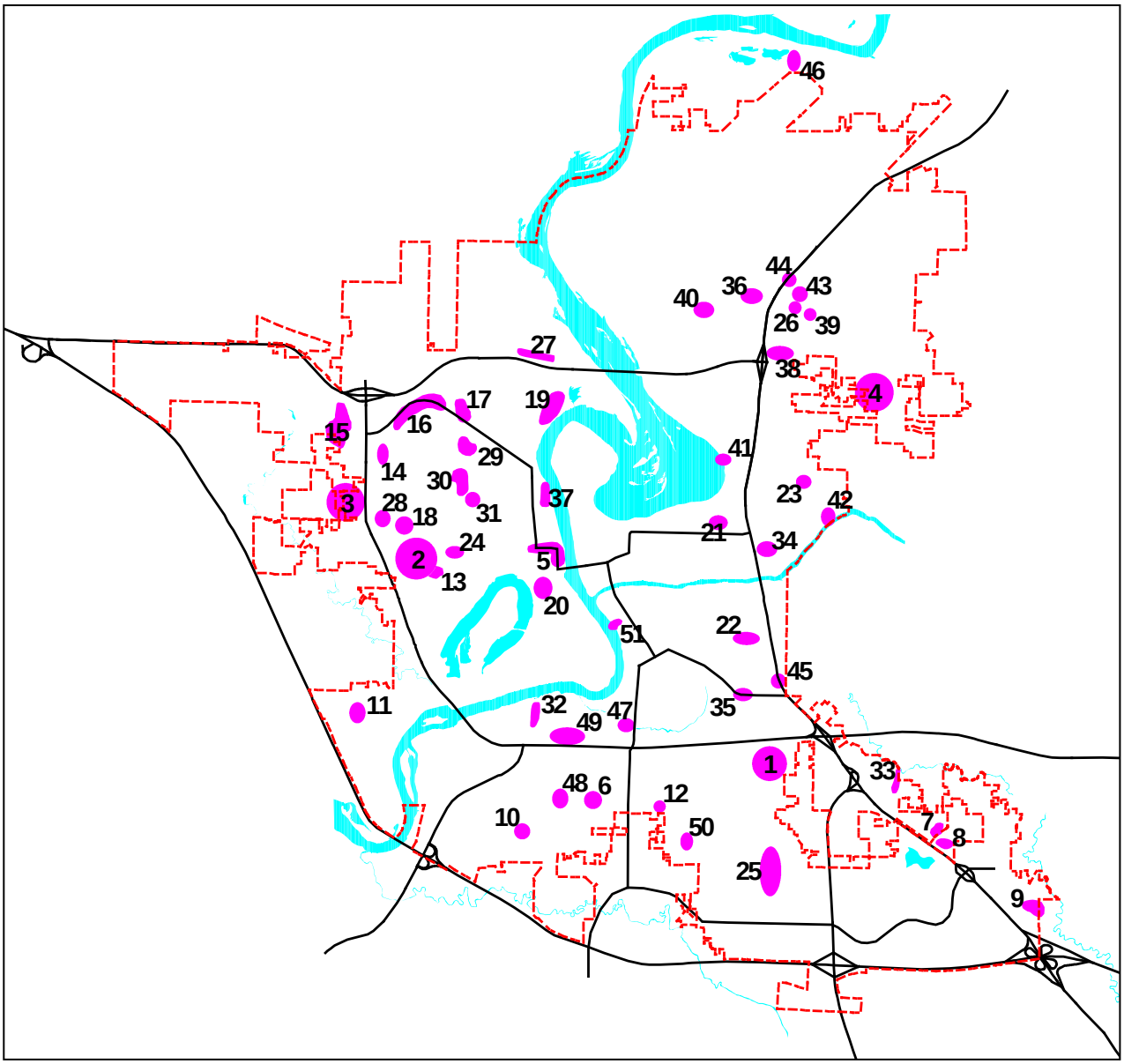


Table 17. Recorded Precipitation • September 10-11, 2000
Chippewa Valley Regional Airport

Date	Time	Rainfall (inches)	Cumulative Rainfall
September 10, 2000	7:00 – 8:00 p.m.	0.01	0.01
	8:00 – 9:00 p.m.	1.65	1.66
	9:00 – 10:00 p.m.	1.04	2.70
	10:00 – 11:00 p.m.	2.08	4.78
	11:00 – 12:00 a.m.	1.20	5.98
September 11, 2000	12:00 – 1:00 a.m.	0.03	6.01
	1:00 – 2:00 a.m.	0.93	6.94
	2:00 – 3:00 a.m.	0.65	7.59
	3:00 – 4:00 a.m.	0.01	7.60
	3:00 – 4:00 p.m.	0.30	7.90
Total Rainfall (24-hour period)		7.90	

Source: Chippewa Valley Regional Airport, September 10-11, 2000

Although this storm affected property throughout Eau Claire, there were four main areas that were identified as having significant amounts of damage and the highest priority for making improvements. Two of these areas were located on the west side of Eau Claire near the intersections of Kohlhepp/Dorret (#3) and Florence/Necessity/Bell (#2), another in the southeast around the intersection of Taft/Kay streets (#1), and the fourth around the intersection of LaSalle/Gooder (#4) in northeast Eau Claire. To address the drainage issues in these areas, the City hired a consulting firm to analyze the problems and recommend solutions for each of the areas which produced the Barr engineering report. In addition, the City reviewed each of the remaining areas.

Based on this analysis and review the City prepared a report of proposed mitigation projects for each of the areas which was incorporated into the City's 2002 flood mitigation plan. Recommended mitigation projects included floodplain acquisition, floodproofing, and stormwater system improvements. These projects are discussed a little later in this section.

2010 Floods—The City of Eau Claire experienced both overland and riverine flooding events in 2010. In June, heavy rains in northern Wisconsin caused the Chippewa River to swell, though flooding within the City of Eau Claire was minimal. Heavy rains on July 14 dislodged manhole covers and flooded streets in low lying areas. Flash flooding due to heavy rains struck the region on August 11th. Nearly ten inches of water on Hastings Way was report. The most significant flooding of the year occurred on September 26th when a swollen Chippewa River crested at 777.5 feet making it the sixth highest of record. Rising water and backed-up storm sewers led to street closures and flooding in a number of areas, such as along First Avenue and Chippewa Street, Bowles an 11th Street, and Brackett Avenue and Hastings Way.

The 2010 flooding event would prove the effectiveness of the City's past mitigation efforts. Though the flood was the sixth highest on record, there were no widespread damage and no buildings were underwater. After assessing the flood, the National Weather Service raised the major flood stage at the Grand Avenue gauge from 777 to 778. A true mitigation success story!

2011 Flood—Four inches of rain in two hours drenched the City on June 18th resulting in widespread overland flooding. As the rain continued and a flash flood warning issued, several streets were flooded leaving some drivers stranded. A mudslide on Interstate 94 in the Town of Union caused three accidents, though no injuries were reported. The roof of a commercial strip mall collapsed under the sudden weight of the water. Manhole covers were blown off by the rushing water in several areas, including the 200 block of North Clairemont Avenue, South Farwell and Main streets, and Omaha and Churchill streets. The flooding on Clairemont backed up into the basement of Chippewa Valley Technical College's administrative/business building. Though floodwaters did not exceed 6 inches, significant damage occurred to office contents, walls, carpets, and the bookstore.

September 2016—Thunderstorms produced very heavy rainfall (5" to 8" in areas) resulting in flash flooding across the region. A mudslide also occurred near Highway 53 on the north side of Eau Claire. Within the City of Eau Claire, 45 homes and businesses sustained minor damage and 5 major damage due to flood waters. The Red Cross assisted those displaced in the City of Eau Claire and surrounding communities.

PART 2: 100-YEAR FLOOD ASSESSMENT

The City of Eau Claire flood assessment was performed by the City of Eau Claire GIS Administrator in close consultation with WCWRPC staff. The City of Eau Claire flood assessment methodology was similar to the county-level assessment explained in Appendix B, with the following notes or differences:

- The City of Eau Claire now has more accurate topographical data available based on a 2013 flight and has produced a flood inundation analysis based on these contours. The City considers the City's digital terrain model (DTM) to be more accurate than the elevation data used for the D-FIRMs and has relied on its own flood analysis using the FIRM flood elevations and the City's DTM to provide a more accurate representation of flood vulnerabilities.
- The City of Eau Claire has more detailed GIS data for buildings, including building footprints and structure characteristics (e.g., basement, # of stories). The City also benefits from engineered floodplain boundaries (Zone AE) for most of the community.
- For improved parcels intersecting the 100-year floodplain, principal structures intersecting the floodplain were identified, excluding 27 parcels/structures for which LOMRs have been approved. Due to flood control measures, LOMRs, and more accurate data, the 100-year floodplain effectively has "pockets in the polygon" compared to past flood assessments for the City.
- For potential floodplain structures, a one-foot buffer was created around all principal structures then using LIDAR-based contour intervals, an average elevation of the structure was determined. This ground floor elevation was then compared to the base flood elevation to determine flood depth.
- Flood depths, building characteristics (e.g., with/without basement, # of stories), and assessed improvement values were then used to estimate % structure damage using the general depth-damage tables within the October 10, 2003, Army Corps of Engineers Economic Guidance Memorandum. When using the tables, depths were rounded to the nearest foot. These tables were used regardless of building type (e.g., residential, commercial, manufacturing). Consistent with FEMA's HAZUS approach, content damage was estimated at 50% of the structure damage/replacement value.
- For the City of Eau Claire, WCWRPC provided damage estimates in the following table for the exempt properties based on the specific type of exempt structure (e.g., office, school, health care), the square footage of the structure, and 2006 R.S. Mean cost per square foot adjusted for inflation.

A total of 302 structures potentially located within the 100-year floodplain were identified using the above approach and are reflected in the following table. The summary results of this table, including a map showing the locations of these structures, are included in Section III.B.i. of the main report. This excludes structures, such as the concentration in the Third Ward, that are protected from flooding by stormwater system management, such as the University of Wisconsin – Eau Claire Flood Gate on Little Niagra Creek and using hydraulic plugs to prevent the backflow of floodwaters through the storm water conveyance system. If these preventative measures are taken, many of these structures would not experience flooding during a typical 100-year riverine flood event.

INDEX NO.	GENERAL LAND USE	NO. OF STORIES	BASEMENT?	BASE FLOOD ELEVATION	GROUND FLOOR ELEVATION	FLOOD DEPTH (IN FT)	ASSESSED IMPROVEMENTS	% STRUCTURE DAMAGE	% CONTENT DAMAGE	STRUCTURE DAMAGES	CONTENT DAMAGES	TOTAL DAMAGES
1	COMMERCIAL		No	773.8	781.35	-7.55	$1,230,000	0	50	$0	$0	$0.00
2	COMMERCIAL		No	774.5	778.69	-4.19	$1,750,000	0	50	$0	$0	$0.00
3	COMMERCIAL		No	774.5	778.58	-4.08	$1,750,000	0	50	$0	$0	$0.00
4	COMMERCIAL		No	774.5	777.8	-3.3	$1,750,000	0	50	$0	$0	$0.00
5	COMMERCIAL		No	775	776.53	-1.53	$470,000	0	50	$0	$0	$0.00
6	COMMERCIAL		No	774.5	779.25	-4.75	$1,750,000	0	50	$0	$0	$0.00
7	COMMERCIAL		No	774.5	778.93	-4.43	$1,750,000	0	50	$0	$0	$0.00
8	MANUFACTURING		No	775	780	-5	$856,200	0	50	$0	$0	$0.00
9	EXEMPT	2	No	778	780.78	-2.78	$7,607,789	0	50	$0	$0	$0.00
10	EXEMPT	4	No	778	779.87	-1.87	$5,905,183	0	50	$0	$0	$0.00
11	COMMERCIAL		No	781	780.55	0.45	$145,000	13.4	50	$19,430	$9,715	$29,145.00
12	COMMERCIAL		No	781	777.69	3.31	$625,000	40.1	50	$250,625	$125,313	$375,937.50
13	COMMERCIAL		No	781	779.87	1.13	$314,000	23.3	50	$73,162	$36,581	$109,743.00
14	COMMERCIAL		No	781	779.3	1.7	$760,000	32.1	50	$243,960	$121,980	$365,940.00
15	COMMERCIAL		No	781	781.14	-0.14	$315,000	13.4	50	$42,210	$21,105	$63,315.00
16	RESIDENTIAL	2	Yes	782.3	780.64	1.66	$67,400	27	50	$18,198	$9,099	$27,297.00
17	COMMERCIAL		No	781	778.12	2.88	$328,000	40.1	50	$131,528	$65,764	$197,292.00
18	COMMERCIAL		No	781	781.93	-0.93	$495,000	2.5	50	$12,375	$6,188	$18,562.50
19	RESIDENTIAL	2	Yes	778	778.71	-0.71	$97,200	13.9	50	$13,511	$6,755	$20,266.20
20	COMMERCIAL		No	778	777.93	0.07	$310,000	13.4	50	$41,540	$20,770	$62,310.00
21	COMMERCIAL		No	780.4	779.3	1.1	$68,000	23.3	50	$15,844	$7,922	$23,766.00
22	COMMERCIAL		No	780.4	779.04	1.36	$68,000	23.3	50	$15,844	$7,922	$23,766.00
23	COMMERCIAL		No	780.4	779.14	1.26	$68,000	23.3	50	$15,844	$7,922	$23,766.00
24	COMMERCIAL		No	780.4	779.38	1.02	$68,000	23.3	50	$15,844	$7,922	$23,766.00
25	RESIDENTIAL	1	Yes	780.4	779.41	0.99	$73,100	32	50	$23,392	$11,696	$35,088.00
26	RESIDENTIAL	2	Yes	780.5	779.46	1.04	$310,100	22.3	50	$69,152	$34,576	$103,728.45
27	COMMERCIAL		No	780.5	779.35	1.15	$68,000	23.3	50	$15,844	$7,922	$23,766.00
28	RESIDENTIAL	2	Yes	780.5	779.64	0.86	$310,100	22.3	50	$69,152	$34,576	$103,728.45
29	RESIDENTIAL	2	Yes	780.5	776.64	3.86	$190,000	36.9	50	$70,110	$35,055	$105,165.00
30	RESIDENTIAL	1H	Yes	780.5	777.12	3.38	$123,000	45.5	50	$55,965	$27,983	$83,947.50
31	RESIDENTIAL	1H	Yes	780.5	777.48	3.02	$98,000	45.5	50	$44,590	$22,295	$66,885.00
32	RESIDENTIAL	1	Yes	780.5	779.94	0.56	$167,000	32	50	$53,440	$26,720	$80,160.00
33	RESIDENTIAL	2	Yes	780.5	779.05	1.45	$123,000	22.3	50	$27,429	$13,715	$41,143.50
34	RESIDENTIAL	2	Yes	780.5	778.92	1.58	$139,000	27	50	$37,530	$18,765	$56,295.00
35	RESIDENTIAL	2	Yes	780.5	779.08	1.42	$139,000	22.3	50	$30,997	$15,499	$46,495.50
36	RESIDENTIAL	1H	Yes	780.5	778.91	1.59	$105,000	38.7	50	$40,635	$20,318	$60,952.50
37	RESIDENTIAL	2	Yes	780.5	781.2	-0.7	$169,000	13.9	50	$23,491	$11,746	$35,236.50
38	RESIDENTIAL	2	Yes	780.5	782.22	-1.72	$105,000	10.2	50	$10,710	$5,355	$16,065.00
39	RESIDENTIAL	2	Yes	780.5	779.62	0.88	$160,000	22.3	50	$35,680	$17,840	$53,520.00
40	COMMERCIAL		No	780.5	778.23	2.27	$302,000	32.1	50	$96,942	$48,471	$145,413.00
41	RESIDENTIAL	2	Yes	780.5	780.17	0.33	$104,000	17.9	50	$18,616	$9,308	$27,924.00
42	RESIDENTIAL	2	Yes	780.5	779.79	0.71	$175,000	22.3	50	$39,025	$19,513	$58,537.50
43	RESIDENTIAL	1	Yes	780.5	779.92	0.58	$73,700	32	50	$23,584	$11,792	$35,376.00
44	RESIDENTIAL	2	Yes	780.5	779.82	0.68	$120,000	22.3	50	$26,760	$13,380	$40,140.00
45	RESIDENTIAL		No	780.5	780	0.5	$180,000	23.3	50	$41,940	$20,970	$62,910.00
46	RESIDENTIAL	1H	Yes	780.5	777.41	3.09	$110,000	45.5	50	$50,050	$25,025	$75,075.00
47	RESIDENTIAL	1	Yes	780.5	776.63	3.87	$120,000	52.2	50	$62,640	$31,320	$93,960.00
48	RESIDENTIAL	1	Yes	780.5	777.51	2.99	$72,700	45.5	50	$33,079	$16,539	$49,617.75
49	COMMERCIAL		No	780.5	781.9	-1.4	$308,000	2.5	50	$7,700	$3,850	$11,550.00
50	RESIDENTIAL	1	Yes	780.5	778.49	2.01	$70,000	38.7	50	$27,090	$13,545	$40,635.00
51	RESIDENTIAL	1	Yes	780.5	778.95	1.55	$70,000	38.7	50	$27,090	$13,545	$40,635.00
52	RESIDENTIAL	2	Yes	780.6	778.6	2	$120,000	27	50	$32,400	$16,200	$48,600.00
53	RESIDENTIAL	2	No	780.6	779.84	0.76	$159,000	15.2	50	$24,168	$12,084	$36,252.00
54	RESIDENTIAL	2	Yes	780.6	779.76	0.84	$117,000	22.3	50	$26,091	$13,046	$39,136.50
55	RESIDENTIAL	2	Yes	780.6	779.3	1.3	$117,000	22.3	50	$26,091	$13,046	$39,136.50
56	RESIDENTIAL	1	Yes	780.8	780.14	0.66	$86,600	32	50	$27,712	$13,856	$41,568.00
57	RESIDENTIAL	1A	Yes	780.8	779.9	0.9	$113,000	32	50	$36,160	$18,080	$54,240.00
58	RESIDENTIAL	1H	Yes	780.8	779.9	0.9	$107,000	32	50	$34,240	$17,120	$51,360.00
59	RESIDENTIAL	2	Yes	780.8	781.17	-0.37	$100,400	17.9	50	$17,972	$8,986	$26,957.40
60	RESIDENTIAL	2	Yes	780.8	780.65	0.15	$179,000	17.9	50	$32,041	$16,021	$48,061.50
61	RESIDENTIAL	1H	Yes	780.8	778.62	2.18	$125,000	38.7	50	$48,375	$24,188	$72,562.50
62	RESIDENTIAL	2	Yes	780.8	779.14	1.66	$157,000	27	50	$42,390	$21,195	$63,585.00
63	RESIDENTIAL	2	Yes	780.8	779.34	1.46	$230,800	22.3	50	$51,468	$25,734	$77,202.60
64	RESIDENTIAL	1	Yes	781	778.85	2.15	$35,000	38.7	50	$13,545	$6,773	$20,317.50
65	RESIDENTIAL	2	Yes	781.5	779.53	1.97	$155,000	27	50	$41,850	$20,925	$62,775.00
66	RESIDENTIAL	1	Yes	781	779.28	1.72	$150,000	38.7	50	$58,050	$29,025	$87,075.00
67	RESIDENTIAL	1A	Yes	780.8	778.57	2.23	$94,000	38.7	50	$36,378	$18,189	$54,567.00
68	RESIDENTIAL	2	Yes	780.8	779.2	1.6	$150,000	27	50	$40,500	$20,250	$60,750.00
70	RESIDENTIAL	2	Yes	781.5	779.85	1.65	$119,900	27	50	$32,373	$16,187	$48,559.50
71	RESIDENTIAL	2	Yes	781.5	779.35	2.15	$116,100	27	50	$31,347	$15,674	$47,020.50
72	RESIDENTIAL	1H	Yes	781.5	779.11	2.39	$116,100	38.7	50	$44,931	$22,465	$67,396.05
73	RESIDENTIAL	1H	Yes	781.5	779.53	1.97	$125,000	38.7	50	$48,375	$24,188	$72,562.50
74	RESIDENTIAL	2	Yes	781.5	780.02	1.48	$125,000	22.3	50	$27,875	$13,938	$41,812.50
75	RESIDENTIAL	2	Yes	781.5	780.85	0.65	$108,000	22.3	50	$24,084	$12,042	$36,126.00

INDEX NO.	GENERAL LAND USE	NO. OF STORIES	BASEMENT?	BASE FLOOD ELEVATION	GROUND FLOOR ELEVATION	FLOOD DEPTH (IN FT)	ASSESSED IMPROVEMENTS	% STRUCTURE DAMAGE	% CONTENT DAMAGE	STRUCTURE DAMAGES	CONTENT DAMAGES	TOTAL DAMAGES
76	RESIDENTIAL	2	No	781.4	782.47	-1.07	$185,000	3	50	$5,550	$2,775	$8,325.00
77	RESIDENTIAL	2	Yes	781.4	780.53	0.87	$130,000	22.3	50	$28,990	$14,495	$43,485.00
78	RESIDENTIAL	1A	Yes	781.4	780.86	0.54	$163,000	32	50	$52,160	$26,080	$78,240.00
79	RESIDENTIAL	1A	Yes	781.5	780.15	1.35	$145,000	32	50	$46,400	$23,200	$69,600.00
80	RESIDENTIAL	1	Yes	781.5	779.78	1.72	$120,000	38.7	50	$46,440	$23,220	$69,660.00
81	RESIDENTIAL	1H	Yes	781.5	780.18	1.32	$128,500	32	50	$41,120	$20,560	$61,680.00
82	RESIDENTIAL	2	Yes	781.5	780.46	1.04	$142,500	22.3	50	$31,778	$15,889	$47,666.25
83	RESIDENTIAL	2	Yes	781.5	780.46	1.04	$117,700	22.3	50	$26,247	$13,124	$39,370.65
84	COMMERCIAL		No	781	776.56	4.44	$1,490,000	47.1	50	$701,790	$350,895	$1,052,685.00
85	RESIDENTIAL	2	Yes	781.8	782.13	-0.33	$72,000	17.9	50	$12,888	$6,444	$19,332.00
86	COMMERCIAL		No	781.5	783.99	-2.49	$385,000	0	50	$0	$0	$0.00
87	EXEMPT	2	No	781	782.16	-1.16	$137,000	2.5	50	$3,425	$1,713	$5,137.50
88	RESIDENTIAL	2A	Yes	782	784.24	-2.24	$194,300	13.8	50	$26,813	$13,407	$40,220.10
89	RESIDENTIAL	2	Yes	782	780.27	1.73	$142,300	27	50	$38,421	$19,211	$57,631.50
90	RESIDENTIAL	2	Yes	782	779.98	2.02	$191,300	27	50	$51,651	$25,826	$77,476.50
91	RESIDENTIAL	1H	No	782	779.25	2.75	$81,600	17.4	50	$14,198	$7,099	$21,297.60
92	RESIDENTIAL	1H	Yes	782	780.33	1.67	$63,900	38.7	50	$24,729	$12,365	$37,093.95
93	RESIDENTIAL	2	Yes	782	779.29	2.71	$135,200	31.9	50	$43,129	$21,564	$64,693.20
94	COMMERCIAL		No	781.6	780.81	0.79	$1,015,000	23.3	50	$236,495	$118,248	$354,742.50
95	RESIDENTIAL	1	Yes	782	780.04	1.96	$76,800	38.7	50	$29,722	$14,861	$44,582.40
96	RESIDENTIAL	1H	Yes	782	780.08	1.92	$118,000	38.7	50	$45,666	$22,833	$68,499.00
97	RESIDENTIAL	1H	Yes	782	780.38	1.62	$90,000	38.7	50	$34,830	$17,415	$52,245.00
98	RESIDENTIAL	2	Yes	782	780.54	1.46	$171,800	22.3	50	$38,311	$19,156	$57,467.10
99	RESIDENTIAL	1A	Yes	782	780.42	1.58	$85,800	38.7	50	$33,205	$16,602	$49,806.90
100	RESIDENTIAL	1A	Yes	782	781.21	0.79	$93,300	32	50	$29,856	$14,928	$44,784.00
101	RESIDENTIAL	2	Yes	782	780.33	1.67	$82,500	27	50	$22,275	$11,138	$33,412.50
102	RESIDENTIAL	2	Yes	782	783.32	-1.32	$148,000	13.9	50	$20,572	$10,286	$30,858.00
103	RESIDENTIAL	2	Yes	782	783.18	-1.18	$68,800	13.9	50	$9,563	$4,782	$14,344.80
104	COMMERCIAL		No	781.8	779.34	2.46	$830,000	32.1	50	$266,430	$133,215	$399,645.00
105	COMMERCIAL		No	781.7	784.51	-2.81	$10,300	0	50	$0	$0	$0.00
106	RESIDENTIAL	2	Yes	782	780.86	1.14	$96,200	22.3	50	$21,453	$10,726	$32,178.90
107	RESIDENTIAL	2	Yes	782	780.4	1.6	$136,000	27	50	$36,720	$18,360	$55,080.00
108	RESIDENTIAL	2	Yes	782	780.65	1.35	$160,000	22.3	50	$35,680	$17,840	$53,520.00
109	RESIDENTIAL	1H	Yes	782	782.1	-0.1	$125,000	25.5	50	$31,875	$15,938	$47,812.50
110	RESIDENTIAL	2	Yes	782	781.01	0.99	$120,900	22.3	50	$26,961	$13,480	$40,441.05
111	RESIDENTIAL	2	Yes	782	781.53	0.47	$91,600	17.9	50	$16,396	$8,198	$24,594.60
112	RESIDENTIAL	1H	Yes	782	781.69	0.31	$68,800	25.5	50	$17,544	$8,772	$26,316.00
113	RESIDENTIAL	2	Yes	782	782.32	-0.32	$75,500	17.9	50	$13,515	$6,757	$20,271.75
114	RESIDENTIAL	2	Yes	782	781.8	0.2	$59,000	17.9	50	$10,561	$5,281	$15,841.50
115	RESIDENTIAL	2	Yes	782	783.1	-1.1	$121,300	13.9	50	$16,861	$8,430	$25,291.05
116	COMMERCIAL		No	782	781.46	0.54	$0	23.3	50	$0	$0	$0.00
117	COMMERCIAL		No	782	783.62	-1.62	$330,000	0	50	$0	$0	$0.00
118	RESIDENTIAL	2	Yes	782	784.62	-2.62	$98,200	7.2	50	$7,070	$3,535	$10,605.60
119	RESIDENTIAL	2	Yes	782	784.39	-2.39	$145,300	10.2	50	$14,821	$7,410	$22,230.90
120	RESIDENTIAL	2	Yes	782	782.99	-0.99	$137,500	13.9	50	$19,113	$9,556	$28,668.75
121	RESIDENTIAL	2	Yes	782	783.75	-1.75	$79,700	10.2	50	$8,129	$4,065	$12,194.10
122	RESIDENTIAL	2	Yes	782	781.64	0.36	$98,300	17.9	50	$17,596	$8,798	$26,393.55
123	RESIDENTIAL	2	Yes	782	781.79	0.21	$78,700	17.9	50	$14,087	$7,044	$21,130.95
124	RESIDENTIAL	2	Yes	782	782.17	-0.17	$78,700	17.9	50	$14,087	$7,044	$21,130.95
125	COMMERCIAL		No	782.6	785.36	-2.76	$218,000	0	50	$0	$0	$0.00
126	EXEMPT	1	No	782.6	786.11	-3.51	$280,279	0	50	$0	$0	$0.00
127	COMMERCIAL		No	782.1	785.07	-2.97	$60,000	0	50	$0	$0	$0.00
128	EXEMPT	1	No	781	787.95	-6.95	$114,260	0	50	$0	$0	$0.00
129	COMMERCIAL		No	783.2	782.13	1.07	$614,000	23.3	50	$143,062	$71,531	$214,593.00
130	RESIDENTIAL	2	Yes	783.2	781.77	1.43	$78,600	22.3	50	$17,528	$8,764	$26,291.70
131	COMMERCIAL		No	783.3	790.71	-7.41	$614,000	0	50	$0	$0	$0.00
132	RESIDENTIAL	1A	Yes	783.3	782.22	1.08	$52,800	32	50	$16,896	$8,448	$25,344.00
133	RESIDENTIAL	1H	Yes	783.3	783.41	-0.11	$89,000	25.5	50	$22,695	$11,348	$34,042.50
134	RESIDENTIAL	1A	Yes	783.1	784.61	-1.51	$130,200	13.8	50	$17,968	$8,984	$26,951.40
135	RESIDENTIAL	1A	Yes	783	786.4	-3.4	$71,700	9	50	$6,453	$3,227	$9,679.50
136	RESIDENTIAL	1A	Yes	782.9	785.79	-2.89	$71,700	9	50	$6,453	$3,227	$9,679.50
137	RESIDENTIAL	1A	Yes	782.9	785.28	-2.38	$68,700	13.8	50	$9,481	$4,740	$14,220.90
138	RESIDENTIAL	1A	Yes	782.8	784.74	-1.94	$85,600	13.8	50	$11,813	$5,906	$17,719.20
139	RESIDENTIAL	1A	Yes	782.8	783.78	-0.98	$82,100	19.4	50	$15,927	$7,964	$23,891.10
140	RESIDENTIAL	1A	Yes	782.8	783.85	-1.05	$82,000	19.4	50	$15,908	$7,954	$23,862.00
141	RESIDENTIAL	1	Yes	782.6	784.38	-1.78	$54,800	13.8	50	$7,562	$3,781	$11,343.60
142	RESIDENTIAL	2	Yes	783	782.38	0.62	$68,900	22.3	50	$15,365	$7,682	$23,047.05
143	RESIDENTIAL	1	Yes	782.9	781.9	1	$59,200	32	50	$18,944	$9,472	$28,416.00
144	COMMERCIAL		No	782.8	782.6	0.2	$218,000	13.4	50	$29,212	$14,606	$43,818.00
145	RESIDENTIAL	1	No	782.8	782.84	-0.04	$58,600	13.4	50	$7,852	$3,926	$11,778.60
146	RESIDENTIAL	1H	Yes	782.9	782.45	0.45	$68,900	25.5	50	$17,570	$8,785	$26,354.25
147	RESIDENTIAL		No	782.9	782.37	0.53	$4,200	23.3	50	$979	$489	$1,467.90
148	RESIDENTIAL	2	Yes	783.1	783.53	-0.43	$73,800	17.9	50	$13,210	$6,605	$19,815.30
149	RESIDENTIAL	2	Yes	783	783.03	-0.03	$73,800	17.9	50	$13,210	$6,605	$19,815.30

INDEX NO.	GENERAL LAND USE	NO. OF STORIES	BASEMENT?	BASE FLOOD ELEVATION	GROUND FLOOR ELEVATION	FLOOD DEPTH (IN FT)	ASSESSED IMPROVEMENTS	% STRUCTURE DAMAGE	% CONTENT DAMAGE	STRUCTURE DAMAGES	CONTENT DAMAGES	TOTAL DAMAGES
225	MANUFACTURING		No	891.5	895.42	-3.92	$2,975,000	0	50	$0	$0	$0.00
226	RESIDENTIAL	2	Yes	801.9	809.65	-7.75	$278,300	0	50	$0	$0	$0.00
227	RESIDENTIAL	BL	No	801.9	812.86	-10.96	$357,700	0	50	$0	$0	$0.00
228	RESIDENTIAL	1	Yes	802	803.03	-1.03	$301,800	19.4	50	$58,549	$29,275	$87,823.80
229	RESIDENTIAL	1	Yes	802	801.14	0.86	$259,100	32	50	$82,912	$41,456	$124,368.00
230	RESIDENTIAL	1	Yes	802	813.67	-11.67	$448,200	0	50	$0	$0	$0.00
231	RESIDENTIAL	2	Yes	802	799.77	2.23	$519,700	27	50	$140,319	$70,160	$210,478.50
232	RESIDENTIAL	BL	No	802.1	802.51	-0.41	$235,600	7.2	50	$16,963	$8,482	$25,444.80
233	RESIDENTIAL	1	No	802.2	799.78	2.42	$272,600	32.1	50	$87,505	$43,752	$131,256.90
234	RESIDENTIAL	SL	Yes	802.2	801.67	0.53	$203,200	23.2	50	$47,142	$23,571	$70,713.60
235	RESIDENTIAL	1	Yes	802.3	800.41	1.89	$247,100	38.7	50	$95,628	$47,814	$143,441.55
236	RESIDENTIAL	1	No	802.3	802.93	-0.63	$274,000	2.5	50	$6,850	$3,425	$10,275.00
237	RESIDENTIAL	1	Yes	802.3	800.3	2	$111,700	38.7	50	$43,228	$21,614	$64,841.85
238	RESIDENTIAL	1	No	802.3	801.85	0.45	$219,300	13.4	50	$29,386	$14,693	$44,079.30
239	RESIDENTIAL	1A	Yes	802.3	801.9	0.4	$86,100	25.5	50	$21,956	$10,978	$32,933.25
240	RESIDENTIAL	1	Yes	802.3	800.84	1.46	$116,900	32	50	$37,408	$18,704	$56,112.00
241	RESIDENTIAL	1	No	802.4	799.39	3.01	$145,700	40.1	50	$58,426	$29,213	$87,638.55
242	RESIDENTIAL	1	Yes	802.5	803.41	-0.91	$202,500	19.4	50	$39,285	$19,643	$58,927.50
243	RESIDENTIAL	1	Yes	802.6	803.13	-0.53	$182,300	19.4	50	$35,366	$17,683	$53,049.30
244	RESIDENTIAL	1	Yes	802.8	806.18	-3.38	$182,300	5.2	50	$9,480	$4,740	$14,219.40
245	RESIDENTIAL	1	Yes	802.4	803.85	-1.45	$129,500	19.4	50	$25,123	$12,562	$37,684.50
246	RESIDENTIAL	BL	No	803.8	805.32	-1.52	$145,400	0	50	$0	$0	$0.00
247	RESIDENTIAL	1	Yes	803	803.65	-0.65	$96,700	19.4	50	$18,760	$9,380	$28,139.70
248	RESIDENTIAL	1	Yes	803.7	803.49	0.21	$171,700	25.5	50	$43,784	$21,892	$65,675.25
249	RESIDENTIAL	1	Yes	803.4	804.13	-0.73	$150,900	19.4	50	$29,275	$14,637	$43,911.90
250	RESIDENTIAL	1	Yes	803	804.35	-1.35	$216,400	19.4	50	$41,982	$20,991	$62,972.40
251	RESIDENTIAL	1	Yes	804	806.18	-2.18	$106,400	13.8	50	$14,683	$7,342	$22,024.80
252	RESIDENTIAL	1	Yes	804	805.53	-1.53	$95,700	13.8	50	$13,207	$6,603	$19,809.90
253	RESIDENTIAL	1	Yes	804	804.17	-0.17	$127,800	25.5	50	$32,589	$16,295	$48,883.50
254	RESIDENTIAL	1	Yes	804	801.18	2.82	$67,900	45.5	50	$30,895	$15,447	$46,341.75
255	RESIDENTIAL	1	Yes	804	800.8	3.2	$83,000	45.5	50	$37,765	$18,883	$56,647.50
256	RESIDENTIAL	1	Yes	804	806.51	-2.51	$110,900	9	50	$9,981	$4,991	$14,971.50
257	RESIDENTIAL	1	Yes	803.8	804.24	-0.44	$71,300	25.5	50	$18,182	$9,091	$27,272.25
258	RESIDENTIAL	1H	Yes	803.8	802.88	0.92	$85,400	32	50	$27,328	$13,664	$40,992.00
259	RESIDENTIAL	2	Yes	803.8	803.41	0.39	$109,200	17.9	50	$19,547	$9,773	$29,320.20
260	RESIDENTIAL	2	Yes	803.8	804.03	-0.23	$109,200	17.9	50	$19,547	$9,773	$29,320.20
261	RESIDENTIAL	1	Yes	803.8	803.41	0.39	$104,600	25.5	50	$26,673	$13,337	$40,009.50
262	RESIDENTIAL	1H	Yes	803.8	803.93	-0.13	$72,400	25.5	50	$18,462	$9,231	$27,693.00
263	RESIDENTIAL	1	Yes	803.8	803.86	-0.06	$213,000	25.5	50	$54,315	$27,158	$81,472.50
264	RESIDENTIAL	1	Yes	804	802.77	1.23	$95,500	32	50	$30,560	$15,280	$45,840.00
265	RESIDENTIAL	1	Yes	804	804.18	-0.18	$82,600	25.5	50	$21,063	$10,532	$31,594.50
266	RESIDENTIAL	1	Yes	804	806.2	-2.2	$110,600	13.8	50	$15,263	$7,631	$22,894.20
267	RESIDENTIAL	1	No	804	807	-3	$103,000	0	50	$0	$0	$0.00
268	RESIDENTIAL	SL	No	804	800.07	3.93	$136,400	22.8	50	$31,099.20	$15,550	$46,648.80
269	RESIDENTIAL	1	Yes	804	799.92	4.08	$99,500	52.2	50	$51,939	$25,970	$77,908.50
270	RESIDENTIAL	1	Yes	804	799.7	4.3	$94,900	52.2	50	$49,538	$24,769	$74,306.70
271	RESIDENTIAL	1	Yes	804	800.07	3.93	$97,600	52.2	50	$50,947	$25,474	$76,420.80
272	RESIDENTIAL	1	Yes	804	799.86	4.14	$116,100	52.2	50	$60,604	$30,302	$90,906.30
273	RESIDENTIAL	1	Yes	804	800.8	3.2	$110,600	45.5	50	$50,323	$25,162	$75,484.50
274	RESIDENTIAL	1	Yes	804	805	-1	$98,400	19.4	50	$19,090	$9,545	$28,634.40
275	RESIDENTIAL	1	Yes	804	800.65	3.35	$110,400	45.5	50	$50,232	$25,116	$75,348.00
276	RESIDENTIAL	1H	Yes	804	805.35	-1.35	$213,200	19.4	50	$41,361	$20,680	$62,041.20
277	RESIDENTIAL	2	Yes	804	803.89	0.11	$127,400	17.9	50	$22,805	$11,402	$34,206.90
278	RESIDENTIAL	1	Yes	804	803.51	0.49	$101,600	25.5	50	$25,908	$12,954	$38,862.00
279	RESIDENTIAL	1	Yes	804	805.4	-1.4	$98,500	19.4	50	$19,109	$9,555	$28,663.50
280	RESIDENTIAL	1	Yes	804	804.35	-0.35	$111,700	25.5	50	$28,484	$14,242	$42,725.25
281	RESIDENTIAL	1	Yes	804	803.96	0.04	$143,800	25.5	50	$36,669	$18,335	$55,003.50
282	RESIDENTIAL	1	Yes	804	803.37	0.63	$201,000	32	50	$64,320	$32,160	$96,480.00
283	RESIDENTIAL	1	Yes	804	805.19	-1.19	$215,300	19.4	50	$41,768	$20,884	$62,652.30
284	RESIDENTIAL	2	Yes	804	805.21	-1.21	$239,800	13.9	50	$33,332	$16,666	$49,998.30
285	RESIDENTIAL	1	Yes	804	805.2	-1.2	$302,700	19.4	50	$58,724	$29,362	$88,085.70
286	RESIDENTIAL	1	Yes	804	805.1	-1.1	$302,700	19.4	50	$58,724	$29,362	$88,085.70
287	RESIDENTIAL	1	Yes	804	804.09	-0.09	$201,000	25.5	50	$51,255	$25,628	$76,882.50
288	RESIDENTIAL	SL	No	804	805.24	-1.24	$133,100	6.4	50	$8,518	$4,259	$12,777.60
289	RESIDENTIAL	1	Yes	804	804.9	-0.9	$112,300	19.4	50	$21,786	$10,893	$32,679.30
290	RESIDENTIAL	1	Yes	804	803.47	0.53	$114,200	32	50	$36,544	$18,272	$54,816.00
291	RESIDENTIAL	1	Yes	804	805.61	-1.61	$93,500	13.8	50	$12,903	$6,452	$19,354.50
292	RESIDENTIAL	1	No	804	800.15	3.85	$73,100	47.1	50	$34,430	$17,215	$51,645.15
293	RESIDENTIAL	1	No	804	799.43	4.57	$78,300	53.2	50	$41,656	$20,828	$62,483.40
294	RESIDENTIAL	1	Yes	804	803.32	0.68	$101,000	32	50	$32,320	$16,160	$48,480.00
295	RESIDENTIAL	1	No	804	804.71	-0.71	$57,200	2.5	50	$1,430	$715	$2,145.00
296	RESIDENTIAL	1H	Yes	790	799.26	-9.26	$139,200	0	50	$0	$0	$0.00
297	RESIDENTIAL	1H	Yes	785	787.37	-2.37	$103,800	13.8	50	$14,324	$7,162	$21,486.60
298	RESIDENTIAL	2	Yes	786	786.94	-0.94	$80,300	13.9	50	$11,162	$5,581	$16,742.55
299	RESIDENTIAL	1	Yes	783.5	783.81	-0.31	$61,400	25.5	50	$15,657	$7,829	$23,485.50
300	RESIDENTIAL	1	Yes	802	800.17	1.83	$144,600	38.7	50	$55,960	$27,980	$83,940.30
301	RESIDENTIAL	1	Yes	802	798.52	3.48	$301,800	45.5	50	$137,319	$68,660	$205,978.50
302	RESIDENTIAL	1	Yes	803.8	803.51	0.29	$202,800	25.5	50	$51,714	$25,857	$77,571.00
302	**TOTALS**						**$81,483,272**			**$9,624,548**	**$4,812,274**	**$14,436,822.64**

PART 3: FLOOD MITIGATION PROJECT SINCE 2000 AND PLANNED PROJECTS

HIGH-PRIORITY MITIGATION PROJECTS

Location	2002 Recommendation	Progress, Plans, & Recommendations
1. Taft & Kay (see Barr Report) • Street and property flooding, sewage backup, property damage, collapsed basement • Low area, pipe outlet	• Alt. TK-1, Remove houses (11) and construct detention pond	**Completed**
2. Florence/Necessity/Bell (see Barr Report) Raedel Road – 1500 Block (Area #13) • Street and property flooding, property damage • Low area pipe outlet	• Alt. FN-1, Remove homes (18) and construct detention pond	**Completed**
3. Dorret/Kohlhepp • Street and property flooding, property damage • Low area, pipe outlet	• Alt. NC-1, Acquire land and construct detention ponds	**Completed**
4. Gooder/LaSalle • Street and property flooding, sewage backup, property damage • Low area, drainage ditch with limited outlet elevation and capacity	• Alt. LG-1, Pursue land acquisition and easements for overland drainage • LG-2 Long Term, Coordinate with WisDOT on USH 53 freeway project	**LG-2 Completed, LG-1 no longer needed**
5. Platt and Oxford • Street and property flooding, collapsed pipe and street • CMP storm sewer replaced with RCP pipe and upgraded to 72" diameter	• Work completed November, 2000	**Completed**

12. E. Hamilton Avenue – 600 Block		
• Street flooding, property damage • Low spot in roadway, house and driveway below road	• Raise height of first floor or acquire house at 605 E. Hamilton Avenue	House acquired and removed, low areas on both sides of the street have been turned into extreme event runoff overflow storage and the conveyance system in E. Hamilton Avenue has been improved to increase capacity. A project has been included in the CIP to improve the capacity of the conveyance system between E. Hamilton Avenue and East Lexington Boulevard.
15. Preston Road @ Truax Blvd. – Sherman Creek Outfall		
• Street flooding, property damage • Low area, no outlet, runoff pumped to Sherman Creek from September storm	• Construct drainage improvements as recommended (2001 CIP)	**Completed**
19. Wells Road – North Slope		
• Slope failure • Geotechnical analysis completed by STS Consultants and plans prepared	• Permanent repairs scheduled for Spring, 2001	**Slope stabilized and runoff diverted from face of slope**
20. Luther Hospital Campus		
• Basement and property flooding • Low areas on site concentrating runoff to entry points into the building with limited pipe outlet capacity	• Work with Mayo/Luther to identify feasible pipe capacity projects • Construct as part of street improvement projects in the area	**Completed**
34. Indianhead Foods/Morningside Dr.		
• Street and property flooding, property damage and slope erosion • Low area in the street overtopping system and flowing down the steep bank	• Temporary modifications to system and driveways on Morningside Drive • Private property owners improvements and modifications • Galloway Street extension in 2003/2004 to provide additional drainage capacity and outlet to Eau Claire River	Slope improvements and Improvements on Indian Head Foods site **completed**. Galloway Street Improvements and outfall to River **completed.** **Completed**

37. First Street – 2600 Block		
• Street flooding, low spot in road • Water overtops curb and flows through yard causing property damage and erosion	• Acquire property at 2611 First Street • Construct emergency overflow route to Chippewa River	**Completed**
43. Locust Lane and Abbe Hill Drive		
• Leslie Lane & Abbe Hill Drive (Area #26) • Eddy Lane & Kilbourne Avenue (Area #36) • S. of Terry Lane(Area #39) • Hastings Way (USH 53) & Landon (Area #44) • Street and property flooding, property damage and basement collapse • Low area, yards below street elevation, pipe outlet • Surface runoff from school fields into limited capacity pipe in the back yards • Property owners working with School District runoff from the play fields	• Acquire property at 3020 Locust Lane • Construct stormwater detention area • Complete XP-SWMM model of watershed area	Property acquired at Locust Lane and Eddy Lane Area #44 Note – The median on Hastings Way between Delbert Rd and Melby St. has flooded during heaving rains causing water over the roadway on northbound lands. This is the same storm sewer that causes issues on Anderson Dr.
46. White Avenue Storm Sewer Outfall – to Campbell Pond		
• On-going erosion problems, see report dated August, 2000	• Reroute outfall, included in 2001 CIP	Acquired Campbell Pond Property
51. Gray Street Outfall to Chippewa River		
• CMP outfall with deteriorating invert	• Replace pipe, 2001 CIP	**Pipe was lined in place**

MEDIUM-PRIORITY MITIGATION PROJECTS

Location	2002 Recommendation	Progress, Plans,& Recommendations
6. Ellis and Fillmore		
• Street flooding, property damage • Low spot in road, pipe outlet	• Flood proof structures • Construct relief storm sewer, included in 2005 CIP	**Completed**
17. Maywood Drive Backyard Drainage		
• Property flooding, property damage • Rear yard drainage ditch overflow into back yard	• Flood proofing and protection	Project **completed** to improve down-stream conveyance
22. Highland and Agnes		
• Street flooding, low spot in road, pipe outlet	• Construct relief storm sewer, included in 2002 CIP	**Projects Completed**. No flooding in past 7 years.
24. 14th Street and Platt Street		
• Street runoff overflows driveway causing property damage • Low spot in road, pipe outlet, driveway below street elevation	• Modify driveway design and elevations, pave driveway	Driveway modified to reduce overflows
29. Nestle and Otis		
• Street flooding, property damage, basement collapse • Low spot in road, pipe outlet	• Street improvements on Otis Street • Construct westside relief storm sewer, 2004 CIP	Otis Street Improvements **completed**
30. 13th Street and Bolles		
• Street and property flooding, property and pipe damage • Low area, pipe outlet, rear yards below street elevation	• Flood proof properties • Construct westside relief storm sewer, 2004 CIP	Projects **Completed**. No flooding since storm sewers were replaced in 2015.
31. St. James Church (11th Street and Marshall)		
• Property flooding and property damage • Low area behind building, pipe outlet with limited capacity, surcharged	• Change building entrance elevation • Flood proof property • Construct westside relief storm sewer, 2004 CIP	Property flood proofed and on-site storm water detention facility constructed. Project **completed** to improve downstream conveyance capacity.

32. University Avenue Outfall Pipe		
• Pipe overflow from hydraulic grade and slope erosion	• Upgrade pipe hydraulics and reinforce overflow route	**Completed**
33. Otter Creek Outfall Pipe		
• Pipe overflow creating overland flow and slope erosion	• Upgrade pipe hydraulics and reinforce overflow route	**Completed**
41. Dells Pond Slope (west of Starr Avenue & Railroad Tracks)		
• Surface water runoff caused bank erosion and incised the slope	• Repair and reinforce bank, 2001	**Completed**
42. Greene Property (south of Birch Street to Eau Claire River)		
• Surface water runoff caused bank erosion and incised the slope from Birch Street (CTH "Q") to the Eau Claire River	• Private property, evaluate repair and upgrade alternatives • Include new outfall in 2003/2004 CIP as part of USH 53 freeway project	**Completed**
52. Hertz Car Lot – Highway 93		
• Low area along highway ditch • Highway 53 freeway project will look at improvements in this area	• Flood proof property • Upgrade drainage ditch as part of USH 53 freeway project, 2004/2005 CIP	**Completed**
53. American Phoenix – Galloway Street		
• Surface water from street into doors of Banbury Place building	• Upgrade drainage as part of Galloway Street project planned for 2001	**Completed**

LOW-PRIORITY MITIGATION PROJECTS

Location	2002 Recommendation	Progress, Plans, & Recommendations
16. Truax Blvd. West of 14th Street		
• Ditch and construction site erosion	• Street construction project scheduled in CIP for 2004	**Completed**
47. State Street Storm Sewer Outfall to Putnam Park		
• Debris and sand in storm sewer outfall	• Clean outfall of sand and debris	**Completed**

NO WORK PLANNED IN 2002

Location	2002 Recommendation	Progress, Plans, & Recommendations
7. Horlacher Lane		
• Construction site erosion	No worked planned in 2002.	**Corrected** Drainage conveyance system constructed
8. Target/Menards Development Area		
• Construction site erosion	No worked planned in 2002.	**Corrected**
9. House Road and Otter Creek Court		
• Flooded street and overflow from detention pond (June storm only) • Construction of the House Road project in the summer of 2000, which included storm sewer and expansion of the detention ponds addressed the problem that was encountered from the June storm. No reported problems from the September storm.	No worked planned in 2002.	Storm Water Facility modified
10. Violet Street and Teal Court		
• Street flooding, low spot in road, pipe outlet	No worked planned in 2002.	Only street flooding during extreme runoff events
11. LaMans Lane and Vienna Terrace		
• Construction site erosion	No worked planned in 2002.	**Corrected**
14. Folsom Street (Epiphany Lane to North)		
• Undeveloped site erosion	No worked planned in 2002.	**Corrected**
18. Delong Middle School Pond		
• Detention pond full • Construction on outfall structure in 1999 improved conditions downstream	No worked planned in 2002.	**Corrected**
21. Omaha and Davis		
• Street flooding, low spot in road, pipe outlet	No worked planned in 2002.	Only street flooding during extreme runoff events

23. Essex and Brookline		
• Street flooding, low spot in road, pipe outlet	No worked planned in 2002.	Only street flooding during extreme runoff events
25. Fairfax Park Detention Basins		
• Construction site erosion from June storm • Minor erosion from September storm, system functioned as planned	No worked planned in 2002.	**Corrected**
27. North Crossing (STH 124) North Ditch		
• Ditch erosion and washout, repaired by Eau Claire Co for DOT	No worked planned in 2002.	WisDOT right-of-way, Delegated to Eau Claire County
28. Melanie and Mittelstadt		
• Street flooding, low spot in road, pipe outlet	No worked planned in 2002.	Only street flooding during extreme runoff events
35. Brackett and Agnes		
• Street flooding, low spot in road, pipe outlet	No worked planned in 2002.	Project **completed** to improve downstream conveyance. Brackett Ave. has not flooded since storm sewers rebuilt.
38. Diane Lane and Jeanne Lane		
• Street flooding, low spot in road, pipe outlet	No worked planned in 2002.	Only street flooding during extreme runoff events
40. Frisbie and Jupiter		
• Street flooding, low spot in road, pipe outlet	No worked planned in 2002.	Only street flooding during extreme runoff events
45. Hastings Way (USH 53) and Valmont		
• Street flooding, low spit in road, pipe outlet	No worked planned in 2002.	**Corrected**
48. Stein and Hamilton		
• Street and property flooding • Low spot in road, areas of property below street elevation, pipe outlet	No worked planned in 2002.	MacArthur Project **Completed**. Additional project planned to improve overflow route. No flooding on Stein Blvd in past seven years.
49. Sacred Heart Hospital and CVTC		
• Property flooding and damage • Roof and building drain pipe capacity, pipe outlet	No worked planned in 2002.	Downstream improvements **completed t**o improve conveyance capacity and upstream improvements to divert runoff from system

50. Cummings and Wayne Place		
• Street flooding • Low spot in road, pipe outlet to detention pond and Lowes Creek outfall	No worked planned in 2002.	Only Floods during extreme runoff events
54. Grissom Drive – Multi Family Property		
• Preliminary review indicates a private property drainage problem not related to the City system	No worked planned in 2002.	Not a public system
55. Lever Street Condominiums		
• Preliminary review indicates a private property drainage problem not related to the City system	No worked planned in 2002.	Not a public system – Condominium Association correcting problem

Other Major Projects completed (not included in 2002 Plan)

- South London Road Storm Water Facility – west side of London Road has not been an issue since detention pond was built.
- Shorewood Drive Storm Sewer and Outfall
- Jeffers Road Storm Water Facility
- Phoenix Park Grading
- West Side Relief Storm Sewer (already in CIP)
- Truax Blvd Sewer Extension (Preston Road to N. Clairemont Avenue)
- Folsom Street west of N. Clairemont Avenue had storm sewer installed in 2015.
- The pond at South Hastings Way frontage road and Horlacher Road (just north of Menard's East) flooded in September 2016. Horlacher Road was closed for five days. At the time, the City jetted the discharge pipe, but it still took several days to drain down. A primary cause of the 2016 flooding at this location was debris build-up on the culvert -end section grates. Debris has been cleared and grates continue to be monitored for blockage.

Projects in Planning Stages (not included in 2002)

- Jeffers Road Relief Storm Sewer (valley east of Jeffers Road) Partially Complete
- Mitscher Park Storm Water Facility control structure modifications

Fund 405

Storm Water Improvements

City of Eau Claire, Wisconsin

Capital Improvement Plan

2019 thru **2023**

PROJECTS & FUNDING SOURCES BY DEPARTMENT

Department	Project #	Priority	2019	2020	2021	2022	2023	Total
Fund 405 - Storm Water								
Storm Water: Bond Issue Costs	405-001	3	40,000	50,000	50,000	40,000	10,000	190,000
Storm Water: C/W Storm Water	405-002	3	1,600,000	1,800,000	1,800,000	1,900,000	1,900,000	9,000,000
Storm Water: Jeffers Road Area Storm Sewer	405-003	1	400,000		300,000			700,000
Storm Water: Basin Acquisition/Development	405-004	1	200,000			200,000		400,000
Storm Water: Halsey Street Relief Storm Sewer	405-005	2		600,000				600,000
Storm Water: Levee Reconstruction	405-006	2			500,000			500,000
Fund 405 - Storm Water Total			**2,240,000**	**2,450,000**	**2,650,000**	**2,140,000**	**1,910,000**	**11,390,000**
G.O. Bonds - Self Supported			1,350,000	1,640,000	1,500,000	1,240,000	700,000	6,430,000
Intergovernmental: State Aid					250,000			250,000
Operating Income: Storm Water			890,000	810,000	900,000	900,000	1,210,000	4,710,000
Fund 405 - Storm Water Total			**2,240,000**	**2,450,000**	**2,650,000**	**2,140,000**	**1,910,000**	**11,390,000**
Grand Total			**2,240,000**	**2,450,000**	**2,650,000**	**2,140,000**	**1,910,000**	**11,390,000**

Project # 405-001
Project Name Storm Water: Bond Issue Costs

Department Fund 405 - Storm Water
Contact Jay Winzenz
Type Financing
Useful Life n/a
Category Recurring
Priority High

Description

Financing for costs incurred by the City when bonds are issued.

Justification

Project # 405-002
Project Name Storm Water: C/W Storm Water

Department Fund 405 - Storm Water
Contact Dave Solberg
Type Infrastructure - Replacement
Useful Life 50 Years
Category Recurring
Priority High

Description

This program consists of city-wide replacements and upgrades of storm sewer pipes and conveyance systems as part of the street reconstruction program. Installation costs for new sewer pipes, manholes, catch basin inlets and storm drain outfalls are included.

Justification

This project provides for the infrastructure necessary to provide sufficient collection and conveyance of water runoff following storms.

Project # 405-003
Project Name Storm Water: Jeffers Road Area Storm Sewer

Department Fund 405 - Storm Water
Contact Dave Solberg
Type City Facility - New
Useful Life 50 Years
Category Non-recurring
Priority Low

Description

This project provides a comprehensive storm sewer management system in the Jeffers Road area. New conveyance infrastructure, as well as improvements to existing conveyance infrastructure will be completed. Work will be in advance of and in conjunction with the 2021 Jeffers Road Reconstruction Project.

Justification

This project provides the public infrastructure necessary to compliment private storm water infrastructure to provide sufficient collection and conveyance of water runoff following storms in the rapidly developing Jeffers Road area.

Project # 405-004
Project Name Storm Water: Basin Acquisition/Development

Department Fund 405 - Storm Water
Contact Dave Solberg
Type City Facility - New
Useful Life 50 Years
Category Non-recurring
Priority Low

Description

Storm water detention basins are designed to reduce peak runoff rates and protect property from flooding. Storm water basins are vital to the efficient functioning of a storm water system.

Justification

This project provides funding to purchase detention basin sites as they become necessary and available with the management and extension of the storm water system.

Project # 405-005
Project Name Storm Water: Halsey Street Relief Storm Sewer

Department Fund 405 - Storm Water
Contact Dave Solberg
Type Infrastructure - Upkeep
Useful Life 50 Years
Category Non-recurring
Priority Medium

Description

Localized flooding typically occurs in the vicinity of the the Halsey Street / Hamilton Avenue intersection. The outlet for this storm water is a 72-inch pipe at Lexington Boulevard. This project upgrades the storm sewer main in Halsey Street to adequately convey storm water from Hamilton Avenue to the 72-inch pipe in Lexington Boulevard.

Justification

This project provides the infrastructure necessary to provide adequate storm water collection and conveyance.

Project # 405-006
Project Name Storm Water: Levee Reconstruction

Department Fund 405 - Storm Water
Contact Dave Solberg
Type Infrastructure - New
Useful Life 50+ Years
Category Non-recurring
Priority Medium

Description

The east bank of the Chippewa River, from Madison Street to CMF, has an existing levee which is not constructed to modern engineering standards and is inadequate to protect against a 100-year flood of the Chippewa River. The WDNR has a flood protection grant that would provide funding towards the construction cost of an engineered levee. The amount requested is the City's estimated 50% cost participation towards the overall construction cost.

Justification

Protection of public safety and infrastructure through construction of levee to provide flood control.

APPENDIX I.

EAU CLAIRE COUNTY DAM INVENTORY

Eau Claire County Dams & Levees (as of August 2018)

Dam Official & Popular Name	Owner or Organization Name	Owner Type	Hazard Rating	Dam Size	Impoundment Size (acres)	Maximum Storage (acres feet)
Altoona	Eau Claire County	COUNTY	High	LARGE	840.0	14000.0
Eau Claire River	Eau Claire County	COUNTY	High	LARGE	1118.0	17000.0
Behm	Paul Whaley	PRIVATE	Significant	LARGE	7.0	73.0
Gilbertson	Ray Gilbertson	PRIVATE	Low	SMALL	3.2	44.7
Pea Creek Flowage	Eau Claire County	COUNTY	Low	SMALL	6.0	20.0
Coon Creek	Eau Claire County	COUNTY	Low	LARGE	75.0	1200.0
Dells	City of Eau Claire	CITY	Low	LARGE	739.0	16000.0
Dells Lake	Herman Borntreger	PRIVATE	Low	LARGE	75.0	560.0
Fairchild	Village of Fairchild	VILLAGE	Low	LARGE	18.0	80.0
Frelk	unavailable	PRIVATE	Low	LARGE	9.0	115.0
Half Moon Lake	City of Eau Claire	CITY	Low	LARGE	130.0	1500.0
Johnson	City of Augusta	CITY	Low	LARGE	.0	150.0
Vogler Flour Mill	Village of Fall Creek	VILLAGE	Low	LARGE	17.3	50.0
Desprez,Louis	DESPREZ,LOUIS	PRIVATE		SMALL	1.0	6.0
Dietz,Harold				SMALL	1.0	10.0
Eau Claire County Youth Camp	EAU CLAIRE COUNTY	COUNTY		SMALL	.3	1.0
Eau Claire Rod And Gun Club	EAU CLAIRE ROD AND GUN C	PRIVATE		SMALL	.0	2.0
Everts, James				SMALL	1.0	1.0
Hart, Robert	HART, ROBERT	PRIVATE		SMALL	1.0	10.0
Kirchoff,Ray	KIRCHOFF,RAY	PRIVATE		SMALL	1.0	20.0
Otter Creek	NORTHWESTERN LUMBER CO.			SMALL		
Planing Mill	G. N. HILLS AND SON			SMALL		
Stanek,Ronald	STANEK,RONALD	PRIVATE		SMALL	1.0	2.0
Strumness, Woodrow	STRUMNESS, WOODROW	PRIVATE		SMALL	1.0	3.0
Washington Mill	WM. DAVIS			SMALL		
Coolie Lake	WM SCHIEFELBEIN					
Five Mile	NORTHWESTERN LUMBER CO					
Forest Street Levee	CITY OF EAU CLAIRE	CITY				
Main River	NORTHWESTERN LUMBER CO					

APPENDIX J.

HAZARD MITIGATION TOOLBOX

MITIGATION TOOLBOX – ALTERNATIVE STRATEGIES

A mitigation strategy is an action that will reduce or prevent the impacts of a hazard event on people, property, critical infrastructure/services, or the economy over the long-term. The acquisition and demolition of a frequently flooded home is the quintessential example of mitigation. But to complicate matters, there is no "bright line" between the different parts of the emergency management cycle—mitigation, preparedness, response, and recovery. For example, having an emergency or continuity plan can also reduce the impacts of a hazard event. While this plan emphasizes mitigation, some strategy alternatives included in the plan may also fall within other parts of the emergency management cycle, but were deemed important by the County or its communities.

A wide variety of possible mitigation tools exist to address natural hazards. The most common mitigation strategies fall within six basic categories:

I. Administrative and Regulatory Activities
II. Structural Projects
III. Education and Awareness Strategies
IV. Natural Resources Protection
V. Emergency Response and Recovery Services
VI. Implementation Strategies

This appendix provides an overview of the alternative mitigation activities available to communities and community members for the typical weather-related natural hazards experienced in west-central Wisconsin, though many of these activities can also be used to mitigate the impacts of additional types of hazards (e.g., pests & infestation, forest fire). No such list of activities is complete, and new strategies are evolving as technology, laws, and impacts change. Many excellent bibliographies of mitigation guides and resource materials exist which provide additional detail on these alternative strategies. For additional information, three excellent starting points are:

Wisconsin Emergency Management. State of Wisconsin Hazard Mitigation Plan. July 2001.

Federal Emergency Management Agency. FEMA Web Site. <http://www.fema.gov >. In particular, see "Mitigation Ideas", FEMA-R5, 9/02.

Schwab, Jim, et.al. Planning for Post-Disaster Recovery and Reconstruction. American Planning Association. Planning Advisory Service Report #483/484. December 1998.

I. ADMINISTRATIVE & REGULATORY ACTIVITIES

These types of activities can be implemented by local governments to protect new construction and expanding development from hazard risks. They fall within the five basic sub-categories listed below, along with the hazard types they would primarily address.

	Key Natural Hazards					
	Tornado	**Winter Storms**	**Thunder-storms**	**Flooding**	**Heat and Drought**	**Wildfire**
Planning Activities	*	*	*	**	*	**
Land-Use Controls	*	*	*	**	*	**
Building Codes	**	**	**	*	*	*
Special Plans & Studies	*	*	*	**	*	**
Strategic Partnerships	*	*	*	*	*	**

A. Planning Activities

Comprehensive and land-use planning can be important hazard mitigation tools, though natural hazard mitigation is often not a primary goal of such plans. In west-central Wisconsin, flooding and floodplain management typically receives the greatest attention in local land-use plans. Such plans often indicate areas appropriate for open space preservation or for low density development. Other planning efforts which may incorporate hazard mitigation recommendations include:

- storm water management plans
- growth management plans
- policies regarding concurrency of infrastructure and development
- capital improvement planning
- floodplain management plans
- shoreland protection plans
- watershed district plans
- historic preservation plans
- wellhead protection plans
- farmland preservation plans
- various hazard analyses and emergency response plans

B. Land-Use Controls

Land-use controls are used to implement the plans and vision of a community. Of the land-use controls, zoning regulations are the most common. Zoning identifies appropriate uses for different areas of a municipality and regulates those uses. Again, within the region, flooding issues receive the most attention among the natural hazards, with regulations often discouraging development or high-density development within floodplains. A wide-variety of land-use controls besides zoning are available to assist in mitigating hazards or their impacts, though some can require technical studies to administer. Some of these include:

- overlay zoning for high-hazard or hazard prone areas
- bonus or incentive zoning, allowing for the transfer of development credits
- performance zoning
- floating zones for areas recently impacted by a hazard
- density controls/down-zoning
- subdivision ordinances
- design review standards
- cul-de-sac & rights-of-way standards for snow removal and emergency vehicle access
- soil conservation and steep slope/hillside ordinances
- stormwater ordinance & impervious surface limits
- development moratorium or interim zoning to allow additional time to plan
- shoreland, floodplain, and wetland zoning, ordinances, or management regulations
- regulate fill, possibly performance based
- compensatory floodland storage (banking) to offset the effects of fill in flood-prone areas
- setback regulations, including vegetation setbacks in wildfire prone areas
- freeboard requirements in special flood hazard areas
- regulations for solid waste, landfills, and hazardous materials
- regulations for agricultural waste and septic systems

C. Building Codes

Building codes are one of the most important hazard mitigation tools, and can be used to address all natural hazards. When properly designed and constructed in an appropriate location, the average structure should rarely be seriously damaged by most of these natural forces.

Building codes can be created and modified to promote mitigation measures such as:

- fire-resistant building materials
- permanent foundations
- anchoring or tie-downs for mobile homes
- wind-resistant construction
- design standards of roofing systems for snow loads and high winds
- overhead sewers or ball-traps for basements to prevent sewer back-up
- stormwater gutters
- storm-shelters or safe-rooms for large capacity buildings
- special containment or monitoring for hazardous materials
- include insulation standards to help protect from extreme heat and cold

In addition to the adoption of such codes, methods of administration and enforcement may be modified to promote compliance. In lieu of regulatory action, educational efforts may also be undertaken to promote these hazard mitigating standards into new construction and existing buildings in the community. The Federal Emergency Management Agency and Institute for Business and Home Safety have many such standards and recommendations available at their respective websites.[1]

D. Special Plans and Studies

Once a problem or potential problem is identified, additional studies, surveys, or plans may be needed for a special planning area or for a specific issue. These can vary in both geographic scope and engineering requirements. A regional watershed or flood management plan may be required to address flooding issues which cross many different governmental boundaries. A neighborhood or industrial park may require stormwater or hydraulic studies to address localized flash flooding. A new home near a river may require a survey of elevations for a floodplain determination. Cost-benefits analysis could be performed before a local government agrees to a new project. Or, a special analysis of a school can be made to determine safe spots in case of a tornado warning.

II. STRUCTURAL PROJECTS

Structural projects are commonly the most expensive mitigation activities to undertake, and often have on-going maintenance costs. There are two basic types of structural projects—infrastructure improvements and building modifications.

A. Infrastructure Improvements & Maintenance

The largest and most common structural projects are infrastructure improvements typically funded by public agencies, often with the assistance of federal or state grant funding. In west-central Wisconsin, the majority of these projects are undertaken to address flooding and stormwater concerns, though there are other improvements and maintenance efforts which address other natural hazards. The following are example infrastructure improvement and maintenance efforts:

- flood control works (construction, restoration/maintenance, or removal), such as:
- dams, dam gates, and reservoirs
- remote dam sensors
- water level strategies for peak runoff events
- levees, berms, floodwalls, & retaining walls
- revetments & rip-rap
- channel maintenance & dredging
- agricultural dikes & drain tiles
- diversions, surface channels, overflow weirs, tunnels
- stormwater retention ponds/basins

[1] FEMA Website--http://www.fema.gov and IBHS Website--http://www.ibhs.org/

- engineering, retrofitting, relocation, or new construction of roads, bridges & utilities, such as:
- alternative routes of access and evacuation
- sufficient access/egress for emergency vehicles
- wells and wastewater plants relocated or protected, including associated monitoring wells
- separation of stormwater and wastewater
- assess and improve, as needed, electrical service reliability during winter or storm events (e.g., encourage back-up power generation or bury power lines)
- evaluate and design water systems and wells to be less vulnerable to drought
- road height or hill cuts to prevent flooding or drifting of snow
- pruning of trees from power lines or clearing rights-of-way (prevent accidents, better snow removal)
- planting of trees to prevent drifting of snow
- improved road systems & signage/signalization to reduce accidents, including rail crossings, bridges, etc.
- separation of transportation types (pedestrian, bicycle, truck routes)
- slope stabilization projects (compacting, vegetation, debris anchoring)
- fire breaks and debris clearing
- various monitoring systems (e.g., fire towers, weather stations, communication systems)

B. Modification of Buildings or Structures

Typically less expensive are modifications to individual structures and buildings. These changes are commonly made in response to building codes or other local regulations. Often, these projects are often funded by individual owners, though governmental agencies or insurance companies may have loan or grant programs available to assist. Some typically mentioned modification activities include:

- elevate structures above flood elevations
- structural retrofits for flood-proofing, such as defined wet areas)
- wind-proofing (bracing, storm shutters, shatter-resistant glass, etc.)
- sewer back-up protection
- construction of flood barriers around structures
- security measures and escape routes
- identification or construction of a safe room or shelter (especially for public facilities and large complexes)
- electric generator for heating and cooling when normal power supply is not available

A more costly strategy is the acquisition, demolition, and/or relocation of flood-prone buildings, facilities, or entire neighborhoods. Typically, such a buy-out program is implemented by the local government, with the assistance of grant funds, and the resulting open space becomes parkland or an environmental corridor.

III. EDUCATION & AWARENESS STRATEGIES

Education and awareness efforts aimed at community members, the private sector, and public officials can be some of those most effective mitigation strategies available. These efforts span all hazard types, even those hazards were other mitigation options may be limited. Some education and awareness strategies are relatively low cost to implement, with little or no new funding required.

	Key Natural Hazards					
	Tornado	**Winter Storms**	**Thunder-storms**	**Flooding**	**Heat and Drought**	**Wildfire**
Public Education & Awareness Activities	**	**	**	**	**	**

Education and awareness strategies can cover a variety of issues and topics, such as:

- hazard risks for the community and potential hazard impacts
- warning systems and terminology
- hazard insurance to protect belongings
- evacuation or location of shelters
- appropriate reaction to hazard events
- safety supplies or kits
- health and safety issues, such West Nile Virus
- agricultural educational efforts on drought, winter kill, and water quality issues
- how domestic practices may contribute to hazards
- permitting processes, including building and development regulations for realtors, builders, engineers, architects
- available technical assistance sources
- mitigation for business & industry leaders
- National Flood Insure Program participation
- required real estate disclosure of hazards
- formation of technical advisory committees
- drills or mock events
- modifying your home to be hazard resistant
- neighborhood or volunteer programs
- assisting with emergency
- driver safety programs
- household hazardous waste disposal

The implementation and delivery methods for these strategies can also vary greatly, including:

- face-to-face meetings
- direct mailings
- local media (television, radio, newspaper)
- informational flyers and self-help guides
- multi-media materials (CD-ROMs)
- World Wide Web
- identify a hazard information center
- information booths at events, fairs, etc.
- presentations to schools, groups, etc.
- pilot projects and demonstrations

FEMA Insurance Program Activities

Communities must adopt & enforce a floodplain management ordinance to qualify for the NFIP.

CRS credited activities for rate reduction encompass a wide variety of mitigation activities, including:

Public Information Activities
Elevation Certificate
Map Determinations
Outreach Projects
Hazard Disclosure
Flood Protection Library
Flood Protection Assistance

Mapping & Regulatory Activities
Additional Flood Data
Open Space Preservation
Higher Regulatory Standards
Flood Data Maintenance
Stormwater Management

Flood Damage Reduction Activities
Repetitive Loss Projects
Floodplain Management Planning
Acquisition & Relocation
Retrofitting
Drainage System Maintenance

Flood Preparedness Activities
Flood Warning Program
Levee Safety
Dam Safety

Some of these activities may be required by law, such as the public noticing of government meetings or public participation during comprehensive planning efforts.

IV. NATURAL RESOURCE PROTECTION

Protecting a community's natural resources yields many positive social, environmental, health, and economic impacts, of which hazard mitigation is one. These protection strategies include the preservation of open space, the restoration of natural ecosystems, and the on-going management of a community's natural resources.

	Key Natural Hazards					
	Tornado	**Winter Storms**	**Thunder-storms**	**Flooding**	**Heat and Drought**	**Wildfire**
Open Space Preservation			*	**		*
Restoration Project			*	**		
Management Practices	*	*	*	*	*	**

A. Open Space and Environmental Corridor Preservation

By limiting development in floodprone or hazard-prone areas, certain hazard impacts can be avoided before they occur. Open space can be maintained in agricultural uses, parks, environmental corridors, and often golf courses. Open space and environmental corridor preservation can also have other multiple benefits, such as protecting unique natural or cultural resources, maintaining or improving water quality, preserving productive farmland, and providing stormwater detention areas. The most common tool to promote open space or to preserve an environmental corridor is through zoning regulations. However, there are additional tools available to promote open space:

- open space/environmental corridor preservation in local or regional planning efforts
- property acquisition
- transfer or purchase of development rights
- purchase options, such as right-of-first refusal or purchase & leaseback arrangements
- use of eminent domain for condemnation
- private or cooperative land trusts
- farmland preservation programs, including use or differential taxation and tax credits
- sediment or erosion controls

B. Restoration Projects

Similar to open space preservation, the restoration of natural areas can also help mitigate the impacts of flooding and stormwater. To address severely flood-prone areas with many repetitive loss properties, some communities have acquired the land and returned it to its natural form. Restorations project with potential positive hazard mitigation components include:

- stream corridor restoration
- shoreland, dune and beach restoration
- watershed management
- prairie restoration
- wetland restoration, preservation, & development regulations
- wetlands mitigation or "banking"
- environmental impact & carrying capacity review & ordinances

Often, these restoration projects occur in conjunction with a larger development project under the guidance of existing local or state regulations. For instance a community may identify an under-developed flood-prone area for restoration and stormwater detention. As development occurs in other areas of the community, the developers help share the financial burden of the restoration based on wetland impacts and stormwater created at the developing locations.

C. Management Practices

Community members and government officials utilize numerous natural resources management tools and best practices which have positive hazard mitigation impacts. Some examples are:

- forest and wild fire fuel reduction

- farmland preservation planning and soil conservation practices
- forest & vegetation management & projects
- urban forestry & landscape management

These management practices can impact most natural hazards to varying degrees. For instance, urban forestry and landscape management can be used to reduce stormwater run-off, improve water quality, reduce the impacts of the urban heat island effect, and help reduce local air and sound pollution. In rural areas, forest and vegetation management can help reduce the potential of large forest and wild fires, improve water quality, reduce the drifting of snow, and can be an important soil conservation tool. Some of these practices may also be incorporated into local regulations.

V. Emergency Response & Recovery Services

Many of the tools & activities listed in this section may more appropriately fit within the scope of a post-disaster recovery & reconstruction plan, rather than a hazard mitigation plan. However, a prompt and organized response to a hazard warning or event can lessen the negative impacts associated with the event, and speed up the recovery process. The majority of these response strategies apply to multiple or all hazards.

	Key Natural Hazards					
	Tornado	**Winter Storms**	**Thunder-storms**	**Flooding**	**Heat and Drought**	**Wildfire**
Planning Activities	**	**	**	**	**	**
Communication Systems	**	**	**	**	*	**
Resources	**	**	*	**	*	**

A. Planning Activities

Emergency response and operations plans and policies can be comprehensive, specific to a hazard-type, or focus on addressing a particular impact. Most importantly, plans should be in place which identify roles, responsibilities, and authority when an event occurs, including any policies regarding emergency legislation. Such planning activities may include:

- evacuation procedures
- security & protection against looting
- animal control
- health issues (e.g., vaccinations for tetanus)
- general clearing, clean-up & refuse disposal
- disaster recovery plans
- emergency government plans

Additional planning and regulatory efforts may be required after an event occurs, and to help guide the redevelopment process, such as:

- development moratorium or interim zoning
- planning solutions for impacted historic buildings & sites
- re-occupancy permits
- emergency or temporary permitting for repair and emergency demolition
- evacuation procedures
- post-disaster evaluation & mitigation (lessons learned)
- post-disaster reconstruction land-use plans and priorities (opportunities)

B. Communication and Warning Systems

Hazard threat recognition & reporting is critical for effective hazard mitigation. Such warning systems may be electronic (e.g., dam monitors, flood gauges, weather radar, road ice sensors) or require human action (e.g., volunteer weather-watchers).

Once a potential or existing hazard is identified, it needs to be communicated effectively to those who may be impacted and to those who need to respond. Such warning systems may include sirens, television/radio, NOAA weather radios, automatic dialing systems, voice-activate radio, or public address systems.

If an event should occur, additional effective communication is needed between emergency response services in the field and the emergency operation center. Additional communication policies for post-disaster response may address media & public interaction and a point-of-contact with state emergency management officials.

C. Resources (Personnel, Financial, and Equipment)

Foremost, personnel need the training to identify a potential hazard, utilities the existing communication systems, and take appropriate action. A well-prepared community will have adopt emergency response procedures and plans such as those previously discussed, and emergency personnel will be knowledgeable of these plans. As such, training is a very important hazard mitigation tool.

The following are some additional resource-related hazard mitigation strategies:

- purchase equipment or special vehicles (or related maintenance)
- maintenance or improvement to utilities & infrastructure to increase response effectiveness
- general clearing, clean-up & refuse disposal
- provide relief services for community members, such as:
- special arrangements for payment of heating bills during severe winter storms
- transportation to heating or cooling centers
- emergency housing or shelters
- public mortgage lending subsidies
- damage assessment & accounting systems
- restoration of utility services
- business support
- other specialists (e.g., environmental, agricultural, hazardous materials)

Related to strategic partnerships, some communities have established various agreements with other municipalities or the private sector for mutual support if a disaster should occur, in order to expedite the recovery process.

VI. IMPLEMENTATION STRATEGIES

Implementation strategies are often not direct means of mitigating a hazard, but are important tools for assisting with the implementation of the various mitigation activities previously discussed. Implementation strategies can apply to all hazard types, and are equally important for pre-disaster mitigation and post-disaster response and recovery. This section overviews strategic partnerships and project financing as important implementation tools.

A. Strategic Partnerships

Strategic partnerships are very important in hazard preparedness, disaster response, and post-disaster recovery. Such partnerships may be between adjacent governmental entities, the private and public sectors, or even between community members themselves. These partnerships may involve formal contracts, mutual aid agreements, and memoranda of understanding, or may be a less formal sharing of information and training. Most common is the formation of partnerships for the sharing of resources, including technical skills, financial resources, equipment, and personnel.

Some example strategic partnerships are:

- partnerships with universities and colleges for training programs or special studies
- establishment of public-private ad hoc task forces to address a critical issue
- sharing of data & information (e.g., GIS, maps, plans, ordinances, procedures)
- identification of community buildings to use a public storm, cooling, and heating shelters
- monitoring for potential hazards & related communication
- multi-agency training, drills, or mock events
- intergovernmental agreements for snow removal, fire, police, or other emergency services
- form a cooperative to increase buying power for special insurance
- intergovernmental agreements for regulatory oversight, inspections, monitoring, assessment, etc.
- agreements to perform comprehensive planning or regional studies
- agreement regarding the provision and maintenance of infrastructure, dams, equipment, etc.
- agreements covering disaster response and recovery services and resources (e.g., Red Cross)

Many of the existing strategic partnerships for hazard mitigation in the County are identified in **Section IV. Current Mitigation Activities** of the plan.

B. Project Financing & Fiscal Mechanisms

There are optional means of funding hazard mitigation measures, outside of the standard annual municipal or county budget cycle. Many communities are beginning to take a longer-term perspective on project financing and adopting capital improvements plans for all types of infrastructure improvements and heavy equipment purchases. This approach allows a better perspective of the long-term needs and financial resources a community has available, enabling the exploration of alternative fiscal mechanisms such as:

- identification & procurement of grant funds (revenue)
- special assessment districts for special services or benefits (revenues, guide development)
- developer exactions, impact fees, development improvement taxes (revenue)
- user-fees (revenue)
- land dedications/exactions & TDRs (land)
- tax incentives--marginal cost pricing & differential assessment (primarily to guide development)
- tax increment financing (TIF) for infrastructure improvements (revenue)
- land transfer, development, gains taxes (versus speculation & profits for projects, create a land bank, etc.)
- tax abatement, low-interest loans, subsidies, etc. (incentives for mitigation or guide development)
- loans or tax-exempt bond financing
- special redevelopment funds
- strategic partnerships with non-profit groups for fund-raising activities (revenues, awareness)
- strategic partnerships to pool financial resources, possibly leveraging additional grant or private funds

APPENDIX K.

FEASIBILITY ANALYSIS OF ALTERNATIVE MITIGATION STRATEGIES

Prioritization considers the following factors: 1) Is the strategy **TECHNICALLY** and **ENVIRONMENTALLY** feasible and appropriate? Do benefits outweigh costs?
2) Is the strategy **LEGALLY** and **ADMINISTRATIVELY** feasible and appropriate? Are resources available?
3) Is the strategy **SOCIALLY** and **POLITICALLY** feasible and appropriate? Would there be support for the action?

Note: The following are county-level and multi-community strategy alternatives; each city and village individually evaluated their community-specific strategy recommendations. Most ongoing preparedness and planning activities or other adopted standard practices in Eau Claire County are not repeated here. The alternative strategies were analyzed based on their potential for loss reduction and feasibility for the mitigation of hazard risks. Some of the following strategies may be rated differently by the county or communities based on other criteria. As such, a strategy may be excluded or ranked low in this plan, but could be a high priority for the county overall.

2018 Plan Strategy Alternative	2013, revised, or new	Prioritization/Score				If recommended, likely key parties to be involved.	Other Comments or Barriers to Implementation
		High (7.5-10)	Med (6.5-7.4)	Low (5.0-6.4)	Exclude		
Flood Mitigation Strategies - Project Alternatives							
1. Continue to monitor, study, and address stormwater and flash flooding hotspots in the county as identified in the flood assessment of the hazard mitigation plan. Potential projects include, but are not limited to creation/expansion of flood/stormwater storage areas, the installation or re sizing of culverts, the creation or improvement of drainageways, and the protection of natural drainage and retention areas.	2013; revised	**8.2**				County Planning & Development, Highway, and Emergency Mgmt; municipalities	Strategy is generalized to allow flexibility in implementation. If significant damages incurred, especially to structures, Emergency Management would become involved. Health Department would be involved in post-flood recovery due to potential contamination of wells, mold, etc.
2. Pursue hazard mitigation grant funding to acquire, relocate, or floodproof structures and properties with a flood history, most at risk of flood damage, and/or following a flood event in which significant damage occurs, if the landowner agrees to participate.	2013		**4.3**			Local Communities with County Emgy Mgmt support; possibly Planning & Devlpmt	Flood assessment suggests potential areas that may be targeted for such mitigation. Flooding threat can change over time. Eligible for mitigation grant dollars if benefits outweigh costs. Steering Cmte increased priority after discussion.
3. Install automated flood gauges on the Eau Claire River, including potential replacement of the USGS flood gauge station north of Fall Creek. Continue working to improve remote monitoring reliability at County dams.	2013; revised slightly			**4.3**		County Planning & Development; County Parks	Could be combined with water quality and stream flow monitoring initiatives, though FEMA grant dollars would not fund this additional capacity. Steering Cmte increased priority after discussion.
4. When funding allows, install a gate system at Lake Altoona Dam that will allow for safe use without having to use the walkway and address related freezing-up challenges.	new		**3.6**				Mentioned in 2013 plan, but was not a separate strategy. Steering Cmte increased priority after discussion.
5. Pursue opportunities to improve the accuracy of floodplain maps (D-FIRMs) now that LIDAR data is available.	2013; revised		**6.5**			County Planning & Development, WCWRPC, WDNR, FEMA	Many counties having similar concerns. Discussions with FEMA underway through WCWRPC to explore options.
Flood Mitigation Strategies - Planning, Policy, & Outreach Alternatives							
1. Continue to enforce County and local floodplain regulations to: discourage future floodplain development and the storage of hazardous materials in floodplains; require dry land access for new structures; limit development in dam shadows; and maintain natural flood storage areas.	2013	**8.2**				County Planning & Development & County Board; municipalities	General policy statement. County floodplain regulations do not regulate dam shadows beyond 100-year floodplain.

2018 Plan Strategy Alternative	2013, revised, or new	Prioritization/Score				If recommended, likely key parties to be involved.	Other Comments or Barriers to Implementation
		High (7.5-10)	Med (6.5-7.4)	Low (5.0-6.4)	Exclude		
2. Continue to educate the public and elected officials of flood risks, flood insurance, and alternatives to mitigate stormwater runoff (e.g., soil health, erosion controls, rain gardens, low-impact development). Especially target those municipalities with the greatest assessed improvements in or near floodplain areas.	new			5.2		County P&D and County Emergency Mgmt; local municipalities	Homeowner's policies typically do not cover flood damage. Abt. 25% of all NFIP insurance claims are for areas outside the 100-year floodplain. Many low value homes have no insurance. Also has potential surface water quality benefits.
3. Encourage collaboration during development permitting. Continue to stress the importance of culvert maintenance and sizing to municipalities. Encourage municipalities to work cooperatively to consider impacts downstream when making stormwater system improvements (e.g., resizing culverts, new drainageways) as well as consider the changing climate.	new			5.2		County Planning & Development & Highway; towns	Ongoing through towns association and individual town contacts.
4. Develop a County Flood Emergency Action Plan. Explore the need for additional sandbagging equipment.	2013; revised slightly			5.6		County P&D and County Emergency Mgmt; local municipalities	In 2013, proposed developing a County plan similar to City of Eau Claire's. Incorporate recommendations from past studies, reviews, and events (e.g., 2010 flooding & 2011 review). WEM may have some of this.
5. Continue to maintain dams and dam emergency operating plans. Discourage development in the hydraulic shadows (dam failure floodplains) of dams. Encourage residents and businesses within or near dam shadows to sign-up for the Smart 911 emergency notification system. Develop G.I.S. map layers for all large and high hazard dams.	2013; revised	9.1				County Planning & Development and Emergency Mgmt	GIS mapping for some dam shadows completed.
6. Monitor and study the need for: (i) further development standards or adaptive action to mitigate flooding beyond the official FEMA 100-year floodplain boundaries, (ii) modifying stormwater management model assumptions, and (iii) reassessing related infrastructure (e.g., culverts) due to climate trends and increasing heavy rain events.	new		6.6			County Planning & Development; City of Eau Claire	This strategy requires further analysis. Some of these actions may already be addressed through design manual updates; most detention facilities designed for more than a 100-yr event. Explore additional climate adaptation measures.
Severe Weather Mitigation Strategies (e.g., tornado, high wind, winter storm)							
1. Based on landowner and/or community interest, pursue grant funding to make cost-sharing available for the installation of safe rooms (storm shelters) at mobile home parks, campgrounds, RV parks, recreational properties, slab-on-grade residential developments, and other areas and communities were no existing shelter alternatives exist, including public-owned facilities (e.g., campgrounds, parks, Expo Center).	2013; revised		5.9			Local communities and landowners w/ County Emgy Mgmt assistance. County if county-owned.	Tornado assessment discusses current need/interest. Would be contingent on park owner participation. Coordinate with villages or cities when opportunities and needs exist. Steering Cmte increased priority after discussion.
2. Explore the construction of a community safe room(s) at the Eau Claire County Expo Center and County campgrounds.	2013			5.6	X		See discussion in the tornado assessment section. Combine with previous alternative for final plan.
3. Consider adoption of County ordinance language which requires new or expanding campgrounds, RV parks, and resorts to construct or identify per formal agreement a community safe room (storm shelter) for visitors. Provide model language to cities, villages, and towns for consideration.	2013; revised				4.3		

2018 Plan Strategy Alternative	2013, revised, or new	Prioritization/Score				If recommended, likely key parties to be involved.	Other Comments or Barriers to Implementation
		High (7.5-10)	Med (6.5-7.4)	Low (5.0-6.4)	Exclude		
4. Implement an educational initiative targeting campgrounds, resorts, mobile home parks, realtors, builders, and the general public with informational materials to promote safe rooms, emergency planning, use of notification systems, etc. If grant funding is available, consider distribution of weather radios and/or construction of a small, model safe room for educational purposes.	new				4		Educational outreach potentially eligible for FEMA mitigation grant 5% funding. Such education is an ongoing activity, but does not require separate mitigation strategy.
5. Implement a NOAA All Hazards (Weather) Radio project with a particular focus on distribution radios (or discount vouchers) to mobile home residents, resorts, campgrounds, special needs populations, and/or critical facilities. Include a general education component on warning sirens, alert systems, and all hazards radios.	2013				3.3	County Emergency Mgmt; Public Health, other partners depending on target audiences	Eligible for FEMA mitigation grant support.
6. Explore the potential installation of lightning detection system and alert systems at major festival grounds.	new				X		Discussed at Steering Cmte meeting. Uses NOAA and uncertain of reliability of such systems; excluded as alternative.
Long-Term Power Outage Strategy Alternatives							
1. If funding opportunities become available, work with communities to pursue grant dollars for emergency power generators for critical facilities and emergency operations centers in Eau Claire County.	2013; revised	8.2				Local communities & critical facilities w/ Emgy Mgmt assistance.	Not currently a priority for mitigation grant funding in Wisconsin. Generator survey shows demand.
2. Continue to work with local power providers to bury overhead electrical lines in areas prone to outages due to falling trees/limbs or high winds or for service to critical facilities. For areas prone to flooding, transformers or other such power infrastructure may require floodproofing, elevating, relocation, or other flood mitigation.	2013; revised slightly			5.6		Electric cooperative & municipal utilities	See Long-Term Power Outage assessment section.
3. Encourage households with persons having special needs that may be uniquely at risk during a power outage or disaster (e.g., oxygen, dialysis, seniors living alone) to develop an emergency contact plan. Encourage these households to sign-up for Smart 911 system and to notify their electric provider to be added to their emergency contact lists.	new		7.3		X	County ADRC, Human Services, Public Health, and Emergency Management.	Contact information collected by ADRC for client intake; discussion underway on how to link this information with Smart 911 system. See related discussion in LTPO subsection. Steering Committee decided to combine this strategy with #4 below.
4. Partner with area electric providers, oxygen providers, and ADRC to review the County's Special Populations emergency plan to identify the roles of electric providers within the County's emergency operations systems and lines of communication. Identify how special needs households are contacted or monitored and how back-up oxygen is distributed if needed. Collaborate with hospitals, clinics, and home health care providers, to identify patients and develop a notification and monitoring plan in the event of a long-term power outage or other disaster.	new	7.7				PHEP Cmte; Public Health; Human Services; County ADRC; electric providers; health care providers	Public Health Preparedness Committee has started work on this to be completed by July 2019. Combine with #3 above for final plan since #3 is addressed as part of the County's Special Populations emergency plan.
5. Eau Claire County Emergency Management should develop and maintain an emergency generator and emergency fuel supply list for use during long-term power outages.	2013; scaled back				3.8		Excluded a generator loan program for farm operations as suggested in 2013; need for such a program is likely low.

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		High (7.5-10)	Med (6.5-7.4)	Low (5.0-6.4)	Exclude		
6. Partner with electric providers to increase public awareness of electrical related risks and power outage preparedness as part of Electrical Safety Month and National Safety Night Out.	new				X		Educational outreach potentially eligible for FEMA mitigation grant 5% funding. Combine w/ #7 below.
7. Work with area utilities to encourage public- and private-sector planning for long-term power loss and pursue other mitigating activities recommended during the 2010 regional long-term power outage planning effort and more recent workshops, as deemed feasible. Encourage local governmental offices, businesses, emergency shelters, and critical facilities to develop a basic long-term power outage plan and continuity strategy that inventories and addresses power generation and emergency fuel needs and provide 24/7 contact information to their electric provider.	mostly new		7.0			County Emgy Mgmt, County EDC, electric providers	Mostly planning and preparedness activities that can be implemented without significant new resources, if time is available and priorities allow. Could include development of and/or maintaining a list of emergency generator and fuel suppliers at the County level for emergency use or referral.
8. Study the wireless communications impacts should a long-term power outage occur in Eau Claire County.	new				4.7		
9. Work with electric providers to increase public awareness of where to get information during a power outage and what to do during an outage, including safety information regarding generator use.	new				4.5		Could be conducted during Electrical Safety Month. Can be combined with #7 above.
Hazardous Materials Spills Strategy Alternatives							
1. Continue Hazardous Materials Emergency Preparedness training. Regularly rotate HazMat exercises and training throughout Eau Claire County with a particular focus on those chemicals commonly transported by rail or highways or at fixed facilities and pipelines within the local host community. Consider having EHS facilities give presentations on their hazardous materials, facilities, and plans at fire chiefs meetings.	new		6.6			County Emgy Mgmt, LEPC, Fire Departments, railroads, EHS facilities	Certain minimum levels of training are already required. Schools and CESA 10 may have a role, since some have haz mat on site as well as evacuation planning.
2. Implement the recommendations of the 2018 *State of Groundwater in Eau Claire County* report, including additional groundwater testing and mapping of areas of high vulnerability.	new			4.5		As recommended in the Groundwater Report; County Board	Including this in the mitigation plan supports plan coordination and raises awareness. Steering Cmte increased priority after discussion.
3. Update the 2011 Commodity Flow Study to provide a better understanding of the types of hazardous materials being transported by highway and rail in Eau Claire County.	new			5.9		County Emergency Mgmt, LEPC	Communities expressed concern that they did not know what haz mat was "moving through." 2011 effort was a multi-county study.
4. Work with local communities to increase public awareness and support of available "Clean Sweep" programs and other methods for the proper disposal of hazardous waste. Encourage State legislators to provide additional funding support for such programming.	new		7.0			County Planning & Development; County Board	Health Department can help promote.
5. Explore development of urgent response protocols for manure and agricultural spill events, then provide related training to area farmers and rural fire departments. Increase responder awareness of common agricultural chemicals.	new			5.4		County Emgy Mgmt & L&WCD, Fire Departments, agri community; UW-Ext	Involve rural fire departments in any spill training.

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		High (7.5-10)	Med (6.5-7.4)	Low (5.0-6.4)	Exclude		
Active Threat/Shooter Strategy Alternatives							
1. For large businesses and critical facilities with significant numbers of employees and clients, encourage the numbering of interior and exterior doors (and windows if appropriate) and provide copies for floor plans with door numbers to local emergency responders and County Emergency Communications. Designate a secure, web-based storage area for such plans at the County level.	new			**5.6**		County Emgy Mgmt, County EDC, business owners, Law Enforcement	Potentially expand to additional businesses as resources and interest allows.
2. Continue to encourage ALICE (or similar), situational awareness, and crisis intervention training for schools, government buildings, businesses, community organizations, and critical facilities. Encourage the creation of basic active threat plans and periodic drills.	new			**5.4**		County Emgy Mgmt, school districts, other critical facilities, DRCV, Law Enforcement	Sheriff's Dept has trained instructors. School resource officers may be an important resource for broader community education. Emphasize personal responsibility and awareness.
3. Conduct periodic active shooter exercises at school, government buildings, large businesses, and other critical facilities to test response plans, crowd control, and assess security hardening. Include all response agencies (law enforcement, fire, EMS, other) as part of these exercises so that roles and responsibilities are understood.	new			**5.9**		Law Enforcement, Emergency Responders, County Emergency Mgmt, facilities, DRCV	Educational institutions have been very active on this. Public schools receive additional support through CESA 10.
4. Provide businesses and critical facilities checklists for workplace violence preparedness and prevention. OSHA, FEMA, and other organizations have a variety of checklists and guides available, some of which are customized to certain types of businesses or facilities.	new			**5.2**		County Emgy Mgmt, County Health Dept, County EDC, DRCV	This is "low hanging fruit." Good fit for DRCV efforts.
5. Develop an active threat/shooter plan for county facilities and events, then continue related training and exercises.	new	**8.2**				County Emgy Mgmt, Facilities Mgmt, and Sheriff's Dept	Plan development underway. Departments need to understand roles and take responsibility.
Agricultural-Related Strategy Alternatives (e.g., Drought, Livestock Pandemic)							
1. Support the efforts of County Land Conservation staff, NRCS, and UW-Extension to promote nutrient management, soil health, and other best practices that can increase infiltration, which helps reduce flash flooding, protects groundwater, and makes croplands more resilient to drought and wind erosion.	2013; revised		**6.7**			County L&WCD, UW-Extension, NCRS, agricultural partners	
2. Formally identify the agricultural disaster assessment team (e.g., Emergency Management, FSA, Land Conservation, NRCS, UW-Extension, state/local veterinarians) and meet annually to discuss emergency procedures, plans, responsibilities, and trends. Explore opportunities to encourage continuity planning and power outage preparedness for farmers.	new				**3.9**	County L&WCD, UW-Extension, NRCS, FSA, Health Dept.	Not a formal group, but does meet as needed. Strategy suggests regular, proactive meetings. However, removed as a recommendation since the membership of the Team will change based on the type of disaster/incident.
3. Work with livestock producers, processers, veterinarians, and DATCP to educate on and evaluate current procedures for the monitoring, reporting, response, and quarantine for livestock viral/disease outbreaks and animal mass casualty incidents. Update and exercise these plans and policies as needed.	new			**3.4**		County L&WCD, Public Health, Emgy Mgmt, and agri partners	If a big incident, DATCP would provide support/lead. Steering Cmte increased priority after discussion.
4. Evaluate Eau Claire County's current plan and related policies for animal mass casualty incidents. Develop basic plans or policies, if needed, and conduct related training.	new				**2.3**	County Emgy Mgmt, L&WCD, DATCP, and agri partners	Part of County EOP's Agricultural annex. If a big incident, DATCP would provide support/lead. Steering Cmte combined with #4 above.

2018 Plan Strategy Alternative	2013, revised, or new	Prioritization/Score				If recommended, likely key parties to be involved.	Other Comments or Barriers to Implementation
		High (7.5-10)	Med (6.5-7.4)	Low (5.0-6.4)	Exclude		
Wildfire & Emergency Access Strategy Alternatives							
1. 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.	2013; revised		**7.0**			County or local zoning offices, Fire Department, local municipalities	County and many towns have ordinances, but issues still exist, especially near surface waters and in forested areas.
2. Consider adoption of a county addressing ordinance for standard design and placement of address signs in towns. Encourage replacement of older signs with newer flag style signs through attrition.	new		**6.6**			County Board; towns	Suggested that input from emergency services providers be considered on any such ordinance. Also, multiple homes on a long dead-end road may require more than one sign per home (1 intersection & 1 driveway).
3. Encourage the creation and maintenance of community wildfire protection plans or FireWise strategies for the highest wildfire risk areas in the County, such as near Lake Eau Claire, Town of Seymour, and the Lowes Creek area.	new			**5.9**		municipalities, lake groups, fire departments, WDNR	The Town of Seymour has a current community wildfire protection plan. Town of Union expressed similar interest for areas of their community.
4. Continue to maintain and implement the Eau Claire County 15-Year Comprehensive Forest Land Use Plan to include best management practices to reduce risks related to wildfire, invasive species, and plant diseases.	new				**4.7**	County Parks & Forestry; County Land & Water Conservation	Ongoing. Does not require a separate mitigation strategy.
5. Pursue grant funds for dry hydrants for fire protection where other water sources are not readily available.	2013				**4.9**	Fire Department and local communities	Grant funding may be available. Wildfire assessment discusses needs identified by towns and fire departments.
6. Continue to cooperate with the Wisconsin DNR, local Fire Departments, and school districts in the education of residents and local officials in the mitigation of wildfire risks, including high risk factors, fire-adapted communities, reducing hazard fuel loads, protecting the home ignition zone, emergency vehicle access, and general fire safety through presentations, public service announcements, social media, and signage. Outreach should especially target areas of highest risk and could include educational mailings.	new		**5.8**			WDNR, Fire Depts, towns, and County Emgy Mgmt	Supports continuing current efforts. While 1-on-1 resident contacts is preferred, mailings may be more feasible due to costs. Last separate mailing about 2014. Could be eligible for mitigation grant dollars. Steering Cmte increased priority following discussion.
7. Eau Claire County, municipalities, and fire departments in the Intensive Fire Protection areas should continue to advocate for and participate in WDNR wildland training exercises.	new			**5.8**		WDNR, Fire Depts, and County Emgy Mgmt	Supports continuing or expanding current efforts. Also allows for improved coordination between neighboring fire departments.
8. Update the Emergency Map Books in 2019-2020.	2013; revised		**6.9**			WDNR, County GIS	Last updated in 2013 and distributed in 2014.
9. Encourage collaboration to create and conduct another large-scale forest fire exercise, including training on use of a radio operations/structure branch, evacuation, and structural protection.	2013; updated				**X**	WDNR, Fire Departs, Law Enforcement, Emgy Mgmt	Functional completed in 2015. Potentially target Seymour/Washington area for next exercise. Steering Cmte combined this with #7 above.

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		High (7.5-10)	Med (6.5-7.4)	Low (5.0-6.4)	Exclude		
Other Private-Public Partnership Strategy Alternatives							
1. As part of the County Multi-Year Training and Exercise Plan (MYTEP), continue to involve electric providers, County Land Information/G.I.S., County health and aging services, private-sector resources, and local non-profits (e.g., housing authorities, long-term care facilities) in preparedness and training exercises, including discussions on their roles within the incident command system (ICS).	2013; revised		6.7			County Emgy Mgmt, electric providers, other partners	Many resources exist, but not all agencies/organizations understand how they fit in. Available resources change over time as agencies and services change. Exercise related triage systems.
2. Review and, if needed, develop emergency action protocols, evacuation planning requirements, and additional security standards for large assembly events, festivals, etc. Consider additional permitting conditions related to natural and active threats. Explore safe room alternatives for such events.	new		7.0			Festival/event coordinators, local municipality, County E.M assistance	Existing permitting requirements largely limited to security, parking, and emergency services response. Include extreme heat considerations.
3. Partner with the Northwest Wisconsin Healthcare Emergency Readiness Coalition to encourage and provide technical assistance for emergency preparedness and continuity planning by long-term care facilities and other health care service providers, including sharing information with public-sector emergency responders as needed.	2013; revised			5.2		County Health, NWWIHERC	Need has increased with recent Federal rule changes. Some providers have approached the county with questions; need to ensure that provider plans do not have unrealistic expectations of public sector during an event.
4. As opportunities allow, partner with local responders and Volunteer Organizations Active in Disaster (VOADs) to engage the media and increase public awareness of the volunteerism needs in the county for local fire departments, first responders, and other local Emergency Mgmt and volunteer organizations.	new			6.0		various partners	County would have a support role, but may not be the lead. Growing, critical issue for volunteer fire and EMS departments, especially in light of training requirements.
5. Continue to partner with Disaster Ready Chippewa Valley to encourage preparedness, continuity planning, and private-public partnering among County businesses and non-profit organizations.	2013; revised slightly			5.3		County Emgy Mgmt, DRCV	
6. Work with partners to identify and execute MOUs for designated cooling and warming shelters for residents, homeless, visitors, and travelers. If possible, such shelters should have emergency power generators.	new		5.9			County Public Health, Red Cross, Emgy Mgmt, partner organizations	No designated cooling or warming shelters in the County. Steering Cmte increased priority following discussion.
7. Partner with emergency services providers and critical facilities to develop and exercise a mass evacuation, access, and temporary shelter protocols.	2013; revised	7.9				County Emgy Mgmt, Human Services, emgy services, critical facilities	Focus on procedures; not a location-specific plan. May include process and contacts for "standing up" a transportation unit within ICS. April 2018 exercise of hospital evacuation with unified command.
8. Work with critical infrastructure to explore opportunities to raise awareness of cyber security threats, the importance of employee education to mitigate these threats, and available resources to assist with vulnerability assessment.	new			6.0		various partners	
9. Support participation by Eau Claire County, City of Eau Claire, and other area critical infrastructure staff in the Regional Cyber Response Team and other such intergovernmental cooperative efforts, such as the Government Information Processing Association of Wisconsin.	new		6.7			County/City governing boards; IT personnel; various partners	
10. Form a work group to explore options and best practices for retaining volunteers for smaller Fire and EMS departments, especially given recent changes in training requirements.	new	X				could be approached at a regional level	Steering Cmte expressed strong support for this late suggestion given the critical need for rural departments.

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		High (7.5-10)	Med (6.5-7.4)	Low (5.0-6.4)	Exclude		
Other Planning & Policy Strategy Alternatives							
1. Review and update the Eau Claire County Continuity of Government Plan. Encourage other local municipalities to consider similar continuity planning efforts for the recovery of critical business functions.	2013; revised slightly		6.9			County Emergency Mgmt, Administration	Plan completed in 2003, but needs revised and update.
2. Continue to work with partners to maintain and exercise the Mass Clinic, Communicable Disease, Special Populations, and other components of the Eau Claire County Public Health Emergency Preparedness Plan.	2013; revised		6.7			County Public Health; other partners	Fatality Management component will be updated once related grant requires.
3. Review and ensure coordination, clarity, and consistency between the County Emergency Operations Plan, County Public Health Emergency Preparedness Plan, and other related plans and protocols. Likewise, clarify roles and responsibilities of various committees, such as the LEPC, Public Health Emergency Preparedness Committee, and Infectious Disease Committee.	new	8.1				County Emergency Management & Public Health	Support also available through the Western Region Public Health Readiness Consortium, of which City-County Health Department is a partner.
4. Continue the development of geographic informational systems (GIS) data for hazard mitigation and emergency management purposes. Continue to explore Reverse-911 capabilities, the ability to provide real-time mapping as part of the EOC or at the incident command center, and emergency mapping of railroad mileposts, key bridges, and grade crossings for emergency use.	2013; revised	7.7				County GIS, Emergency Management, and 911 Comm.	When developed, may require explanation in use to emergency services and dispatch personnel.
5. Encourage the county and municipalities to integrate hazard and flood mitigation issues and strategies into their comprehensive plan updates.	2013			5.2		County Planning & Development and local communities	Eau Claire County has done this. Not a state requirement, though being encouraged by FEMA and Wisconsin Emergency Management.
6. County Emergency Management should continue to maintain an up-to-date list of the status of local Emergency Operations Plans (EOPs) and work with local communities to practice/drill and update these plans regularly. Municipalities are encouraged to incorporate continuity planning, data backup, debris management, and mutual aid into their plans and to notify the County when plan changes or updates are completed.	2013; revised	7.5				County Emgy Mgmt; local communities	Important since some community may be primarily relying on County Emergency Management or local Fire Department to address, rather than maintaining their own EOP.
7. Mobile command unit serves as County back-up EOC but can be a challenge to get to certain sites and set-up. Strategy needed?	new			X			Steering Cmte added this strategy following discussion at their final meeting. Existing unit is aging and requires a very large truck (e.g., dump truck) to haul.
8. Continue planning and preparedness efforts that would enable Eau Claire County's emergency management program to obtain Emergency Management Assessment Program (EMAP) certification.	new			X			This includes the HIRA and Hazard Mitigation suggested further actions recommended in the mitigation plan update.

2018 Plan Strategy Alternative	2013, revised, or new	Prioritization/Score				If recommended, likely key parties to be involved.	Other Comments or Barriers to Implementation
		High (7.5-10)	Med (6.5-7.4)	Low (5.0-6.4)	Exclude		
Other Communication, Coordination, & Outreach Strategy Alternatives							
1. Designate and train a County team use the County webpage and social media to keep the public informed of recovery status, recommended actions, etc. following an emergency or disaster event. Link such announcements to the social media of communities and other key partners.	new			**5.6**		County Emergency Mgmt and Public Health. Cities and Villages.	Must be available 24/7 w/ contingency person(s). Messaging coordination with PIO through EOC.
2. Encourage Eau Claire County residents, businesses, and organizations to enroll their cell phone numbers for the County's Smart 911 mass notification system. Educate residents and critical facilities on the capabilities of Smart 911, such as severe weather, hazardous spill locations, missing persons, evacuations, road closures, etc.	new	**8.4**				County Emergency Mgmt; local municipalities	2013 plan referenced CityWatch system that is no longer being used.
3. Update and exercise the City-County Risk Communications Plan, including the relationship and roles of local municipalities. Exercise notification systems for key partners and resources.					**X**		After discussion, Steering Cmte decided to combine this strategy with #1 for the final plan update.
3. Work with WDOT to obtain portable digital message boards for use on Interstate 94 and other roadways during emergencies or severe weather.	revised			**5.4**		County Highway Department, WDOT	As noted in the Current Mitigation Activities section, progress on this strategy has been made since last mitigation plan.
4. Once every two years, or as needed, Eau Claire County Emergency Mgmt will continue to provide presentation(s) to the Towns Association on basic roles/responsibilities of town officials, emergency operations planning, available resources, hazard event reporting, emerging issues, and training opportunities. Also, look for opportunities to educate elected officials in the County on factors that influence ISO ratings (e.g., Fire Dept capability, building inspections, 9-1-1 Center) and the relationship to local insurance costs.	2013; revised slightly		**6.9**			County Emgy Mgmt, Towns Association	Towns Association meets quarterly. Some towns have not taken advantage of post-flood grant dollars in past.
5. Encourage local officials, public works personnel, and key municipal/county staff with a role EOP or EOC role to have a minimum of ICS 100, 200, 700, and 800 training, with additional training for any specialized roles. Encourage each municipality and emergency response agency to designate one or more trained PIOs.	2013; revised			**5.6**		County Emergency Mgmt; municipalities	Training courses available online.
6. Undertake a small-scale initiative to encourage County employees to be prepared at home.	new			**5.5**		County Administration, Emergency Mgmt, Health Dept	Continuity strategy; if employees are not prepared at home, they will not be available to assist County in response and recovery. This was a City of Eau Claire strategy from previous plans.
7. Increase County resident awareness of Great Rivers 2-1-1 as a source of information during a disaster event. Work cooperatively to strengthen the Great Rivers 2-1-1 disaster resource list for Eau Claire County and adopt procedures to keep Great Rivers 2-1-1 updated during and following a disaster event.	2013			**6.2**		County Emgy Mgmt, Public Health Preparedness Cmte	County has an MOU with Great Rivers 2-1-1. Limited familiarity with Great Rivers 2-1-1 among communities and County staff.

APPENDIX L.

POTENTIAL STATE AND FEDERAL GRANT PROGRAMS FOR MITIGATION PROJECTS

Potential Federal and State Grant Programs for Hazard Mitigation

adapted and amended from: Wisconsin Emergency Management. Resource Guide to All Hazards Mitigation Planning in Wisconsin. April 2003. p19-20

This is a selection of more commonly used grant programs, but is not 100% complete.

These programs and requirements are subject to change. Contact these agencies for application materials, program changes, and additional potential funding sources not identified here.

#	Federal or State Agency and Grant Program Name	Address and Telephone Contact Information	Eligible Activities	Federal, State and Local Cost Share Requirements	Other Program Characteristics	Grant Application Due Date
1	Federal Emergency Management Agency, Hazard Mitigation Grant program (HGMP)	Wisconsin Emergency Management P.O. Box 7865 2400 Wright Street Street, Madison, WI 54707-7865	Flood proofing, acquisition and relocation of flood prone properties, elevation of flood prone properties, wind resistant or retrofit, storm water improvements, education and awareness, All Hazards Mitigation Planning efforts	Federal - 75% State - 12.5% Local - 12.5%	Local government must be in compliance with the National Flood Insurance Program to be eligible. Projects must be cost-effective, environmentally sound and solve a problem.	After a Presidential Disaster Declaration
2	Federal Emergency Management Agency, Pre-disaster Mitigation (PDM) Program	Wisconsin Emergency Management P.O. Box 7865 2400 Wright Street Street, Madison, WI 54707-7865	Grants can be used for management costs, information dissemination, planning, technical assistance and mitigation projects	Federal - 75% Local - 25%	Must have an approved hazard mitigation plan.	Typically, pre-applications due abt. July and application due abt. Sept.
3	Federal Emergency Management Agency, Flood Mitigation Assistance (FMA) Program	Wisconsin Emergency Management P.O. Box 7865 2400 Wright Street Street, Madison, WI 54707-7865	Acquisition, relocation, elevation and flood-proofing of flood-prone insured properties, flood mitigation planning	Federal - 75% Local - 25%	Repetitive loss properties given a high priority. Must have an approved hazard mitigation plan.	Typically, pre-applications due abt. July and application due abt. Sept.
4	Federal Emergency Management Agency, Public Assistance (PA) program	Wisconsin Emergency Management P.O. Box 7865 2400 Wright Street Street, Madison, WI 54707-7865	Repair of infrastructure damaged during a flood that results in a Presidential Disaster declaration. Cost effective mitigation measures may be eligible during the repair of damaged facilities	Federal - 75% State - 12.5% Local - 12.5%		After a Presidential Disaster Declaration
5	Economic Development Administration, Economic Adjustment Program (see CFDA 11.307)	United State Department of Commerce, Economic Development Administration, 111 North Canal Street, Suite 855, Chicago, IL 60606-7204 312-353-7148	Improvements and reconstruction of public facilities after a disaster or industry closing. Research studies designed to facilitate economic development.	Federal - 50%-70% Local - 30%-50%	Documenting economic distress, job impact and proposing a project that is consistent with a Comprehensive Economic Development Strategy are important funding selection criteria	Anytime
6	Economic Development Administration, Public Works and Development Facilities (see CFDA 11.300)	United State Department of Commerce, Economic Development Administration, 111 North Canal Street, Suite 855, Chicago, IL 60606-7204 312-353-7148	Water and sewer, industrial access roads, rail spurs, port improvements, technological and related infrastructure.	Federal - 50%-70% Local - 30%-50%	Documenting economic distress, job impact and proposing a project that is consistent with a Comprehensive Economic Development Strategy are important funding selection criteria	Anytime
7	Wisconsin Department of Commerce, Community Development Local Grant, Public Facilities Emergency Program	Wisconsin Department of Commerce, 201 West Washington Avenue, PO Box 7970, Madison, WI 53707-7970 608-266-8934	Repair of water, sewer, street, curb and gutter, police and fire stations	Federal - 75% Local - 25%	Available after a state and/or Presidential Disaster declaration. these funds can be used towards the local match to receive FEMA public assistance and HMGP funds	After a Disaster event
8	Wisconsin Department of Commerce, Community Development Block Grant, Public Facilities Program	Wisconsin Department of Commerce, 201 West Washington Avenue, PO Box 7970, Madison, WI 53707-7970 608-266-8934	Water, sewer, street, curb and gutter, libraries, fire stations and community centers	To receive maximum points $1.5 of local match to every $1 of state Community Development Block Grant	A community's economic distress score influences funding determination. These funds can be used as a local match to receive FEMA Public Assistance and HMGP funds.	Anytime
9	Wisconsin Department of Transportation (DOT), Flood Damage Aid	Wisconsin Department of Transportation, 4802 Sheboygan Avenue, Madison, WI 53707 608-267-5254	Replacement and improvement costs for major flood damage to a road or road structure under local jurisdiction. To help defray costs of repairing major flood damage to any pubic street, alley, or bridge not located on the State Trunk Highway System	State - 75% of replacement costs and 50% of improvement costs, reimbursed by local	Repairs or replacements can includes resign to prevent or reduce future flood damage. If Federal Disaster Aid is received, community is ineligible for State Federal Disaster Aid.	Applicant must submit final costs within 2 years following flood damage
10	Wisconsin Department of Transportation (DOT), Transportation Enhancement funds	Wisconsin Department of Transportation, 4802 Sheboygan Avenue, Madison, WI 53707 608-267-5254	Activities that "enhance" the surface transportation infrastructure "above and beyond" basic highway projects, can include: landscaping and scenic beautification, acquisition of scenic easements, and scenic or historic sites.	Federal - 80% Local - 20%	Can provide scenic vista and runoff areas, parking and landscaping along flood-prone riverways. Can acquire flood-prone areas along roads for green corridors. Food damage reduction potential is not the primary purpose of the program.	Even-numbered years. Application forms available in January. Must be submitted by April. Funds granted competitively.
11	Wisconsin Department of Commerce, Division of Housing and Community Development CDBG - Emergency Assistance Program	Wisconsin Department of Commerce, 201 West Washington Avenue, PO Box 7970, Madison, WI 53707-7970 608-267-3682	Assists local governments in response to a natural or manmade disaster. Can be used to address damage to housing, public infrastructure, businesses, community buildings, etc.	Varies, depending upon whether the community is already an entitlement community for CDBG funding.	Must give preference to households at or below 80% of the county median income.	After a disaster event.

12	Wisconsin Housing and Economic Development Agency Temporary Housing Grants	WHEDA 201 W. Washington Ave, Ste. 700 Madison WI, 53703 608-266-7884 800-334-6873	WHEDA has provided grant support to communities in the past following a disaster event for housing needs.	contact WHEDA for more information	contact WHEDA for more information	After a disaster event.
13	Wisconsin Department of Natural Resources, River Protection Grant Program	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	River organization development, education, special river study needs to help protect rivers, water quality, habitat, etc.	State - 75% maximum Local - 25%	$10,000 maximum grant Local govt's and non-profit organizations may apply.	1-May
14	Wisconsin Department of Natural Resources, River Protection Grant	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	Purchase of land or easements, restoration of in-stream or shoreland habitat	State - 75% maximum Local - 25%	$50,000 maximum grant, adoption of outdoor recreation plan required	May 1
15	Wisconsin Department of Natural Resources, Lake Planning Grant	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	Water quality studies, land use analysis, ordinance analysis, planning recommendations	State - 75% maximum Local - 25%	$10,000 maximum per grant, but can receive up to $50,000 in total grants	February 1 and August 1
16	Wisconsin Department of Natural Resources, Lake Protection Grant	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	Projects to protect and improve water quality and their ecosystems.	State - 75% maximum, not to exceed $200,000 Local - 25%	Acquisition of land and easements also eligible	May 1
17	Wisconsin Department of Natural Resources, Urban Rivers Grant Program	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	Land acquisition and revitalization of urban water fronts	State - 50% Local - 50%	Project must be part of adopted outdoor recreation plan	May 1
18	Wisconsin Department of Natural Resources, Aids for the Acquisition and Development of Local Parks (ADLP)	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	Acquisition and development of public outdoor recreation areas	State - 50% Local - 50%		May 1
19	Wisconsin Department of Natural Resources, Acquisition of Urban Green Space	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	Funding the protection of natural spaces in proximity to urban development	State - 50% Local - 50%	Protect land with scenic, ecological or natural values in urban areas from development	May 1
20	Wisconsin Department of Natural Resources, Land and Water Conservation Fund - Federal Program Administered by State DNR	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	Acquisition and development of outdoor parks and non-commercial recreation facilities	Federal - 50% Local - 50%	Funding comes from U.S. Department of Interior, project must be part of an adopted outdoor recreation plan	May 1
21	Wisconsin Department of Natural Resources, Municipal Flood Control Project	Wisconsin Department of Natural Resources, 101 S. Webster Street, PO Box 7921, Madison, WI 53707-7921 608-266-7555	Acquisition, flood proofing, wetland-floodplain restoration, storm water projects, flood insurance studies, and floodplain mapping.	State - 70% Local - 30%	Maximum grant cannot exceed 20% of funding available. Cities, villages, towns, and metropolitan sewer districts are eligible.	15-Mar
22	Wisconsin Department of Administration, Comprehensive Planning Program	Wisconsin Department of Administration Comprehensive Planning Program 101 E. Wilson Street, 9th Floor Madison WI, 53703 608-267-3369	Cost sharing in preparation of a community comprehensive plan as defined under State Statute.	Varies depending on community size and number of municipalities participating in the application.	Land use decisions must be consistent with comprehensive plan per State Statute. Comp plans may also include guidance, projects, and policies regarding hazard mitigation.	November 1
23	Wisconsin Emergency Management, Domestic Preparedness Equipment Grant Program	Wisconsin Emergency Management, 2400 Wright Street, Madison, WI 54707-7865 608-242-3232	Some equipment purchased for terrorism readiness may also have valuable emergency response use to mitigate impacts should an event occur.			
24	Wisconsin Department of Natural Resources, Targeted Runoff Management (TRM) Grant Program		Develop stormwater management facilities to control non-point source pollution , primarily in urban or developing areas.	May be able to leverage with Wisconsin DOT funds.		
25	U.S. Army Corp of Engineers Section 14-Emergency Streambank and Shoreline Protection	regional contact: Detroit District 477 Michigan Avenue Detroit, Michigan 48226 313-226-6764	Provide bank protection of highways, bridges, essential public works, and critical facilities endangered by flood-caused erosion.	Federal - 75% Local - 25%	Must meet U.S. Army Corps of Engineers economic feasibility and other criteria Maximum $500,000 per project.	

26	U.S. Army Corp of Engineers Section 22-Water Resources Planning Grant	regional contact: Detroit District 477 Michigan Avenue Detroit, Michigan 48226 313-226-6764		Federal - 50% Local - 50%	Must meet U.S. Army Corps of Engineers economic feasibility and other criteria	
27	U.S. Army Corps of Engineers Section 205-Small Flood Control Projects (CFDA 12.106)	regional contact: Detroit District 477 Michigan Avenue Detroit, Michigan 48226 313-226-6764	Provision of specialized services through projects not specifically authorized by Congress.	First $100,000 is federally funded, with remainder split 50% Federal/50% Local.	Must meet U.S. Army Corps of Engineers economic feasibility and other criteria Maximum $7 million per project, though this may change.	
28	U.S. Army Corps of Engineers Section 208-Clearing Channels for Flood Prevention (CFDA 12.108)	regional contact: Detroit District 477 Michigan Avenue Detroit, Michigan 48226 313-226-6764	Provision of specialized services. Non-federal sponsor must provide all lands, easements, and rights-of-way.	Federal - 75% Local - 25%	Must meet U.S. Army Corps of Engineers economic feasibility and other criteria Maximum $500,000 per project.	
29	U.S. Department of Agriculture, Farm Service Agency Emergency Conservation Program (ECP)	contact local Farm Service Agency	Perform emergency conservation measures to control wind erosion on farmlands and rehabilitate farmlands damaged by natural disasters; includes water conservation	Cost-sharing determined by County committees , following USDA guidelines.	Farm operator or landlord/owner in a disaster area or impacted by drought.	following a natural disaster event; eligibility determined by county FSA cmte
30	U.S. Department of Agriculture, Natural Resources Conservation Service, Watershed Protection and Flood Prevention	Wisconsin Natural Resources Conservation Service - NW Area 1304 N. Hillcrest Altoona, WI 54720 715-832-6547	Project grants and technical assistance to protect and utilize land and water resources in small watersheds. Emphasizes interdisciplinary planning teams.	Varies depending on nature of the project. Federal funding may be incorporated within other State Programs; check with WisDNR.	Agricultural related enterprises must account for at least 20% of the total benefits.	
31	U.S. Department of Agriculture, Natural Resources Conservation Service, Emergency Watershed Protect - Floodplain Easement	Wisconsin Natural Resources Conservation Service - NW Area 1304 N. Hillcrest Altoona, WI 54720 715-832-6547	Purchase floodplain easements as an emergency measure in floodplain areas which are impaired or have a history of repetitive flooding	Easement compensation varies by site and location. NRCS pays 100% of restoration costs.	Voluntary program to restore floodplain functions. Easements are permanent. Easement compensation based on offer, rate cap, and area market.	Sign-up period is in March.
32	U.S. Department of Agriculture - Rural Development, Housing & Community Facilities Programs	Rural Development Business & Community Programs 4949 Kirschling Court Stevens Point, WI 54481 Phone: 715-345-7610	Has been used for a wide variety of projects, including early warning systems, sirens, fire equipment, EMS buildings, shelters, radios, etc. Additional USDA programs available for larger projects.	Varies by community size, local household incomes, and funding availability	Counties and small communities; must work with USDA Rural Development officials from beginning of the project	
33	Wisconsin Department of Natural Resources, Forest Fire Protection (FPP) Grant	FFP Grant Manager Department of Natural Resources P.O. Box 7921 Madison, WI 53707-7921 (608) 267-0848	Equipment, training, prevention materials, communication equipment, mapping/rural numbering systems, ATVs, dry hydrants	For individual fire depts: min. $750; max. $10,000 For County Fire Assoc: min. $5,000; max. $25,000	Fire departments and County Fire Associations	varies; usually May, June or July
34	U.S. Homeland Security Assistance to Firefighters Grant Program	U.S. Dept. of Homeland Security 800 K Street NW Washington DC 20472-3620 1-866-274-0960	For Fire Departments and EMS organizations to enhance fire-related capabilities.	Varies by population served, but 5% - 10% for small communities	Applicants serving less than 500,000 population may not receive over $1 mil in funding.	April or May
35	U.S. Department of Interior Rural Fire Assistance Outreach	U.S. Dept of Interior check up-to-date application materials for contact info.	Training, personal protective equipment, basic gear, limited communications equipment, basic tools, and other activities.	Minimum 10% local match.	Max. award of $20,000 per fiscal year. Need to serve DOI lands.	April
36	U.S. Department of Homeland Security, Emergency Operations Centers (CFDA 97.052)	Department of Homeland Security 245 Murray Drive, SW. Washington, DC 20528 202-282-8000	Improve local capabilities to respond to emergencies and disasters	Phase 1 for assessment Phase 2 requires a 50% nonfederal cost share.	Local governments can be sub-grantees under the State.	
37	Federal Emergency Management Agency, Interoperable Communications Equipment (CFDA 97.055)		Explore uses of equipment and technologies to increase the interoperability among fire services, law enforcement, and emergency medical services.	Funding is discretionary. Max. Federal share is $6 million. 25% nonfederal cost-share.	Local governments are nominated by the State to submit an application.	Contact FEMA headquarters.

APPENDIX M.

SUMMARY OF PLAN CHANGES SINCE THE 2013 COUNTY PLAN

The 2018 *Eau Claire County Multi-Hazard Mitigation Plan* was a complete review and update of the 2013 plan. This section highlights the major changes since the 2013 plan, including a brief description of how the steering committee reviewed and analyzed each section.

Section I. Introduction

- The City of Eau Claire Natural Hazard Mitigation Plan was full incorporated into the Eau Claire County Plan; in previous years, they were separate plan documents. A City of Eau Claire plan update work group was established and met three times during the process.
- A project brochure was updated and distributed to encourage participation.
- Stakeholder interviews included review of the 2013 plan recommendations.
- Town surveys were more customized for each town in this plan and incorporated aspects of the 2013 plan to encourage input.
- A brief discussion was added as part of Section I.E. on how other plans, studies, etc., were considered and incorporated as part of the planning process.
- Steering Committee Analysis & Review: The planning process, which is summarized in Section I, was the focus of the first plan steering committee meeting, including a review of the process used during the 2013 plan and recommended changes for the plan update.

Section II. Community Profile

- Demographics and other data was updated. An agricultural profile subsection was added.
- GIS data for critical facilities was updated and amended as available.
- Steering Committee Analysis & Review: The highlights of the community profile were reviewed and discussed during the second plan steering committee meeting. Particular attention was paid to the analysis of demographic and development trends, and their implications for mitigation and emergency response.

Section III. Assessment of Hazard Conditions

- The plan scope was expanded beyond natural hazards to include manmade and technological hazards of significant risk.
- Throughout this section, NCDC statistics, NFIP participation information, and other data was updated and, for many risks, further supplemented. This includes integrating data and maps available in the State of Wisconsin Homeland Security Council THIRA & SPR, which was updated January 2017.
- Issues, risks, needs, and concerns for each of the hazard risks based on meetings and stakeholder input were integrated into the different sub-sections.
- A section was added for Hazards of Concern Addressed in Other Plans to briefly address these risks and refer to other plans and efforts instead of being unnecessarily redundant in this document.
- A web-based long-term power outage/emergency power generator survey was distributed.
- The Impact of Climate Change on Natural Hazard Risk was expanded upon including a review of potential adaptation alternatives.

- Steering Committee Analysis & Review: An overview hazard trends were briefly discussed by the committee during their first and second meetings, including a review of the results of the hazard survey performed as part of the 2013 plan. Following the first meeting, committee members completed a survey assesses hazard risks and vulnerabilities. The survey results were discussed at the committee's second meeting and the noted changes in scope were made. The analysis of the key results of the assessment and interview process were the focus of the steering committee's second and third meetings.

Section IV. Current Mitigation Activities

- Updated current mitigation activities using a new table-based format.
- Steering Committee Analysis & Review: Current mitigation activities were discussed during interviews. Related issues and opportunities were discussed by the committee at their third and fourth meetings.

Section V. Progress on the 2013 Mitigation Plan Strategies

- During stakeholder interviews, lead parties for each strategy from the 2013 plan were asked to provide an update on progress, which was integrated into Section V.
- All strategies from the 2013 plan were reviewed for potential inclusion as 2018 recommendations and any suggested modifications.
- Steering Committee Analysis & Review: Progress on the 2013 strategies was reviewed by the steering committee during its third and fourth meetings to fill any remaining gaps, including some discussion on potential strategy alternatives.

Section VI. Mitigation Goals and Strategies

- The mitigation strategies were updated.
- The feasibility analysis in Appendix K provides the relative priority scores given by the steering committee. Comments and barriers to implementation from the steering committee and other stakeholders related to each strategy were also included.
- For the highest rated projects, a special implementation section was added which provides both focus, cost estimates (if available), and guidance. It is expected that this approach may help increase interest levels and use of the plan following adoption.
- Steering Committee Analysis & Review: Plan goals were reviewed and discussed as part of the third steering committee meeting. Following the third meeting, a strategy alternatives survey was distributed via e-mail to all steering committee members. The survey results yielded a relative priority of the alternatives, barriers to implementation, and guided the selection of which strategies would be recommended in the final plan. The final strategies were selected and fine-tuned during the fourth steering committee meeting.

Section VII. Hazard Mitigation-EMAP Crosswalk

- This is a new section comparing the draft mitigation plan to mitigation requirements found in the EMAP standards.

Section VIII. Plan Adoption & Maintenance Process

- Plan coordination updated.
- Steering Committee Analysis & Review: The plan adoption and maintenance process was identified by the Emergency Management Coordinator, then reviewed by the steering committee as part of the draft plan review during the fourth meeting.

Changes that Address Reviewer Comments on 2013 Plan

The Local Mitigation Plan Review Tool completed by WEM and FEMA for the 2013 plan recommended no specific changes.