Town of Somers
7511 12th Street
Somers, WI 53171

Town Board Meeting
Agenda
Wednesday, August 14th, 2024
5:15 pm

Town Board Meeting:	
Item #	
1	Call to order
2	Pledge of Allegiance
3	Consent and Approval of Minutes of Town Board meetings on July 9th, 2024
4	Correspondence: a. Rezoning of Property at 4415 88th Avenue, Parcel #08-222-28-300-200 b. Rezoning of Property at Parcel #80-4-222-131-0155
5	Citizens Comments
6	Chair & Supervisor Comments
7	Action on proposed Resolution 2024-001, A Resolution adopting the Kenosha County Hazard Mitigation Plan
8	Discussion and possible action Cigarette and Tobacco License Application for Suburb Video
9	Approval of Operator Licenses:
10	Adjourn

I hereby certify that as the designee of the chief elected official of the Town of Somers I posted this notice of the August 14th, 2024, Town Board Meeting & Agenda in 3 public places.

Dated this 9th day of August, 2024. Wendy Burnette, Clerk-Treasurer

Requests from persons with disabilities who need assistance to participate in this meeting should be made to the Clerk's Office at 262-859-2822 with as much notice as possible. **Notice is hereby given that members of the Town Board may participate telephonically. Notice is hereby given that members of the Village Board may be in attendance for the sole purpose of gathering information. A quorum may be present. However, no Board action will be taken.**

Original Post Date: August 9th, 2024

Town of Somers
Proceedings from the Town Board Meeting July 9, 2024

Chairman Mark Molinaro called the meeting to order at 5:15 p.m.

Present: Chairman Mark Molinaro, Supervisor Richard Lesko, and Supervisor James Armes. Also present: Administrator Jason Peters, Assistant to the Administrator Kevin Poirier, and Clerk/Treasurer Wendy Burnette.

Chairman Mark Molinaro led the Pledge of Allegiance.

Consent and Approval of Minutes of Annual Town Board meeting on June 11, 2024

Supervisor Armes moved to approve the Minutes of Town Board meeting on June 11, 2024

Seconded by Supervisor Lesko. Motion carried. 3-0 vote

Correspondence

a. Attachment request for property at 3700 18th Street, Parcel #80-4-222-133-0160.
b. Rezoning of property at 3700 18th Street, Parcel #80-4-222-133-0160
c. Attachment request for property west of 64th Avenue and South of CTH "S" (Schutz Container Systems Inc.), Parcels #80-4-222-273-0230, 80- 222-273-0320, 80-4-222-273-0401 and 80-4-222-273-0406

Citizen Comments

None

Supervisor's Comments

Chairman Molinaro commented that the Walmart/Sams parkway has a lot of overgrowth and needs attention.

Action on possible waiving of the first reading of proposed Ordinance 2024-003, an Ordinance to create section 11.14 of the Code of Ordinances of the Town of Somers Relating to an Opt-Out of any Extension of Hours during the Republican National Convention

Supervisor Armes moved to approve waiving the first reading of proposed Ordinance 2024-003, an Ordinance to create section 11.14 of the Code of Ordinances of the Town of Somers Relating to an Opt-Out of any Extension of Hours during the Republican National Convention

Seconded by Supervisor Lesko. Motion carried. 3-0 vote

Action on proposed Ordinance 2024-003, an Ordinance to create section 11.14 of the Code of Ordinances of the Town of Somers Relating to an Opt-Out of any Extension of Hours during the Republican National Convention

Supervisor Lesko moved to approve the Ordinance 2024-003, an Ordinance to create section 11.14 of the Code of Ordinances of the Town of Somers Relating to an Opt-Out of any Extension of Hours during the Republican National Convention

Seconded by Supervisor Armes. Motion Carried. 3-0 vote

Adjourn

Supervisor Armes moved to Adjourn at 5:19 pm.

Seconded by Supervisor Lesko. Motion carried. 3-0 vote

Drafted this 10th day of July 2024 by Wendy Burnette, Clerk/Treasurer

These minutes are not official until approved by the Town Board

THE CITY OF KENOSHA
CHART A BETTER COURSE

CITY DEVELOPMENT

July 26, 2024

Town of Somers
7511 12th Street
PO Box 197
Somers, WI 53171

Dear Town of Somers:

RE: Rezoning of Property at 4415 88th Avenue, Parcel #08-222-28-300-200

As a municipality located within one thousand (1,000') feet of a proposed rezoning on property located at 4415 88th Avenue, Parcel #08-222-28-300-200, you are being notified of a public hearing to be held as follows:

City Plan Commission Meeting – Thursday, August 8, 2024 at 5:00pm
Municipal Building, 625 52nd Street, Kenosha, Room 202

The rezoning petition would rezone the property from *A-2 Agricultural Land Holding District* to *M-2 Heavy Manufacturing District*. This rezoning is to permit construction of an industrial warehouse.

Final action on this request is scheduled as follows:

Common Council Meeting – Wednesday, September 4, 2024, at 7:00pm
Municipal Building, 625 52nd Street, Kenosha, Room 200

This notification is required under Wisconsin State Statute 62.23(7)(d).

If you have any questions, please contact me at 262.653.4037 or via email at rgasper@kenosha.org.

Sincerely,

Rachel Gasper
Planner

RG:llb
Enclosure

c: Michelle Nelson, City Clerk's Office

City of Kenosha

District Map
Rezoning

Supplement No. Z11-24
Ordinance No. _____

TP Kenosha, LLC petition



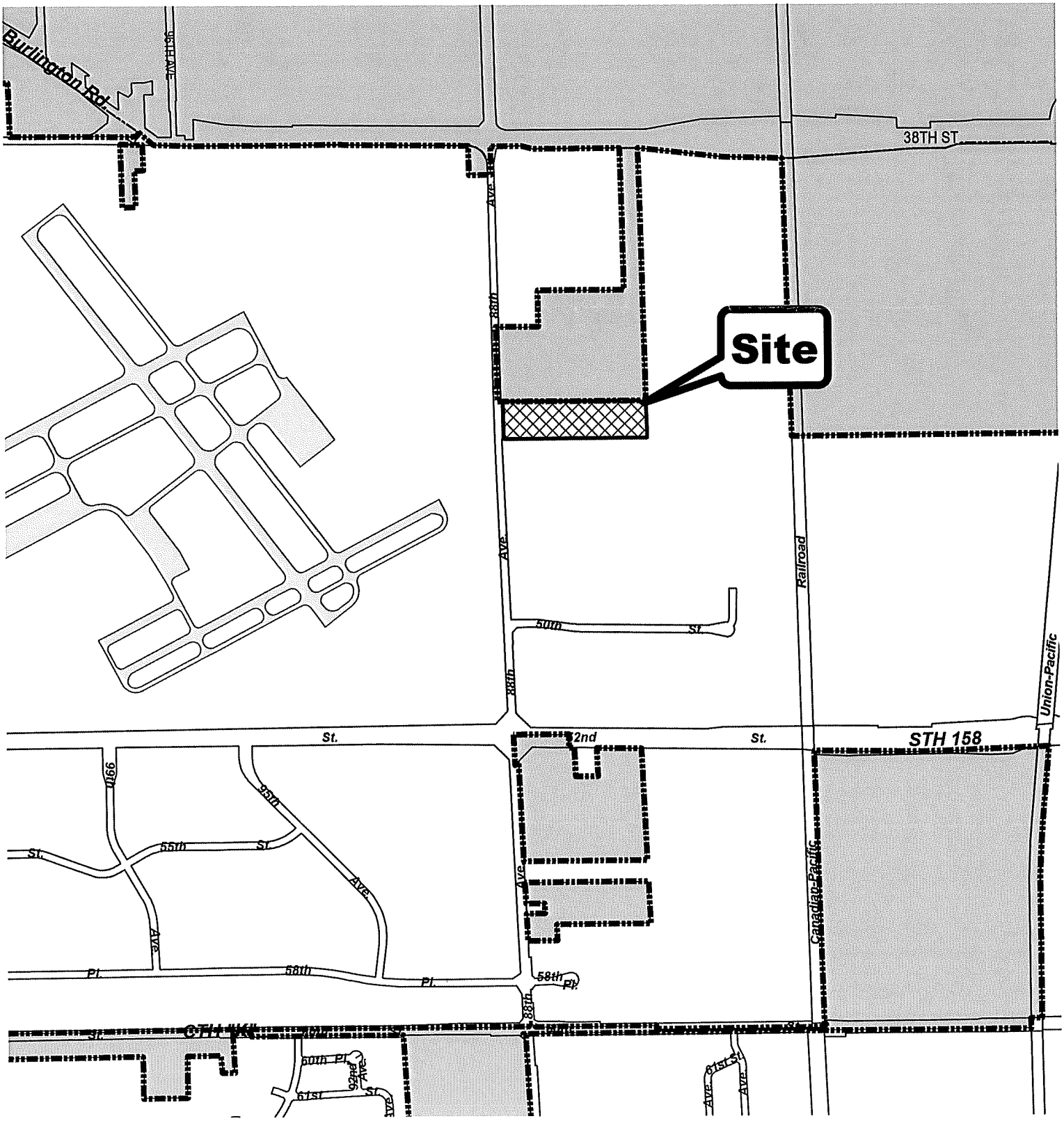
Property requested to be zoned from:

A-2 *Agricultural Land Holding* to **M-2** *Heavy Manufacturing*

0 500
Feet

DCD ~ Planning & Zoning Division ~ RPS ~ RMG ~ July 10, 2024 ~ mc

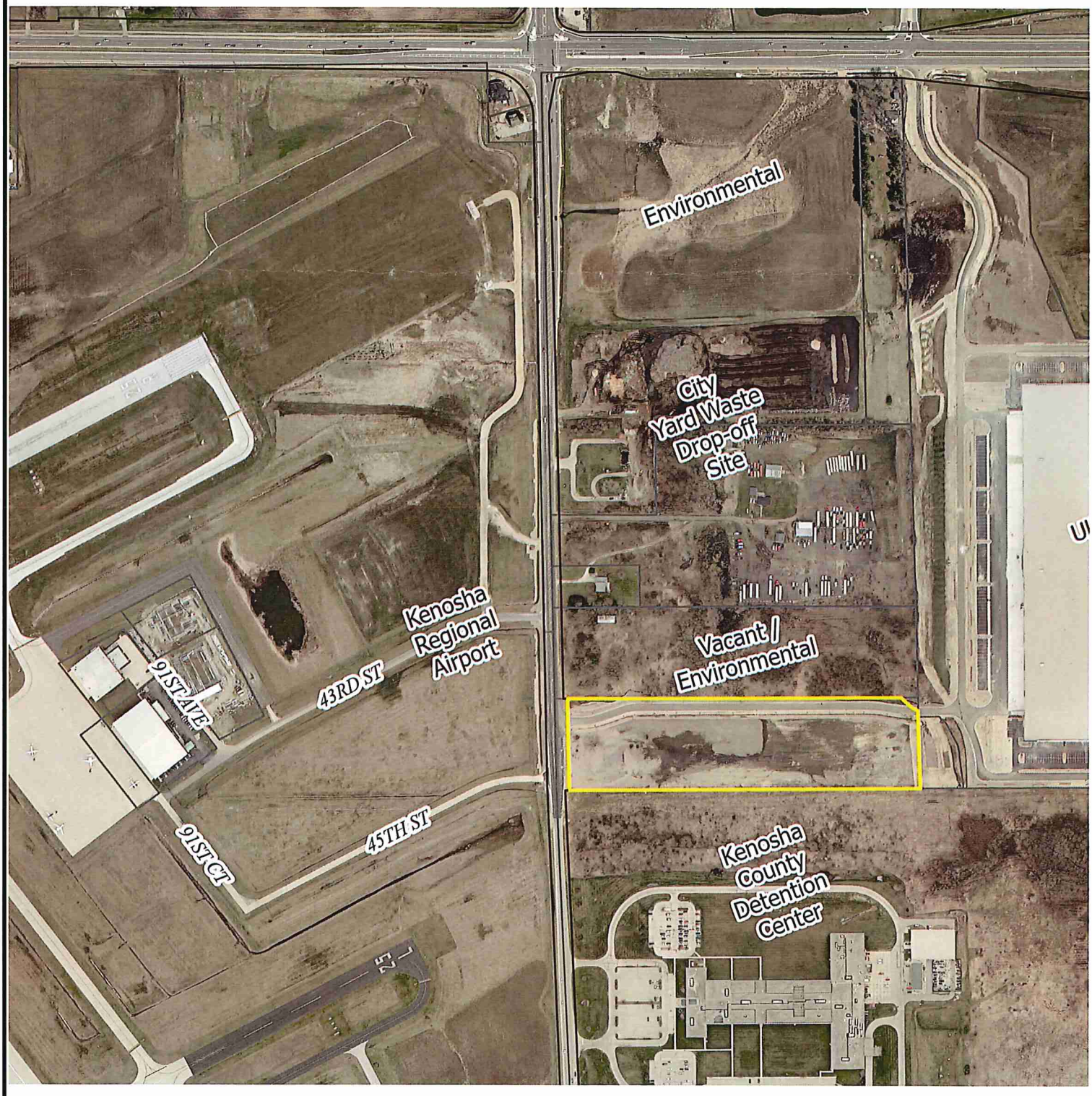
Vicinity Map
TP Kenosha, LLC rezoning



City of Kenosha

Land Use Map

TP Kenosha, LLC Rezoning



Property petitioned to be rezoned

0 520

Feet

DCD ~ Planning & Zoning Division ~ RPS ~ RMG ~ July 11, 2024 ~ mc

THE CITY OF KENOSHA
CHART A BETTER COURSE

CITY DEVELOPMENT

July 26, 2024

Town of Somers
7511 12th Street
PO Box 197
Somers, WI 53171

Dear Town of Somers:

RE: Rezoning of Property at Parcel #80-4-222-131-0155

As a municipality located within one thousand (1,000') feet of a proposed rezoning on property located at Parcel #80-4-222-131-0155, you are being notified of a public hearing to be held as follows:

City Plan Commission Meeting – Thursday, August 8, 2024 at 5:00pm
Municipal Building, 625 52nd Street, Kenosha, Room 202

The rezoning petition would rezone the property from *A-2 Agricultural Land Holding District* to *RS-1 Single Family Residential*. The rezoning is to permit the lot to be subdivided into two parcels on which two single family homes will be built.

Final action on this request is scheduled as follows:

Common Council Meeting – Wednesday, September 4, 2024, at 7:00pm
Municipal Building, 625 52nd Street, Kenosha, Room 200

This notification is required under Wisconsin State Statute 62.23(7)(d).

If you have any questions, please contact me at 262.653.4037 or via email at rgasper@kenosha.org.

Sincerely,

Rachel Gasper
Planner

RG:llb
Enclosure

c: Michelle Nelson, City Clerk's Office

City of Kenosha

District Map
Rezoning

Supplement No. Z10-24
Ordinance No.

Success Realtors I, LLC petition



Property requested to be zoned from:

A-2 *Agricultural Land Holding* to **RS-1** *Single Family Residential*

KENOSHA

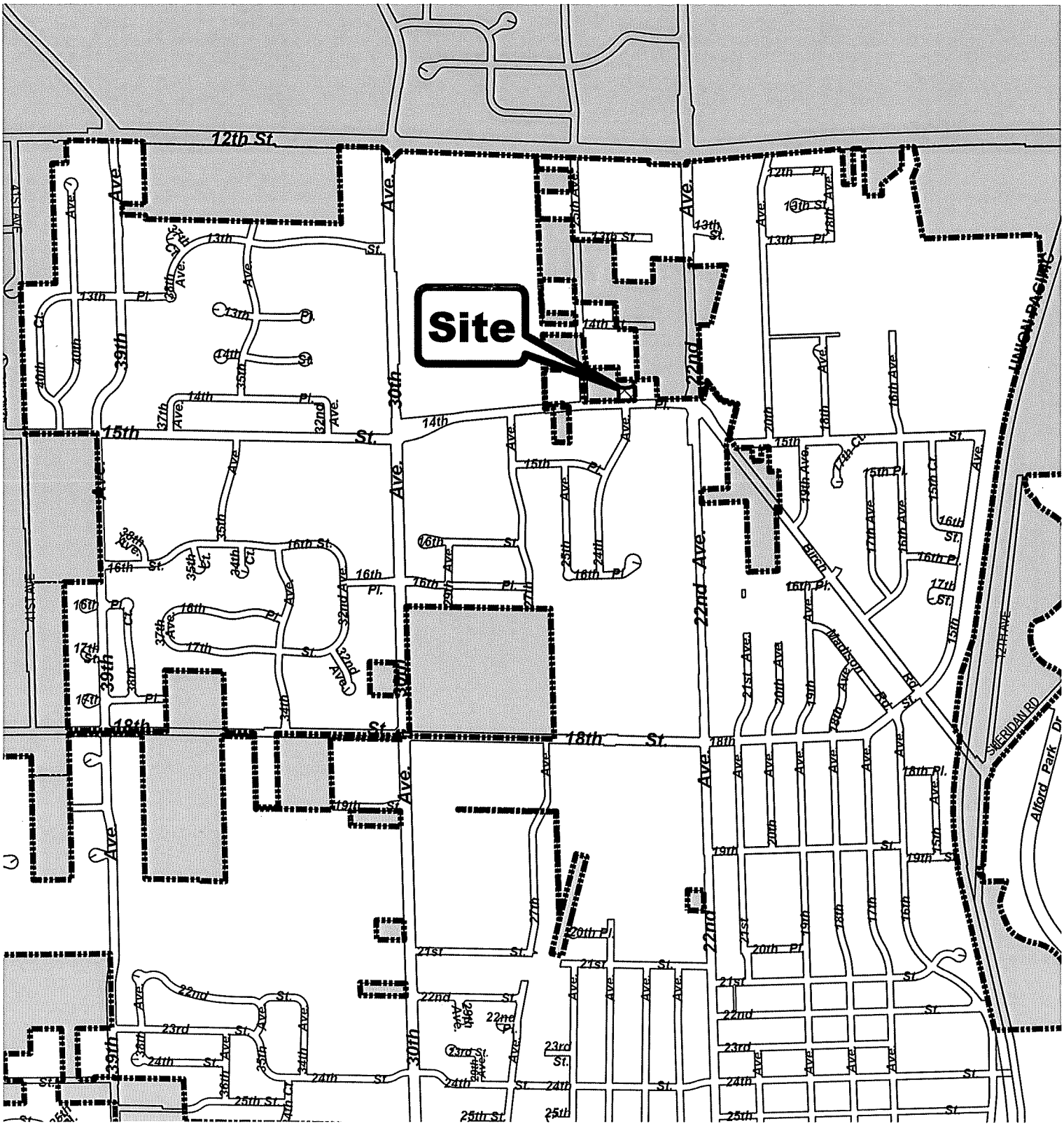
0 200

Feet

DCD ~ Planning & Zoning Division ~ RPS ~ RMG ~ July 10, 2024 ~ mc

City of Kenosha

Vicinity Map
Success Realtors I, LLC rezoning



DCD ~ Planning & Zoning Division ~ RPS ~ RMG ~ July 10, 2024 ~ mc

City of Kenosha

Land Use Map

Success Realtors I, LLC Rezoning



Property petitioned to be rezoned

KENOSHA

0 200

Feet

DCD ~ Planning & Zoning Division ~ RPS ~ RMG ~ July 10, 2024 ~ mc

Established 1843
Somers
VILLAGE & TOWN
www.somers.org
P.O. Box 197, Somers, WI 53171 • PH: (262) 859-2822 • FAX: (262) 859-2331

TOWN OF SOMERS
TOWN BOARD
MEETING ITEM MEMORANDUM

MEETING DATE: August 14th, 2024

TO: Town Chair Molinaro and Town Supervisors

PREPARED BY: Jason J. Peters, Administrator

AGENDA ITEM: #7 Action on proposed Resolution 2024-001, A Resolution adopting the Kenosha County Hazard Mitigation Plan

BACKGROUND:

The Southeastern Wisconsin Regional Planning Commission has completed the 4th edition Kenosha County Hazard Mitigation Plan Update 2023-2028. The County has requested that the Board adopted their model Resolution to adopt the Kenosha County Hazard Mitigation Plan. There are no budget implications for the Town in adopting the plan. Adopting this plan, does the following:

- Access federal funds for projects that reduce disaster risks
- Improve our community's preparedness for various hazards
- Align our local efforts with county-wide mitigation strategies.

PRIOR ACTION TAKEN:

This matter was reviewed and discussed at our August 6th Work Session.

SUGGESTED ACTION/ACTION REQUESTED/COMMENTS:

Administrator Peters has attached the proposed resolution and the proposed updated Plan. Staff would recommend approval. In the event that the Town Board agrees with the suggested action, a suggested motion to approve would be as follows:

"*Motion to proposed Resolution 2024-001, A Resolution adopting the Kenosha County Hazard Mitigation Plan"*

ATTACHMENTS:

Proposed Resolution 2024-001

Kenosha County Hazard Mitigation Plan Updated: 2023-2028

RESOLUTION NO. 2024-001

A Resolution adopting the Kenosha County Hazard Mitigation Plan

WHEREAS, Kenosha County Sheriff's Department Division of Emergency Management executed an agreement with the Southeastern Wisconsin Regional Planning Commission in early 2021 to update the countywide hazard mitigation plan leading to the recommendations for reducing natural hazards impacting Kenosha County, and

WHEREAS, such plan has been completed under a cooperative effort of the Kenosha County Sheriff's Department Division of Emergency Management and the Southeastern Wisconsin Regional Planning Commission under the guidance of the Kenosha County Hazard Mitigation Plan Local Planning Team, and

WHEREAS, the Town of Somers believes that the plan is a valuable guide to the means for reducing the impact of natural hazards that could potentially impact Kenosha County, and that the adoption of such plan by the Kenosha County Board of Supervisors and municipal local Boards, will assure a common understanding by the local governments, and

WHEREAS, the preparation and adoption of the hazard mitigation plan is a requirement for maintaining eligibility for certain hazard mitigation and disaster grant programs funded by the Federal Emergency Management Agency and administered by the State of Wisconsin Department of Military Affairs, Division of Emergency Management, and

WHEREAS, this resolution required no budget modification,

NOW THEREFORE BE IT RESOLVED, that the Town of Somers hereby adopts the Kenosha County Hazard Mitigation Plan as set forth in SEWRPC Community Assistance Planning Report No. 278, 4th edition Kenosha County Hazard Mitigation Plan Update 2023-2028, and

BE IT FURTHER RESOLVED, that the Town of Somers directs the Town Clerk to transmit a certified copy of the resolution to the Southeastern Wisconsin Regional Planning Commission.

Adopted this _____ day of _____, 2024

TOWN OF SOMERS
KENOSHA COUNTY, WISCONSIN

_____
Mark Molinaro. Jr., Town Chairperson

Attest: _____
Wendy Burnette, Clerk-Treasurer

Date: _____

COMMUNITY ASSISTANCE
PLANNING REPORT NO. 278
(4TH EDITION)

KENOSHA COUNTY HAZARD MITIGATION PLAN UPDATE: 2023-2028



SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

KENOSHA COUNTY
John Holloway
Amy Maurer
Robert W. Pitts

MILWAUKEE COUNTY
Donna Brown-Martin
Priscilla Coggs-Jones
Michael Maistelman

OZAUKEE COUNTY
Thomas H. Buestrin
Natalia Minkel-Dumit
Eric Stelter

RACINE COUNTY
Jonathan Delagrave
Peggy L. Shumway
Vacant

WALWORTH COUNTY
Charles L. Colman, *Chairman*
Brian E. Holt
Mary Knipper

WASHINGTON COUNTY
Katrina Hanson
Jeffrey D. Schleif
David L. Stroik, *Treasurer*

WAUKESHA COUNTY
Michael A. Crowley, *Secretary*
James T. Dwyer, *Vice-Chairman*
Dewayne J. Johnson

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION STAFF

Stephanie Hacker, AICP, LEED AP .... Executive Director
Benjamin McKay, AICP ..... Deputy Director
Christopher Hiebert, PE ..... MPO Director
Elizabeth Larsen, SPHR, SHRM-SCP ..... Director of Administration
Joel Dietl, AICP ..... Chief Land Use Planner
Laura Herrick, PE, CFM ..... Chief Environmental Engineer
Ryan Hoel, PE ..... Chief Transportation Engineer
Eric Lynde ..... Chief Special Projects Planner
Rob Merry, PLS ..... Chief Surveyor
Nakeisha Payne ..... Public Involvement and Outreach Manager
Thomas Slawski, PhD ..... Chief Biologist

Special Acknowledgements is due to Christopher Parisey, Senior Planner; Dr. Joseph Boxhorn, Principal Planner; Megan Deau, Senior Graphic Designer; Timothy Gorsegner, GIS Specialist; Zijia Li, Former Engineer; Julia Orlowski, Senior Engineer; Aaron Owens, Senior Planner; and Megan Shedivy, Planner for their contributions in the preparation of this report.

KENOSHA COUNTY HAZARD MITIGATION PLAN PLANNING TEAM MEMBERS

See Appendix A (Figure A.1) for a listing of Team Members.

KENOSHA COUNTY OFFICIALS

County Executive
Samantha Kerkman

Board Of Supervisors
Monica Yuhas, County Chairperson
Daniel Gaschke, County Vice Chairperson
Laura Belsky
Frederick Brookhouse
Guida Brown
Erin Decker
John Franco
Andres Gama
Felix Garcia
Dave Geertsen
Jeffrey Gentz
William Grady
Keith Gray
Aaron Karow
Sarah Kirby
Stephanie Knezz
Eric Meadows
John Morrissey
Mark Nordigan
Gabe Nudo
John Poole
Tim Stocker
Brian Thomas

INTERGOVERNMENTAL STAFF FOR THE KENOSHA COUNTY HAZARD MITIGATION PLAN UPDATE

Sgt. Christopher Hannah;
Director, Kenosha County Division of Emergency Management
Capt. Horace Staples;
Director (former), Kenosha County Division of Emergency Management
Alyssa Werfelmann;
Executive Assistant, Division of Emergency Management

COMMUNITY ASSISTANCE PLANNING REPORT
NUMBER 278 (4TH EDITION)

KENOSHA COUNTY HAZARD MITIGATION PLAN UPDATE: 2023-2028

Prepared by the
Southeastern Wisconsin Regional Planning Commission
W239 N1812 Rockwood Drive
P.O. Box 1607
Waukesha, Wisconsin 53187-1607
www.sewrpc.org

May 2024

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INTRODUCTION AND BACKGROUND 1

1.1 INTRODUCTION

In July 2021, the Southeastern Wisconsin Regional Planning Commission (SEWRPC) and the Kenosha County Division of Emergency Management agreed to cooperatively prepare an update to the all-hazards mitigation plan for Kenosha County. The plan is designed to be consistent with the guidelines of the Wisconsin Department of Military Affairs, Division of Emergency Management (DMA, DEM), and the Federal Emergency Management Agency (FEMA).[1] As such, the plan aligns with the requirements and procedures defined in the amended Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) of Title 44 Code of Federal Regulations (CFR) Section 201 "Mitigation Planning" and Section 201.6, "Local Mitigation Plans."[2] These requirements call for local hazard mitigation plans to be reviewed; updated to reflect changes in development, progress in local mitigation efforts, and changes in priorities; and reapproved every five years for local jurisdictions to be able to receive hazard mitigation funding.

Kenosha County, in cooperation with its 12 municipalities and SEWRPC, began preparation of this plan update (4th Edition) in July of 2021. The plan update focuses on natural hazard mitigation which the Wisconsin Division of Emergency Management (WEM) and FEMA recommend as an option to single hazard mitigation planning. Natural weather hazard conditions, which include flooding, severe weather conditions including windstorms, tornadoes, periods of extreme heat or cold, drought, and winter storms were specifically considered for the preparation of this hazard mitigation plan update. While the plan considered all potential hazards, it must be recognized that only limited mitigation actions were feasible for some of these hazards, since they are not site-specific or repetitive in nature.

1.2 OVERVIEW OF STUDY AREA

Kenosha County is located in Southeastern Wisconsin, and is bordered on the east by Lake Michigan, on the north by Racine County, on the west by Walworth County, and on the south by Lake and McHenry Counties in Illinois. The impacts of urbanization in the greater Milwaukee and Chicago metropolitan areas are increasingly affecting the County.

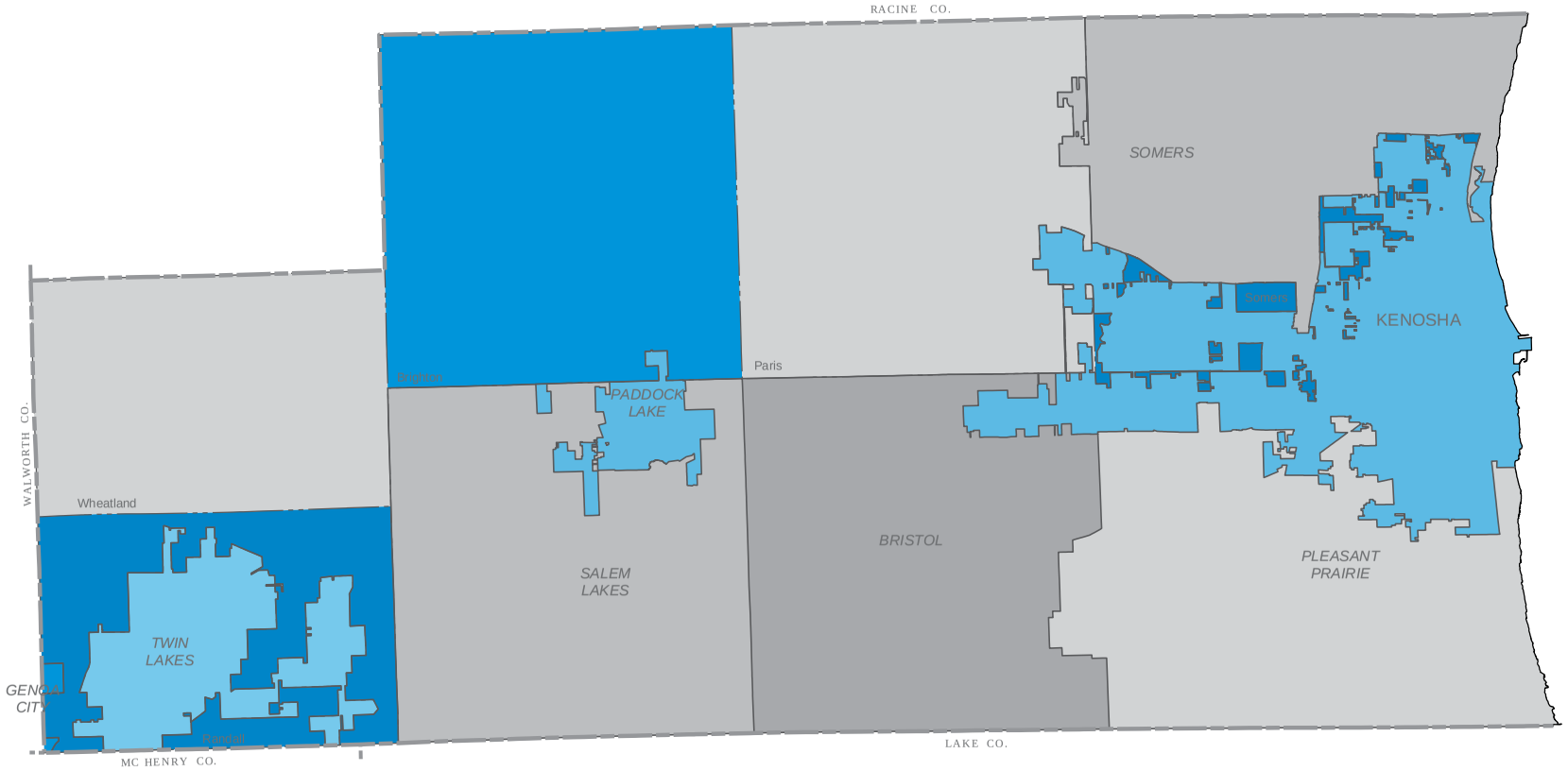
Kenosha County covers about 278 square miles and contains one city, all or parts of seven villages, and five towns as shown on Map 1.1. There are all or parts of five natural watersheds and a total of about 4,800 acres of inland surface waters within the County. The County has a diversified natural resource base, including the Lake Michigan nearshore area, several inland lakes, as well as major river systems.

The majority of the population resides in the eastern portion of Kenosha County, within the City of Kenosha and the Village of Pleasant Prairie. However, population centers are also found in the western communities in the vicinity of the major lakes, including the Villages of Paddock Lake, Salem Lakes, and Twin Lakes and in the partially urbanized town areas. Much of the land in the County remains in agriculture, but the dairy industry has steadily declined. The major industries within the County are generally located east of Interstate Highway (IH) 94, with smaller amounts of industrial development being located west of IH 94 and in the other urban centers.

[1] *Federal Emergency Management Agency, State and Local Mitigation Planning How-to-Guide, "Understanding Your Risks: Identifying Hazards and Estimating Losses," Publication No. FEMA 386-2, September 3, 2015; Federal Emergency Management Agency, Multi-jurisdictional Mitigation Planning, March 10, 2009; Federal Emergency Management Agency, Local Mitigation Planning Policy Guide, April 2022.*

[2] *On April 19, 2022, FEMA updated the State and Local Mitigation Planning Policy Guides (policies). The policies are the official interpretation of the requirements in the Stafford Act, as amended, specifically Title 44 CFR Section 201.*

Map 1.1
Civil Division Boundaries in Kenosha County: 2022



LOCAL GOVERNMENT TYPE

CITY: KENOSHA

VILLAGE: *BRISTOL*

TOWN: Paris

N

0 1 2 3 Miles

Source: Kenosha County and SEWRPC

1.3 RELATIONSHIP OF HAZARD MITIGATION PLANNING TO EMERGENCY OPERATIONS PLANNING AND COUNTY REGULATIONS

The focus of this planning effort is natural hazard mitigation measures. Such measures generally involve lasting, often permanent, measures designed to reduce the exposure to, probability of, or potential loss from hazardous events. Such measures tend to focus on actions related to where and how to build structures, education to reduce losses or injury, and programs to improve the safety of identified hazard areas. A hazard mitigation plan outlines the strategy for mitigating the hazards potentially impacting a county or municipality.

Emergency Operations Planning

The mitigation plan should be distinguished from, but compatible with, an emergency operations plan. An emergency operations plan is defined as a plan which describes how people and property will be protected in disaster and disaster threat situations; details who is responsible for carrying out specific actions; identifies the personnel, equipment, facilities, supplies, and other resources available for use in the disaster; and outlines how all actions will be coordinated. Numerous such plans have been developed at the jurisdictional level, and often involve mutual assistance and cooperation agreements between local units of government in adjoining municipalities, both within and outside of Kenosha County. Plans for mitigating natural hazards are related to emergency operation activities involving short-term recovery decision-making, since such activities may highlight prospects for implementation of a mitigation strategy aimed at reducing long-term risk to human life and property.

Kenosha County Emergency Operations Planning

In January 2013, Kenosha County adopted a comprehensive emergency management plan. The County plan includes procedures and protocols to respond to disasters or large-scale emergencies. The purpose and goal of the County emergency operations plan is to assist government in protecting lives, property, and the environment from major emergencies through addressing the areas of mitigation, preparedness, response, and recovery. This basic plan is intended as the core of the Kenosha County emergency operations program. It provides policy for department and agency managers and emergency management professionals to use in planning and actual operations. In response to a disaster or large-scale emergency, all local government forces, including law enforcement, fire, medical, health, public works, and others, will be considered a part of the County's emergency management organization, and will be the first line responders to such an emergency. When the emergency or disaster exceeds the capability of the local governments and the County to respond, the County will request assistance from the State of Wisconsin on behalf of the County and the affected municipalities. The Federal government will provide assistance to the State of Wisconsin when all local and State resources have been exhausted.

In addition, many of the local units of government have developed emergency operations plans and/or programs which complement the County plan and which also set forth procedures and actions to deal with a range of situations and events.

Regulations And Programs Related to Hazard Mitigation

The current ordinances and programs which are most directly related to hazard mitigation and plan implementation include general zoning, floodland zoning, shoreland or shoreland–wetland zoning regulations, and emergency operations programs. Those ordinances and operations programs administered by Kenosha County and the local units of government in the County are summarized in Table 1.1.

General Zoning

Cities in Wisconsin are granted general, or comprehensive, zoning powers under Section 62.23 of the *Wisconsin Statutes*. The same powers are granted to villages under Section 61.35 of the *Wisconsin Statutes*. Counties are granted general zoning powers within their unincorporated areas under Section 59.69 of the *Wisconsin Statutes*. However, a county zoning ordinance becomes effective only in those towns that ratify the county ordinance. Towns that have not adopted a county zoning ordinance may adopt village powers and subsequently utilize the city and village zoning authority conferred in Section 62.23 of the *Wisconsin Statutes*. Town zoning, however, is subject to county board approval where a general county zoning ordinance exists. General zoning is in effect in the unincorporated areas of the County, including all towns in the County and is jointly administered by Kenosha County and the towns. General zoning in the City of Kenosha and all villages within the County is administered individually by the municipalities.

Table 1.1
Regulations and Programs Within Kenosha County Related to Hazard Mitigation

Community	General Zoning	Floodland Zoning	Stormwater Management Ordinance or Plan	Shoreland or Shoreland Wetland Zoning	Emergency Operations Plan
County					
Kenosha County	Adopted	Adopted[a]	Yes	Adopted	Yes
Cities					
Kenosha	Adopted	Adopted	Yes	Adopted	Yes
Villages					
Bristol	Adopted	Adopted	Yes	Adopted	Yes
Paddock Lake	Adopted	--	Yes	Adopted	Yes
Pleasant Prairie	Adopted	Adopted	Yes	Adopted	--
Salem Lakes	Adopted	Adopted	Yes	Adopted	--
Somers	Adopted	Adopted	Yes	Adopted	--
Twin Lakes	Adopted	Adopted	Yes	Adopted	Yes
Towns					
Brighton	County Ordinance	County Ordinance	--	County Ordinance	Yes
Paris	County Ordinance	County Ordinance	--	County Ordinance	--
Randall	County Ordinance	County Ordinance	--	County Ordinance	--
Somers	County Ordinance	County Ordinance	Yes	County Ordinance	--
Wheatland	County Ordinance	County Ordinance	--	County Ordinance	Yes

[a] *Chapter 17, "Stormwater Management, Erosion Control, and Illicit Discharge Ordinance," was adopted on February 26, 2010. This ordinance only applies to County property and to those towns that have not enacted their own ordinances.*

Source: Kenosha County Division of Emergency Management, Kenosha County Department of Planning and Development, and SEWRPC

Floodplain Zoning

Section 87.30 of the *Wisconsin Statutes* requires that cities, villages, and counties, with respect to their unincorporated areas, adopt floodplain zoning to preserve floodplain areas and to prevent the location of new flood damage-prone development in flood hazard areas. The minimum standards that such ordinances must meet are set forth in Chapter NR 116, "Wisconsin's Floodplain Management Program" of the *Wisconsin Administrative Code*. The required regulations govern filling and development within a regulatory floodplain, which is defined as the area subject to inundation by the 1-percent-annual-probability (100-year recurrence interval) flood event. Under Chapter NR 116, local floodplain zoning regulations must prohibit nearly all forms of development within the floodway, which is that portion of the floodplain required to convey the 1-percent-annual-probability peak flood flow. Local regulations must also restrict filling and development within the flood fringe, which is that portion of the floodplain located outside of the floodway that would be covered by floodwater during the 1-percent-annual-probability flood. Allowing the filling and development of the flood fringe area, however, reduces the floodwater storage capacity of the natural floodplain, and may thereby increase downstream flood flows and stages.

The County Shoreland and Floodplain Zoning Ordinance applies in all unincorporated areas in Kenosha County. All incorporated cities and villages where floodplains have been identified have adopted floodplain zoning ordinances.

Shoreland and Shoreland-Wetland Zoning

Under Section 59.692 of the *Wisconsin Statutes*, counties in Wisconsin are required to adopt zoning regulations within statutorily defined shoreland areas, or those lands that are within 1,000 feet of the ordinary high water mark (OHWM) of a navigable lake, pond, or flowage, or 300 feet of the OHWM of a navigable stream, or, to the landward side of the floodplain, whichever distance is greater, within their unincorporated areas. Standards for county shoreland zoning ordinances are set forth in Chapter NR 115,

"Wisconsin's Shoreland Protection Program," of the *Wisconsin Administrative Code*.[3] Chapter NR 115 sets forth requirements regarding lot sizes and building setbacks; restrictions on cutting of trees and shrubbery; and restrictions on filling, grading, lagooning, dredging, ditching, and excavating that must be incorporated into county shoreland zoning regulations. In addition, Chapter NR 115 requires that counties place all wetlands five acres or larger and within the statutory shoreland zoning jurisdiction area into a wetland conservancy zoning district to ensure their preservation after completion of appropriate wetland inventories by the WDNR.

Minimum standards for city and village shoreland-wetland zoning ordinances are set forth in Chapter NR 117, "Wisconsin's City and Village Shoreland-Wetland Protection Program" of the *Wisconsin Administrative Code*.

County shoreland-wetland zoning ordinances are in effect in all unincorporated areas of Kenosha County. All incorporated municipalities within the County have adopted their own shoreland-wetland zoning ordinances.

An important element of the City of Kenosha, Village of Pleasant Prairie, and Village of Somers shoreland zoning ordinances relates to the Lake Michigan shoreline where shoreline erosion hazards exist. In the case of the Village of Pleasant Prairie and Village of Somers ordinances, provisions that are included relate to shoreline erosion protection, including defining pertinent terms, designating the lands to be regulated, specifying the necessary regulation of land use and facility location, specifying the regulation of certain land disturbance activities, designating setback distances, and describing procedures for modifying the extent of the designated setbacks.

The Lake Michigan shoreland protection ordinances have been based upon recommendations of a Lake Michigan coastal erosion management technical committee which guided the preparation of a Lake Michigan coastal erosion management study[4] for Kenosha County. That study recommended, and the current ordinance reflects, different shoreline setbacks for areas designated for development and structural shoreline protection and for areas of limited development where no structural protection measures are envisioned.

1.4 SCOPE AND PURPOSE OF PLAN

This plan updates the 2017 Kenosha County hazard mitigation plan.[5] The scope of this plan is countywide, and is intended to set forth the most appropriate, feasible, and effective hazard mitigation strategy for Kenosha County and the local units of government within the County. The plan complements and refines the *State Hazard Mitigation Plan of Wisconsin*[6] and focuses on local conditions and natural weather hazards likely to occur or be experienced within Kenosha County and Southeastern Wisconsin. As such, the County and SEWRPC will evaluate, update, and revise existing mitigation strategies as well as develop new local mitigation strategies specific to a community's exposure and impacts from identified natural hazards.

The plan is developed as a multi-jurisdictional plan, covering Kenosha County and all municipalities located within the County. The mitigation planning requirements identified in 44 CFR, Section 201.6 require all jurisdictions participating in a multi-jurisdictional hazard mitigation plan to participate in the planning process. Examples of participation include, but are not limited to, attending planning meetings, contributing research, data, or other information, and commenting and reviewing drafts of the plan. The municipalities that participated in the development of the Kenosha County hazard mitigation plan update include the

[3] *The 2015-2017 State Budget (Act 55) changed State law relative to shoreland zoning. Under Act 55 a shoreland zoning ordinance may not regulate a matter more restrictively than it is regulated by a State shoreland-zoning standard unless the matter is not regulated by a standard in Chapter NR 115, "Wisconsin's Shoreland Protection Program," of the Wisconsin Administrative Code. (Examples of unregulated matters may involve wetland setbacks, bluff setbacks, development density, and stormwater standards.) In addition, under Act 55, a local shoreland zoning ordinance may not require establishment or expansion of a vegetative buffer on already developed land and may not establish standards for impervious surfaces unless those standards consider a surface to be pervious if its runoff is treated or is discharged to an internally drained pervious area.*

[4] *SEWRPC Community Assistance Planning Report No. 86, op. cit.*

[5] *SEWRPC Community Assistance Planning Report No. 278, 3rd Edition, Kenosha County Hazard Mitigation Plan: 2017-2022, November 2017.*

[6] *Wisconsin Emergency Management, State Hazard Mitigation Plan of Wisconsin, December 2021.*

City of Kenosha; the Villages of Bristol, Paddock Lake, Pleasant Prairie, Salem Lakes, Somers, and Twin Lakes; and the Towns of Brighton, Paris, Randall, Somers, and Wheatland. Table 1.2 summarizes municipal participation in the planning process. For more complete details on the level of participation of local citizens and community groups in the public involvement process, see Appendix A.

The plan was prepared by the staff of the Kenosha County Division of Emergency Management and SEWRPC. In In preparing this plan update, the County involved all appropriate County departments as needed. In addition, the planning was coordinated with the related activities of other concerned units and agencies of government and was developed under the guidance of the Kenosha County Hazard Mitigation Plan Local Planning Team (LPT),[7] which was created by the County specifically for plan development purposes. In assembling the Kenosha County Hazard Mitigation Plan LPT, the County Division of Emergency Management sought representatives from a cross-section of community interests. Representatives from each municipality in the County were invited to participate, including elected and appointed officials and representatives of law enforcement agencies, fire departments, public health departments, and public works departments. In addition, representatives from educational institutions, nonprofit agencies, and private sector firms were invited to participate. Summary notes for each LPT meeting are provided in Appendix A.

While it is acknowledged that the County can be affected by hazardous incidents that occur outside of the County jurisdiction, the degree of impact—in terms of property damage, injury, loss of life, and ability of the County to respond—is significantly limited and frequently unquantifiable. Thus, while some hazards, such as weather-related events, can extend over a wide area, most affect Kenosha County only tangentially, and many result in site specific impacts. Those that are site-specific in their impact may be best addressed within local level hazard mitigation plans and through local action. Nevertheless, where appropriate, areas of cooperation between jurisdictions have been noted, especially with respect to hazards such as flooding, for example, which commonly affect entire river basins as well as the specific communities located within them. Generally, hazard mitigation as well as emergency response planning at the local and subregional levels is beyond the scope of this plan.

As previously stated, this plan update was developed under the guidance of the LPT with a collective effort of a number of agencies, organizations, and stakeholders. The membership, formation, and active participation of the LPT is documented in Appendix A. In addition to formation and active participation of the LPT, the plan update included the following steps:

- Collation and review of all pertinent reports relating to the hazard mitigation activities in Kenosha County since adoption of the initial plan
- Review of materials developed as a part of the multi-jurisdictional comprehensive planning process for Kenosha County
- Inventory mapping and analysis of hazards pertinent to Kenosha County
- Identification of the facilities and ongoing programs related to hazard mitigation
- Assessment of the vulnerability of the County assets to each hazard
- Review and updating of hazard and risk assessments
- Identification of and prioritization of needed facilities and programs
- Consideration of issues relating to neighboring municipalities and units of government likely to be affected or influenced by natural hazards within Kenosha County
- Development and evaluation of alternatives to address the identified needs

[7] *For the development of the initial plan and the 2nd Edition, this group was called the Kenosha County All Hazards Mitigation Plan Task Force. For the 3rd Edition and current plan update (4th Edition), the name of this group has been changed to reflect the current terminology used by FEMA.*

Table 1.2
Participation in the Kenosha County Hazard Mitigation Plan Update Planning Process

Civil Division	Attendance at Local Planning Team Meetings			Provision of Data[a]	Review of Report
	March 28, 2022	March 15, 2023	December 6, 2023		
County					
Kenosha County	X	X	X	X	X
Cities					
Kenosha	X	X	X	X	X
Villages					
Bristol	X	X	X	X	X
Paddock Lake	--	--	--	X	X
Pleasant Prairie	X	X	--	X	X
Salem Lakes	X	--	--	X	X
Somers	X	X	X	X	X
Twin Lakes	X	--	--	X	X
Towns					
Brighton	X	--	--	--	X
Paris	X	X	X	X	X
Randall	--	--	--	X	
Somers	X	X	X	X	X
Wheatland	--	--	--	X	X
Other Stakeholders					
State of Wisconsin	--	--	--	X	X
SEWRPC	X	X	X	X	X
Carthage College	X	--	--	--	X
Gateway Technical College	X	--	--	--	X
UW-Parkside	X	--	--	--	X
Shalom Center	X	--	--	--	X
Sharing Center, Inc.	X	--	--	--	X

Note: X indicates participation by at least one representative of the municipality or organization.

[a] *Provision of data includes providing information on hazards experienced, projects undertaken, and outreach efforts as well as sharing of relevant plans, reports, and concerns.*

Source: SEWRPC

- The development of plan recommendations and an implementation plan
- Development of a public informational and educational program and program of public consultation to guide the plan development and implementation program, including a prioritization of the recommended plan elements
- Adoption of a strategy for monitoring and refining the plan

1.5 PLAN MAINTENANCE AND IMPLEMENTATION ACTIVITIES

Outreach Activities

Since the adoption of the initial hazard mitigation plan, the Kenosha County Division of Emergency Management and local municipalities in the County have conducted outreach activities to educate the public about emergency preparedness, including hazard mitigation. The most recent activities are summarized in Table 1.3. The most common methods include making information available on the County or municipality's website and mailing or emailing periodic newsletters to residents. As part of these activities, a number of campaigns have been conducted on hazard awareness, including programs related to winter storms, tornados and severe storms, heat awareness, and flood safety. In recent years, some of the local municipalities have also begun reaching the public through social media sites such as Facebook® and Twitter®.

Table 1.3
Outreach Activities by Local Communities in Kenosha County Related to Hazard Mitigation

Community	Activity
Kenosha County	County website Fox River Flood Mitigation Program webpages Division of Emergency Management webpages and Facebook page Division of Emergency Management Damage Hotline Ties to the Land newsletter Contract with Root-Pike WIN for stormwater education and outreach
City of Kenosha	City website Contract with Root-Pike WIN for stormwater education and outreach Production and distribution of brochures on stormwater for stormwater utility
Village of Bristol	Village newsletter Village website Contract with Root-Pike WIN for stormwater education and outreach
Village of Paddock Lake	Village newsletter Village website
Village of Pleasant Prairie	Monthly newsletter Village website Text messages and email notifications Contract with Root-Pike WIN for stormwater education and outreach
Village of Salem Lakes	Village website Email informational notices Contract with Root-Pike WIN for stormwater education and outreach
Village of Somers	Quarterly newsletter Village website Contract with Root-Pike WIN for stormwater education and outreach
Village of Twin Lakes	Village website
Town of Brighton	Public posting at three locations Town website
Town of Paris	Town website
Town of Randall	Town website
Town of Somers	Town website Contract with Root-Pike WIN for stormwater education and outreach
Town of Wheatland	Town website

Source: Community Websites, Kenosha County, and SEWRPC

Implementation Activities

Since the adoption of the 2017 (3rd Edition) to the hazard mitigation plan, Kenosha County and the local municipalities have conducted several projects intended to implement recommendations of the plan. These projects are summarized in Table 1.4.

1.6 REVIEW OF PLAN DEVELOPMENT EFFORTS, PROCESS, AND ADOPTION

The LPT met three times during the plan update preparation period to provide input on the types of hazards to be considered, the appropriate mitigation strategies, and to review the draft report chapters. Those chapters were then refined to reflect the comments and recommendations of the LPT (see Appendix A).

As draft chapters of plan were completed, copies were placed in downloadable form on the SEWRPC website, and a webpage was available on which members of the public could ask questions and submit comments on the draft plan update. Following completion of updates to the community profiles, the risk and vulnerability assessments sections of the plan, and review of drafts of the corresponding chapters by the LPT, a public informational meeting was held to review these sections of the plan with local officials, business and industry, and citizens and solicit their input.

Table 1.4
Hazard Mitigation Activities in Kenosha County: 2018-2023

Community	Project	Cost	Funding Source	Completion Date
Kenosha County	Fox River Flood Mitigation Program	--	FEMA, Wisconsin Division of Emergency Management, Federal Community Development Block Grant, WDNR, County	Ongoing
	Participation in National Flood Insurance Program Community Rating System (CRS)	--	Kenosha County	Ongoing
	List of Cooling Center Sites	--	Kenosha County Health Department	--
City of Kenosha	Stormwater Management Plan	--	City	Ongoing
	Sanitary Sewer Rehabilitation and Manhole Rehabilitation Programs	--	City	Ongoing
	Storm Sewer Manhole and Inlet Rehabilitation Program	--	City	Ongoing
	Storm Sewer Rehabilitation Program	--	City	Ongoing
Village of Pleasant Prairie	Beverly Woods and Chateau Eau Plaines Stormwater Projects	--	U.S. Department of Housing and Urban Development Community Development Block Grant	2023

Source: Kenosha County and SEWRPC

After the plan was completed in draft form, an additional public informational meeting was held to review the draft plan with local officials, businesses and industry, and citizens. Copies of the draft plan were made available at the Kenosha County Division of Emergency Management and on the SEWRPC website.

Following a finding by FEMA that the plan was approvable after adoption, copies of the plan were sent to each of the local units of government requesting that they adopt the plan in order to retain future eligibility for mitigation funding for the FEMA Hazard Mitigation Grant, Flood Mitigation Assistance, and Building Resilient and Innovative Communities (BRIC) programs administered by WEM. In addition, County and SEWRPC staff were available to meet with communities on an individual basis to review the plan update and consider adoption and implementation steps.

BASIC STUDY AREA INVENTORY AND ANALYSIS 2

2.1 INTRODUCTION

Information on certain pertinent natural and built features and aspects of the study area is an important consideration in sound hazard mitigation planning. Accordingly, the collection and collation of definitive information regarding basic demographic characteristics, existing and planned land use, surface water and Lake Michigan shoreline system characteristics, transportation and utility systems, critical community facilities, and existing hazard management programs constitute an important step in the planning process. The resulting information is an important element to the planning process since sound mitigation approaches cannot be formulated and evaluated without an in-depth knowledge of the relevant conditions in the study area.

2.2 CIVIL DIVISIONS

The geographic extent and functional responsibilities of civil divisions and special-purpose units of government are important factors to be considered in hazard mitigation planning, since these local units of government provide the basic structure of the decision-making framework, within which such planning must be addressed. The boundaries of the 12 civil divisions in Kenosha County are shown on Map 1.1 in Chapter 1 of this report. There are five towns in Kenosha County, including Brighton, Paris, Randall, Somers, and Wheatland. In addition, there are six villages, which include Bristol, Paddock Lake, Pleasant Prairie, Salem Lakes, Somers, and Twin Lakes, and the City of Kenosha located within the County. Three changes in civil divisions have occurred since the adoption of the initial hazard mitigation plan. In December 2009, a portion of the Town of Bristol incorporated as the Village of Bristol. Subsequent to this, the Village of Bristol annexed the remaining portion of the Town of Bristol. In April 2015, a portion of the Town of Somers incorporated as the Village of Somers. In February 2017, the Village of Salem Lakes was created from the merger of the Village of Silver Lake and the Town of Salem. The total land area and proportion of the County within each civil division is presented in Table 2.1.

2.3 DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS

Population

The area that is now Kenosha County was first included in the Federal census in 1850. Historical population levels in Kenosha County are provided in Table 2.2. The resident population was 75,238 persons in 1950. Since then, Kenosha County has steadily continued to increase in population, with the greatest percent increase between the years of 1950 and 1960. As of 2020, there were 169,151 individuals residing in the County. The population in Kenosha County is expected to increase through the year 2050 by approximately 48 percent.

The City of Kenosha is the most populous municipality in the County with about 59 percent of the County's population, in 2020. The next most populous communities in year 2020 are the Village of Pleasant Prairie with 13 percent of the County's population; the Village of Salem Lakes with 9 percent of the County's population; and the Village of Somers with 5 percent of the County's population.

Vulnerable Populations

Every community needs to be able to prepare for and respond to hazardous events, including natural disasters. A number of factors including poverty; lack of access to transportation, technology, and educational resources; age; health; language barriers; insufficient education; and crowded housing can affect a community's ability to reduce or prevent the risks associated with a hazardous event. Such factors, known as social vulnerability, are often associated with populations who have been historically underserved or overlooked. Examination of potential additional vulnerabilities that these populations may face from specific hazard events is a critical consideration for hazard mitigation planning.

The Centers for Disease Control and Prevention (CDC) and the Agency for Toxic Substances and Disease Registry (ATSDR) created a Social Vulnerability Index (SVI) database using U.S. Census data to determine the social vulnerability of every U.S. census tract.[8] The SVI ranks each tract on 16 social factors. These social factors are grouped into four related themes to assess an area's social vulnerability including socioeconomic status, household characteristics, race and ethnic minority status, and type of housing and transportation.

As indicated in Appendix B, the overall SVI for Kenosha County (using all 16 variables) is primarily considered low. There is a high degree of correlation between the themes, indicating that certain areas of the County have populations who may be especially vulnerable due to multiple factors. As indicated in Figure B.1 of Appendix B, there are higher concentrations of socially vulnerable residents in the more urbanized or densely populated areas, specifically within the City of Kenosha and the Villages of Pleasant Prairie, Somers, and Salem Lakes. The overall State CDC/ATSDR SVI score of 0.97 for Kenosha County is considered high and the County's overall National CDC/ATSDR SVI score of 0.54 is considered medium to high.

Additionally, FEMA integrates the SVI into its National Risk Index (NRI) dataset and interactive mapping tool. The NRI tool enables public health professionals, emergency planners, and the general public to understand their risk to 18 natural hazards. It was designed and built by FEMA in collaboration with various stakeholders and partners including academia; local, state, and federal governments; and private industry. The NRI uses available source data (i.e., the Social Vulnerability Index by CDC and the Baseline Resilience Indicators for Communities from the University of South Carolina) for natural hazard and community risk factors to develop a standard risk measurement for each county and Census tract in the United States. The NRI provides Risk Index scores and rating based on data for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience. Kenosha County has a Risk Index rating of 78.4, or "Relatively Low," and a Community Resilience rating of 98.0, or "Very High," when compared to the rest of the U.S. This interactive mapping tool, available through FEMA's website, can be used to support resilience building efforts and ensure that resources go where they are needed most.

Table 2.1
Areal Extent of Civil Divisions in Kenosha County: 2022

Community	Area		Percent of County Area
	Acres	Square Miles	
Cities			
Kenosha	18,424	28.8	10.3
Villages			
Bristol	21,120	33.0	11.9
Paddock Lake	2,067	3.2	1.2
Pleasant Prairie	21,548	33.7	12.1
Salem Lakes	21,208	33.1	11.9
Somers	16,526	25.8	9.3
Twin Lakes	6,475	10.1	3.6
Towns			
Brighton	22,897	35.8	12.8
Paris	22,025	34.4	12.4
Randall	8,783	13.7	4.9
Somers	1,570	2.5	0.9
Wheatland	15,418	24.1	8.6
Total[a]	178,207	278.4	100.0

[a] *Includes a 146-acre portion of the Village of Genoa City located in Kenosha County. The remainder of the Village is located in Walworth County.*

Source: SEWRPC

Table 2.2
Historical Resident Population Levels in Kenosha County: 1950-2050

Year	Population	Change from Preceding Census	
		Incremental	Percent
1950	75,238	--	--
1960	100,615	25,377	33.7
1970	117,917	17,302	17.2
1980	123,137	5,212	4.4
1990	128,181	5,044	4.1
2000	149,577	21,396	16.7
2010	166,426	16,849	11.3
2020	169,151	2,725	1.6
2050[a]	251,100	81,949[b]	48.4

[a] *Population based on projections from SEWRPC's* VISION 2050 Plan.

[b] *Relative to 2020.*

Source: U.S. Bureau of the Census and SEWRPC

Households

In addition to total population, the number of households, or occupied housing units, is of importance in land use planning and public facility planning insofar as it greatly influences the demand for urban land as well as the demand for transportation and other public facilities and services. Trends in the number of households in the County are shown in Table 2.3. The County experienced significant gains in the number

[8] *Census tracts are subdivisions of counties for which the Census collects statistical data.*

of new households between 1970 and 2020. Since 1970, the rate of increase in the number of households has exceeded the rate of population increase. Between 1970 and 2020, the number of households increased by about 88 percent, compared to a population increase of about 43 percent. With the number of households increasing at a faster rate than the population, the number of persons per household has decreased.

Table 2.3
Number of Households in Kenosha County: Census Years 1970-2050

Year	Number of Households	Change from Preceding Census	
		Number	Percent
1970	35,468	--	--
1980	43,064	7,596	21.4
1990	47,029	3,965	9.2
2000	56,057	9,028	19.2
2010	62,650	6,593	11.8
2020	66,842	4,192	6.7
2050[a]	100,900	34,058	51.0

[a] *Household projection from SEWRPC's* VISION 2050 Plan.

Source: U.S. Bureau of the Census and SEWRPC

Employment
Trends in job growth in the County are set forth in Table 2.4. The jobs are enumerated at their location and the data thus reflect the number of jobs within the County, including both full- and part-time jobs. A significant increase in the number of jobs may be expected to attract additional residents to the County, thus influencing population growth. As indicated in Table 2.4, employment growth was significant in the County between 1970 and 2020, with an increase in the number of jobs of about 98 percent.

Property Value
The value of the real estate and personal property in a municipality reflects the upper end of the potential for property damages in each municipality. The equalized value as of 2022 of the real estate and personal property in Kenosha County and each of the general-purpose units of government in the County is shown in Table 2.5. The three communities with the highest equalized values in the County in 2022 are the City of Kenosha, Village of Pleasant Prairie, and the Village of Salem Lakes.

2.4 LAND USE

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

Existing Land Uses
Land uses in Kenosha County in 2020 are set forth on Map 2.1 and in Table 2.6. Urban land uses occupied about 25 percent of the County in 2020. Intensive urban development, including most commercial, industrial, and multi-family residential development, is concentrated within or near the City of Kenosha and the Villages of Bristol, Pleasant Prairie, and Somers or along the IH 94 corridor. Much of the single-family residential development also occurred within or surrounding the County's urban centers, while scattered low-density development occurred outside these communities amid predominantly rural areas. Residential development was the largest component of urban land use, encompassing about 49 percent of urban land uses and about 12 percent of the total area of the County. Most of this consisted of single-family residential development which encompassed about 45 percent of the urban land uses and 11 percent of the total area of the County.

Land uses categorized as transportation, communication, and utilities constituted the second largest urban land use category in 2020, encompassing about 28 percent of the area of all urban land and 7 percent of the total area of the County.

Major arterial highways serving the County include Interstate Highway (IH) 94/41, USH 45, State Trunk Highways (STH) 31, 32, 75, and 83, which traverse the County in a north-south direction; and STH 50, 142, 158, and 165, which traverse the County in a generally east-west direction. Other uses in the transportation, communications, and utilities category within the County include Metra, a commuter rail service line, Amtrak, three railway freight service lines, and four airports which serve the public, including Kenosha Municipal Airport.

Nonurban land uses occupied about 75 percent of the County in 2020. Agricultural land use was the largest component of nonurban land use, encompassing about 60 percent of the area of all nonurban land and about 45 percent of the total area of the County. Other major nonurban land uses present in the County include wetlands, woodlands, open lands, and surface water.

Manufactured homes can be particularly vulnerable to some hazards such as high winds. Map 2.2 shows the locations of manufactured home parks and individual manufactured homes in Kenosha County. In 2021 there were 2,099 manufactured homes located in the County. Most of these were located in 22 manufactured home parks. In addition, there were nine sites in the County that contained isolated individual manufactured homes.

Planned Land Use

Planned land use must seek to accommodate the impending demand for land within the Region, which primarily depends on future population, household, and employment levels. SEWRPC recently completed projections of land use, population, households, and employment from the period of 2020 to 2050 to provide a basis for preparation of VISION 2050. Map 2.3 and Table 2.7 present the recommended development pattern from the VISION 2050 land use component as it pertains to Kenosha County.

Planned urban-density areas depicted on Map 2.3 include land uses such as medium and high density residential; mixed use development; commercial development, including office and professional services; industrial development; government and institutional land use; and parks and recreational areas. Urban density areas are associated with the City of Kenosha, and adjacent urban areas in the Towns of Randall and Somers, and the Villages of Bristol, Paddock Lake, Pleasant Prairie, Salem Lakes, Somers, and Twin Lakes.

Urban land uses in Kenosha County are projected to increase by approximately 21 percent between 2020 and 2050 (Table 2.7). Table 2.8 shows the forecast growth of population, households, and employment levels for Kenosha County between the same time period. Population and household growth is projected to double between 2020 and 2050, while the number of jobs is projected to increase by about 20 percent. Anticipating the needs of future populations, rather than responding to problems as they occur, is a main goal of hazard mitigation planning. Therefore, sound land use planning is a necessary tool for reducing or eliminating the costs of future hazard events.

Table 2.4
Number of Jobs in Kenosha County: Census Years 1970-2050

Year	Number of Jobs	Change from Previous Time Period	
		Number	Percent
1970	42,715	--	--
1980	54,631	11,916	27.9
1990	52,230	-2,401	-4.4
2000	68,654	16,424	31.4
2010	74,900	6,246	8.3
2020	84,636	9,736	13.0
2050[a]	102,700	18,064[b]	21.3

[a] *Estimated jobs for the year 2050 as projected reported in SEWRPC's* VISION 2050 Plan.

[b] *Relative to 2020.*

Source: U.S. Bureau of Economic Analysis and SEWRPC

Table 2.5
Equalized Value of Property in Kenosha County by Municipality: 2022

Community	2022 Equalized Value ($)
Cities	
Kenosha	9,307,639,900
Villages	
Bristol	971,619,800
Paddock Lake	364,438,100
Pleasant Prairie	5,369,863,700
Salem Lakes	1,921,115,300
Somers	1,155,365,200
Twin Lakes	1,177,824,900
Towns	
Brighton	291,053,000
Paris	308,873,100
Randall	775,121,900
Somers	104,143,200
Wheatland	480,840,800
Total[a]	22,227,898,900

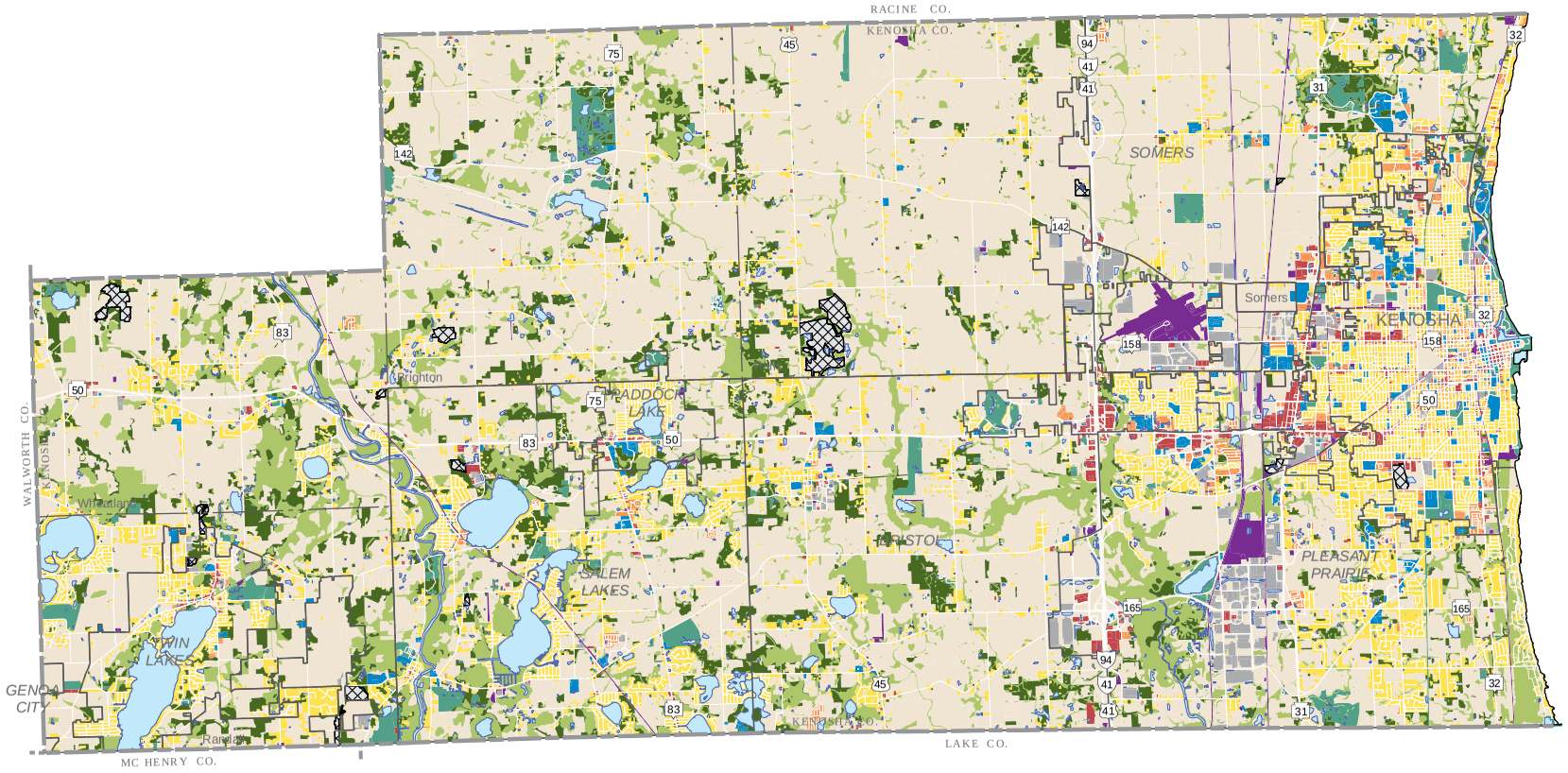
[a] *The total for Kenosha County, including the equalized value of the portion of the Village of Genoa City that is in Kenosha County, is $22,228,331,000. The Village is predominantly located in Walworth County and is not included under this plan.*

Source: Wisconsin Department of Revenue and SEWRPC

Surface Waters, Floodplains, and Lake Michigan Coastline

Surface water resources, consisting of streams and lakes, form a particularly important element of the natural resource base. Surface water resources provide recreational opportunities, influence the physical development of the County, and enhance its aesthetic quality. Watershed boundaries, wetlands, and major streams and lakes within the County are shown on Map 3.2.

Map 2.1
Existing Land Uses in Kenosha County: 2020



Source: SEWRPC

Table 2.6
Land Uses in Kenosha County: 2020

Land Use Category[a]	Acres	Percent of Subtotal	Percent of County
Urban			
Single-Family Residential	20,038	44.5	11.2
Multi-Family Residential[b]	1,797	4.0	1.0
Commercial	1,950	4.3	1.1
Industrial	2,599	5.8	1.5
Transportation, Communications, and Utilities	12,675	28.1	7.1
Governmental and Institutional	2,173	4.8	1.2
Recreational	3,838	8.5	2.2
Urban Subtotal	45,070	100.0	25.3
Nonurban			
Agricultural	79,385	59.6	44.6
Woodlands	11,526	8.7	6.5
Wetlands	18,877	14.2	10.6
Surface Water	5,734	4.3	3.2
Extractive	427	0.3	0.2
Landfill	418	0.3	0.2
Open Lands[c]	16,768	12.6	9.4
Nonurban Subtotal	133,135	100.0	74.7
Total	178,205	--	100.0

[a] *Parking lots are included with the associated use.*

[b] *Includes two-family residential.*

[c] *Open lands include lands in rural uses that are not being farmed; land under development, except for single-family residential uses; and other lands that have not been developed including residential lands or outlots attendant to existing urban development that are not expected to be developed.*

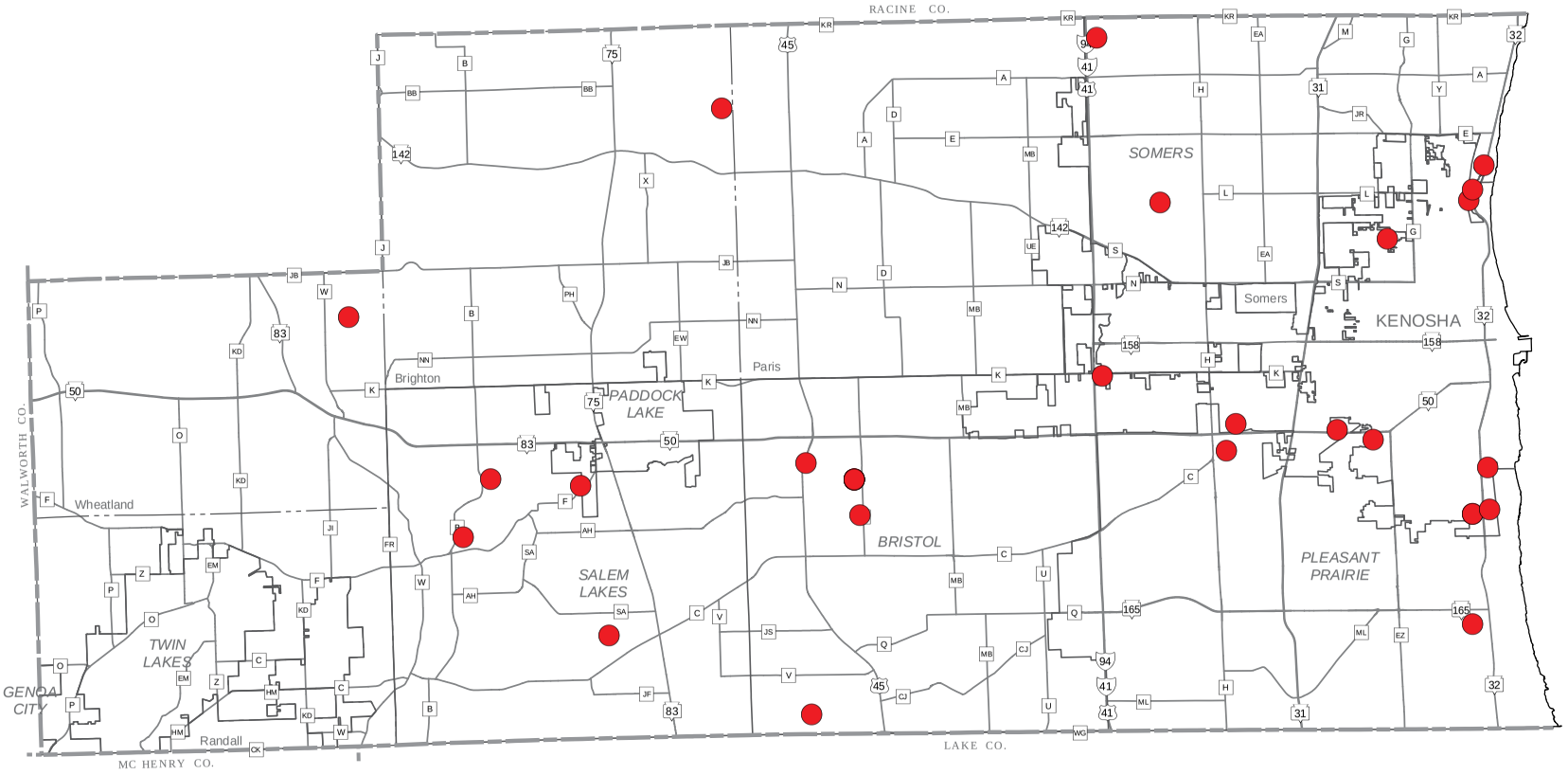
Source: SEWRPC

Major streams are defined as those which maintain, at a minimum, a small continuous flow throughout the year except under unusual drought conditions. There are approximately 110 miles of major streams in Kenosha County, located within four watersheds: the Des Plaines River, Fox (Illinois) River, Pike River, and Root River watersheds. A fifth watershed encompasses those areas adjacent to Lake Michigan which drain directly into the Lake through intermittent streams. The Fox River watershed generally encompasses the western portion of the County and includes the Lower Fox (Illinois) River portion of the watershed. The Des Plaines River watershed covers the central portion from the northern border to the southern border of the County and includes the Des Plaines River, Jerome Creek, Kilbourn Road Ditch, Center Creek, Brighton Creek, and the Dutch Gap Canal. The Root River watershed encompasses a small portion in the northern part of the County and includes the East Branch of the Root River Canal. The Pike River watershed, in the northeast portion of the County, includes the Pike River and Pike Creek.

There are also 20 major lakes, lakes of 50 acres or more, in Kenosha County. The major lakes include Benet Lake, Camp Lake, Center Lake, Cross Lake, Dyer Lake, George Lake, Hooker Lake, Lake Andrea, Lake Benedict, Elizabeth Lake, Lake Mary, Lake Shangri-La, Lilly Lake, Paddock Lake, Powers Lake, Rock Lake, Silver Lake, Vern Wolf Lake, and Voltz Lake. There are eight lake management districts in the County which have responsibilities related to the protection, rehabilitation, and management of 11 lakes.

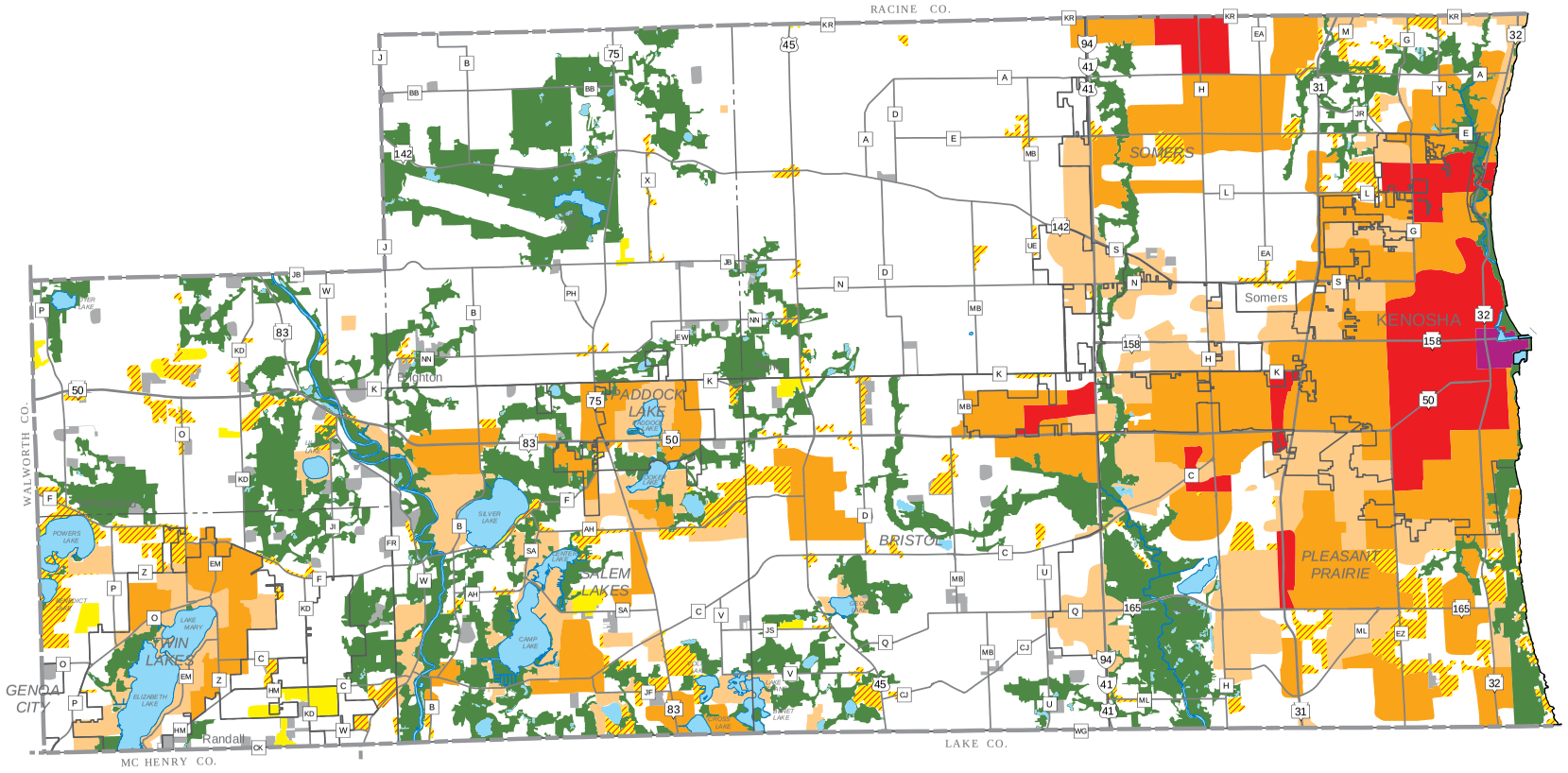
Floodplains are the wide, gently sloping areas contiguous to, and usually lying on both sides of, a stream channel or lake. For planning and regulatory purposes, floodplains are normally defined as the areas subject to inundation by the 1-percent-annual-probability (100-year recurrence interval) flood event. Floodplain areas are generally not well suited to urban development, not only because of the flood hazard, but also because of the presence of high-water tables and, generally, of soils poorly suited to urban uses. Floodplain areas often contain important natural resources, such as high-value woodlands, wetlands, and wildlife habitat and, therefore, constitute prime locations for parks and open space areas.

Map 2.2
Manufactured Homes and Parks in Kenosha County: 2021



Source: Wisconsin Department of Safety and Professional Services and SEWRPC

Map 2.3
Regional Land Use Plan as it Pertains to Kenosha County: 2050



- MIXED-USE CITY CENTER (Residential and Other Urban Land—At Least 18.0 Dwelling Units per Net Residential Acre)
- MIXED-USE TRADITIONAL NEIGHBORHOOD (Residential and Other Urban Land—At Least 7.0 to 17.9 Dwelling Units per Net Residential Acre)
- SMALL LOT TRADITIONAL NEIGHBORHOOD (Residential and Other Urban Land—At Least 4.4 to 6.9 Dwelling Units per Net Residential Acre)
- MEDIUM LOT NEIGHBORHOOD (Residential and Other Urban Land—At Least 2.3 to 4.3 Dwelling Units per Net Residential Acre)
- LARGE LOT NEIGHBORHOOD (Residential and Other Urban Land—At Least 0.7 to 2.2 Dwelling Units per Net Residential Acre)
- LARGE LOT EXURBAN (Residential Land— 0.2 to 0.6 Dwelling Units per Net Residential Acre)
- RURAL ESTATE (0.1 TO 0.2 Dwelling Units per Acre)
- AGRICULTURAL AND OTHER OPEN LANDS
- PRIMARY ENVIRONMENTAL CORRIDOR
- SURFACE WATER

N

0 1 2 3 Miles

Source: SEWRPC

Table 2.7
Projected Changes in Land Uses in Kenosha County: 2020 and 2050

Land Use Category	Acres			Percent Change
	2020	2050	Change	
Urban				
Residential	21,835	27,584	5,749	26.3
Commercial	1,950	2,560	610	31.3
Industrial	2,599	2,880	281	10.8
Transportation, Communications, and Utilities	12,675	14,272	1,597	12.6
Governmental and Institutional	2,173	2,368	195	9.0
Recreational	3,838	4,672	834	21.7
Urban Subtotal	45,070	54,336	9,266	20.6
Nonurban Land				
Agricultural and Other Open Lands	96,998	89,463	-7,535	-7.8
Surface Water	5,734	5,734	--	--
Wetlands	18,877	18,496	-381	-2.0
Woodlands	11,526	10,176	-1,350	-11.7
Nonurban Subtotal	133,135	123,869	-9,266	-7.0
Total	178,205	178,205	--	--

Source: SEWRPC

Table 2.8
Forecasted Growth in Kenosha County: 2050

Type	Existing (2020)	Forecast (2050)	Percent Change: 2020-2050
Population	169,151	251,100	48.4
Households	66,842	100,900	51.0
Employment	84,636	102,700	21.3

Source: SEWRPC

The floodplains shown on Map 3.2 in this report have been identified by Kenosha County, SEWRPC, and FEMA. Approximately 20,193 acres, not including surface water in lakes and existing stream channels, or about 11 percent of the total area of the County, are located within the 1-percent-annual-probability flood hazard area. Maps, tables, and more detailed hazard information related to floodplains in Kenosha County can be found in Chapter 3.

The Lake Michigan coastline in Kenosha County consists of about 15.4 miles of shoreline, encompassing portions of three local units of government, including the City of Kenosha and the Villages of Pleasant Prairie and Somers. Maps, tables, and more detailed hazard information related to Lake Michigan's coastline in Kenosha County can be found in Chapter 3.

Environmental Corridors

SWERPC has identified and delineated those areas of Kenosha County having concentrations of natural, recreational, historic, aesthetic, and scenic resources that should be preserved and protected in order to maintain the overall quality of the environment. Such areas normally include one or more of the following seven elements of the natural resource base which are essential to the maintenance of both the ecological balance and the natural beauty of the Region: 1) lakes, rivers, and streams and the associated underdeveloped shorelands and floodplains; 2) wetlands; 3) woodlands; 4) prairies; 5) wildlife habitat areas; 6) wet, poorly drained, and organic soils, and 7) rugged terrain and high-relief topography. The foregoing seven elements constitute integral parts of the natural resource base. There are five additional elements that are important considerations in identifying and delineating areas with scenic, recreational, and educational value. These additional elements are: 1) existing outdoor recreation sites; 2) potential outdoor recreation and related open space sites; 3) historic, archaeological, and other cultural sites; 4) significant scenic areas, and 5) natural and scientific areas.

In southeastern Wisconsin, the delineation of these 12 natural resource and natural resource-related elements on maps result in an essentially linear pattern of relatively narrow, elongated areas which have been termed "environmental corridors" by SEWRPC. Primary environmental corridors include a wide variety of the aforementioned important resource and resource-related elements and are, by definition, at least 400 acres in size, two miles in length, and 200 feet in width. In Kenosha County in 2020 there were 29,176 acres of primary environmental corridors. These generally lie along rivers and streams and adjacent to lakes, or are associated with woodlands, wetlands, or park and open space sites. In addition, smaller concentrations of natural resource features that have been separated physically from the environmental corridors by intensive urban or agricultural land uses have also been identified. These areas which are at least five acres in size are referred to as isolated natural resource areas. In Kenosha County there are 4,361 acres of isolated natural resource areas. Secondary corridors and isolated natural resources areas are generally not considered of regional significance and consequently are not shown on the existing and planned land use maps. However, such resources may be important at the local level and should be considered for preservation by local governments in the development of local plans.

2.5 EMERGENCY SERVICES AND CRITICAL FACILITIES

The type and location of public safety facilities are important considerations in hazard mitigation planning, because of the potential direct involvement of such facilities in certain hazard situations. The location of the fire stations, police stations, and associated emergency service areas are shown in Map 2.4. A listing of these facilities is included in Appendix C. The location of these stations in relationship to the floodplain areas are further analyzed and described in Chapter 3.

Fire Suppression and Rescue Services

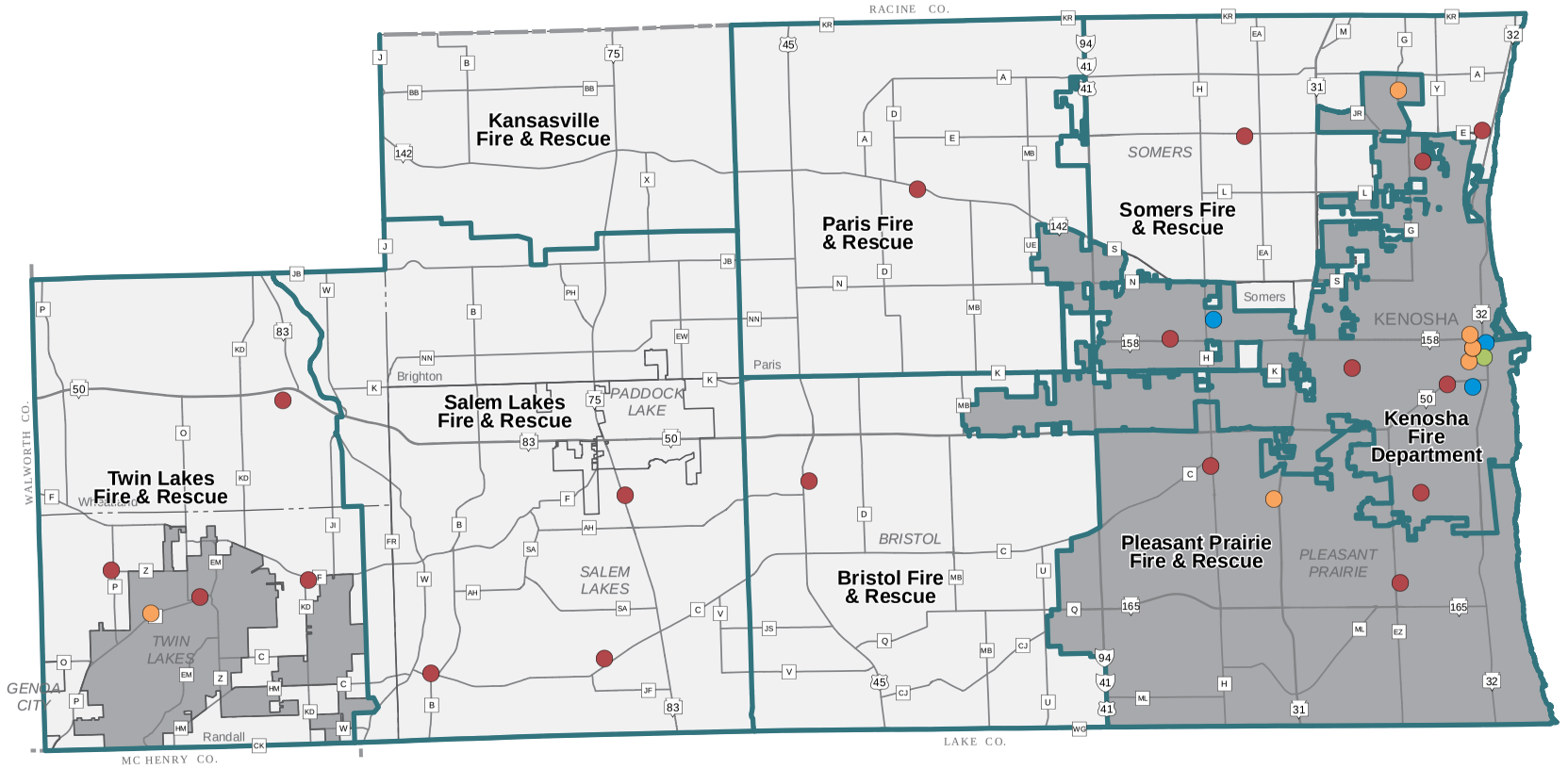
Each of the 12 local units of government in Kenosha County either own or contract for fire suppression services or emergency medical services. The location of each of the fire stations and the fire service areas within Kenosha County are shown on Map 2.4. A variety of remote fire suppression systems are also present in Kenosha County. Throughout the County, fire departments, municipalities, and schools have installed devices such as fire suppression cisterns and dry hydrants to aid in fire suppression activities.

Each of the fire departments in Kenosha County, except the Town of Brighton, Randall, and Wheatland, and the Village of Paddock Lake, independently maintains an emergency medical service. The emergency medical service areas in Kenosha County are also shown on Map 2.4. Salem Lakes Fire and Rescue provides rescue services in the Town of Brighton and Village of Paddock Lake. Salem Lakes Fire and Rescue and Twin Lakes Fire and Rescue provide rescue services in the Towns of Randall and Wheatland. In the case of all jurisdictions, rescue service is provided by a publicly sponsored fire or fire and rescue department. The emergency medical service areas in Kenosha County are shown on Map 2.4.

All of the fire and rescue departments in Kenosha County participate in a mutual aid agreement with each other and numerous other Illinois and State of Wisconsin fire and rescue departments, and through a Mutual Aid Box Alarm System (MABAS) agreement. This agreement enables each department to render assistance to, and receive assistance from, other departments in the County as needed to respond to fire and rescue emergencies. Under the agreement, departments render assistance without charge to the extent of available resources not required for the protection of their own service areas. This agreement enables individual departments to significantly supplement their own personnel, apparatus, and equipment with that from other departments in responding to emergencies.

Importantly, the agreement allows individual departments to access equipment, such as tankers, aerial trucks, and extraction equipment, which they themselves do not possess and which they may only need infrequently. In addition to the County mutual aid agreement, each department has reciprocal mutual agreements with one or more neighboring departments. Some of these are formal written agreements; others are unwritten. Many departments have indicated they would respond to any request for mutual aid, whether or not there is a mutual aid agreement, provided that they are able to do so without jeopardizing their own services.

Map 2.4
Emergency Services in Kenosha County: 2022



FIRE/EMS STATION

POLICE STATION

COUNTY COURT HOUSE

CORRECTIONAL FACILITY

FIRE DEPARMENT DISTRICTS

AREA SERVED BY A LOCAL POLICE DEPARTMENT

AREA SERVED BY KENOSHA COUNTY SHERIFF'S DEPARTMENT ONLY

N

0 1 2 3 Miles

Source: Wisconsin Department of Justice (WILENET), Racine County Office of Emergency Management Department, Racine County, and SEWRPC

Fire departments in the County participate in several specialized response teams. The Kenosha County Dive team consists of paid and volunteer members of the County's fire, rescue, police, and sheriff's departments. This team provides emergency response of trained personnel and equipment in water-related life-threatening situations, recovery of drowning victims, and search and recovery of crime evidence within the jurisdictional waters of Kenosha County. The Confined Space Rescue Team responds to any rescue involving victims trapped or incapacitated in an area having limited or restricted means for entry or exit. The High Angle Rescue Team responds to any rescue that requires rope and related equipment necessary to safely gain access to, and remove victim(s) from, hazardous areas with limited access such as water towers, ravines, high-rise buildings, above or below grade structures or terrain by means of a rope system. The Structural Collapse Rescue Team conducts search and rescue operations for victims at a structural collapse incident. The Trench Rescue Team responds to any incident involving victims trapped in a narrow excavation made below the surface of the ground. The Hazardous Materials Team responds to incidents involving hazardous materials. This team is responsible for identifying hazardous materials, assessing the hazard and risk associated with incidents, implementing control procedures, performing containment and confinement operations, rendering the incident area safe, and performing decontamination procedures.

Law Enforcement

Three of the 12 municipalities in Kenosha County provide for law enforcement through full-time police departments. In the remaining municipalities primary law enforcement is provided through the Kenosha County Sheriff's Department. In addition, the Town of Wheatland provides limited law enforcement through a Town constable and the Village of Salem Lakes provides limited law enforcement through public safety and water patrol officers. The University of Wisconsin-Parkside also has a law enforcement agency that patrols County and State roads adjacent to the campus. The location of local law enforcement stations in Kenosha County is shown on Map 2.4. That map also shows the location of the State of Wisconsin Department of Corrections, correctional facilities and County detention centers in Kenosha County.

The law enforcement agencies within Kenosha County have several special-purpose units and teams. The Kenosha County Bomb Squad operates under the authority of the Kenosha County Sheriff's Department and is made up of members from the Sheriff's Department, the City of Kenosha Police Department, and the City of Kenosha Fire Department. Members of this team have specialized training in handling suspected explosive devices, suspicious packages, bomb threats, and fireworks storage and disposal. The Sheriff's Department also has canine, all-terrain vehicle, and marine units. The City of Kenosha Police Department's special teams include a bike patrol and a canine unit. There are two special weapons and tactics (SWAT) type teams within the County in the Sheriff's Department and City of Kenosha Police Department.

Critical Community Facilities

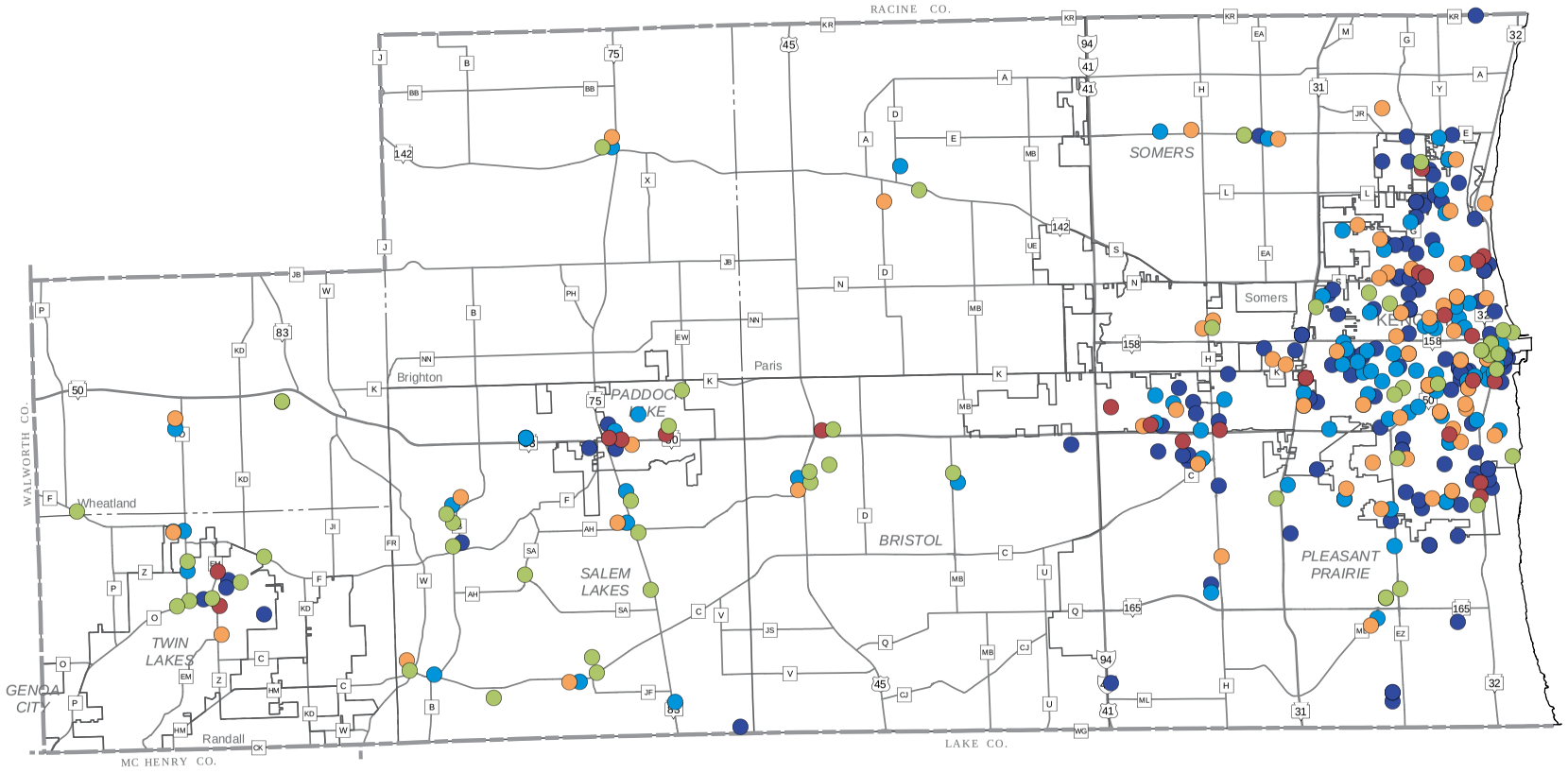
In addition to fire stations and law enforcement stations, as described above, other community facilities which are of importance in hazard mitigation planning include schools, hospitals and major clinics, nursing homes, day care centers with a capacity of 20 children or more, and government administration buildings. Map 2.5 shows the location of selected types of critical community facilities within Kenosha County. Because of the need for access to and from these facilities, the hazard mitigation plan includes their location. Their location in relation to flood hazard areas is discussed further in Chapter 3. A listing of the critical community facilities is included in Appendix C.

Historic Sites

Historic sites in Kenosha County often have important recreational, educational, and cultural value. Certain sites of known historic significance are listed on the National Register of Historic Places. As of 2022, there were 26 individual sites and three historic districts[9] within the County listed on the National Register. The location of sites and districts in Kenosha County listed on the National Register of Historic Places are presented on Map 2.6. More detailed information on these historic sites can be found on the National Park Service's National Register of Historic Places Database and Research website.

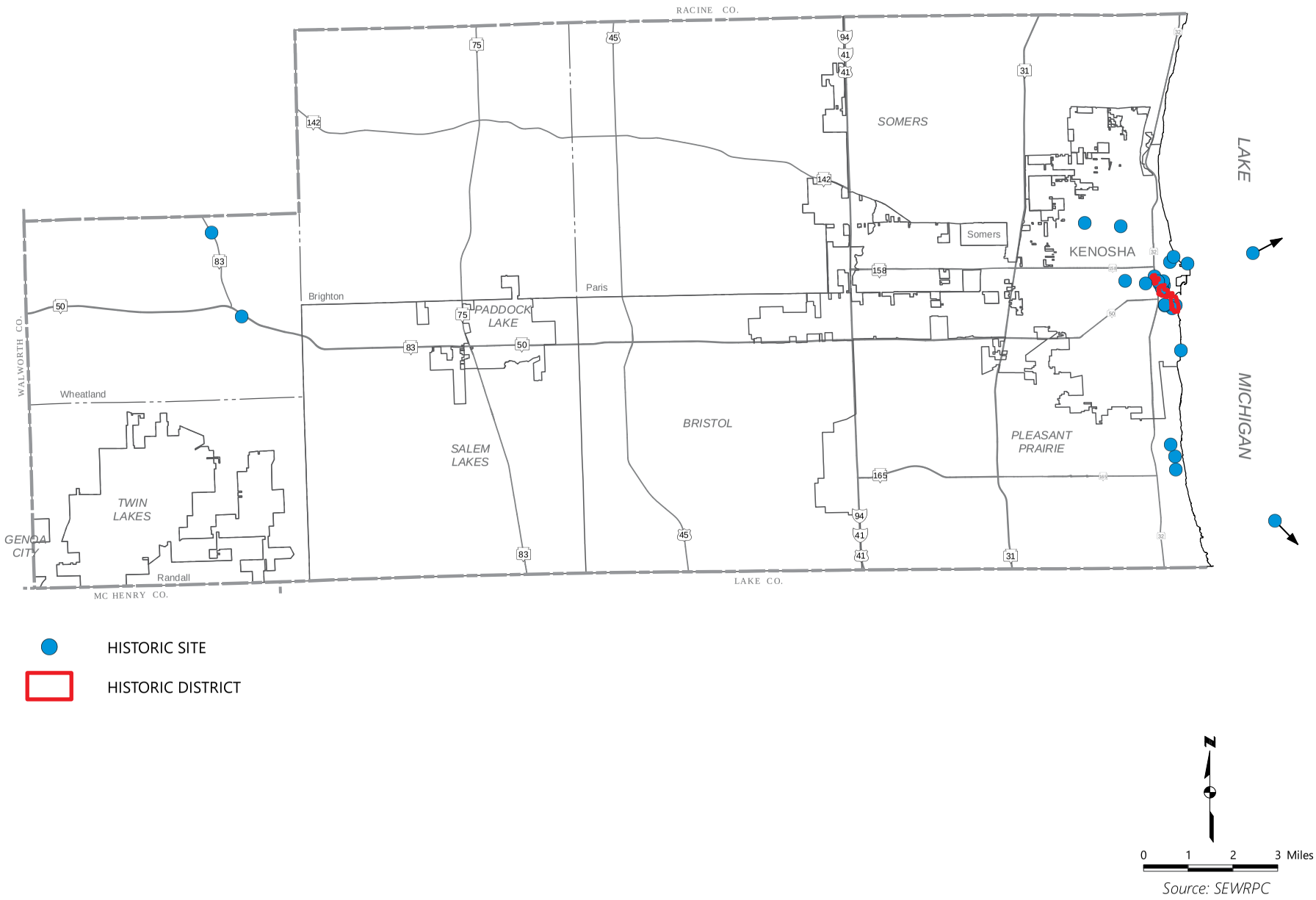
[9] *A historic district is a geographically definable area, urban or rural, that contains a concentration of significant historic sites or structures from the same period of time.*

Map 2.5
Critical Community Facilities in Kenosha County: 2022



Source: Wisconsin Department of Children and Families, Wisconsin Department of Health and Social Services, Wisconsin Department of Public Instruction, Kenosha County, and SEWRPC

Map 2.6
National and State Registers of Historic Sites and Districts in Kenosha County: 2020



Source: SEWRPC

2.6 CLIMATE AND CLIMATE CHANGE

Climate, which is the long-term weather conditions in an area, is significant for hazard mitigation planning. Wisconsin's climate continues to change. In the ten years since the initial 2011 Wisconsin Initiative on Climate Change Impacts (WICCI) Assessment Report, new data continues to show increases in warming, rain and snow, and more frequent extreme rainfall events. Statewide temperatures have warmed by about 3°F (Fahrenheit), and precipitation in the south has increased by nearly 20 percent since 1950.[10] For example, Southern Wisconsin has experienced the highest increase in precipitation over the last decade and nearly every region of the state has recently experienced extreme rainfall events that led to flooding of roads, homes, businesses, and farm fields. New analyses reaffirm previous projections indicating that many of these trends will continue with wide ranging consequences throughout Wisconsin's natural and built environments.[11]

The risk posed to Kenosha County by many of the natural hazards profiled in this plan have been estimated largely upon the historical occurrence of, and impacts attributed to, the hazard within the County. Over longer periods of time, climate change may render estimates of risk based on historical occurrences and impacts unreliable. The following subsections describe the changes that have occurred in Wisconsin's climate since 1950, and the changes that are projected to occur by the middle of the 21st century. For those hazards whose frequency of occurrence or impacts are likely to be affected by the changes in climate, these descriptions will form the basis of evaluating potential long-term changes in hazard conditions.

Historical Climate Change Trends

Average annual temperatures in Wisconsin have increased over the last half of the 20th century and into the 21st century. In Kenosha County, the increase was about 2°F, as can be seen in Figure 2.1.[12] Much of this increase in average temperature occurred in the form of higher night-time low temperatures. For example, over the period 1950 through 2018, the average number of days in Kenosha County in which the daily low temperature fell below 0°F decreased by about 7 days per year. The greatest increase in average temperatures occurred during winter months. Average winter temperatures in Kenosha County increased by about 4°F over this period.

Average annual precipitation in Wisconsin has increased over the last half of the 20th century and into the 21st century. In Kenosha County annual precipitation increased over the period of 1950 through 2018 by about 15 percent (see Figure 2.2).[13] Most of the increase in average precipitation occurred during winter months. In Kenosha County, average precipitation during winter months increased by about 20 percent between 1950 and 2018. Increases also occurred during spring and autumn in the County. Throughout the State, the changes in average precipitation during summer months were highly variable. In Kenosha County, average precipitation during summer months increased about 5 percent between 1950 and 2018. The frequency and magnitude of heavy precipitation events has also been increasing in Wisconsin. Extreme rainfall patterns in the City of Madison illustrates this trend. In the decade between 2001 and 2010, there were 24 days in which 2.0 inches or more of precipitation fell. This is twice the previous maximum of 12 days in the 1950s.

Climate Change Projections

The consensus from downscaled results from climate models indicate that average annual temperatures will continue to increase through the 21st century.[14] Depending on location, it is projected that average temperatures in the State of Wisconsin will increase by between 4.0°F and 5.0°F over the period 2041 to 2060 (see Figure 2.3). This increase is projected to be on the order of 4.0°F in most of Kenosha County, with a small portion in the southwestern part of the County projected to increase by about 5.0°F. The greatest changes are projected to occur during winter months, with average winter temperatures being projected to increase by about 5.0°F in Kenosha County. By contrast, average temperatures in Kenosha County during the summer are projected to increase by about 4.0°F. Changes in extreme temperatures will accompany these

[10] *Wisconsin Initiative on Climate Change Impacts, Wisconsin's Changing Climate: Impacts and Adaptation, Nelson Institute for Environmental Studies, University of Wisconsin-Madison and Wisconsin Department of Natural Resources, 2021.*

[11] *Wisconsin Initiative on Climate Change, 2021, op. cit.*

[12] *Wisconsin Initiative on Climate Change website, wicci.wisc.edu.*

[13] *Wisconsin Initiative on Climate Change, website, wicci.wisc.edu.*

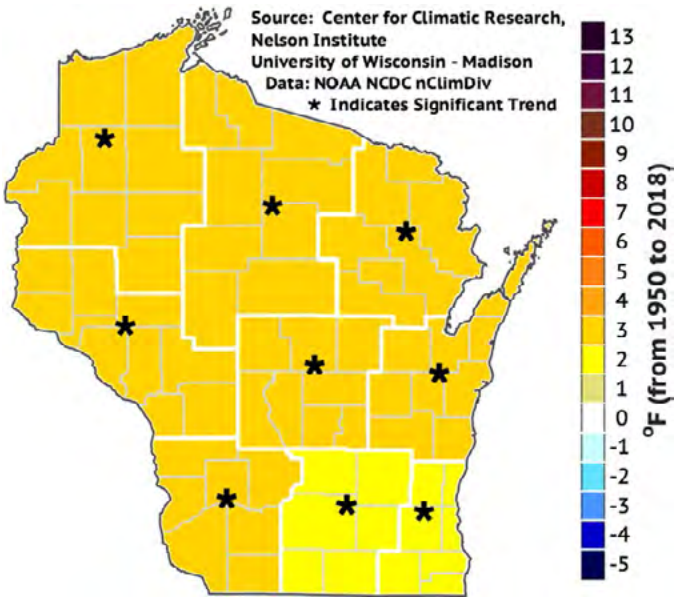
[14] *Wisconsin Initiative on Climate Change Impacts, 2021, op. cit.*

changes in average temperature. The frequency of extreme daily high temperatures is projected to increase. The average number of days per year with daily high temperatures greater than 90°F is currently about 12 in southern Wisconsin. This is likely to triple to about 36 days per year by 2055. By contrast, the frequency of extreme daily low temperatures is projected to decrease. The average number of days per year with daily low temperatures below 0°F is currently about 15 in southern Wisconsin. This is projected to decrease to about nine days per year by 2055.

The consensus from downscaled results from climate models project several changes in precipitation through the 21st century.[15] There is a projected increase in annual precipitation in the whole State of Wisconsin by about 5 percent (see Figure 2.4). The projections indicate that the amount of precipitation falling during winter is likely to increase by about 25 percent. Due to the projected increase in temperatures, it is projected that a greater amount of precipitation occurring during the winter will fall as rain rather than snow.[16] This will be accompanied by both an increase in the likelihood of freezing rain events and decreases in snow depth and snow cover. Model projections also show that Wisconsin will receive more precipitation and more frequent intense precipitation events during the spring, especially during early spring. As in winter, it will become more likely for early spring precipitation to fall as rain rather than snow.

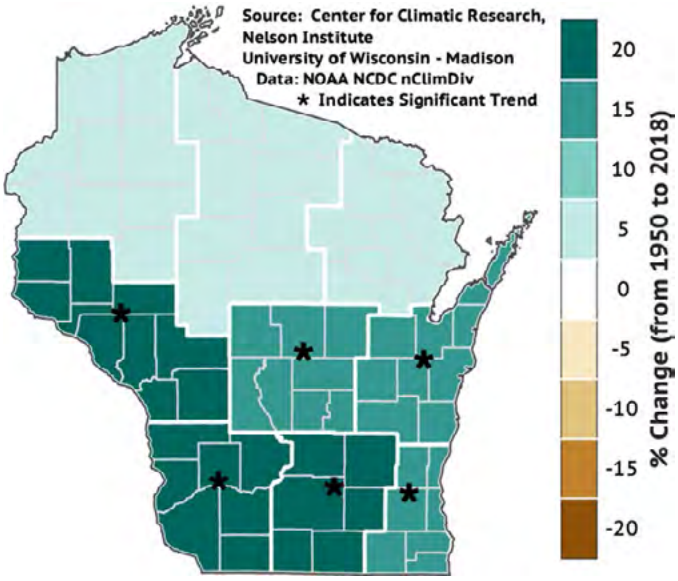
The total amount of precipitation occurring during the summer is not projected to change much, however the frequency of intense rainfall events will increase. In southern Wisconsin, the frequency of precipitation events in which two or more inches fall in a 24-hour period is expected to increase from about 12 events per decade to 15 events per decade by the middle of the 21st century. These changes will be concentrated in the spring and fall. The projections indicate that the magnitude of the heaviest precipitation events will also increase. The shift to more heavy rainfall events, but little change in total summertime precipitation, implies that more dry days will occur in Wisconsin during the summer. More dry days, coupled with higher summer temperatures and the increases in evapotranspiration that are likely to result from higher temperatures, will lead to an increase in the likelihood of summer droughts.

Figure 2.1
Change in Annual Average Temperature from 1950 to 2018



Source: Wisconsin Initiative on Climate Change Impacts, Trends and Projections, wicci.wisc.edu

Figure 2.2
Change in Annual Precipitation from 1950 to 2018

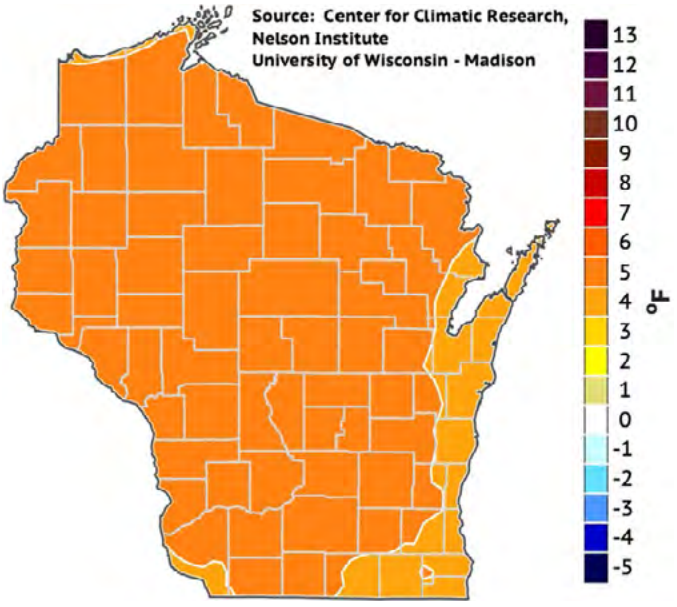


Source: Wisconsin Initiative on Climate Change Impacts, Trends and Projections, wicci.wisc.edu

[15] *Wisconsin Initiative on Climate Change Impacts, 2021, op. cit.*

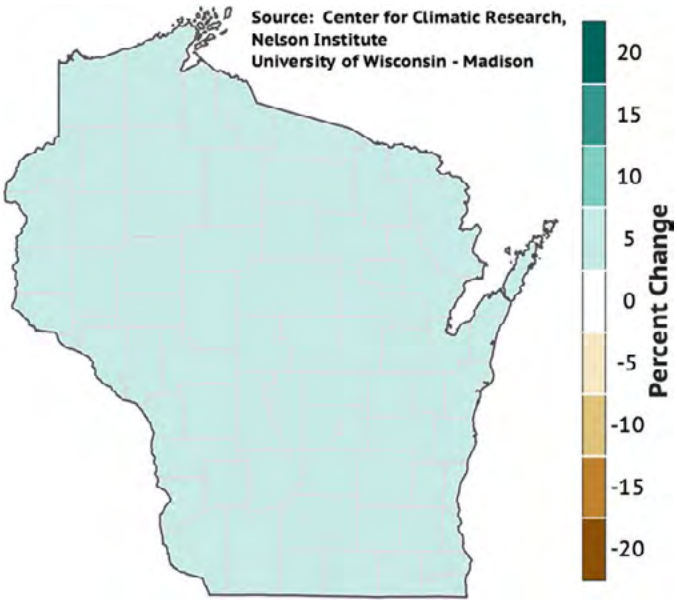
[16] *Michael Notaro, David J. Lorenz, Daniel Vimont, Stephen Vavrus, Christopher Kucharik, and Kristie Franz, "21st Century Wisconsin Snow Projections Based on an Operational Snow Model Driven by Statistically Downscaled Climate Data," International Journal of Climatology, Volume 31, pages 1615-1633, 2011.*

Figure 2.3
Projected Change in Annual Average Temperature from 2041 to 2060



Source: Wisconsin Initiative on Climate Change Impacts, Trends and Projections, wicci.wisc.edu

Figure 2.4
Projected Change in Annual Precipitation from 2041 to 2060



Source: Center for Climatic Research, Statistical Downscaling for Wisconsin, ccr.nelson.wisc.edu

ANALYSIS OF HAZARD CONDITIONS 3

To evaluate various potential hazard mitigation alternatives for Kenosha County and select the most effective and feasible hazard mitigation strategies, the existing potential natural weather hazard problems in the County must first be analyzed and the vulnerability to such hazards documented. Accordingly, this chapter provides the following:

- Identification of the hazards likely to affect Kenosha County
- Profiles of the extent and severity of recent hazard events which occurred in the County
- Assessment of the vulnerability and risk associated with each type of hazard
- Identification of the potential for changes in hazard severity and risk under future conditions

The vulnerability assessment focuses on the County and community assets described in Chapter 2.

3.1 HAZARD IDENTIFICATION

The process of identifying those natural weather hazards that should be specifically addressed in the Kenosha County hazard mitigation plan was based upon consideration of a number of factors. The process included input from the Kenosha County Hazard Mitigation Local Planning Team (LPT), including a priority ranking of hazards; review of the hazard identification set forth in the State hazard mitigation plan; review of documentation of past hazard events; and review of related available mapping, plans, and assessments. As part of the updating process, the identification of hazards likely to affect Kenosha County was reviewed and reevaluated. This reevaluation included additional input from the Kenosha County Hazard Mitigation LPT.

As part of the updating process for this third plan update (4th edition), the LPT reevaluated the hazards to be considered using a hazard and vulnerability assessment tool similar to the one used for reviewing hazard identification for the previous plan update. In this survey, members of the LPT indicated the likelihood of each hazard occurring in Kenosha County and evaluated the severity of each hazard on the basis of possible impacts to people, property, and businesses. Finally, the LPT evaluated the relative state of preparedness for each hazard. The ratings given by the LPT for each hazard were used to derive a perceived level of risk posed by each hazard. Following this, the hazards were ranked by perceived level of risk (Table 3.1).

Summary of Hazard Vulnerability and Risk Assessment Survey Results

Methods

The assessment survey was completed at the March 28, 2022, meeting of the Kenosha County Hazard Mitigation Local Planning Team, with 16 surveys returned and analyzed. For each of the hazards, a risk was computed for each survey using the formula:

Risk (in weighted average) =
[(Probability) x (Human impact + Property impact + Business impact - Preparedness)]

Probability (likelihood that an event would occur), Human impact (possibility of death or injury), Property impact (physical losses and damages), Business impact (interruption of services), and Preparedness (mitigation or pre-planning) were each assigned a number from 0 to 3, with 0 indicating "not applicable", 1 indicating low, 2 indicating moderate, and 3 indicating high.

The interpretation of the results returned by this formula is that the perceived threat increases with increasing total risk. For each hazard, total risk was calculated using the results of all the returned surveys. The hazards were then ranked by total risk, with a rank of 1 indicating the highest perceived risk.

Table 3.1
Perceived Risks of Hazards as Determined by Hazard Vulnerability and Risk Assessment Survey: 2022

Hazard	Probability[a] *Likelihood this will occur*	Human Impact[a] *Possibility of death or injury*	Property Impact[a] *Physical losses and damages*	Business & Agency Impact[a] *Interruption of services*	Preparedness[a] *Mitigation or pre-planning*	Total Risk[b] *Relative threat*	Rank[c]
Tornado	1.750	2.438	2.688	2.438	2.188	9.406	1
Stormwater Flooding	2.500	1.813	2.125	1.875	2.188	9.063	2
Ice Storm	2.375	2.063	1.688	2.063	2.250	8.461	3
Lake Michigan Erosion	2.250	1.563	1.938	1.313	1.063	8.438	4
Heavy Snowstorm	2.625	1.750	1.625	2.188	2.375	8.367	5
Blizzard	2.375	2.063	1.625	2.188	2.500	8.016	6
Extreme Cold	2.500	1.938	1.375	1.688	2.063	7.344	7
Thunderstorm	2.813	1.250	1.563	1.563	2.438	5.449	8
Extreme Heat	1.750	1.875	2.063	1.625	1.938	5.250	9
Riverine Flooding	1.500	1.875	2.063	1.625	2.125	5.156	10
Lightning	2.750	1.438	1.438	1.375	2.438	4.984	11
Hail	2.375	1.250	1.563	1.438	2.188	4.898	12
High Straight-Line Wind	1.375	1.688	2.125	1.875	2.250	4.727	13
Inland Lake Flooding	1.375	1.313	1.813	1.188	1.563	3.781	14
Fog	2.188	1.375	0.875	1.250	2.000	3.281	15
Wildfire	1.000	1.563	1.625	1.375	1.438	3.125	16
Drought	1.375	0.813	1.063	1.250	1.563	2.148	17
Dam Failure	0.625	1.313	1.688	1.688	1.563	1.953	18
Inland Landslide	0.563	0.813	1.438	1.000	1.250	1.125	19
Earthquake	0.313	1.250	0.875	1.625	1.188	0.801	20
Land Subsidence	0.563	0.750	1.188	1.000	1.563	0.773	21
Dust Storm	0.688	0.750	0.813	0.750	1.313	0.688	22

Note: Value is based on the weighted average of the number of votes received for each score of No Available information (NA/0), low (1), moderate (2), or high (3).

[a] *Severity = Sum of Impact – Preparedness*

[b] *Total Risk = Probability x Severity*

[c] *Perceived threat/rank is based on Total Risk score.*

Source: SEWRPC

Results

The results from the assessment survey are summarized in Table 3.1. Hazard events are listed in order of highest perceived risk to lowest perceived risk.

Summary and Ranking of Hazards

There are several ways the Kenosha County hazards can be ranked and summarized to be considered in the County hazard mitigation plan. Current guidance for all hazard mitigation plans promotes comprehensive consideration of all natural hazards. The natural weather hazards have been ranked by consideration of their frequency, amount of damage, and death and injuries incurred, as well as by concerns of, and degree of importance assigned by, the collective judgment of the Kenosha County Hazard Mitigation LPT.

The hazards to be considered in this plan are summarized in Table 3.2,[17] along with qualitative information on the hazard severity. As part of the updating process, the hazards considered in the previous plan update were reevaluated based on data related to the occurrence of natural weather hazards since the previous plan update and to the perceived risk associated with each hazard, as summarized in Table 3.1.

Hazard severity can be assessed and ranked in a variety of ways. The purpose of ranking hazards is to help set priorities and direct more resources to address those hazards of the greatest severity. However, the kinds of mitigation actions that will be needed and warranted depend on the type of vulnerability to be addressed. Some hazards, such as excessive heat and lightning, are unlikely to cause a disaster, but they can be fatal and, therefore, are serious hazards. Vulnerability to such hazards can best be addressed by preventative measures, such as public information to encourage hazard awareness and personal protection. Other hazards, such as flooding, are pervasive and devastating, and may require a variety of tools such as mapping, building codes, zoning laws, insurance, elevation or acquisition of flood-prone structures, and public awareness, to effectively reduce the risk of disaster. However, flooding might not result in more fatalities than a heat wave. In general, ranking hazards by the number of deaths that they cause shifts the focus away from major and largely avoidable disasters, such as floods. Weather hazards that have caused past Kenosha County disasters are likely the hazards that will cause future disasters. However, the types of natural hazards that result in fatalities remain a public health and safety concern.

The summary listing of hazards in Tables 3.1 and 3.2 does include some hazards that have been found to have minimal chance of occurring or offer only limited applicable mitigation options. The hazards listed below will not be discussed further in this report.

Fog

Fog is low-level moisture caused by many contributing factors, including ice or snowmelt, moist air from Lake Michigan, or rain evaporation with light winds, which may reduce visibility levels, especially in river valleys and other low spots. Dense fog is often seen with clearing skies the day following a heavy rainstorm. Fog is a widespread natural hazard event that usually covers several counties during an episode. There have been 65 fog events reported in and around Kenosha County from 2001 through 2021. Although no deaths or injuries were recorded during that period, fog can affect mobility. Dense fog may persist for several hours or days, reducing visibility and leading to vehicle accidents, flight delays, or cancellations at airports. This natural hazard event does not offer significant mitigation alternatives to warrant individual examination.

Wildfires

A forest fire is an uncontrolled fire occurring on forest or woodlands outside the limits of incorporated villages or cities. A wildfire is any instance of uncontrolled burning in brush, marshes, grasslands or field lands. The causes of these fires include lightning, sparks from trains, human carelessness, or arson. Land use, vegetation, amount of combustible materials present, and weather conditions, such as wind, low humidity, and lack of precipitation, are the chief factors determining the number of fires and acreage burned.

[17] *The rankings in Table 3.2 were assigned by combining rankings of the natural hazards listed based upon the number of occurrences, amount of damages, numbers of fatalities and injuries reported since 1950, and the perceived risk associated with each hazard as identified by the Local Planning Team and summarized in Table 3.1. It is important to note that some of the natural hazards listed in Table 3.2 represent combinations of hazards listed in Table 3.1. For example, while specific risks associated with thunderstorms, such as hail and lightning are listed separately in Table 3.1, they are combined into one category in Table 3.2.*

Table 3.2
Summary of Hazards to be Considered in the Kenosha County Hazard Mitigation Plan

Hazard	Risk of Occurrence (high, medium, or low)	Damage to Property (high, medium, or low)	Threat to Life Safety (high, medium, or low)	Duration of Impact (long, moderate, or short)	Size of Area Affected (large, medium, or small)
Tornadoes	Low	High	High	Short	Small
Flooding and Stormwater Drainage Problems	High	High	Low	Moderate	Large
Thunderstorm, High Winds, Hail, Lightning	High	High	Medium	Long	Large
Temperature Extremes	Medium	Low	Medium	Long	Large
Coastal Hazards	High	Medium	Low	Long	Small
Winter Storms	High	Low	Medium	Moderate	Large
Drought	Medium	Low	Low	Long	Large

Note: Some of the natural hazards listed in this table represent combinations of hazards listed in Table 3.1. For example, while specific risks associated with thunderstorms, such as hail and lightning are listed separately in Table 3.1, here they are combined into one category.

Source: Kenosha County LPT and SEWRPC

Only about 6.5 percent of the land area in Kenosha County is woodland. Historical agricultural land use and urbanization has reduced the threat of a large-scale forest or wildfire event. According to the Wisconsin Department of Natural Resources (WDNR), Bureau of Forestry, no forest fires or wildfires over 500 acres have occurred in Kenosha County from 2011 through 2021. Based on guidance from the National Association of State Foresters, the WDNR in conjunction with its Federal and tribal partners, developed a Statewide assessment of communities at risk from wildfires. None of the communities in Kenosha County were determined to be at high or very high risk. Considering the low risk and lack of historic incidents, forest and wildfire hazards will not be addressed in later chapters.

Dust Storms

There have been no dust storm events reported in Kenosha County from 2011 through 2021. Natural hazard events that occurred in the past are likely to reoccur in the future, providing the opportunity to plan for them. A dust storm event in Kenosha County would be atypical, therefore, mitigation strategies will not be recommended for this hazard in the current plan.

Land Subsidence

Land subsidence occurs when large amounts of groundwater have been withdrawn from certain types of rocks, such as fine-grained sediments. The rock compacts because the water is partly responsible for holding the ground up. When the water is withdrawn, the rock falls in on itself.[18] Land subsidence is not immediately noticeable because it occurs over large areas over a certain amount of time, unlike sinkholes. Due to the karst terrain of Wisconsin and high groundwater levels, there have been no land subsidence events reports in Kenosha County from 2011 through 2021. A land subsidence event in Kenosha County would be atypical, and therefore, mitigation strategies will not be recommended for this hazard in the current plan.

Inland Landslide

The most frequent and widespread damaging landslides in the U.S. are started by prolonged or heavy rainfall. The majority of rainfall-induced landslides are shallow, small, and move rapidly. Many rainfall-induced landslides transform into debris flows (fast-moving slurries of water, soil, and rock) as they travel down steep slopes, especially those that enter stream channels where they may mix with additional water and sediment.[19] The major concern for the U.S. Geological Survey (USGS) in regard to landslides resides in the State of California. Due to the lack of bare (no plants or trees to hold the soil in place) hills or steep

[18] *U.S. Geological Survey, "Land Subsidence", Water Science School, June 2018.*

[19] *U.S. Geological Survey, "Overview of Rainfall-Induced Landslides", Landslide Hazards, July 2018.*

slopes in the County, inland landslides are considered a very low hazard level.[20] There have been no inland landslides reported in Kenosha County from 2011 through 2021. Thus, mitigation strategies for this hazard will not be recommended in the current plan.

Earthquake

An earthquake is a shaking or sometimes violent trembling of the earth that results from the sudden shifting of rock beneath the earth's crust. This sudden shifting releases energy in the form of seismic waves or wave-like movement of the surface of the earth. Earthquakes can strike without warning and may range in intensity from slight tremors to great shocks lasting a few seconds or over five minutes. The actual movement of the ground during earthquakes is seldom the direct cause of injury or death. Casualties may result from falling objects and debris as well as disruption of communications; electrical power supplies; and gas, sewer, and water lines should be expected from earthquakes. The severity of an earthquake can be measured by comparing the peak acceleration associated with the horizontal shaking it produces to the normal acceleration a falling object experiences due to the force of gravity. This is usually expressed as a percentage of g, the acceleration due to gravity. The level of risk due to earthquake can be expressed as the percentage of g, for which there is a 2 percent probability of being exceeded in a 50-year period. Depending on location, sites in Kenosha County have a 2 percent probability of experiencing earthquakes in a 50-year period in which the peak acceleration associated with horizontal shaking exceeds between 4 percent and 8 percent of g.[21] These are low values. While these levels of shaking can be noticeable, they are rarely associated with damages to structures. The earthquake threat to the State and Kenosha County is considered low, therefore earthquakes will not be considered further in subsequent sections of this report.

Past Hazard Experience

Past experiences with disasters are an indication of the potential for future disasters for which Kenosha County would be vulnerable. Accordingly, a review was made of the hazards that Kenosha County has faced in the past. Tables 3.2 through 3.4 detail the history of estimated disaster damages caused by federally declared emergencies, the total number of weather hazard events recorded, and the severe weather history in the County.

As shown in Table 3.3, Kenosha County has had 8 major disaster declarations and 3 emergency disaster declarations between 1993 and 2021. The total documented estimated damages of these 11 events exceeded $76 million.

Since 2001, Kenosha County has experienced 581 weather hazard events, as summarized in Table 3.4. To illustrate the broader hazard damage potential, Table 3.4 summarizes the reported damages associated with the 581 natural hazard events. Those hazard events were estimated to have caused over $91 million in damages.

The historical events summarized in Table 3.4 show that snow and ice are the most frequent weather hazards, followed by high straight-line winds, fog, and extreme temperatures. However, flooding is the most damaging weather hazard, followed by tornadoes and lightning. Extreme temperatures accounted for six documented deaths and high straight-line winds accounted for two documented deaths in Kenosha County.

To illustrate the potential frequency of thunderstorms and tornadoes, a review was made of the warnings historically issued by the National Weather Service, as shown in Table 3.5. Over the period of 2001 through 2021, there have been 117 flash flood or flood warnings, 356 thunderstorm-related watches or warnings, and 58 tornado-related watches or warnings.

[20] *Global Facility for Disaster Reduction and Recovery (GFDRR), "Think Hazard: Wisconsin Landslide", Retrieved May 31, 2022, from www.thinkhazard.org/en/report/3263-united-states-of-america-wisconsin.*

[21] *U.S. Geological Survey, "2008 United States National Seismic Hazard Maps", USGS Fact Sheet 2008-3018, April 2008.*

Table 3.3
Summary of Estimated Disaster Damages and Assistance in Kenosha County for Federally Declared Disaster Emergencies: 1993-2021

Date of Disaster and Event(s)	Estimated Property and Crop Damages ($)	Public Assistance[a] ($)	Individual Assistance[b] ($)
1993 – Severe Storms, Flooding, & Tornadoes (DR-994)	550,000	816,175	1,400
2000 – Heavy Rains, Severe Storms & Flooding (DR-1332)	18,350,000	1,072,372	77,685
2000 – Snow (EM-3163)	--	334,804	--
2004 – Severe Storms & Flooding (DR-1526)	26,825,000	571,636	146,165
2007 – Severe Storms & Flooding (DR-1719)	900,000	--	225,418
2008 – Record Snow & Near Record Snow (EM-3285)	--	617,849	--
2008 – Severe Storms, Flooding, & Tornadoes (DR-1768)	21,640,000	611,567	439,524
2011 – Severe Winter Storm & Snowstorms (DR-1966)	20,000	747,096	--
2012 – Drought[c]	736,504	--	--
2017 – Flooding	4,000,000	1,873,278[d]	--
2020 – Severe Winter Storm & Flooding (DR-4477)	3,300,000	367,112	--
Total	76,321,504	7,011,889	890,192

Note: Damage amounts ($) are associated with the year that the event took place.

[a] *Public assistance includes assistance to local units of government and nonprofit organizations.*

[b] *Individual assistance includes disaster assistance through FEMA programs and disaster loans from the U.S. Small Business Administration to individuals, households, and businesses.*

[c] *USDA Secretarial disaster declaration issued by the U.S. Secretary of Agriculture.*

[d] *The July 11, 2017, flooding event was not part of a Federally declared disaster. However, Kenosha County was awarded $1,873,278 in grants through the Hazard Mitigation Grant Program (HMGP) under disasters DR-4276, DR-4288, DR-4343, and DR 4402 to mitigate damage resulting from this event. These disaster declarations occurred in other counties throughout the State from 2016-2018, but Kenosha County was eligible to apply for remaining funds awarded but not spent by the counties designated under those declarations.*

Source: National Climatic Data Center, U.S. Department of Agriculture Risk Management Agency, Wisconsin Emergency Management, Kenosha County Division of Emergency Management, and SEWRPC

Table 3.4
Historical Hazard Events Recorded in Kenosha County: 2001-2021

Hazard	Risk of Occurrence (high, medium, or low)	Damage to Property (high, medium, or low)	Threat to Life Safety (high, medium, or low)	Duration of Impact (long, moderate, or short)	Size of Area Affected (large, medium, or small)
Tornadoes	Low	High	High	Short	Small
Flooding and Stormwater Drainage Problems	High	High	Low	Moderate	Large
Thunderstorm, High Winds, Hail, Lightning	High	High	Medium	Long	Large
Temperature Extremes	Medium	Low	Medium	Long	Large
Coastal Hazards	High	Medium	Low	Long	Small
Winter Storms	High	Low	Medium	Moderate	Large
Drought	Medium	Low	Low	Long	Large

Note: Some of the natural hazards listed in this table represent combinations of hazards listed in Table 3.1. For example, while specific risks associated with thunderstorms, such as hail and lightning are listed separately in Table 3.1, here they are combined into one category.

Source: Kenosha County LPT and SEWRPC

Table 3.5
Kenosha County Severe Weather Warning History: 2001-2021

Year	Flash Flood Warning	Flood Warning	Severe Thunderstorm		Tornado	
			Watch	Warning	Watch	Warning
2001	0	0	10	13	1	0
2002	0	0	7	4	1	0
2003	1	0	9	5	3	0
2004	3	0	15	14	5	0
2005	0	0	11	5	0	1
2006	3	0	20	11	3	0
2007	4	4	3	8	3	0
2008	4	12	10	15	7	4
2009	2	8	8	7	1	1
2010	1	7	11	7	8	1
2011	0	5	14	10	2	0
2012	0	1	7	7	0	0
2013	1	10	6	5	2	2
2014	1	6	8	8	1	1
2015	2	4	5	14	2	2
2016	1	2	7	6	0	0
2017	2	9	10	13	2	0
2018	0	8	4	5	1	0
2019	1	10	8	6	0	0
2020	0	5	5	5	2	2
2021	0	0	4	6	0	0
Total	26	91	182	174	44	14

Source: National Oceanic and Atmospheric Administration, National Weather Service, and Iowa State University College of Agriculture – Department of Agronomy, "Iowa Environmental Mesonet"

3.2 DESCRIPTION OF ANALYSIS, METHODS, AND PROCEDURES

In the previous section of this report, the hazards considered applicable to Kenosha County were identified and ranked (Table 3.1). This section of the report develops a vulnerability assessment for the identified hazards. This vulnerability assessment provides the basis for developing mitigation strategies that address the identified vulnerabilities.

The procedures utilized in the vulnerability assessment are based upon guidance provided by the Federal Emergency Management Agency (FEMA) and the Wisconsin Department of Military Affairs, Division of Emergency Management.[22] The analysis includes three components: 1) profile of hazard events, 2) inventory of assets, and 3) estimation of losses. In addition, where applicable, potential changes in vulnerability under future conditions and the variance of vulnerability among the 12 communities within Kenosha County is analyzed. The profiling of hazard events was developed by utilizing the HAZUS methodology, data available on the FEMA and National Oceanic and Atmospheric Administration National Climatic web sites, data provided by the Wisconsin Department of Military Affairs, Division of Emergency Management, and file data available from the Kenosha Division of Emergency Management and SEWRPC.

Data and estimated losses and vulnerability were developed utilizing standard risk assessment methodology as set forth in FEMA and State Division of Emergency Management guidelines for hazard mitigation planning where hazards can be estimated spatially and by order of magnitude over a range of events. For hazards which cannot be quantified, alternative approaches have been used relying on qualitative measures. A vulnerability description has been included for each of the applicable hazards listed in Table 3.2.

[22] *Federal Emergency Management Agency, State and Local Mitigation Planning How-to Guide, "Understanding Your Risks, Identifying Hazards and Estimating Losses," Publication No. FEMA 386-2, August 2001; Federal Emergency Management Agency, Local Multi-Hazard Mitigation Planning Guidance. July 1, 2008; Federal Emergency Management Agency, Local Mitigation Planning Handbook. March 1, 2013. See also Federal Emergency Management Agency, State and Local Plan Interim Criteria under the Disaster Mitigation Act of 2000, July 11, 2002.*

3.3 HAZARD VULNERABILITY AND RISK ASSESSMENTS

Tornadoes

Wisconsin lies along the northern edge of an area of the United States commonly known as "tornado alley." This area extends northeasterly along an axis extending from Oklahoma and Iowa in the west, to Michigan and Ohio in the east. This corridor accounts for one-fourth of the total tornadoes in a given year, with 758 tornadoes reported in the U.S. during the year 2011. A tornado is defined as a violently rotating column of air extending from the ground up to the thunderstorm base. It generally lasts for only a short period. The tornado appears as a funnel-shaped column with its lower, narrower end touching the ground and upper, broader end extending into the thunderstorm cloud system. In some cases, the visible condensation cloud may not appear to reach the ground, but meanwhile tornado-force winds may be causing severe destruction (rotating winds can be nearly invisible, except for dust and debris). Similar events, not reaching the land surface, are known as funnel clouds. Funnel clouds may be a precursor to a tornado event. In Wisconsin, tornadoes usually occur in company with thunderstorms formed by eastward-moving cold fronts striking warm moist air streaming up from the south. However, it is not possible to predict tornado activity based upon the occurrence of thunderstorms, and, occasionally, multiple outbreaks of tornadoes occur along the thunderstorm frontal boundary, affecting large areas of the State at one time. Tornadoes generally occur near the trailing edge of a thunderstorm and it is not uncommon to see clear, sunlit skies behind a tornado.

Historically, tornadoes have been categorized based upon the most intense damage along their paths using the Fujita Scale. Since February 2007, the Fujita Scale has been replaced by the Enhanced Fujita Scale, which retains the same basic design of its predecessor with six strength categories (see Table 3.6). The newer scale reflects more refined assessments of tornado damage surveys, more standardization, and consideration of damage over a wider range of structures.

Table 3.6
Enhanced Fujita Scale Characteristics

EF-Scale	Wind Speed (miles per hour)[a]	Character of Damage	Relative Frequency (percent)
EF0 (weak)	65-85	Light	53
EF1 (weak)	86-110	Moderate	32
EF2 (strong)	111-135	Considerable	11
EF3 (strong)	136-165	Severe	3
EF4 (violent)	166-200	Devastating	1
EF5 (violent)	>200	Incredible (rare)	<1

[a] *Equivalent wind speeds associated with the Enhanced Fujita Scale represent a three-second gust of wind.*

Source: National Oceanic and Atmospheric Administration

The destructive power of a tornado results primarily from its high-wind velocities, wind-driven debris, and uplifting force. These tornado characteristics probably account for 90 percent of tornado-caused damage. Since tornadoes are generally associated with severe storm systems, hail, torrential rain, and intense lightning usually accompany tornado events. In addition, tornadoes may be accompanied by downbursts, events which are characterized by strong downdrafts initiated by a thunderstorm that manifest as straight-line winds on or near the ground. These winds can be powerful, with speeds up to 70 to 100 mph. These winds interact with tornadoes and can affect the path of the tornado event in such a manner as to make tornadoes somewhat unpredictable. Depending on their intensity, tornadoes can uproot trees and crops, down power lines, and damage or destroy buildings and infrastructure. Flying debris can cause serious injury and death to humans, livestock, and wildlife in their path. An approaching cloud of debris can mark the location of a tornado, even if the classic funnel cloud is not visible. Before a tornado hits, the wind may die down and the air may become very still.

The National Weather Service (NWS) monitors severe weather nationwide from its Norman, Oklahoma office. This office is the only entity that can issue a tornado watch. The NWS office in Milwaukee/ Sullivan, and the Kenosha County Division of Emergency Management may issue tornado warnings. A tornado watch means that tornadoes are possible, and that persons within the area for which the watches are issued should remain alert for approaching storms. A tornado warning means that a tornado has been sighted in an area or indicated as likely to have occurred by weather radar. When tornado warnings are issued for an area, persons near and within that designated area are advised to move to a pre-designated place of safety. As discussed previously, Table 3.5 shows the total number of tornado watches and warnings in Kenosha County from 2001 through 2021. The NWS operates a 24-hour weather radio transmitter serving Kenosha and Racine Counties, operating at a frequency 162.450 MHz, from a location at CTH KR and Wood Road, Racine County. Most of Kenosha County is also served by a NWS 24-hour weather radio transmitter located in Delafield, Waukesha County that operates at a frequency of 162.400 MHz.

In addition to tornado watches and warnings, severe thunderstorm watches and warnings indicate severe weather conditions that may generate conditions in which tornadoes may occur. Such watches and warnings may be followed by tornado watches and warnings as weather conditions develop.

Recent Events

In the State of Wisconsin, tornado paths historically have averaged 3.5 miles in length and 50 yards in width, although tornadoes of a mile or more in width and 300 miles in length have been known to occur elsewhere in the U.S. On average, tornadoes in southeastern Wisconsin move across the land surface at speeds of between 25 and 45 miles per hour, although overland speeds of up to 70 mph have been reported. Tornadoes rarely last more than a few minutes over a single spot or more than 15 to 20 minutes in a 10-mile area, but in those few minutes, significant devastation may occur.

The gravity of any particular tornado event is measured in terms of resulting deaths, injuries, and economic losses. The magnitudes of the tornadoes recorded in southeastern Wisconsin have been low, primarily EF0 or EF1 events on the Enhanced Fujita Scale (see Table 3.6). Nevertheless, tornadoes are second only to stormwater damage associated with floods, as the costliest natural hazards to impact southeastern Wisconsin.

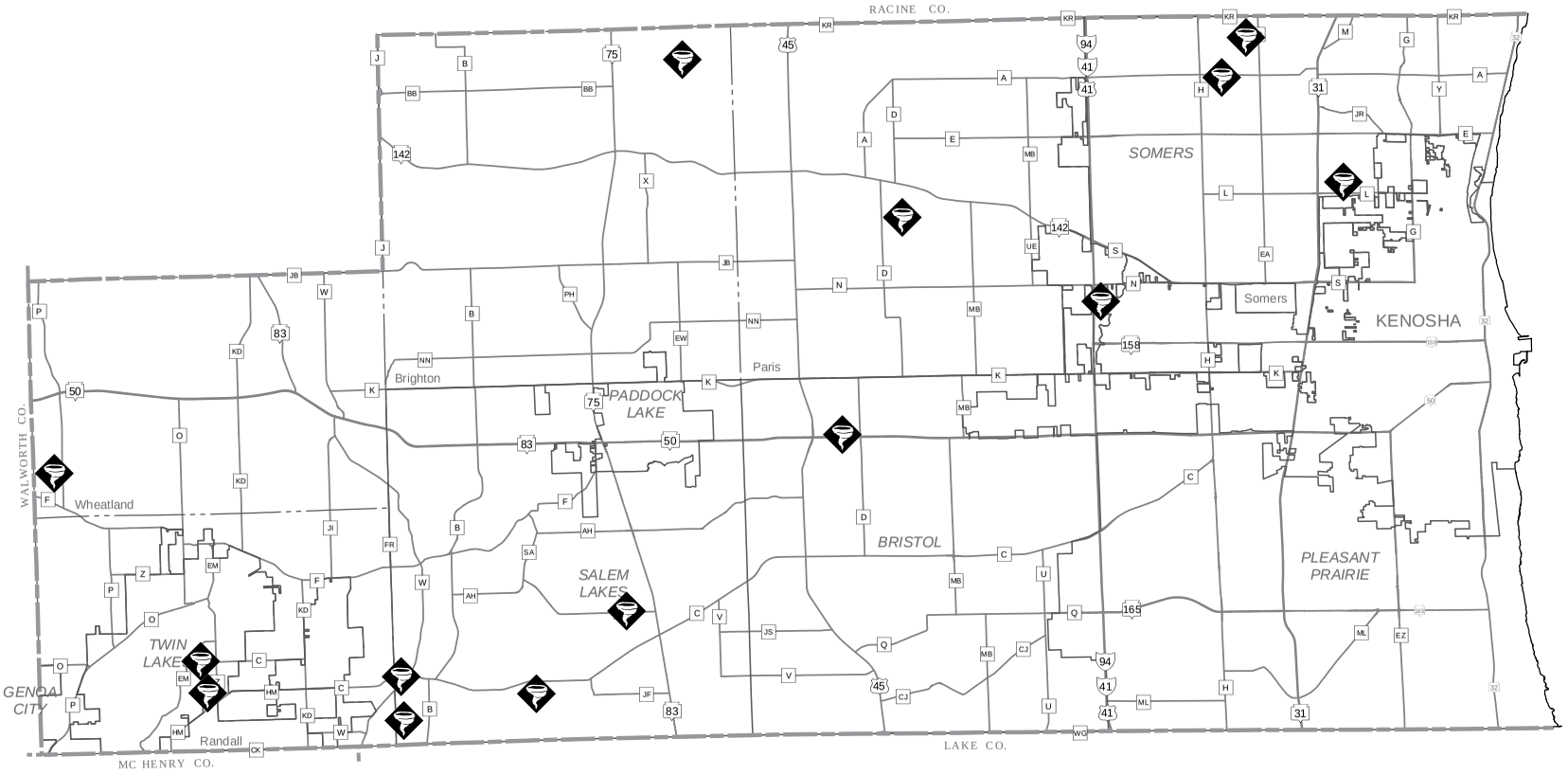
On average, there are about 25 tornadoes reported each year within the State of Wisconsin. A total of 14 tornadoes have been recorded in Kenosha County during the 58-year period between July 1963 to December 2021, or about one tornado every four years. Of the tornadoes reported for Kenosha County during that period four were F1 or EF1 events, and one was an F3 event as categorized on the Fujita scale or the Enhanced Fujita scale. The locations of these tornado events are shown on Map 3.1 and documented in terms of their magnitude and impact in Table 3.7. In total, these 14 tornadoes have resulted in about $30.4 million in property damage. About 93 percent of the $30.4 million in total property damage resulted from two tornado events both occurring on January 7, 2008.

On January 7, 2008, a warm, moist, unstable air mass, with temperatures rising into the lower 60s, moved into southeastern Wisconsin, setting the stage for a rare January severe weather event. Thunderstorms formed ahead of a stationary front and produced hail, damaging winds, and a few tornadoes. This storm produced two tornadoes in Kenosha County, the northernmost in an outbreak of 48 tornadoes occurring in an area running from southeastern Wisconsin to eastern Oklahoma. The first January 7, 2008, tornado spun up about two miles northeast of Pell Lake in southeastern Walworth County and tracked to the northeast through the Towns of Wheatland and Brighton. The path of this tornado was about 10.8 miles long, nine of these in Kenosha County. With an estimated duration of 15 minutes, this suggests that the tornado had an average forward speed of 43 miles per hour. The maximum width of the tornado path was about 200 yards. With estimated maximum wind speeds of 150 to 160 miles per hour, this tornado was classified as an EF3 on the Enhanced Fujita Scale. An estimated $17.9 million (2021 dollars) in property damages resulted from this storm. Included in these damages were 29 homes destroyed, 30 homes which sustained major damage, and 28 homes which sustained minor damage. About 160 persons were left homeless due to residential damage. In addition, 15 persons sustained minor injuries.

The second January 7, 2008, tornado spun up just east of the intersection of CTH L and STH 31 and tracked to the east-northeast through the Town of Somers and the City of Kenosha. The path of this tornado was about two miles and had a maximum width of about 75 yards. With estimated maximum wind speeds of 95 miles per hour, this tornado was classified as an EF1 on the Enhanced Fujita Scale. An estimated $10.3 million (2021 dollars) in property damages resulted from this storm. Included in these damages were five homes and one church that were destroyed, seven homes which sustained major damage, and 23 homes which sustained minor damage. In addition, dozens of trees were uprooted and several power lines were toppled. No deaths or injuries were reported to have resulted from this storm.

There has only been one reported tornado in Kenosha County between 2011 and 2021, occurring on August 10, 2020. This tornado was categorized as an EF1 and resulted in property damage totaling about $268,000. The tornado started in northwestern Lake County in Illinois where some house and structural damage occurred just south of the Wisconsin/Illinois border. The tornado then crossed into Wisconsin and knocked hundreds of trees down near Camp Lake in the Village of Salem Lakes. Shingle damage was noted on a few houses and some pontoon boats and docks were toppled on Camp Lake. No deaths or injuries were reported to have resulted from this storm.

Map 3.1
Historic Tornado Events Reported in Kenosha County: 1963-2021



Source: National Climatic Data Center and SEWRPC

Table 3.7
Tornado Events in Kenosha County: 1963-2021

Date	Location	Magnitude (Fujita)	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
July 19, 1963	Village of Twin Lakes	F0	0	0	229,683	--
June 9, 1974	Town of Somers	F1	0	0	1,426,036	--
March 28, 1994	Kenosha County	N/A	0	0	--	--
July 24, 1996	Wilmot – Town of Salem	F0	0	0	--	--
July 18, 1997	Wilmot – Town of Salem	N/A	0	0	--	--
July 18, 1997	Village of Twin Lakes	N/A	0	0	--	--
June 6, 1999	Town of Salem	N/A	0	0	--	--
August 25, 2001	Town of Paris	F0	0	0	157,171	--
January 7, 2008	Town of Wheatland	EF3	0	15	17,885,101	--
January 7, 2008	Town of Somers	EF1	0	0	10,313,306	--
June 19, 2009	City of Kenosha	EF0	0	0	--	--
October 26, 2010	Town of Somers	EF1	0	0	128,910	--
November 22, 2010	Town of Brighton	EF0	0	0	2,578	--
August 10, 2020	Village of Salem Lakes	EF1	0	0	267,591	--
		Total	0	15	30,410,376	--

Note: Dollar Values were adjusted to year 2021 by the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics. N/A indicates data not available.

Source: National Centers for Environmental Information and U.S. Department of Agriculture Risk Management Agency

Vulnerability and Community Impact Assessment

In order to assess the vulnerability of the Kenosha County area to tornado hazards, a review of the community assets described in Chapter 2 was made which indicates the potential for significant tornado impacts to: 1) a variety of residential, commercial, and other developed land uses; 2) agricultural lands; 3) critical community facilities; and 4) historic sites. Significant impacts may also be possible to other infrastructure or utility systems, solid waste disposal sites, or hazardous material storage sites.

Tornado prediction is not an exact science. The National Weather Service can forecast that a line of thunderstorms may be likely to produce tornadoes, but where they form or touch down, and how powerful they might be, remains unpredictable. In addition, tornadoes may form quickly without ample warning since Doppler Radar does not see below the cloud base. As can be seen from the distribution of historic tornado events shown on Map 3.1, the locations of tornado impact areas are widely scattered throughout the County, although the western portion of the County appears to be more susceptible to tornado events than other portions of the County. The historic tornado events have resulted in about $30.4 million of reported damage. On average, the reported tornados have resulted in about $2.2 million of reported property damage per event. It should be noted that two events were responsible for most of these damages, so the average damages per event may not be representative of the damages that could be expected from a tornado event affecting the County. On average, there is one tornado event every 4.1 years (or about 0.24 tornado events per year) in Kenosha County. Over the 1963-2021 period of record, tornado hazards have resulted in an average of about $524,300 in property damages per year.

During a tornado event, homes, businesses, public buildings, and infrastructure may be damaged or destroyed by high winds, rain, and hail. Airborne debris, carried by the tornado and associated high winds, can break windows and doors, allowing winds and rain access to interior spaces. Fixed infrastructure, such as roads and bridges, can also be damaged by exposure to high winds. Although more bridge damage appears to result from washout associated with flash flooding and debris jams, as opposed to direct damage due to contact with funnel clouds. In an extreme tornado event, such as an F4 event, the force of the wind alone can cause tremendous devastation, uprooting trees, toppling power lines, and causing the failure of weak structural elements in homes and buildings. Due to the unpredictability of tornado events, all buildings, infrastructure, and critical facilities within the County are considered at risk.

Future Changes and Conditions

Changes in land use can have an impact on the potential for damage due to tornadoes and related hazards. Such changes relate to the potential future increase in development within the County. Changing land use patterns within Kenosha County, as documented in the adopted VISION 2050 plan and summarized in Chapter 2, indicate a continuing level of moderate risk of tornado damage and related losses in the County. Because of the actions that have been taken by Kenosha County and local units of government and individuals, the current vulnerability to tornadoes and related hazards has generally decreased in recent years. These ongoing mitigation measures are described further in Chapter 5.

The likely effects of climate change on tornado frequency and severity are not clear. The projections based upon downscaled climate model results do not address potential trends in tornado conditions. A recent study found that growth in the human-built environment is projected to outweigh the effects of increased risk of future tornado disaster potential, however, an increase in risk and exposure of tornadoes may lead to a significant increase in the magnitude and disaster impact of tornadoes on that built environment from 2010 to 2100.[23] Additionally, high-risk tornado regions may experience increased disaster probability and historically vulnerable regions may be at greater risk of tornado disaster due to a combination of factors which include increased tornado risk, rapidly amplified exposure, and pre-existing social and physical vulnerabilities.

Multi-Jurisdictional Risk Management

Based upon a review of the historic patterns of tornado events in Kenosha County, there are no specific municipalities that have unusual risks. Rather, the events are considered to be relatively uniform and of a countywide concern.

Flooding

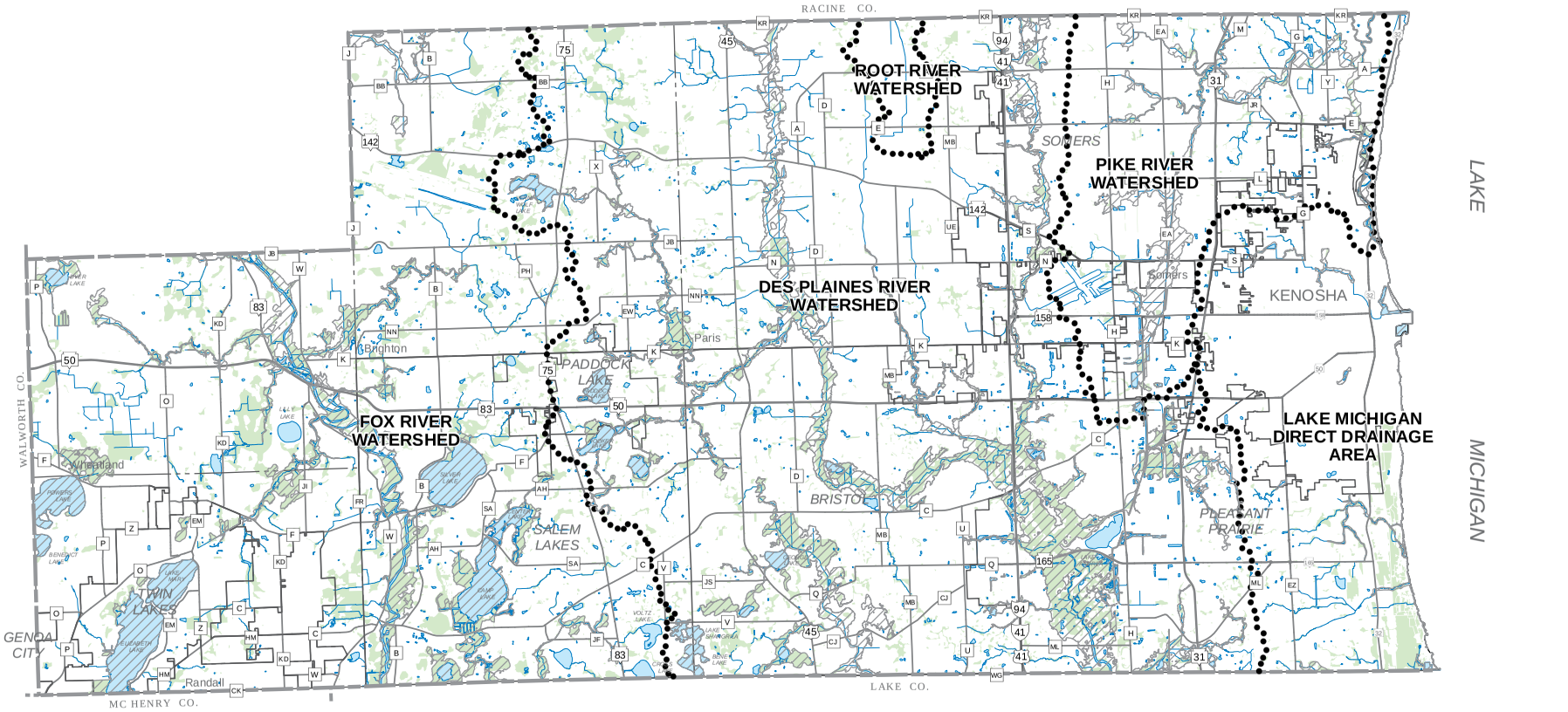
Flooding is a significant hazard in Kenosha County. As described in Chapter 2, There are approximately 110 miles of major streams in Kenosha County, located within four watersheds: the Des Plaines River, Fox (Illinois) River, Pike River, and Root River watersheds. A fifth watershed encompasses those areas adjacent to Lake Michigan which drain directly into the Lake through intermittent streams. There are also 20 major lakes (lakes of 50 acres or more) in Kenosha County. Watershed boundaries, wetlands, and major streams and lakes within the County are shown on Map 3.2.

Floodplains are the wide, gently sloping areas contiguous to, and usually lying on both sides of, a stream channel or lake. For planning and regulatory purposes, floodplains are normally defined as the areas subject to inundation by the 1-percent-annual-probability (100-year recurrence interval) flood event. Floodplain areas are generally not well suited to urban development, not only because of the flood hazard, but also because of the presence of high-water tables and, generally, of soils poorly suited to urban uses. Floodplain areas often contain important natural resources, such as high-value woodlands, wetlands, and wildlife habitat and, therefore, constitute prime locations for parks and open space areas. The floodplains shown on Map 3.2 have been identified by Kenosha County, SEWRPC, and FEMA. Approximately 20,193 acres, not including surface water in lakes and existing stream channels, or about 11 percent of the total area of the County, are located within the 1-percent-annual-probability flood hazard area. The land area within the 1-percent-annual-probability floodplain in each community is given in Table 3.8.

In addition to flooding, stormwater drainage problems exist on a scattered basis throughout Kenosha County. The distinction between stormwater drainage, stormwater management, and flood control is not always clear. For the purpose of this report, flood control is defined as the prevention of damage from the overflow of natural streams and watercourses. Drainage is defined as the control of excess stormwater on the land surface before such water has entered stream channels. The term "stormwater management" encompasses both stormwater drainage and nonpoint source pollution control measures. While the focus of this section is on the flooding hazard, the related stormwater drainage hazards are also considered because of the interrelationship between those two hazard conditions.

[23] *Strader, S. M., Ashley, W. S., Pingel, T. J., & Krmenec, A. J. (2017). Projected 21st century changes in tornado exposure, risk, and disaster potential. Climatic Change, 141(2), 301–313. doi.org/10.1007/s10584-017-1905-4.*

Map 3.2
Surface Waters, Wetlands, and Floodplains in Kenosha County: 2020



1-PERCENT-ANNUAL-PROBABILITY (100-YEAR RECURRENCE INTERVAL) FLOODPLAINS (FEMA FIS, JUNE 2021)

MAJOR WATERSHED BOUNDARIES

PERENNIAL STREAM

INTERMITTENT STREAM

WETLANDS

SURFACE WATER

N

0 1 2 3 Miles

Source: Federal Emergency Management Agency and SEWRPC

Types of Flooding Problems

Aside from riverine flooding, other types of flooding problems to consider in Kenosha County are highlighted below:

Dam Failure

A consideration in flood hazard mitigation is the potential for increased flooding due to dam failures. As indicated in Table 3.9 and Map 3.3, there are 21 dams identified by the WDNR in Kenosha County. Dams built according to accepted engineering principles at the time of construction and dams built without application of engineering principles can both equally fail. When a dam fails, or is subject to overtopping, large quantities of water can rush downstream with great destructive force. In the State of Wisconsin, WDNR inspects and assigns hazard ratings to dams.

The WDNR assigns hazard ratings to large dams within the State. Two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified, by law, into three categories that identify the potential hazard to life and property.[24]

- A **low hazard** rating is assigned to those dams that have no development unrelated to allowable open space use in the dam failure hydraulic shadow and failure would result in no probable loss of human life, low economic losses (losses are principally limited to the owners property), low environmental damage, no significant disruption of lifeline facilities, and have land use controls in place to restrict future development in the hydraulic shadow.

- A **significant hazard** rating is assigned to those dams that have no existing development in the hydraulic shadow that would be inundated to a depth greater than 2 feet and have land use controls in place to restrict future development in the hydraulic shadow. Potential for loss of human life during failure is unlikely. Failure or mis-operation of the dam would result in no probable loss of human life but can cause economic loss, environmental damage, or disruption of lifeline facilities.

- A **high hazard** rating is assigned to those dams that have existing development in the hydraulic shadow that will be inundated to a depth greater than 2 feet or do not have land use controls in place to restrict future development in the hydraulic shadow. This rating is assigned if loss of human life during failure or mis-operation of the dam is probable.

In Kenosha County, two dams are currently assigned high hazard ratings, three have been assigned significant and the remaining 16 have been assigned low hazard ratings. The risk of dam failure is monitored closely by the WDNR.

Agricultural Flood Damages

Historically, flood damages to agricultural land have been significant in Kenosha County, with crop damages totaling $38.4 million (2021 dollars) over the period of 1950 to 2021. Thus, the average annual reported damages in the County can be approximated at $540,000 per year. There are about 4,516 acres of agricultural land located within the identified flood hazard area. Thus, the average annual flood damage is about $135 per mapped acre. Because these approximations are only based on reported damages, they are assumed to represent an underestimation of actual flood related agricultural damages. It should be noted that localized crop damage can also be expected during smaller storm events.

Table 3.8
Areal Extent of 1-Percent-Annual-Probability Floodplain by Community in Kenosha County: 2022

Community	Area (acres)
Cities	
Kenosha	843.2
Villages	
Bristol	3,226.5
Paddock Lake	239.4
Pleasant Prairie	3,714.9
Salem Lakes	3,778.0
Somers	1,939.5
Twin Lakes	1,192.4
Towns	
Brighton	1,051.5
Paris	1,405.7
Randall	698.5
Somers	285.4
Wheatland	1,817.5
Total	20,192.5

Source: Federal Emergency Management Agency and SEWRPC

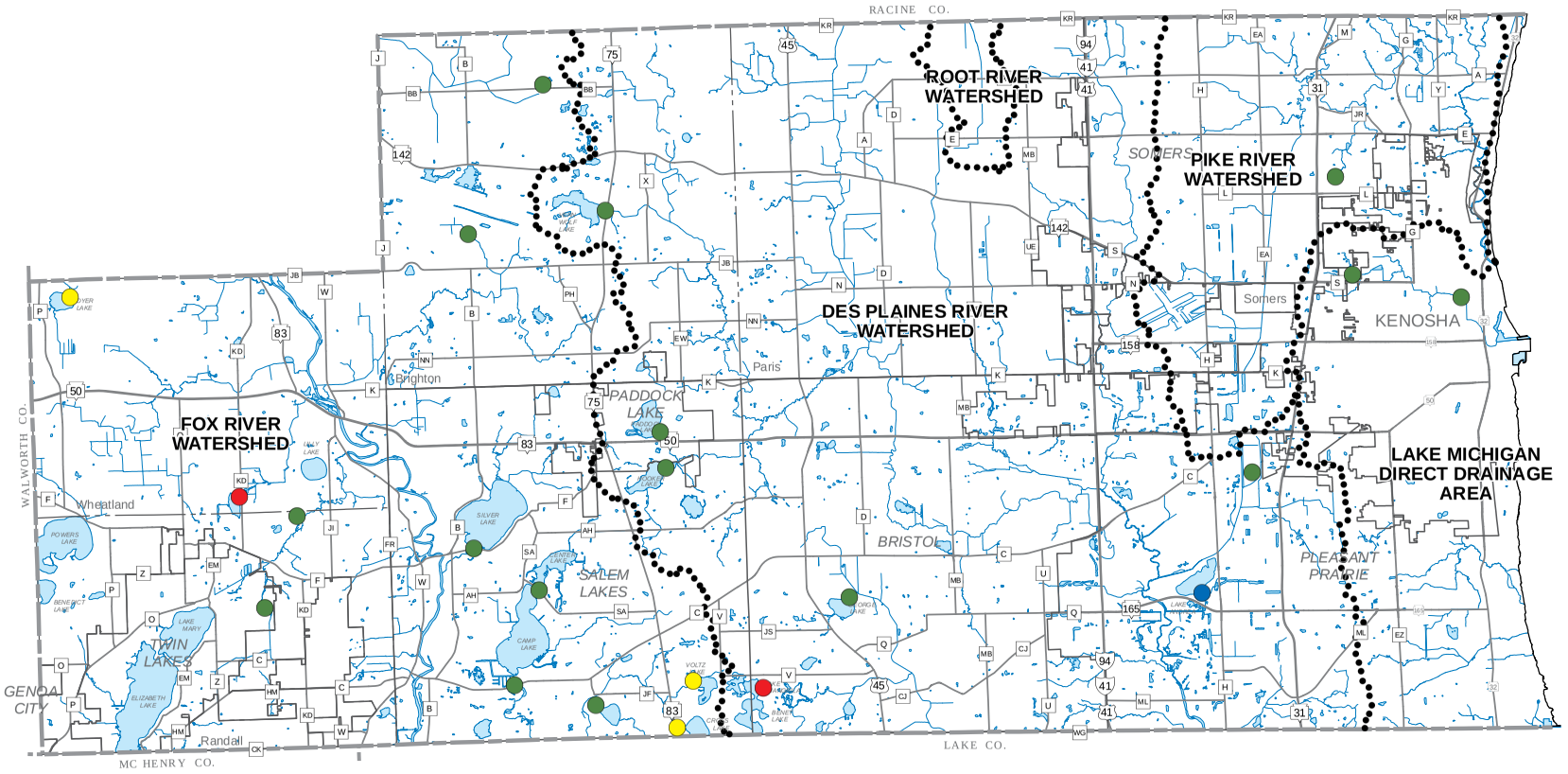
[24] *Wisconsin Administrative Code, NR 333.06*

Table 3.9
Wisconsin Department of Natural Resources Dam Inventory Information: 2022

Count	Community	Dam Name		Owner Organization	Size	Structural Height (feet)	Hazard Potential
		Official	Local				
1	Bristol	Lake Shangri-La	--	Village of Bristol	Large	16.0	High
2	Salem Lakes	Rock Lake	--	Linda Valentine	Large	8.0	Low
3	Brighton	Bong Recreation Area 8	Wolf Lake Dam	WDNR	Large	10.0	Low
4	Twin Lakes	Hawke	--	Robert K. Hawke	Small	--	--
5	Salem Lakes	Hooker Lake	Carl Bryzek	Carl Bryzek Farm, LLC	Small	3.0	Low
6	Salem Lakes	Camp Lake	Camp Lake	Kenosha County	Large	7.2	Low
7	Paddock Lake	Paddock Lake 3	--	Paddock Lake Cottages, LLC	Small	3.0	Low
8	Salem Lakes	Silver Lake	Jack Erb	Brian Sullivan	Small	2.0	Low
9	Salem Lakes	Cross Lake	B. J. Corbin	Sam Samra	Small	4.0	Significant
10	Bristol	Lake George	John Haterlein	George Wronowski	Small	6.0	Low
11	Salem Lakes	Voltz Lake	--	Unknown	Small	5.0	Significant
12	Salem Lakes	Center Lake	Center Lake Conservation & Sports Club	Camp and Center Lake Rehabilitation District	Small	3.0	Low
13	Wheatland	Dyer Lake	--	Kenosha Boys Scouts of America	Small	6.0	Significant
14	Brighton	Bong Recreation Area 2	--	WDNR	Small	9.4	Low
15	Brighton	Bong Recreation Area 7	--	WDNR	Small	2.0	Low
16	Kenosha	Pike Creek	--	City of Kenosha	Small	7.0	Low
17	Kenosha	Charles Yandre	--	Charles Yandre	Small	8.0	Low
18	Randall	New Munster Wildlife Area	--	WDNR	Small	7.0	Low
19	Pleasant Prairie	Pleasant Prairie	Lake Andrea	Village of Pleasant Prairie	Small	4.7	Low
20	Wheatland	Meyer Material KD Pit	--	Kenosha County	Large	21.5	High
21	Somers	Marescalco	--	--	Small	--	Low

Source: Wisconsin Department of Natural Resources and SEWRPC

Map 3.3
Dams Located in Kenosha County: 2021



HAZARD RATING

- HIGH
- SIGNIFICANT
- LOW
- NONE ASSIGNED

0 1 2 3 Miles

Source: Wisconsin Department of Natural Resources and SEWRPC

One particularly flood-prone agricultural area of the County is the agricultural lands lying adjacent to the Des Plaines River in the Village of Bristol and Town of Paris. Specific data on flood damages was developed for these lands under a 2003 watershed study for the area.[25] Based on 1990 land use conditions the average amount of agricultural land that may be expected to be flooded annually is approximately 2,160 acres, or about 2,080 acres of cropland and 80 acres of pasture. The expected average annual flood damage of agricultural land in this watershed was estimated to be $58,000. These damages would be about $87,740 in 2021 dollars.

Stormwater Drainage Problems

Because of the interrelationship between stormwater management and floodland management, stormwater management actions are an important consideration of the flood vulnerability assessment. Small area stormwater drainage problems are known to exist throughout the urbanized portions of the County. These problems are generally addressed by local site-specific planning and stormwater facility design. Stormwater management plans are typically required by Kenosha County and the local municipalities for new developments. This practice should minimize the creation of new stormwater related problems. Stormwater management planning in Kenosha County is described further in the following chapters, and that planning serves as the basis of the assessment of stormwater drainage problem vulnerability. Such problems largely impact community facilities by causing nuisance conditions and are not generally of concern for community health and welfare.

Recent Events

A total of 23 flood events have been recorded in Kenosha County between 2011 and 2021. These events are shown in Table 3.10 and are based upon data published by the National Climatic Data Center. As shown in Table 3.10 these flood events can range from no events per year or up to seven events per year, which demonstrates the likelihood and unpredictability of these events. In total, these flood events did not result in any deaths or injuries but did result in over $5 million in property and crop damages within Kenosha County. See Table 3.10 for a full list of recent flood events. A few examples of recent events from Table 3.10 are noted below.

2017 – On July 11-12, 2017, three to eight inches of rain fell over the County for several hours causing widespread flooding adjacent to the Fox River in the Village of Salem Lakes and Town of Wheatland. The Fox River near New Munster hit a record crest of 17.47 feet on July 13. Many roads were closed or washed-out, including Highway 50 at the Fox River, and floodwaters entered the lower levels of numerous homes (see Figure 3.1). Various road closures continued due to flooding through July 17 and the power was out for much of the area for a few days. Property damages resulting from this flood were estimated to be $4,526,730 and crop damages were estimated at $22,600.

2019 – On March 13, 2019, mild temperatures and some rainfall led to snow melt and excessive runoff on frozen ground. Numerous rivers flooded including flooding in atypical areas due to ice jams. Evacuations were needed in some communities. The Fox River at New Munster reached moderate flood stage, cresting at 13.2 feet. Floodwater reached the lower levels of some homes in the Village of Salem Lakes along Riverside Drive and Shorewood Drive. Rising waters on Lilly Lake in the Town of Wheatland resulted in waterfront properties being surrounded by high water. Property damages resulting from this flood were estimated to be $1,085.

2020 – In the middle of May 2020, a slow-moving low-pressure area brought moderate to heavy rainfall over an 18 to 24 hour period. Three to 6 inches of rain fell, which resulted in river, creek, and lowland flooding. The Fox River at New Munster reached minor flood stage, cresting at 12.97 feet. Floodwater was about 12 inches deep over 77th Street in the Town of Wheatland. Property damages resulting from this flood were estimated to be $5,350.

In addition to the flood events shown on Table 3.10, Table 3.11 lists locations in Kenosha County where the flooding or overtopping of roadways during rain events has been frequently reported from 2017-2022.

Vulnerability and Community Impact Assessment

To assess the vulnerability of the Kenosha County area to flooding hazards and related stormwater drainage problems, consideration was specifically given to potential structure flooding, including critical facilities, and cropland flood damages.

[25] *SEWRPC Planning Report No. 44,* A Comprehensive Plan for the Des Plaines River Watershed*, June 2003*.

Table 3.10
Recent Flood Events in Kenosha County: 2011-2021

Date	Location	Type[a]	Deaths	Injuries	Property Damages ($)[a]	Crop Damages ($)[a]
3/11/2013	Wheatland/Salem Lakes	Flood	--	--	5,982	1,196
4/9/2013	Wheatland/Salem Lakes	Flood	--	--	5,982	1,196
6/30/2013	Wheatland/Salem Lakes	Flood	--	--	5,982	3,589
5/12/2014	Brighton	Flash Flood	--	--	1,187	--
5/12/2014	Paris	Flash Flood	--	--	1,187	--
7/10/2017	Kenosha	Flash Flood	--	--	282,733	--
7/10/2017	Paddock Lake	Flash Flood	--	--	113,095	16,964
7/12/2017	Wheatland/Salem Lakes	Flood	--	--	4,526,730	22,619
2/20/2018	Wheatland/Salem Lakes	Flood	--	--	11,097	--
2/20/2018	Twin Lakes	Flood	--	--	5,549	--
5/14/2018	Wheatland/Salem Lakes	Flood	--	--	5,549	--
6/20/2018	Wheatland/Salem Lakes	Flood	--	--	1,110	5,549
10/2/2018	Wheatland/Salem Lakes	Flood	--	--	11,097	--
2/6/2019	Wheatland/Salem Lakes	Flood	--	--	1,085	--
3/13/2019	Wheatland/Salem Lakes	Flood	--	--	1,085	--
9/11/2019	Twin Lakes	Flash Flood	--	--	5,425	--
9/13/2019	Kenosha	Flash Flood	--	--	5,425	--
9/13/2019	Paddock Lake	Flood	--	--	--	--
9/13/2019	Wheatland/Salem Lakes	Flood	--	--	10,849	--
10/2/2019	Wheatland/Salem Lakes	Flood	--	--	10,849	--
4/30/2020	Wheatland/Salem Lakes	Flood	--	--	2,141	--
5/1/2020	Wheatland/Salem Lakes	Flood	--	--	3,211	--
5/17/2020	Wheatland/Salem Lakes	Flash Flood	--	--	5,352	--
		Total	0	0	5,017,355	51,113

Note: Dollar Values were adjusted to year 2021 by the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.

[a] *National Weather Service determines the type of event bason on report narratives from local officials.*

Source: The National Climatic Data Center (NCDC), National Oceanic and Atmospheric Administration (NOAA)

The 1-percent-annual-probability floodplain areas for Kenosha County, as well as the source of hydrologic and hydraulic data are shown on Map 3.2. As can be seen from the map, these areas are generally located along the major streams and lakes throughout the County. The majority of the floodplains shown on Map 3.2 were developed for FEMA using detailed modeling and GIS techniques to produce the County Digital Flood Insurance Rate Maps (DFIRMs) and were last updated in June, 2021. It should be noted that several floodplain mapping projects are currently being conducted in Kenosha County that would refine these floodplains and associated data and could potentially change the flood damage estimates. These projects are described in further detail in Chapter 5 of this report.

Damage Estimation Method: Parcel-Based Loss Analysis

SEWRPC staff conducted a parcel-based analysis to estimate the damages that would be sustained by buildings as a result of a 1-percent-annual-probability flood event. GIS was used to identify those parcels that are wholly or partially located in the 1-percent-annual-probability floodplain. The parcels were then examined using both 2015 orthophotography and topography to determine whether a principal building, such as a house, a commercial building, or an industrial building was located within the floodplain. For those parcels in which a principal building was located wholly or partially in the floodplain, the 2022 assessed value of improvements was obtained from Kenosha County land information GIS portal. The information in the assessment was used to classify each principal building as residential (including manufactured homes), commercial, agricultural, governmental, parks and recreational, industrial, utility, or other. For each principal building, the elevation of the ground at the building was determined from the 2015 one-foot contour topographic maps.

Standard assumptions were made as to the elevation of the first floor of a principal building. For a residential building, it was assumed that the first floor was 1.0 feet above the adjacent ground elevation. For the analysis it was also assumed that a residential building had a basement. For manufactured homes it was assumed that the first floor was 2.0 feet above ground elevation. For all other building types, it was assumed that the first floor was 0.5 feet above ground elevation.

Flood elevations for the 1-percent-annual-probability flood event were derived from information in the Flood Insurance Study for the County. These elevations were developed using detailed methods (Zone AE on the digital flood insurance rate map (DFIRM)).

A slightly different methodology was used for those buildings located in floodplains that were developed using approximate methods (Zone A on the DFIRM). A transect was drawn at the building through the floodplain perpendicular to the stream. In most cases, the higher contour elevation at the floodplain edge was used to estimate the flood elevation at the building. In cases where the difference between the elevations at the two edges of the floodplain was greater than 10 feet, the average contour elevations at the floodplain margins was used to estimate the flood elevation.

For each building, the first-floor elevation and flood elevation were compared. The extent of direct damage, which include the costs associated with cleaning, repairing, or replacing the structure, its contents, the land, for each principal building was estimated as a percent of the value of improvements based on standardized flood loss depth-damage curves prepared by FEMA, U.S. Army Corps of Engineers, and SEWRPC. Indirect damages, such as the costs associated with temporary evacuations, relocations, lost wages, lost production and sales, and the incremental costs of traffic detours, were estimated to be a percentage of direct damages for residential, commercial, and industrial buildings.

Figure 3.1
July 12, 2017, Flooding: Fox River in the Town of Wheatland

Floodwaters submerging the Highway 50 bridge over the Fox River in the Town of Wheatland



Residential flooding in the Town of Wheatland



Source: SEWRPC

Impacts of a 1-Percent-Annual-Probability Flood

A review of the community assets described in Chapter 2 indicate the potential for flooding impacts to: 1) a variety of flood-prone residential (including manufactured homes), commercial, and other developed land uses; 2) agricultural, recreational, and lowland areas; 3) roadway systems; and 4) critical community facilities. No significant impacts are expected to other infrastructure or utility systems, solid waste disposal sites, or hazardous material storage sites. The analyses estimating the damages that would result from a 1-percent-annual-probability flood were based on the regulatory floodplains that were available at the time the analyses were conducted.

Based upon the initial review of the parcel-based analysis, there are currently 286 structures estimated to be located within the 1-percent-annual-probability (100-year recurrence interval) flood hazard areas of Kenosha County. The locations of these structures are shown on Map 3.4. There are 270 residential

Table 3.11
Roadway Flooding Observed in Kenosha County: 2017-2022

Community	Location
City of Kenosha	Alford Park Drive Bridge – North of 7th Avenue and Sheridan Road intersection
	38th Street Bridge – East of I-94 East frontage road (near Gordon Food Service)
	38th Street Bridge – East of I-94 East frontage road (near Amazon entrance)
	128th Avenue – at stream crossing South of 38th Street
	57th Avenue – North of STH 50 (75th Street)
	STH 50 (75th Street) – West of 39th Avenue
Village of Bristol	CTH JS (107th Street) – East of CTH V (224th Avenue)
	CTH MB (158th Avenue) – North of CTH C (Wilmot Road)
	144th Avenue – South of STH 50
	CTH C (Wilmot Road) – West of 136th Street
	101st Street – East of USH 45 (Bristol Road)
	195th Avenue – South of 101st Street
	208th Avenue – South of CTH V (116th Street)
	CTH AH (83rd Street) and 195th Avenue
	CTH AH (85th Street) – West of 207th Avenue
	82nd Street – West of 206th Avenue
	81st Street – East of 216th Avenue
	216th Avenue – South of STH 50
Village of Paddock Lake	78th Street – near Hooker Lake boat launch
	72nd Street – East of 248th Avenue
	248th Avenue – Between 72nd Street and 73rd Street
	248th Avenue and 67th Street
	250th Avenue – Between 68th Street and 69th Street
	243rd Avenue and 64th Place
	62nd Street – West of 236th Avenue
	236th Avenue – Between 61st Street and 62nd Street
	235th Avenue and 62nd Street
	237th Avenue – South of CTH K (60th Street)
	CTH K (60th Street) – Between 247th Avenue and 248th Court
Village of Pleasant Prairie	2nd Avenue – 8700 block
	Lakeshore Drive and 108th Street
	Lakeshore Drive – North of 90th Street
	61st Avenue – North of 116th Street
	61st Avenue and 111th Street
	76th Street – Between 49th Avenue and 50th Avenue
	83rd Street – West of 49th Avenue
	83rd Street and Cooper Road (51st Avenue)
	116th Street – near Springbrook Road
	CTH ML (122nd Street) – Des Plaines River Bridge
Village of Salem Lakes	84th Street – East of 245th Avenue
	119th Street – East of STH 83
	122nd Street – West of 250th Avenue
	264th Avenue – South of 106th Street
	267th Avenue – South of 108th Street
	110th Street – East of 269th Avenue
	256th Avenue – South of 93rd Street
	256th Avenue – South of 112th Place
	Riverside Drive – Northwest of Oak Street
	Shorewood Drive – North of Riverside Drive
	98th Street – East of STH 83

Table continued on next page.

Table 3.11 (Continued)

Community	Location
Village of Somers	CTH L (18th Street) – West of 41st Avenue
	13th Avenue – South of CTH KR (1st Street)
	13th Avenue – North of CTH A (7th Street)
	CTH E (Somers Road) and CTH H (88th Avenue)
	CTH E (Somers Road) at Kilbourn Road Ditch
	11th Street – West of CTH H (88th Avenue)
	CTH H (88th Avenue) – South of CTH L (18th Street)
	CTH G (Wood Road) – Between 4th Street and CTH A (7th Street)
Village of Twin Lakes	Herda Avenue – South of Holy Hill Road (93rd Street)
	Rosebud Avenue and Willow Street
	Park Drive – 200 block
	2nd Street – East of Zefras Drive
	Steinert Road – South of 2nd Street
Town of Brighton	CTH JB (31st Street) – West of CTH PH (246th Avenue)
Town of Randall	CTH F (Bloomfield Road) – East of CTH P (400th Avenue)
	401st Avenue and 95th Street
Town of Wheatland	313th Avenue – North of 77th Street
	314th Avenue – between 75th Street and 77th Street
	76th Street – West of 314th Avenue
	77th Street – West of 312th Avenue
	319th Avenue – between 69th Street and 71st Street
	71st Street – West of 319th Avenue
	71st Street – at 317th Avenue

Source: Municipalities, Kenosha County, and SEWRPC

structures (including 29 residential mobile homes), 13 industrial, business, and commercial structures, one agricultural building, one community utility building, and one miscellaneous building. The specific location of each structure and its relationship to the floodplain is shown on the FEMA digital flood insurance rate maps for Kenosha County, which were finalized in 2021.

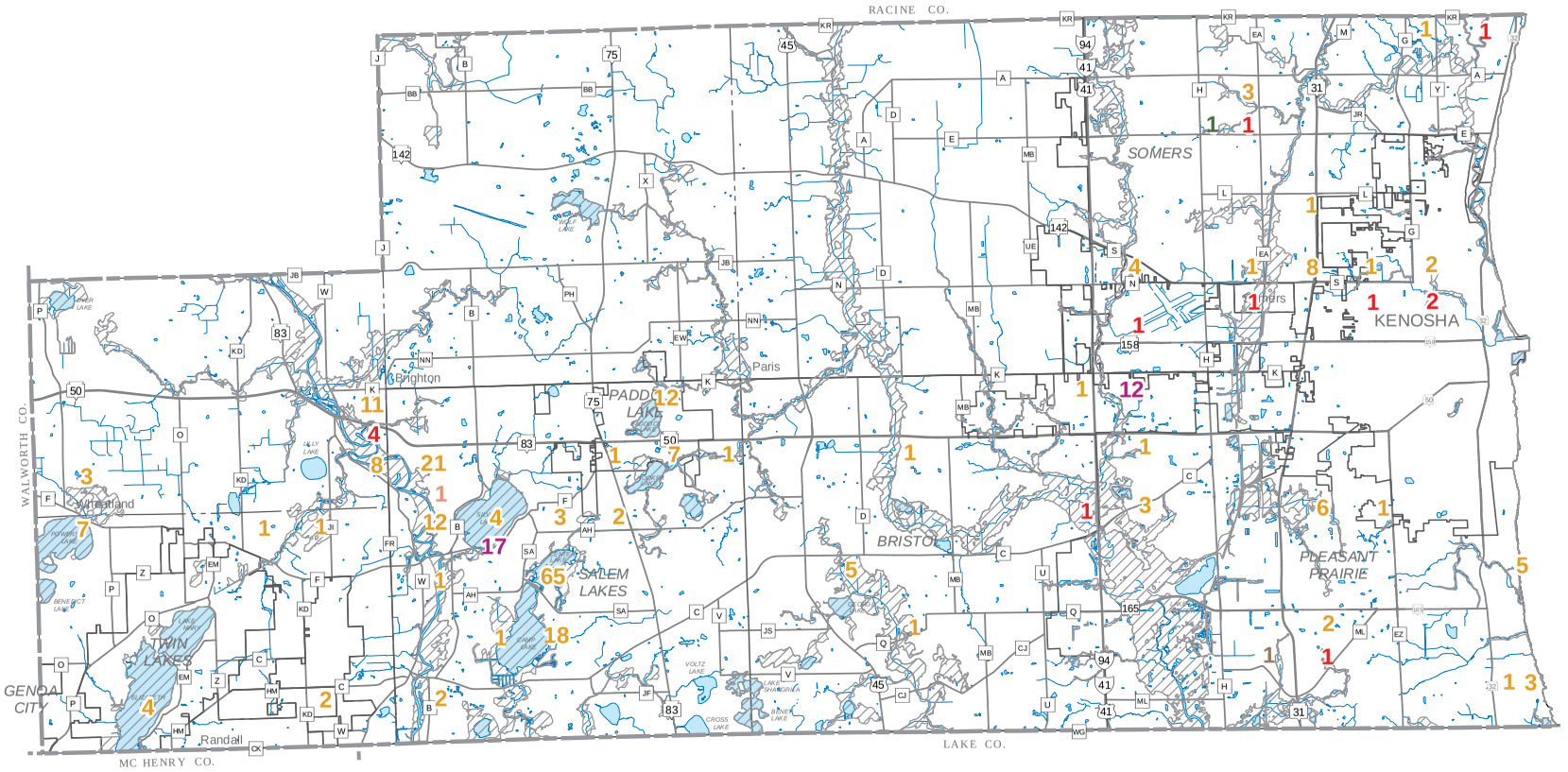
As of August 2022, there are 32 structures which are considered by FEMA to be repetitive- or substantial-loss properties in Kenosha County. All of these are single-family residences. There are 30 structures considered repetitive loss in the Village of Salem Lakes and one in both the Villages of Paddock Lake and Pleasant Prairie. Repetitive-loss structures are those that have two or more flood insurance claims of at least $1,000 each. Most of these structures sustained damages during the July 12, 2017, flood event. In addition to the 32 structures identified, 16 structures that were previously identified as repetitive- or substantial-loss properties have been purchased and removed either by Kenosha County, the City of Kenosha, or the Town of Wheatland.

Detailed flood hazard data are available for all flood hazard areas identified. Estimated damages are included in Table 3.12 for a 1-percent-annual-probability (100-year recurrence interval) flood event. In 2021, the total value of the 286 structures (not including land value) which are identified as being subject to flooding or stormwater drainage problems is nearly $62 million. The total market value plus contents within these structures are estimated at over $76 million. Damages expected during a 1-percent-annual-probability flood event are estimated to be about $5.7 million (2021 dollars).

It should be noted that, with a few exceptions, all of these structures were identified as being in the floodplain based upon the best available topographic mapping. Field surveys would be required to determine the precise building relationship to the floodplain. Some structures may be found to be outside the flood hazard areas based upon detailed field survey data.

Maps 3.5 and 3.6 show the location of emergency service structures and critical community facilities relative to the 1-percent-annual-probability floodplain. There are 421 buildings identified as critical community facilities, emergency service structures, and historical sites that are distributed geographically throughout the County. A listing of those facilities can be found in Appendix C. With the exception of two historical sites,

Map 3.4
Structures Located Within the 100-Year Floodplain: 2022



241 RESIDENTIAL STRUCTURES WITHIN U.S. PUBLIC LAND SURVEY SECTION

13 COMMERCIAL STRUCTURES WITHIN SECTION

1 AGRICULTURAL STRUCTURES WITHIN SECTION

29 MOBILE HOMES WITHIN SECTION

1 COMMUNITY UTILITY STRUCTURES WITHIN SECTION

1 OTHER STRUCTURES WITHIN SECTION

1-PERCENT-ANNUAL-PROBABILITY (100-YEAR RECURRENCE INTERVAL) FLOODPLAINS (FEMA FIS, JUNE 2021)

PERENNIAL STREAM

INTERMITTENT STREAM

SURFACE WATER

N

0 1 2 3 Miles

Source: Federal Emergency Management Agency, Kenosha County, and SEWRPC

Table 3.12
Estimated Flood Damages for a 1-Percent-Annual-Probability Flood in Kenosha County: 2021

Municipality	Number of Structures in Floodplain	Flood Damages		
		Direct ($)	Indirect ($)	Total ($)
Cities				
Kenosha	11	643,890	167,500	811,390
Villages				
Bristol	9	212,120	63,130	275,250
Paddock Lake	13	165,770	24,880	190,650
Pleasant Prairie	21	492,300	81,090	573,390
Salem Lakes	155	2,300,310	432,160	2,732,470
Somers	18	373,400	80,010	453,410
Twin Lakes	4	20,690	8,000	28,690
Towns				
Brighton	0	0	0	0
Paris	0	0	0	0
Randall	9	90,010	26,690	116,700
Somers	18	79,090	13,690	92,780
Wheatland	28	376,470	65,910	442,380
Total	286	4,754,050	963,060	5,717,110

Note: Estimated damages are based on assessed improvement values in 2021.

Source: Wisconsin Department of Natural Resources and SEWRPC

none of these facilities are located within the flood hazard, although some are located in the immediate vicinity of the flood hazard area (see Map 3.7). Because of the need for access to and from these facilities, the flood mitigation plan includes their location and shows the relationship to the flood hazard areas.

Additionally, east to west travel in the County could potentially be restricted during flood events due to overtopping of several arterial streets and highways in the Des Plaines, Fox, and Pike River watersheds. This review of the extent and severity of flooding conditions within Kenosha County indicates that there is a significant community impact due to the damages caused by flooding of buildings and disruption of the transportation system during extreme flooding events.

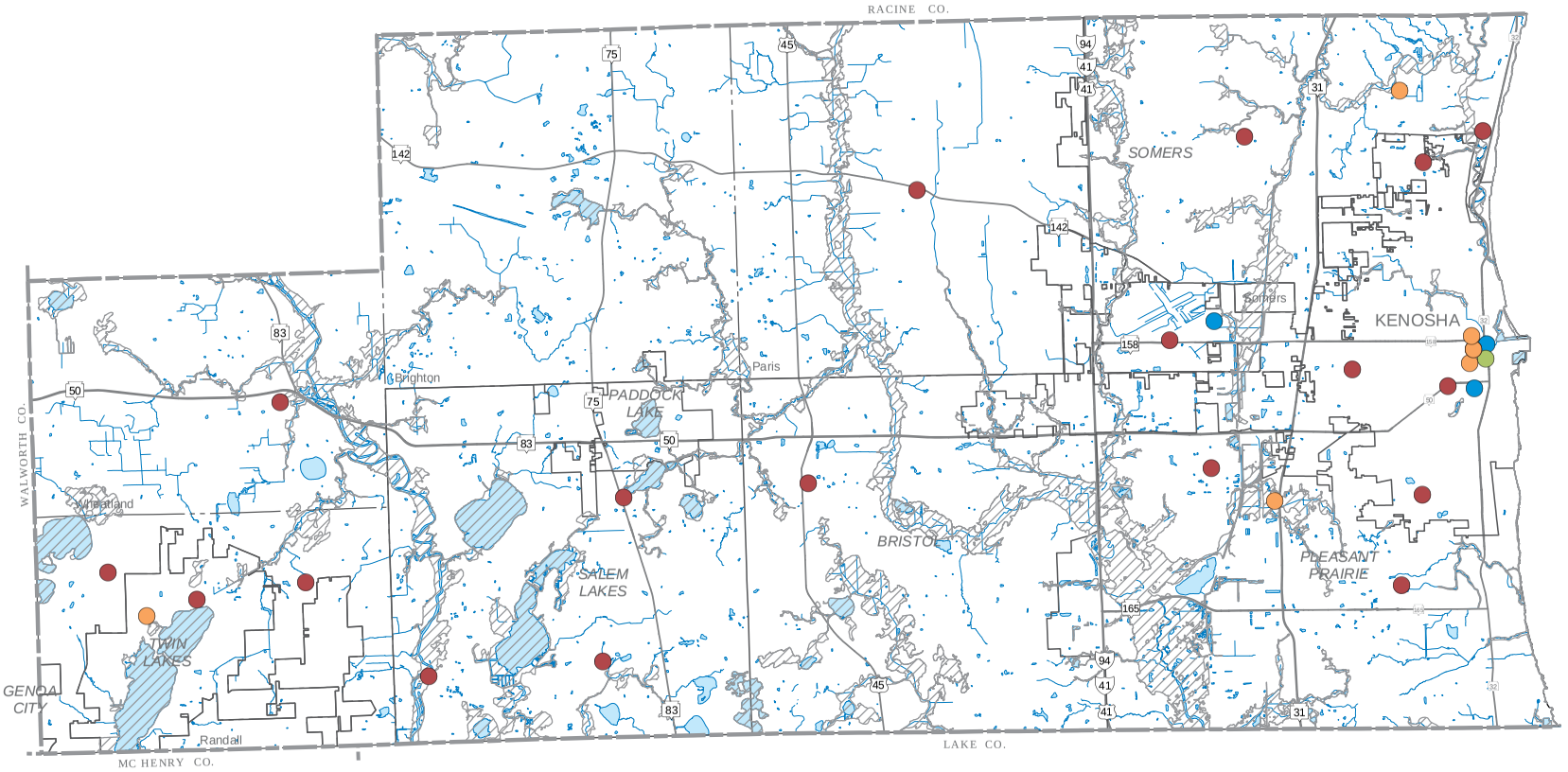
The stormwater flooding impacts on the community infrastructure and the need to prepare for major evacuations and other emergency actions are not a significant concern given the isolated nature and limited severity of the stormwater flooding problems. However, the ongoing coordinated Kenosha County and local emergency operations planning programs do have provisions for carrying out such actions if necessary. Significant flood-related impacts on the community economy and businesses are of an infrequent and short-term nature.

Another potential impact for emergency and police vehicles to consider is the need to utilize alternative transportation routes when providing services during periods of flooding. In most of the County, this is expected to be a rare occurrence. However, in the municipalities lying within the Fox River and Des Plaines River floodplains, where a major portion of the flood-prone structures exist, there is a need for further review because of the extent of the flooding and emergency vehicle access concerns.

Future Changes and Conditions

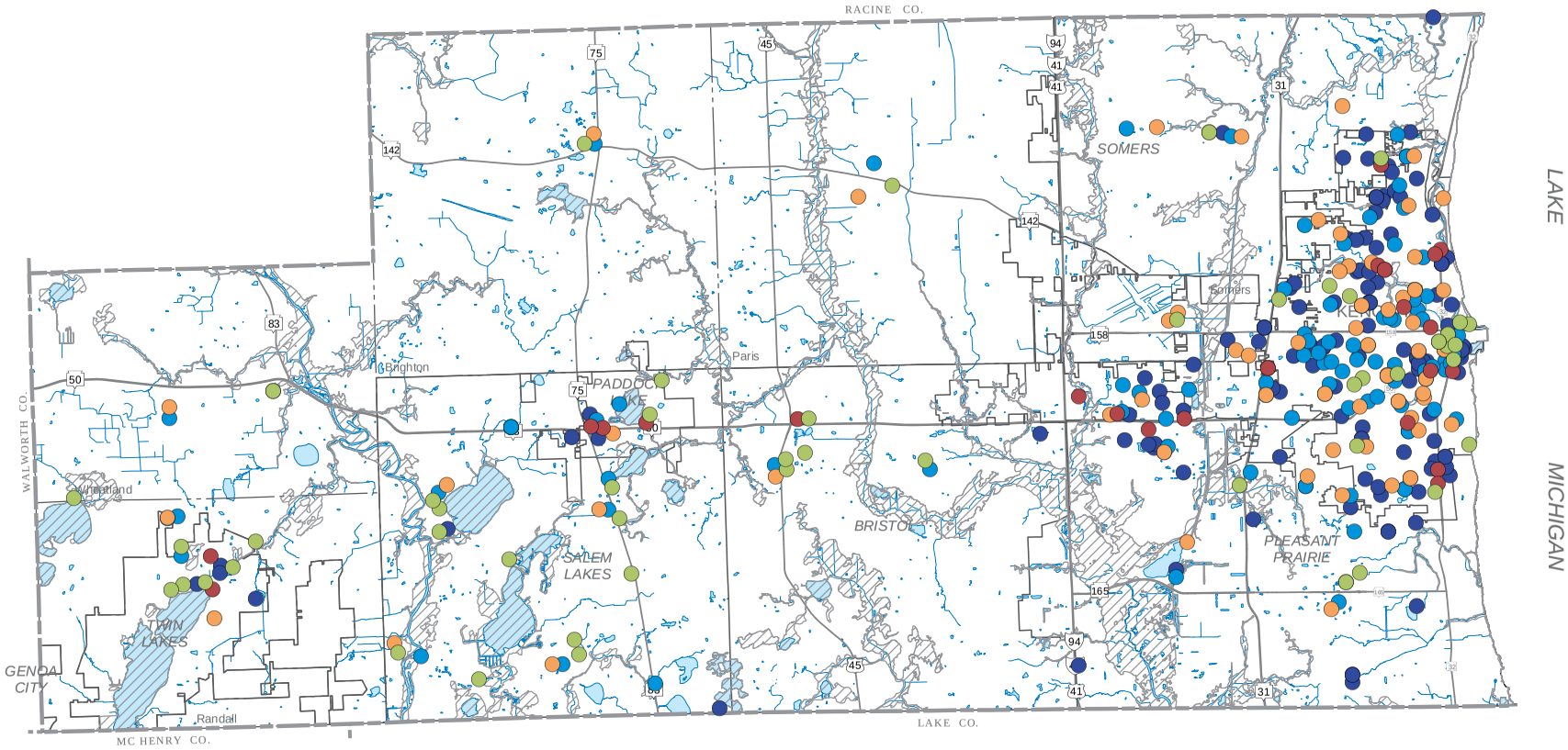
Changes in land use can have a direct impact on flood flows and stages and, accordingly, can impact flooding problems. The changes in urban land use in Kenosha County over the 25-year period from 2020 through 2050 are expected to result in an increase in the amounts of impervious surface in these watersheds. In the absence of mitigative measures, this could lead to increases in future flood flows and stages, especially in downstream areas. As is discussed previously in this report, there are a number of programs in place that are intended to mitigate the potential for such increases in flood flows. Nevertheless, it is important that future condition flood flows and stages be considered as mitigative actions are being developed.

Map 3.5
Emergency Service Structures in Relation to 100-Year Floodplains: 2022



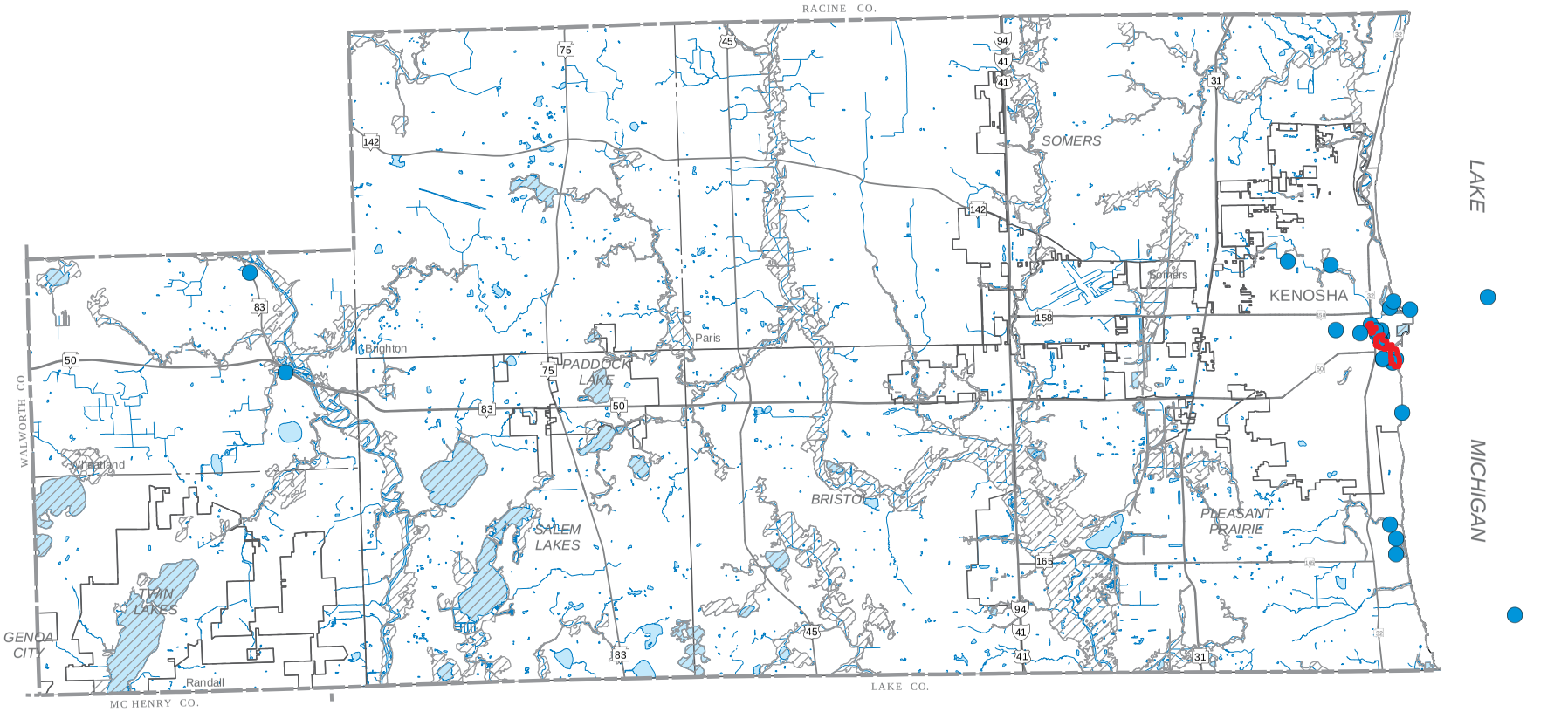
Source: Wisconsin Department of Justice (WILENET), Racine County Office of Emergency Management Department, Kenosha County, and SEWRPC

Map 3.6
Critical Community Facilities in Relation to 100-Year Floodplains: 2022



Source: Wisconsin Department of Children and Families, Wisconsin Department of Health and Social Services, Wisconsin Department of Public Instruction, Kenosha County, and SEWRPC

Map 3.7
National and State Registers of Historic Sites and Districts in Relation to 100-Year Floodplains: 2022



Source: Federal Emergency Management Agency and SEWRPC

Based upon the above, it can be concluded that the extent and severity of the flooding problem within the County has the potential to become more severe to a limited extent in the near future. This conclusion highlights the importance of carrying out and implementing current floodplain and related ordinances and existing and ongoing stormwater management plans and regulations.

Changes in climate are likely to affect the potential for flooding in Kenosha County during the 21st century. As previously described in Chapter 2, model projections show Wisconsin receiving more precipitation and more frequent intense precipitation events. By the mid-21st century, Kenosha County may receive three more precipitation events of two or more inches in 24 hours per decade, roughly a 25 percent increase in the frequency of heavy precipitation events.[26] This is likely to increase the frequency of high flows and high water levels and potentially increase the frequency and severity of flooding. In particular, the expected increases in the magnitude and frequency of large rainfall events will likely increase flood magnitudes in streams and rivers in Wisconsin, although the amount of increase will vary from place to place. The amount of precipitation that falls as rain during winter and early spring months is expected to significantly increase. Winter rain can create stormwater management problems due to icing and runoff over frozen ground which may also lead to increased risk of flooding.

These changes may lead to several flood and stormwater related impacts. Increased rainfall and shifting precipitation patterns that favor more rain during periods of low infiltration and evapotranspiration may lead to more frequent and severe stream and river flooding. Increased precipitation during winter and spring may also result in increased occurrence of inland lake flooding. Increased cold-weather precipitation and increased variability in frost conditions may cause a rise in water tables in some areas leading to an increase in groundwater flows into basements.

The projected increase in the magnitude and frequency of heavy storms could also affect the performance of existing and planned stormwater management and flood mitigation systems. This increase could also expand flood hazard areas, such as the 1-percent-annual-probability flood hazard area, beyond their existing boundaries, potentially encompassing more existing development. This could lead to an increase in the risk of flood damages and a need for larger stormwater management facilities and programs.

The magnitudes of potential increases in flooding are unknown, and there is a complex interrelationship between the climatological factors that will be affected by climate change and the features of watersheds that produce runoff. In some cases, climate change-induced modifications to certain climatological factors may offset the changes in other factors relative to their effects on flood flows. In other cases, the effects will reinforce one another. Thus, it is very important to continue to improve methods for downscaling climatological data, to expand the climatological parameters for which downscaled data can be developed, and to apply hydrologic and hydraulic simulation models to quantify the potential effects on flooding resulting from climate change.

Multi-Jurisdictional Risk Management

Flooding and associated stormwater drainage problems have been identified as a significant risk in Kenosha County. As noted earlier and shown on Map 3.4, structures within flood hazard areas have been identified within all of the 12 general-purpose local units of government in the County, except for the Towns of Brighton and Paris. In addition, there are related stormwater drainage problems in selected areas of many communities. Based upon the number of structures potentially impacted (see Map 3.4), the extent of the agricultural flood damage potential, and the extent of roadway flooding, 11 of the 12 communities will require special consideration with regard to the selection of mitigation measures for flooding and related stormwater problems. Those communities are noted in Table 3.13, along with the basis of special consideration over and above the countywide consideration.

Severe Weather Events (Thunderstorms, Strong Winds, Hail, and Lightning)

NOAA's National Center for Environmental Information (NCEI) defines severe weather as "destructive storm or weather" that is "usually applied to local, intense, often damaging storms such as thunderstorms, hailstorms, and tornadoes." While this definition can cover a variety of hazards beyond what is listed, thunderstorms,

[26] *Wisconsin Initiative on Climate Change Impacts, Wisconsin's Changing Climate: Impacts and Adaptation, Nelson Institute for Environmental Studies, University of Wisconsin-Madison and Wisconsin Department of Natural Resources, 2021.*

Table 3.13
Communities in Kenosha County with Special Flood and Related Stormwater Drainage Considerations

Community	Reason for Consideration
City of Kenosha	11 structures in flood hazard area
Village of Bristol	9 structures in flood hazard area
Village of Paddock Lake	13 structures in flood hazard area and one repetitive loss property
Village of Pleasant Prairie	21 structures in flood hazard area and one repetitive loss property
Village of Salem Lakes	155 structures in flood hazard area and 29 repetitive loss properties. Substantial agricultural flood damages. Localized stormwater drainage problems related to new development on narrow lake-frontage lots, and need for stormwater management planning to address existing and planned development
Village of Somers	18 structures in the flood hazard area
Village of Twin Lakes	4 structures in flood hazard area and one repetitive loss property
Town of Paris	Substantial agricultural flood damages
Town of Randall	9 structures in flood hazard area
Town of Somers	18 structures in flood hazard area
Town of Wheatland	28 structures in the flood hazard area

Source: SEWRPC

tornadoes, high winds, hail, and lightning are the most prevalent in Wisconsin. Thunderstorms and their related strong or straight-line winds, lightning, hail hazards, and non-thunderstorm high winds are covered within this section.

Thunderstorms

Compared to other natural hazards within the State of Wisconsin, thunderstorms are the most common type of severe weather event. A thunderstorm is defined as a severe and violent form of convection produced when warm, moist air is overrun by dry, cool air. As the warm air rises, thunderheads (cumulonimbus clouds) form. These thunderheads produce the strong winds, lightning, thunder, hail, and heavy rain that are associated with these storm events. The thunderheads may be a towering mass averaging 15 miles in diameter and reach up to 40,000 to 50,000 feet in height. These storm systems may contain as much as 1.5 million tons of water and enormous amounts of energy that often are released in one of several destructive forms, such as high winds, lightning, hail, excessive rains, and tornadoes. However, excessive rains that cause flash flooding, such as occurred in the summer storm events in 1998, 2000, 2007, and 2008 when the request for Presidential disaster declaration was approved (see Vulnerability Assessment for Flooding and Associated Stormwater Drainage Problems) and tornadoes are covered separately from this hazard analysis (see Vulnerability Assessment for Tornadoes).

A thunderstorm often lasts approximately 30 minutes in a given location, because an individual thunderstorm cell frequently moves at an average velocity that ranges between 30 to 50 miles per hour (mph). However, strong frontal systems may produce more than one squall line composed of many individual thunderstorm cells. In Wisconsin, these fronts can often be tracked across the entire State from west to east.[27] Thunderstorms may occur individually, form clusters, or as a portion of a large line of storms. Therefore, it is possible that several thunderstorms may affect one particular area in the course of a few hours, as well as larger areas of the State or County, within a relatively short period of time.

All thunderstorms are potentially dangerous. However, only about 10 percent of the thunderstorms that occur each year nationwide are classified as severe. According to the National Weather Service, a thunderstorm is considered severe if it produces hail sizes at least one-inch in diameter, wind speeds equal to or greater than 58 miles per hour (measured or implied by tree and/or structural damage), or a tornado. A thunderstorm with wind speeds equal to or greater than 40 mph or hail at least 0.5 inch in diameter is defined as approaching severe. Severe weather event statistics in the State of Wisconsin for the period 1982-2008 indicate that about 56 percent of thunderstorm events are characterized by damaging straight-line winds, 38 percent are hail events, and the remaining 6 percent are tornado events. Severe thunderstorms can

[27] *National Weather Service Forecast Office.*

cause injury or death and can also result in substantial property and crop damage. They may cause power outages, disrupt telephone service, and severely affect radio communications, as well as surface and air transportation, which may seriously impair the emergency management capabilities of the impacted areas.

The National Weather Service (NWS) monitors severe weather for 20 southern Wisconsin counties, including Kenosha County, from its Milwaukee/Sullivan office.[28] A thunderstorm watch indicates that conditions are favorable for severe weather, and that persons within the area for which the watches are issued should remain alert for approaching storms. A severe thunderstorm warning indicates that severe weather has been sighted in an area or indicated by weather radar and persons should seek shelter immediately. These severe thunderstorm watch and warning bulletins and advisories are disseminated over a number of telecommunication channels, including the NOAA Weather Radio, the NOAA Weather Wire, and the State Law Enforcement TIME System. NOAA Weather Radio is available to any individual with a weather alert radio. This system and the other sources are routinely monitored by local media which rebroadcast the weather bulletins over public and private television stations, radio stations, and mobile alert applications on cell phones. In addition, the NWS operates a 24-hour weather radio transmitter serving Kenosha and Racine Counties, operating at a frequency 162.450 MHz, from a location at CTH KR and Wood Road, Racine County. Most of the County is also served by a 24-hour weather radio transmitter located in Delafield, Waukesha County which is operated by the NWS at a frequency of 162.400 MHz.

To convey the severity and potential impacts from thunderstorm winds, the NWS recently added a new "damage threat" to Severe Thunderstorm Warnings. A summary of the three classifications is below:[29]

- **Destructive** damage threat is at least 2.75-inch diameter (baseball sized) hail and/or 80 mph thunderstorm winds. Warnings with this tag will automatically activate a Wireless Emergency Alert (WEA) on smartphones within the warned area.

- **Considerable** damage threat is at least 1.75-inch diameter (golf ball-sized) hail and/or 70 mph thunderstorm winds. This will not activate a WEA.

- **Baseline** or **"base"** severe thunderstorm warning remains unchanged, which is1.00-inch (quarter-sized) hail and/or 58 mph thunderstorm winds. This will not activate a WEA.

Types of Thunderstorm-Related Problems

Thunderstorm Winds

High-velocity, straight-line winds that are produced by thunderstorms and widespread non-thunderstorm high winds are a very destructive natural hazard in Wisconsin and are responsible for most wind-related damages to property.[30] Damaging winds are classified as those exceeding 50-60 mph. As with severe thunderstorms, the peak season for severe thunderstorm winds is April through August. During the period of 2011 to 2021, Kenosha County experienced one event with hurricane force winds (74 mph or higher) and 39 thunderstorm wind events (greater than 50 mph) (see Table 3.14).

Although distinctly different from tornadoes, straight-line winds produced by thunderstorms can be very powerful, are fairly common, and can cause damage similar to that of a tornado event. Depending upon their intensity, thunderstorm winds can uproot trees and crops, down power lines, and damage or destroy buildings and infrastructure. Flying debris can cause serious injury and death to humans, livestock, and wildlife in their path. Boats, mobile homes, and airplanes are also extremely vulnerable to damage from thunderstorm winds. During the period from 1982 to 2015, in the State of Wisconsin, 17 fatalities and dozens of injuries were attributed to wind from severe thunderstorms.

[28] *National Weather Service, Milwaukee/Sullivan Weather Forecast Office.*

[29] *Wisconsin Department of Emergency Management and Military Affairs, State of Wisconsin Hazard Mitigation Plan, December 2021.*

[30] *Wisconsin Emergency Management Department of Military Affairs, State of Wisconsin Hazard Mitigation Plan, December 2021.*

Table 3.14
Recent Severe Weather Events in Kenosha County: 2011-2021

Date	Location	Event Type	Magnitude	Reported Damages[a]			
				Deaths	Injuries	Property Damages ($)	Crop Damages ($)
January 1, 2011	Kenosha County	Strong Wind	38 mph	--	--	4,942	--
February 18, 2011	Kenosha County	Strong Wind	27 mph	--	--	2,471	--
April 15, 2011	Kenosha County	Strong Wind	35 mph	--	--	3,706	--
May 15, 2011	Kenosha County	Strong Wind	30 mph	--	--	6,177	--
May 22, 2011	Silver Lake	Thunderstorm Wind	70 mph	--	--	123,543	--
June 15, 2011	Kenosha County	High Wind	58 mph	--	--	12,354	--
June 30, 2011	Somers	Thunderstorm Wind	65 mph	1	1	123,543	--
July 11, 2011	Salem Lakes	Thunderstorm Wind	56 mph	--	--	--	--
July 11, 2011	Downtown Kenosha	Thunderstorm Wind	53 mph	--	--	--	--
August 2, 2011	Twin Lakes	Thunderstorm Wind	50 mph	--	--	--	--
August 2, 2011	Pleasant Prairie	Thunderstorm Wind	55 mph	--	--	--	--
September 29, 2011	Kenosha County	Strong Wind	46 mph	--	--	2,471	--
October 19, 2011	Kenosha County	High Wind	53 mph	--	--	12,354	--
November 13, 2011	Kenosha County	Strong Wind	43 mph	--	--	1,235	--
November 29, 2011	Kenosha County	Strong Wind	40 mph	--	--	1,235	--
January 1, 2012	Kenosha County	Strong Wind	39 mph	--	--	2,429	--
March 10, 2012	Kenosha County	Strong Wind	39 mph	--	--	2,429	--
April 15, 2012	Kenosha County	Strong Wind	43 mph	--	--	1,214	--
April 16, 2012	Kenosha County	Strong Wind	41 mph	--	--	1,214	--
April 16, 2012	Kenosha County	Strong Wind	43 mph	--	--	1,214	--
April 16, 2012	Kenosha County	Strong Wind	41 mph	--	--	1,214	--
June 18, 2012	Kenosha County	Strong Wind	39 mph	--	--	12,143	--
September 4, 2012	Wheatland	Thunderstorm Wind	52 mph	--	--	6,071	--
September 4, 2012	Benet Lake	Thunderstorm Wind	52 mph	--	--	6,071	--
October 30, 2012	Kenosha County	Strong Wind	38 mph	--	--	6,071	--
November 11, 2012	Kenosha County	Strong Wind	43 mph	--	--	3,643	--
January 18, 2013	Kenosha County	Strong Wind	39 mph	--	--	5,982	--
January 19, 2013	Kenosha County	High Wind	50 mph	--	--	17,945	--
April 11, 2013	Kenosha County	Strong Wind	38 mph	--	--	4,785	--
August 30, 2013	Twin Lakes	Thunderstorm Wind	55 mph	--	--	3,589	--
August 30, 2013	Paddock Lake	Thunderstorm Wind	50 mph	--	--	1,196	--
October 5, 2013	Downtown Kenosha	Heavy Rain		--	--	--	--
November 17, 2013	Kenosha County	Strong Wind	45 mph	1	--	--	--
November 17, 2013	Bristol	Thunderstorm Wind	51 mph	--	--	33,497	--

Table continued on next page.

Table 3.14 (Continued)

Date	Location	Event Type	Magnitude	Reported Damages[a]			
				Deaths	Injuries	Property Damages ($)	Crop Damages ($)
February 20, 2014	Kenosha County	High Wind	36 mph	--	--	--	--
April 12, 2014	Downtown Kenosha	Hail	0.88 inch	--	--	--	--
April 13, 2014	Wheatland	Hail	0.75 inch	--	--	--	--
May 12, 2014	Carol Beach	Heavy Rain		--	--	--	--
June 30, 2014	Downtown Kenosha	Thunderstorm Wind	50 mph	--	--	3,562	--
July 12, 2014	Truesdell	Thunderstorm Wind	87 mph	--	--	83,114	--
July 29, 2014	Salem Lakes	Thunderstorm Wind	50 mph	--	--	3,562	--
August 26, 2014	Salem Lakes	Lightning		--	--	5,937	--
June 8, 2015	Silver Lake	Hail	1 inch	--	--	--	--
June 8, 2015	Trevor	Hail	1 inch	--	--	--	--
June 8, 2015	Salem	Hail	1.25 inch	--	--	--	--
June 8, 2015	Trevor	Hail	1.75 inch	--	--	--	--
June 8, 2015	Pleasant Prairie	Hail	0.75 inch	--	--	--	--
July 13, 2015	Brighton	Thunderstorm Wind	54 mph	--	--	23,575	--
July 18, 2015	Twin Lakes	Thunderstorm Wind	50 mph	--	--	5,894	--
August 2, 2015	Brighton	Thunderstorm Wind	65 mph	--	--	11,787	--
August 2, 2015	Kenosha Airport	Thunderstorm Wind	55 mph	--	--	5,894	--
August 2, 2015	Downtown Kenosha	Hail	1.00 inch	--	--	--	--
September 17, 2015	Salem	Thunderstorm Wind	60 mph	--	--	2,357	--
December 23, 2015	Kenosha County	Strong Wind	47 mph	--	--	1,179	--
February 19, 2016	Kenosha County	High Wind	55 mph	--	--	115,478	--
March 16, 2016	Kenosha County	High Wind	51 mph	--	--	9,238	--
March 31, 2016	New Munster	Hail	1 inch	--	--	--	--
April 25, 2016	Twin Lakes	Hail	0.75 inch	--	--	--	--
April 25, 2016	Trevor	Hail	0.88 inch	--	--	--	--
July 6, 2016	Twin Lakes	Thunderstorm Wind	52 mph	--	--	4,619	--
March 7, 2017	Kenosha Airport	Thunderstorm Wind	51 mph	--	--	--	--
March 8, 2017	Kenosha County	High Wind	53 mph	--	--	28,273	--
April 10, 2017	Brighton	Hail	0.88 inch	--	--	--	--
June 28, 2017	Twin Lakes	Thunderstorm Wind	52 mph	--	--	28,273	--
June 28, 2017	Carol Beach	Thunderstorm Wind	52 mph	--	--	11,309	--
July 6, 2017	Paris	Thunderstorm Wind	56 mph	--	--	4,524	--
July 12, 2017	Bassett	Hail	1 inch	--	--	--	--
August 3, 2017	Downtown Kenosha	Hail	0.88 inch	--	--	--	--
December 4, 2017	Kenosha County	High Wind	50 mph	--	--	7,917	--

Table continued on next page.

Table 3.14 (Continued)

Date	Location	Event Type	Magnitude	Reported Damages[a]			
				Deaths	Injuries	Property Damages ($)	Crop Damages ($)
May 2, 2018	Twin Lakes	Hail	2.9 inch	--	--	--	--
May 14, 2018	Twin Lakes	Hail	0.88 inch	--	--	--	--
June 18, 2018	Slades Corners	Thunderstorm Wind	50 mph	--	--	7,768	--
July 19, 2018	Twin Lakes	Lightning		--	1	--	--
October 20, 2018	Kenosha County	Strong Wind	41 mph	--	--	1,110	--
February 24, 2019	Kenosha County	High Wind	52 mph	--	--	2,170	--
June 30, 2019	Wheatland	Thunderstorm Wind	50 mph	--	--	1,085	--
June 30, 2019	Salem	Thunderstorm Wind	50 mph	--	--	2,170	--
June 30, 2019	Silver Lake	Thunderstorm Wind	61 mph	--	--	10,849	--
August 7, 2019	Twin Lakes	Thunderstorm Wind	50 mph	--	--	542	--
August 18, 2019	Downtown Kenosha	Thunderstorm Wind	50 mph	--	--	16,274	--
November 27, 2019	Kenosha County	Strong Wind	49 mph	--	--	10,849	--
April 20, 2020	Kenosha Airport	Thunderstorm Wind	52 mph	--	--	--	--
April 29, 2020	Paris	Heavy Rain		--	--	535	--
July 26, 2020	Somers	Heavy Rain		--	--	--	--
August 10, 2020	Powers Lake	Thunderstorm Wind	52 mph	--	--	--	--
August 10, 2020	Powers Lake	Thunderstorm Wind	56 mph	--	--	3,211	--
August 10, 2020	Downtown Kenosha	Thunderstorm Wind	50 mph	--	--	6,422	--
November 10, 2020	Truesdell	Thunderstorm Wind	56 mph	--	--	5,352	--
November 10, 2020	Tobin Road	Thunderstorm Wind	56 mph	--	--	--	--
November 10, 2020	Kenosha Airport	Thunderstorm Wind	52 mph	--	--	--	--
August 6, 2021	Downtown Kenosha	Thunderstorm Wind	52 mph	--	--	20,000	3,000
August 10, 2021	Downtown Kenosha	Thunderstorm Wind	52 mph	--	--	--	1,000
August 11, 2021	Kenosha Airport	Thunderstorm Wind	50 mph	--	--	--	--
December 15, 2021	Kenosha County	High Wind	56 mph	--	--	15,000	--
			Total	2	2	864,567	4,000

Note: In many instances damages from hazard events go unreported. This table represents estimated losses and should not be considered an exact documentation of damages and losses incurred from a particular event or time period.

[a] *Dollar values were adjusted to year 2021 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.*

Source: The National Climatic Data Center (NCDC), National Oceanic and Atmospheric Administration (NOAA), and the National Environmental Satellite, Data and Information Service (NESDIS), and the U.S. Department of Agriculture Risk Management Agency

Non-Thunderstorm High Winds

High winds are also produced in the absence of thunderstorms. Non-thunderstorm high winds tend to be less forceful than thunderstorm winds but are typically more sustained and widespread. These high winds can affect a region for hours, or even several days. Longer lasting windstorms have two main causes: large differences in atmospheric pressure across a region, and strong jet-stream winds overhead. Horizontal pressure differences can accelerate the surface winds substantially as air travels from a region of higher atmospheric pressure to one of lower pressure. Intense winter storms can also cause long-lasting and damaging high winds. Cold fronts associated with intense low-pressure systems can produce high winds both as they pass and for a period afterward as colder air flows overhead. High winds in the winter can produce dangerous wind chills when air temperatures are cold. Severe wind chills are discussed further in the extreme temperature section below.

Like thunderstorm winds, non-thunderstorm high winds can uproot trees and crops, cause widespread power outages, damage buildings, and make travel treacherous. Non-thunderstorm high winds tend to be more sustained and widespread, leading to more damage over a whole region, as compared to thunderstorm winds. During the period of 2011 to 2021, 32 non-thunderstorm high wind events were reported in Kenosha County (Table 3.14).

Hail

Hailstorms are also associated with thunderstorms and are the fourth most destructive type of weather hazard in the State of Wisconsin. A hailstorm is a product of strong thunderstorms and unique weather condition where atmospheric water particles form into rounded or irregular masses of ice that fall to earth. Hail normally falls near the center of the moving storm along with the heaviest rain. In some instances, strong winds at high altitudes can blow the hailstones away from the storm center, causing unexpected hazards at places that otherwise might not appear threatened. Hailstones normally range from the size of a pea to the size of a golf ball, but hailstones 1.5 inches or larger in diameter are not uncommon in the State of Wisconsin. When strong underlying, updraft winds no longer can support the hailstone weight, they fall earthward. Hail tends to fall in swaths that may be 20 to 115 miles long and five to 30 miles wide and can fall continuously or sporadically in a series of hail strikes. Hail strikes are typically one-half mile wide and five miles long. They may partially overlap, but often leave completely undamaged gaps between them.

Hailstorms are considered formidable among the weather and climatic hazards to property and farm crops, because they dent vehicles and structures, break windows, damage roofs, and batter crops to the point that significant agricultural losses result. Falling hailstones can also cause serious injury and loss of human life and livestock, however these occurrences are rare. In addition to impact damage, thick hail combined with heavy rain can clog storm sewers and contribute to stormwater flooding. Hail sufficiently thick to cover a road will pose a traffic hazard. The peak season for hailstorms is May through September with approximately 85 percent of hailstorms occurring during this period. This coincides with the growing and harvesting seasons for most crops in the state. From 2011 through 2021, 16 hailstorms were reported in Kenosha County (Table 3.14).

Lightning

After floods, lightning kills the most people on average each year. Nationally, lightning has the highest total fatalities since 1940 out of all the severe weather hazards. However, in Wisconsin, there have been no reported lightning fatalities since 2017.[31]

Lightning is defined as a sudden and violent discharge of electricity from within a thunderstorm due to a difference in electrical charges and represents a flow of electrical current from cloud to cloud or cloud to ground. Water and ice particles also affect the distribution of electrical charge. Lightning bolts can travel 20 miles before striking the ground. The air near a lightning bolt can be heated to 50,000 degrees Fahrenheit (°F), which is five times hotter than the surface of the sun. The rapid heating and cooling of the air near the lightning channel causes a shock wave that results in thunder.

[31] *Wisconsin Department of Emergency Management and Military Affairs, State of Wisconsin Hazard Mitigation Plan, December 2021.*

Lightning is a significant hazard associated with any thunderstorm and can cause extensive damage to buildings and structures, kill or injure people and livestock, start forest fires and wildfires, and damage electrical and electronic equipment. Lightning is a major cause of damage to farm buildings and equipment, responsible for more than 80 percent of all livestock losses, and is the number one cause of farm fires. From 2000 to 2015, Wisconsin had nearly $55 million in property and crop damages from lightning. Also, from 2007 to 2015, Wisconsin reported six fatalities and 11 injuries caused by lightning.[32]

Kenosha County reported two lightning events during the period of 2011 to 2021 causing a reported $6,000 in property damage (Table 3.14). Counties in southern Wisconsin experience a higher number of lightning events than other parts of the State due to higher thunderstorm frequency and more thorough documentation by the local media. Statistics have also shown that 92 percent of lightning-related fatalities occur during May through September, and 73 percent of these events occur during the afternoon and early evening. Approximately 30 percent of persons struck by lightning die and 74 percent of lightning strike survivors have permanent disabilities.

Recent Events (2011-2021)

A total of 94 severe weather events have been recorded in Kenosha County between 2011 and 2021. This total includes thunderstorm winds, strong winds, hail, and lightning. These events are documented in Table 3.14, based upon data published by the National Climatic Data Center. As shown in Table 3.14 these storms can range from one to two events per year or up to 10 events per year, which demonstrates the high unpredictability of these storms. In total, these severe thunderstorm events have resulted in 2 deaths, 2 injuries, and over $868,000 in property and crop damages within Kenosha County. A few examples of recent events from Table 3.14 are noted below.

2011 – A large supercell thunderstorm, just offshore over Lake Michigan, produced strong outflow winds that moved into far southeastern Milwaukee County, and eastern sections of Racine and Kenosha counties during the evening of June 30, 2011. Law enforcement officials reported numerous trees and power lines down across far eastern Kenosha County from severe thunderstorm winds that gusted up to 75 mph as estimated by a trained spotter. A 31-year-old man riding a motorcycle was killed when a tree blew over on him in the 7600 block of 25th Avenue in the City of Kenosha. A Pleasant Prairie woman injured her hip when she was struck by debris from a shed. Two other residents of the City of Kenosha were injured when they touched live wires brought down by the strong winds. Many large branches were also broken off by the powerful winds, which also damaged several homes. Officials estimate 500 to 800 trees were destroyed or badly damaged by the winds. At one point, over 27,000 customers were without power in southeastern Wisconsin, many for several days. Property damages from this storm were estimated at over $123,000 (2021 dollars).

2013 – On November 17th, strong west winds along and behind a cold front gusted to 35 to 55 mph across southern Wisconsin. A man was killed in Kenosha County when a strong wind gust forced him to lose control of his motorcycle. No property damage from this storm was reported.

2014 – On July 12th, a small segment bow echo ahead of a cold front accelerated east across Kenosha County. A mesovortex developed along the leading edge of the bow echo and produced a 3.6 mile west to east path of significant straight line wind damage. The most concentrated damage was just south of Highway 50 and east of Green Bay Road. Numerous large trees snapped and uprooted. A large tree fell on a home, many privacy fences were destroyed, and shingle damage to approximately eight homes was reported. Property damages from this storm were estimated at over $83,000 (2021 dollars).

Vulnerability and Community Impact Assessment

The National Weather Service can forecast and track a line of thunderstorms that may be likely to produce severe high winds, hail, lightning, and tornadoes, but where these related hazards form or touch down and how powerful they might be, remains unpredictable and the locations of storm impact points are widely scattered throughout the County.

[32] *Wisconsin Department of Emergency Management and Military Affairs, State of Wisconsin Hazard Mitigation Plan, December 2016.*

In order to assess the vulnerability of the Kenosha County area to severe thunderstorm-related hazards, a review of the community assets described in Chapter 2 indicate the potential for significant thunderstorm and related hazard impacts to: 1) a variety of residential, commercial, and other developed land uses; 2) agricultural lands; 3) roadway transportation system; 4) utilities; 5) critical community facilities; and 6) historic sites. Significant impacts may also be possible to other infrastructure or utility systems, or hazardous material storage sites.

On average, the events occurring over the period of 2011-2021 have resulted in about $9,240 of total reported damages per event in the County. However, many events had no damages reported to the NCDC, and very few events have been responsible for a large percentage of the total damages. Thus, the average damage cost is considered to be only a very approximate measure of potential damages. On average, there are 8.5 thunderstorm and related storm events per year in Kenosha County. Over this same period, thunderstorms and related storm hazards have resulted in an average of about $78,961 in property damages per year (2021 dollars). Due to the unpredictability of severe thunderstorms that include high straight-line winds, hail, and lightning events, all buildings, infrastructure, and critical facilities within the County are considered at risk.

Future Changes and Conditions

Based upon recent historical data from the period 2011-2021, Kenosha County can expect to experience averages of 3.6 thunderstorm wind events per year, 1.5 hail events per year, and 2.9 non-thunderstorm high-wind events per year somewhere in the County. It should be noted that the historical record shows considerable variation among years in the numbers of these events that occurred. While it would be expected that in some years the County will experience either fewer events or more events than the average number, the average annual number of events is not expected to change.

The likely effect of climate change on severe weather events is not clear. While projections based upon downscaled climate model results indicate that the magnitude and frequency of heavy precipitation events are likely to increase by the middle of the 21st century, they do not address potential trends in wind, hail, or lightning conditions. Modeling studies utilizing the output of multiple climate models suggest that number of days per year in which atmospheric environments that are known to support the formation of severe thunderstorms under current climatic conditions will increase between now and the end of the 21st century.[33] It should also be noted that wind strengths over the Great Lakes have increased and are expected to continue increasing in the future.[34] Surface wind speeds above the Lakes are increasing by about 5 percent per decade, exceeding trends in wind speed over land.

Changes in land use can have an impact on the potential for damage to occur from severe weather events. Such changes relate to the potential future increase in development within the County. Changing land use patterns within Kenosha County, as documented in the adopted regional land use plan and County land and water resource management plan and summarized in Chapter 2, indicate a potential increased risk of thunderstorm-related damage and related losses in the expanding urbanized areas within the County. Because of the actions that have been taken by the County and local units of government and individuals, the current vulnerability to thunderstorms and related hazards has decreased in recent years. These ongoing mitigation measures are described further in Chapter 5.

Multi-Jurisdictional Risk Management

Based upon a review of the historic patterns of severe thunderstorm-related hazards that include high straight-line wind, hail, and lightning events in Kenosha County, there are no specific municipalities that have unusual risks. Rather, the events are considered to be relatively uniform and of countywide concern.

[33] *Noah S. Diffenbaugh, Martin Scherer, and Robert J. Trapp, "Robust Increases in Severe Thunderstorm Environments in Response to Greenhouse Forcing," Proceedings of the National Academy of Sciences, Volume 110, pages 16,361-16366, 2013.*

[34] *Ankur R. Desai, Jay A. Austin, Val Bennington, and Galen A. McKinley, "Stronger Winds Over a Large Lake in Response to Weakening Air-to-Lake Temperature Gradient," Nature Geoscience, Volume 2, pages 855-858, 2009.*

Extreme Heat

The Centers for Disease Control and Prevention (CDC) reports that nationwide between 2018 and 2020, a total of 3,066 heat-related deaths occurred.[35] Excessive heat has become the deadliest hazard in Wisconsin. According to the National Weather Service, 22 people have died in Wisconsin directly as a result of heat waves from 2011 to 2021. Temperature data for two selected observation stations in the Cities of Kenosha in Kenosha County and Burlington in neighboring Racine County are shown in Table 3.15. The table shows extreme high and low temperatures and the departure from average annual temperatures recorded in the period from 2011 through 2021. The average high and low extreme temperatures for these two stations for the period 2011-2021 are 95.7°F and -9.3°F for the City of Kenosha and 93.2°F and -11.1°F for the City of Burlington during this period. Prolonged exposure to these extreme temperatures could present a significant danger. It should be noted that Lake Michigan may be exerting some effect on average annual temperatures but does not appear to be reducing the average extreme high temperature.

Heat and humidity together can create the most severe problems to human health. High humidity makes heat more dangerous because it slows the evaporation of perspiration, which is the body's natural cooling process. The Heat Index (HI) is a measure of discomfort and the level of risk posed to people in high-risk groups by heat and humidity. The HI is expressed in degrees Fahrenheit (°F) and incorporates an adjustment to the air temperature for relative humidity (RH). For example, if the air temperature is 94°F and the RH is 55 percent, the HI would equal about 106°F (see Figure 3.2). Since HI values were devised for shady, light wind conditions, exposure to full sunshine can increase HI values by up to 15°F. The level of risk to people in high-risk groups associated with different levels of the HI is shown in Table 3.16. The NWS will initiate alert procedures (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat wave determines whether advisories or warnings are issued. High temperature periods are often also accompanied by the related air quality problems related to ground-level ozone which can be harmful, especially to sensitive groups, such as active children and adults with respiratory problems.

The following definitions/criteria for extreme heat events are used for the 20 counties in south-central and southeastern Wisconsin served by the Milwaukee/Sullivan Weather Forecast Office.

- **Outlook Statement**—Issued two to seven days prior to the time that minimal Heat Advisory or Excessive Heat Warning conditions are expected. Serves as a long-term "heads-up" message.

- **Excessive Heat Watch**—Issued 24 to 48 hours in advance when Excessive Heat Warning conditions are expected.

- **Heat Advisory**—Issued six to 24 hours in advance of any 24-hour period in which daytime heat indices are expected to be 100° to 104°F, or 95°-99°F for four or more consecutive days, and nighttime heat indices are greater than or equal to 75°F. Advisories are issued for less serious conditions that cause significant inconvenience and, if caution is not exercised, could lead to situations that may threaten life.

- **Excessive Heat Warning**—Issued six to 24 hours in advance of any 48-hour period in which daytime heat indices are expected to exceed 105°F for three or more hours, and nighttime heat indices are greater than or equal to 75°F. In addition, if Heat Advisory conditions are expected to persist for four or more days, then an Excessive Heat Warning will be issued. Warnings are issued for weather conditions posing a threat to life.

During extended periods of very high temperature, coupled with high humidity levels, individuals can suffer a variety of ailments, including heat cramps (muscular pains and spasms due to heavy exertion). Although heat cramps are the least severe heat-related ailment, they are an early signal that the body is having trouble with the high temperatures. Heat exhaustion typically occurs when people exercise heavily or work in a hot, humid place where body fluids are lost through heavy sweating. Blood flow to the skin

[35] *Merianne R. Spencer and Matthew F. Garnett., "QuickStats: Percentage Distribution of Heat-Related Deaths, by Age Group – National Vital Statistics System, United States, 2018-2020". MMWR Morbidity and Mortal Weekly Rep 2022; 71:808. June 17, 2022.*

Table 3.15
Extreme Temperature and Departure from Average Temperature Within Kenosha County: 2011-2021

	Burlington Inland Site				Kenosha Lakeshore Site			
Year	Max High Temperature (°F)	Max Low Temperature (°F)	Average Annual Temperature (°F)	Departure from Average Temperature (°F)[a]	Max High Temperature (°F)	Max Low Temperature (°F)	Average Annual Temperature (°F)	Departure from Average Temperature (°F)[a]
2011	97.0	-14.0	46.4[a]	+0.2	100.0	-9.0	48.6[b]	-0.1
2012	102.0	-4.0	48.6[a]	+2.4	105.0	0.0	51.8	+3.1
2013	94.0	-10.0	44.2[a]	-2.0	96.0	-5.0	46.6[b]	-2.1
2014	87.0	-19.0	42.6	-3.6	91.0	-14.0	44.8	-3.9
2015	91.0	-15.0	46.4	+0.2	93.0	-9.0	48.0	-0.7
2016	91.0	-14.0	48.1	+1.9	95.0	-9.0	50.4	+1.7
2017	92.0	-10.0	45.9	-0.3	91.0	-6.0	49.7	+1.0
2018	93.0	-13.0	45.7	-0.5	95.0	-9.0	47.8	-0.9
2019	94.0	-27.0	45.0	-1.2	95.0	-27.0	47.5	-1.2
2020	92.0	20.0	47.4	+1.2	97.0	-5.0	50.0	+1.3
2021	92.0	-16.0	47.9	+1.7	95.0	-9.0	50.9	+2.2
Average	93.2	-11.1	46.2	--	95.7	-9.3	48.7	--

[a] *The average temperature is the average annual temperature for the County for the period 2011 through 2021.*

[b] *Average and/or total values computed with one to nine daily values missing.*

Source: National Weather Service and National Oceanic and Atmospheric Administration NOWData

Figure 3.2
Heat Index Chart

Relative Humidity (%)	Temperature (°F)															
	80	82	84	86	88	90	92	94	96	98	100	102	104	106	180	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
- Extreme Danger

Source: National Weather Service and SEWRPC

Table 3.16
Level of Risk for Persons in High-Risk Groups Associated with the Heat Index

Heat Index (°F)	Category	Possible Heat Disorders for Persons in High-Risk Groups
80-90	Caution	Fatigue possible with prolonged exposure and/or physical activity
90-105	Extreme Caution	Sunstroke, muscle cramps, and/or heat exhaustion possible with prolonged exposure and/or physical activity
105-129	Danger	Sunstroke, muscle cramps and/or heat exhaustion likely. Heatstroke possible with prolonged exposure and/or physical activity
130 or above	Extreme Danger	Heat stroke or sunstroke likely

Source: National Weather Service

increases, causing blood flow to decrease to the vital organs. This results in a form of mild shock. If not treated, the victim may suffer heat stroke. Heat stroke is life threatening and requires immediate medical attention. The victim's temperature control system, which produces sweating to cool the body, stops working. The body temperature can rise so high that brain damage and death may result if the body is not cooled quickly. Sunstroke is another term for heat stroke. In addition to posing a public health hazard, periods of excessive heat usually result in high electrical consumption for air conditioning, which can cause power outages and brown outs.

Most heat-related deaths occur in cities. Large urban areas become "heat islands." Brick buildings, asphalt streets, and tar roofs store and radiate heat like a slow burning furnace. Heat builds up in a city during the day and cities are slower than rural areas to cool down at night. The amount of sunshine is an important contributing factor in urban heat waves. In addition, the stagnant atmospheric conditions associated with a heat wave trap ozone and other pollutants in urban areas. The worst heat disasters, in terms of loss of life, happen in large cities when a combination of high daytime temperatures, high humidity, warm nighttime temperatures, and an abundance of sunshine occurs for a period of several days. There are also socioeconomic problems that make some urban populations at greater risk. The elderly, disabled, and debilitated are especially susceptible to heat-related illness and death.

Recent Events

Extreme heat that affects Kenosha County are not localized events, as they usually encompass the entire south-central to southeastern portion of the State and may continue for several days or weeks. Table 3.17 lists the extreme heat events in southeastern Wisconsin from 2011-2021. A few examples of recent events from Table 3.17 are noted below.

2012 – The July 3 through 6, 2012, heat wave was one of the three worst heat waves to affect Wisconsin. Locally a hot air mass settled over southern Wisconsin on July 3, bringing 100-degree heat to many locations for multiple days. While humidity levels were relatively low, maximum heat indices reached between 100°F and 115°F during this hot spell. Daily maximums temperatures at the Kenosha Regional Airport reached 105ºF on July 4, 106°F on July 5, and 102°F on July 6. Numerous new daily record highs were set as well as record high daily minimum temperatures. Deaths directly related to the heat were reported in Dane and Milwaukee Counties and deaths in which heat was a contributing factor were reported in Rock and Walworth Counties. Based on news reports hundreds of people received medical treatment at hospitals or clinics due to heat-related illnesses; however, the exact number is unknown. Buckled road pavements were noted and wildlife specialists reported some fish and bird die-offs as water temperatures in inland lakes and rivers increased.

Another round of dangerous heat affected southern Wisconsin on July 25, 2012. High temperatures of between 98° and 101°F combined with dew points near 70 to produce heat index values between 100° and 108°F across all of south-central and southeastern Wisconsin. This heat wave resulted in the sixth day in 2012 with maximum temperatures reaching or exceeding 100°F in several counties. The maximum heat index value in Kenosha County reached 109°F.

2018 – On June 29th, hot and humid conditions produced heat index values ranging from 100° to 110°F. Numerous cooling centers were opened by local communities throughout southern Wisconsin. Some public swimming pools hours were extended due to the heat. The heatwave continued into July 1st.

Table 3.17
Recent Extreme Heat Events in Kenosha County: 2011-2021

Date	Type	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
July 17, 2011	Heat	0	0	--	--
July 20, 2011	Heat	0	0	--	--
June 28, 2012	Heat	0	0	--	--
July 3, 2012	Excessive Heat	0	0	--	--
July 16, 2012	Heat	0	0	--	--
July 23, 2012	Heat	0	0	--	--
July 25, 2012	Heat	0	0	--	--
July 16, 2013	Excessive Heat	0	0	--	--
August 30, 2013	Heat	0	0	--	--
July 21, 2016	Heat	0	0	--	--
June 17, 2018	Heat	0	0	--	--
June 29, 2018	Excessive Heat	0	0	--	--
July 1, 2018	Excessive Heat	0	0	--	--
July 4, 2018	Heat	0	0	--	--
July 19, 2019	Excessive Heat	0	0	--	--
	Total	0	0	--	--

Source: National Climatic Data Center and U.S. Department of Agriculture Risk Management Agency.

Vulnerability and Community Impact Assessment

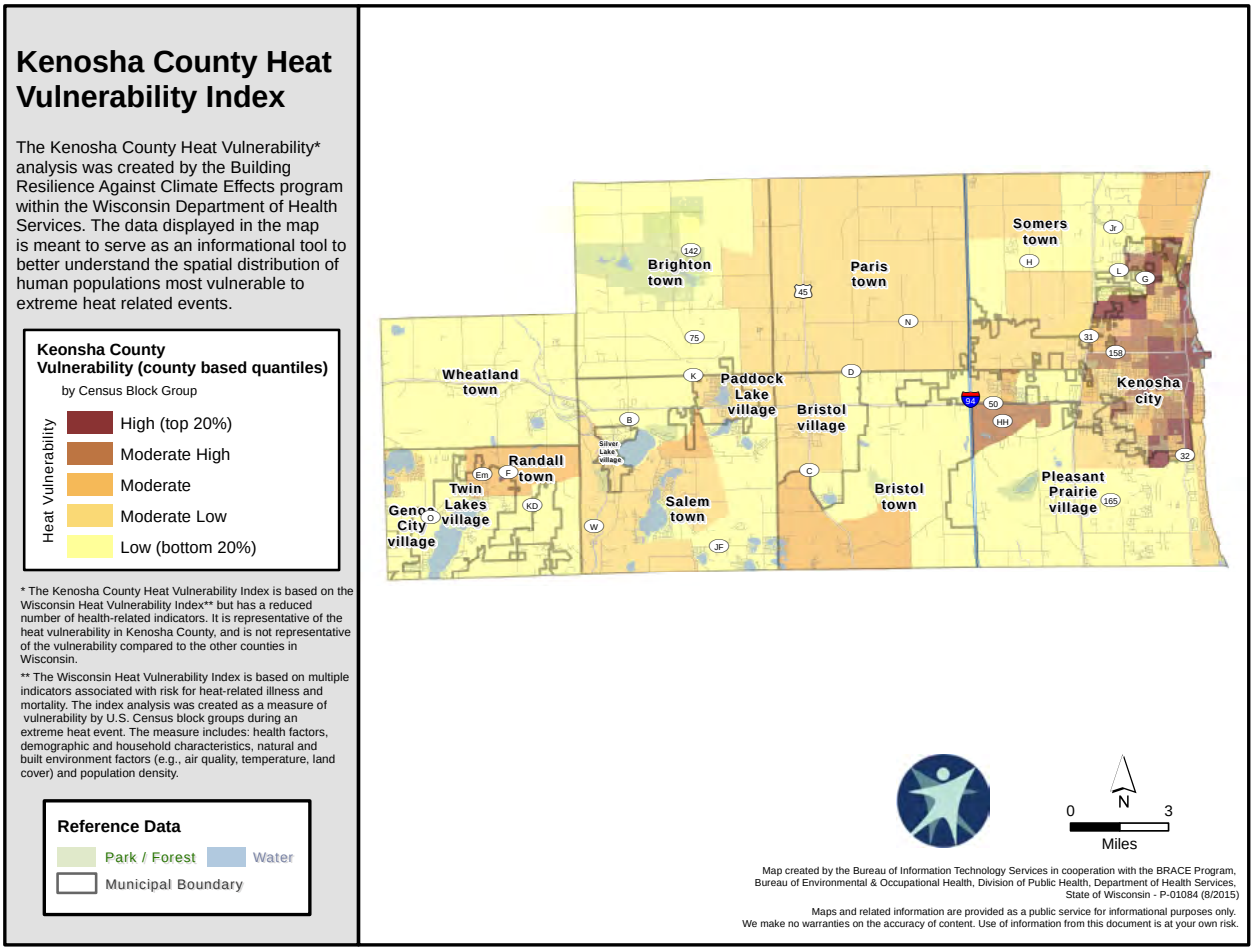
Heat extremes are primarily a public health concern. The poor and elderly are much more susceptible to temperature-related deaths and injury. Education, improved social awareness, and community outreach programs have likely helped to reduce the number of individuals killed or injured by extreme temperature events. Those at greatest risk are the very young, the very old, and the sick. Most deaths during a heat wave are the result of heat stroke. Large and highly urbanized cities can create an island of heat that can raise the area temperature by 3°F to 5°F. Therefore, urban communities with substantial populations of elderly, disabled, and debilitated people could face a significant medical emergency during an extended period of excessive heat. Some residents in high crime areas, especially the elderly, are afraid to open windows or go out to cooling shelters. As neighborhoods change, some older residents become isolated because of cultural, ethnic, and language differences.

The Building Resilience Against Climate Effects (BRACE) program in the Wisconsin Department of Health Services has compiled heat vulnerability index maps for the State and each county. The results of the Kenosha County heat vulnerability index are shown in Figure 3.3. The heat vulnerability index is based on multiple indicators associated with risk for heat-related illnesses and mortality including health factors, demographic and household characteristics, natural and built environment factors, and population density. As indicated in Figure 3.3, areas within Kenosha County that have the highest vulnerability to an extreme heat event include portions of the City of Kenosha, Village of Pleasant Prairie, and Village of Somers.

High demands for electricity can result in black outs and brown outs. Loss of water pressure can result from opening of fire hydrants in urban areas. Stagnant atmospheric conditions that occur with heat waves are also favorable for trapping ozone and other pollutants in urban areas. Pets and livestock can suffer from prolonged exposure to excessive heat. Although there has been no reported deaths, injuries, or damages between 2011 and 2021, on average, there are about 1.3 extreme heat events per year in Kenosha County that can still have an impact on people, pets, and other forms of life.

A review of the community assets described in Chapter 2 indicate the potential for extreme heat hazard events to impact: 1) residents at a countywide level, especially the poor, elderly, and sick, 2) agricultural croplands; 3) pets and livestock; 4) municipal water and electric utilities; and 5) natural surface and groundwater reserves.

Figure 3.3
Kenosha County Heat Vulnerability Index: 2015



Source: Wisconsin Department of Health Services, Building Resilience Against Climate Effects Program

Future Changes and Conditions

Based upon recent historical data, Kenosha County can expect to experience an average of 1.3 extreme heat events per year. It should be noted that the historical record shows considerable variation among years in the numbers of these events that occurred. While it would be expected that in some years the County will experience either fewer events or more events than the average number, the average annual number of events is not expected to change over the five-year term of this plan update.

The projections based on downscaled results from climate models indicate that there will likely be substantial changes in the frequencies of extreme heat events over the 21st century. Extreme heat events are likely to occur more frequently and to be more severe by the middle of the century. As previously described in Chapter 2, average summertime temperatures in Kenosha County are projected to increase by 6.0°F to 7.0°F by year 2055.[36] The number of days per year in which temperatures in southern Wisconsin exceed 90°F is expected to triple by 2055. Given that much of the documented increases in average temperature since 1950 have occurred through increases in night-time low temperatures, it is likely that there will be fewer night-time breaks in the heat during extreme heat events in the future. This could result in some extreme heat events persisting longer. Heat waves have direct impacts on human health, especially among sensitive populations such as the young children and the elderly. In the absence of mitigative measures, the projected increase in the frequency, duration, and severity of heat waves will be likely to cause increases in fatalities and illnesses related to extreme heat.

[36] *Wisconsin Initiative on Climate Change Impacts, 2021, op. cit.*

Multi-Jurisdictional Risk Management

Based upon a review of the historic patterns of extreme heat events in Kenosha County, there are no specific municipalities that have unusual risks. Rather, the events are of a uniform countywide concern.

Extreme Cold

Like extreme heat, extreme cold is also a deadly hazard. The CDC reports that the death rate of excessive cold as the underlying cause ranges from 1 to 2.5 deaths per million people and over 19,000 people have died from exposure to cold since 1979.[37] Exposure to extreme cold temperatures can also cause a number of health conditions and can lead to loss of fingers and toes; or cause permanent kidney, pancreas, and liver injury, and even death. These health impacts often result from a combination of cold temperatures, winds, and precipitation. As a result, winter storms can pose substantial risks because they can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. In addition, when deaths and injuries due to cold-related vehicle accidents and fatalities, fires due to dangerous use of heaters, carbon monoxide poisoning due to use of nontraditional sources of heat such as cooking ovens, and other winter weather fatalities are considered, the impact of severe cold periods becomes even greater.

Frostbite and hypothermia are two major health risks associated with severe cold. Frostbite is an injury caused by freezing of the skin and underlying tissues. Frostbite causes a loss of feeling and a white or pale appearance in extremities. Severe frostbite can damage skin and underlying tissues and requires medical attention. Potential complications of severe frostbite include infection and nerve damage. Frostbite is most common on fingers, toes, nose, ears, face, and chin. While exposed skin in cold, windy weather is most vulnerable to frostbite, this injury can also occur on skin covered by gloves or other clothing.

Hypothermia is a condition brought on when the core body temperature drops to less than 95°F. It occurs when the body loses heat more quickly than it is able to produce it. As with frostbite, wind or wetness can contribute to producing hypothermia. Symptoms of moderate to severe hypothermia include lack of coordination, slurred speech, confusion, drowsiness, progressive loss of consciousness, weak pulse, and shallow breathing. Hypothermia may cause lasting kidney, liver, and pancreas problems or death. Members of certain populations are particularly vulnerable to hypothermia. These include older adults, infants and very young children, the homeless, persons consuming alcohol or other drugs, and persons taking certain medications.

Wind chill is an index used to evaluate the risk posed by the combination of cold temperatures and wind. It is based on temperature and wind speed. Table 3.18 shows the wind chill table used by the National Weather Service. Wind chill is not the actual temperature, but rather a measure of how the combination of wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature. This combination can strongly affect the risks associated with exposure to extreme cold. For example, a wind chill of -20°F will cause frostbite on exposed skin in just 30 minutes.

The National Weather Service issues wind chill advisories when wind chill temperatures are potentially hazardous and wind chill warnings when wind chill temperatures are life threatening. The exact criteria of a wind chill advisory and warning varies from state to state. A wind chill advisory in Wisconsin is issued when wind chill values reach -20°F to -34°F, with wind speeds of 4 mph or more. A wind chill warning in Wisconsin is issued when wind chill values will reach -35°F or colder, with wind speeds of at least four mph for three hours or more. In addition, a wind chill watch is issued 12 to 48 hours before these conditions are expected to occur.

What constitutes extreme cold varies in different parts of the country. In the south, near freezing temperatures are considered extreme cold. Freezing temperatures can cause severe damage to citrus fruit crops and other vegetation. Pipes may freeze and burst in homes that are poorly insulated or without heat. In the north, extreme cold means temperatures well below zero. Winter residents in Kenosha County may see heavy snow, strong winds/blizzards, extreme wind chill, lake-effect snow, and ice storms. The public can stay informed by listening to NOAA Weather Radio, commercial radio or television for the latest winter storm warnings and watches.

[37] *CDC, 2018.*

Table 3.18
Wind Chill Temperatures[a]

Wind (mph)	Temperature (°F)																	
	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	**-22**	**-28**	**-34**	**-40**	**-46**	**-52**	**-57**	**-63**
10	34	27	21	15	9	3	-4	-10	-16	**-22**	**-28**	**-35**	**-41**	**-47**	**-53**	**-59**	**-66**	**-72**
15	32	25	19	13	6	0	-7	-13	**-19**	**-26**	**-32**	**-39**	**-45**	**-51**	**-58**	**-64**	**-71**	**-77**
20	30	24	17	11	4	-2	-9	-15	**-22**	**-29**	**-35**	**-42**	**-48**	**-55**	**-61**	**-68**	**-74**	**-81**
25	29	23	16	9	3	-4	-11	-17	**-24**	**-31**	**-37**	**-44**	**-51**	**-58**	**-64**	**-71**	**-78**	**-84**
30	28	22	15	8	1	-5	-12	**-19**	**-26**	**-33**	**-39**	**-46**	**-53**	**-60**	**-67**	**-73**	**-80**	**-87**
35	28	21	14	7	0	-7	-14	**-21**	**-27**	**-34**	**-41**	**-48**	**-55**	**-62**	**-69**	**-76**	**-82**	**-89**
40	27	20	13	6	-1	-8	-15	**-22**	**-29**	**-36**	**-43**	**-50**	**-57**	**-64**	**-71**	**-78**	**-84**	**-91**
45	26	19	12	5	-2	-9	-16	**-23**	**-30**	**-37**	**-44**	**-51**	**-58**	**-65**	**-72**	**-79**	**-86**	**-93**
50	26	19	12	4	-3	-10	-17	**-24**	**-31**	**-38**	**-45**	**-52**	**-60**	**-67**	**-74**	**-81**	**-88**	**-95**
55	25	18	11	4	-3	-11	**-18**	**-25**	**-32**	**-39**	**-46**	**-54**	**-61**	**-68**	**-75**	**-82**	**-89**	**-97**
60	25	17	10	3	-4	-11	**-19**	**-26**	**-33**	**-40**	**-48**	**-55**	**-62**	**-69**	**-76**	**-84**	**-91**	**-98**

[a] *Wind Chill (°F) = 35.74 + 0.6215T - 35.75($V^{0.16}$) + 0.4275T($V^{0.16}$), where T = air temperature (°F) and V = wind speed (mph). The wind chill temperature is only defined for temperatures at or below 50°F and wind speeds above 3 mph. Bright sunshine may increase wind chill temperature by 10°F to 18°F.*

Frostbite times associated with wind chills:

- 30 minutes
- 10 minutes
- 5 minutes

Source: National Weather Service

Recent Events

Extreme cold that affects Kenosha County are not localized events, as they usually encompass the entire south-central to southeastern portion of the State and may continue for several days or weeks. Between 2011 and 2021, three deaths and no injuries were reported in the County as a result of extreme cold temperatures. Table 3.19 lists the extreme cold events in Kenosha County from 2011-2021. A few examples of recent events from Table 3.19 are noted below.

2013 – On January 21st, arctic air spread into southern Wisconsin behind deep low pressure that tracked to the north of the state. High winds combined with surface temperatures in the single digits below zero to produce wind chills between -20°F to -30°F. The frigid wind chills began the morning of January 21 and continued into the morning hours of January 22. This was one of the relatively few times Milwaukee recorded a low temperature below zero without having a snow cover.

2014 – On January 27th, an arctic cold wave affected southern Wisconsin. West to northwest winds of 10 to 20 mph with the passage of an arctic cold front brought wind chill temperatures of -20°F to 38°F beginning in the early morning of January 27. These wind chills did not end until the morning of January 29. The coldest period was the morning of January 28 when wind chills ranged from -30°F to -38°F. Widespread school and business closings occurred during this time. The Governor declared a state of emergency due to a propane shortage across the state. Numerous water main breaks and frozen laterals continued to occur throughout the entire month of January.

2019 – On January 29th, a surge of historically cold arctic air settled over southern Wisconsin. Windy conditions and low temperatures in the -20s°F to -30s°F resulted in wind chill temperatures of 35 below to 55 below zero for much of this period. Widespread government, school, and business closings were common on January 30-31st. The United States Postal Service suspended mail delivery on January 29-30th. Many water main breaks and power outages occurred.

Table 3.19
Recent Extreme Cold Events in Kenosha County: 2011-2021

Date	Type	Deaths	Injuries	Property Damage ($)	Crop Damage ($)
January 1, 2011	Cold/wind chill	0	0	--	--
January 21, 2013	Cold/wind chill	0	0	--	--
January 6, 2014	Extreme cold/wind chill	0	0	--	55
January 27, 2014	Cold/wind chill	0	0	--	--
January 7, 2015	Cold/wind chill	0	0	--	--
January 9, 2015	Cold/wind chill	0	0	--	--
February 28, 2015	Cold/wind chill	1	0	--	--
January 11, 2016	Cold/wind chill	1	0	--	--
December 14, 2016	Cold/wind chill	0	0	--	--
December 18, 2016	Cold/wind chill	0	0	--	--
November 16, 2017	Cold/wind chill	1	0	--	--
December 25, 2017	Cold/wind chill	0	0	--	--
January 1, 2018	Cold/wind chill	0	0	--	--
January 29, 2019	Extreme cold/wind chill	0	0	--	--
February 7, 2021	Cold/wind chill	0	0	--	--
February 13, 2021	Cold/wind chill	0	0	--	11,842
	Total	3	0	--	11,897

Source: National Climatic Data Center and U.S. Department of Agriculture Risk Management Agency

Vulnerability and Community Impact Assessment

Similar to extreme heat, extreme cold is primarily a public health concern, with the poor and elderly being much more susceptible to extreme temperature-related deaths and injury. Pets and livestock can also suffer from prolonged exposure to excessive cold. Severe cold temperatures can cause breaks in water mains that can interrupt water supply. The impacts of a water main break depend on the size and location of the main. Frozen service laterals can also interrupt water supply to individual buildings. Water main breaks can be costly to municipalities. On average, there are about 1.5 extreme cold events per year in Kenosha County.

A review of the community assets described in Chapter 2 indicate the potential for extreme cold hazard events to impact: 1) residents at a countywide level, especially the poor, elderly, and sick, 2) agricultural croplands; 3) pets and livestock; 4) municipal water and electric utilities; and 5) natural surface and groundwater reserves.

Future Changes and Conditions

As mentioned previously, Kenosha County can expect to experience an average of 1.5 extreme cold events per year. It should be noted that the historical record shows considerable variation among years in the numbers of these events that occurred. While it would be expected that in some years the County will experience either fewer events or more events than the average number, the average annual number of events is not expected to change over the five-year term of this plan update.

The projections based on downscaled results from climate models indicate that there will likely be substantial changes in the frequencies of extreme cold events over the 21st century.[38] The frequency of extreme cold events may decrease by the middle of the century. Projected warming trends are expected to be greatest during the winter with average winter temperatures in Kenosha County projected to increase by about 7.5°F. This may result in a reduction of some risks associated with extreme cold.

Multi-Jurisdictional Risk Management

Based upon a review of the historic patterns of extreme temperature events in Kenosha County, there are no specific municipalities that have unusual risks. Rather, the events are of a uniform countywide concern.

[38] *Wisconsin Initiative on Climate Change Impacts, 2021, op. cit.*

Lake Michigan Coastal Hazards

The Lake Michigan coast of Kenosha County consists of about 15.4 miles of shoreline, encompassing portions of three local units of government, including the City of Kenosha and the Villages of Pleasant Prairie and Somers. The portion of the Lake Michigan shoreline lying within the jurisdiction of each of these general-purpose local units of government is shown in Table 3.20.

There are three types of Lake Michigan coastal hazards of concern that pose risk to Kenosha County:

- **Erosion of Coastal bluffs, beaches, and near shore lake beds**
- **Coastal Flooding** from high Lake Michigan levels and/or storm surge and storm-induced waves (i.e., wave run-up) causing damage to structures such as residences, businesses, and public facilities
- **Damage and failure of shoreline protection structures** (revetments,[39] seawalls, and groins[40]) from wave action, storm surge, and varying lake levels

The main focus of this vulnerability assessment will be on the first two types of coastal hazards noted above: erosion of coastal bluffs and beaches and coastal flooding from high Lake levels and/or storm surge. With regard to the third hazard listed above for damage and failure of shoreline protection structures, there are assets in the County, primarily in the City of Kenosha, that are protected by riprap revetments, groin-beach systems, bulkheads, and breakwater systems. However, the designs of these shore protection structures, most notably those protecting the City sewage treatment and water plants and the marina facilities, have applied standards suitable for major public and private facilities. In addition, the structures are maintained as needed.

It is important to note that shoreline protection structures have been known to contribute to coastal problems by decreasing, or preventing, natural erosion of littoral material (lake bottom near shore) such as sand and gravel from existing shorelines. Additionally, these structures can disrupt the natural flow and deposition of those sediments along the lake shore, affecting beach ecosystems. Some shoreline protection structures may redirect wave energy to adjacent shorelines, which can increase the potential for erosion at neighboring sites.[41]

Nearly 80 percent of Wisconsin's Lake Michigan shoreline is affected by coastal erosion and bluff recession to some degree, and recurring erosion presents a significant risk in almost every coastal county. The terms recession and erosion are often used interchangeably. Recession is the landward movement of a land feature, such as a bluff crest, while erosion is the wearing away of land. Recession is expressed as distance or a change in distance, while erosion is expressed as a volume or change in volume. Recession can be thought of as a consequence of erosion. Shoreline recession rates are usually determined by comparing aerial photographs taken on different dates.

The rate at which coastal erosion occurs is dependent on a variety of factors including Lake Michigan level fluctuations, disruption of the transport of beach-building sediments, elevated groundwater levels, storms, and surface stormwater runoff. Additional contributing factors to coastal erosion can include soil composition, vertical cracks in the upper slope of the soil, shoreline ice cover, freezing and thawing cycles, shoreline orientation, beach composition, beach width and slope, the presence or absence of shore protection, and the type of shore protection.[42] Shores that have cohesive materials, such as clay, till, and bedrock have strong binding forces. Shores that have non-cohesive materials, such as sand and/or gravel have weak or

[39] *Revetments are sloping structures placed on banks or cliffs in such a way as to absorb the energy of incoming water (i.e., wave impact). Many materials may be used such as wooden piles, loose-piled boulders (i.e., riprap), concrete shapes, or geotextile fabric sandbags.*

[40] *A groin is a narrow structure (i.e., breakwater and/or jetty) built out into the water from a beach in order to prevent beach erosion or to trap and accumulate sediments that would otherwise drift along the beach face. A groin can be successful in stabilizing a beach on the up-drift side, but erosion tends to be aggravated on the down-drift side.*

[41] *University of Wisconsin Sea Grant,* Great Lakes Coastal Shore Protection Structures and Their Effects on Coastal Processes, *2013*.

[42] *U.S. Army Corps of Engineers-Detroit District, University of Wisconsin Sea Grant,* Living on the Coast: Protecting Investments in Shore Property on the Great Lakes, *2003*.

no binding forces. Like most of the Great Lakes Region, the soils in Kenosha County are composed of sand, gravel, clay, and clay-like material known as glacial till. Much of the bluffs along the Kenosha County coast are relatively high (50-200 feet) and are prone to landslides, slumping, surface rill erosion, and soil creep.[43]

Table 3.20
Lake Michigan Shoreline Length of Communities in Kenosha County

Community	Lake Michigan Shoreline Length (miles)	Percent of County Total
City of Kenosha	7.00	45.5
Village Pleasant Prairie	5.31	34.5
Village of Somers	3.07	20.0
Total	15.38	100.0

Source: SEWRPC

Lake Level Fluctuations

Lake level can be a significant factor in determining the rate of erosion along the Wisconsin Lake Michigan coasts. As mentioned above, high Lake levels and increased wave action can worsen both coastal erosion and coastal flooding issues. As Lake levels rise, bluff recession rates can also increase. Major storm events can also lead to high erosion rates because of increased wave action on the shoreline. The effects of wave-induced erosion are usually greater during periods of high Lake levels. Conversely, low Lake levels pose problems for facilities that are dependent on constant access to water, such as ports, marinas, and nearshore water utility intakes. Low water levels can also cause problems with shore protection structures, such as normally submerged timber pilings being exposed to air.

Water levels in the Great Lakes fluctuate seasonally, annually, and over multi-decade cycles. Seasonally, the lakes are at their lowest levels during the winter, when much of the precipitation is held on land in the form of snow and ice, and evaporation occurs only over open water. The highest seasonal levels are typically during the summer when snowmelt from the spring thaw and summer rains contribute to the Lake water supply. For Lake Michigan in the 30-year-period between 1991-2021, the average difference between summer high water levels and winter low water levels has been about one foot.[44] Long-term variations in Lake levels (over multi decades) depend on climatic factors such as precipitation, the presence or absence of ice cover on the Lake during the winter, and evaporation of water from the Lake.

Coastal hazard problems have been most evident in southeastern Wisconsin and Kenosha County during high water periods. These have occurred in recent history on Lake Michigan in the early 1950s, the early 1970s, and the mid-1980s, with water levels in 2019 approaching the record set in 1986. As of November 2021, Lake Michigan water levels continued their seasonal decline, decreasing by about 3 inches from October to November. Though Lake Michigan is about 25 inches below the highest monthly water level recorded for November in 1986, the Lake is still about 13 inches above the long-term average water level as of November 2021. Water levels are expected to continue their seasonal decline through the early winter but remain above the long-term average.[45]

Shoreline Recession and Bluff Stability Conditions

An inventory of the shoreline conditions and bluff stability within the entire Southeastern Wisconsin Region was conducted in 1977[46] by a number of coastal technical consultants under the Wisconsin Coastal Management Program (WCMP) and again in 1995 for a study done by SEWRPC in conjunction with the WCMP.[47] The latter study found bluff recession rates of up to nine feet per year over the period 1963 to 1995, with an average of 1.8 feet per year. Similarly, erosion rates of up to eight feet per year, with an average of 1.1 feet per year were found for the period 1975 to 1995. In general, the study found bluff stability had improved compared to 1977 conditions. This is likely due to the construction of shoreline

[43] *Soil creep (also known as downhill creep, or creep) is the slow and subtle downward progression of rock and soil down a low grade slope.*

[44] *This is a calculated average from monthly water levels obtained from the National Oceanic and Atmospheric Administration's Great Lakes Environmental Research Laboratory.*

[45] *Collaborative Action for Lake Michigan (CALM) Coastal Resilience Monthly Newsletter, November 2021.*

[46] *D.M. Mickelson, L. Acomb, N. Brouwer, T.B. Edil, C. Fricke, B. Haas, D. Hadley, C. Hess, R. Klauk, N. Lasca, and A.F. Schneider,* Technical Report, Shoreline Erosion and Bluff Stability Along Lake Michigan and Lake Superior Shorelines of Wisconsin, *Wisconsin Coastal Management Program, February 1977.*

[47] *SEWRPC Technical Report No. 36,* Lake Michigan Shoreline Recession and Bluff Stability in Southeastern Wisconsin: 1995, *December 1997.*

protection measures in areas of development. The 1997 study also reported relatively stable conditions for the most part in areas where shoreline development exists in Kenosha County. However, there is the potential for shoreline and bluff erosion to impact structures over the long term. One area with an unstable bluff was found to be located on the shoreline in the northern part of the County. In addition, during severe climatic conditions, such as high water levels or saturated ground conditions, larger episodic bluff erosion events could occur. The 1997 study also noted the importance of offshore lake depths, as increases in offshore depths can cause increased shore erosion problems. At the five sites in Kenosha County where offshore bathymetry was measured in 1995 and compared to 1977 data, changes in depths were not definitive. However, at the seven sites in neighboring northern Racine County where offshore bathymetry was measured, four sites showed significant improvement in shore erosion conditions with decreases in depth, while the others showed little change.

Wisconsin Shoreline and Oblique Photo Viewer

WCMP, the Association of State Floodplain Managers (ASFPM), and Geo-Professional Consultants, LLC have developed a web mapping tool to view shoreline conditions along most of Wisconsin's Great Lakes coast. The Wisconsin Shoreline Inventory and Oblique Photo Viewer (shoreline viewer tool)[48] can be used to view and compare assessments on shoreline protection and shore and bluff conditions. Shoreline characteristics and conditions were derived from interpretation of oblique aerial photography of the Lake Michigan coastline taken in 1976 and 2007, performed by David M. Mickelson.[49] It should be noted that these interpretations represent conditions on the date that these photographs were taken and are limited by what can be seen in the photos.

In addition, geotagged oblique images can be viewed and compared on the shoreline viewer tool from 1976, 2007, 2010, 2017, 2018, 2019, 2020, and 2021. These images can be used with the interactive mapping tool to understand and evaluate how bluffs along the Kenosha County coast have changed over time.

Map 3.8 summarizes an assessment of the types of shore protection in the County in 2018-2019, as provided on the shoreline viewer tool. Nearly 17 percent of the shoreline in Kenosha County was unprotected in 2018-2019. The most common type of shore protection in the County was revetment (43.4 percent); followed by poorly organized rip-rap or rubble (30.1 percent); public marina (7.3 percent); seawall or bulkhead (2.5 percent); and private marina (0.1 percent).

The shoreline viewer tool also provides insight into current general conditions of Lake Michigan bluffs in 2018, as shown in Map 3.9. In 2018, 77.9 percent of the Kenosha County shoreline did not contain bluffs, and 9.9 percent of the shoreline was considered to have moderately unstable to unstable/failing bluffs (as shown in black and red on Map 3.9). According to the assessment, bluffs considered to be unstable or failing were all located in the Village of Somers. Map 3.10 specifies the types of bluff failure that were occurring at the time of the 2018-2019 assessment. Shallow slides were the most common type of bluff failure, occurring at 13.3 percent of the assessed County shoreline, followed by creep failure (0.3 percent), and 8.4 percent of the coastline showed no obvious failures.

Long-Term and Short-Term Bluff Toe and Bluff Crest Recession

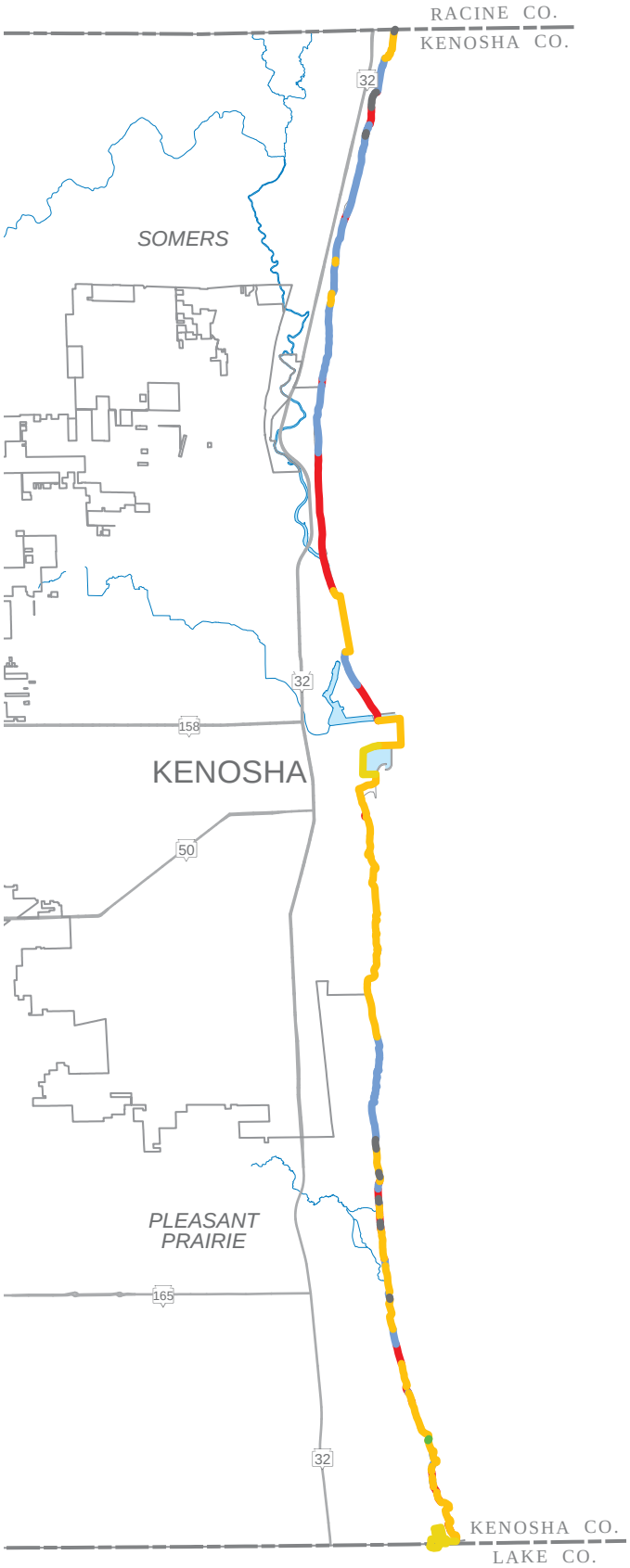
A recent analysis by the University of Wisconsin-Madison Coastal Sustainability and Environmental Fluid Mechanics Laboratory is also available to view on the shoreline viewer tool. The study measured long-term (1956-2015) and short term (1995-2015) bluff toe recession, bluff crest recession, and general shoreline recession along the shores of Kenosha, Milwaukee, Ozaukee, and Racine Counties.[50] Bluff recession distances were measured from historical aerial photos in Geographic Information Systems (GIS) software. The bluff crest, bluff toe, and shoreline were carefully traced on each aerial photo. The bluff crest is identified as the break in slope between the upland and the bluff slope; the bluff toe is identified as the break in slope between the bluff slope and the beach; and the shoreline is defined as the location that appears as the

[48] *Floodatlas.org/asfpm/oblique viewer.*

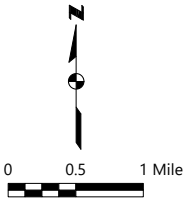
[49] *Mickleson, D and Stone J,* Wisconsin's Lake Superior and Lake Michigan Shoreline Oblique Photography: Analysis of Changes 1976 (78) to 2007 (08), A Report to the Wisconsin Coastal Management Program, *2012*.

[50] *This study was funded by the Wisconsin Coastal Management Program and the National Oceanic and Atmospheric Administration, Office for Coastal Management.*

Map 3.8
Types of Shore Protection in Kenosha County: 2018-2019

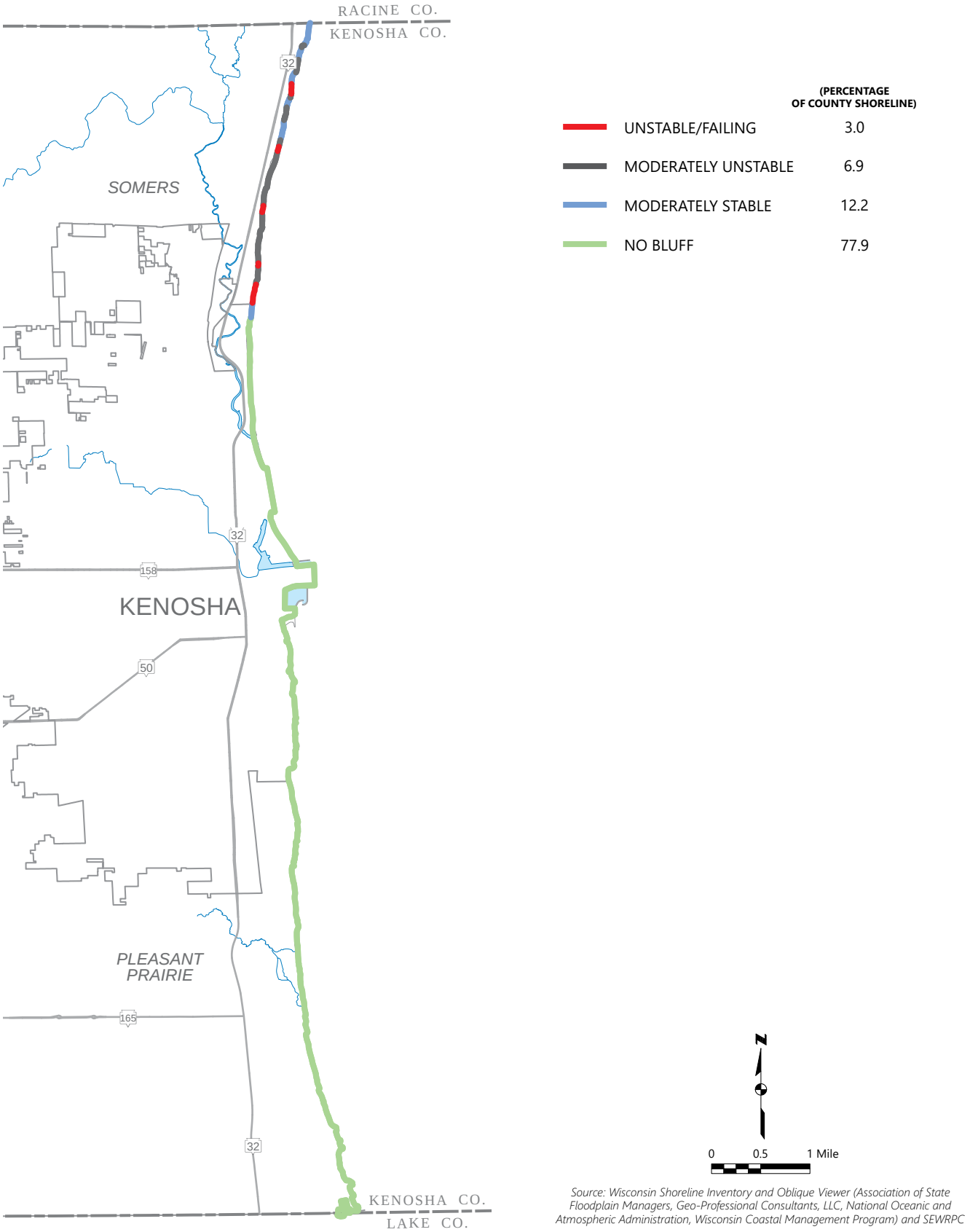


	(PERCENTAGE COUNTY SHORELINE)
PUBLIC MARINA	7.3
PRIVATE MARINA	0.1
SEAWALL/BULKHEAD	2.5
REVETMENT	43.4
POORLY ORGANIZED RIP-RAP/RUBBLE	30.1
NO PROTECTION	16.6



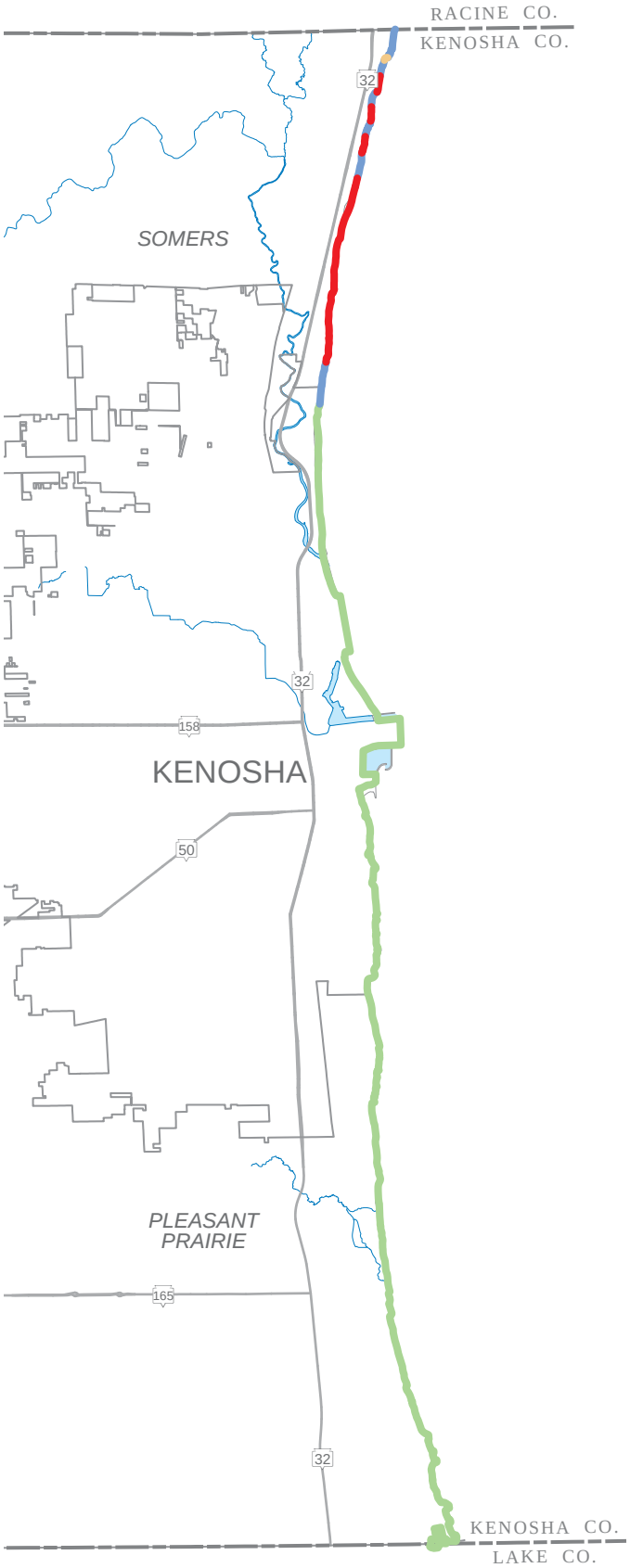
Source: Wisconsin Shoreline Inventory and Oblique Viewer (Association of State Floodplain Managers, National Oceanic and Atmospheric Administration, University of Wisconsin Coastal Sustainability Laboratory, UW Sea Grant Institute, Wisconsin Coastal Management Program) and SEWRPC

Map 3.9
General Bluff Conditions in Kenosha County: 2018

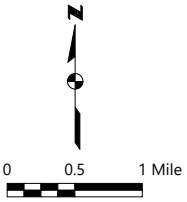


Source: Wisconsin Shoreline Inventory and Oblique Viewer (Association of State Floodplain Managers, Geo-Professional Consultants, LLC, National Oceanic and Atmospheric Administration, Wisconsin Coastal Management Program) and SEWRPC

Map 3.10
Types of Bluff Failure in Kenosha County: 2018-2019



	(PERCENTAGE OF COUNTY SHORELINE)
SHALLOW SLIDES	13.3
CREEP	0.3
NO OBVIOUS FAILURES	8.4
NO BLUFF	77.9



Source: Wisconsin Shoreline Inventory and Oblique Viewer (Association of State Floodplain Managers, National Oceanic and Atmospheric Administration, University of Wisconsin Coastal Sustainability Laboratory, UW Sea Grant Institute, Wisconsin Coastal Management Program) and SEWRPC

interface between the water and land at the time the photo was taken (see Figure 3.4). Data in Maps 3.11 through 3.14 show recession distances that have been spatially averaged along 300-foot sections of the coast. The data therefore represent average recession over a distance wider than a typical parcel or shoreline frontage and should not be interpreted as recession at a specific property.

This recession analysis can provide useful insights into the historic migration of the Lake Michigan coast in Kenosha County. It should be noted that bluff recession can be sporadic. A bluff crest that remained unchanged for decades can recede many feet almost instantly due to a bluff collapse. This analysis represents how the bluffs have responded to historical environmental conditions and human actions over a specific time period. There will always be uncertainty in how bluff and shoreline recession will respond to future conditions.

Long-Term Bluff Toe and Crest Recession

As shown in Map 3.11, about 7.1 percent of the bluff toe in Kenosha County has experienced at least some recession in the 59-year long term period from 1956 to 2015. Furthermore, about 1.8 percent of the County's bluff toe was estimated to have experienced significant recession of at least 20 feet, mostly observed in the in Village of Somers in the northern portion of the County. It is estimated that about 92.9 percent of the bluff toe in the County has experienced accretion, or has moved towards the Lake. It should be noted that accretion or small bluff toe recession distances may represent areas where the bluff crest has slumped towards the shoreline or where the construction of shore protection structures has advanced the bluff toe lakeward.

Map 3.12 shows long term bluff crest recession distances in the County. About 22.2 percent of the bluff crest in Kenosha County has experienced at least some recession, with 13.0 percent experiencing at least 20 feet of retreat, and 1.8 percent experiencing more than 60 feet of recession, mostly observed in the Village of Somers. About 77.8 percent of the bluff crest in the County has had no recession or has experienced accretion, possibly due to fill added to the bluff in a slope stabilization project.

Short-Term Bluff Toe and Crest Recession

As shown in Map 3.13, about 43.9 percent of the bluff toe in Kenosha County has experienced at least some recession in the 20-year period from 1995 to 2015, with most of that percentage experiencing 0 to 10 feet of bluff toe retreat. It is estimated that 5.3 percent of bluff toe in the County has not seen any recession and 50.8 percent has experienced accretion. Again, it should be noted that bluff toe accretion may represent areas where material has slumped from the bluff crest above.

Map 3.14 shows short term bluff crest recession distances in Kenosha County. About 9.3 percent of bluff crest data collected in the County has shown at least some recession in the 20-year short term period, and 3.7 percent has experienced at least 10 feet of recession. Conversely, 18.5 percent of the bluff crest in Kenosha County has experienced no recession and 72.2 percent has experienced accretion during this short-term period.

Coastal Flooding

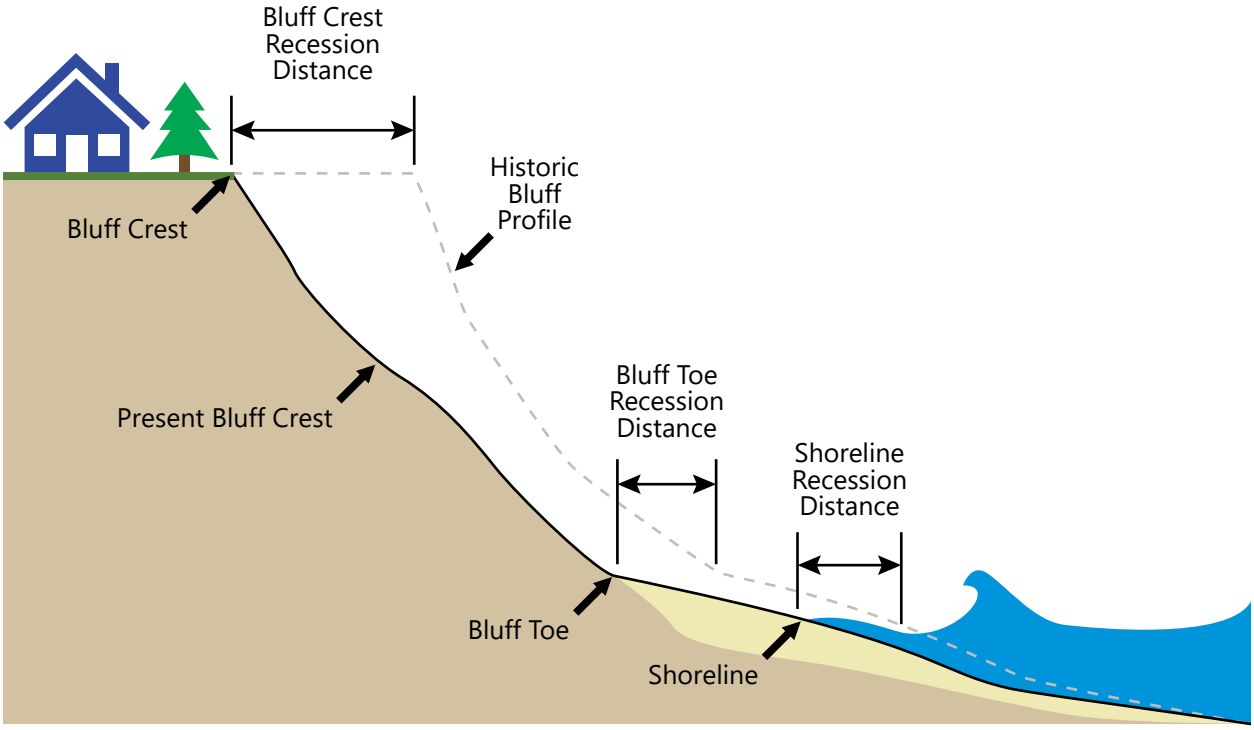
Coastal flooding tends to be most serious in the low-lying areas.[51] The risk of coastal flooding is reduced when lake levels are low, however other factors such as storm-induced winds and wave run-up can cause or exacerbate coastal flooding. Likewise, when lake levels are high, storm surge, wave height, and wave run-up also influence the severity of coastal flooding. Communities positioned on low terraces are at a medium risk of flooding, whereas communities in the County located on high bluff areas are not vulnerable to coastal flooding.[52]

Based on a SEWRPC parcel-based analysis, there were seven parcels with structures (all residential and located in the Village of Pleasant Prairie) identified within the Lake Michigan 100-year recurrence interval floodplain (special flood hazard area). The assessed value of these structures in 2021 was estimated at about $1.6 million and more than $2.3 million when the value of contents is considered. The location of the parcels with structures within the flood hazard areas are shown on Map 3.15. Because of their proximity to the Lake and low-lying position, these identified structures are vulnerable to coastal flooding and its

[51] *State of Wisconsin Hazard Mitigation Plan, December 2016, op. cit.*

[52] Ibid.

Figure 3.4
Bluff Recession Schematic



Source: Wisconsin Coastal Management Program and SEWRPC

associated hazards such as storm-induced winds or wave run-up. It is estimated that in the event of 100-year recurrence interval coastal flood, these structures would sustain about $290,000 in damages ($252,000 in direct damages, and $38,000 in indirect damages) (2021 dollars).

The Great Lakes Coastal Flood Study (GLCFS) is an on-going collaboration between FEMA and the U.S. Army Corps of Engineers (USACE) and will soon complete mapping for coastal flood velocity zones (V Zones) for the Great Lakes. Currently, the Lake Michigan coast has flood Zones A or AE along much of its coast, including Kenosha County. Zones A and AE are typically inland (i.e., lakes and rivers) flood zones that do not account for wave action greater than 3 feet or storm surge. Zones V and VE represent the area along the coast that is subject to inundation by the 1-percent-annual-probability flood along with additional hazards associated with wave run-up greater than 3 feet above the base flood elevation (BFE). Zones AE and VE have detailed hydraulic studies to determine the BFE (i.e., elevation data), while Zones A and V do not and are approximate flood zones. Digital Flood Insurance Rate Maps (DFIRMs) showing the new coastal V and VE Zones for Kenosha County should be available within the life span of this plan.[53]

Recent Events

2013 – Lake Michigan water levels were up an average of more than three feet since January 2013, its highest level since 1998 according to the National Weather Service. The large amount of ice cover in the winters of 2013-14 has led to less evapotranspiration, contributing to rising Lake levels.

2014 – Strengthening low pressure over the lower peninsula of Michigan in conjunction with a strong push of cold air over the relatively warm waters of Lake Michigan resulted in strong winds affecting the nearshore waters of Lake Michigan on October 31st. Wind gusts were frequently between 39 and 49 miles per hour over nearshore waters, with gusts of 54 miles per hour being reported at the City of Kenosha. These winds produced 20-foot high waves which caused considerable damage along the lakefront in the City of Kenosha. The waves pushed rocks and debris onto Kennedy Drive. While City crews were able to clean up the area, some sections of the revetment needed to have larger boulders restacked in order to

[53] *State of Wisconsin Hazard Mitigation Plan, December 2016, op.cit.*

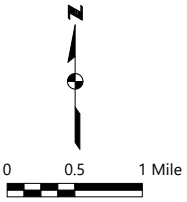
Map 3.11
Long Term Bluff Toe Recession in Kenosha County: 1956-2015



BLUFF RECESSION

(IN TOTAL FEET)		(PERCENT OF DATA)
●	GREATER THAN 60 (Greater than 1 Ft/Year)	0.0
●	40 TO 60 (0.7 to 1 Ft/Year)	0.0
●	20 TO 40 (0.3 to 0.7 Ft/Year)	1.8
●	0 TO 20 (0 to 0.3 Ft/Year)	5.3
●	NO RECESSION	0.0
●	ACCRETION	92.9

Note: Areas with no data points indicate locations where no bluff is present.



Source: Wisconsin Shoreline Inventory and Oblique Viewer (Association of State Floodplain Managers, National Oceanic and Atmospheric Administration, University of Wisconsin Coastal Sustainability Laboratory, UW Sea Grant Institute, Wisconsin Coastal Management Program) and SEWRPC

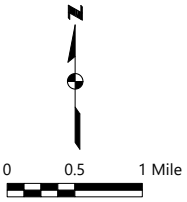
Map 3.12
Long Term Bluff Crest Recession in Kenosha County: 1956-2015



BLUFF RECESSION

(IN TOTAL FEET)	(PERCENT OF DATA)
GREATER THAN 60 (Greater than 1 Ft/Year)	1.8
40 TO 60 (0.7 to 1 Ft/Year)	5.6
20 TO 40 (0.3 to 0.7 Ft/Year)	5.6
0 TO 20 (0 to 0.3 Ft/Year)	9.2
NO RECESSION	3.7
ACCRETION	74.1

Note: Areas with no data points indicate locations where no bluff is present.



Source: Wisconsin Shoreline Inventory and Oblique Viewer (Association of State Floodplain Managers, National Oceanic and Atmospheric Administration, University of Wisconsin Coastal Sustainability Laboratory, UW Sea Grant Institute, Wisconsin Coastal Management Program) and SEWRPC

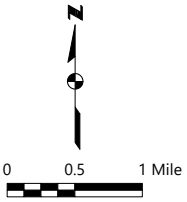
Map 3.13
Short Term Bluff Toe Recession in Kenosha County: 1995-2015



BLUFF RECESSION

(IN TOTAL FEET)	(PERCENT OF DATA)
GREATER THAN 20 (Greater than 1 Ft/Year)	5.3
10 TO 20 (0.5 to 1 Ft/Year)	14.0
0 TO 10 (0 to 0.5 Ft/Year)	24.6
NO RECESSION	5.3
ACCRETION	50.8

Note: Areas with no data points indicate locations where no bluff is present.



Source: Wisconsin Shoreline Inventory and Oblique Viewer (Association of State Floodplain Managers, National Oceanic and Atmospheric Administration, University of Wisconsin Coastal Sustainability Laboratory, UW Sea Grant Institute, Wisconsin Coastal Management Program) and SEWRPC

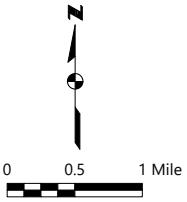
Map 3.14
Short Term Bluff Crest Recession in Kenosha County: 1995-2015



BLUFF RECESSION

(IN TOTAL FEET)	(PERCENT OF DATA)
GREATER THAN 20 (Greater than 1 Ft/Year)	0.0
10 TO 20 (0.5 to 1 Ft/Year)	3.7
0 TO 10 (0 to 0.5 Ft/Year)	5.6
NO RECESSION	18.5
ACCRETION	72.2

Note: Areas with no data points indicate locations where no bluff is present.



Source: Wisconsin Shoreline Inventory and Oblique Viewer (Association of State Floodplain Managers, National Oceanic and Atmospheric Administration, University of Wisconsin Coastal Sustainability Laboratory, UW Sea Grant Institute, Wisconsin Coastal Management Program) and SEWRPC

Map 3.15
Location of Structures Along the Lake Michigan Coastal that are Within the 1-Percent-Annual-Probability Flood Hazard Area: 2020



Source: Federal Emergency Management Administration, Wisconein Department of Natural Resources, and SEWRPC

obtain the required height. The cost of construction for doing this was estimated at $59,000 to $89,000 (2021 dollars). At Southport Marina, waves undermined a boat storage facility, causing its concrete floor to collapse. Waves also damaged a concrete overlook at HarborPark and a cobblestone walkway along the harbor. The costs of construction for repairing the overlook were estimated at $178,000 (2021 dollars). The greatest damage occurred at Southport Park, where waves impacted about 500 feet of shoreline. Damages included dislodging of riprap, severe erosion, and the failure of a stone revetment wall. The estimated cost to rebuild about 450 feet of stone revetment wall and install additional protection against erosion at Southport Park was about $600,000 to $650,000 (2021 dollars).

2018 – On April 15th, a prolonged period of strong and gusty onshore northeast winds resulted in high waves crashing into the western shore of Lake Michigan from April 13th through the 14th, and into the early morning of April 15th. Northeast winds were persistent 20 to 30 mph with frequent gusts of 35 to 45 mph for about a 24 hour period. Waves were estimated to reach 15 feet in height as they crashed into shore. These waves and high Lake levels resulted in areas of lakeshore erosion and damage from Port Washington south to Kenosha with the most erosion in the Racine and Kenosha County lake shore areas.

2019 – In the fall of 2019, lakefront erosion in the Village of Somers reached a threatening level. One home had dealt with bluff erosion along Lake Michigan for one and a half years. According to Kenosha News, an excessive amount of rain and near record Lake water levels caused a portion of the basement to slide off the bluff. Demolition of the entire property occurred the following week and cost approximately $50,000 (2021 dollars). This event was not isolated to a single home, however. Other parts of Somers experienced lakefront erosion during the multi-year high Lake level.

2020 – On January 10th, a winter storm created significant damage along the Lake Michigan shoreline. Near record high Lake Michigan water levels along with strong winds and resultant high waves peaking at 10 to 15 feet caused considerable erosion and lakeshore flood damage. Kemper Center County Park in the City of Kenosha was severely damaged due to high winds and waves. The shoreline between 71st and 76th Streets in the City of Kenosha was damaged. A sinkhole developed and caused the shoreline to collapse in two locations. Damage also occurred on the Kenosha Harbor walls and promenade due to high waves of at least 10 feet. Lakeshore flooding also closed Kenosha streets including First Avenue, 50th Street, Fourth Avenue, and 45th Street. The Village of Pleasant Prairie sustained lakeshore damage on Lake Shore Drive between 107th Street and 113th Street, impacting about 1,300 feet of shoreline. A stream outlet just north of 110th Street was buried by lakeshore flooding and erosion, which resulted in flooding on upstream properties. A 15-inch corrugated metal culvert end section required emergency excavation to alleviate the riverine flooding. Damage was also done at the South Beach area, Chiwaukee Beach, and Prairie Shores Beach. Lakeshore erosion also caused a Pleasant Prairie home to teeter on the edge of the bluff overlooking Lake Michigan. As a result of the storm, Governor Tony Evers declared a major disaster for the State of Wisconsin on February 10, 2020.

Vulnerability and Community Impact Assessment

In 2021, Wisconsin Emergency Management (WEM) conducted a county-level coastal erosion risk and vulnerability assessment for the State as part of the Threat and Hazard Identification and Risk Assessment (THIRA). WEM used the statewide parcel inventory (Wisconsin Statewide Parcel Database) as the basis for estimating the existing potential losses from Lake Michigan coastal erosion. Each parcel contained information such as total parcel value, improvement value, and property class. A GIS buffer analysis was conducted to identify parcels within one-quarter and one-half mile of the Lake Michigan coastline. Parcels within one-quarter of a mile from the coast were considered to be in a High Risk Erosion Zone, while parcels within one-half mile were considered to be in a Low Risk Erosion Zone. As a result, a total of 7,289 parcels were determined to be within the coastal risk erosion zones (see Table 3.21). Of those 7,289 total identified parcels, 6,689 were classified as residential, 587 as commercial, and 13 as manufacturing. The low-risk zone has an estimated value of improvements of nearly $790 million, while the high-risk zone has a value of improvements of more than $459 million, for a combined total value of improvements around $1.25 billion. It should be noted that the high and low risk coastal zones are solely based on distance from the Lake Michigan shoreline. Steps already taken, such as shoreline protection structures, likely have reduced the coastal hazard risk to many of these structures.

Table 3.21
Parcels Within the Low- and High-Risk Coastal Erosion Zones in Kenosha County: 2021

	Improved Parcels in Erosion Risk Zone				Value of Improvements ($)[a]			
Kenosha County	Residential	Commercial	Manufacturing	Total	Residential	Commercial	Manufacturing	Total
Low-Risk Zone (within 0.5 miles)	4,286	454	11	4,751	568,748,200	215,881,600	4,760,400	789,390,200
High-Risk Zone (within 0.25 miles)	2,403	133	2	2,538	377,573,100	81,545,800	667,100	459,786,000
Total	6,689	587	13	7,289	946,321,300	297,427,400	5,427,500	1,249,176,200

[a] *2021 dollars.*

Source: Wisconsin Emergency Management

Some low-lying areas in the southern portion of the County, where bluffs are not present, have been susceptible to recent beach erosion and contain structures vulnerable to a 1-percent annual flood hazard event. Ordinances that require property owners to stabilize the bluffs along their property before building has reduced the chance of property damage in many parts of the County. As discussed above, the seven structures identified as a possible risk to coastal flooding along the low-lying coastline in the Village of Pleasant Prairie had an estimated $252,000 of potential direct damages and $38,000 potential indirect damages, for an estimated total of $290,000 in total damages for a 100-year recurrence interval storm event (2021 dollars).

A review of the community assets described in Chapter 2 indicate the potential for coastal hazard impacts to: 1) flood prone residential, commercial, and other developed land uses; 2) agricultural lands; 3) a limited extent of the roadway transportation system; 4) utilities associated with the potentially impacted roadways and structures; and 5) some utilities located immediately along the lakeshore.

A review of the Lake Michigan coastal erosion conditions in Kenosha County indicates that there is a significant potential community impact as a result of the potential loss of land improvements and infrastructure in selected areas due to lakeshore erosion. A potential utility problem relates to the potential impact of extreme high lake levels on the City of Kenosha wastewater treatment plant outfall and related facility hydraulic capacity. In addition to major facility impacts, it is possible that local utilities located in road rights-of-way could be impacted if Lake erosion were to be severe enough to endanger portions of the street. No significant impacts are expected to other infrastructure or utility systems, solid waste disposal sites, or hazardous material storage sites.

A review of coastal flooding conditions within Kenosha County indicates that there is a moderate potential community impact as indicated from the potential damages to structures within the 1-percent-annual-probability flood hazard area along the southern coast of the County. However, with proper surveillance, the need to prepare for major evacuations and other emergency actions are not a significant concern given the isolated nature and the limited severity of the problems.

Future Changes and Conditions

Changes in land use can have an impact on the potential for coastal erosion hazards to occur. Such changes relate to the potential future increase in development within the erosion hazard areas, particularly when not accompanied by proper shore protection measures. Enforcement of the current zoning procedures that are in place in the coastal communities of Kenosha County call for the use of shoreline protection, bluff stabilization structural measures, and bluff setbacks for new development along portions of the Lake Michigan shoreline where urban shoreline development exists, or is envisioned, and for areas of limited development where no structural protection measures are envisioned.

As discussed in the sections above, Lake Michigan is about 13 inches above the long-term average water level as of November 2021, causing some residents in the Village of Somers to experience significant erosion and bluff recession issues. In addition, climate change may lead to more drastic fluctuations in Lake Michigan water levels. Over the five-year period covered by this plan update, Lake Michigan water levels are expected to continue to fluctuate. Potential future fluctuations in Lake Michigan water levels could lead to continued bluff failures, particularly in areas that have no shoreline protection, where shoreline protection structures are not maintained adequately, or where shoreline protection structures are not built to sufficient specifications to protect against fluctuating water levels. Mitigation measures to protect areas along the Lake Michigan coast are described further in Chapter 5.

Changes over the 20th century and projections based on downscaled results from climate models indicate that there will likely be changes affecting coastal conditions over the 21st century. Coastal areas have experienced, and are projected to experience, increases in air temperatures, increases in precipitation, especially during fall, winter, and spring months, and increases in the frequency of heavy precipitation events.[54] Wind strengths have increased over the Great Lakes and are expected to continue increasing into the future.[55] In addition, wind patterns over Lake Michigan have altered. Prevailing winds during summer months have shifted from coming from the southwest during the 1980s to coming from the east after

[54] *Wisconsin Initiative on Climate Change Impacts, 2021, op. cit.*

[55] *Desai, Austin, Bennington, and McKinnley, 2009, op.cit.*

1990.[56] These climatic changes are expected to influence lake levels, coastal erosion, flooding, and shoreline stability, sometimes in complex ways. According to the NOAA Office for Coastal Management in 2015, "recent climate studies, along with the large spread in existing modeling results, indicate that projections of Great Lakes water levels represent evolving research and are still subject to considerable uncertainty."

For example, Lake Michigan is likely to be impacted by trends that act both to increase and to decrease water levels. Increased precipitation will increase water contributions to the Lake. At the same time, increases in temperatures will lead to increases in evaporation of water from the Lake. The projected temperature increase will also result in reduced ice cover over the winter. This affects evaporation because ice cover on the Lake acts as a cap, reducing evaporation by preventing water vapor from escaping into the air. As a result of both of these processes, evaporation from the Lake is projected to increase.[57] It should be noted that water levels in the Lake vary widely around their average, with high-water and low-water decades occurring. This variability is expected to continue.

While the hazard impacts associated with water level variations should be similar in type to those impacts currently resulting from water level variations, there may be some increase in the magnitude of these impacts. While low water levels may allow beaches and beach ridges to build and beach-anchoring vegetation to move toward the Lake, they may also adversely impact shipping, power generation, and tourism. It should be noted that long periods of low water levels may lead to erosion of the lakebed, which may allow storm-generated waves to reach farther inland when water levels rise. While high water levels may benefit communities, businesses, and industries that depend upon Great Lakes waters for commercial shipping, hydro power, recreational boating, and tourism, higher water levels with increased storm frequency and intensity could increase shoreline and bank erosion. This could increase damages to lakefront property and reduce the area of beaches.

Several other elements of climate change may also act to intensify shoreline erosional processes. Increases in wind strength over the Lake and changes in prevailing wind direction would be likely to lead to greater offshore wave development. This would produce higher waves along the coast. Changes in several elements of climate may affect the stability of bluffs along the lakeshore. The amount of water contained in bluff soils is an important factor determining their stability. Friction between soil particles hold them in place. As water fills the spaces between these particles the friction between soil particles decreases, causing the soil to become more fluid and less stable. Higher lake levels and increases in 1) precipitation, 2) the frequency of heavy storms, and 3) the number of freeze-thaw cycles may all contribute to shoreline bluffs becoming less stable and more susceptible to slumping. Prolonged dry periods and droughts may also contribute to reduced stability of coastal bluffs. As bluff soils dry out, cracks in the soil can form, weakening the surface soil. During long-term droughts, these cracks can develop into deep fractures. Such fractures can allow surface water to penetrate deep into bluff soils. If heavy rainfall events occur following a drought, they may cause rapid saturation of dry, fractured bluff soils which could cause a major slope failure.

Multi-Jurisdictional Risk Management

Shoreline erosion, bluff failure, and coastal flooding, when combined, present a moderate risk in Kenosha County. As discussed above, coastal hazard risks are present in all three local units of government in Kenosha County along Lake Michigan. Areas of recent active erosion have been identified within the City of Kenosha and the Villages of Pleasant Prairie and Somers. Those communities are noted in Table 3.22 along with the basis of special consideration over and above the countywide consideration.

Severe Winter Storms

Winter storms can vary in size and strength and include heavy snowstorms, blizzards, freezing rain, sleet, ice storms, and blowing and drifting snow conditions. Extremely cold temperatures accompanied by strong winds can result in wind chills that cause bodily injury, such as frostbite and death. A variety of weather phenomena and conditions can occur during winter storms. For clarification, the following are National Weather Service approved descriptions of winter storm elements.

[56] *James T. Waples and J. Val Klump, "Biophysical Effects of a Decadal Shift in Summer Wind Direction over the Laurentian Great Lakes," Geophysical Research Letters, Volume 29, pages 43-1 through 43-4, 2009.*

[57] *Wisconsin Initiative on Climate Change Impacts, 2021, op. cit.*

Table 3.22
Communities in Kenosha County with Special Coastal Hazard Conditions

Community	Reason for Special Consideration
City of Kenosha	Portions of the shoreline have been shown to recede one to two feet per year Damming of the mouth of the Pike River by littoral drift in Lake Michigan
Village of Pleasant Prairie	Portions of the shoreline have been shown to recede one to two feet per year Low-lying coastal areas contain residential structures within the 1-percent annual flood hazard area
Village of Somers	Unstable or failing bluffs; Short-term bluff toe recession rates of over one foot per year and crest recession rates up to one foot per year

Source: SEWRPC

- **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

- **Blizzard** – An occurrence of sustained wind or frequent gusts 35 mph or higher accompanied by falling or blowing snow, and visibilities of one-quarter mile or less, for three or more hours

- **Ice Storm** – An occurrence of rain falling from warmer upper layers of the atmosphere to the colder ground, freezing upon contact with the ground and exposed surfaces, resulting in ice accumulations of one-quarter inch or more within 12 hours or less

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

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

- **Wind Chill** – An apparent temperature that describes the combined effect of wind and low air temperatures on exposed skin

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 10 inches of widespread accumulation happen on the average only once per winter season across southern Wisconsin. In addition, a snowfall event of six to eight inches usually occurs once per winter. The northwestern portion of Wisconsin receives most of its snow during early and late season storms, while southwestern and southeastern counties receive heavy snows more often in mid-winter. Snowfall amounts in Kenosha County average between 30 and 40 inches per season.

Lake Michigan can have both an enhancement effect and a dampening effect on snowfall totals in the County. Warmer water temperatures in the Lake can keep winter air temperatures on land near the lakeshore warm enough for precipitation to fall as rain where it may fall as snow only a mile further inland. On the other hand, lake effect snow bands can drop significant amounts of snow on nearshore communities, while areas slightly further inland may see no snow at all. Lake effect snow occurs when cold air moves across the relatively warm open waters of Lake Michigan, causing warm air and moisture to transfer into the lowest portion of the atmosphere, forming snow producing clouds.

Blizzard-like conditions often can occur during heavy snowstorms when gusty winds cause severe blowing and drifting of snow, even if the conditions did not last long enough to be considered a true blizzard. True blizzards are not common in Wisconsin. However, when they do occur, they tend to affect the eastern counties near Lake Michigan. Due to less frictional drag over Lake Michigan, northeast windstorms can reach higher speeds. According to the NCDC and shown in Table 3.23, Kenosha County has experienced two blizzard events from 2011 to 2021.

Freezing rain, ice, and sleet storms can occur at any time from October into April. In a typical winter season, there are three to five light freezing rain events in the southeastern Wisconsin region. On average, a major ice storm occurs about once every other year somewhere in the State and once every seven years over southeastern Wisconsin. If one-half inch of rain freezes on trees and utility wires, extensive damage can

Table 3.23
Recent Winter Events in Kenosha County: 2011-2021

Date	Type[a]	Deaths	Injuries	Property Damages ($)	Crop Damages ($)
January 17, 2011	Winter Weather	--	--	--	--
February 1, 2011	Blizzard	--	--	24,709	--
February 21, 2011	Winter Weather	--	--	--	--
December 29, 2011	Winter Weather	--	--	--	--
January 12, 2012	Winter Weather	--	5	--	--
January 17, 2012	Winter Weather	--	--	--	--
January 20, 2012	Winter Weather	--	--	--	--
February 23, 2012	Winter Weather	--	--	--	--
March 2, 2012	Winter Storm	--	3	--	--
January 27, 2013	Winter Weather	--	--	--	--
January 30, 2013	Winter Weather	--	--	--	--
February 7, 2013	Winter Storm	--	--	--	--
February 22, 2013	Winter Weather	--	--	--	--
February 26, 2013	Winter Storm	--	--	--	--
March 5, 2013	Winter Storm	--	--	--	--
March 18, 2013	Winter Weather	--	--	--	--
November 25, 2013	Winter Weather	--	--	--	--
December 8, 2013	Winter Weather	--	--	--	--
December 19, 2013	Winter Weather	--	--	--	--
December 22, 2013	Winter Storm	--	--	--	--
December 31, 2013	Winter Weather	--	--	--	--
January 1, 2014	Winter Weather	--	--	--	--
January 10, 2014	Winter Weather	--	--	--	--
January 14, 2014	Winter Weather	--	--	--	--
January 24, 2014	Winter Weather	--	--	--	--
January 26, 2014	Winter Weather	--	--	--	--
January 26, 2014	Winter Weather	--	--	--	--
February 4, 2014	Winter Weather	--	--	--	--
February 13, 2014	Winter Weather	--	--	--	--
February 17, 2014	Winter Storm	--	--	--	--
March 4, 2014	Winter Weather	--	--	--	--
November 22, 2014	Winter Weather	--	--	--	--
January 8, 2015	Winter Weather	--	--	--	--
February 1, 2015	Blizzard	--	--	--	--
February 25, 2015	Winter Weather	--	--	--	--
March 3, 2015	Winter Weather	--	--	--	--
March 23, 2015	Winter Weather	--	--	--	--
November 20, 2015	Winter Storm	--	--	--	--
December 28, 2015	Winter Storm	--	--	--	--
February 29, 2016	Winter Weather	--	--	--	--
March 1, 2016	Winter Weather	--	--	--	--
March 24, 2016	Winter Weather	--	--	--	--
April 2, 2016	Winter Weather	--	--	--	--
April 8, 2016	Winter Weather	--	--	--	--
December 4, 2016	Winter Weather	--	--	--	--
December 10, 2016	Winter Storm	--	--	--	--
December 16, 2016	Winter Storm	--	--	--	--
January 10, 2017	Winter Weather	--	--	--	--
January 11, 2017	Winter Weather	--	--	--	--
January 16, 2017	Winter Weather	--	--	--	--
February 24, 2017	Winter Weather	--	--	--	--
March 12, 2017	Lake-Effect Snow	--	--	--	--
January 7, 2018	Winter Weather	--	--	--	--

Table continued on next page.

Table 3.23 (Continued)

Date	Type[a]	Deaths	Injuries	Property Damages ($)	Crop Damages ($)
January 14, 2018	Winter Weather	--	--	--	--
January 22, 2018	Winter Storm	--	--	--	--
February 3, 2018	Winter Weather	--	--	--	--
February 5, 2018	Winter Weather	--	--	--	--
February 8, 2018	Winter Storm	--	--	--	--
February 11, 2018	Winter Weather	--	--	--	--
March 5, 2018	Winter Weather	--	--	--	--
April 3, 2018	Winter Weather	--	--	--	--
April 15, 2018	Winter Weather	--	--	--	--
April 18, 2018	Winter Weather	--	--	--	--
November 15, 2018	Winter Weather	--	--	--	--
November 25, 2018	Winter Storm	--	--	5,549	--
December 28, 2018	Winter Weather	--	--	--	--
January 18, 2019	Winter Storm	--	--	--	--
January 22, 2019	Winter Weather	--	--	--	--
January 27, 2019	Winter Storm	--	--	--	--
February 5, 2019	Winter Weather	--	--	--	--
February 7, 2019	Winter Weather	--	--	--	--
February 11, 2019	Winter Weather	--	--	--	--
February 17, 2019	Winter Weather	--	--	--	--
February 26, 2019	Winter Weather	--	--	--	--
April 14, 2019	Winter Storm	--	--	--	--
April 27, 2019	Winter Weather	--	--	--	--
October 30, 2019	Winter Weather	--	--	--	--
November 10, 2019	Winter Weather	--	--	--	--
January 11, 2020	Winter Weather	--	--	--	--
January 17, 2020	Winter Weather	--	--	--	--
January 24, 2020	Winter Weather	--	--	--	--
January 31, 2020	Winter Weather	--	--	--	--
February 9, 2020	Winter Weather	--	--	--	--
February 12, 2020	Winter Weather	--	--	--	--
December 29, 2020	Winter Weather	--	--	--	--
January 1, 2021	Winter Weather	--	--	--	--
January 26, 2021	Winter Storm	--	--	--	--
January 30, 2021	Winter Storm	--	--	--	--
February 4, 2021	Winter Weather	--	--	--	--
February 11, 2021	Winter Weather	--	--	--	--
February 13, 2021	Winter Weather	--	--	--	11,842
February 15, 2021	Winter Storm	--	--	--	--
March 15, 2021	Winter Weather	--	--	--	--
December 28, 2021	Winter Weather	--	--	--	--
	Total	0	8	30,258	11,842

Note: The data presented in this table only accounts for damages, injuries, and deaths that are directly caused by each winter storm event. Damages, injuries, and deaths that occur indirectly as the result of traffic accidents, slips and falls, or health issues associated with winter storms are not included in this table.

Dollar values were adjusted to year 2021 by the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics

Table continued on next page.

Table 3.23 (Continued)

[a] *NWS defines the following types of events:*

- ***Blizzard*** *as a winter storm which produces the following conditions for three consecutive hours or longer: (1) sustained winds or frequent gusts 30 knots (35 mph) or greater, and (2) falling and/or blowing snow reducing visibility frequently to less than 1/4 mile.*
- ***Winter Storm*** *is an event that has more than one significant hazard (i.e., heavy snow and blowing snow; snow and ice; snow and sleet; sleet and ice; or snow, sleet and ice) and meets or exceeds locally/regionally defined 12 and/or 24-hour warning criteria for at least one of the precipitation elements.*
- ***Winter Weather*** *as an event that causes a death, injury, or a significant impact to commerce or transportation, but does not meet locally/regionally defined warning criteria. Such an event could result from one or more winter precipitation types (snow, or blowing/drifting snow, or freezing rain/drizzle). The Winter Weather event can also be used to document out-of-season and other unusual or rare occurrences of snow, or blowing/drifting snow, or freezing rain/drizzle.*

Source: National Centers for Environmental Information and U.S. Department of Agriculture Risk Management Agency

occur, especially if accompanied by high winds that compound the effects of the added weight of the ice. There are also between three and five instances of glazing (less than one-quarter of an inch of ice) throughout the State during a normal winter.

Recent Events

Generally, the winter storm season in Wisconsin runs from October through March. Severe winter weather has occurred, however, as early as September and as late as the latter half of April and into May in some locations in the State. The average annual duration of snow cover in Kenosha County is approximately 85 days. Table 3.23 lists the recent winter storm events that have occurred in Kenosha County from 2011 to 2021. A few examples of recent events from Table 3.23 are noted below.

2011 – During the overnight hours of February 1 to February 2, 2011, a powerful low-pressure center passing south of Wisconsin produced blizzard conditions across much of southern Wisconsin (the Groundhog Day Blizzard of 2011). Snow associated with the system began in the mid-afternoon hours in far southern Wisconsin and pushed northward into the State through the evening. Twenty-four hour snowfall totals were between 20 and 26 inches, with 24 inches of snow reported by a cooperative observer near the City of Kenosha. This was in addition to several inches of snow that had fallen on January 31. In Kenosha, this storm set new two-day and three-day snowfall records, with snowfalls of 25.3 inches and 27.3 inches, respectively. Very strong winds were associated with this storm for an extended period of time. Sustained northeast winds of 30 to 40 mph were common throughout the event, with peak wind gusts between 45 and 65 mph. Strong wind gusts were reported near Lake Michigan, with the lakeshore observation site at Kenosha reporting a gust of 64 mph. The combination of high winds and heavy snow created widespread sustained visibilities of less than one-quarter mile, with frequent whiteout conditions and near zero visibilities. Many locations saw blizzard conditions beginning early during the evening of February 1 and continuing through the early morning hours of February 2. Snow drifts of three to 10 feet were common, with reports of some drifts reaching 12 to 15 feet in open rural areas. Drifting snow closed highways and roads with many stranded motorists having to be rescued from vehicles buried in the drifting snow. Due to the large number of vehicles and operators caught in the storm on February 2, the Kenosha Police Department and the National Guard collaborated in assisting stranded motorists. Officers responded to over 121 calls from motorists for assistance. This represents about 61 percent of the calls that the Department received on that day. About 100 National Guardsman were mobilized statewide to help rescue motorists and run emergency shelters at armories in response to the Governor's emergency declaration for 29 counties. At the height of the storm, We Energies reported 5,200 customers were without power across southeastern Wisconsin. A presidential disaster declaration was issued for 11 Wisconsin Counties, including Kenosha County, as a result of the Groundhog Day Blizzard of 2011. Kenosha County received about $640,000 in public assistance under this declaration.

2015 – Intensifying low pressure tracked from the central Great Plains to southeast Indiana the night of January 31st into the evening of February 1st. This resulted in a long duration winter storm and blizzard over portions of southern Wisconsin. Snowfall of 6 to 14 inches accumulated over far southern and eastern Wisconsin. Winds gusted from 30 to 40 mph with blizzard conditions and included frequent whiteouts from heavy and blowing snow in Kenosha and Racine Counties. Vehicle slide-offs and accidents were prevalent. The Milwaukee County Medical Examiner Office reported the death of three men who died after collapsing from shoveling snow.

Vulnerability and Community Impact Assessment

Between 2011 and 2021, 94 winter weather events have affected Kenosha County. Based on this, it is estimated that Kenosha County experiences an average of 8.5 winter weather events per year. It should be noted that during this time period there has been considerable variation around this average, with the County experiencing as few as four winter storm events in some years and as many as 14 winter storm events in other years (Table 3.23).

The NCEI database contains few reports of property damages and crop damages for winter storms for Kenosha County. Between 2011 and 2021, about $30,000 (2021 dollars) in property damages have been reported as having been caused by winter storms affecting Kenosha County. Given that the County received over $640,000 in public assistance under the disaster declaration related to the Groundhog Day blizzard of 2011, the reported damages in the NCEI database clearly represent an underestimate of the potential damages associated with severe winter storms impacting Kenosha County. Records of crop insurance indemnities from the U.S. Department of Agriculture Risk Management Agency show that about $12,000 (2021 dollars) have been paid out between 2011 and 2021 due to damage caused by winter related weather, such as frost, freeze, or snow in Kenosha County.

The NCEI database contains no reports of property damages or crop damages for winter storms. For Kenosha County, records of crop insurance indemnities from the U.S. Department of Agriculture Risk Management Agency show that about $487,084 have been paid out between 2011 and 2021 due to damage caused by winter related weather, such as frost, freeze, or snow. Since 2001, about $39,798 in property damages have been reported as having been caused by winter weather events in Kenosha County.

Winter storms present a serious threat to the health and safety of affected citizens and can result in significant damage to property. Snow and ice are the major hazards associated with winter storms which are the eighth most destructive natural hazard in Wisconsin. Snow and ice can cause traffic accidents, bring down telephone and power lines, damage trees, impede transportation, burst water pipes, and can tax the public's capabilities for snow removal during heavy storms. A major winter storm can have a serious impact on a community. Loss of heat and mobility are key complications that contribute to winter storm fatalities.

Ice storms and freezing rain are less common than snow for Kenosha County but produce road conditions that can make travel hazardous. Even fog or mist on cold roads can produce a glaze of ice that makes travel slippery and dangerous. Accumulated ice can cause the structural collapse of buildings, bring down trees and power lines, causing property damage, loss of power, and isolate people from assistance or services.

Future Changes and Conditions

Based upon recent historical data from the period 2011-2021, Kenosha County can expect to experience an average of 8.5 winter storm events per year. It should be noted that the historical record shows considerable variation among years in the numbers of these events that occurred. While it would be expected that in some years the County will experience either fewer events or more events than the average number, over the five-year term of this plan update the average annual number of events is not expected to change.

Changes in the 20th century and projections based on downscaled results from climate models indicate that there will likely be changes in winter storm conditions affecting Kenosha County over the 21st century. It is projected that by 2055, the average amount of precipitation that Kenosha County receives during the winter will increase by about 0.5 to 1.0 inch (measured as water), an increase of about 25 percent.[58] Due to increasing winter temperatures, the amount of precipitation that falls as rain during the winter rather than as snow is projected to increase significantly. It is also projected that freezing rain will be more likely to occur.

It should also be noted that the likelihood of lake effect snow occurring could be impacted by climate change. Rising temperatures during the winter will reduce the frequency and extent of ice cover over the Lake. A lack of ice cover over Lake Michigan during the winter may promote the development of lake effect snow. But the increase in temperature may also result in some of this precipitation falling as rain, so it is unclear how higher temperatures will impact lake effect events.

[58] *Wisconsin Initiative on Climate Change Impacts, 2021, op. cit.*

Multi-Jurisdictional Risk Management

Based upon a review of the historic patterns of winter storm events in Kenosha County, there are no specific municipalities that have unusual risks. Rather, the events are of a uniform countywide concern.

Drought

Drought is the result of a natural decline in the expected precipitation over an extended period of time, and occurs in virtually every climate on the planet, including areas of high and low precipitation. The severity of drought can be aggravated by other climatic factors, such as prolonged high winds, high temperatures, and low relative humidity. Drought is a complex natural hazard which is reflected in the following four definitions commonly used to describe it.

- **Meteorological drought** – The degree of dryness, expressed as a departure of actual precipitation from expected average or normal amount, based on monthly, seasonal, or annual time scales
- **Hydrological drought** – The effects of precipitation shortfalls on streamflow, reservoir, lake, and groundwater levels
- **Agricultural drought** – Soil moisture deficiencies relative to water demands of crop life
- **Socioeconomic drought (or water management drought)** – Occurs when the demand for water exceeds the water supply, resulting in a water shortage

The severity of a drought depends on several factors, including its duration, its intensity, its geographic extent, and the demands for water for use by humans, wildlife, and vegetation.

Drought can be difficult to define in exact terms. This is partly due to its multi-dimensional nature and partly due to the ways it differs from other natural hazards. There is no exact and universally accepted definition of what constitutes a drought. The onset and end of a drought are difficult to determine due to the slow accumulation of its impacts and its lingering effects after ending. The impacts of drought are less obvious than those of some other hazards and may be spread over a larger geographic area. These characteristics have hindered the preparation of drought contingency or mitigation plans by many governments and can make it difficult to perform an accurate risk assessment analysis.

Droughts can have several impacts. They can reduce water levels and flows in surface waterbodies and groundwater. This can cause shortages of water for human and industrial consumption, hydroelectric power, recreation, and navigation. Water quality may also decline, and the number and severity of wildfires may increase during a drought. Severe droughts may result in reduced yields or the loss of agricultural crops and forest products, undernourished wildlife and livestock, and lower land values.

One method to measure the magnitude of a drought is by using the Palmer Drought Severity Index. This method considers factors like temperature, soil moisture, and precipitation, which are entered into an algorithm that returns results between -5 (extreme drought) and 4 (extremely moist) with zero being normal conditions. The U.S. Drought Monitor uses the Palmer Index, along with other indicators, to rate drought conditions into categories, as described in Figure 3.5.

Wisconsin is vulnerable to agricultural drought. The State has approximately 14.2 million acres of farmland on 64,100 farms.[59] Even small droughts of limited duration can significantly reduce crop growth and yields, adversely affecting farm incomes and local economies. Droughts significantly increase the risk of forest fires and wildfires. Additionally, the loss of vegetation in the absence of sufficient water to maintain it can result in flooding, even from average rainfall.

Estimates of agricultural losses experienced in Kenosha County due to drought over the period 2011 to 2021 are shown in Table 3.24. Due to inconsistent reporting with NCDC data, these estimates come from records of indemnities paid to agricultural operators by Federal crop insurance programs.[60] The loss estimates

[59] *State of Wisconsin Department of Agriculture, Trade and Consumer Protection, 2022 Wisconsin Agricultural Statistics.*

[60] *Payments of crop insurance indemnities are reported by the U.S. Department of Agriculture Risk Management Agency.*

Figure 3.5
U.S. Drought Monitor Classifications

			Ranges				
Category	**Description**	**Possible Impacts**	Palmer Drought Severity Index (PDSI)	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	Objective Drought Indicator Blends (Percentiles)
D0	Abnormally Dry	Going into drought: • short-term dryness slowing planting, growth of crops or pastures Coming out of drought: • some lingering water deficits • pastures or crops not fully recovered	-1.0 to -1.9	21 to 30	21 to 30	-0.5 to -0.7	21 to 30
D1	Moderate Drought	• Some damage to crops, pastures • Streams, reservoirs, or wells low, some water shortages developing or imminent • Voluntary water-use restrictions requested	-2.0 to -2.9	11 to 20	11 to 20	-0.8 to -1.2	11 to 20
D2	Severe Drought	• Crop or pasture losses likely • Water shortages common • Water restrictions imposed	-3.0 to -3.9	6 to 10	6 to 10	-1.3 to -1.5	6 to 10
D3	Extreme Drought	• Major crop/pasture losses • Widespread water shortages or restrictions	-4.0 to -4.9	3 to 5	3 to 5	-1.6 to -1.9	3 to 5
D4	Exceptional Drought	• Exceptional and widespread crop/pasture losses • Shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0 to 2	0 to 2	-2.0 or less	0 to 2

Source: U.S. Drought Monitor Drought Classification (droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx)

reflect several factors. First, crop losses often go unreported. Second, Federal crop insurance policies offer coverage to only certain types of crops in any particular year. Third, agricultural operators generally insure only a portion of their crops when purchasing Federal crop insurance. Thus, crop loss estimates are likely to be underestimates of actual losses. It should be noted that indemnities for drought related losses were paid out in most years. This probably reflects variability in rainfall causing localized crop losses. Based on these sources, it is estimated that Kenosha County experienced crop damages of nearly $1.2 million between 2011 and 2021 (2021 dollars). Based on this, average annual crop losses due to drought in Kenosha County are estimated to be about $107,500.

Small droughts of shortened duration have occurred in Wisconsin at an interval of about every 10 years since the 1930s. Extended, widespread droughts have been infrequent in Wisconsin. The five most significant droughts, in terms of severity and duration, are 1929-1934, 1948-1950, 1955-1959, 1976-1977, and 1987-1988.

The 1929-1934 drought probably was the most significant in Wisconsin history considering its duration, as well as its severity. This drought affected a large majority of the United States and contributed to the Dust Bowl period that greatly damaged agriculture throughout the County (see Figure 3.6) Wisconsin experienced at least a 75-year recurrence drought interval in most of the State and over 100-year recurrence drought interval in certain areas. The severe economic impact of the Depression compounded the effect of this drought period. The drought continued with somewhat decreased effect until the early 1940s in some parts of the State.

Recent Events

The only drought event that has occurred recently between 2011 and 2021 took place in 2012. A lack of rain over south central and southeastern Wisconsin during June 2012 allowed a drought to slowly develop and the intensity increased rapidly. By July 10, conditions in Kenosha County had progressed from abnormally dry to moderate drought. By July 17, Kenosha County was experiencing extreme drought. The drought was moderated by several rounds of thunderstorms that moved through the area during the latter half of July; however, this rain came too late for much of the corn crop, which had passed the critical pollination stage. In addition, not enough precipitation was deposited by these storms to end the drought. Severe drought conditions continued in Kenosha County until late August and moderate drought conditions persisted until the end of October. Conditions remained abnormally dry in Kenosha County into March 2013. This drought reduced crop yields. Agricultural operators in Kenosha County received nearly $900,000 in crop insurance indemnities in 2012 due to drought (Table 3.24). The drought also forced sell offs of some dairy and beef cattle herds. Farmers also reported that heat impacts to cows reduced milk production, in some instances by as much as 20 percent. In response to this drought, the Governor declared a drought emergency and authorized the WDNR to expedite permit applications for water withdrawals from lakes and streams for the emergency purpose of watering crops.

Table 3.24
Estimates of Crop Losses Due to Drought in Kenosha County: 2011-2021

Year	Crop Insurance Indemnity Paid ($)[a]
2011	472
2012	894,329
2013	92,386
2014	0
2015	557
2016	13,396
2017	1,305
2018	0
2019	0
2020	87,253
2021	92,596
Total	1,182,294

[a] *Dollar values were adjusted to year 2021 by using the average Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.*

Source: National Climatic Data Center (NCDC), the U.S. Department of Agriculture Risk Management Agency, and SEWRPC

Vulnerability and Community Impact Assessment

Kenosha County is vulnerable to agricultural drought. There are about 79,385 acres of farmland on 415 farms.[61] Even small droughts of limited duration can significantly reduce crop growth and yields, adversely affecting farm income. More substantial events can decimate croplands and result in total loss, hurting the local economy. Due to the importance of agriculture to the Kenosha County economy and the potential for large crop losses, drought is a major natural hazard threat. There are also 110 miles of major streams, 20 major and numerous smaller lakes, and nearly 19,000 acres of wetlands which can also be negatively impacted by drought conditions. In addition, groundwater levels can be impacted by drought conditions. This is most important in the portion of the County west of IH 94, as well as limited areas of development east of IH 94, which rely on groundwater as a source of water supply. Severe droughts may only happen on average every 25 or 50 years, but they can be devastating to agriculture, damaging to the local economy, and negatively impact natural surface waters and the groundwater supply system.

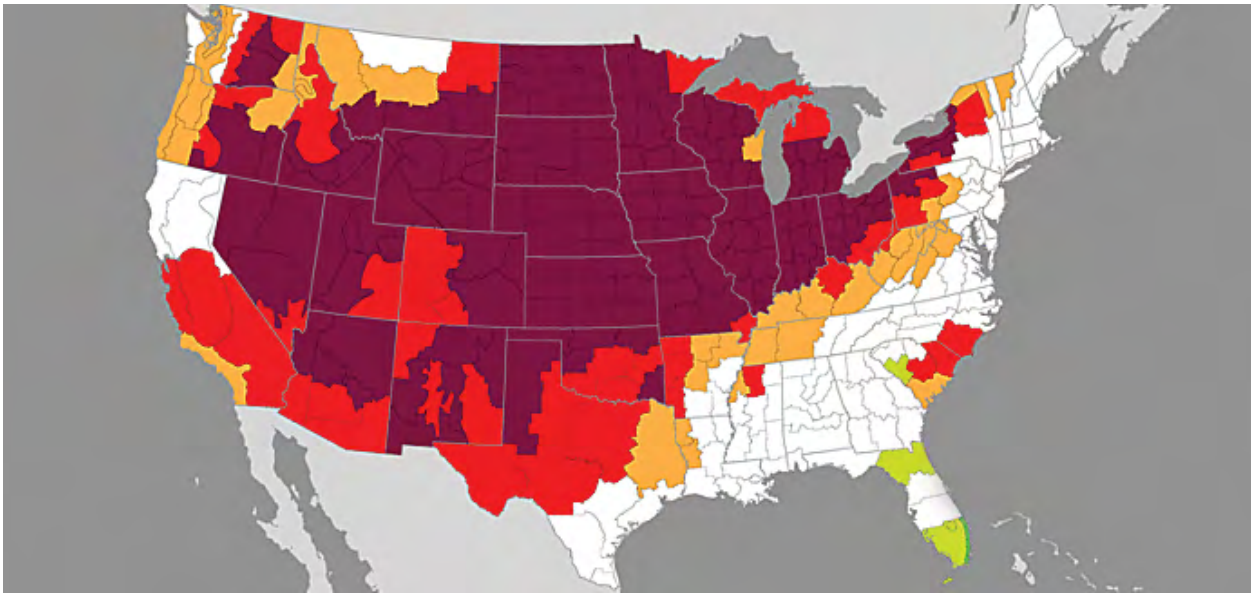
In 2017, the most recent year for which data are available, the market value of agricultural products sold by farms in Kenosha County was about $59.9 million. This was comprised of about $40.4 million in crops and $19.5 million in livestock, poultry, and their products.[62] Based on the current average estimate of $107,500 in crop losses per year, it can be expected that approximately 0.27 percent of the market value of all crops, or about 0.18 percent of the market value of all agricultural products sold by farms in the County, will be lost to drought each year. It is also expected that there will be considerable variation among years in the amount of losses experienced.

The ample supply of fresh water available in the Great Lakes and the Mississippi River basins help to minimize water supply problems in Kenosha County. However, during a severe drought some wells, mainly private wells, will go dry. It is agriculture that is most vulnerable to drought, as many farms in Kenosha County do not irrigate.

[61] *United States Department of Agriculture, National Agricultural Statistics Service, 2017 Census of Agriculture.*

[62] *U.S. Department of Agriculture National Agricultural Statistics Service op. cit.*

Figure 3.6
Palmer Drought Severity Index for July 1934



Source: National Climatic Data Center

A review of the community assets described in Chapter 2 indicate the potential for drought hazard events to impact: 1) residents at a countywide level, 2) agricultural croplands, 3) livestock, 4) municipal water utilities, and 5) natural surface and groundwater reserves.

Future Changes and Conditions

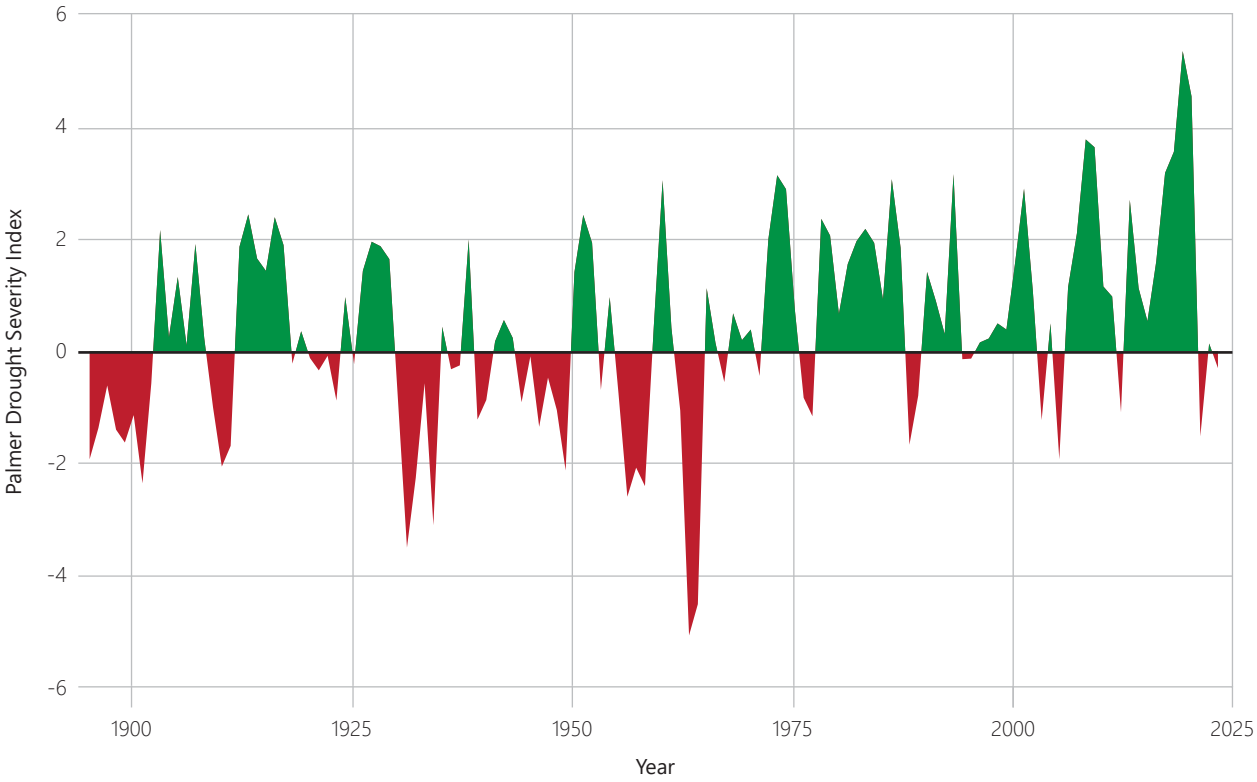
Based upon recent historical data, Kenosha County has about a 40 percent probability of drought conditions occurring during a portion of any given year. Some of these episodes are likely to be of short duration. The statewide historical record indicates that severe droughts can be expected to occur at roughly 10-year intervals. As can be seen in Figure 3.7, southeastern Wisconsin regularly experienced drought to at least a moderate level two to three times every ten years from 1895 to 2022.[63] It is not expected that the probability of drought will change during the five-year term of this plan update.

Historical changes over the 20th century and projections based on downscaled results from climate models indicate that there will likely be changes in drought conditions affecting Kenosha County over the 21st century. By mid-century, average temperatures are projected to rise, leading to longer summers and shorter winters. The temperature increase will also lead to a longer growing season and increased rates of evapotranspiration during summer and early fall months. While the amount of rain during the summer is not projected to change, a greater proportion of precipitation is projected to fall in heavy rainfall events. This will result in a greater number of dry days during the summer. More dry days, coupled with higher summer temperatures and increases in evapotranspiration rates, will increase the likelihood of summer droughts occurring.[64]

[63] *University of Wisconsin-Madison, Atmospheric and Oceanic Sciences, www.aos.wisc.edu.*

[64] *Wisconsin Initiative on Climate Change Impacts, 2021, op. cit.*

Figure 3.7
Palmer Drought Severity Index for Southeastern Wisconsin: 1895-2023



Source: University of Wisconsin Atmospheric and Oceanic Sciences, Wisconsin State Climatology Office

Multi-Jurisdictional Risk Management

Based upon a review of the potential impacts of droughts in Kenosha County, the areas most susceptible to hazard conditions are the agricultural communities, the municipalities served by public water supply which use groundwater as a source of supply, and those communities which have the largest numbers of private wells. This water supply impact includes all communities in the County, except the City of Kenosha and portions of the Villages of Pleasant Prairie and Somers. Drought events are of a uniform countywide concern, with those communities with largely agricultural land uses being the most vulnerable to risk.

HAZARD MITIGATION GOALS 4

Planning may be defined as a rational process for formulating and meeting goals and objectives. Consequently, the formulation of goals and objectives is an essential task that must be undertaken before plans can be prepared. This chapter sets forth hazard mitigation goals and objectives for use in the consideration of alternative hazard mitigation strategies for Kenosha County and in the selection of recommended strategies from among those alternatives.

In formulating and setting forth goals and objectives, their differing natures and purposes must be kept in mind. In this regard, the definition of goals and objectives used herein is as promoted by the Federal Emergency Management Agency (FEMA). Goals are general guidelines that explain what a community desires to achieve. Based upon the selected goals, a community can then develop the specific objectives or standards needed to attain the goals. Objectives and standards more narrowly define strategies for meeting the selected goals and are more specific.

4.1 RELATIONSHIP OF HAZARD MITIGATION GOALS AND OBJECTIVES TO OTHER RELEVANT PLANNING EFFORTS

Kenosha County and nine of its local governments have prepared a comprehensive plan that provides a basis for broad-based decision-making on land use-related matters by County and local government officials, and will increase the awareness and understanding of County, city, village, and town planning goals and objectives by landowners, developers, and other private interests.[65] That plan incorporates and updates elements from other pertinent County and Regional Plans as appropriate. The Villages of Bristol and Silver Lake (subsequently merged with the newly incorporated Village of Salem Lakes) and the Towns of Brighton, Bristol (subsequently annexed by the Village of Bristol), Paris, and Somers adopted the multi-jurisdictional plan document as their local comprehensive plan. The City of Kenosha, Village of Pleasant Prairie, and the Towns of Salem (subsequently incorporated as the Village of Salem Lakes) and Wheatland have adopted separate comprehensive plans based on the multi-jurisdictional plan. In addition, the Villages of Paddock Lake and Twin Lakes, and the Town of Randall have adopted their own comprehensive plans, which were incorporated into the County comprehensive plan.

Additional planning efforts that incorporate and update elements from pertinent Regional, County, and local plans were considered when formulating goals and objectives for the County's hazard mitigation program, which include:

Regional Plans

- SEWRPC Planning Report No. 27, *A Regional Park and Open Space Plan for Southeastern Wisconsin: 2000*, November *1977*
- SEWRPC Planning Report No. 30, *A Regional Water Quality Management Plan for Southeastern Wisconsin: 2000*, July *1979*
    - SEWRPC Memorandum Report No. 93, *A Regional Water Quality Management Plan for Southeastern Wisconsin: An Update and Status Report, Part 1, Part 2, Part 3, March 1995*
- SEWRPC Planning Report No. 42, *Regional Natural Areas Plan*, September *1997,* amended 2010
- SEWRPC Planning Report No. 52, *A Regional Water Supply Plan, Volume One, Chapters 1-12, December 2010 and Volume Two, Appendices*, December 2010

[65] *SEWRPC Community Assistance Planning Report No. 299*, A Multi-Jurisdictional Comprehensive Plan for Kenosha County: 2035, *April 2010*

- SEWRPC Planning Report No. 55, *Vision 2050: A Regional Land Use and Transportation Plan for Southeastern Wisconsin*, *June 2020*

County Plans

- SEWRPC Community Assistance Planning Report No. 131, *A Park and Open Space Plan for Kenosha County (2nd Edition)*, April 2012

- SEWRPC Community Assistance Planning Report No. 269, *A Flood Mitigation Plan for Kenosha County*, September 2001

- *A Land & Water Resource Management Plan for Kenosha County: 2017-2026*, February 2016

Watershed Plans

- SEWRPC Planning Report No. 9, *A Comprehensive Plan for the Root River Watershed*, July 1969

- SEWRPC Planning Report No. 12, *A Comprehensive Plan for the Fox River Watershed, Volume One, Inventory Finding and Forecasts,* April 1969, and *Volume Two, Alternative Plans and Recommended Plan*, February 1970

- SEWRPC Planning Report No. 35, *A Comprehensive Plan for the Pike River Watershed*, June 1983

- SEWRPC Planning Report No. 44*, A Comprehensive Plan for the Des Plaines River Watershed*, June 2003

4.2 HAZARD MITIGATION GOALS AND OBJECTIVES

The following goals have been established for the Kenosha County hazard mitigation planning program. The goals have been established based, in part, upon goals previously established in watershed, park and open space, and land use planning programs

1. A spatial distribution of the various land uses that minimizes hazards and dangers to health, welfare, and safety as well as further enhancing the economic base of the County and will result in a compatible arrangement of land uses properly related to the existing and proposed supporting transportation, utility, public safety systems, and public facility systems.

2. A spatial distribution of the various land uses that maintains biodiversity and that will result in the protection and wise use of the natural resources of the County, including its soils, inland lakes and streams, groundwater, wetlands, woodlands, wildlife, and natural areas and critical species habitats.

3. The provision of facilities necessary to maintain a high quality of fire and police protection and emergency medical services throughout the County.

4. The development of a stormwater and floodplain management system that reduces the exposure of people to drainage- and flooding-related inconvenience and to health and safety hazards and that reduces the exposure of real and personal property to damage through inundation resulting from flooding and inadequate stormwater drainage.

5. The identification of high erosion risk Lake Michigan shoreline areas and the development of a coastal erosion management program that reduces the exposure of people and real and personal property to shoreline erosion and bluff recession.

6. The identification and development of programs that complement the County and local emergency operations plans to mitigate the potential exposure to health and safety and the exposure of real and personal property resulting from a broad range of hazards that are unpredictable and geographically specific in nature.

7. Communications interoperability throughout the County among all First Responders, so as to be able to quickly and effectively respond to any incident to prevent the loss of life and to save property.

Complementing each of these goals is a set of objectives which can be used to define more specific actions or strategies to achieve the goals. The goals, objectives, and standards that are set forth in Figure 4.1 incorporate the goals, objectives, and related County planning programs, where there was the most direct relationship to hazard mitigation planning. There are a number of other objectives and standards associated with the stated goals that are relevant to other planning activities, but not specifically to hazard mitigation planning. However, these have not been restated herein, but are documented in the referenced reports.

Figure 4.1
Goals and Objectives for the Kenosha County Hazard Mitigation Plan

➤ **Goal 1: Maintain a spatial distribution of the various land uses which minimizes hazards and dangers to health, welfare, and safety, as well as further enhancing the economic base of the County and will result in a compatible arrangement of land uses properly related to the existing and proposed supporting transportation, utility, public safety systems, and public facility systems.**

- **Objective 1.1:** Urban high-, medium-, and low-density residential uses should be located within planning units which are served with centralized public sanitary sewerage and water supply facilities and contain, within a reasonable walking distance, necessary supporting local service uses, such as neighborhood park, local commercial, and educational facilities, and should have reasonable access through the appropriate component of the transportation system to employment, commercial, cultural, and governmental centers, and elementary and secondary school and higher educational facilities; and should be provided with readily available fire and police protection and emergency medical services.

- **Objective 1.2:** Rural- and suburban-density residential uses should have reasonable access through the appropriate component of the transportation system to local service uses; employment, commercial, cultural, and governmental centers; elementary, secondary schools, and higher educational facilities and should have reasonable access to fire and police protection and emergency medical services.

- **Objective 1.3:** Industrial uses should be located to have direct access to arterial street and highway facilities and reasonable access through an appropriate component of the transportation system to residential areas and to railway, seaport, and airport facilities, and should be provided with readily available fire and police protection and emergency medical services.

- **Objective 1.4:** Major commercial uses should be located in centers of concentrated activity on only one side of an arterial street and should be afforded direct access to the arterial street system; and should be provided with readily available fire and police protection and emergency medical services.

➤ **Goal 2: Maintain a spatial distribution of the various land uses that maintains biodiversity and will result in the protection and wise use of the natural resources of the County, including its soils, inland lakes and streams, groundwater, wetlands, woodlands, wildlife, and natural areas and critical species habitats.**

- **Objective 2.1:** Floodplains should not be allocated to any urban development which would cause or be subject to flood damage.

- **Objective 2.2:** No unauthorized structure or fill should be allowed to encroach upon and obstruct the flow of water in perennial stream channels.

- **Objective 2.3:** The types and distribution of land uses should be developed considering the potential impacts on flood flows, on surface water quality, and on groundwater quality and quantity.

- **Objective 2.4:** All remaining undeveloped lands within the designated primary environmental corridors in the County should be preserved in essentially natural, open uses.

- **Objective 2.5:** All remaining undeveloped lands within the designated secondary environmental corridors and isolated natural resource areas in the County should be considered for preservation as urban development proceeds and used as drainageways, floodwater storage areas, and parks.

- **Objective 2.6:** All wetlands adjacent to streams or lakes, all wetlands within areas having special wildlife or other natural values, and all wetlands having an area of five acres or greater should not be allocated to any urban development, except limited recreational use, and should not be drained or filled. In addition, County and local units of government may choose to preserve all wetlands.

Figure 4.1 (Continued)

➤ **Goal 3: Provide facilities necessary to maintain a high quality of fire and police protection and emergency medical services throughout the County.**

- **Objective 3.1:** Because adequate fire and police protection and emergency medical services are essential to the protection of the public health and safety and of real property values and is a public service which enhances the economic development potential of an area, fire and police stations and emergency medical equipment should be developed and distributed based upon the accepted standards for such services.

➤ **Goal 4: Develop a stormwater and floodplain management system which reduces the exposure of people to drainage- and flooding-related inconvenience and to health and safety hazards and which reduces the exposure of real and personal property to damage through inundation resulting from flooding and inadequate stormwater drainage.**

- **Objective 4.1:** In order to prevent significant property damage and safety hazards, the major components of the stormwater management system and the floodplain management system should be designed to accommodate runoff from a 100-year recurrence interval storm event.

- **Objective 4.2:** In order to provide for an acceptable level of access to property and of traffic service, the minor components of the stormwater management system should be designed to accommodate runoff from a storm event to be determined appropriate by each community.

- **Objective 4.3:** In order to provide an acceptable level of access to property and of traffic service, the stormwater management system should be designed to provide two clear 10-foot lanes for moving traffic on existing arterial streets, and one clear 10-foot lane for moving traffic on existing collector and land access streets during storm events up to and including the 10-year recurrence interval event.

- **Objective 4.4:** Flow of stormwater along and across the full pavement width of collector and land access streets shall be acceptable during storm events exceeding a 10-year recurrence interval when the streets are intended to constitute integral parts of the major stormwater drainage system.

- **Objective 4.5:** Plan components shall be designed to comply with the requirements of Chapter NR 116 of the *Wisconsin Administrative Code*.

- **Objective 4.6:** All new and replacement bridges and culverts over waterways shall be designed so as to accommodate, according to the categories listed below, the designated flood events without overtopping of the related roadway or railway track.

    - Minor and collector streets used or intended to be used primarily for access to abutting properties: a 10-year recurrence interval flood discharge.

    - Arterial streets and highways, other than freeways and expressways, used or intended to be used primarily to carry heavy volumes of through traffic: a 50-year recurrence interval flood discharge.

    - Freeways and expressways: a 100-year recurrence interval flood discharge.

    - Railways: a 100-year recurrence interval flood discharge.

- **Objective 4.7:** All new and replacement bridges and culverts along waterways shall be designed so as not to inhibit fish passage in areas which are supporting, or which are capable of supporting, valuable recreational sport and forage fish species.

- **Objective 4.8:** Provide for the capability to provide fire and police protection and emergency medical services and for adequate operation of wastewater treatment facilities during a 100-year recurrence interval flood event.

Figure 4.1 (Continued)

- **Goal 5: Identify high erosion risk Lake Michigan shoreline areas and the development of a coastal erosion control program which reduces the exposure of people and real and personal property to shoreline erosion and bluff recession.**

  - **Objective 5.1:** Erosion risk areas and structure setback distances from the Lake Michigan shoreline should be established based upon the recommendations included in the Lake Michigan shoreline recession and bluff stability report (SEWRPC Technical Report No. 86, *Lake Michigan Shoreline Recession and Bluff Stability in Southeastern Wisconsin: 1995*).

- **Goal 6: The identification and development of programs which complement County and local emergency operations plans, to mitigate the potential exposure to health and safety and the exposure of real and personal property resulting from a broad range of hazards which are unpredictable and not geographically specific in nature.**

- **Goal 7: Communications interoperability throughout the County amongst all First Responders, so as to be able to quickly and effectively respond to any incident to prevent the loss of life and to save property.**

  - **Objective 7.1:** Provide communications interoperability to fire, emergency medical service, law enforcement, public health, public works, dispatch, emergency management, and hospitals to assure the adequate operations of prevention and response.

Source: SEWRPC

HAZARD MITIGATION STRATEGIES 5

5.1 PLANNING FOR HAZARD MITIGATION MEASURES

Hazard mitigation planning systematically evaluates the nature and vulnerability of existing hazards, along with developing continued actions to reduce or eliminate long-term risks from hazards and their effects. Specific purposes of hazard mitigation include eliminating loss of life, lessening danger to human health and safety, minimizing monetary damage to private and public property, reducing the cost of utilities and services, creating community resilience, and minimizing disruption in community affairs. Hazard mitigation also involves avoiding the intensification of existing hazards and the creation of new hazards.

The preparation of a hazard mitigation plan for Kenosha County involves developing and evaluating alternative mitigation measures, or actions to reduce risk, and selecting the most effective elements of the alternatives to formulate an integrated plan. For planning purposes, the alternative mitigation measures are separated into one of three categories: 1) Nonstructural (i.e., nature-based solutions), 2) Structural, and 3) Public Informational and Educational Programming to enhance community capability.

The mitigation measures identified in each hazard category were evaluated based upon relative cost and likely benefits (both direct and indirect) as indicated in the cost-benefit analysis summary tables located at the end of each profiled hazard. Consideration was given to the likelihood of occurrence of each hazard as set forth in the hazard prioritization analysis in the preceding section. Greatest priority is recommended to be given to those mitigation measures that directly or indirectly resulted in minimized loss of life or injury.

Estimated Cost of Implementation

Where possible, the cost-benefit analysis table for each hazard includes a summary of the estimated capital cost and average annual operation and maintenance cost for each mitigation measure. There are many mitigation measures where a meaningful direct monetary cost analysis was not possible. Therefore, mitigation measures were also assigned a classification of low-, moderate-, and high-cost to categorize the relative expense of implementing the measure. The three categories are generally defined as including:

Low-Cost (less than $100,000)

- Educational and informational programming
- Ongoing enforcement of ordinances
- Plan development
- Continued coordination/mutual aid/interagency agreements

Moderate-Cost (greater than $100,000 and less than $1,000,000)

- Addition of new staff
- Additional staff hours budgeted
- Additional equipment
- New ordinance development
- New programs/task force

High-Cost (greater than $1,000,000)

- Major construction
- New buildings (infrastructure)
- Capital programs

This cost assessment allows the mitigation measures to be prioritized with particular regard to cost effectiveness by comparing the estimated low-, moderate-, and high-cost to the number of both direct and indirect benefits identified.

Benefits (Direct and Indirect)

The benefits of implementing a mitigation measure can be classified as direct or measurable, and as indirect or intangible. Direct benefits were defined as enhanced preparedness/protection of individuals or communities, reduced property damage, reduced injuries, and reduced mortalities. Although the exact numbers or amounts of such benefits are often unknown, these would directly result from implementing a particular mitigation measure. In contrast, indirect benefits represent a range of potential benefits that may result from implementing specific management actions, such as increased environmental and recreational benefits/ecosystem services and reduced loss of life and injury with associated benefits for economic productivity. For this hazard mitigation plan, direct and indirect benefits are combined into one category within each cost-benefit analysis table of the profiled hazard event.

Communities/Jurisdictions Affected

The cost-benefit analysis tables for each profiled hazard also indicate a list of the communities affected by each hazard and corresponding priority mitigation measures. Some of the mitigative actions described are ongoing or committed actions that do not require evaluating alternative measures but still may be included in the plan. In other instances, there may be viable alternatives described and evaluated. This Chapter describes the hazard mitigation actions considered to resolve the identified hazards within Kenosha County described in Chapter 3.

In preparing updates to the plan, SEWRPC staff, the Kenosha County Division of Emergency Management, and the Kenosha County Hazard Mitigation Plan Local Planning Team (LPT) reviewed and reevaluated the hazard mitigation goals for the County (see Chapter 4 of this report). This review considered whether the initial plan's goals were still applicable and whether other goals should be added. In addition, hazard conditions within the County were reviewed and reevaluated (see Chapter 3 of this report). This review included reevaluation of the identification of hazards likely to affect the County, updating the data upon which the profiles of the extent and severity of hazard events that occurred in the County were based, reassessment in light of the updated data of the vulnerability and risk associated with each type of hazard, and reevaluation as warranted by the updated assessments of the potential for changes in hazard severity and risk under future conditions. This review and reevaluation of hazard mitigation goals and hazard conditions, along with consideration of changes in conditions within Kenosha County since the drafting of the initial plan (see Chapter 2 of this report) and progress in implementing the initial hazard plan, served as the basis for the review and reevaluation of viable measures to reduce vulnerability to hazards identified in the updated risk assessment and the selection of priority mitigation actions to address those hazards.

5.2 HAZARD MITIGATION PLAN COMPONENT FOR MULTIPLE HAZARD TYPES

One of the bedrock principles of emergency management is to approach issues from a multi-hazard perspective. This is generally very cost-effective because it accomplishes mitigation goals and preparedness for several types of hazards with *one* resource or strategy. This initial plan component includes mitigation strategies, actions, projects, or programs that benefit multiple identified hazard events. This means combining similar mitigation strategies that would otherwise be repeated for several or all of the identified hazards in this Plan update. This section will present current programs, considerations, and mitigation measures that apply to multiple hazards.

Below is a summary of the major programs and effort for multiple hazard types. A full listing of the priority mitigation measures is presented in a table at the end of this section.

Current Programs

Federal and State Programs

FEMA funds several programs that assist State and local governments with hazard mitigation efforts and are administered through WEM in the State of Wisconsin. Two of these programs fit best in this "multiple hazards" section because they address a broad array of hazard events. These programs include the Hazard Mitigation Grant Program (HMGP) and the Building Resilient Infrastructure and Communities (BRIC) pre-disaster mitigation program. These programs provide funding for pre-disaster planning and on-the-ground projects; they will be discussed in further detail in the hazard mitigation funding sources in Chapter 6. Federal and State agencies also have programs that offer awareness and educational resources and tools

to enhance State, local, and Tribal hazard mitigation efforts. FEMA and WEM provide many online resources and social media tool kits to assist the public in hazardous weather preparedness, safety, and recovery. FEMA offers a free mobile application through the Department of Homeland Security's Ready Campaign program that features safety tips on what to do before, during, and after disasters as well as weather alerts and personal reminders.[66]

NOAA's NWS also has extensive public information and programs to educate people about the dangers of severe weather and prevent associated deaths and injuries. The NWS issues warnings, watches, and advisories when there is a threat of severe weather conditions. In conjunction with the NWS and other State and local government agencies, the Wisconsin Department of Health Services provides preparedness and severe weather information to the public.

Kenosha County is not an active participant in the NOAA Weather-Ready Nation (WRN) Ambassador Initiative and is not actively pursuing the NWS StormReady Program designation. The WRN Ambassador initiative helps unify the efforts across government, non-profits, academia, and private industry toward making the nation more ready, responsive, and resilient against extreme weather hazards. Becoming a WRN Ambassador would help Kenosha County commit to working with NOAA and other Ambassadors to strengthen resilience against extreme weather. The NWS StormReady Program encourages communities to take a proactive approach to improve local hazardous weather operations by providing emergency managers with guidelines on how to improve their hazardous weather operations.[67]

Local Programs

Programs within Kenosha County include those conducted by the Kenosha County DEM. The Kenosha County DEM has several brochures, booklets, and pamphlets available for the public on severe weather safety and other general emergency management-related topics. Kenosha County DEM participates in all State-sponsored severe weather awareness campaigns.

Kenosha County annually sponsors severe weather spotter training. Depending on availability, training sessions are conducted by the NWS or SKYWARN, a partnership between the NWS and several other organizations. The SKYWARN Storm Spotter Program[68] trains volunteers to provide timely and accurate reports of severe weather to the NWS. Sessions are targeted toward emergency response personnel and members of the public. In the event of a severe thunderstorm or tornado warning, police and fire department personnel go to designated locations to monitor weather conditions.

Kenosha County DEM and County Dispatch rely on the following to notify residents of severe weather hazards: NOAA All Hazard Weather Radio, Universal Weather Service, NAWAS, emergency e-mail network, and Doppler Radar. Kenosha County DEM encourages all local citizens to have a NOAA All Hazard Weather Radio. In 2002, NOAA Weather Radio installed a new transmitter at CTH KR and Wood Road in Racine County. This transmitter serves both Kenosha and Racine Counties and is assigned a frequency of 162.450 megahertz. In addition, severe thunderstorm and related hazard warnings from NOAA Weather Radio are relayed to other media via the Federal Communication Commission's Emergency Alert System (EAS). The EAS allows officials to send emergency information targeted to specific geographical areas. The EAS sends alerts out to broadcast media, cable television providers, satellites, pagers, direct broadcast satellites, high-definition television, and video dial tone. This system uses the same digital protocols as NOAA Weather Radio. Nationally, the National Weather Service generates about 80 percent of EAS activations primarily for short-duration weather warnings and watches. Federal, State, and local emergency personnel can also access this system to disseminate nonweather emergency messages through the National Weather Service's HAZCollect system. Other available modes of communication in which the residents of Kenosha County can receive severe weather warnings include local television and radio broadcasts, digital mobile alert systems, social media platforms, and even door-to-door notifications in certain situations.

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[66] *Go to Ready.gov to download the mobile app.*

[67] *More information on the Weather-Ready Ambassador Initiative and the StormReady Program can be found at www.weather.gov.*

[68] *More information on the NWS's SKYWARN Storm Spotter Program can be found at www.weather.gov.*

In addition, county emergency management representatives from southeastern Wisconsin have worked with computer science students from the University of Wisconsin-Parkside's "App Factory" to develop the *Ready Badger* app for wireless devices.[69] The app is designed to speed the process of sharing and gathering hazard-related information. This app allows emergency managers to send custom-made alerts for any type of emergency, including severe thunderstorms and high wind related events. It also provides users with access to emergency preparedness information specific to their county. Users can also use the app to submit digital damage reports to County emergency managers, allowing them to assess damages and respond to disasters more quickly.

The provision of advanced warning systems and public informational and educational programming are some of the most important mitigation actions to be considered. Kenosha County owns and operates a total of 35 outdoor warning and communication siren systems, with eight located within the City of Kenosha, nine within the Village of Pleasant Prairie, four within the Villages of Bristol and Salem Lakes, three within the Village of Somers, two within the Village of Twin Lakes, one within the Village of Paddock Lake. and one within each of the Towns of Brighton, Paris, Randall, and Wheatland. The County regularly tests and maintains these sirens.

Kenosha County has developed an emergency operations plan and hazard analysis, which sets forth an all-hazards action plan. In addition, many of the local units of government have developed emergency operations plans and/or programs that complement the County plan and that also set forth procedures and actions to deal with a range of situations and events.

Multi-Jurisdictional Considerations

The hazards addressed by mitigation measures in this multi-hazard plan component include multiple weather events and non-weather-related hazards. These events can potentially impact all municipalities within Kenosha County, causing damage or loss to various infrastructure (i.e., transmission lines, communication lines, and transportation routes), buildings (i.e., homes, businesses, critical facilities), and property. Kenosha County, municipalities, and relevant businesses and organizations should continue coordinating hazard mitigation activities through a cooperative County and local government partnership in countywide hazard mitigation planning and response mechanisms.

Evaluation of Alternatives and Identification of Priority Mitigation Measures

Based on the risk analysis given in Chapter 3 indicating the vulnerability of human life, property, and economic production related to various hazard events, it is indisputable that measures focusing on educating the public and providing advanced warning of impending hazard events should continue to represent a significant component of planned mitigation actions. The existing warning systems should continue to rely upon multiple means of communication to alert people to the threat of various hazard events. Warning systems will need to be maintained routinely and improved as technology advances. In addition, informing the public of the significance of various hazard events and their dangers is an essential and ongoing component for minimizing the associated risks. Community-based informational programs should continue to be conducted by the County in partnership with Federal, State, and local officials.

Kenosha County's participation and coordination in disaster and emergency preparedness with other local, State, and Federal organizations is a principle mitigative action to protect the County's citizens and preserve private property and public infrastructure.

The best way to mitigate vulnerability to many hazards is to avoid them altogether when possible. Life and property are vulnerable to hazard events in or near known hazard areas. For this reason, an important aspect of any hazard mitigation plan is continuing to enforce, review, and, when necessary, enact new regulations and ordinances. The County and its municipalities should continue to review building code regulations and ordinances related to new development and redevelopment. New development should not be permitted in or near known hazard areas.

Based upon the initial evaluation and consideration of risk and review by the Kenosha County Hazard Mitigation Plan LPT, 25 actions apply to multiple types of hazards and were determined to be priority mitigation measures as part of this hazard mitigation plan update. These priority mitigation measures, and a general cost-benefit summary are presented in Table 5.1.

[69] *The Ready Badger app can be downloaded for free in the Apple App Store and Android Google Play Store.*

Table 5.1
Cost-Benefit Analysis for Priority Measures Included in the Kenosha County Hazard Mitigation Plan: Multi-Hazards

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Nonstructural												
Continue to enforce State building code regulations that aim to improve the ability of structures to withstand hazardous weather conditions	--[c]	--[c]	X			X	X	X	X			Kenosha County and all local jurisdictions[d]
Encourage the periodic review of and/or explore the need for new municipal and County development regulations, especially in known hazard areas	--[c]	--[c]	X			X	X	X	X			Kenosha County and all local jurisdictions[d]
Encourage local municipalities to participate in the National Weather Service's (NWS) StormReady program	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]
Continue the integration of hazard mitigation planning into other local planning efforts (i.e., comprehensive and land use planning	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]
Create local funding opportunities and mechanisms for hazard mitigation	--[c]	--[c]		X		X						Kenosha County and all local jurisdictions[d]
Continue to update a list of potential funding sources associated with hazard mitigation planning	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]
Continue to work with public health and human services departments, volunteer groups, NGOs, and American Red Cross	--[c]	--[c]	X			X						Kenosha County
Continue coordination of emergency response and operation plans among governmental units and first responders	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d] and NGOs
Encourage agricultural producers to purchase crop insurance and promote enrollment of agricultural producers into Federal crop insurance programs	--[c]	--[c]	X			X				X		Kenosha County and all local jurisdictions[d]

Table continued on next page.

Table 5.1 (Continued)

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Nonstructural (continued)												
Routinely inspect mobile and manufactured housing to ensure they are securely anchored (i.e., tie-downs)	--[c]	--[c]	X			X	X	X				Kenosha County and all local jurisdictions[d]
Pursue grant funding for the installation or upgrading of adequate safe rooms in existing mobile home parks, campgrounds, and public parks and beaches based on community and landowner interest	--[c]	--[c]	X			X		X	X			Kenosha County and all local jurisdictions[d]
Structural												
Maintain, update, and upgrade public early warning systems and networks	--[e]	--[e, f]		X		X						Kenosha County and all local jurisdictions[d]
Continue using, maintaining, and updating of the County's interoperability communication network systems	--[e]	--[e]		X		X	X					Kenosha County
Bury and protect power and utility lines, where feasible and appropriate, to prevent damage from hazardous weather conditions	--[c]	--[c]			X	X						Kenosha County and all local jurisdictions[d]
Promote emergency on-site back-up power generation at critical facilities, including water treatment and wastewater treatment facilities	--[c]	--[c]		X		X	X					Kenosha County and all local jurisdictions[d]
Trim and maintain the health of trees near vulnerable infrastructure	--[g]	--[g]		X		X	X					Kenosha County and all local jurisdictions[d]
Continue to promote, update, and add to Kenosha County Division of Emergency Management's online resources related to hazardous weather events, preparedness, and post-event management	--[c]	--[c]	X			X						Kenosha County

Table continued on next page.

Table 5.1 (Continued)

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Public Information and Educational Programming												
Continue participating in public outreach events that educate County residents, including to the communities considered vulnerable, on planning and preparing for severe weather events	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]
Encourage residents to develop a Family Emergency Preparedness Plan and Disaster Supply Kit (see Appendix D)	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]
Promote inclusion of safety strategies for severe weather events into driver educational classes and materials	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]
Encourage and educate the public on the use of severe weather warning applications (apps) on electronic mobile devices (i.e., FEMA's *ready.gov* severe weather warning cellular phone app)	--[c]	--[c]	X			X						Kenosha County
Continue distributing and promoting information and educational resources and programs on available home insurance, flood insurance (i.e., NFIP), severe weather insurance, and crop insurance for damages sustained during a natural hazard event	--[g]	--[g]	X			X						Kenosha County and all local jurisdictions[d]
Ensure emergency preparedness and educational outreach is accessible to all residents, especially those considered vulnerable, to help protect them from severe weather hazards	--[e]	--[e]	X			X		X	X	X		Kenosha County and all local jurisdictions[d]

Table continued on next page.

Table 5.1 (Continued)

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Public Information and Educational Programming (continued)												
Continue to utilize social media to conduct outreach and to inform the public on severe weather hazards	--[c]	--[c]	X			X				X		Kenosha County and all local jurisdictions[d]
Promote and distribute information related to maintaining healthy trees on private lands	--[e]	--[e]	X			X	X					Kenosha County and all local jurisdictions[d]

[a] *All costs expressed in 2021 dollars unless otherwise noted.*

[b] *Cost of implementation is allocated among three categories of low (less than $100,000 dollars), moderate (greater than $100,000 and less than $1,000,000), and high (greater than $1,000,000) costs, which are generally defined as:*

Low	*Moderate*	*High*
Educational and informational programming	*Addition of new staff*	*Major construction*
Ongoing enforcement of ordinances	*Additional staff hours budgeted*	*New buildings (infrastructure)*
Plan Development	*Additional equipment*	*Capital programs*
Continued coordination/mutual aid/interagency agreements	*New ordinance development*	
	New programs/task force	

[c] *Costs covered under ongoing activity.*

[d] *Jurisdictions include general purpose units of government—Cities, Towns, and Villages—and special purpose units of government such as School Districts, Sanitary and Utility Districts, and Agricultural Drainage Districts.*

[e] *Costs are site-specific.*

[f] *Costs include an annual subscription fee of $13,000 for targeted alert notification service.*

[g] *Costs to be determined. Partially covered under ongoing programs.*

Source: Kenosha County Division of Emergency Management and SEWRPC

5.3 HAZARD MITIGATION PLAN COMPONENT FOR TORNADOES

Tornadoes are natural hazard events of moderate concern to be considered in this update of the Kenosha County hazard mitigation plan. This section describes alternative and selected priority strategies to mitigate these types of hazards. As part of the updating process, these strategies were reviewed and reevaluated by the Kenosha County Hazard Mitigation LPT in light of the updated hazard conditions and hazard mitigation goals documented in Chapters 3 and 4, respectively.

Identification of Alternative Mitigation Strategies

All tornadoes are potentially dangerous hazards within Kenosha County as discussed in Chapter 3. However, tornadoes have been shown to impact Kenosha County about once every four to five years and these are most likely to be an EF1 (or F1) magnitude or less. In addition, when tornadoes and related hazard events occur, they generally last for short periods of time and impact relatively small areas upon the landscape. However, when strong tornadoes do strike, they can cause extensive property damage, injuries, and death.

While it may not be possible to accurately identify specific areas where there is significant risk from tornado events, or the number or severity of the events, measures can be taken to reduce the potential damage caused by tornado-related hazards wherever they may occur in the County. Based upon review by the Kenosha County Hazard Mitigation LPT, the following measures to reduce vulnerability to tornadoes have been identified as viable for this update of the Kenosha County hazard mitigation plan. In addition to the measures listed below, mitigation strategies that were found to address multiple hazard types, including tornadoes, are discussed in the hazard mitigation plan component for multiple hazard types earlier in this Chapter. This section will present current programs, considerations, and mitigation measures that apply to tornado hazards.

Current Programs

Federal and State Programs

The NWS issues tornado watches when conditions are favorable for the development of thunderstorms that have a strong capability of producing tornadoes and issues tornado warnings when a tornado has been spotted by a trained observer or Doppler radar has indicated a developing tornado.

Federal and State programs include awareness and education efforts. NOAA's National Severe Storms Laboratory (NSSL) website has educational material on severe weather, including tornadoes. In addition, the NWS has an extensive public information program to educate people about the dangers of tornadoes and related hazards that assist in preventing related deaths and injuries. WEM, in conjunction with the NWS and State and local government agencies, provides both preparedness information and severe weather information to the public. Similarly, WEM has produced several educational resources regarding tornadoes including prerecorded radio public service announcements, scripts for radio public service announcements, fliers, and educational materials for children.[70] The Wisconsin Department of Health Services has developed a severe thunderstorm and tornado tool kit to provide information to local governments, health departments, and citizens in Wisconsin about preparing for and responding to severe thunderstorms and tornadoes.[71] In addition, numerous other organizations, including the American Red Cross, provide public safety information regarding tornadoes.

Local Programs

Programs within Kenosha County include those conducted by the Kenosha County DEM. The Kenosha County DEM has a number of brochures, booklets, and pamphlets available for the public on tornado safety and other general emergency management-related topics. Kenosha County DEM participates in all State sponsored severe weather awareness campaigns.

As discussed in detail in the multiple hazards plan component, Kenosha County has a variety of methods to warn residents of emergency situations, including tornado events.

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[70] *These can be accessed at Wisconsin Emergency Management's ReadyWisconsin website located at: ready.wi.gov/Resources/Manager_Resources.asp.*

[71] *Wisconsin Department of Health Services,* Wisconsin Severe Thunderstorm and Tornadoes Toolkit, op. cit.

Kenosha County owns and operates a total of 35 outdoor warning and communication siren systems, with eight located within the City of Kenosha, nine within the Village of Pleasant Prairie, four within the Villages of Bristol and Salem Lakes, three within the Village of Somers, two within the Village of Twin Lakes, one within the Village of Paddock Lake. and one within each of the Towns of Brighton, Paris, Randall, and Wheatland. The County regularly tests and maintains these sirens.

Multi-Jurisdictional Considerations

Tornadoes and their related hazards can potentially impact all municipalities within the County. In addition, these events can potentially cause severe damage to a variety of infrastructure including transmission lines, communication lines, and transportation routes due to high winds and debris. Public and private buildings can also be destroyed. Hence, Kenosha County, municipalities, relevant businesses, and other organizations should coordinate hazard mitigation activities through a cooperative County and local government partnership in countywide disaster planning and response mechanisms. Such measures are already well underway through the comprehensive emergency management planning program involving the Kenosha County DEM and coordinated local community emergency operations programs and should be continued.

Evaluation of Alternatives and Identification of Priority Mitigation Measures

Based upon review of the above, refinement and expansion of the current ongoing programs represent a major component of the planned mitigation action with regard to early warning systems. The existing warning systems should continue to rely upon the use of multiple means of communication to alert people to the threat of severe weather. Developed urban areas located within unincorporated areas, such as major lake developments, should also consider having outdoor early warning systems. The best shelters are specifically designed tornado shelters or safe rooms. Lacking such shelters, taking refuge in a basement near supporting walls or pillars, and away from windows, or, if there is no basement, taking shelter in smaller interior, windowless rooms, such as hallways or closets, can offer some protection and is the next best option. Cars, mobile homes, garages, and outbuildings are not safe shelters from tornadoes. Thus, promoting the provision of adequate safe places to seek shelter during tornadoes constitutes an additional approach to mitigating some impacts of severe storms in Kenosha County. Residents of mobile home parks, in particular, represent a segment of the County's population that lacks access to adequate shelters. Kenosha County has 22 manufactured home parks located in the City of Kenosha, the Villages of Bristol, Pleasant Prairie, Salem Lakes, and Somers, and Towns of Brighton, Somers, and Wheatland. Thus, these communities bear additional risks from tornadoes. Encouraging and promoting the construction of community safe rooms to provide shelter from tornadoes for these vulnerable populations constitutes an important addition to this hazard mitigation plan.

In addition, informing the public of the significance of tornado watches and warnings so that they take tornado warnings seriously and know where to seek shelter in emergency situations, are important, ongoing components for minimizing the risks associated with these natural hazards. Community- and school-based informational programs should also continue to be conducted by the County in partnership with Federal, State and local authorities.

Finally, other feasible mitigation actions include enforcing building code regulations that improve the ability of structures to withstand severe wind, on-site emergency backup power generation for critical infrastructure, and other precautions that would limit potential injury, death, or property damage. The majority of these measures are currently in place to varying degrees, indicating an emphasis on informational programming and enforcement would take precedence.

Based upon the foregoing evaluation and consideration of risk and consideration by the Kenosha County Hazard Mitigation LPT (see Appendix A), there are 14 actions determined to be priority mitigation measures as part of this hazard mitigation plan update that are specifically related to tornado events.[72] These priority mitigation measures, along with a general cost-benefit summary are presented in Table 5.2.

[72] *Priority mitigation measures that apply to multiple hazard types, including tornado events, are presented in the "Hazard Mitigation Plan Component for Multiple Hazard Types" section in this Chapter.*

Table 5.2
Cost-Benefit Analysis for Measures Included in the Kenosha County All-Hazards Mitigation Plan: Tornado Hazards

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Nonstructural												
Review local building codes to determine if revisions are needed to improve the ability of structures to withstand greater wind velocities	--[c]	--[c]	X			X	X	X	X			Kenosha County and all local jurisdictions[d]
Routinely inspect mobile and manufactured housing to ensure they are securely anchored (i.e., tie-downs)	--[c]	--[c]	X			X	X	X				Kenosha County and all local jurisdictions[d]
Encourage the development of a local tornado spotter network	--[c]	--[c]	X			X						Kenosha County
Establish safe and appropriate locations for temporary debris disposal sites	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]
Conduct an inventory and inspection of facilities to ensure the quality, quantity, and accessibility of adequate tornado shelters	--[c]	--[c]	X			X		X	X			Kenosha County and all local jurisdictions[d]
Encourage provision of safe rooms, especially in structures that do not have a basement	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]
Require construction regulations for safe rooms in new schools, daycares, and nursing homes, and encourage the establishment of safe rooms for existing structures that do not have basements	--[f]	--[f]			X	X		X	X			Kenosha County and all local jurisdictions[d]
Provide model mobile home park regulations to municipalities for their consideration which requires that community safe rooms (storm shelters) be provided for residents of new and expanding mobile home parks. Based on community and landowners interest, pursue grant funding for installation of community safe rooms in existing mobile home parks	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]

Table continued on next page.

Table 5.2 (Continued)

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Structural												
Ensure that maintenance, monitoring, and usage policies/procedures of the County's public outdoor warning systems are up-to-date and reflect the needs of fire and police personnel	--[f]	--[f]	X			X						Kenosha County and all local jurisdictions[d]
Work to locally adopt and implement the Wisconsin Outdoor Warning Siren Best Practices	--[h]	--[h]	X			X	X	X	X			Kenosha County and all local jurisdictions[d]
Work with municipalities and businesses to explore installation or upgrading of community safe rooms and hardening projects for public buildings, community facilities, major industrial and manufacturing sites, large businesses, mobile home parks, campgrounds, and fairgrounds to ensure adequate shelter from tornadoes	--[c]	--[c]			X	X		X	X			Kenosha County and all local jurisdictions[d]
Public Information and Educational Programming												
Increase public education and awareness of the potential severity of tornadoes and continue to produce and distribute emergency preparedness information related to tornado events	--[h]	--[h]	X			X						Kenosha County and all local jurisdictions[d]
Distribute, and make readily available, information on where to go during severe weather events for campground, park, and beach visitors	--[e]	--[e]	X			X						Kenosha County
Produce and distribute information related to what steps should be taken by the public when they hear tornado sirens	--[c]	--[c]	X			X		X	X			Kenosha County and all local jurisdictions[d]

Table continued on next page.

Table 5.2 (Continued)

[a] *All costs expressed in 2021 dollars unless otherwise noted.*

[b] *Cost of implementation is allocated among three categories of low (less than $100,000 dollars), moderate (greater than $100,000 and less than $1,000,000), and high (greater than $1,000,000) costs, which are generally defined as:*

Low	Moderate	High
Educational and informational programming	Addition of new staff	Major construction
Ongoing enforcement of ordinances	Additional staff hours budgeted	New buildings (infrastructure)
Plan Development	Additional equipment	Capital programs
Continued coordination/mutual aid/interagency agreements	New ordinance development	
	New programs/task force	

[c] *Costs are site-specific.*

[d] *Jurisdictions include general purpose units of government—Cities, Towns, and Villages—and special purpose units of government such as School Districts, Sanitary and Utility Districts, and Agricultural Drainage Districts.*

[e] *Costs to be determined. Partially covered under ongoing programs.*

[f] *Costs are site-specific, and a survey is needed for countywide estimate.*

[g] *Costs covered under ongoing activity.*

[h] *Portion of costs included in ongoing program and construction project implementation programs. The additional cost of all of the hazard mitigation and public informational and educational programs is estimated to be $21,800 per year.*

Source: Kenosha County Division of Emergency Management and SEWRPC

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5.4 HAZARD MITIGATION PLAN COMPONENT FOR FLOODING AND ASSOCIATED STORMWATER DRAINAGE PROBLEMS

Flooding and related stormwater drainage problems represent one of the most common and damaging types of hazards affecting Kenosha County. Generally, the amount of damage from flooding is a direct consequence of the contributing drainage area land use. It is likely that flooding and related stormwater drainage problems will continue to be a major source of damages resulting from natural hazards affecting the County in the future. This highlights the need for effective mitigation measures for this hazard. This section describes alternative and selected strategies to mitigate the impacts of flooding hazards. As part of the updating process, these strategies were reviewed and reevaluated by the Kenosha County Hazard Mitigation LPT considering the updated hazard conditions and hazard mitigation goals documented in Chapters 3 and 4, respectively.

Identification of Alternative Mitigation Strategies

Various nonstructural, structural, and educational or informational measures are available for mitigating the impacts of flood and related stormwater drainage problem events in Kenosha County. Nonstructural measures include reservation of floodplains for conservation, recreation, and other open space uses; floodplain use regulations; land use and related stormwater management measures designed to limit rainfall-runoff; structure floodproofing and/or elevation; structure removal; channel maintenance; flood insurance; lending institution policies; realtor policies; community utility policies; and emergency programs. Structural measures include floodwater storage facilities, such as reservoirs and impoundments; floodwater diversion facilities, such as dikes and channels; floodwater containment facilities, such as earthen dikes and concrete floodwalls; floodwater conveyance facilities, such as channel modifications; and bridge and culvert modifications or replacements. Nonstructural measures are most effective when the flooded structures are scattered throughout the watershed. In contrast, structural measures typically are most effective where impacted buildings are concentrated, such as in urban areas. Educational and informational flood mitigation-related material is effective for communities, homeowners, landowners, businesses, farmers, and local officials who continually experience riverine and stormwater flooding events.

For purposes of organizing this extensive plan component, mitigation strategies are grouped into four plan elements:

- Preservation of Floodplains, Open Space, and Environmentally Sensitive Lands
- Floodplain Management
- Stormwater Management
- Public Information and Education Outreach

Preservation of Floodplain, Open Space, and Environmentally Sensitive Lands Plan Element

Floodplain management regulations and open space and environmentally sensitive land policies perform critical roles toward assuring that flood mitigation efforts are properly implemented. Kenosha County and the municipalities within the County have several pertinent floodplain management regulations and programs in place, most notably in the form of zoning regulations and ordinances. In addition, a significant portion of environmentally sensitive lands within the County, including wetlands, woodlands, and floodplains are under protective ownership and/or zoning ordinance(s).

<u>Floodplain and Wetland Preservation Regulations</u>

As indicated in Table 1.1 in Chapter 1 of this report, floodplain management regulations include floodplain zoning ordinances and wetland-shoreland zoning ordinances. The floodplain zoning ordinances are intended to preserve the floodwater conveyance and storage capacity of floodplain areas and to prevent the location of new flood-damage-prone development in flood hazard areas. The wetland preservation zoning ordinance seeks to maintain the stormwater and floodwater storage capacity of wetlands in the County and prohibits certain land uses detrimental to wetland areas. Implementing these ordinances on an ongoing basis is an integral part of the County flood mitigation strategy.

Environmentally Sensitive Lands and Open Space Preservation Actions

Protecting environmentally sensitive lands, such as environmental corridors and important natural features, can prevent increased flood flows and associated problems. These areas often include significant lowland areas of floodplains and wetlands. Preserving wetlands is of particular importance because wetlands often provide floodwater storage and enhance water quality and wildlife habitat. Furthermore, the intrusion of intensive urban development into environmentally sensitive areas that tend to have high water tables may result in serious and costly problems, such as failing foundations for pavements and structures, wet basements, excessive operation of sump pumps, excessive clear-water infiltration into sanitary sewerage systems, and poor drainage. Similarly, the destruction of vegetative ground cover may result in soil erosion, stream siltation, more rapid stormwater runoff, and increased flooding.

The regional land use plan[73] and park and open space plan described in Chapter 2 of this report carry forward fundamental land use recommendations, including reducing and containing urban sprawl and protecting and preserving environmentally sensitive lands, such as environmental corridors, open space lands, and isolated natural resource areas. This regional land use plan forms the framework for ongoing local land use planning or plans carried out by the local units of government, including Kenosha County. In 2022, Kenosha County had 44 park and open space sites of 40 or more acres, encompassing 11,552 acres. Of these park and open space sites, seven were owned and maintained by the County and 16 were owned and maintained by State departments, including the Wisconsin Department of Natural Resources (WDNR), the Wisconsin Department of Transportation (WisDOT), and the University of Wisconsin. The current status of County- and State-owned sites are shown on Map 5.1. In addition to the 2022 County- and State-owned park and open space sites in Kenosha County, there were 21 sites of 40 or more acres owned and maintained by local units of government, including cities, villages, towns, school districts, or other public districts, as shown on Map 5.2.

Private organizations or conservation easements protect other open space and environmentally sensitive sites in Kenosha County. Conservation easements are typically voluntary contracts between a private landowner and a land trust or government body that limit or prohibit any future parcel development. These easements typically are voluntary contracts between a private landowner and a land trust or governmental body that limit, or in some cases prohibit, future development of the parcel. In 2022, the Kenosha Racine Land Trust had conservation easements on two sites in Kenosha County, encompassing 140 acres. These sites are shown on Map 5.3.

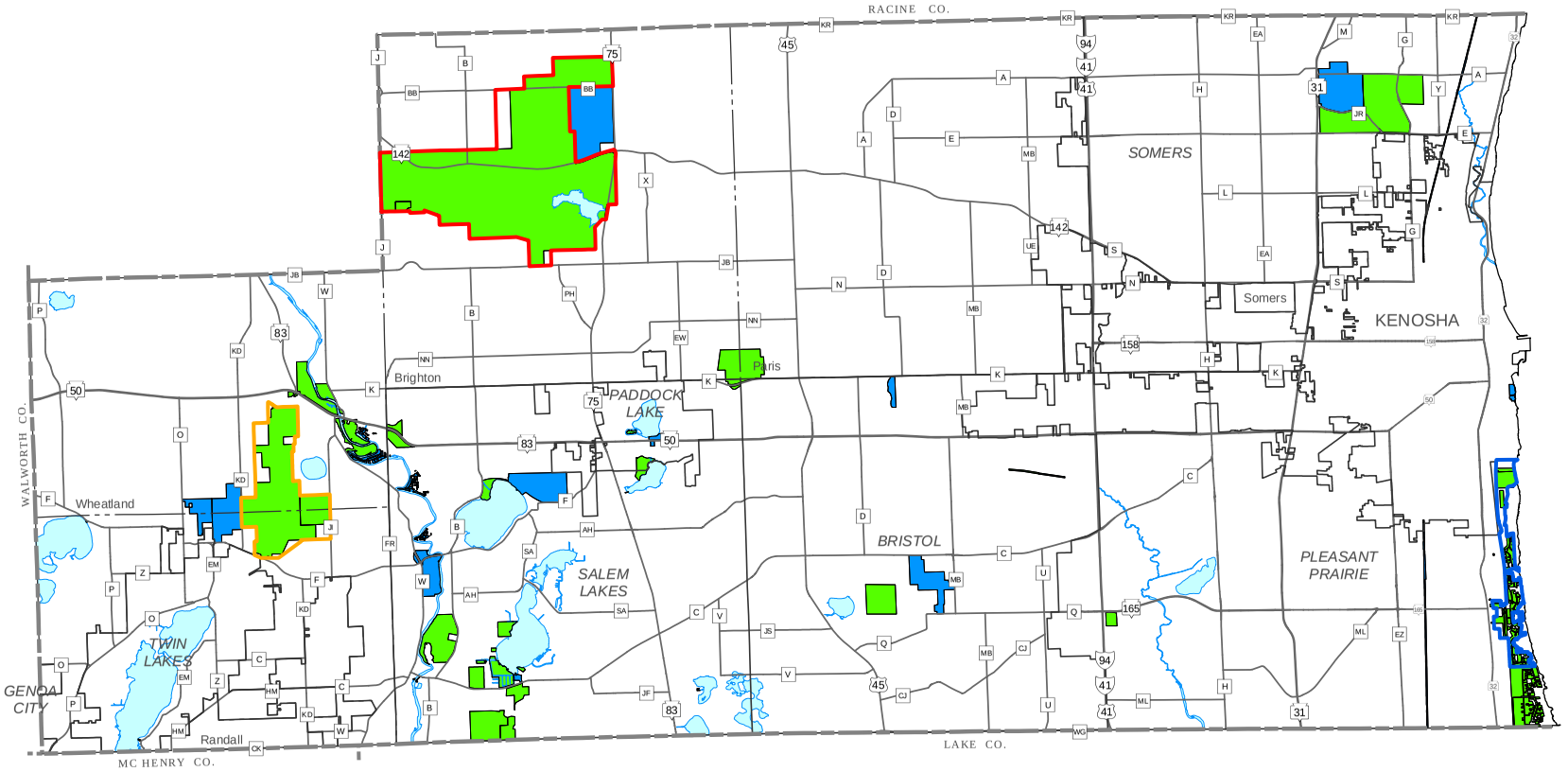
The Kenosha County park and open space plan[74] provides for the preservation of environmental corridors and isolated natural resource areas. That plan's open space preservation and outdoor recreation elements are summarized on Maps 5.4 and 5.5, respectively. Kenosha County and its municipalities have actively promoted and prepared land use and park and open space plans consistent with Regional and County objectives for preserving environmentally sensitive lands. This Kenosha County hazard mitigation plan update incorporates the open space and environmentally sensitive land preservation recommendations of the Kenosha County park and open space plan. The Kenosha County park and open space plan recommends that 4,150 additional acres be protected through a combination of public or nonprofit conservation organization ownership[75] or the application of protective zoning. These 4,150 acres include planned primary and secondary environmental corridors, planned isolated natural resource areas, and areas outside corridors but within the WDNR project boundaries. All-natural areas and critical species habitat sites recommended to be preserved are contained within the planned primary or secondary environmental corridors or the planned isolated natural resource areas. The cost, in 2021 dollars, of full implementation of this recommendation is estimated to be about $24.6 million.

[73] *SEWRPC Planning Report No. 55*, Vision 2050 Volume III: Recommended Regional Land Use and Transportation Plan*, July 2017*.

[74] *SEWRPC Community Assistance Planning Report No. 131, 2nd Edition,* A Park and Open Space Plan for Kenosha County*, Wisconsin, April 2012*.

[75] *Public ownership includes lands owned by a Federal, state, county, or local unit of government, school districts, or other public districts.*

Map 5.1
Kenosha County and State of Wisconsin Park and Open Space Sites: 2022



STATE OWNED SITE

COUNTY OWNED SITE

WISCONSIN DEPARTMENT OF NATURAL RESOURCES PROJECT BOUNDARY

BONG STATE RECREATION AREA

CHIWAUKEE PRAIRIE STATE NATURAL AREA

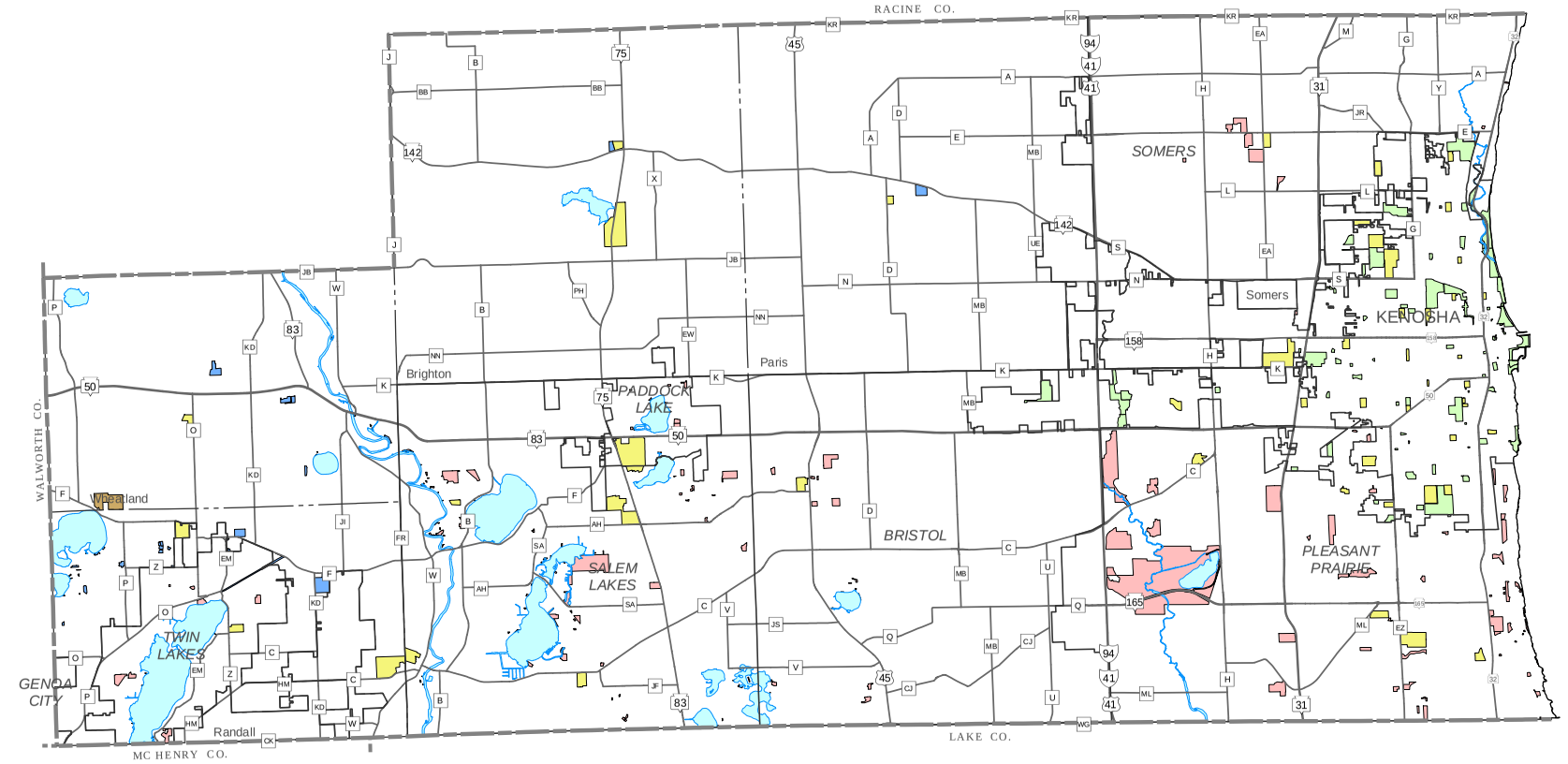
NEW MUNSTER STATE WILDLIFE AREA

N

0 1 2 3 Miles

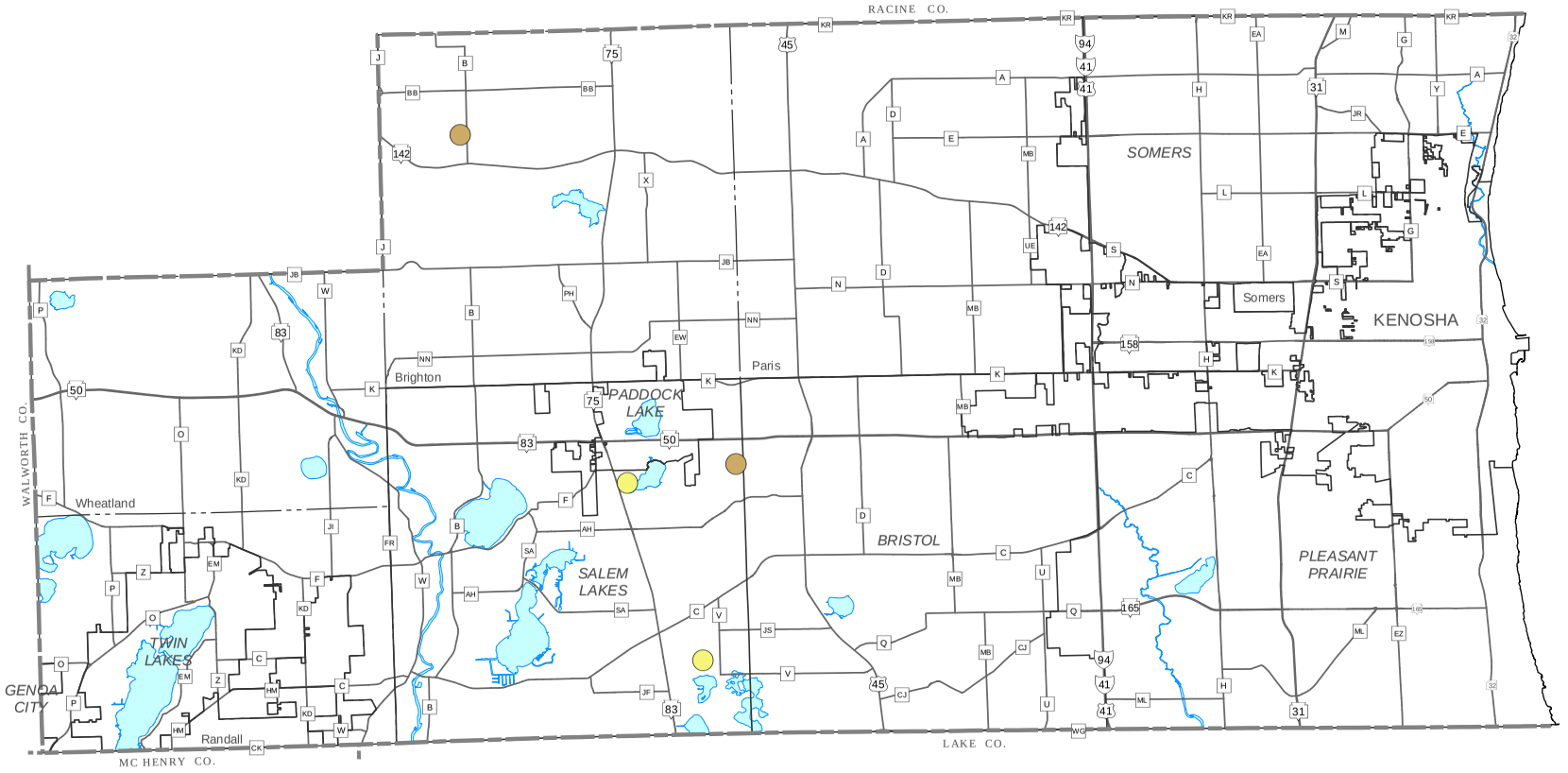
Source: Wisconsin Department of Natural Resources, Racine County, and SEWRPC

Map 5.2
Park and Open Space Sites Owned by Cities, Villages, Towns, School Districts, or Other Public Districts in Kenosha County: 2022



Source: Wisconsin Department of Natural Resources, Racine County, and SEWRPC

Map 5.3
Lands Under Conservation Easements in Kenosha County: 2022



VILLAGE EASEMENT

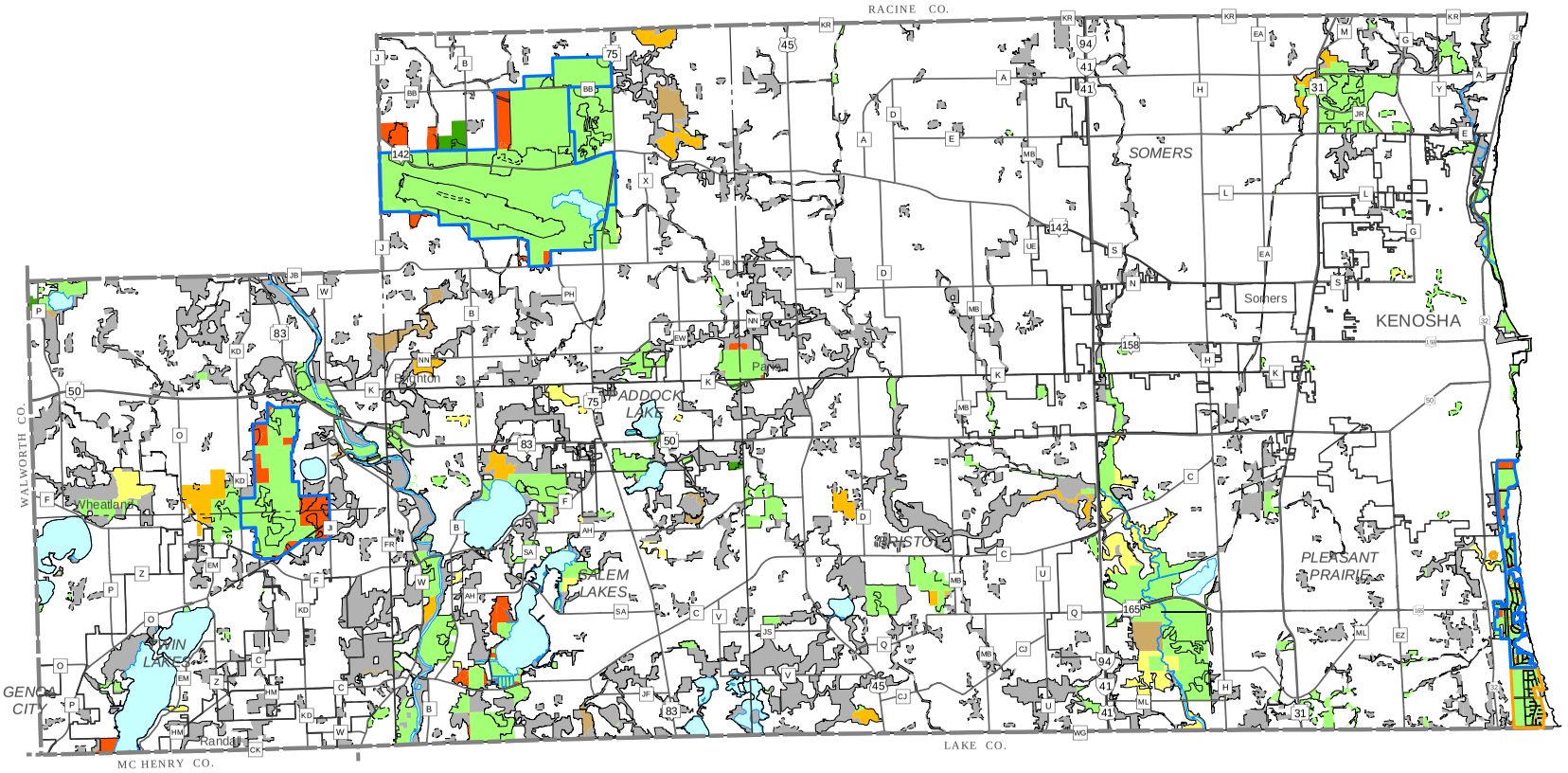
NON-PROFIT/CONSERVATION ORGANIZATION EASEMENT

N

0 1 2 3 Miles

Source: Wisconsin Department of Natural Resources, Racine County, and SEWRPC

Map 5.4
Open Space Preservation Element of the Kenosha County Park and Open Space Plan: 2035



EXISTING PUBLIC INTEREST OWNERSHIP OF OPEN SPACE LANDS

- FEDERAL, STATE, COUNTY, LOCAL, NONPROFIT CONSERVATION ORGANIZATION, SCHOOL OR OTHER PUBLIC DISTRICT, OR COMPATIBLE PRIVATE OUTDOOR RECREATION OR OPEN SPACE SITES
- LANDS UNDER CONSERVATION EASEMENT

PROPOSED PUBLIC INTEREST OWNERSHIP OF OPEN SPACE LANDS

- STATE
- COUNTY
- CITY, VILLAGE, TOWN, SPECIAL PURPOSE DISTRICT
- NONPROFIT CONSERVATION ORGANIZATION
- OPEN SPACE LANDS TO BE PROTECTED BY PUBLIC LAND USE REGULATION

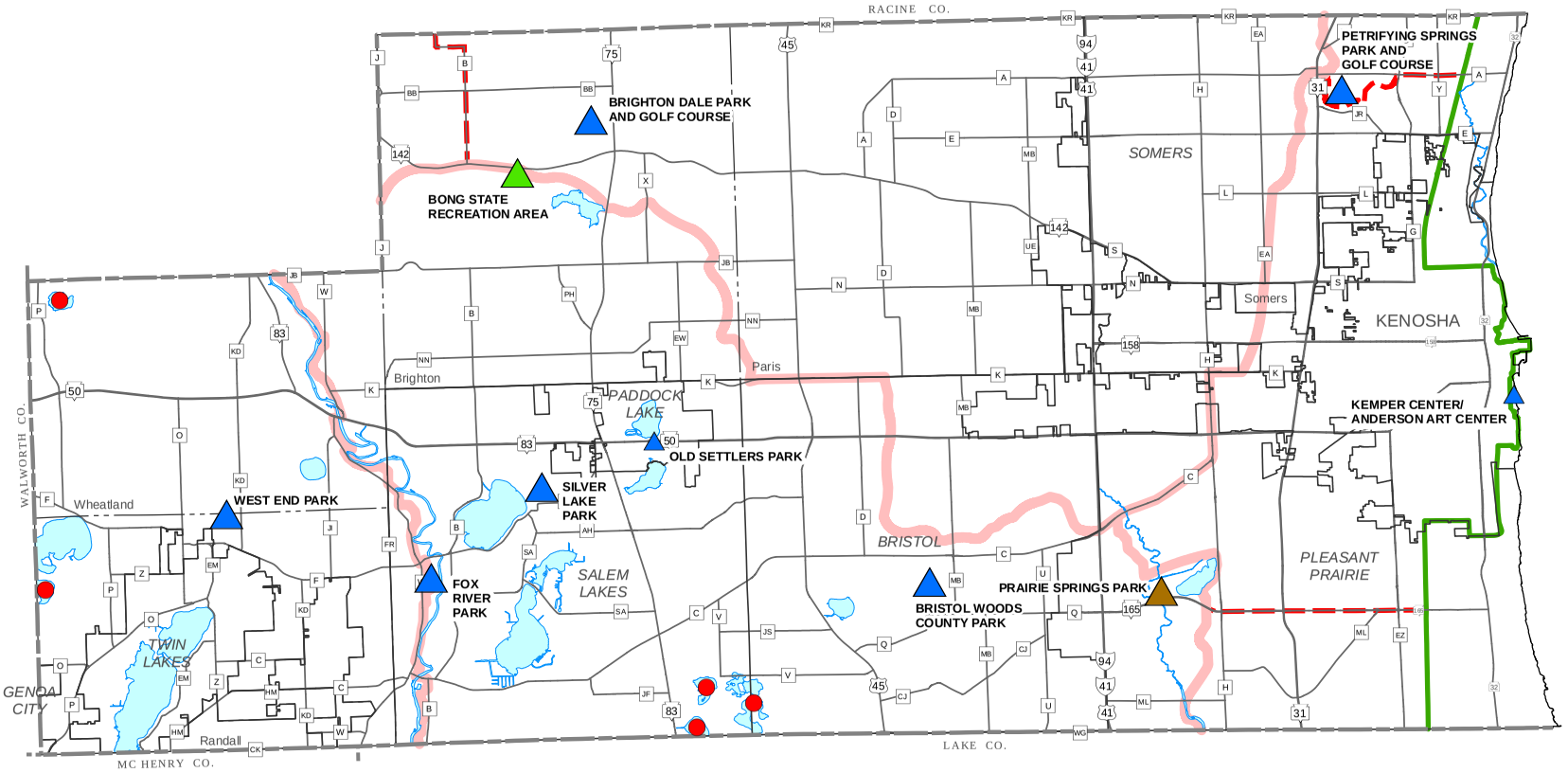
- PLANNED PRIMARY ENVIRONMENTAL CORRIDOR (2010)
- PLANNED SECONDARY ENVIRONMENTAL CORRIDOR (2010)
- PLANNED ISOLATED NATURAL RESOURCE AREA (2010)
- SURFACE WATER
- PROJECT BOUNDARY ADOPTED BY THE WISCONSIN NATURAL RESOURCES BOARD
- THE NATURE CONSERVANCY PROJECT BOUNDARY

N

0 1 2 3 Miles

Source: SEWRPC

Map 5.5
Outdoor Recreation Element of the Kenosha County Park and Open Space Plan: 2035



MAJOR PARKS
- COUNTY
- STATE
- LOCAL

OTHER PARKS
- COUNTY

RECREATION CORRIDORS
- EXISTING RECREATION TRAIL
- PROPOSED RECREATION TRAIL (GENERAL LOCATION)
- PROPOSED CONNECTION TRAIL (GENERAL LOCATION)

BOAT ACCESS FACILITIES
- LAKE NEEDING NEW OR EXPANDED FACILITY

N

0 1 2 3 Miles

Source: SEWRPC

Wetland Restoration to Reduce Flood-Related Crop and Property Damages

Wetlands and floodplains can provide natural storage areas for floodwaters during heavy rain or snow melt events. Restoring the natural function of former wetland areas can be an effective strategy to reduce potential flood damage in downstream areas. According to the U.S. Environmental Protection Agency (USEPA), a one-acre wetland can typically store about three acre-feet, or about one million gallons of water at any given time. Wetland vegetation can slow the movement of floodwater and can transfer some of this water into the atmosphere through evapotranspiration. Increasing flood storage capacity in Kenosha County by expanding wetland acreage may also help communities adapt to and reduce the potential impacts of climate change.[76]

As indicated in Table 2.6, Kenosha County had about 18,877 acres of wetland in 2020. However, this is a fraction of the wetland area in the County that existed in pre-settlement years. Urbanization and agricultural development have altered the landscape and surface water drainage characteristics in the County, leading to increased volumes of runoff and flooding. To facilitate drainage of wetlands and other low-lying areas for cultivation, networks of drainage tile were installed, agricultural drainage ditches were constructed, and some existing streams were channelized. Consequently, channelization has reduced or eliminated the connection between the stream channel and overbank areas during floods. This disconnection of streams from their floodplains reduces floodwater storage in the overbank areas, potentially resulting in larger flood flows downstream.

In addition to storing flood waters and potentially reducing property damages due to flooding downstream, returning marginally productive agricultural lands to their original wetland or marsh condition would significantly reduce annual crop damages. In 2020, approximately 4,500 acres of agricultural land were located within the 1-percent-annual-probability (100-year recurrence interval) flood hazard area in Kenosha County, making them susceptible to riverine flooding during large storm events. Over $37.7 million in crop damages were reported due to flooding in Kenosha County between 1958 through 2021 (2021 dollars). The average annual crop damages due to flooding are approximately $589,000. It should be noted that these economic losses likely represent an underestimate of the actual damages to crops due to flooding in the County because damages to crops often go unreported, and records of crop losses prior to 1989 are spotty. Therefore, these estimated economic losses represent an underestimate of the actual damages in the County.

The WDNR has developed a digital dataset to identify former wetlands that were drained and converted to agricultural uses.[77] The WDNR refers to these areas as potentially restorable wetlands. Areas identified as potentially restorable wetlands must have hydric soils, a current land use compatible with wetland restoration techniques, and must not be mapped as a wetland. There are about 2,919 acres of potentially restorable wetlands located within the 1-percent-annual-probability flood hazard area and are currently in agricultural use, per the SEWRPC 2020 land use inventory. These areas are shown in Map 5.6.

Agricultural lands are prime candidates for wetland restoration because they are in undeveloped, open space uses, and because there are Federal and State programs available to support conversion of certain agricultural lands to wetlands. Conversion of agricultural lands could be done through land purchases, donation, or easements. Some programs provide a percentage of the restoration costs as well as an annual rental rate. In some instances, farmers may be able to plant a harvestable grass crop for hay. In other instances, land may be purchased or permanently placed into conservation easement by willing landowners, restricting development and eliminating the chance that these open areas may be placed into more impervious urban land uses in the future.

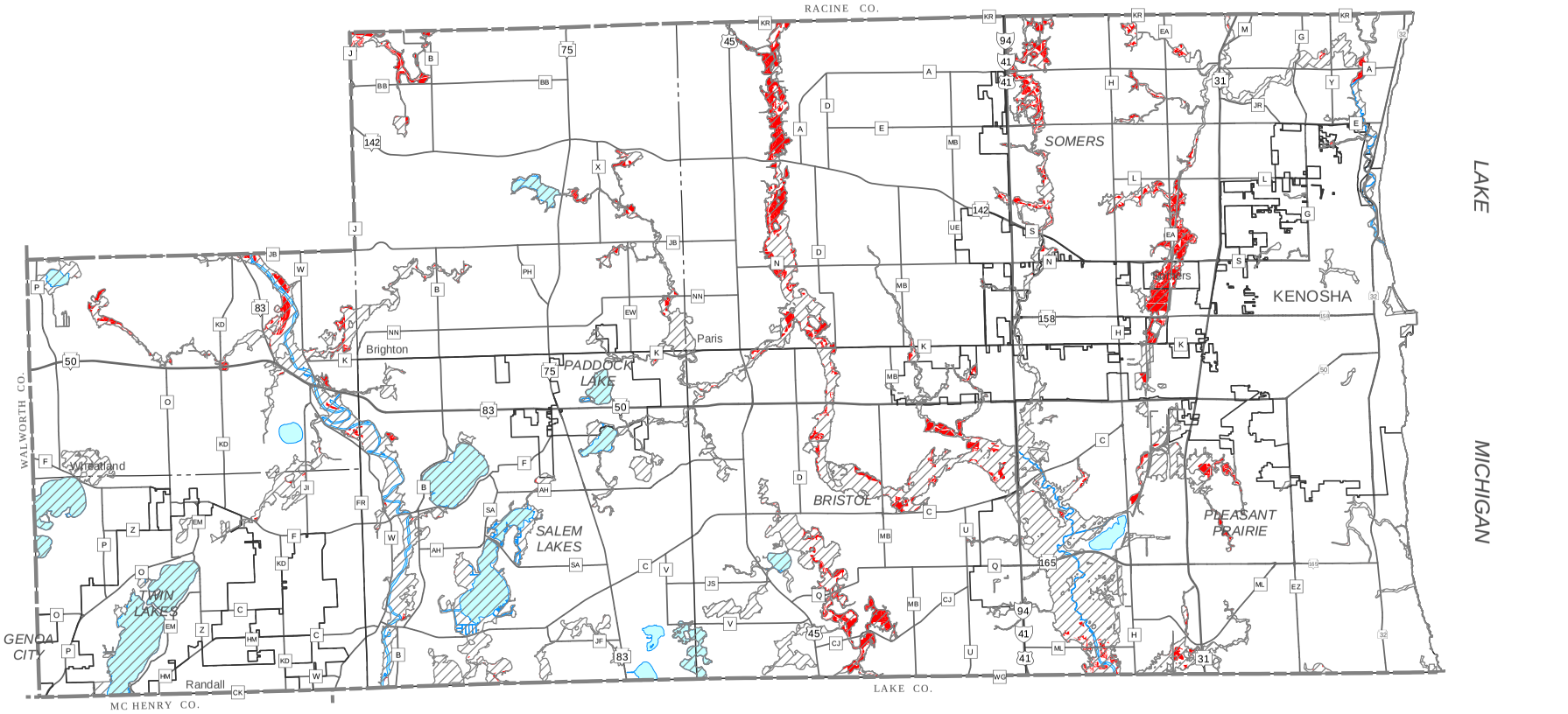
Restoring selected potentially restorable wetlands currently in agricultural uses in Kenosha County is one alternative flood mitigation measure to be considered in addition to the structural flood mitigation measures discussed below. The implementation of this alternative may affect decisions to implement other structural alternatives. In addition, some of the areas identified on Map 5.6 may also be recommended to be acquired by a governmental entity or nonprofit conservation organization as part of the environmentally sensitive areas and open space preservation element discussed in the section above.

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[76] *Detailed modeling would need to be conducted on a subwatershed or subbasin level to estimate changes in flood flows resulting from wetland restorations and projected climate change conditions. Such modeling must be based on multiple parameters, including the specific acreages of land converted and the previous land use categories of such sites.*

[77] *Detailed information on WDNR's Potentially Restorable Wetlands mapping methods and metrics can be found in WDNR's Report entitled: "Wisconsin Department of Natural Resources*, Mapping Potentially Restorable Wetlands in the Rock River Basin*," August 2008.*

Map 5.6
Agricultural Land to be Considered for Wetland Restoration



AGRICULTURAL LAND TO BE CONSIDERED FOR WETLAND RESTORATION
(These areas indicate agricultural land that is located within the 100-Year Floodplain and considered by WDNR to be Potentially Restorable Wetland) (2019)

1-PERCENT-ANNUAL-PROBABILITY (100-YEAR RECURRENCE INTERVAL) FLOODPLAINS (FEMA FIS, JUNE 2021)

SURFACE WATER

N

0 1 2 3 Miles

Source: Federal Emergency Management Agency and SEWRPC

It can be assumed that the majority of flood-related crop damages reported in the County occur within the 100-year flood hazard area. If all of the areas shown on Map 5.6 were taken out of agricultural production, crop losses due to flooding could potentially be reduced by up to 65 percent, or about $350,000 per year based on reported losses. Additional mitigation of potential downstream property damage is also possible.[78] Wetland restoration projects would potentially have the additional benefits of fish and wildlife habitat improvements, erosion control, water quality improvements, and recreational opportunities.

When opportunities present themselves on a particular tract of agricultural land (see Map 5.6), wetland restoration should be considered. This alternative would be implemented as a voluntary program, considered at the discretion of each individual property owner.

It should be noted that estimates of cost for wetland restoration vary greatly depending upon the type of wetland, the specific restoration techniques employed, local construction costs, and whether restoration costs include the cost of land acquisition. For the purpose of this recommendation, the estimated wetland restoration per acre cost developed for the Des Plaines River Watershed Plan of $6,000 (2021 dollars) was used.[79] Thus the estimated cost of restoring all 2,919 acres of potentially restorable wetland that are located within the 1-percent-annual-probability (100-year recurrence interval) flood hazard area and are currently in agricultural land uses would be about $17.5 million (2021 dollars).

Floodplain Management Plan Element

Floodplain Management Plans for Kenosha County Watersheds

SEWRPC has prepared and adopted comprehensive plans for the Fox River, Root River, Pike River, and Des Plaines River watersheds. In preparing these plans, a concerted effort was made to offer for public evaluation a full range of physically feasible alternative plan elements, at the time of publication, that might satisfy one or more agreed-upon watershed development objectives. Each alternative plan element was evaluated insofar as possible in terms of technical, economic, and legal feasibility, and public acceptability, as well as with respect to satisfaction of the watershed development objectives.

For each plan, a number of alternatives were explored in the preparation of floodplain management elements and a variety of structural and nonstructural measures were identified for possible application. The plans include many projects that would mitigate flood risks for communities in Kenosha County located in their respective watersheds. Therefore, the projects listed in the watershed plans are included in this Kenosha County hazard mitigation plan by reference. Table 5.3 provides the estimated cost of implementing selected principal features of the watershed plans that are feasible today. Although a floodplain management plan for the Lake Michigan direct drainage watershed in Kenosha County has not been completed, Table 5.3 also includes selected floodplain management measures for this watershed that were developed by SEWRPC in stream watershed restoration plans.

Fox (Illinois) River Watershed Mitigation Plan

A hazard mitigation plan for the Fox (Illinois) River Watershed was completed by SEWRPC staff in 2023.[80] This plan focused on watershed-wide hazards related to flooding, dams, and drought only. The plan included many projects that would mitigate flood risks for communities in Kenosha County located in the Fox River watershed. Therefore, the projects included in the watershed plan are included in this Kenosha County hazard mitigation plan by reference.

Actions to Address Structures Located in High-Risk Areas

The main emphasis of the floodplain management element of the Kenosha County hazard mitigation plan is to address the structures identified in the parcel-based analysis as potentially being in the 1-percent-annual-probability (100-year recurrence interval) floodplains and structures that experience repetitive flooding issues.

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[78] *Detailed modeling would need to be conducted to determine the amount of flood flow reduction associated with wetland restoration of agricultural land.*

[79] *SEWRPC Planning Report No. 44,* A Comprehensive Plan for the Des Plaines River Watershed, *June 2003.*

[80] *SEWRPC Community Assistance Planning Report No. 343,* Fox (Illinois) River Watershed Mitigation Plan*, September 2023.*

Table 5.3
Principal Features and Costs from SEWRPC Planning Reports for the Floodplain Management Plan Element for the Kenosha County

Component Location	Capital Cost[a]		Annual Operation and Maintenance Cost (thousands of dollars)	Implementation Status
	Component Details	Cost (thousands of dollars)		
Fox River Watershed[b]				
Fox River Watershed	Remove up to 187 residential structures[c, d]	33,917.7	--	Partially implemented and ongoing[d]
Hoosier Creek and tributaries	Brush clearing	359.1	--	Ongoing
Root River Watershed[e]				
East Branch Root River Canal	Channel clearing and maintenance	73.9	2.3	Partially implemented
Pike River Watershed[f]				
Upper Pike River	Aquatic habitat restoration, CTH KR to river mile 10.80[g]	101.9	--	Not implemented
Pike River Watershed	Remove eight structures[c, d]	14,510.9	29.2	Not implemented
Des Plaines River Watershed[h]				
Des Plaines River Watershed	Provide onsite detention storage facilities for planned new development	71,109.2	680.6	Ongoing
Des Plaines River Watershed	Prairie restoration[i]	28,123.0	2,554.6	Not Implemented
Des Plaines River Watershed	Wetland restoration[i]	12,429.8	1,315.5	Not Implemented
Des Plaines River Watershed	Floodproofing, elevation, and removal of structures[c,d]	4,184.4	--	Not Implemented
Unnamed Tributary No. 6 to Brighton Creek	Improve storm sewer and provide centralized detention storage facility	1,797.8	--	Not Implemented
Unnamed Tributary No. 6 to Brighton Creek	Remove seven residential structures[d]	1,608.4	--	Not Implemented
Lake Michigan Direct Drainage Area				
Pike Creek	Remove six structures[c, d]	1,088.3	--	Not Implemented
Tobin Creek	Study to review flows and slope stabilization needs	168.0	--	Not Implemented
	Total	169,472.4	4,582.2	--

[a] *Includes engineering, administration, and contingencies. Costs are shown in 2021 dollars.*

[b] *Includes strategies recommended in a comprehensive plan for the Fox River Watershed (SEWRPC Planning Report No. 12, February 1970) and further amended as it affects Racine County in 1975 (SEWRPC Community Assistance Planning Report No. 5, May 1975) and 1995 (SEWRPC Memorandum Report No. 102, March 1995).*

[c] *Number of structures as of October 2023.*

[d] *Structure removal to be carried out at discretion of property owners.*

[e] *Includes strategies recommended in a comprehensive plan for the Root River Watershed (SEWRPC Planning Report No. 9 July 1966).*

[f] *Includes strategies recommended in a comprehensive plan for the Pike River Watershed (SEWRPC Planning Report No. 35, June 1983); Amendment to the Pike River Watershed Plan, City of Kenosha/Town of Somers, June 1987; and Amendment to the Pike River Watershed Plan, Kenosha and Racine Counties, March 1996.*

[g] *River mile 10.80 is located about 1,850 feet downstream of CTH KR.*

[h] *Includes strategies recommended in a comprehensive plan for the Des Plaines River Watershed (SEWRPC Planning Report No. 44, June 2003).*

[i] *Prairie and wetland restoration be carried out at discretion of property owners.*

Source: SEWRPC

As Chapter 3 of this report noted, based on information from large-scale topographic maps, the parcel-based analysis identified 286 structures as potentially being in the 1-percent-annual-probability floodplains in Kenosha County (see Map 3.4). The estimated total assessed value for the 286 flooded structures is about $62 million. Damages expected during a 1-percent-annual-probability flood event are estimated to be about $5.7 million (2021 dollars).

There are 32 structures which are considered by FEMA to be repetitive- or severe repetitive-loss properties in Kenosha County, all of which are single-family residences. Of these 32 structures, 30 are located in the Village of Salem Lakes, and one is located in both the Villages of Paddock Lake and Pleasant Prairie. The combined estimated fair market value of these structures in 2021 was about $8.4 million. Of these structures, 28 of them were estimated to be located within the 1-percent-annual-probability-floodplain and were included in SEWRPC's parcel-based analysis.

The following priority mitigation measures are recommended for addressing the structures identified as potentially being located in the 1-percent-annual-probability floodplain:

- Acquisition and demolition of the 32 repetitive loss properties that have been identified by FEMA in the County. Following demolition of the structures, the land should be kept in open use. This plan element is presented as an option, subject to the preference of each individual property owner. Based on the land and improvement values from the County's 2021 assessment and estimated demolition costs, it is estimated that the cost of this measure would be about $10.7 million.

- There are currently several ongoing efforts to refine delineation and mapping of floodplains and estimate flood elevations for portions of the watersheds in Kenosha County. These efforts are described in the subsection on the National Flood Insurance Program and floodplain map updating efforts later in this chapter. Following completion of each map updating effort and approval of the revised Flood Insurance Rate Map (FIRM) by the Federal Emergency Management Agency (FEMA), the status of the structures identified as potentially being located in the associated 1-percent-annual-probability floodplain should be re-evaluated.

- When implementation of floodproofing, relocation, or removal measures is being considered (as described below), field surveys should be made of those structures identified as being potentially located within 1-percent-annual-probability floodplains in order to obtain a more definitive assessment of their flood hazard status. It should be noted that where LiDAR[81] topographic data are available, applicants for Letters of Map Amendment (LOMA) may submit LiDAR data to FEMA in lieu of a certified elevation survey by a professional engineer or land surveyor provided that certain standards are met.[82] This may allow a more definitive assessment of a structure's flood hazard status to be obtained at a lower cost. This plan element is presented as a voluntary option, subject to the preference of the individual property owner.

    - In portions of the County where floodplain maps are being refined and updated, field surveys as called for in the preceding recommendation should be pursued only for those structures that have been determined to be potentially located within the updated flood hazard area following the map updating.

    - Because many of the other structures identified as potentially being located within the 1-percent-annual-probability floodplain are dispersed throughout the County, the decision to conduct the proposed surveys should generally be made on a case-by-case basis. Despite this, there are some areas within the County that have large enough numbers of flooded structures (i.e., clusters) that it may be worthwhile for the County or the affected communities to consider conducting such surveys as part of a larger program. These concentrated areas of structures in the 100-year flood hazard area can be seen on Map 3.4.

[81] *LiDAR stands for Light Imaging, Detection, and Ranging.*

[82] *The standards are summarized in Wisconsin Department of Natural Resources, "FEMA Announces New Letter of Map Amendment Guidance,"* Floodplain and Shoreland Management Notes*, Volume 11, Number 3, page 3, Fall 2012.*

- Floodproofing[83] of up to 16 structures identified in the parcel-based analysis (using geographic information system techniques and color orthophotography) as potentially being in the 1-percent-annual-probability floodplains is recommended. These structures consist of all other building types besides single-family residential. These building types include multi-unit residential buildings such as condominiums and apartment buildings, commercial structures, agricultural structures, government and other structures. For any nonresidential structure, this recommendation should be implemented following confirmation of the structure's flood hazard status through the floodplain map updating and field surveys previously described.[84] This plan element is presented as a voluntary option, subject to the preference of the individual property owner. The damages that these properties would experience from a 1-percent-annual-probability flood are estimated to be about $684,000 (2021 dollars). The estimated cost of floodproofing all 16 structures is about $909,000.

    - Priority mitigation measures to protect and floodproof critical community facilities, infrastructure, and utilities from flood hazard events is recommended for Kenosha County. As discussed in Chapter 3, and shown on Maps 3.5, 3.6, and 3.7, critical community and emergency facilities relative to the 1-percent-annual-probability-floodplain include hospitals, nursing homes, clinics, schools, childcare centers, community administration facilities, fire and police stations, and historic sites.

- Acquisition and removal of up to 241 residential structures identified in the parcel-based analysis (using geographic information system techniques and color orthophotography) as potentially being in the 1-percent-annual-probability floodplains is recommended.[85] Following demolition of the structures, the land should be kept in open space uses. These structures consist of single-family residential buildings and some associated structures. For any structure, this recommendation should be implemented following confirmation of the structure's flood hazard status through the floodplain map updating and field surveys previously described. This plan element is presented as a voluntary option, subject to the preference of the individual property owner. The damages that these properties would experience from a 1-percent-annual-probability flood are estimated to be about $4.8 million (2021 dollars). The estimated cost of acquiring and removing all 241 structures is about $80.7 million.

- Removal of up to 29 mobile homes identified in the parcel-based analysis (using geographic information system techniques and color orthophotography) as potentially being located in the 1-percent-annual-probability floodplains and acquisition of the land on which they are located. Following removal of the mobile homes, the land should be kept in open space uses. This recommendation should be implemented following confirmation of the structure's flood hazard status through the floodplain map updating and field surveys previously described. This plan element is presented as a voluntary option, subject to the preference of the individual property owner. The damages that these properties would experience from a 1-percent-annual-probability flood are estimated to be about $200,000 (2021 dollars). The estimated cost of acquiring and removing all 29 mobile homes is about $1.6 million.

- In addition to structural flooding, infrastructure such as major roadways and bridges within the County have been reported to experience frequent flooding problems. The 100-year recurrence floodplain overtops a number of major roadways in Kenosha County. Chapter 3 details the roadway locations of these known flooding problems. Potentially raising these roadways and ongoing maintenance to reduce flood damage and flooding concerns related to infrastructure is an important consideration for Kenosha County flood hazard mitigation planning.

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[83] *Floodproofing is a combination of structural and non-structural changes, or adjustments made in the building that reduces or prevents flood damage to the structure and/or its contents. There are two main types of floodproofing: dry floodproofing and wet floodproofing. Dry flood proofing is the practice of making a building watertight or substantially impermeable to floodwaters up to the expected flood water height. (FEMA, 2008). Wet flood proofing reduces damage from flooding in three ways: allowing flood water to easily enter and exit a structure in order to minimize structural damage; use of flood damage resistant materials; and elevating important utilities. (FEMA, 2008).*

[84] *It is anticipated that the results of the floodplain map updating efforts and the field surveys may reduce the number of structures that are confirmed to be in the flood hazard area and that may require floodproofing.*

[85] *Note that this total and the associated costs do not include the 32 repetitive loss properties previously described.*

Once updated floodplain mapping is complete, for those areas of the County with large number of flooded structures in close proximity (clustered), in lieu of a large number of voluntary acquisitions it may also make sense to investigate a large flood control project. Project types could include levees, diversions, or impoundments, perhaps in combination with acquisitions and floodproofing. These types of projects are not recommended for this plan, but if a municipality would like to pursue further, the first step would be to perform an engineering evaluation to develop feasible alternatives.

Fox River Floodplain Mitigation Program

Since 1995, Kenosha County's Fox River Flood Mitigation Program has reduced potential flood damages by voluntarily acquiring and demolishing residential structures located in the 1-percent-annual-probability floodplain of the Fox River in a project area between State Trunk Highway (STH) 50 and County Trunk Highway (CTH) F within the Village of Salem Lakes and Town of Wheatland. In total, the owners of 128 homes have participated in this program, commonly referred to as the "buyout program", since its inception, and an additional 31 homes are eligible for participation. Funding is provided by several sources, including FEMA, WEM, WDNR, Federal Community Development Block Grants, and Kenosha County. The County helps residents participate by encouraging interested parties to fill out a Notice of Voluntary Interest and helping residents get pre-approved for acquisition with Wisconsin Emergency Management (WEM). Preapproval allows all parties to be ready when funding becomes available, such as a disaster allocation after a major flooding event.

However, the formal grant process, from County application preparation to acquisition and structure removal, can typically be expected to take two to five years and can only begin in response to a major flood event despite the project area experiencing yearly flooding problems. In anticipation of potential State legislation that would require WEM to create and administer a pre-disaster flood resilience grant program, Kenosha County has initiated efforts to establish a pre-disaster floodplain buyout program that would allow the County to obtain funds before a major flood event occurs. This would enable a faster process for affected homeowners that is administered in a more positive setting as opposed to a more dire, post-flood setting where many homeowners face the stress of dislocation or enduring potentially unhealthy living conditions while the availability of assistance remains uncertain for months or even years.

Normally the buyout program offers homeowners a higher price than market value to incentivize the purchase when the homeowner would not otherwise be interested in selling. However, in recent years Kenosha County started setting aside additional funds to have available to purchase a home closer to market value when a residence goes up for sale; this allows for a more efficient use of funds and prevents a new homeowner from buying a house in the floodplain.

After parcels in the floodplain are acquired and structures are removed, it is recommended that the land remain an open space and be used for additional public recreational, ecological, or environmental purposes when possible. The U.S. Army Corps of Engineers is currently investigating the feasibility of conducting stream restoration work along the riparian corridor in the area of the Kenosha County buyouts under Section 519 of the Water Resources Development Act of 2000. This project would aim to reconnect the floodplain, wetland, and backwater areas with the main Fox River channel, as well as implement bank stabilization practices to reduce soil erosion and increase habitat for wildlife. Projects like these can improve flooding resilience while also providing supplemental benefits such as improving water quality and ecological function.

Survey of Buildings in and near the 100-Year Floodplain

The extent of the 1-percent-annual-probability floodplain has been delineated on the Kenosha County large-scale topographic maps, and much of that information is reflected on the FEMA digital flood insurance rate maps (DFIRMs) that have been prepared. While those maps are adequate in detail to identify the extent of flooding for planning and zoning purposes, they can only be considered approximate in regard to establishing building grades. Thus, when flood mitigation actions are being considered for a given structure or group of structures, this plan calls for Kenosha County, or the appropriate municipality, to survey the low-grade elevations adjacent to buildings and the first-floor elevations of buildings that have been identified as being in or near the 1-percent-probability floodplain. Such surveys will provide a more definitive identification of the flood hazard for those properties and will assist property owners in deciding upon a course of action regarding flood mitigation options.

Participation in the National Flood Insurance Program (NFIP) and Floodplain Map Updating Efforts

Kenosha County and all its cities and villages have been designated by FEMA as having flood hazard areas and have taken the steps needed to make residents eligible to participate in the NFIP. Based on a detailed Flood Insurance Study (FIS), FEMA produces Flood Insurance Rate Maps (FIRMs) to identify areas in the community that are subject to flooding. A FIS has been completed for Kenosha County and all municipalities identified by FEMA as having flood hazard areas. This plan calls for the continued participation of Kenosha County and its municipalities in the NFIP. The plan also calls for the appropriate County or incorporated municipality to request FEMA to revise, as necessary, the FIS to reflect new flood hazard data when such data becomes available. In addition, this plan recommends homeowners in and near flood prone areas purchase flood insurance to provide some financial relief for flood losses. Finally, as recommended flood control measures are implemented, the plan calls for FEMA to make the necessary revisions to the FIS. Participation in the NFIP by the communities in Kenosha County is summarized in Table 5.4.

FEMA completed an update of the Kenosha County FIS as part of its Map Modernization program. The Map Modernization products include a countywide FIS and digital flood insurance rate maps (DFIRMs). The floodplain areas in the County were mapped on large-scale topographic mapping prepared at a scale of one inch equals 200 feet, with a contour interval of two feet. The floodplain mapping is shown on the FEMA digital flood insurance rate maps for Kenosha County which were finalized in 2012 and are available as a digital file layer for the Kenosha County cadastral mapping system which covers the entire County.

FEMA has begun additional examinations of floodplains in several portions of Kenosha County through its Risk MAP Program. This program provides communities with more precise flood mapping products, risk assessment tools, and planning and outreach support in order to reduce the risks due to flooding.[86] The Risk MAP work will become final by summer 2024, which will update the Kenosha County FIS as well as floodplains in the Fox River watershed and the Lake Michigan shoreline.

Participation in the Community Rating System

The Community Rating System (CRS) is an additional program offered by FEMA as part of the NFIP. The CRS recognizes and encourages community floodplain management activities that go beyond the minimum NFIP standards. The program assigns a ranking to communities that participate based on voluntary floodplain management activities and outreach services that the community provides to its residents. A high CRS ranking will offer citizens of that municipality discounts on flood insurance premiums of up to 45 percent. In addition to the benefit of reduced insurance rates, floodplain management and outreach activities associated with CRS aim to further enhance public safety, reduce damages to property and public infrastructure, avoid economic disruption and losses, reduce human suffering, and protect the environment. Participation in the CRS program can provide extra incentive for communities to maintain and improve their floodplain management program. Technical assistance related to design and implementation of some activities associated with the CRS program are available at no charge.

Kenosha County is currently the only governmental entity participating in the CRS program. It is recommended that municipalities consider participation in the CRS program based on the number of NFIP policies currently in effect in their community. All unincorporated communities are eligible for premium discounts under Kenosha County's participation. Incorporated villages and cities are required to participate individually.

Lending Institution and Real-Estate-Agent Policies

This plan calls for lending institutions to continue their practice of determining the flood prone status of properties before mortgage transactions are completed. To that end, these institutions should consult with the appropriate local zoning department to inquire about any additional flood hazard studies for areas not identified in the FIS. The plan also calls for real-estate brokers and salespersons to continue to inform potential purchasers of property of any flood hazard that may exist at the site in accordance with rules of the Wisconsin Department of Safety and Professional Services.

[86] *Risk Mapping, Assessment, and Planning (Risk MAP) is a FEMA program implemented in 2010 that provides communities with both flood information and tools and some updated DFIRMs that communities can use to make better informed decisions and to take action to reduce risk to life and property..*

Table 5.4
Participation in the National Flood Insurance Program by Kenosha County Jurisdictions

Civil Division	Participating in Kenosha County Hazard Mitigation Plan	Participating in National Flood Insurance Program	Date Initial Flood Hazard Boundary Map Identified	Date of Initial Flood Insurance Rate Map (FIRM)	Current Effective Map Date	Entry Date into National Flood Insurance Program
Cities						
Kenosha	Yes	Yes	12/28/1973	09/02/1982	06/19/2012	09/02/1982
Villages						
Bristol	Yes	Yes	--	06/19/2012	06/19/2012	03/08/2013
Paddock Lake	Yes	Yes	--	06/19/2012	06/19/2012	10/24/2012
Pleasant Prairie	Yes	Yes	--	12/05/1996	06/19/2012	04/03/1998
Salem Lakes	Yes	Yes	12/28/1973	09/01/1978	06/19/2012	09/01/1978
Somers	Yes	Yes	04/16/1976[a]	02/17/1982	06/19/2012	02/17/1982
Twin Lakes	Yes	Yes	06/07/1974	06/01/1982	06/19/2012	06/01/1982
Towns						
Brighton	Yes	Yes	04/16/1976[b]	02/17/1982[b]	06/19/2012[b]	02/17/1982[b]
Paris	Yes	Yes	04/16/1976[b]	02/17/1982[b]	06/19/2012[b]	02/17/1982[b]
Randall	Yes	Yes	04/16/1976[b]	02/17/1982[b]	06/19/2012[b]	02/17/1982[b]
Somers	Yes	Yes	04/16/1976[b]	02/17/1982[b]	06/19/2012[b]	02/17/1982[b]
Wheatland	Yes	Yes	04/16/1976[b]	02/17/1982[b]	06/19/2012[b]	02/17/1982[b]
County	Yes	Yes	04/16/1976	02/17/1982	06/19/2012	02/17/1982

[a] *On April 24, 2015, a portion of the Town of Somers incorporated as the Village of Somers.*

[b] *In Wisconsin, towns are covered under county eligibility in the National Flood Insurance Program.*

Source: Federal Emergency Management Agency

Documentation of the Extent of Future Floods

It is recommended that when flooding occurs in Kenosha County, the County and affected municipalities document the extent of the floods as well as damages incurred by the flood. A number of methods could be used to accomplish this, including aerial, satellite, or ground-based photography showing locations of flooded areas; surveying and mapping of the elevation of debris lines resulting from floods; or other documentation techniques.

While FIRMs and the associated FIS are based upon the best data available at the time of their development, the inundation patterns depicted on and described in them are not those of actual historical flood events. Instead they represent estimates of the extent of a hypothetical 1-percent-annual-probability event based on historic events. These estimates are developed using models that are based upon the best available topography; land use; the geometry of, and conditions within, stream channels and adjacent overbank areas; and the presence, configuration, and condition of structures within and adjacent to the stream channel. Actual inundation patterns for actual floods will vary and the flooded areas are affected by a number of factors such as local intensity and duration of rainfall, which affects the magnitude of flood flows; blockages of drains and structures; the state of vegetation coverage; and changes that have occurred within the watershed since the development of the FIRM and FIS. It should also be noted that FIRMs only depict flooding related to waterbodies overflowing their banks and do not depict areas inundated by stormwater runoff as it travels to a receiving stream.

Data developed by documenting the extent of future floods can be used to periodically refine the hydrologic and hydraulic simulation models used to develop the FIRMs and FIS. In addition, such data may also be useful in bridge and culvert design and in water quality management planning.

Ice Jams and Mitigation Measures

Ice jams occur when floating river ice accumulates at a natural or man-made structure that impedes the progress of the ice downstream with the river current. Ice jams can significantly block the flow of a river causing upstream flooding. Mitigation measures to prevent future ice jam flood losses are recommended.

Such measures include:

- Development and maintenance of an ice jam event database to include:
    - Historical and recent records of ice jam events
    - Site-specific ice event data, including duration of freeze-up and ice cover breakup
- Implement the use of the U.S. Army Corps of Engineers (USACE) Cold Regions Research and Engineering Laboratory (CRREL) database.[87]

Stream Channel Maintenance

This plan calls for Kenosha County, local municipalities, and drainage districts to continue to work together to develop and expand existing programs for regular stream channel maintenance. These programs would include the periodic removal of sediment deposits, selected heavy vegetation, and debris for all watercourses in the County, including bridge openings and culverts, subject to obtaining any necessary local and State permits.

Continued Maintenance of Existing U.S. Geological Survey (USGS) Stream Gages on Streams and Rivers of Kenosha County and Installation of Additional Stream Gage Locations

Kenosha County has two active USGS stream flow gages located within its boundaries. Continued maintenance, updating, and monitoring of this equipment is important for stream flow data and flood preparedness. The gages that require continued maintenance include the gage on the Fox River in the Town of Wheatland and the gage on the Pike River in the Village of Somers.

Actions to Manage the Potential Flood-Related Impacts of Dam Failure

Flooding can also occur as a result of a dam failure. Dam failure flooding may occur when flood flows exceed the hydraulic capacity of the dam spillways, resulting in water overtopping the dam or abutments or when structural failure of the dam occurs. The potential impacts of such failure are related both to the size and configuration of the dam and to the amount, types, and locations of development downstream of the dam.

There are 21 dams located in Kenosha County (see Table 3.9 and Map 3.3). Two of these dams have been assigned a high hazard rating by the WDNR, indicating the potential for loss of human life as well as economic loss, environmental damage, or disruption of lifelines during failure or misoperation of the dam. Three dams have been assigned significant hazard ratings in the County. The remaining 16 dams have been assigned low hazard ratings.

The following mitigation measures are recommended to address the risk of flooding due to dam failure in Kenosha County:

- All dams in Kenosha County should be regularly inspected and maintained. Chapter 31, "Regulation of Dams and Bridges Affecting Navigable Waters," of the *Wisconsin Statutes,* requires inspection of dams by a professional engineer with experience in dams at a frequency based upon the dam's hazard rating. High hazard dams are required to be inspected every two years, significant hazard dams are required to be inspected every three to four years, and low hazard dams are required to be inspected every 10 years. In addition, it is recommended that owners and operators of dams inspect their dams both on a regular basis and following any high-water event.
- Owners or operators of dams should continue to monitor their dams during high water events
- Owners and operators of high hazard and significant hazard dams should develop, maintain, and periodically update emergency action plans for their dams

[87] *Department of the Army, U.S. Army Corps of Engineers,* Engineering and Design ICE ENGINEERING*, October 30, 2002.*

- Owners and operators of dams of any hazard rating should consider developing, maintaining, and periodically updating emergency action plans for their dams. Requirements for emergency action plans and guidance for developing such plans are available from the WDNR. Such a plan should include:
    - Procedures to be followed to warn the public in the event that a dam failure is likely to occur.
    - Procedures for evacuating areas likely to flood as a result of failure of the dam.
    - An identification of road closings and rerouting needed to keep traffic and people out of danger areas in the event of flooding due to failure of the dam.
- Dam failure analyses should be completed for those dams for which they are required and have not been done.
- Hydraulic shadows from available dam failure analyses should be added to County and local government geographic information system (GIS) map layers. Local units of government within the County should regulate and zone the hydraulic shadow areas as floodway unless the shadow area is specifically mapped as floodway and flood fringe for the dam hazard designation.

Stormwater Management Plan Element

Floodplains provide a number of beneficial and natural functions, including flood control, erosion control, stormwater management, and water quality enhancement. With increases in urbanization and alterations to the natural landscape, many of the natural functions of floodplains are greatly reduced or even lost causing large amounts and high velocities of stormwater runoff. Because of this, the relationship between stormwater management and floodplain management is an important consideration within the flood mitigation plan element of this report.

Today most communities, including those in Kenosha County, have stormwater management plans and/or regulations (i.e., ordinances) designed to minimize the adverse impacts caused by urban development. This element of the plan includes the status of stormwater management planning and related regulations in Kenosha County.

Stormwater Management Plans and Programs

In *Wisconsin Administrative Code* Chapter NR 216, the State requires certain industrial facilities, construction sites, and municipal separate storm sewer systems (MS4s)[88] to obtain Wisconsin Pollutant Discharge Elimination System (WPDES) stormwater discharge permits[89] to manage the quantity and quality of stormwater runoff before it enters streams and waterbodies.

Designated WPDES entities (i.e., a MS4) are required to address the following application elements in order to obtain a State stormwater discharge permit: public education and outreach; public involvement and participation; an illicit discharge detection and elimination program; a construction site pollutant control plan; a post-construction stormwater management plan; a pollution prevention plan for the municipal facilities; and an annual report of their stormwater management including a map of their storm sewer system(s) and installed stormwater best management practices.

[88] *What classifies as a Municipal Separate Stormwater Sewer System (MS4) is defined under Wisconsin Administrative Code Chapter NR 216.02. Generally, a MS4 is a conveyance or system of conveyances, including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm sewers designed or used for collecting or conveying untreated stormwater, and is owned or operated by a state, city, town, county, district, association, or other public entity.*

[89] *Individual (i.e., site-specific) WPDES permits are issued to municipal and industrial facilities discharging to surface water and/or groundwater. WPDES general permits are issued by the DNR for specific categories of industrial, municipal and other wastewater discharges. Under the authority in section 283.35, Wis. Stats., the department may issue WPDES general permits applicable to categories or classes of point source discharges.*

Within Kenosha County, certain municipalities are required to obtain State stormwater discharge permits under the Wisconsin Pollution Discharge Elimination System (WPDES). Those municipalities with approved permits include Kenosha County, the City of Kenosha, the Villages of Bristol, Paddock Lake, Pleasant Prairie, Salem Lakes, Somers, and Twin Lakes, and the Town of Randall. In addition, the University of Wisconsin-Parkside has an approved stormwater discharge permit.

The City of Kenosha has adopted a stormwater management policy. The City developed a stormwater and sanitary sewer management plan for the Forest Park area in 2014. It has also begun development of a city-wide comprehensive stormwater management plan. The Villages of Paddock Lake, Pleasant Prairie, and Salem Lakes adopted stormwater management plans in 2009, 2006, and 2010 respectively.

The remaining urban communities in the County are encouraged to prepare stormwater management plans. In those towns that are anticipated to remain mostly rural under the adopted land use plan, stormwater management planning is considered to be needed only for certain site-specific areas where urbanization is expected or where isolated urban areas already exist and stormwater-related problems have occurred.

Stormwater-Related Regulations

In 2002, the WDNR issued Chapter NR 151 of the *Wisconsin Administrative Code*, outlining the performance standards governing stormwater runoff from both agricultural and nonagricultural lands. Those standards include controls for both the quantity and quality of runoff from newly developed and redeveloped lands. These rules are administered by the WDNR through the Chapter NR 216 stormwater discharge permit system, although local municipalities have the option of adopting their own ordinances consistent with the *Administrative Code*. Chapter NR 152 of the *Administrative Code* contains model ordinances covering both agricultural and nonagricultural operations. Those communities that are required to obtain a WPDES stormwater discharge permit are required to have a stormwater management program that most often results in adoption of a stormwater management ordinance.

As noted previously, Kenosha County, the City of Kenosha, the Villages of Bristol, Paddock Lake, Pleasant Prairie, Salem Lakes, Somers, and Twin Lakes, and the Town of Randall have adopted stormwater management ordinances as part of their discharge permit program. The County ordinance applies to all unincorporated areas not covered by their own ordinances. In those Towns that also have a stormwater management ordinance, it is recommended that the County and the Towns work to ensure that the objectives of each ordinance are met in a coordinated manner. Table 1.1 in Chapter 1 of this report indicates the communities in Kenosha County that have adopted a stormwater management related ordinance or plan.

Stormwater Management Facilities Maintenance

The effectiveness of stormwater management conveyance and detention facilities and other management measures can be sustained only if proper operation, repair, and maintenance procedures are carefully followed. Important maintenance efforts for stormwater conveyance features include the periodic repair of storm sewers, curbs and gutters, clearing of sewer obstructions, maintenance of open channel vegetation linings, and clearing of debris and sediment from open channels. Important maintenance efforts for stormwater treatment features include protection of the infiltration capacity of stormwater infiltration facilities, maintenance of detention facility inlets and outlets, maintenance of detention basin vegetative cover, and periodic removal of sediment accumulated in detention basins. This plan calls for these maintenance activities to be carried out on a continuing basis to maximize the effectiveness of the stormwater management facilities and to protect the capital investment in these facilities.

Green Infrastructure and Low Impact Design Integration

With continuing development and increased volumes of precipitation, stormwater management continues to evolve and change. Newer stormwater management techniques focus more on imitating natural systems by capturing rainwater where it falls. These types of practices are known as green infrastructure. Green infrastructure systems that enhance infiltration include rain gardens, bio-swales, retention ponds, vegetated rooftops, and permeable pavements. Similarly, low impact design (LID) practices can greatly reduce runoff volumes by preserving natural areas and vegetation, reducing the extent of impervious surfaces, and integrating stormwater management into the landscape. By reducing stormwater runoff and protecting floodplains, both green infrastructure and LID management techniques are recommended to

be investigated for new development and redevelopment as mitigation measures to reduce stormwater flooding as well as enhance water quality and wildlife habitat in Kenosha County. Furthermore, implementing green infrastructure and LID management techniques, such as detention, retention, or bioretention ponds into the County's stormwater management regulations can provide the County with CRS credit.

Public Education and Information Element

Public information, education, and participation constitute an integral aspect of Kenosha County's flood and stormwater mitigation and related efforts. This element includes two sub-element activities to be carried out, namely public education activities and public information programing and coordination associated with detailed stormwater and floodplain management plans.

Current Federal, State, and Local Educational and Outreach Activities

As discussed in the multiple hazards plan element, FEMA, the National Weather Service (NWS), and WEM provide many online resources and social media toolkits to assist the public with hazardous weather preparedness, safety, and recovery. FEMA's website provides a number of resources related to flooding hazards, flood insurance, and flood mitigation assistance programs. Currently, FEMA administers the Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) pre-disaster mitigation program, Flood Mitigation Assistance (FMA), and Repetitive Flood Claims (RFC). As previously described, Kenosha County is currently participating in FEMA's BRIC, RiskMAP, National Flood Insurance Program (NFIP), and Community Rating System (CRS) programming efforts. Continued outreach and educational efforts promoting the importance of obtaining flood insurance through the NFIP and CRS programming to Kenosha County residents remains an important part of flood hazard mitigation.

FEMA's website also provides flood risk mapping services. The FEMA Flood Map Service Center (MSC) is the official online source for flood hazard information produced under the NFIP. All flood mapping products, such as Flood Insurance Rate Maps (FIRMs), Flood Insurance Studies (FIS), and National Flood Hazard Layer (NFHL) geodatabases, are available to view and download.[90] FEMA has also produced a Flood Risk Report that provides stakeholders with a comprehensive understanding of flood hazard and risk exposure for their community, watershed, or other geographic area. In addition, Ready.gov provides a Flood Safety Social Media Toolkit that contains numerous materials related to flood safety and preparedness.

The WDNR has several grant programs related to flood and stormwater control, including the municipal flood control grant program, municipal dam grant program, and urban nonpoint source stormwater construction grant. The WDNR website also contains informational and educational material and additional resources related to its floodplain management program.

The U. S. Army Corps of Engineer (USACE) website also provides informational and educational resources and links related to flood risk preparedness and management. The USACE National Flood Risk Management program was established to integrate and coordinate USACE flood risk management programs and activities with FEMA and other Federal, state, regional, and local agencies. The USACE flood risk management program maintains and constructs public flood control structures such as dams, reservoirs, levees, floodwalls, and diversion channels. The USACE Disaster Preparedness program includes emergency management organization, planning, training, maintaining adequate supplies, tools and equipment, and inspection for non-Federal flood risk management projects.

USACE Cold Regions Research and Engineering Laboratory (CRREL) applies advanced science and engineering skills to study complex environments, materials, and processes such as ice jam events. The CRREL ice jam database provides informational and educational resources as well as known locations and descriptions of historical and current ice jam events.[91]

Over the years, Federal, State, and local governmental agencies have constructed numerous wetland restorations projects covering hundreds of acres on public and private land in Kenosha County. Their efforts are ongoing, with several additional wetlands appearing on the landscape each year through incentives

[90] *msc.fema.gov/portal/resources/productsandtools.*

[91] *www.crrel.usace.army.mil/icejams.*

such as those provided by the Natural Resources Conservation Service (NRCS), United States Fish & Wildlife Service (USFWS), WDNR, and County programs. These programs encourage landowners to remove highly erodible land from agricultural use and restore natural plant communities. Restoration projects such as this help reduce and prevent flooding and stormwater impacts while at the same time improving the ecological, economic, and social well-being of Kenosha County.

The Wisconsin Department of Health Services has prepared a flooding toolkit for citizens.[92] The toolkit provides general flood information, preparedness tips, and guidelines on cleaning up after a flood has occurred. A factsheet prepared by WEM explains the different types of flood watches and warnings and provides information on what citizens should do if a flood is likely to occur in their area.[93]

Kenosha County and the various municipalities should, as needed, collaborate to prepare and distribute various public informational and educational materials, including materials oriented toward property owners and homeowners designed to help them consider and potentially undertake actions to mitigate damages caused by stormwater flooding and sanitary sewer backups. Methods available for distributing information include, but are not limited to, print and broadcast media, cable television, pamphlet development, individual seminars, municipal and County online resources, social media, and community speaking engagements.

Public Participation Activities and Coordination with Other Agencies and Units of Government

The second sub element of this mitigation measure involves direct public participation and coordination with other agencies during detailed stormwater and floodplain management plan development. Much of this input has occurred in conjunction with floodplain map updating activities.

With a focus toward further informing the public regarding flood mitigation, stormwater and floodplain management, and related issues, this hazard mitigation plan update calls for concerned units and agencies of government, including Kenosha County and all cities and villages within the County, to involve members of the general public and to seek public input in preparing and implementing recommendations regarding such issues.

Multi-Jurisdictional Considerations

As noted in Chapter 3 and shown on Map 3.4, structures within flood hazard areas have been identified within all of the 12 general-purpose local units of government in the County, except for the Towns of Brighton and Paris. In addition, there are related stormwater drainage problems in selected areas of many communities.

Evaluation of Alternatives and Identification of Priority Mitigation Measures

The goal of flood mitigation activities is to reduce, in a cost-effective manner, the loss of lives and property due to these events. In the initial assessment of potential mitigation measures for flooding and in examining alternative approaches to mitigate the impacts of flooding problems in Kenosha County, the full range of nonstructural and structural approaches was considered.

An important factor in selecting priority mitigation measures is to consider incorporating recommendations from other related County and local planning efforts (i.e., Kenosha County's park and open space plan, comprehensive plan, economic plan, land and water plan, and comprehensive emergency management plan) that may help prevent flooding or act to mitigate the impacts of flooding when it occurs. Including such recommendations in the hazard mitigation plan furthers the goal of integrating the elements of the various plans that seek to provide guidance to the County for a variety of issues. Similarly, it was judged important that the set of priority mitigation measures incorporate existing programs and efforts that reduce the exposure of people and property to risks posed by flooding or that act to mitigate the impacts of flooding when it occurs. Examples of such programs include floodplain zoning, continued and expanded participation in the CRS and National Flood Insurance Program (NFIP), updating of FIRM maps, stormwater management regulation and planning, and educational and informational outreach programs.

[92] *The Wisconsin Flood Toolkit is available for download at www.dhs.wisconsin.gov/publications/p0/p00631.pdf.*

[93] *The Ready Wisconsin flood informational handout is available for download at readywisconsin.wi.gov/media/pdf/Flooding.pdf.*

Flooding damages can be mitigated by limiting or restricting how development occurs in high-risk areas. These measures can limit the County's and municipalities' future vulnerability to impacts from flooding and should be a principal element in any flood mitigation effort. Measures to implement this type of mitigation include incorporating recommendations from other related County and local planning efforts and enforcing regulations such as floodplain, wetland, and wetland-shoreland zoning regulations and management. Another important measure to implement this element is preserving open space and environmentally sensitive lands to preserve and restore the flood mitigating functions of Kenosha County's natural resources.

Another important flood mitigation component should be to focus on existing development located within high-risk areas. Recurring economic losses and distress from flooding can be reduced by either removing structures from the floodplain or modifying them to resist damage from flooding. This priority element includes acquisition and demolition, floodproofing, and retrofitting of structures in high-risk areas. In addition, actions to manage the potential flood-related impacts of dam failure is an important component of this hazard mitigation plan update.

Based upon the foregoing evaluation and consideration of risk, and review by the Kenosha County Hazard Mitigation LPT, the flooding and related stormwater drainage problem mitigation plan for Kenosha County consists of four elements: a preservation of floodplain and environmentally sensitive lands element, a floodplain management element; a stormwater management element, and a public education and information element. Each element of the plan is an important component of the overall strategy for reducing flood risk and flood damage. Some aspects of the overall plan are already being implemented in the form of existing and ongoing activities being carried out by the County and local units of government. The priority mitigation measures, along with a general cost benefit summary are presented in Table 5.5.

5.5 HAZARD MITIGATION PLAN COMPONENT FOR SEVERE THUNDERSTORMS COMBINED HAZARDS (THUNDERSTORMS, HIGH STRAIGHT-LINE WINDS, HAIL, AND LIGHTNING)

Thunderstorm winds, non-thunderstorm high-winds, hail, and lightning are natural hazard events of significant concern to be considered in the Kenosha County hazard mitigation plan. This section describes alternative and selected priority strategies to mitigate these types of hazards. As part of the updating process, these strategies were reviewed and reevaluated by the Kenosha County Hazard Mitigation LPT in light of the updated hazard conditions and hazard mitigation goals documented in Chapters 3 and 4, respectively.

Identification of Alternative Mitigation Strategies

All thunderstorm related hazards and non-thunderstorm high-wind events are potentially dangerous and are common within Kenosha County. An estimated 10 percent of the thunderstorms and related hazard events that occur each year within Southeastern Wisconsin are classified as severe. Severe thunderstorm fronts can often be tracked, providing ample warning for potentially affected areas to take precautionary actions. In addition, when severe thunderstorms and related hazard events occur, they generally last for short periods.

While it may not be possible to accurately identify specific areas where there is significant risk from thunderstorm-related hazard events or non-thunderstorm high-wind events, measures can be taken to reduce the potential damage caused wherever they may occur in the County. High-wind events associated with windstorms and thunderstorms are similar to tornadoes, except they are more common and usually less powerful.

Hailstorms tend to occur in conjunction with severe thunderstorms. A severe thunderstorm weather advisory or advance warning system may indicate that large or damaging hail is imminent. Personal safety is the first priority during a hailstorm, and people should seek shelter and stop driving to avoid accidents. Advance warning systems may allow some actions to reduce hail damage to vehicles and some property, but little can be done to protect structures or crops in the field.

Personal protection is paramount for lightning safety—many people suffer injuries or are killed due to misinformation and inappropriate behavior during lightning storms. A few simple precautions can reduce many of the dangers posed by lightning. The individual is ultimately responsible for their safety and should take appropriate action when threatened by lightning. Little can be done to protect property from lightning strikes.

Table 5.5
Cost-Benefit Analysis Summary of Measures Included in the Kenosha County Hazard Mitigation Plan: Flood and Associated Stormwater Drainage Problems Hazards

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Direct Benefits				Indirect Benefits[c]	Community/Jurisdictions Affected
	Capital (thousands of dollars)	Average Annual Operation and Maintenance (thousands of dollars)	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Floodplain and Environmentally Sensitive Land Preservation Element											
Maintain floodplain and wetland zoning regulations[d]	--[e]	--[e]	X		--	X	X	X	X	5	Kenosha County; City of Kenosha; and Villages of Bristol, Paddock Lake, Pleasant Prairie, Salem Lakes, Somers, and Twin Lakes
Continued preservation and maintenance of environmentally sensitive lands and open space areas[d]	--[f]	--[f]	--		X	X	X			4	Kenosha County, and all cities, villages, and towns
Wetland restoration to reduce flood-related agricultural and property damage[g]	--[s]	--[s]	--		X	X	X			4	Kenosha County, and all cities, villages, and towns
Floodplain Management Plan Element											
Adopt updated comprehensive watershed and watershed mitigation plans and support implementation of floodplain management recommendations	--[h]	--[h]	X			X	X			--	Kenosha County, and all cities, villages, and towns
Removal of up to 32 repetitive loss structures[d,l]	--[h]	--[h]			X	X	X	X	X	4	Kenosha County, and all cities, villages, and towns
Floodproofing of 16 structures identified as potentially located in flood hazard area.[d,j]	909	--[h]			X	X	X	X	X	4	Kenosha County, and all cities, villages, and towns
Acquisition and 270 removal/demolition of structures identified as being potentially located in flood hazard area[d]	90,400	--[h]			X	X	X	X	X	4	Kenosha County, and all cities, villages, and towns
Removal of 29 mobile homes identified as being potentially located in the flood hazard area	1,600	--[h]			X	X	X	X	X	4	Kenosha County, and all cities, villages, and towns
Consider elevating roads above the base flood elevation to maintain dry access. In areas where flood waters tend to wash roads out, construction, reconstruction, or repair can include stabilization or armoring of vulnerable shoulders or embankments, in addition to improving drainage	--[h]	--[h]			X	X		X		5	Kenosha County, and all cities, villages, and towns
Consider floodproofing and/or relocating critical facilities located within flood-prone areas	--[h]	--[h]			X	X	X			1, 3	Kenosha County, and all cities, villages, and towns
Continue participation in FEMA's National Flood Insurance Program and floodplain map updating[d]	--[e]	--[e]	X			X	X			1, 3	Kenosha County, and all cities, villages, and towns

Table continued on next page.

Table 5.5 (Continued)

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Direct Benefits				Indirect Benefits[c]	Community/Jurisdictions Affected
	Capital (thousands of dollars)	Average Annual Operation and Maintenance (thousands of dollars)	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Floodplain Management Plan Element (continued)											
Continue County participation in the Community Rating System program	--[j]	--[j]		X		X	X			3	Kenosha County and towns
Lending institution and real estate agent policies should continue their practice of determining the flood prone status of properties before mortgage transactions are complete[d]	--[e]	--[e]	X			X	X			3	Kenosha County, and all cities, villages, and towns
Enforcement of floodplain regulations	--[e]	--[e]	X			X	X			5	Kenosha County, and all cities, villages, and towns
Develop ice jam mitigation measures	--[e]	--[e]	X			X	X			3	Kenosha County, and all cities, villages, and towns
Installation of new and maintenance of existing USGS stream gages	--[e]	--[e]	X			X				1	Pike River in the Village of Somers, Fox River in the Town of Wheatland
Documentation of extent of future floods	--[k]	--[k]	X			X				1	Kenosha County, and all cities, villages, and towns
Stream channel maintenance	--[e]	--[e]	X			X	X			3, 4	Kenosha County, and all cities, villages, and towns
Dam Failure Sub-Element											
Regular inspection and maintenance of dams	--[k]	--[k]	X			X	X			3, 5	Kenosha County, and all cities, villages, and towns
Dam emergency action plans	--[k]	--[k]	X			X	X			1	Kenosha County, and all cities, villages, and towns
Dam failure analysis	--[L]	--	X			X	X			3, 5	Kenosha County, and all cities, villages, and towns
Investigate interest in abandonment and removal of high hazard potential dams	--[k]	--[k]	X			X				3, 5	Kenosha County and all cities, villages, and towns
Stormwater Management Element											
Development and/or continued maintenance of stormwater management plans/programs[d]	--[e]	--[e]	X							1	Kenosha County and all cities, villages, and towns
Continuation of stormwater-related regulations.[d]	--[e]	--[e]	X							1, 3	Kenosha County and all cities, villages, and towns
Continuous implementation of stormwater management facilities maintenance activities	--[e]	--[e]	X			X	X			4	Kenosha County and all cities, villages, and towns
Implementation and integration of green infrastructure and low impact design	--[k]	--[k]	X			X				4	Kenosha County and all cities, villages, and towns
Public Informational and Educational Element											
Continue and enhance public education activities related to flood and stormwater management	--[e]	--[e]	X			X				5	Kenosha County and all cities, villages, and towns
Promote and distribute information related to Federal Flood Insurance Program	--[e]	--[e]	X			X	X			3	Kenosha County and all cities, villages, and towns

Table continued on next page.

Table 5.5 (Continued)

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Direct Benefits				Indirect Benefits[c]	Community/Jurisdictions Affected
	Capital (thousands of dollars)	Average Annual Operation and Maintenance (thousands of dollars)	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Public Informational and Educational Element (continued)											
Enhance public participation activities and coordination with other agencies and units of government	--[e]	--[e]	X			X				1	Kenosha County and all cities, villages, and towns

[a] *All costs expressed in 2021 dollars unless otherwise noted.*

[b] *Cost of implementation is allocated among three categories of low (less than $100,000 dollars), moderate (greater than $100,000 and less than $1,000,000), and high (greater than $1,000,000) costs, which are generally defined as:*

Low
Educational and informational programming
Ongoing enforcement of ordinances
Plan Development
Continued coordination/mutual aid/interagency agreements

Moderate
Addition of new staff
Additional staff hours budgeted
Additional equipment
New ordinance development
New programs/task force

High
Major construction
New buildings (infrastructure)
Capital programs

[c] *Indirect benefits represent a continuum of potential benefits that may occur as a result of the implementation of specific management actions. For example, implementation of informational programming, while not directly saving lives, may ultimately result in people having the knowledge necessary to save lives and protect property. These intangible benefits cannot be readily quantified and range from increased awareness to reduced loss of life and property, and have been assessed using the following relative cumulative scale:*

1 = Increased awareness/preparedness
2 = Enhanced quality of life/social benefits
3 = Reduced property damage
4 = Increased environmental and recreational benefits/ecosystems services
5 = Reduced loss of life and injury with concomitant benefits for economic productivity

[d] *This mitigation is related to, but not essential to, compliance with the requirements of the National Flood Insurance Program.*

[e] *Costs are covered under ongoing or day-to-day activities.*

[f] *Costs were developed under the Kenosha County Park and Open Space Plan. Unit costs used to estimate acquisition costs were $3,000 per acre of wetlands, $10,000 per acre of woodlands, and $6,000 per acre of other open lands in 2010 dollars. The costs are based on purchasing all recommended land for parks and open spaces. It should be noted that the protection of these areas could also be accomplished through conservation easements, conservation subdivisions, donations, and purchase or transfer of development rights. The acquisition of all land is unlikely to occur before the park and open space plan year 2020 since acquisitions occur only on a willing seller, willing-buyer basis, and only when funds are available. In the past, major land acquisitions by Kenosha County have been subsidized by State and Federal grants, which are not always available.*

[g] *Wetland restoration to be carried out at discretion of property owners.*

[h] *Costs are unknown.*

[i] *Structure floodproofing, elevation, or removal will be evaluated on a site-by-site basis and be carried out at the discretion of property owners.*

[j] *Kenosha County currently participates in the CRS program, covering all townships. Cost of municipality participation is to be determined.*

[k] *Costs to be determined. Partially covered under ongoing programs.*

[l] *Costs are site-specific, and additional investigation is needed for countywide estimate.*

Source: Kenosha County Division of Emergency Management and SEWRPC

Through review by the Kenosha County Hazard Mitigation LPT, the following measures to reduce vulnerability to thunderstorm winds, non-thunderstorm high-winds, hail, and lightning have been identified as viable for this update of the County hazard mitigation plan. In addition to the measures listed below, mitigation strategies that were found to address multiple hazard types, including thunderstorm-related and non-thunderstorm high-wind events, are discussed in the hazard mitigation plan component for multiple hazard types earlier in this Chapter. This section will present current programs, considerations, and mitigation measures that apply to thunderstorm winds, non-thunderstorm high-winds, hail, and lightning.

Current Programs

Federal and State Programs

The NWS issues warnings, watches, and advisories when there is a threat of severe weather conditions. Several categories of warnings, watches, and advisories apply to thunderstorms and associated hazards. The NWS Storm Prediction Center in Norman, Oklahoma will issue a severe thunderstorm watch when conditions are favorable for the development of severe thunderstorms in and close to the watch area.

The NWS Milwaukee/Sullivan office will issue a severe thunderstorm warning when:

- A spotter reports a thunderstorm that is producing winds equal to or exceeding 58 miles per hour (mph)
- Hail of one inch or larger in diameter
- A severe thunderstorm is detected by Doppler radar

The NWS Milwaukee/Sullivan office will issue a high wind warning when:

- Sustained winds of 40 mph are expected to occur for an hour or more
- Wind gusts of 58 mph or more are expected to occur

The NWS Milwaukee/Sullivan office will issue a wind advisory when:

- Sustained winds of 30 mph are expected to occur for an hour or more
- Wind gusts of 45 mph to 57 mph are expected to occur

Federal and State programs include awareness and education efforts. As mentioned in the multiple hazards plan, FEMA, NWS, and WEM provide many online resources and social media tool kits to assist the public on hazardous weather preparedness, safety, and recovery. The NWS has an extensive public information program to educate people about the dangers of thunderstorms and related hazards.

The Wisconsin Department of Health Services has developed a severe thunderstorm and tornado tool kit to provide information to local governments, health departments, and citizens in Wisconsin about preparing for and responding to severe thunderstorms and tornadoes. Similarly, WEM has produced several educational resources regarding thunderstorms and related hazards including prerecorded radio public service announcements, scripts for radio public service announcements, fliers, and educational materials for children. In addition, numerous other organizations, including the American Red Cross, provide public safety information regarding lightning.

Local Programs

As discussed in detail in the multiple hazards plan component, Kenosha County has a variety of methods to warn residents of emergencies, including thunderstorms and thunderstorm-related events.

The Kenosha County DEM has a number of brochures, booklets, and pamphlets available for the public on severe weather safety and other general emergency management-related topics. Kenosha County DEM participates in all State sponsored severe weather awareness campaigns.

Multi-Jurisdictional Considerations

Thunderstorms and their related hazards can potentially impact all municipalities within the County. In addition, these severe events can potentially cause multiple damages to a variety of infrastructure including, transmission lines, communication lines, and transportation routes due to flooding, as well as damage to buildings from flooding, hail, and/or high winds. Hence, Kenosha County, municipalities, relevant businesses, and other organizations should coordinate hazard mitigation activities through a cooperative County and local government partnership in countywide disaster planning and response mechanisms. Such measures are already well underway through the comprehensive emergency management planning program involving the Kenosha County DEM and coordinated local community emergency operations programs and should be continued.

Evaluation of Alternatives and Identification of Priority Mitigation Measures

Based upon review of the above and the risk analysis given in Chapter 3, continuation and refinement of current early warning system programs represents a major component of the planned mitigation action for thunderstorm-related hazards and non-thunderstorm high-wind events. The existing warning systems should continue to rely upon the use of multiple means of communication to alert people to the threat of severe weather. In addition, informing the public of the significance of thunderstorm watches and warnings so that they take thunderstorms and related hazards seriously, know where to seek shelter in emergency situations, and are prepared should such a storm cause a disaster is an important component for minimizing the risks associated with these natural hazards. Community-based informational programs should also continue to be conducted by the County in partnership with Federal, State and local authorities.

Providing adequate safe places for people to seek shelter during severe storms constitutes an additional approach to mitigating some impacts of severe storms in Kenosha County. Residents of manufactured home parks represent a segment of the County's population that lacks access to adequate shelters. Encouraging and promoting the construction of community safe rooms to provide shelter from severe storms to these vulnerable populations constitutes an important addition to this hazard mitigation plan.

Severe storm events can also cause economic losses especially to agricultural producers through damage to crops. Continuing to provide agricultural producers with information regarding Federal crop insurance programs and encouraging them to purchase crop insurance provides some protection against such losses.

Other feasible mitigation actions include:

- Enforcement of building code regulations that improve the ability of structures to withstand severe wind and surge protection for sensitive electronic equipment
- On-site emergency backup power generation for critical infrastructure
- Other precautions that will limit possible injuries, deaths, or property damages due to severe weather events

The majority of these measures are currently in place to varying degrees, indicating an emphasis on informational programming and enforcement would take precedence.

Based upon the foregoing evaluation and consideration of risk and consideration by the Kenosha County Hazard Mitigation LPT (see Appendix A), there are 11 actions determined to be priority mitigation measures for this hazard mitigation plan update that are specifically related to thunderstorm winds, non-thunderstorm high-winds, lightning and hail events.[94] These priority mitigation measures, along with a general cost-benefit summary are presented in Table 5.6.

[94] *Priority mitigation measures that apply to multiple hazard types including thunderstorm winds, non-thunderstorm high-winds, lightning and hail events, are presented in the "Hazard Mitigation Plan Component for Multiple Hazard Types" section in this Chapter.*

Table 5.6
Cost-Benefit Analysis for Measures Included in the Kenosha County Hazard Mitigation Plan: Thunderstorm, Non-Thunderstorm High-Winds, Hail, and Lightning Hazards

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Nonstructural												
Continue to enforce State building code regulations that aim to improve the ability of structures to withstand greater wind velocities and impacts from hail	--[c]	--[c]	X			X	X	X	X			Kenosha County and all local jurisdictions[d]
Continue to obtain and maintain equipment to help detect or mitigate lightning-related fires, such as thermal imaging devices	—	—		X		X						Kenosha County and all local jurisdictions[d]
Continue to enforce existing local ordinances requiring adequate electrical grounding in newly constructed buildings	--[c]	--[c]		X		X	X					Kenosha County and all local jurisdictions[d]
Promote emergency back-up power at critical facilities	--[c]	--[c]		X		X	X					Kenosha County and all local jurisdictions[d]
Encourage agricultural producers to purchase crop insurance	--[c]	--[c]	X			X						Kenosha County
Promote planting windbreaks for farm crops	--[c]	--[c]		X		X	X					Kenosha County and all local jurisdictions[d]
Structural												
Work with municipalities and businesses to explore installation or upgrading of community safe rooms and hardening projects for public buildings, community facilities, major industrial and manufacturing sites, large businesses, mobile home parks, campgrounds, and fairgrounds to ensure adequate shelter from thunderstorm and high-wind hazards	--[c]	--[c]			X	X		X	X			Kenosha County and all local jurisdictions[d]

Table continued on next page.

Table 5.6 (Continued)

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Structural (continued)												
Install lightning grade surge protection devices for critical electronic components used by government, public service, and public safety facilities	--[e]	--[e]		X		X	X					Kenosha County and all local jurisdictions[d]
Bury and protect power and utility lines	--[e]	--[e]		X		X	X					Kenosha County and all local jurisdictions[d]
Public Information and Educational Programming												
Increase public education and awareness of the potential severity of thunderstorm related hazards and non-thunderstorm high-wind hazards and distribute emergency preparedness information related to thunderstorm hazards	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]
Provide information and encourage the use of fire-resistant materials and surge protectors on critical electronic equipment	--[c]	--[c]	X			X	X					Kenosha County and all local jurisdictions[d]

[a] *All costs expressed in 2021 dollars unless otherwise noted.*

[b] *Cost of implementation is allocated among three categories of low (less than $100,000 dollars), moderate (greater than $100,000 and less than $1,000,000), and high (greater than $1,000,000) costs, which are generally defined as:*

Low	Moderate	High
Educational and informational programming	*Addition of new staff*	*Major construction*
Ongoing enforcement of ordinances	*Additional staff hours budgeted*	*New buildings (infrastructure)*
Plan Development	*Additional equipment*	*Capital programs*
Continued coordination/mutual aid/interagency agreements	*New ordinance development*	
	New programs/task force	

[c] *Costs covered under day-to-day operations.*

[d] *Jurisdictions include general purpose units of government—Cities, Towns, and Villages—and special purpose units of government such as School Districts, Sanitary and Utility Districts, and Agricultural Drainage Districts.*

[e] *Costs are site-specific.*

Source: Kenosha County Division of Emergency Management and SEWRPC

5.6 HAZARD MITIGATION PLAN COMPONENT FOR EXTREME TEMPERATURE

Extreme temperatures are natural hazard events of moderate concern to be considered in the Kenosha County hazard mitigation plan. Extreme temperatures can cause disruption of normal activities for the population and even the loss of life, particularly among more vulnerable populations. This section describes alternative and selected priority strategies to mitigate this type of hazard. As part of the updating process, these strategies were reviewed and reevaluated by the Kenosha County Hazard Mitigation Plan LPT in light of the updated hazard conditions and hazard mitigation goals documented in Chapters 3 and 4, respectively.

Identification of Alternative Mitigation Strategies

Extreme temperature events pose a serious threat to Kenosha County and should be expected with each summer and winter season. Extreme heat is the deadliest type of severe weather in Wisconsin. Extreme heat and cold events do not typically occur suddenly and are generally connected to a weather system that can be forecast days in advance, making this a hazard for which plans to mitigate injury, loss of life, and property damage can be activated with sufficient advanced warning. When extreme temperature events do occur, they commonly last for extended periods of time (several days to as much as a week) and impact areas larger than Kenosha County.

Temperature extremes are difficult for a community to mitigate and can cause risks to the health and safety of citizens, animals, and the viability of crops. While it may not be possible to accurately identify specific areas where there is significant risk from extreme temperature, extreme heat will have the greatest impact in the most urbanized areas of the County, where larger amounts of paved areas can cause an urban heat island effect, enhancing the natural hot air mass. Demographically, the elderly, debilitated, mentally ill, poor, and homeless are most vulnerable to both excessive heat and cold. Fatalities are often related to age because excessive heat is stressful to the human body and can overwhelm those who are weakened because of age or illness. Measures can be taken to reduce the potential injuries and fatalities caused by temperature extremes wherever they may occur in the County. Based upon review by the Kenosha County Hazard Mitigation LPT as part of the updating process, the following measures to reduce the vulnerability to extreme temperature events have been identified as viable for this update of the Kenosha County hazard mitigation plan.

Current Programs

Federal and State Programs

The NWS issues warnings, watches, and advisory statements to media, emergency management, and public health officials when there is a threat of severe weather conditions. Several categories of warnings, watches, and advisories apply to both extreme heat and extreme cold conditions and associated hazards. The conditions necessary for each of these categories are presented in detail in Chapter 3 of this report. Heat waves cannot be prevented; therefore, it is important to provide notice of adverse conditions so that the public can anticipate and avoid health-threatening situations. Excessive heat alert thresholds specific to major metropolitan centers are determined based on research results that link unusual amounts of heat-related deaths to city-specific meteorological conditions. The heat alert procedures are:

- Include Heat Index values in zone and city forecasts
- Issue Special Weather Statements and/or Public Information Statements presenting a detailed discussion of 1) the extent of the hazard including Heat Index values, 2) who is most at risk, and 3) safety guidelines for reducing the risk
- Assist State and local health officials in preparing civil emergency messages in severe heat waves. Meteorological information from Special Weather Statements will be included, as well as medical information, advice, and names and telephone numbers of health officials
- Release to the media and over the NOAA Weather Radio all of the above information

State programs include awareness and education efforts. WEM, in conjunction with the National Weather Service and State and local government agencies, provide both preparedness and severe weather information to the citizens of Wisconsin. Preparedness information is provided during three severe weather awareness campaigns conducted during the year, each focusing on the prevalent weather hazard at that time. The Wisconsin Department of Health Services (WI DHS) has developed an extreme heat tool kit to provide information to local governments, health departments, and citizens in Wisconsin about preparing for and responding to extreme heat events.[95]

WI DHS developed a Building Resilience Against Climate Effects (BRACE) Program. The Program conducted a geo-spatial analysis of heat-related vulnerability in the State. This analysis used existing data related to population density, such as the number of people per square mile; health factors, such as the percentage of the population that visited a hospital emergency department for heat stress; demographic and socioeconomic factors, such as the percentages of young children or persons over 85 years of age and the percentage of households in poverty; and natural and built environment factors, such as surface air temperature during a heat wave, land cover, and air quality; to create a heat vulnerability index (HVI) to identify areas of greatest risk for negative health impacts due to extreme heat. The HVI was calculated for each census block in the County. Based on the HVI, each census block was placed in one of five vulnerability categories based on the level of vulnerability indicated, with each category consisting of 20 percent of the census blocks analyzed. It is important to note that the levels of vulnerability shown by the HVI indicate relative levels of risk and do not indicate absolute risks. The results of the Kenosha County heat vulnerability index are shown in Figure 3.3.

Additionally, WI DHS has developed a winter weather tool kit to provide information about winter weather, including extreme cold.[96] WEM has produced several educational resources regarding extreme heat and winter weather, such as extreme cold, including prerecorded radio public service announcements, scripts for radio public service announcements, fliers, and educational materials for children.[97] In addition, numerous other organizations, such as the American Red Cross, provide public safety information.

Local Programs

The Kenosha County DEM has information available for the public on extreme temperatures and other general emergency management-related topics. The Kenosha County DEM participates in all State sponsored severe weather awareness campaigns. The Kenosha County Division of Health Services has compiled and disseminates a list of cooling centers that provide air-conditioned environments to prevent adverse effects from the heat. Kenosha County has also developed a severe heat and a severe cold plan to help protect and inform the public about these hazards.

Kenosha County has developed an emergency operations plan and hazard analysis, which sets forth an all-hazards action plan. In addition, many of the local units of government have developed emergency operations plans and/or programs that complement the County plan and that also set forth procedures and actions to deal with a range of situations and events, including extreme temperatures.

Finally, a variety of methods to warn the residents of Kenosha County of emergency situations, including extreme temperatures, are described in detail in the "multiple hazards" plan component earlier in this Chapter.

Multi-Jurisdictional Considerations

Extreme temperature events are primarily a public health concern for all communities within the County and ultimately prevention should fall to the neighborhood watch groups and local authorities. These events can affect all individuals in the County; however, they are particularly dangerous for the elderly, sick, mentally ill, poor, and homeless who cannot access shelter with adequate heat or air conditioning; or lack access to advisory and educational resources. A coordinated effort involving the Kenosha County DEM and local

[95] *Wisconsin Department of Health Services,* Wisconsin Extreme Heat Toolkit, *Publication P00632, March 2014.*

[96] *Wisconsin Department of Health Services,* Wisconsin Winter Weather Toolkit, *Publication P00652, April 2014.*

[97] *These can be accessed at Wisconsin Emergency Management's ReadyWisconsin website located at: ready.wi.gov/Resources/Manager_Resources.asp.*

community emergency operations programs will be needed to identify and protect individuals vulnerable to temperature-related hazards.

Evaluation of Alternatives and Identification of Priority Mitigation Measures

Based upon review of the above and the risk analysis given in Chapter 3, the ongoing informational and educational programs related to extreme temperatures represent a major component of the planned mitigation action. Kenosha County should continue to promote basic strategies to reduce injuries and fatalities, hazard awareness, and community involvement. Temperature hazards are experienced by Kenosha County residents annually and the ability to make positive decisions concerning exposure limits will depend on safety awareness. Analysis of the vulnerability of humans, infrastructure, and economic production caused by extreme temperature events demonstrates that the provision of advanced weather forecasting systems; provision of early warning systems to alert the public of extreme temperature situations; availability of adequate shelter from the heat and cold in public buildings, major industrial sites, and other large businesses or complexes; and public informational and educational programming are the most important mitigation actions to be considered. Kenosha County supports measures presently implemented by the National Weather Service; national, State, and local health organizations; and the media preceding and during excessively hot and cold weather. It is also important to continue to encourage concern and awareness of neighbors, especially the elderly, debilitated, and mentally ill. Outreach to poor and homeless populations to inform them of the availability and location of warming and cooling shelters within the County is an important component to keeping these vulnerable populations safe. Community and school-based informational programs should continue to be conducted by the County in partnership with Federal, State and local authorities.

Based upon the foregoing evaluation and consideration of risk and consideration by the Kenosha County Hazard Mitigation LPT (see Appendix A), there are 12 actions determined to be priority mitigation measures as part of this hazard mitigation plan update that are specifically related to extreme temperature events.[98] These priority mitigation measures, along with a general cost-benefit summary are presented in Table 5.7.

5.7 HAZARD MITIGATION PLAN COMPONENT FOR LAKE MICHIGAN COASTAL HAZARDS

Lake Michigan bluff recession, shoreline erosion, flooding, and shoreline protection structural damage are natural hazard events of high concern to be considered in the Kenosha County hazard mitigation plan. The Great Lakes shoreline is a high energy environment with storm surge and waves. Beyond the erosive nature of waves, the shoreline is highly vulnerable to erosion largely because the landforms are made up of mixed, unconsolidated glacial till material. Additionally, there has been significant change in the duration of ice cover and rainfall intensity recently making the dynamics of Lake Michigan less predictable. Lake Michigan water levels have increased significantly from near record low levels in 2013 to near record high levels in 2019 as described in Chapters 2 and 3 of this report. Coastal bluffs erode and fail under normal conditions, however, with human activity and intervention these natural processes often occur at faster rates than anticipated. Planning, preparing for, and adapting to coastal hazards can enhance community resilience to the dynamic coastal conditions and strengthen coastal economies. This section describes alternative and selected priority strategies to mitigate these types of hazards.

As part of the updating process, these strategies were reviewed and reevaluated by the Kenosha County Hazard Mitigation LPT in light of the updated hazard conditions and hazard mitigation goals documented in Chapters 3 and 4, respectively.

Identification of Alternative Mitigation Strategies

As reported in Chapters 2 and 3, a number of studies and planning programs have been carried out related to Lake Michigan coastal erosion and related hazards. A review of those plans and materials under the State of Wisconsin Coastal Management Program (WCMP) indicates a range of alternative shoreline erosion control and flood mitigation measures. Kenosha County's Lake Michigan shoreline is low-lying along the southern shores of the Village of Pleasant Prairie, while the northern portion of the County has high coastal

[98] *Priority mitigation measures that apply to multiple hazard types, including extreme temperature events, are presented in the "Hazard Mitigation Plan Component for Multiple Hazard Types" section in this Chapter.*

Table 5.7
Cost-Benefit Analysis Summary of Measures Included in the Kenosha County Hazard Mitigation Plan: Extreme Temperature Hazards

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Nonstructural												
Organize neighborhood outreach groups who look after vulnerable populations and promote the availability of shelters during extreme heat and cold	--[c]	--[c]	X			X			X			Kenosha County and all local jurisdictions[d]
Provide special arrangements for payment of heating and cooling bills for customers unable to pay due to financial constraints	--[c]	--[c]	X			X		X		X		Kenosha County and all local jurisdictions[d]
Designate sites in the County to be used as public cooling/heating shelters during extreme temperature events and promote transportation options to assist members of vulnerable populations to reach these sites during extreme temperature events	--[e]	--[e]	X			X		X		X		Kenosha County and all local jurisdictions[d]
Reschedule public events to avoid large outdoor gatherings during periods of extreme heat or cold	--[e]	--[e]	X			X		X	X	X		Kenosha County and all local jurisdictions[d]
Extend public swimming pools hours during extreme heat events	--[c]	--[c]		X		X		X		X		Kenosha County and all local jurisdictions[d]
Establish and promote a donation program of functional window air conditioner units and fans that are no longer in use and distribute these items to vulnerable populations	--[c]	--[c]	X			X		X	X	X		Kenosha County and all local jurisdictions[d]
Promote and expand winter weather clothing drives (coats, hats, mittens) where people can drop off gently used winter clothing for distribution to vulnerable populations	--[c]	--[c]		X		X		X	X	X		Kenosha County and all local jurisdictions[d]

Table continued on next page.

Table 5.7 (Continued)

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Structural												
Maintain and update warming and cooling public shelter sites in Kenosha County	--[e]	--[e]	X			X		X	X	X		Kenosha County and all local jurisdictions[d]
Promote measures to reduce heat island effects in urban areas	--[c]	--[c]	X			X				X	X	Kenosha County and all local jurisdictions[d]
Public Information and Educational Programming												
Increase public education and awareness of the potential severity of temperature extreme events and distribute emergency preparedness information related to extreme temperature events	--[e]	--[e]	X			X						Kenosha County and all local jurisdictions[d]
Promote awareness of public warming and cooling shelters that are available during extreme temperature events through municipal and County websites	--[e]	--[e]	X			X						Kenosha County and all local jurisdictions[d]
Produce and distribute emergency preparedness information related to the safe operation of generators, space heaters, fireplaces, and wood stoves	--[c]	--[c]	X			X		X		X		Kenosha County and all local jurisdictions[d]

[a] *All costs expressed in 2021 dollars unless otherwise noted.*

[b] *Cost of implementation is allocated among three categories of low (less than $100,000 dollars), moderate (greater than $100,000 and less than $1,000,000), and high (greater than $1,000,000) costs, which are generally defined as:*

Low	*Moderate*	*High*
Educational and informational programming	*Addition of new staff*	*Major construction*
Ongoing enforcement of ordinances	*Additional staff hours budgeted*	*New buildings (infrastructure)*
Plan Development	*Additional equipment*	*Capital programs*
Continued coordination/mutual aid/interagency agreements	*New ordinance development*	
	New programs/task force	

[c] *Costs to be determined. Partially covered under ongoing programs.*

[d] *Jurisdictions include general purpose units of government—Cities, Towns, and Villages—and special purpose units of government such as School Districts, Sanitary and Utility Districts, and Agricultural Drainage Districts.*

[e] *Costs covered under ongoing activity.*

Source: Kenosha County Division of Emergency Management and SEWRPC

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bluffs, many of which are unstable. The recent near-record water levels for Lake Michigan have increased the vulnerability of all of these coastal areas in Kenosha County. For this plan element, coastal mitigation measures are presented in four main categories:

- Regulations and policy measures
- Bluff top and bluff face mitigation measures
- Near-shore and shoreline mitigation measures
- Informational and educational programming

The following measures to reduce the vulnerability to shoreline erosion and flooding hazards were considered viable for incorporation into this update of the Kenosha County hazard mitigation plan.

Regulations and Policy Measures

A fundamental element for coastal communities to consider is the setback requirements from coastal bluffs and shorelines to protect development and redevelopment from potential coastal hazards. A number of States, including Wisconsin, have adopted coastal management regulations and/or policies.[99]

Wisconsin's Shoreland Management Program is a partnership between State and local government that requires the adoption of County shoreland zoning ordinances to regulate development near navigable lakes and streams, in compliance with statewide minimum standards. These minimum statewide standards are set forth in Chapter NR 115, *Wisconsin Administrative Code*.

WCMP developed a model coastal ordinance for construction setback distances above and beyond the setback required by the State's Shoreland Protection Program. The model ordinance states all buildings must be set back a minimum of 75 feet from the top of bluff edge or the calculated stable slope angle setback, whichever is greater. The following are current recommendations to consider regarding coastal development:

- Continue to participate in FEMA's NFIP and RiskMAP floodplain mapping program for updated Lake Michigan coastal V and VE flood hazard zones
- Develop and enforce consistent County and municipal shoreland regulations and policies (i.e., ordinances) relating to setbacks for new development or redevelopment and structural shoreline erosion protection, bluff stabilization, and coastal erosion ravine measures
- Continue working with Wisconsin Coastal Management Program (WCMP) and University of Wisconsin-Sea Grant Institute to review, and re-examine as necessary, the County's current zoning ordinances, regulations, and comprehensive plans to identify opportunities to better address coastal hazards
- Kenosha County and its coastal communities should continue to participate in the Southeast Wisconsin Coastal Resilience Project's "Community of Practice" meetings. The Community of Practice is designed to be a network of local and state officials and coastal experts to demonstrate coastal resilience resources, discuss ongoing hazard issues, initiate inter-community collaboration, and develop consistent approaches to address coastal hazards in the Southeastern Wisconsin Region

[99] *Alan R. Lulloff, P.E., CFM, Science Services Program Director - Association of State Floodplain Managers and Philip Keillor, P.E., Coastal Engineer,* Wisconsin Coastal Management Program: Managing Coastal Hazard Risks On Wisconsin's Dynamic Great Lakes Shoreline, *2015*.

Bluff Top and Bluff Face Mitigation Measures

- Develop and encourage bluff top best management practices (BMPs) to be implemented along the entire bluff coastline of Kenosha County. Implementing these practices is of particular priority in areas where significant bluff crest recession has been observed, both long-term and short-term. As discussed in Chapter 3, the largest bluff crest recession distances were observed in the Village of Somers. Bluff top and bluff face best management practices include:

    - Stormwater management – Stormwater runoff can contribute to bluff destabilization and erosion. Paved surfaces and structures on the top of the bluff can cause sheet and concentrated flows that increase the force of flowing water which causes erosion. It is recommended to have a well-designed and properly constructed drainage system to eliminate stormwater from flowing over the edge and down the face of the bluff.[100] These BMPs include:

        » Positioning stormwater ditches and roof gutters to direct flow away from the bluff

        » Use rain barrels to capture roof runoff

        » Route water into existing stormwater systems that move water away from the coastal bluff

    - Groundwater management – Groundwater saturation can weaken the soil matrix, causing landslides or slumps on the bluff face. Where groundwater saturation is known to be weakening bluff soils, it is recommended to investigate the suitability of installing a well-designed, appropriately-located underground drainage system to help dewater the subsurface bluff soils. This system would help reduce groundwater saturation and increase bluff stability.

    - Vegetative plantings – Vegetation on coastal bluff slopes can stop surface erosion and may prevent shallow slides. Combining a variety of plants and root structures increases the strength and cohesion of soil even during saturated conditions, thus implementing this technique can slow stormwater runoff, reduce erosion, and increase bluff top and face stability. Guidance on selecting suitable plant species for bluff stabilization can be found in "A Property Owner's Guide to Protecting Your Bluff".[101]

- Continue to review and implement findings of up-to-date geotechnical engineering studies that assess the variables (i.e., soil, groundwater conditions, maximum groundwater levels, vegetative cover, surface drainage, bluff height, slope angle, and previous studies) which determine the stable slope angle setback for bluff stability and shoreline recession determinations.

- Bluff slope stability analyses should be based upon the highest groundwater conditions (when the bluff is most likely to fail), and safety factors appropriate for the consequences of failure.[102]

- If determined to be necessary by a licensed engineer, maintain bluff stability by regrading and terracing the angle of the bluff face to create a less steep slope between the top and toe of the bluff. Any bluff regrading project would need to be designed and overseen by a geotechnical engineer trained in slope stabilization and a qualified contractor should be involved throughout the project.[103]

- Consider relocating buildings determined to be at high-risk for sustaining damages from bluff recession and/or failure. Detailed studies by a licensed engineer would be needed to determine if a building should be considered for relocation. This plan element is presented as an option, subject to the preference of the individual property owner.

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[100] *A. Mangham, D. Hart, A. Belche, G. Clark, D. Peroff, J. Noordyk, B. Stitt, and L. Stitt, University of Wisconsin Sea Grant Institute,* Adapting to a Changing Coast*,* Options and Resources for Lake Michigan Property Owners, *August 2017.*

[101] *L. Salus, A. Bechle, J. Noordyk, G. Clark, and D. Carter, University of Wisconsin Sea Grant and Southeastern Wisconsin Regional Planning Commission,* A Property Owners Guide to Protecting Your Bluff, September 2021.

[102] Ibid.

[103] Ibid.

- In circumstances where buildings cannot be relocated safely or economically, or where bluff recession has progressed to the point where the risk of catastrophic failure of the slope is imminent, or where there is an imminent threat of failure within five years, acquisition and demolition of the structures should be considered. This plan element is presented as an option, subject to the preference of the individual property owner.

- Develop and maintain long-term protection measures for critical community, utility, and historical facilities located within the high-risk coastal hazard zone.

- Continue to enforce County setback regulations along coastal ravines.

Near-Shore and Shoreline Protection Measures

- Conduct an updated inventory and assessment of the condition and effectiveness of all shoreline protection structures along the Lake Michigan coast in the County. Structures to include in the inventory and assessment are breakwater walls, jetties, groins, seawalls, and revetments.

- Ensure breakwater walls and piers within and around the Kenosha harbor are properly designed and constructed to withstand gale force winds, the highs and lows of storm seiche events, and intense wave events, especially with high Lake Michigan water levels.

- Construct and maintain shoreline protection structures where public infrastructure is at risk. It should be noted that effective shore protection may also require bluff stabilization measures as discussed above. The following considerations should be evaluated prior to any shore protection project:

    - Structural shore protection measures (i.e. jetties, groins, seawalls, and revetments) should be installed if other less invasive measures are inadequate in reducing shoreline erosion and if it can be shown that such measures will effectively reduce shoreline erosion while not adversely affecting adjacent sections of the Lake Michigan shoreline

    - Fish and wildlife preservation measures to limit any adverse impacts during construction should be considered and implemented

    - Assistance from a geotechnical engineer or geologist trained in slope stabilization, an engineer trained in shore protection design, and a qualified marine contractor should be involved throughout the stabilization project[104]

    - It can often be more economical and effective to plan and implement shoreline protection or bluff stability projects in concert with design and implementation of such measures for neighboring properties[105]

- The WDNR may allow the placement of temporary emergency material in public waters if the landowner makes a request in writing to protect a structure or infrastructure from an eroding shoreline or bluff. In 2019, the WDNR developed a streamlined temporary erosion control placement authorization process intended for emergency situations for coastal (Great Lakes) shorelines.[106] Once the required form is submitted, work on the project may proceed provided it is designed to meet all the requirements included on the form. With this streamlined process landowners do not need to wait to hear back from the WDNR prior to initiating emergency shoreline protection, and the WDNR will continue to allow the placement of temporary emergency material in public water to protect property during the application process. [107]

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[104] *University of Wisconsin Sea Grant and US Army Corps of Engineers,* Living on the Coast—Protecting Investments in Shore Property on the Great Lakes, *2003*.

[105] Ibid.

[106] *Temporary emergency material WDNR form 3500-127 can be downloaded at dnr.wi.gov/files/PDF/forms/3500/3500-127.pdf.*

[107] *Details and requirements of this program can be found at dnr.wi.gov/topic/waterways/shoreline/GreatLakesErosionControl.html.*

- The coastal 1-percent-annual-probability floodplain has been mapped for all of Wisconsin's coastal counties. This information is included in FEMA's National Flood Hazard Layer (NFHL), which was used by SEWRPC to conduct the GIS parcel-based analysis for the flood risk assessment presented earlier in this Chapter. That analysis found that up to seven structures were estimated to potentially be within the coastal 1-percent-annual-probability flood hazard area. Considering the recent near record water levels for Lake Michigan, these structures may now be at an even higher risk. As indicated in the recommendations made earlier in this Chapter, these coastal flood risk structures should be considered for acquisition and demolition. This plan element is presented as an option, subject to the preference of the individual property owner. Furthermore, field surveys should be made for these structures in order to obtain a more definitive assessment of their flood hazard status. The estimated cost of implementing this recommendation of the floodplain management element related to potential Lake Michigan flooding would be nearly $3 million (2021 dollars). This cost is already included in the floodplain management element costs presented earlier in this Chapter.

- This plan encourages landowners to consider, to the degree practicable, nature-based shoreline protection measures, such as living revetments or seawalls, native plantings, dune and coastal wetland restoration, and beach replenishment. Traditional "hard" shoreline protection structures (i.e., jetties, groins, breakwaters, seawalls, and levees) intervene with the natural processes of coastal systems and can sometimes cause unintended consequences to other locations along the shore. Nature-based protection measures are intended to be less intrusive to natural coastal processes.

Public Informational and Educational Programming

- Coastal hazard information should be readily available to the public. Coastal erosion hazard assessments and associated erosion hazard maps have been developed for Lake Michigan's coast.[108] It is recommended, as a part of this plan update, to inform and encourage Kenosha County coastal communities and landowners to use the Wisconsin Shoreline Inventory and Oblique Photo viewer mapping tool to better understand long- and short-term shoreline processes and the natural or man-made impacts on individual properties

- Work with WCMP to develop, refine, and distribute guidance and education to local decision makers, developers, consultants, and homeowners related to coastal hazards

- Work with WCMP to continue to conduct public outreach and to provide technical assistance to decision-makers and landowners regarding best management practices to prevent shoreline erosion and bluff recession, including shoreline protection structures, planting proper vegetation, and stormwater/groundwater drainage practices

- Provide information on shoreland erosion related hazards to serve as a "fair warning" guide for groups such as realtor-brokers, shoreline property owners, developers, lending institutions, and prospective buyers

- Promote the awareness of flood insurance to residents along the County's low-lying coast in the City of Kenosha and Village of Pleasant Prairie.

Current Programs

Federal Programs

The USACE exercises some control over lake levels through the use of water controls, such as locks and dams between the Great Lakes. However, these impacts are minimal compared to the lake level impacts due to climatic influence. The USACE provides current, past, and forecasted average daily and monthly mean water levels for the Great Lakes. The USACE can provide technical, direct, and advanced measures assistance. In addition, the USACE Report entitled, "Living on the Coast" provides informational and educational guidance for local officials and coastal property owners.[109]

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[108] *Wisconsin Coastal Management Program*, Managing Coastal Hazard Risk on Wisconsin's Dynamic Great Lakes Shoreline*, Alan R. Lulloff, P.E., CFM, Science Services Program Director - Association of State Floodplain Managers and Philip Keillor, P.E., Coastal Engineer, 2011, updated in 2015.*

[109] Ibid.

FEMA's Great Lakes Coastal Flood Study (GLCFS) is a comprehensive storm and wind study of the Great Lakes basin for updating coastal flood hazard information and DFIRMs for Great Lakes coastal communities, including Kenosha County. These flood maps and related information are tools that can help communities identify high-risk areas and guide land use planning and capital investments to mitigate future losses. Updated Kenosha County floodplain maps completed as part of the Risk MAP effort will include results from the GLCFS effort for the Lake Michigan coast.

The FEMA Community Rating System (CRS) rewards communities that are doing more than meeting the minimum requirements of the National Flood Insurance Program (NFIP) to help citizens prevent or reduce flood losses. Communities that prohibit hard shoreline protection structures, can receive points under the CRS program.[110]

In cooperation with the University of Wisconsin-Madison's Sea Grant Institute, Department of Civil and Environmental Engineering, Land Information and Computer Graphics Facility, the WDNR, several private consultants and agencies from the State of Michigan, the USACE organized the Lake Michigan Potential Damages Study (LMPDS). The objective of this research project, which took place between 1996 and 2000, was to create a modeling procedure and engineering-management tool for predicting future shoreline retreat and estimating economic effects of lake level changes and related social, environmental and cultural impacts.[111]

State Programs

Wisconsin Emergency Management (WEM) provides coastal hazard mitigation education and information in the state hazard mitigation plan. In addition, WEM administers Federal programs within the State to assist coastal communities and local governments in preventing coastal hazards which include the Hazard Mitigation Grant Program (HMGP) and the Building Resilient Infrastructure and Communities (BRIC) pre-disaster mitigation program.

The WCMP, which is part of the Wisconsin Department of Administration, Division of Intergovernmental Relations, oversees management of the State's coastal resources and strives to maintain a balance between preservation and economic needs. Established in 1978 under the Federal Coastal Zone Management Act, the WCMP works to preserve, protect, and wisely use the resources of the Lake Michigan and Lake Superior coastline for this and future generations. The WCMP provides guidance and grants to encourage the management and protection of Wisconsin's coastal resources and to increase public access to the Great Lakes. The WCMP has constituted an interagency coastal hazards work group that includes staff from the WDNR, University of Wisconsin-Madison's Sea Grant Institute, the State Cartographer's Office, and the WCMP as a forum to coordinate initiatives related to coastal management in the State.

In 2015, the WCMP updated its Report entitled, "Managing Coastal Hazard Risks on Wisconsin's Dynamic Great Lakes Shoreline" to provide a number of educational and informational resources regarding Wisconsin's coastal environments, regulations, and practices throughout Wisconsin. Furthermore, the WCMP created a web-based tool that allows users to examine oblique photos from the late 1970s and compare them to corresponding photos from 2007 and 2008 to assess changes to the shoreline.[112] GIS layers for shore structures, beach protection, and bluff conditions for each time frame allow for more detailed analysis of shoreline and bluff changes. WCMP is a vital partner and resource for the County and local communities for any coastal related issues and advice related to coastal resilience projects.

The University of Wisconsin Sea Grant is a statewide program of basic and applied research, education, outreach, and technology transfer dedicated to the stewardship and sustainable use of the Great Lakes. The Sea Grant staff has, over the years, provided substantial support to Kenosha County in dealing with Lake Michigan shoreline management issues.

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[110] *Federal Emergency Management Agency, FEMA,* CRS Credit for Management of Coastal Erosion Hazards*, 2006.*

[111] *ascelibrary.org.*

[112] *The Wisconsin Shoreline Inventory and Oblique Photo Viewer can be accessed at greatlakesresilience.org/maps-tools-data/data/wisconsin-shoreline-inventory-and-oblique-photo-viewer.*

The Southeast Wisconsin Coastal Resilience Project was a collaborative effort to enhance community capacity in southeastern Wisconsin and to build resilience to coastal hazards. The Coastal Resilience project developed educational and outreach materials for bluff best management practices, bluff slope vegetation practices that can improve bluff stability, nature-based shoreline protection specifically for Great Lakes shorelines, and resilient beach restoration practices that increase resistance to erosion. This project has an online website, which provides an excellent resource for local officials and residents living in coastal communities. The website contains informational and education programs, a blog, and social media outlets with updated news in regard to State and local coastal information.[113]

Local Programs

As stated previously in this report, Kenosha County, the City of Kenosha, the Village of Pleasant Prairie, and the Village of Somers have adopted shoreland zoning ordinances that apply to the Lake Michigan shoreland area. The Kenosha County ordinance applies to the shoreline in the Town of Somers, including nearly all of the potentially developable land and the highly erodible bluff area. The current County shoreland policy and regulation calls for shore protection where necessary and for Lake Michigan setbacks for development. The ordinance provides for the use of shoreline protection and bluff stabilization structural measures, as well as bluff setbacks for development in portions of the County where urban shoreline development exists or is envisioned and provides for a larger setback for development in other parts of the County where structural protection is not envisioned to be used due to limited planned urban development. The County policies and regulations also provide for specific procedures for the design and review of shore protection measures.

A variety of methods are used to warn people in Kenosha County of emergency situations, including Lake Michigan coastal hazards. These warning systems are described in the section of this chapter related to multiple hazards types.

Multi-Jurisdictional Considerations

The plan elements for Lake Michigan shoreline erosion and related problems correspond only to Kenosha County, the City of Kenosha, and the Villages of Pleasant Prairie and Somers.

Evaluation of Alternatives and Identification of Priority Mitigation Measures

Based upon the foregoing evaluation and consideration of risk, and review by the Kenosha County Hazard Mitigation LPT (see Appendix A), there are 14 actions determined to be priority mitigation measures as part of this hazard mitigation plan update that are specifically related to Lake Michigan coastal hazard events.[114] These priority mitigation measures, along with a general cost-benefit summary are presented in Table 5.8.

5.8 HAZARD MITIGATION PLAN COMPONENT FOR WINTER STORMS

Winter storms are natural hazard events of moderate concern to be considered in the Kenosha County hazard mitigation plan. This section describes alternative and selected priority strategies to mitigate this type of hazard. As part of the updating process, these strategies were reviewed and reevaluated by the Kenosha County Hazard Mitigation Plan LPT in light of the updated hazard conditions and hazard mitigation goals documented in Chapters 3 and 4, respectively.

Identification of Alternative Mitigation Strategies

Severe winter weather can include blizzards, freezing rain, sleet, ice, and dangerous combinations of temperatures and wind. Winter storms may last a few hours or days, completely shutting down businesses and government, while isolating residents in their homes.

Impacts of heavy snow and ice accumulations include slippery roads and walkways; collapsed roofs from heavy ice and snow loads; and damaged trees, telephone poles and lines, electrical wires, and communications

[113] *sewicoastalresilience.org/about/project-overview.*

[114] *Priority mitigation measures that apply to multiple hazard types, including Lake Michigan coastal hazard events, are presented in the "Hazard Mitigation Plan Component for Multiple Hazard Types" section in this Chapter.*

Table 5.8
Cost-Benefit Analysis for Measures Included in the Kenosha County Hazard Mitigation Plan: Lake Michigan Coastal Hazards

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Regulations and Policy Measures												
Continue to participate in FEMA's NFIP and RiskMAP floodplain mapping program for updated Lake Michigan coastal V and VE zones	--[c]	--[c]	X			X	X			X		City of Kenosha and Villages of Pleasant Prairie and Somers
Develop and enforce consistent county and municipal shoreland regulations and policies (i.e., ordinances) relating to setbacks along bluffs and ravines	--[d]	--[d]	X			X	X	X				Kenosha County, City of Kenosha and Villages of Pleasant Prairie and Somers
Consider establishing a buyout program to acquire and remove structures in areas susceptible to impacts of Lake Michigan coastal hazards	--[c]	--[c]		X		X	X				X	Kenosha County, the City of Kenosha, and Villages of Pleasant Prairie and Somers
Bluff Top and Face Mitigation Measures												
Develop and encourage bluff top and face best management practices	--[d]	--[d]	X			X	X			X		City of Kenosha and Villages of Pleasant Prairie and Somers
Implement engineering studies that assess the variables influencing bluff stability and shoreline recession which determine the stable slope angle setback	--[d]	--[d]		X		X	X					City of Kenosha and Villages of Pleasant Prairie and Somers
Consider relocating buildings within high-risk bluff failure areas	--[c]	--[c]		X		X	X	X	X			City of Kenosha and Villages of Pleasant Prairie and Somers
Continue to enforce County coastal ravine setback regulations	--[d]	--[d]	X			X	X					City of Kenosha and Villages of Pleasant Prairie and Somers
Near Shore/Shoreline Protection Measures												
Conduct an assessment of the condition and effectiveness of all shoreline protection structures in the County	--[d]	--[d]	X			X	X	X			X	City of Kenosha and Villages of Pleasant Prairie and Somers

Table continued on next page.

Table 5.8 (Continued)

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Near Shore/Shoreline Protection Measures (continued)												
Ensure breakwater walls and piers within and around the Kenosha harbor are properly designed and constructed to withstand severe environmental conditions of Lake Michigan	--[e]	--[e]		X		X	X					City of Kenosha
Construct and maintain shoreline protection structures and bluff stabilization measures where public infrastructure is at risk	--[c]	--[c]		X		X	X	X				City of Kenosha and Villages of Pleasant Prairie and Somers
Possible acquisition and demolition of up to seven structures identified as potentially being located in the low-lying shores of Lake Michigan's 1-percent-annual-probability floodplain[g]	$2.8 million	--[f]		X		X	X					Kenosha County and the Village of Pleasant Prairie
Encourage the practice of non-structural or nature-based shoreline protection measures, such as living revetment or seawalls and artificial beach and beach nourishment	--[d]	--[d]	X			X	X				X	City of Kenosha and Villages of Pleasant Prairie and Somers
Public Informational and Educational Programming												
Work with WCMP to conduct public outreach and to provide technical assistance regarding BMPs to prevent shoreline erosion and bluff recession	--[d]	--[d]	X			X						Kenosha County, the City of Kenosha, and Villages of Pleasant Prairie and Somers
Promote flood insurance to residents along the County's low-lying coast located in Lake Michigan's flood hazard area	--[d]	--[d]	X			X	X					Kenosha County, the City of Kenosha, and Village of Pleasant Prairie

Table continued on next page.

Table 5.8 (Continued)

[a] *All costs expressed in 2021 dollars unless otherwise noted.*

[b] *Cost of implementation is allocated among three categories of low (less than $100,000 dollars), moderate (greater than $100,000 and less than $1,000,000), and high (greater than $1,000,000) costs, which are generally defined as:*

Low	*Moderate*	*High*
Educational and informational programming	*Addition of new staff*	*Major construction*
Ongoing enforcement of ordinances	*Additional staff hours budgeted*	*New buildings (infrastructure)*
Plan Development	*Additional equipment*	*Capital programs*
Continued coordination/mutual aid/interagency agreements	*New ordinance development*	
	New programs/task force	

[c] *Costs to be determined. Partially covered under ongoing programs.*

[d] *Costs covered under ongoing programs.*

[e] *Project costs.*

[f] *Costs to be determined.*

[g] *Acquisition and demolition costs of these structures are included in the parcel-based analyses conducted by SEWRPC staff when determining potential damages caused from a 100-year probability flood as described in Chapter 3.*

Source: Kenosha County Division of Emergency Management and SEWRPC

towers.[115] Additionally, indirect injuries and fatalities can occur frequently from activities associated with winter storms such as heart attacks while shoveling snow, carbon monoxide poisoning, hypothermia, frostbite, automobile accidents, and improper use of space heaters. Severe winter storm fronts can often be tracked, which generally provides ample warning for potentially affected areas to take preventative actions.

While it may not be possible to accurately predict the number or severity of winter storm events, measures can be taken to reduce the potential damage caused by winter storms and their related hazards whenever they may occur in the County. High-wind, freezing rain, sleet, ice, and snow may be associated with a winter storm. Reviewed by the Kenosha County Hazard Mitigation LPT as part of the updating process, the following measures to reduce vulnerability to these dangers have been identified as viable for the Kenosha County hazard mitigation plan. This section will present current programs, considerations, and mitigation measures that apply to winter storm hazards.

Current Programs

Federal and State Programs

The NWS issues warnings, watches, and advisories when there is a threat of severe weather conditions. Several categories of warnings, watches, and advisories apply to winter weather conditions and associated hazards. The NWS Milwaukee/Sullivan office will issue a winter storm warning when one or more of the following weather events are expected to occur over a period of 12 or fewer hours:

- Snowfall greater than six inches
- Sleet accumulations of two or more inches
- Intermittent blowing snow that reduces visibility below one-half mile with winds of 25 to 34 mph or closed roads
- Less than one-quarter inch of freezing rain accompanied by another winter event

The NWS Milwaukee/Sullivan office will issue a winter weather advisory when one or more of the following weather events are expected to occur over 12 or fewer hours:

- Snowfall of three to six inches
- Sleet accumulations of less than two inches
- Intermittent blowing snow that reduces visibility below one-half mile with winds of less than 25 mph
- Less than one-quarter inch of freezing rain accompanied by another winter event

The NWS office will also issue an advisory or warning for blizzard, ice storm, and lake effect snow events.

The NWS winter bulletins are distributed over a number of telecommunication channels, including the NOAA Weather Radio All Hazard radio network, the NOAA All Hazards Weather Wire, and the State law enforcement TIME system, and through an emergency e-mailing network. In addition, these bulletins are relayed to other local media via the Federal Communication Commission's Emergency Alert System (EAS) which rebroadcast the weather bulletins over public and private television and radio stations.

Federal and State winter storm programs include awareness and education activities. The Department of Homeland Security's *Ready.gov* campaign provides online resources on snowstorms and extreme cold awareness and preparedness.

In November each year, Winter Awareness Week focuses on informing and educating people concerning the hazards presented by severe winter weather and information on preparedness for extreme weather conditions during winter. The Wisconsin Department of Health Services (DHS) has developed a weather

[115] *Wisconsin Department of Emergency Management and Military Affairs,* State of Wisconsin Hazard Mitigation Plan, *December 2016*.

tool kit to provide information to local governments, health departments, and citizens in Wisconsin about preparing for and responding to winter storm events.[116] Similarly, WEM has produced several educational resources regarding winter weather, including prerecorded radio public service announcements, scripts for radio public service announcements, fliers, and educational materials for children.[117]

The Wisconsin Building Code specifies design requirements to minimize vulnerability to winter storms by setting the load capacity of roofs by region based on likely maximum snowfall. The NWS reports that 70 percent of winter storm fatalities occur in automobiles, therefore, listening to weather advisories and avoiding travel during winter storms would help prevent many fatalities.

Local Programs

Programs within Kenosha County include those conducted by the Kenosha County DEM, including a severe winter weather plan. Community strategies include plowing, salting and sanding roads, maintaining the health of urban trees to minimize damage from ice storms, and promoting sound levels of home insulation. Older homes can be vulnerable to heat loss and any home is vulnerable to power loss, therefore, possession of an alternative heat and power source is a consideration in protecting against winter storm hazards.

As described in Chapter 2, Kenosha County has developed an emergency operations plan and hazard analysis, which sets forth an all-hazards action plan. In addition, many of the local units of government have developed emergency operations plans and/or programs that complement the County plan and that also set forth procedures and actions to deal with a range of situations and events, including winter storm events.

A variety of methods are used to warn people in Kenosha County of emergency situations, including winter storms. These warning systems are described in the section of this chapter related to multiple types of hazards.

Multi-Jurisdictional Considerations

Winter storms and their related hazards can potentially impact all municipalities within the County. In addition, these severe events can potentially cause multiple damages to a variety of infrastructure including transmission lines, communication lines, and transportation routes due to whiteout conditions, snow accumulations, and ice. Kenosha County, local units of government, and relevant businesses need to coordinate hazard mitigation activities through local government participation in countywide disaster planning and response mechanisms.

Evaluation of Alternatives and Identification of Priority Mitigation Measures

Analysis of the vulnerability of humans, infrastructure, and economic production to winter storms and related hazard events demonstrates that providing advanced weather forecasts and warning systems, as well as public informational and educational programming, are the most important mitigation actions to be considered. In addition, informing the public of the significance of winter storm watches and warnings so that they take these events seriously and know where to seek shelter in emergency situations, are important, ongoing components to minimizing the risks associated with these natural hazards. Forming a neighborhood outreach program to locate isolated, vulnerable or special-needs populations likely to be affected by winter storms is an important element in ensuring that these vulnerable population groups are protected during these events and assistance is available to those who need help clearing away snow or ice after winter storm events. Community and school based informational programs are currently being conducted by the County in partnership with Federal, State and local authorities.

Based upon the foregoing evaluation and consideration of risk and consideration by the Kenosha County Hazard Mitigation LPT (see Appendix A) there are 12 actions determined by the Kenosha County Hazard Mitigation LPT to be priority mitigation measures as part of this hazard mitigation plan update that are specifically related to winter storm events.[118] These priority mitigation measures, along with a general cost-benefit summary are presented in Table 5.9.

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[116] *Wisconsin Department of Health Services,* Wisconsin Winter Weather Toolkit, op. cit.

[117] *These can be accessed at Wisconsin Emergency Management's ReadyWisconsin website located at ready.wi.gov/Resources/Manager_Resources.asp.*

[118] *Priority mitigation measures that apply to multiple hazard types, including winter storm events, are presented in the "Hazard Mitigation Plan Component for Multiple Hazard Types" section in this Chapter.*

Table 5.9
Cost-Benefit Analysis for Measures Included in the Kenosha County Hazard Mitigation Plan: Winter Storms

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Nonstructural												
Review the energy efficiency and winter readiness of critical facilities and housing in the community	--[c]	--[c]	X			X				X		Kenosha County and all local jurisdictions[d]
Continue to work with American Red Cross to establish a system for short-term sheltering of vulnerable populations	--[c]	--[c]		X		X		X	X	X		Kenosha County and all local jurisdictions[d] and NGOs
Pursue additional funding opportunities to assist with budgeting for overtime hours and extra governmental personnel needed during extreme winter events	--[c]	--[c]		X		X		X	X	X		Kenosha County and all local jurisdictions[d]
Ensure that the necessary amount of snow removal, anti-icing, and deicing equipment is available and operational	--[c]	--[c]		X		X				X		Kenosha County and all local jurisdictions[d]
Structural												
Work with utility companies to assess and improve, as needed, electric service systems dependability	--[e]	--[e]		X		X				X		Kenosha County and all local jurisdictions[d]
Maintain and update shelter sites that have back-up emergency power sources	--[e]	--[e]		X		X		X	X	X		Kenosha County and all local jurisdictions[d]
Continue installing and promote the installation of additional snow fences and planting of windbreaks to protect farm crops and highways	--[c]	--[c]	X			X	X	X	X			Kenosha County and all local jurisdictions[d]
Public Information and Educational Programming												
Continue to maintain and promote winter hazard awareness, including home and travel safety measures, such as avoiding travel during winter storms; having a shovel, sand, warm clothing, food, and water, in vehicle if travel cannot be avoided; and installing a back-up heating system in at least one room in the home	--[c]	--[c]	X			X						Kenosha County

Table continued on next page.

Table 5.9 (Continued)

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Public Information and Educational Programming (continued)												
Organize neighborhood outreach groups who look after vulnerable, or special-needs populations, during and after winter storms	--[c]	--[c]	X			X				X		Kenosha County and all local jurisdictions[d]
Promote the availability of low-income energy assistance programs	--[e]	--[e]	X			X				X		Kenosha County and all local jurisdictions[d]
Publicize the availability of emergency shelter sites for those in need of temporary shelter during winter storms	--[e]	--[e]	X			X				X		Kenosha County and all local jurisdictions[d]
Promote the installation of backup power systems at homes and businesses	--[c]	--[c]	X			X				X		Kenosha County and all local jurisdictions[d]

[a] *All cost expressed in 2021 dollars unless otherwise noted.*

[b] *Cost of implementation is allocated among three categories of low (less than $100,000 dollars), moderate (greater than $100,000 and less than $1,000,000), and high (greater than $1,000,000) costs, which are generally defined as:*

Low	*Moderate*	*High*
Educational and informational programming	*Addition of new staff*	*Major construction*
Ongoing enforcement of ordinances	*Additional staff hours budgeted*	*New buildings (infrastructure)*
Plan Development	*Additional equipment*	*Capital programs*
Continued coordination/mutual aid/interagency agreements	*New ordinance development*	
	New programs/task force	

[c] *Costs are covered under day-to-day operations.*

[d] *Jurisdictions include general purpose units of government—Cities, Towns, and Villages—and special purpose units of government such as School Districts, Sanitary and Utility Districts, and Agricultural Drainage Districts.*

[e] *Costs to be determined. Partially covered under ongoing programs.*

Source: Kenosha County Division of Emergency Management and SEWRPC

5.9 HAZARD MITIGATION PLAN COMPONENT FOR DROUGHT

Droughts are natural hazard events of moderate concern to be considered in the Kenosha County hazard mitigation plan. This section describes alternative and selected priority strategies to mitigate this type of hazard. As part of the updating process, these strategies were reviewed and reevaluated by the Kenosha County Hazard Mitigation Plan LPT in light of the updated hazard conditions and hazard mitigation goals documented in Chapters 3 and 4, respectively.

Identification of Alternative Mitigation Strategies

A drought is a prolonged period of unusually constant dry weather that persists long enough to cause deficiencies in water supply (surface or groundwater). When drought events do occur, they often impact a relatively large area. The effects of drought are often grouped as economic, environmental, and social. Over time droughts can severely affect crops, municipal water supplies, recreational resources, human health, and wildlife. If drought conditions extend over a number of years, the direct and indirect impacts can be significant.[119]

Ultimately, drought is about the sufficiency of water, and communities have always depended on water for their economic and physical survival. Stresses on the water resources of Kenosha County include a growing population, increased competition for available water, loss of groundwater recharge areas due to development, and the potential effects of a changing climate.

While it may not be possible to accurately predict specific areas where there is significant risk from extreme drought, droughts have the greatest impact on agricultural producers. Kenosha County has over 79,000 acres of farmland (as shown on Map 2.1). It should be noted that even droughts of limited duration can significantly reduce crop growth and yields, adversely affecting farm income. More substantial events can decimate croplands and result in total loss, negatively impacting individual producers and the local economy.

Although nothing can prevent a drought, measures can be taken to reduce the potential loss and impacts caused by droughts wherever they may occur in the County. In a review by the Kenosha County Hazard Mitigation Plan LPT as part of the updating process, the following measures to reduce vulnerability to drought events have been identified as viable for this update of the Kenosha County hazard mitigation plan. This section will present current programs, considerations, and mitigation measures that apply to drought hazards.

Current Programs

Federal Programs

Interagency/Collaborative Efforts

The National Oceanic and Atmospheric Administration's (NOAA) National Integrated Drought Information System (NIDIS) Act was signed into law in 2006. This law is a comprehensive interagency program that coordinates and integrates drought research by building upon existing federal, tribal, State, and local partnerships in support of creating a national drought early warning information system. In addition, the NIDIS website[120] serves as the primary drought portal and clearinghouse for drought related resources. The NIDIS website provides regional drought early warning systems (DEWS)[121], links to research and resources for drought planning and preparedness, recovery, education, news about drought, regional webinars and upcoming drought-related events. In addition, the website has a number of maps, tools, social media updates, and data related to drought at both the national and regional scale.

The National Drought Resilience Partnership (NDRP)

NDRP is a federal partnership comprised of the U.S. Department of Agriculture (USDA), the U.S. Department of Energy (U.S. DOE), the U.S. Department of the Interior (U.S. DOI); and federal sub-agencies including NOAA, National Weather Service (NWS), NIDIS, U.S. Geological Survey (USGS), National Aeronautics and

[119] *FEMA,* Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards*, January 2013.*

[120] *The NIDIS website can be found at www.drought.gov.*

[121] *The Drought Early Warning System (DEWS) utilizes new and existing networks of federal, tribal, State, local, and academic partners to make climate and drought science accessible and useful for decision makers. It also aims to improve the capacity of stakeholders to monitor, forecast, plan for, and cope with the impacts of drought.*

Space Administration (NASA), the Assistant Secretary of the Army for Civil Works, FEMA, and the U.S Environmental Protection Agency (EPA). The NDRP leverages technical and financial Federal resources, strengthens communication, and supports State, tribal, and local efforts to build, protect, and sustain long-term drought resilience capacity at regional and basin-level scales. The NDRP responsibilities include:

- Strengthening coordination of federal drought policies and programs in support of State, tribal, and community efforts
- Serving as a single federal point of contact on drought resilience
- Leveraging the work of existing federal investments such as the NIDIS, the development of a National Soil Moisture Network, and the Bureau of Reclamation-Natural Resource Conservation Service partnership to improve agricultural water use efficiencies
- Linking information such as monitoring, forecasts, outlooks, and early warnings with long-term drought resilience strategies in critical sectors such as agriculture, municipal water systems, energy, recreation, and manufacturing

University of Nebraska-Lincoln National Drought Mitigation Center

The National Drought Mitigation Center (NDMC), based at the University of Nebraska-Lincoln, helps people, organizations, and institutions build resilience to drought through monitoring and planning. The NDMC serves as the academic partner and web host of the U.S. Drought Monitor map. NDMC's capabilities include climatology, social science, and public engagement. NDMC's services are directed to State, Federal, regional, tribal, and local governments as well as individual ranchers and farmers involved in drought and water supply planning, mitigation, and policy making. NDMC's website offers abundant information on drought research, education, planning, and monitoring.

The U.S. Drought Monitor (USDM)

USDM produces a weekly map product that provides a general summary of current drought conditions. The USDM is a partnership between the NDMC, USDA, and NOAA. Multiple drought indicators are reviewed and synthesized for this weekly product including various indices, outlooks, field reports, and news accounts. In addition, numerous experts from agencies and offices across the country are consulted. The drought monitor map uses five drought classifications (D0, D1, D2, D3, and D4) that are described in Chapter 3 of this report.[122]

U.S. Geological Survey (USGS)

The USGS monitors, assesses, researches, and presents information on a wide range of water resource conditions including streamflow, groundwater, water quality, and water use and availability. Natural interactions of the hydrologic system, both in surface and groundwater, enables resource managers and policy-makers to better prepare for and respond to drought. The USGS National Water Information System (NWIS) is a comprehensive system that supports long-term storage of water data including surface water and ground water level information. The USGS website provides water quality and water level data through a number of interactive map programs, including USGS "Drought Watch", "Water Watch", and "Groundwater Watch." In addition, the website offers a number of additional drought-related resources and links available for public information and education.

USGS Groundwater and Streamflow Information Program: 2018

The USGS Groundwater and Streamflow Information Program (GWSIP) serves as the national source of impartial, timely, rigorous, and relevant data for short- and long-term water decisions by stakeholders across the United States. In 2018, the USGS began piloting the Nation's next-generation integrated water observing system that provides high-fidelity, real-time data on water quantity and quality.

[122] *www.droughtmonitor.unl.edu.*

The United States Department of Agriculture (USDA)

The USDA Farm Service Agency (USDA-FSA) provides information about conservation, commodity programs, crop insurance, and farm loans, along with State and county contacts. It also administers several programs which can provide emergency assistance to agricultural producers in the event of natural disasters such as drought. These programs include the Emergency Conservation Program, the Emergency Forest Restoration Program, the Emergency Loan Program, the Livestock Forage Disaster Program, the Noninsured Crop Disaster Assistance Program and the Tree Assistance Program. The FSA's electronic Hay and Grazing Net Ad Service (eHayNet) is an internet-based service allowing farmers and ranchers to share "Need Hay" and "Have Hay" ads online. Recently this service expanded its website to include the option to list a need for grazing acres or to list acres available for grazing.

The Natural Resources Conservation Service (NRCS) provides financial and technical assistance to farmers, ranchers, and other private landowners through its conservation programs. Conservation programs such as the Environmental Quality Incentives Program, Conservation Stewardship Program, Regional Conservation Partnership Program, Agricultural Conservation Easement Program, the Healthy Forests Reserve Program, and the Conservation Technical Assistance Program help alleviate the effects of drought through proper soil, land, and water best management practices.[123] Additionally, the NRCS website provides a number of informational and educational resources related to drought preparedness.

The National Oceanic and Atmospheric Administration (NOAA)

The National Weather Service (NWS), a federal sub-agency under NOAA, provides a number of informational and educational online resources related to drought and drought monitoring, including the NWS Climate Prediction Center, the National Climatic Data Center Drought Monitoring, and NOAA's experimental drought monitoring and early warning guidance tool known as Evaporative Demand Drought Index.[124]

Additional Federal Programs and Mitigation Resources

FEMA provides drought mitigation assistance through its Hazard Mitigation Grant Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC) pre-disaster mitigation program as well as drought-related informational and educational resources and links available on the FEMA website. NASA's Gravity Recovery and Climate Experiment (GRACE) satellite integrates groundwater and soil moisture storage observations with modeling to generate drought indicators based on cumulative distribution of wetness conditions.[125] In 2013, the American Planning Association (APA), in collaboration with NDMC and NIDIS, published a guide to help decision-makers, resource managers, public agencies, land owners, local officials, and policy-makers assist communities for drought preparedness and mitigation.[126]

State Programs

The Wisconsin Geological and Natural History Survey (WGNHS), in collaboration with USGS, and WDNR, provide interactive online maps of statewide monitoring wells that include groundwater elevation and conditions.

Farmers in the County that irrigate can also use the Wisconsin Irrigation Scheduling Program (WISP). This research-based computer program provided by the University of Wisconsin-Extension can assist growers in determining frequency and amounts of irrigation throughout the growing season. Irrigation scheduling provided by this program may be especially helpful during a drought.

The Farmer to Farmer Hay, Forage and Corn List sponsored by the University of Wisconsin-Extension puts Wisconsin farmers in touch with one another for the purpose of buying and/or selling corn and forage. The farmer-to-farmer list is free of charge to both buyers and sellers.

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[123] *Detailed information related to NRCS financial and technical assistance programs can be found at www.nrcs.usda.gov/wps/portal/nrcs/main/national/about.*

[124] *Evaporation Demand Drought Index (EDDI) can offer early warning of agricultural drought, hydrologic drought, and fire-weather risk by providing near-real-time information. EDDI can capture signals of water stress at weekly to monthly timescales, which makes it a strong tool for drought preparedness.*

[125] *Drought.gov.*

[126] *James C. Schwab, American Planning Association-Planning Advisory Service Report No. 574,* "Planning and Drought"*, October, 2013.*

The Wisconsin Department of Health Services has developed a drought tool kit to provide information to local governments, health departments, and citizens in Wisconsin about preparing for and responding to drought events.[127] Similarly, Ready Wisconsin Drought provides drought-related information and resources to assist individuals and communities prior to and during a drought.[128]

Chapter NR 852, "Water Conservation and Water Use Efficiency," of the *Wisconsin Administrative Code* establishes mandatory water conservation and efficiency measures for withdrawals in the Great Lakes Basin and water loss approvals throughout the State. The requirements set forth in this chapter apply to all people within the Great Lakes Basin applying for a diversion or a new or increased withdrawal averaging 0.1 million gallons per day (mgd) or more and all people within the State applying for withdrawals that will result in a water loss averaging more than 2 mgd. The chapter establishes three tiers of requirements based upon the size of the withdrawal and the amount of water not returned to the basin from which it is withdrawn as a result of a diversion or consumptive use. The chapter requires that people applying for a new or increased withdrawal, diversion, or water loss approval submit a water conservation plan meeting specific requirement with their application. In addition, written documentation must accompany the application showing that water conservation and efficiency measures (CEM) that do not require retrofitting have been implemented or completed. The specific CEMs required vary according to the water use sector and tier to which the application is assigned.

Local Programs

Programs within Kenosha County include those conducted by the Kenosha County DEM. The Kenosha County DEM has a number of brochures, booklets, and pamphlets available for the public on droughts and other general emergency management-related topics.

As described in Chapter 2, Kenosha County has developed a comprehensive emergency management plan that sets forth an all-hazards action plan. In addition, many of the local units of government have developed emergency operations plans and/or programs in accordance with the County plan and with additional procedures and actions to deal with a range of situations and events, including instances of drought.

Multi-Jurisdictional Considerations

Droughts and their related hazards can potentially impact all municipalities within the County, however, those communities that depend on groundwater as a source of water supply and agricultural areas experience the most severe impacts from drought events. Kenosha County, the local units of government, and relevant businesses and agricultural producers need to coordinate hazard mitigation activities through local government participation in countywide disaster planning and response mechanisms.

Evaluation of Alternatives and Identification of Priority Mitigation Measures

Drought can have economic, environmental, and social impacts. These events can impact agriculture by reducing crop yields or destroying crops. Drought can also reduce local water supplies. Mitigation of the potential impacts of drought should be addressed through a multi-faceted approach. Important elements of such an approach include developing plans for responding to drought conditions for local communities and utilities; protecting local water supply sources; water conservation efforts, both in municipal and agricultural settings; and encouraging agricultural producers to take advantage of Federal crop insurance programs.

Based upon the foregoing evaluation and consideration of risk and consideration by the Kenosha County Hazard Mitigation LPT (see Appendix A), there are 14 actions determined to be priority mitigation measures for this hazard mitigation plan update that are specifically related to drought events.[129] These priority mitigation measures, along with a general cost-benefit summary are presented in Table 5.10.

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[127] *Wisconsin Department of Health Services,* Wisconsin Drought Toolkit, *Publication P00884, revised May, 2019.*

[128] *Ready.gov/wisconsin.*

[129] *Priority mitigation measures that apply to multiple hazard types including drought events, are presented in the "Hazard Mitigation Plan Component for Multiple Hazard Types" section in this Chapter.*

Table 5.10
Cost-Benefit Analysis for Priority Measures Included in the Kenosha County Hazard Mitigation Plan: Drought Hazards

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Nonstructural												
Encourage the development and maintenance of drought emergency plans for local utilities and local communities including development of criteria for triggering drought-related actions; development of agreements for secondary water sources; and specification of water use regulations during drought conditions	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]
Encourage the development of local water conservation programs	--[e]	--[e]	X			X						City of Kenosha, Villages of Bristol, Paddock Lake, Pleasant Prairie, Salem Lakes, and Somers
Promote regional activities to protect groundwater recharge areas inside and outside of the County boundaries	--[g]	--[g]	X			X					X	Kenosha County and all local jurisdictions[d]
Identify areas with potential groundwater level problems and inspect wells in those areas for adequate depth and construction	--[f]	--[f]		X		X	X				X	Kenosha County and all local jurisdictions[d]
Allow and encourage the use of drought-resistant landscaping practices using native plantings	--[e]	--[e]	X			X	X				X	Kenosha County and all local jurisdictions[d]
Promote the use of green infrastructure and other stormwater management practices that facilitate aquifer recharge	--[c]	--[c]	X			X					X	Kenosha County and all local jurisdictions[d]
Support agricultural programs that promote soil health, preserve soil moisture, and help to minimize loss of crops and topsoil during drought conditions	--[c]	--[c]	X			X	X				X	Kenosha County and all local jurisdictions[d]

Table continued on next page.

Table 5.10 (Continued)

Mitigation Measures	Estimated Cost[a]		Costs of Implementation[b]			Benefits						Community/ Jurisdictions Affected
	Capital	Average Annual Operation and Maintenance	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities	Enhanced quality of life/social benefits	Increased Environmental and/or Recreational Benefits/Ecosystems	
Nonstructural (continued)												
Design and plan for water supply infrastructure systems that are not vulnerable to drought events	--[h]	--[h]		X		X	X			X		Kenosha County and all local jurisdictions[d]
Promote enrollment of agricultural producers into Federal crop insurance programs	--[f]	--[f]	X			X	X					Kenosha County and all local jurisdictions[d]
Structural												
Consider implementing the recommendations made in the regional water supply plan for additional water supply facilities and programs to meet forecast water use demands	--[c]	--[c]	X			X				X	X	Kenosha County and all local jurisdictions[d]
Continue operation and monitoring of stream gaging stations and groundwater monitoring wells by the WDNR, USGS, National Weather Service, and U.S. Army Corps of Engineers	--[c]	--[c]	X			X					X	Kenosha County
Public Information and Educational Programming												
Increase public education and awareness of the potential severity of drought events	--[c]	--[c]	X			X	X	X	X	X	X	Kenosha County and all local jurisdictions[d]
Promote and distribute emergency preparedness information related to drought	--[c]	--[c]	X			X				X	X	Kenosha County and all local jurisdictions[d]
Encourage farmers to report crop and/or livestock losses to appropriate officials including the Kenosha County Division of Emergency Management	--[c]	--[c]	X			X						Kenosha County and all local jurisdictions[d]

Table continued on next page.

Table 5.10 (Continued)

[a] *All costs expressed in 2021 dollars unless otherwise noted.*

[b] *Cost of implementation is allocated among three categories of low (less than $100,000 dollars), moderate (greater than $100,000 and less than $1,000,000), and high (greater than $1,000,000) costs, which are generally defined as:*

Low	Moderate	High
Educational and informational programming	Addition of new staff	Major construction
Ongoing enforcement of ordinances	Additional staff hours budgeted	New buildings (infrastructure)
Plan Development	Additional equipment	Capital programs
Continued coordination/mutual aid/interagency agreements	New ordinance development	
	New programs/task force	

[c] *Costs covered under ongoing activity.*

[d] *Jurisdictions include general purpose units of government—Cities, Towns, and Villages—and special purpose units of government such as School Districts, Sanitary and Utility Districts, and Agricultural Drainage Districts.*

[e] *Costs to be determined.*

[f] *Costs are site-specific.*

[g] *Costs to be determined based on amount of funding allocated for program.*

[h] *Costs are site-specific. Partially covered under ongoing programs.*

Source: Kenosha County Division of Emergency Management and SEWRPC

5.10 HAZARD RISK ANALYSIS AND PRIORITIZATION: 2022

The major hazards that have been identified as potentially affecting Kenosha County have been ranked by risk to assist in developing a mitigation plan. Additional description of hazards as well as the vulnerability assessment of Kenosha County to these hazards have been identified and summarized in Chapter 3 of this report. These priority rankings were based upon the number of incidences per year, number of mortalities, number of injuries, property damage, and crop damage inventories set forth in Chapter 3. Specifically, this prioritization is based upon protecting human life and health and protection from property and crop damage throughout the County. Therefore, the major indicators of hazard severity used to rank these hazards in Kenosha County are based upon the deaths and injuries versus economic losses as summarized in Tables 5.11 and 5.12, respectively.

As identified in the vulnerability assessment of hazards to Kenosha County in Chapter 3, the magnitude and consequent risk of a particular hazard is dependent upon a number of factors that include, but are not limited to, time (e.g., time of year for thunderstorm events or time in terms of how long an event may last such as drought), size or scale, frequency of occurrence, population size potentially impacted, and amount of urban growth or development potentially impacted. These factors do not indicate that rural areas are any more or less important than urban areas; however, it does indicate that the more urbanized areas have a greater chance of loss in terms of human death, injury, and property damage per hazard event. It is also important to note, as identified in Chapter 3, that many disaster events are compound in nature and not the result of a single event, such as flooding hazards during a severe thunderstorm event. Nonetheless, since the causes of disasters of the past will likely be the best predictor of future disasters, an attempt was made to normalize all of the hazard incidences to an annual average in order to understand the relative potential level of risk each hazard poses to Kenosha County on an annual basis (see Tables 5.11 and 5.12).

Ranking Severity of Hazards

Death and Injury

Using the data from the various sources summarized in the vulnerability assessment of Chapter 3, the priority hazards identified in Table 3.1 were ranked with respect to their severity in terms of the sum of the number of annual death and injuries they caused and then by frequency of occurrence of each type of hazard event as shown in Table 5.11.

Three of the seven identified hazards are associated with mortality and injury as shown in Table 5.11. These hazards include tornadoes, temperature extremes, and thunderstorms, high-wind, hail, and lightning events. The vulnerability and community impact assessment indicate that the entire County is at risk from these hazards and these events are highly unpredictable in terms of exactly where they may occur and how powerful they might be. It is important to mention that these numbers represent an *annual average* which is low. In addition, injuries and deaths are only analyzed if directly caused by the hazard event; therefore, any indirect injury or death caused by a hazard event are not included.

The remaining four hazards have not been recorded as causing mortality and injury in Kenosha County, based upon known data. These include the meteorological hazards of winter storms, drought, flooding, and coastal erosion. It is important to note that although flooding has not been recorded to cause mortality and injury, this hazard is associated with the greatest property damage costs to Kenosha County (see Table 5.12). This illustrates that there are significant differences in the ranking of hazards depending upon whether the ranks are derived by comparing hazards based on their impacts upon human life and injury or by comparing hazards based upon the damages to property and crops that result from hazard incidents (see Property Damage section below).

Property Damage

Another way to assess the vulnerability of Kenosha County to hazards is to examine the resultant property damage. Again, using the data from the various sources summarized in the vulnerability assessment of Chapter 3, hazards in Kenosha County were ranked with respect to their severity in terms of the annual sum of the property and crop damage caused and then by frequency of occurrence of each type of hazard event as shown in Table 5.12. Annual average estimates of property and/or crop damages were determined for five of the seven priority hazards. These hazards, in order of appearance based upon total annual property

Table 5.11
Priority Ranking of Hazards Affecting Kenosha County Based Upon Mortality and Injury

Order Based on Local Planning Team[a]	Hazards Identified in the Hazard Vulnerability Assessment Tool	Period of Record	Number of Incidents Per Year (average)	Number of Mortalities Per Year (average)[b]	Number of Injuries Per Year (average)	Sum of Average Mortality and Injury Incidences Per Year
17	Drought	2001-2021	0.8	0.0	0.0	0.0
2, 10	Flood (Stormwater Flooding and Riverine Flooding)	2001-2021	2.6	0.0	0.0	0.0
4	Lake Michigan Erosion[c]	2001-2021	--	--	--	--
7, 9	Temperature Extremes (Extreme Cold and Extreme Heat)	2001-2021	2.9	0.3	0.0	0.3
8, 11, 12, 13	Thunderstorms, Hail, Lightning, Strong Winds	2001-2021	10.1	0.1	0.3	0.4
1	Tornado	2001-2021	0.3	0.0	0.7	0.7
3, 5, 6	Winter Storms (Heavy Snow, Ice Storm, and Blizzard)	2001-2021	7.8	0.0	0.0	0.0

[a] *These numbers indicate the ranked order of the hazards assigned by the Kenosha County Hazard Mitigation Local Planning Team (LPT) through responses given in the Hazard and Vulnerability Assessment Tool (HVA). For more details see Hazard Identification section in Chapter 3 of this report. Similar hazardous events as listed in the HVA tool (see Table 3.1) are shown in italics—hence the multiple rankings given for hazardous events. Similar events listed in the HVA tool were combined into one hazardous event for this Hazard Mitigation Plan. For example, "heavy snow," "ice storm," and "blizzard" in the HVA tool were combined into "Winter Storms."*

[b] *Deaths that are reported in this table refer only to deaths that are directly caused by the hazard event, indirectly related deaths are not reported in this table. For example, a death caused by a car accident where fog or snow-covered roads were contributing factors are considered indirectly related deaths and are not reported in this table.*

[c] *No available data for Kenosha County.*

Source: National Climatic Data Center (NCDC), National Oceanic and Atmospheric Administration (NOAA), National Environmental Satellite, and Data and Information Service (NESDIS) and SEWRPC

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Table 5.12
Priority Ranking of Hazards Affecting Kenosha County Based Upon Crop and Property Damages

Order Based on Local Planning Team[a]	Hazards Identified in the Hazard Vulnerability Assessment Tool[b]	Period of Record	Number of Incidents Per Year (average)	Total Property Damage Per Year (dollars)[c]	Total Crop Damage Per Year (dollars)[c]	Sum of Property and Crop Damages Per Year (dollars)[c]	Priority Ranking Based on Analysis
17	Drought	2001-2021	0.8	0	177,496	177,496	7
2, 10	Flood (Stormwater Flooding and Riverine Flooding)	2001-2021	2.6	1,472,031	794,858	2,266,889	2
4	Lake Michigan Coastal Erosion[d]	2001-2021	--	--	--	--	5
7, 9	Temperature Extremes (Extreme Cold and Extreme Heat)	2001-2021	2.9	316	564	880	4
8, 11, 12, 13	Thunderstorms, Hail, Lightning, Strong Winds	2001-2021	10.1	843,752	191	843,943	3
1	Tornado	2001-2021	0.3	1,047,714	0	1,047,714	1
3, 5, 6	Winter Storms (Heavy Snow, Ice Storm, and Blizzard)	2001-2021	7.8	3,284	0	3,284	6

[a] *These numbers indicate the ranked order of the hazards assigned by the Kenosha County Hazard Mitigation Local Planning Team (LPT) through responses given in the Hazard and Vulnerability Assessment Tool (HVA). For more details see Table 3.1 and the Hazard Identification section in Chapter 3 of this report.*

[b] *Similar hazardous events listed in the HVA tool (see Table 3.1)—as shown in italics—were combined into one category of similar nature for this hazard mitigation Plan. For example, "heavy snow," "ice storm," and "blizzard" in the HVA tool was combined into the "Winter Storms" for this hazard mitigation plan.*

[c] *Dollar values were adjusted to year 2021 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.*

[d] *No available data for Kenosha County.*

Source: National Climatic Data Center (NCDC), National Oceanic and Atmospheric Administration (NOAA), and National Environmental Satellite, Data and Information Service (NESDIS), and the U.S. Department of Agriculture Risk Management Agency

damages, include flooding; tornadoes; thunderstorms, high winds, hail, and lightning; drought; winter storms; and extreme temperatures. Among these hazards profiled, flooding was identified as resulting in the greatest amount of damage to property and crops in Kenosha County. Because of the unpredictability of tornadoes, thunderstorm wind, hail, lightning, and non-thunderstorm high wind events, all buildings, infrastructure, and critical facilities within the County are considered at risk.

As summarized in the vulnerability and community impact assessment in Chapter 3, it is expected that for some years the County will experience more events than other years, but the average annual number is not expected to change over the five-year planning period of this Plan. In addition, future changes in climate and land use can adversely impact crop and property damage due to flooding events.

PLAN ADOPTION, IMPLEMENTATION, MAINTENANCE, AND REVISION 6

The hazard mitigation plan described in this report is designed to attain, to the maximum extent practicable, the goals and objectives set forth in Chapter 4 of this report. In a practical sense, however, the plan is not complete until the steps to convert the plan into action policies and programs have been specified. This chapter presents the plan implementation strategies envisioned and includes information on plan adoption, maintenance, and revision.

6.1 PLAN REFINEMENT, REVIEW, AND ADOPTION

As described in Chapter 1, Kenosha County initiated the hazard mitigation planning program in 2003. The plan update set forth in this report began in 2021 and was conducted pursuant to the mitigation planning requirements of 44 *Code of Federal Regulations*, Section 201.6(d) (44 CFR 201.6(d)), which call for local hazard mitigation plans to be reviewed; updated to reflect changes in development, progress in local mitigation efforts, and changes in priorities; and reapproved every five years for local jurisdictions to be able to receive hazard mitigation funding. In 2002, the Federal Emergency Management Agency (FEMA) published rules for hazard mitigation planning in response to the Disaster Mitigation Act of 2000. These rules address State and local mitigation planning and are important for the Kenosha County hazard mitigation program in the following manner:

- The Wisconsin Department of Military Affairs, Division of Emergency Management (WEM), is directly involved in a partnership role for all-hazard mitigation planning. That agency is responsible for preparing and periodically updating a State all-hazard mitigation plan, providing technical assistance and guidance for local all-hazard planning, and administering planning grant programs for FEMA.

- The rules outline State and local mitigation planning guidelines for accessing hazard mitigation grant funds. For disasters declared after November 1, 2004, local units of government must have a FEMA-approved mitigation plan to receive project grants from the Hazard Mitigation Grant Program (HMGP) and the Pre-Disaster Mitigation (PDM) program. This element is important because it requires local adoption of a hazard mitigation plan to remain eligible for grants from specific mitigation funds. Communities can formally adopt the County plan or create and adopt their own plan.

- The rules and related guidance provide more specificity and detail on the hazard mitigation plan content than did the previous rules. The Kenosha County hazard mitigation plan has been structured to meet the 2002 guidance.

This Kenosha County hazard mitigation plan was prepared under the guidance of the Kenosha County Hazard Mitigation Local Planning Team (LPT) comprised of representatives of all of the communities within the County, including elected and appointed officials and representatives of law enforcement agencies, fire departments, public health departments, and public works departments. In addition, representatives from educational institutions and nonprofit agencies were invited to participate. The LPT met three times during the plan preparation period to provide input on the types of hazards to be considered, the appropriate mitigation strategies, and to review and refine the draft report chapters to reflect the comments and recommendations of the LPT. The activities of the LPT are documented in Appendix A.

During the drafting of the plan, public informational meetings were held to review the plan with local officials, stakeholders, and citizens, following completion of the first three chapters and after completion of the plan in draft form. In addition, as draft chapters of the updated plan were completed, copies were placed in downloadable form on the website of the Southeastern Wisconsin Regional Planning Commission (SEWRPC) and a webpage was available on the SEWRPC website on which members of the public could ask questions and submit comments on the draft plan update.

Additionally, consideration of the input and needs of underserved and vulnerable populations was incorporated throughout the planning process. Public feedback on the draft plan was solicited online through the websites of both the Kenosha County Division of Emergency Management (DEM) and SEWRPC, and public participation was encouraged through social media posts. Physical copies of the draft plan were available to be printed on behalf of the public through the Kenosha County Division of Emergency Management. An opportunity for in-person public comment was provided at two public informational meetings, held in the evening to accommodate people who could not attend during normal business hours. Meeting notice was provided to local print, internet, and radio broadcast media contacts, and shared via social media. The public meeting notice and agenda was also shared at three separate County facilities, including the Kenosha County Center in Bristol and Aging and Disability Resource Center. The Local Planning Team included leaders from organizations who represent the needs of vulnerable populations, including, among others, the Salvation Army and the Shalom Center.

Following plan finalization, the plan was presented for consideration and adoption to the Kenosha County Board of Supervisors. Copies of the plan were also provided to each of the local units of government in the County by request, and incorporated municipalities were advised of the need for adoption by the local government to retain future eligibility for mitigation funding from the FEMA Hazard Mitigation Grant and the HMGP Planning Program administered by WEM. In addition, County and SEWRPC staff have been made available to meet with communities on an individual basis to review the plan and consider adoption and implementation steps. The Kenosha County Division of Emergency Management maintains a status report on plan adoption by the County and local government units.

6.2 PLAN IMPLEMENTATION STRATEGIES

An important first step in implementing the updated hazard mitigation plan for Kenosha County is its formal adoption by the County; the City of Kenosha; and the Villages of Bristol, Paddock Lake, Pleasant Prairie, Salem Lakes, Somers, and Twin Lakes. Upon formal adoption, the plan becomes an important guide to hazard mitigation and related management decisions for the County and participating local units of government. Such adoption serves to signify agreement with and official support of the plan recommendations and enables government officials and staff to begin integrating the plan recommendations into the other ongoing County and municipal programs, such as land use and public works development planning and programming.

Realization of the plan will require a long-term commitment to the objectives of the plan and a high degree of coordination and cooperation among County officials and staff and various County and community departments and other bodies, including the Hazard Mitigation Local Planning Team; intergovernmental task forces or other committees that may be created in the future to help address common hazard mitigation issues; other concerned units and agencies of government and their respective officials and staffs; area developers and lending institutions; businesses, industry, and institutions; and concerned private citizens in undertaking the substantial investments and series of actions needed to implement the plan. Close cooperation with WEM and FEMA is also essential.

A summary of the plan elements and selected implementation strategy information, including current status, general priority assignments, designated management agencies, and schedules is included in Table 6.1. It is recommended that the County and local units of government incorporate the analyses performed and mitigation strategies recommended into other local planning efforts, such as those related to stormwater management, stream and river protection, land and water conservation, and comprehensive planning, where appropriate.

Community Capability Assessment

After the preliminary draft of the updated hazard mitigation plan for Kenosha County was made available for review at www.sewrpc.org/hmp, the Kenosha County DEM asked individuals representing Kenosha County and each of its municipalities to complete an online Community Capability Assessment survey. The purpose of the survey was to better understand how each jurisdiction perceived their capability to implement the hazard mitigation strategies proposed in the plan and identify areas where increased support may improve the jurisdiction's ability reduce hazard risk. A copy of the survey is provided in Appendix E. Survey responses were received from nine of the County's twelve municipalities, as well as from three Kenosha County departments. The majority of respondents cited more Federal or State funding as the greatest need in improving their capability to implement the hazard mitigation strategies proposed in the plan.

Table 6.1
Summary of Mitigation Measures and Funding Sources

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Multi-Hazards					
Continue to enforce State building code regulations that aim to improve the ability of structures to withstand hazardous weather conditions	Implemented	High	Ongoing	Wisconsin Department of Safety and Professional Services, Municipal Building Inspector and/or Engineer	1, 4, 5, 7, 33, 36, 39, 41, 49, 73
Encourage the periodic review of and/or explore the need for new municipal and County development regulations, especially in known hazard areas.	Partially Implemented	Medium	Ongoing	SEWRPC, KCB, KCDEM, KCPDD	
Encourage local municipalities to participate in the National Weather Service's (NWS) StormReady program	Not Implemented	Low	As funding and opportunities become available	NWS, KCDEM	
Continue the integration of hazard mitigation planning into other local planning efforts (i.e., comprehensive and land use planning	Implemented	High	Ongoing	KCDEM, KCPDD, SEWRPC	
Create local funding opportunities and mechanisms for hazard mitigation	Partially Implemented	Low	As funding and opportunities become available	KCB, KCDEM	
Continue to update a list of potential funding sources associated with hazard mitigation planning	Implemented	Medium	Ongoing	SEWRPC, KCDEM	
Continue working with public health and human services departments, volunteer groups, NGOs, and American Red Cross	Implemented	High	Ongoing	American Red Cross, KCHD, KCSD, Municipal EMS, Fire, and Police Departments	
Continue coordinating emergency response and operation plans among governmental units and first responders	Implemented	High	Ongoing	FEMA, WEM, SEWRPC, KCDEM, KCPDD	
Encourage agricultural producers to purchase crop insurance and promote enrollment of agricultural producers into Federal crop insurance programs	Partially Implemented	Low	Ongoing	USDA-FSA, KCPDD	
Routinely inspect manufactured housing to ensure they are securely anchored (i.e., tie-downs)	Not Implemented	Medium	Ongoing	KCDEM, KCPW	
Pursue grant funding for the installation or upgrading of adequate safe rooms in existing manufactured home parks, campgrounds, and public parks and beaches based on community and landowner interest	Not Implemented	High	As funding and opportunities become available	WEM, WDNR, KCDEM, Municipal Planning and/or Community Development Commissions	

Table continued on next page.

Table 6.1 (Continued)

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Multi-Hazards (continued)					
Maintain, update, and upgrade public early warning systems and networks	Implemented	High	As needed	NOAA, KCDEM, KCSD	1, 4, 5, 7, 33, 36, 39, 41, 49, 73
Continue using, maintaining, and updating of the County's interoperability communication network systems	Implemented	High	As needed	KCDEM, KCSD, Municipal Fire and Police Departments	
Bury and protect power and utility lines, where feasible and appropriate, to prevent damage from hazardous weather conditions	Partially Implemented	Medium	Ongoing	We Energies, KCDEM, Municipal Public Works and/or Utility Departments	
Promote emergency on-site back-up power generation at critical facilities, including water treatment and wastewater treatment facilities	Partially Implemented	High	Ongoing	KCDEM, Municipal Water Supply and Wastewater Utilities	
Trim and maintain the health of trees near vulnerable infrastructure	Partially Implemented	Low	As funding and opportunities become available	WDNR, UW-Extension, KCDPD	
Continue to promote, update, and add to Kenosha County Division of Emergency Management's online resources related to hazardous weather events, preparedness, and post-event management	Implemented	Medium	Ongoing	KCDEM	
Continue participating in public outreach events that educate County residents on planning and preparing for severe weather events	Implemented	Low	Ongoing	KCDEM	
Encourage residents to develop a Family Emergency Preparedness Plan and Disaster Supply Kit (see Appendix E)	Implemented	Medium	Ongoing	FEMA, WEM, KCDEM, KCPDD	
Promote inclusion of safety strategies for severe weather events into driver educational classes and materials	Partially Implemented	Low	Ongoing	KCDEM, WisDOT	
Encourage and educate the public on the use of severe weather warning applications (apps) on electronic mobile devices (i.e., FEMA's *ready.gov* severe weather warning cellular phone app)	Implemented	Low	Ongoing	FEMA, NOAA, NWS, KCDEM, City and Village Boards	
Continue distributing and promoting information and educational resources and programs on available home insurance, flood insurance (i.e., NFIP), severe weather insurance, and crop insurance for damages sustained during a natural hazard event	Implemented	High	Ongoing	FEMA, KCDEM, KCPDD	

Table continued on next page.

Table 6.1 (Continued)

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Multi-Hazards (continued)					
Ensure emergency preparedness and educational outreach is accessible to all residents, especially those considered vulnerable, to help protect them from severe weather hazards	Implemented	High	Ongoing	FEMA, KCDEM, KCPDD	1, 4, 5, 7, 33, 36, 39, 41, 49, 73
Continue to utilize social media to conduct outreach and to inform the public on severe weather hazards	Partially Implemented	Medium	Ongoing	KCDEM, City and Village Boards	
Promote and distribute information related to maintaining healthy trees on private lands	Partially Implemented	Low	As funding and opportunities become available	WDNR, UW-Extension, KCDPD	
Flooding and Associated Stormwater Drainage Problems					
Floodplain and Environmentally Sensitive Land Preservation Element					
Maintain floodplain and wetland zoning regulations	Implemented	High	Ongoing	WDNR, KCPDD, Municipal Engineering, Planning, and/or Zoning Departments	1, 2, 3, 4, 5, 13, 15, 17, 21, 23, 24, 26, 27, 28, 29, 32, 34, 35, 36, 37, 39, 44, 45, 46, 51, 52, 54, 55, 56, 57, 58, 59, 60, 61, 62, 65, 74
Continued preservation and maintenance of environmentally sensitive lands and open space areas	Partially Implemented	High	As funding and opportunities become available	WCMP, WDNR, KRLT, KCPDD, Municipal- Council/Board; Parks, Open Space, and/or Recreational Departments; and Planning Departments	
Continue wetland restoration to reduce flood-related agricultural and property damage	Not Implemented	Medium	As funding and opportunities become available	USFWS, NRCS, WDNR, KRLT, KCPDD, Municipal Engineering, Planning, and/or Zoning Departments	
Floodplain Management Plan Element					
Adopt updated comprehensive watershed and watershed mitigation plans and support implementation of floodplain management recommendations	Not Implemented	High	Ongoing	KCB, KCPDD, Municipal- Council/Board; Engineering, Planning, and/or Zoning Departments	1, 2, 3, 5, 14, 15, 17, 18, 19, 20, 21, 29, 36, 37, 38, 39, 40
Remove up to 32 repetitive loss structures	Not Implemented	High	As funding and opportunities become available	FEMA, WEM, KCDEM, KCPDD, Property Owners, Municipal- Council/Board; Engineering, Planning, and/or Zoning Departments	

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Table 6.1 (Continued)

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Flooding and Associated Stormwater Drainage Problems (continued)					
Floodplain Management Plan Element (continued)					
Floodproofing of 16 structures identified as potentially located in flood hazard area	Not Implemented	Medium	Implement after updating floodplain maps and surveys of structures	FEMA, WEM, KCDEM, KCPDD, Property Owners, Municipal-Council/Board; Engineering, Planning, and/or Zoning Departments	1, 2, 3, 5, 14, 15, 17, 18, 19, 20, 21, 29, 36, 37, 38, 39, 40
Acquisition and removal/demolition of up to 270 structures identified as being potentially located in flood hazard area.	Not Implemented	Medium	Implement after updating floodplain maps and surveys of structures	FEMA, WEM, KCDEM, KCPDD, Property Owners, Municipal-Council/Board; Engineering, Planning, and/or Zoning Departments	
Removal of up to 29 manufactured homes identified as being potentially located in the flood hazard area.	Not Implemented	Medium	Implement after updating floodplain maps and surveys of structures	FEMA, WEM, KCDEM, KCPDD, Property Owners, Municipal-Council/Board; Engineering, Planning, and/or Zoning Departments	
Consider elevating roads above the base flood elevation to maintain dry access. In areas where flood waters tend to wash roads out, construction, reconstruction, or repair can include stabilization or armoring of vulnerable shoulders or embankments, in addition to improving drainage	Not Implemented	High	As needed and ongoing	WEM, KCDEM, KCPW, Municipal-Council/Board; Engineering, Planning, and/or Zoning Departments	
Consider floodproofing and/or relocating critical facilities located within flood-prone areas	Not Implemented	Medium	As needed	WEM, KCDEM, KCPW, Municipal-Council/Board; Engineering, Planning, and/or Zoning Departments	
Continue participation in FEMA's National Flood Insurance Program and floodplain map updating	Partially Implemented	High	Ongoing	FEMA, WDNR, SEWRPC, KCPDD, all municipalities	
Continue County participation in the Community Rating System (CRS) program	Not Implemented	Medium	Ongoing	FEMA, WDNR, SEWRPC, KCPDD	
Lending institution and real estate agent policies should continue their practice of determining the flood prone status of properties before mortgage transactions are complete	Partially Implemented	High	Ongoing	Lending Institutions, Real Estate Brokers	
Enforcement of floodplain regulations	Partially Implemented	High	Ongoing	KCPDD, all municipalities	

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Table 6.1 (Continued)

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Flooding and Associated Stormwater Drainage Problems (continued)					
Floodplain Management Plan Element (continued)					
Develop ice jam mitigation measures	Not Implemented	Medium	Ongoing	WEM, KCDEM, KCPW, Municipal-Council/Board; Engineering, Planning, and/or Zoning Departments	1, 2, 3, 5, 14, 15, 17, 18, 19, 20, 21, 29, 36, 37, 38, 39, 40
Installation of new and maintenance of existing USGS stream gages	Implemented	High	Ongoing	USGS, WDNR, SEWRPC, KCPDD	
Documentation of extent of future floods	Not Implemented	High	As future flooding occurs	KCPDD	
Stream channel maintenance	Partially Implemented	Medium	Ongoing as funding and opportunities become available	WDNR, KCPDD, Municipal Public Works Departments	
Dam Failure Sub-Element					
Regular inspection and maintenance of dams	Partially Implemented	High	At a minimum, as required by WDNR[b]	WDNR, Municipal Public Works Department, KCPW, Private and Public Dam Owners	36, 37, 60, 74
Dam emergency action plans	Partially Implemented	High	Ongoing	WDNR, KCDEM, Private and Public Dam Owners	
Dam failure analysis	Partially Implemented	High	Ongoing	WDNR, KCDEM, Private and Public Dam Owners	
Investigate interest in abandonment and removal of high hazard potential dams	Not Implemented	Medium	As dam failure analyses are completed	WDNR, Private Owners	
Stormwater Management Plan Element					
Development and/or continued maintenance of stormwater management plans/programs	Partially Implemented	High	Ongoing	KCPDD, Municipal Public Works Departments	5, 20, 29, 55, 62, 63, 64
Continuation of stormwater-related regulations	Partially Implemented	High	Ongoing	KCPDD, WDNR, Municipal Public Works Departments	
Continuous implementation of stormwater management facilities maintenance activities	Partially Implemented	High	Ongoing	KCPDD, WDNR, Municipal Public Works Departments	
Implementation and integration of green infrastructure and low impact design	Partially Implemented	Medium	As funding and opportunities become available	FEMA, WDNR, KCPDD, Municipal-Board/Council, Planning Commission, Public Works Departments	
Public Informational and Educational Element					
Continue and enhance public education activities related to flood and stormwater management	Partially Implemented	High	Ongoing	UW-Extension, KCPDD, KCDEM, WDNR, Municipal Public Works Departments	5, 41, 55, 62
Promote and distribute information related to Federal Flood Insurance Program	Partially Implemented	Medium	Ongoing	FEMA, KCDEM, KCPDD, Municipal Planning Commissions	

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Table 6.1 (Continued)

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Flooding and Associated Stormwater Drainage Problems (continued)					
Public Informational and Educational Element (continued)					
Enhance public participation activities and coordination with other agencies and units of government	Partially Implemented	High	Ongoing	UW-Extension, WDNR, KCDEM, KCPDD	5, 41, 55, 62
Thunderstorm Wind, Non-Thunderstorm High-Wind, Hail, and Lightning					
Continue to maintain and regularly update local fire department equipment to help detect or mitigate lightning-related fires, such as thermal imaging devices	Implemented	Medium	As needed	Municipal Fire Departments	1, 5, 9, 15, 33, 36, 41, 73
Enforce existing local ordinances requiring adequate electrical grounding in newly constructed buildings	Implemented	High	As needed	Wisconsin Department of Safety and Professional Services, Municipal Building Inspector and/or Engineer	
Encourage agricultural producers to purchase crop insurance	Implemented	Low	Ongoing	UW-Extension, KCDEM, SEWRPC, KCPDD	
Promote planting windbreaks for farm crops	Implemented	Low	Ongoing	UW-Extension, KCDEM, SEWRPC, KCPDD	
Install lightning grade surge protection devices for critical electronic components used by government, public service, and public safety facilities	Partially Implemented	High	As needed	KCDEM, Municipal Council/Boards	
Increase public education and awareness of the potential severity of thunderstorm related hazards and non-thunderstorm high-wind hazards and distribute emergency preparedness information related to thunderstorm hazards	Partially Implemented	Low	Ongoing	UW-Extension, KCDEM	
Provide information and encourage the use of fire-resistant materials and surge protectors on critical electronic equipment	Partially Implemented	Low	Ongoing	We Energies, KCDEM	
Tornadoes					
Encourage the development of a local tornado spotter network	Not Implemented	Medium	As funding and opportunities become available	KCDEM	1, 5, 36, 41, 73
Establish safe and appropriate locations for temporary debris disposal sites	Not Implemented	Low	Ongoing	KCDEM, City and Village Boards	
Conduct an inventory and inspection of facilities to ensure the quality, quantity, and accessibility of adequate tornado shelters	Not Implemented	Medium	As funding and opportunities become available	KCDEM, Municipal Council/Boards, Engineering, Planning, Community Development, and/or Zoning Departments	

Table continued on next page.

Table 6.1 (Continued)

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Tornadoes (continued)					
Encourage provision of safe rooms, especially in structures that do not have a basement	Not Implemented	Medium	Ongoing	KCDEM, KCPDD	1, 5, 36, 41, 73
Require construction regulations for safe rooms in new schools, daycares, and nursing homes, and encourage the establishment of safe rooms for existing structures that do not have basements	Not Implemented	High	As funding and opportunities become available	KCDEM, Municipal Council/Boards	
Provide model manufactured home park regulations to municipalities for their consideration which requires that community safe rooms (storm shelters) be provided for residents of new and expanding parks. Based on community and landowners interest, pursue grant funding for installation of community safe rooms in existing manufactured home parks.	Not Implemented	High	As funding and opportunities become available	KCDEM, KCPDD, SEWRPC	
Ensure that maintenance, monitoring, and usage policies/procedures of the County's public outdoor warning systems are up-to-date and reflect the needs of fire and police personnel	Implemented	High	Ongoing	KCDEM, KCSD, Municipal Fire and Police Departments	
Work to locally adopt and implement the Wisconsin Outdoor Warning Siren Best Practices	Partially Implemented	High	Ongoing	KCDEM, KCSD	
Work with municipalities and businesses to explore installation or upgrading of community safe rooms and hardening projects for public buildings, community facilities, major industrial and manufacturing sites, large businesses, manufactured home parks, campgrounds, and fairgrounds to ensure adequate shelter from tornadoes	Partially Implemented	Medium	As needed	KCDEM, Municipal Council/Boards, Engineering, Planning, Community Development, and/or Zoning Departments	
Increase public education and awareness of the potential severity of tornadoes and continue to produce and distribute emergency preparedness information related to tornado events	Implemented	Medium	Ongoing	UW-Extension, KCDEM	

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Table 6.1 (Continued)

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Tornadoes (continued)					
Distribute, and make readily available, information on where to go during severe weather events for campground, park, and beach visitors	Not Implemented	Low	As funding and opportunities become available	WDNR, KCDEM, KCPDD	1, 5, 36, 41, 73
Produce and distribute information related to what steps should be taken by the public when they hear tornado sirens	Not Implemented	Low	As funding and opportunities become available	WDNR, KCDEM, KCPDD	
Extreme Temperatures					
Organize neighborhood outreach groups who look after vulnerable populations and promote the availability of shelters during extreme heat and cold	Partially Implemented	High	Ongoing	KCDEM, KCHD	36, 41, 49, 68
Provide special arrangements for payment of heating and cooling bills for customers unable to pay due to financial constraints	Implemented	Medium	As needed	KCHS, KCHD	
Designate sites in the County to be used as public cooling/heating shelters during extreme temperature events and promote transportation options to assist members of vulnerable populations to reach these sites during extreme temperature events	Implemented	High	Ongoing	American Red Cross, KCHD, KCDEM	
Reschedule public events to avoid large outdoor gatherings during periods of extreme heat or cold	Implemented	High	As needed	KCHD, KCB, KCDEM, Municipal Council/Boards	
Extend public swimming pools hours during extreme heat events	Implemented	Low	As needed	KCHD, KCB, KCP, KCDEM, Municipal Council/Boards	
Establish and promote a donation program of functional window air conditioner units and fans that are no longer in use and distribute these items to vulnerable populations	Not Implemented	Medium	As needed	KCHD, KCB, KCDEM, Municipal Council/Boards	
Promote and expand winter weather clothing drives (coats, hats, mittens) where people can drop off gently used winter clothing for distribution to vulnerable populations	Not Implemented	Medium	As needed	KCHD, KCB, KCDEM, Municipal Council/Boards	
Maintain and update warming and cooling public shelter sites in Kenosha	Implemented	Medium	As needed	KCHD	
Promote measures to reduce heat island effects in urban areas including increasing green space in urban areas	Not Implemented	Low	As needed and as funding and opportunities become available	KCP, KCDPD, Municipal Planning Commissions, and Parks and Recreational Departments	

Table continued on next page.

Table 6.1 (Continued)

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Extreme Temperatures (continued)					
Increase public education and awareness of the potential severity of temperature extreme events and distribute emergency preparedness information related to extreme temperature events	Implemented	Medium	Ongoing	UW-Extension, KCHD, KCDEM	36, 41, 49, 68
Promote awareness of public warming and cooling shelters that are available during extreme temperature events through municipal and County websites	Partially Implemented	High	Ongoing	American Red Cross, KCHD, KCDEM	
Produce and distribute emergency preparedness information related to the safe operation of generators, space heaters, fireplaces, and wood stoves	Implemented	High	Ongoing	KCDEM, KCHD, Ready Wisconsin	
Lake Michigan Coastal Hazards					
Continue to participate in FEMA's NFIP and RiskMAP floodplain mapping program for updated Lake Michigan coastal V and VE zones	Implemented	High	Ongoing	FEMA, KCPDD	1, 2, 3, 4, 14, 15, 20, 21, 41, 66, 67, 72, 74
Develop and enforce consistent county and municipal shoreland regulations and policies (i.e., ordinances) relating to setbacks along bluffs and ravines	Partially Implemented	High	Ongoing	WDNR, KCPDD, Municipal Plan Commissions	
Consider establishing a buyout program to acquire and remove structures in areas susceptible to impacts of Lake Michigan coastal hazards	Not Implemented	Low	Ongoing	KCB, KCPDD, Municipal Council/Boards	
Develop and encourage bluff top and face best management practices	Not Implemented	High	As needed and as funding becomes available	WDNR, WCMP, UW-Sea Grant, KCPDD	
Implement engineering studies that assess the variables influencing bluff stability and shoreline recession which determine the stable slope angle setback	Partially Implemented	High	As needed	WDNR, WCMP, KCPDD	
Consider relocating buildings within high-risk bluff failure areas	Not Implemented	High	Implement after surveys of structures are complete	USACE, FEMA, WEM, WDNR, KCDEM, KCPDD, Municipal Council/Boards, Engineering, and Plan Commissions	
Continue to enforce County coastal ravine setback regulations	Implemented	High	Ongoing	WDNR, KCPDD	

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Table 6.1 (Continued)

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Lake Michigan Coastal Hazards (continued)					
Conduct an assessment of the condition and effectiveness of all shoreline protection structures in the County	Partially Implemented	Medium	Assessment to be done every 10 years	WDNR, UW-Sea Grant, Municipal Council/Boards, Public Works and Engineering Departments, and Private Landowners	1, 2, 3, 4, 14, 15, 20, 21, 41, 66, 67, 72, 74
Ensure breakwater walls and piers within and around the Kenosha harbor are properly designed and constructed to withstand severe environmental conditions of Lake Michigan	Implemented	Medium	Ongoing	City of Kenosha Common Council and Public Works Department	
Construct and maintain shoreline protection structures and bluff stabilization measures where public infrastructure is at risk	Not Implemented	High	As needed and as funding becomes available	USACE, WDNR, KCDEM, Municipal Council/Boards and Engineering Departments, and Private Landowners	
Possible acquisition and demolition of up to seven structures identified as potentially being located in the low-lying shores of Lake Michigan's 1-percent-annual-probability floodplain	Not Implemented	High	Implement as funds become available, after floodplain maps have been updated and surveys of structures has been completed	USACE, FEMA, WEM, WDNR, KCDEM, KCPDD, Municipal Council/Boards, Engineering, and Planning Departments, and Property Owners	
Encourage the practice of non-structural or nature-based shoreline protection measures, such as living revetment or seawalls and artificial beach and beach nourishment	Not Implemented	Medium	As needed and as funding becomes available	WCMP, UW-Sea Grant, UW-Extension, KCPDD	
Work with WCMP to conduct public outreach and to provide technical assistance regarding BMPs to prevent shoreline erosion and bluff recession	Not Implemented	Medium	Ongoing	WCMP, UW-Sea Grant, UW-Extension, KCPDD	
Promote flood insurance to residents along the County's low-lying coast located in Lake Michigan's flood hazard area	Partially Implemented	High	Ongoing	FEMA, WEM, KCPDD, KCDEM	
Winter Storms					
Review the energy efficiency and winter readiness of critical facilities and housing in the community	Partially Implemented	High	Ongoing	KCDEM, KCHD	1, 5, 68
Continue to work with American Red Cross to establish a system for short-term sheltering of vulnerable populations	Implemented	High	Ongoing	American Red Cross, KCDEM, KCHD	
Pursue additional funding opportunities to assist with budgeting for overtime hours and extra governmental personnel needed during extreme winter events	Implemented	Medium	As needed	KCDEM, KCB, Municipal Council/Boards	

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Table 6.1 (Continued)

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Extreme Temperatures (continued)					
Increase public education and awareness of the potential severity of temperature extreme events and distribute emergency preparedness information related to extreme temperature events	Implemented	Medium	Ongoing	UW-Extension, KCHD, KCDEM	36, 41, 49, 68
Promote awareness of public warming and cooling shelters that are available during extreme temperature events through municipal and County websites	Partially Implemented	High	Ongoing	American Red Cross, KCHD, KCDEM	
Produce and distribute emergency preparedness information related to the safe operation of generators, space heaters, fireplaces, and wood stoves	Implemented	High	Ongoing	KCDEM, KCHD, Ready Wisconsin	
Lake Michigan Coastal Hazards					
Continue to participate in FEMA's NFIP and RiskMAP floodplain mapping program for updated Lake Michigan coastal V and VE zones	Implemented	High	Ongoing	FEMA, KCPDD	1, 2, 3, 4, 14, 15, 20, 21, 41, 66, 67, 72, 74
Develop and enforce consistent county and municipal shoreland regulations and policies (i.e., ordinances) relating to setbacks along bluffs and ravines	Partially Implemented	High	Ongoing	WDNR, KCPDD, Municipal Plan Commissions	
Consider establishing a buyout program to acquire and remove structures in areas susceptible to impacts of Lake Michigan coastal hazards	Not Implemented	Low	Ongoing	KCB, KCPDD, Municipal Council/Boards	
Develop and encourage bluff top and face best management practices	Not Implemented	High	As needed and as funding becomes available	WDNR, WCMP, UW-Sea Grant, KCPDD	
Implement engineering studies that assess the variables influencing bluff stability and shoreline recession which determine the stable slope angle setback	Partially Implemented	High	As needed	WDNR, WCMP, KCPDD	
Consider relocating buildings within high-risk bluff failure areas	Not Implemented	High	Implement after surveys of structures are complete	USACE, FEMA, WEM, WDNR, KCDEM, KCPDD, Municipal Council/Boards, Engineering, and Plan Commissions	
Continue to enforce County coastal ravine setback regulations	Implemented	High	Ongoing	WDNR, KCPDD	

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Table 6.1 (Continued)

Mitigation Measures	Status	Priority	Implementation Timetable	Designated Department, Management Agency, or Personnel	Potential Funding Programs (see Appendix F)
Drought (continued)					
Promote regional activities to protect groundwater recharge areas inside and outside of the County boundaries	Not Implemented	Low	As needed	KCPDD, SEWRPC	28, 32, 33, 45, 64, 73
Identify areas with potential groundwater level problems and inspect wells in those areas for adequate depth and construction	Partially implemented	High	Ongoing	USGS, WDNR, KCPDD, Property Owners	
Allow and encourage the use of drought-resistant landscaping practices using native plantings	Partially Implemented	Low	Ongoing	USDA, NRCS, UW-Extension, KCPDD, SEWRPC	
Promote the use of green infrastructure and other stormwater management practices that facilitate aquifer recharge	Partially Implemented	Medium	Ongoing	USDA, NRCS, UW-Extension, KCPDD, SEWRPC	
Support agricultural programs that promote soil health, preserve soil moisture, and help to minimize loss of crops and topsoil during drought conditions	Implemented	Medium	Ongoing	USDA, NRCS, UW-Extension, KCPDD	
Design and plan for water supply infrastructure systems that are not vulnerable to drought events	Not Implemented	Low	Ongoing	Municipal Water Supply Utilities and Planning Commissions	
Promote enrollment of agricultural producers into Federal crop insurance programs	Partially Implemented	Medium	Ongoing	USDA, NRCS, UW-Extension, KCPDD	
Consider implementing the recommendations made in the regional water supply plan for additional water supply facilities and programs to meet forecast water use demands	Not Implemented	Medium	Ongoing	KCDEM, KCPDD, Municipal Water Supply Utilities and Planning Commissions	
Continue operation and monitoring of stream gaging stations and groundwater monitoring wells by the WDNR, USGS, National Weather Service, and U.S. Army Corps of Engineers	Partially Implemented	Low	Ongoing	USACE, USGS, WDNR, KCPDD	
Increase public education and awareness of the potential severity of drought events	Not Implemented	High	Ongoing	USDA, NRCS, UW-Extension, KCPDD, KCDEM	
Promote and distribute emergency preparedness information related to drought	Not Implemented	High	Ongoing	USDA, NRCS, UW-Extension, KCPDD, KCDEM	
Encourage farmers to report crop and/or livestock losses to appropriate officials including the Kenosha County Division of Emergency Management	Not Implemented	High	Ongoing	USDA, NRCS, UW-Extension, KCPDD, KCDEM	

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Table 6.1 (Continued)

Note: The following abbreviations are used for designated management agencies or departments:

FEMA= Federal Emergency Management Agency
KCB = Kenosha County Board
KCDEM= Kenosha County Division of Emergency Management
KCHD= Kenosha County Health Department
KCHS= Kenosha County Human Services Department
KCPDD = Kenosha County Planning and Development Department
KCPW = Kenosha County Public Works Department
KCSD= Kenosha County Sheriff's Department
KRLT= Kenosha/Racine Land Trust
NOAA= National Oceanic and Atmospheric Administration
NRCS= Natural Resources Conservation Service
NWS= National Weather Service
PSC= Public Service Commission
SEWRPC= Southeastern Wisconsin Regional Planning Commission
USACE= U.S. Army Corps of Engineers
USDA-FSA= U.S. Department of Agriculture - Farm Service Agency
USFWS= U.S. Fish and Wildlife Service
USGS= U.S. Geological Survey
WCMP= Wisconsin Coastal Management Program
WDNR= Wisconsin Department of Natural Resources
WEM= Wisconsin Emergency Management
WisDOT= Wisconsin Department of Transportation

[a] *Land acquisition, demolition of structures, and removal of structures to be done on a willing buyer, willing seller basis.*

[b] *As required in Chapter 31, "Regulation of Dams and Bridges Affecting Navigable Waters," of the Wisconsin Statutes, high hazard dams are required to be inspected every two years; significant hazard dams are required to be inspected every three to four years; and low hazard dams are required to be inspected every 10 years. Owners and operators of dams should inspect their dams both on a regular basis and following high water events.*

Source: SEWRPC

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6.3 HAZARD MITIGATION FUNDING SOURCES

The ability of each participant in this hazard mitigation plan to implement the measures proposed is most often limited by their ability to finance the projects and dedicate sufficient staffing time toward implementing projects while still providing other essential services. Financing of the construction, operation, and maintenance of hazard mitigation measures may be accomplished through a number of means, including: establishing a stormwater utility; tax incremental financing (TIF) districts; local property taxes; reserve funds; general obligation bonds; private-developer contributions, including fees applied to construction of regional stormwater management facilities in lieu of providing onsite facilities; State grants or loans; and certain Federal and State programs.

Identifying potential funding sources, including sources other than solely local-level sources, is an integral part of implementing a successful mitigation plan and serves as one way for participants in this plan to expand on and improve their capability to mitigate the impacts of hazard events in their communities. Successfully pursuing and receiving grant funding takes a considerable amount of time and effort and the lack of available staff time to pursue funding opportunities is often a major barrier to successful plan implementation. Having sufficient staff time dedicated to pursuing grant funding opportunities represents a way to expand a community's capability to implement the hazard mitigation measures recommended in this plan, particularly with additional funding becoming available through the Bipartisan Infrastructure Law.[130]

The following description of some of the major funding sources includes those that appear to be applicable for hazard mitigation projects for the County and local units of government as of 2023. However, because funding programs and opportunities are constantly changing, the involved staff of County and local units of government will need to monitor the potential funding sources and programs. Some of the programs described in this chapter may not be available under all envisioned conditions in the County or to its residents and/or property owners for a variety of reasons, including, for example, eligibility requirements or lack of funds at a given time in Federal and/or State budgets. Nonetheless, the list of sources and programs set forth in this chapter should provide a starting point for identifying possible funding for implementing the hazard mitigation plan recommendations in this report (see also Appendix F).

U.S. Federal Emergency Management Agency (FEMA)

Several FEMA programs provide funding for flood and urban stormwater flooding mitigation activities. In the State of Wisconsin, these programs are administered through the Wisconsin Department of Military Affairs, Division of Emergency Management (WEM). These programs are described below.

Building Resilient Infrastructure and Communities

The Building Resilient Infrastructure and Communities (BRIC) is a new FEMA pre-disaster hazard mitigation program that replaced the Pre-Disaster Mitigation program. The BRIC program assists states, local communities, tribes, and territories participating in hazard mitigation projects that reduce the risks faced by disasters and natural hazards including capability- and capacity-building, encouraging and enabling innovation, promoting partnerships, enabling large projects, maintaining flexibility, and providing consistency. Projects eligible under BRIC must:

- Be cost-effective
- Reduce or eliminate risk and damage from future natural hazards
- Meet either of the two latest International Building Codes (i.e., 2015 or 2018)
- Align with the applicable hazard mitigation plan
- Meet all environmental and historic preservation (EHP) requirements

[130] *U.S. Public Law No. 117-58 (2021),* Infrastructure Investment and Jobs Act, *www.govinfo.gov/app/details/PLAW-117publ58.*

Eligible applicants include states, territories, and Tribal governments. These entities can submit applications on behalf of sub-applicants such as local units of government and state and tribal agencies. BRIC grants require a non-federal share of 25 percent of the project costs.

Hazard Mitigation Grant Program

The Hazard Mitigation Grant Program (HMGP) can provide up to 75 percent of the costs of certain natural hazard mitigation projects. In the case of flood mitigation, projects can include floodproofing, acquisition and relocation, or demolition of flood-prone properties, elevation of structures in compliance with NFIP standards, and other flood control measures, where identified as cost-effective. To be eligible for mitigation activities with FEMA funding, structures must be insured under the NFIP. The HMGP requires a non-federal match of 25 percent of project costs. In Wisconsin half of this match is provided by the WEM HMGP funds that become available only after a Presidential disaster declaration has been issued within the State. Applications must be submitted to WEM within 60 days of the declaration. Eligible projects must be included as part of the grantee's all-hazard mitigation plan and must meet cost-benefit criteria established by FEMA. HMGP funds can be used on private property for eligible projects. The HMGP gives priority to properties identified by FEMA as repetitive-loss properties.

Flood Mitigation Assistance Program

The Flood Mitigation Assistance (FMA) program can provide up to 75 percent of the costs attendant to acquiring, relocating, elevating, and floodproofing structures in compliance with NFIP standards. Properties included in a project sub-application for FMA funding must be NFIP-insured at the time of the application submittal and prior to the period of availability or application start date. Flood insurance must be maintained through completion of the mitigation activity and for the life of the structure. In addition to participating in the NFIP, eligible program applicants must meet cost-benefit criteria established by FEMA. Mitigating repetitive-loss properties is given a high priority under this program. Increased cost of compliance (ICC) coverage under the NFIP may provide a funding source for bringing noncompliant structures into compliance after a flood loss.

Public Assistance Program

FEMA's Public Assistance Program (PA) can provide some limited assistance with respect to structure elevation and relocation. For example, if entire portions of a community were to be relocated outside of a floodplain, this program can assist in rebuilding the necessary infrastructure in the new location. Funding under this program is provided for repairing infrastructure damaged during a flood that results in a Presidential disaster declaration. In making repairs to the infrastructure, cost-effective mitigation activities may be included. If a community determines that a badly damaged facility is not to be repaired, the estimated damage amount may be used to fund an alternate project. Funding provided under the PA may pay for cost-effective hazard mitigation measures for facilities damaged by the incident. In addition, funding from the PA may be combined with funding from the HMGP, FMA, and/or PDM programs to implement mitigation measures on the same facility; however, they cannot be combined to pay for the same work.

U.S. Army Corps of Engineers

The Army Corps of Engineers programs are potential sources of funding for implementing the floodplain management recommendations of this plan. In order to be eligible for funding, the plan components must meet specific Corps economic feasibility and other criteria. The programs that may be applicable include the following:

- Section 22—Water resources planning assistance (50 percent Federal, 50 percent local cost share)
- Section 103—Hurricane and Storm Damage Reduction Program. Maximum $5.0 million per project (65 percent Federal, 35 percent local cost share)
- Section 205—Flood damage reduction projects. Maximum Federal cost for planning, design, and construction is $10.0 million per project (65 percent Federal, 35 percent local cost share)
- Section 208—Clearing debris and sediment from channels for flood prevention. Maximum $500,000 per project (65 percent Federal, 35 percent local cost share)

- Section 14—Emergency streambank and shoreline protection. Maximum $1.5 million per project (65 percent Federal, 35 percent local cost share)

U.S. Department of Agriculture Farm Service Agency

The U.S. Department of Agricultural Farm Service Agency (USDA-FSA) oversees several voluntary conservation-related programs that provide direct and indirect hazard mitigation benefits. These programs work to address a large number of farming- and ranching-related issues including drinking water protection, reducing soil erosion, preserving wildlife habitat, preserving and restoring forest and wetlands, and aiding farmers whose farms have been damaged by natural disasters (also see Appendix E).

U.S. Department of Agriculture Natural Resources Conservation Service

The U.S. Department of Agricultural Natural Resources Conservation Service (USDA-NRCS) provides farmers and ranchers with financial and technical assistance to voluntarily install conservation measures to concurrently help the environment and agricultural operations. Many of these programs may serve as potential funding sources for flood mitigation efforts by the County and local communities (see Appendix E).

Wisconsin Department of Natural Resources

The Wisconsin Department of Natural Resources (WDNR) operates programs that may serve as potential funding sources for flood mitigation efforts by the County and local communities (see also Appendix E). One of these programs are described below.

Dam Removal Grant Program

The Dam Removal Grant Program provides reimbursement for 100 percent of eligible project costs up to a maximum of $50,000 for any owner who wishes to remove a dam. Eligible costs include labor, materials and equipment directly related to planning the actual removal, the dam removal itself and the restoration of the impoundment. Counties, cities, villages, towns, tribes, public inland lake protection and rehabilitation districts, and private dam owners may apply for grant funds through this program.

Other Potential Funding Sources

A variety of other potential funding sources exist which may provide funds for implementation of elements of the recommended hazard mitigation plan. These are listed in Appendix E.

6.4 PLAN MONITORING AND REEVALUATION STRATEGIES

For a hazard mitigation plan to be successful it must not only be implemented; it must be monitored. Plan monitoring is best accomplished through a formal, periodic process designed to measure and assess progress in implementation, changes in outside circumstances that may affect the plan and efforts to implement it, and changes to the plan or the implementation process. The plan should also be reviewed following each hazard event to assess its continued viability and the need for revisions.

Plan Monitoring

Review

Toward ensuring successful monitoring of the hazard mitigation plan, it is recommended that the Kenosha County All Hazards Mitigation Plan LPT meet periodically to review the plan and the status of its implementation with a view toward enhancing and improving response to natural hazard events. Plan review meetings will be held following any disasters that affect the County and at the discretion of the Director of the County Division of Emergency Management. These meetings will provide the opportunity to develop and recommend any necessary revisions of the plan to the Kenosha County Board of Supervisors, as well as to the local units of government involved. The revisions would be proposed, considered, and adopted in the form of formal amendments to the hazard mitigation plan. This review process will be coordinated and conducted by the County DEM, with input from, coordination with, and participation by all concerned County officials and staff, all units and agencies of government involved in plan implementation and concerned private parties. The LPT, in its review process, will periodically examine the plan and the efforts to implement it with respect to:

1. Whether any hazards affecting the County and local units of government have changed, and if so, how they have changed

2. Whether any hazard mitigation goals and objectives have changed, or need to be changed

3. The degree and extent of progress made in implementing previously identified hazard mitigation actions

4. Whether the plan elements and their priorities should remain unchanged or need modification

5. Whether any new plan elements are needed

6. Whether applicable funding programs and levels have changed

As an integral part of its review process, it is recommended that the County DEM, with review and guidance of the LPT, will periodically submit a written report to the Local Emergency Planning Committee and the County Board that sets forth the status of plan implementation efforts, details plan implementation actions taken since adoption of this plan update, prioritizes future mitigation goals and activities, and sets forth any recommended revisions to the plan. It is also recommended that the County DEM oversee the development and maintenance of a tracking and archiving system for all future detailed hazard mitigation studies undertaken by or for the County or the local units of government concerned. Such studies should be evaluated using policies established either by the LPT or the County Board.

The meetings of the LPT will continue to be publicly noticed and salient decisions recorded in County DEM files and, where appropriate, on the County website and in press releases, among others. Meetings of the LPT are considered public meetings under Wisconsin Law and are open to all interested parties. County DEM staff will also continue to organize community level events to increase public awareness, participation, and preparedness. The staff will ensure that appropriate notices, agendas, and other documentation are provided to interested people and LPT members in a timely manner. The venue and timing of these events shall be varied to ensure the widest possible participation and geographic spread across the County. Through these community level events, staff will gain an understanding of issues of concern, encourage public involvement, and maintain hazard awareness and preparedness at a high level. County DEM will be responsible on a day-to-day basis for creating and implementing a common monitoring system. This will require close cooperation and coordination with other units of government and agencies involved. This review will form part of the agendas for the aforementioned meetings of the LPT.

Post-Disaster Review

The plan monitoring and refinement strategy will include a post-disaster component whereby the plan is reviewed and evaluated after any future major hazard event. Based upon this review, the hazard mitigation plan will be updated or revised as needed based upon the experiences with, circumstances, and consequences of the hazard. In this regard, the post-disaster review effort will be coordinated with the emergency operations program administered by the County DEM in partnership with the local units of government. The experiences of emergency operations may indicate a need for refined mitigation actions that would then be incorporated into the plan. Any plan updating found to be needed will be incorporated into the periodic plan update noted above.

Reevaluation Strategy

As a condition of eligibility for receiving project grant funding from its mitigation grant programs, FEMA requires that hazard mitigation plans be reviewed, revised, and resubmitted for approval every five years. The updated plan should document changes that have occurred since the development of the plan, such as implementing recommended mitigation measures, changes in development, occurrences of hazard events, and changes in local priorities. In addition, it should update the risk analysis. This should include both determining whether the risks posed by specific hazards have changed and reevaluating the identified hazards to determine whether any changes need to be made in the set of hazards addressed by the plan. Finally, the updated plan should evaluate the relevance of the plan's goals, objectives, and recommended strategies and update them as appropriate.

To meet these requirements, it is recommended that the hazard mitigation plan be updated at a minimum of five-year intervals. Updating efforts should be led by the Director of the Kenosha County DEM in partnership with other appropriate County Departments. Reevaluation, updating, and revision of this plan should be initiated approximately 24 months prior to expiration of this plan. As part of the updating process, the Director will reconstitute the Hazard Mitigation LPT to oversee development of the updated plan. The team should include representatives of all of the municipalities that are covered under the plan. The meetings of the LPT will be publicly noticed. In addition, at appropriate times during the updating process, members of the public and adjacent communities will be provided with opportunities to review and submit questions and comment on the plan update. Plan updating will be conducted according to relevant guidance available from FEMA and WEM. Following completion of the updated plan in draft form, it will be submitted to WEM and FEMA for review and approval. Following approval by FEMA, the updated plan will need to be adopted by the Kenosha County Board and by the governing bodies of the incorporated municipalities in the County.

Incorporating Existing Planning Mechanisms

The Hazard Mitigation LPT will meet periodically to provide a mechanism for ensuring that the actions identified in the Plan are incorporated into ongoing County planning activities. Kenosha County currently utilizes comprehensive land use planning, land use regulations, neighborhood planning, and building codes to guide and control development in the County. These existing mechanisms will have hazard mitigation strategies integrated into them where applicable. In addition, the County will require that participating local municipalities address hazards in their comprehensive plans and land use regulations. Specifically, one of the goals in the Plan promotes the spatial distribution of land uses to minimize hazards and dangers to the health, welfare, and safety of County residents from natural and man-made hazards. The County Planning and Development Department will conduct periodic reviews of the County's comprehensive plan and land use policies, analyze any plan amendments, and provide technical assistance to other local municipalities in implementing these requirements.

APPENDICES

KENOSHA COUNTY HAZARD MITIGATION LOCAL PLANNING TEAM ROSTER, AGENDAS, AND MEETING SUMMARY NOTES AND INFORMATION ON PUBLIC MEETINGS

APPENDIX A

Figure A.1
Members of the Kenosha County Hazard Mitigation Local Planning Team

Sgt. Chris Hannah, Chair	Director, Kenosha County Division of Emergency Management
Lt. Horace Staples, Chair	Director (former), Kenosha County Division of Emergency Management
Chris Parisey, Secretary	Senior Planner, Southeastern Wisconsin Regional Planning Commission
Ben Andersen	Fire Chief, Village and Town of Somers
Ray Arbet	Director, Kenosha County Department of Public Works (retired)
James Beller	Captain, Kenosha Police Department
Benny Benedict	Director of Emergency Disaster Services, Salvation Army of Wisconsin
Jeff Berard	Director, Journey Disaster Response Team
Christopher Bigley	Fire Chief, Kenosha Fire Department
Shelly Billingsley	Director, Kenosha County Department of Public Works
Dr. Joseph Boxhorn	Principal Specialist, Southeastern Wisconsin Regional Planning Commission
Andy Buehler	Director, Kenosha County Department of Planning & Development
Richard Caravetta	Salvation Army
Brian Cater	Interim Director of Public Works, City of Kenosha
Thomas Cousino	Associate V.P. of Facilities and Security, Gateway Technical College
Tamarra Coleman	Director, Shalom Center
Susan Crane	Chairwoman, Town Brighton
Curt Czarnecki	General Manager, City of Kenosha Water Utility
Derek Ferguson	Director of Public Safety, Carthage College
Chase Forster	Kenosha County Sheriff's Department
Robert Grieshaber	Safety-Risk Manager, University of Wisconsin-Parkside
Adam Grosz	Police Chief, Village of Twin Lakes
Colin Hennessey	Rescue Assistant Chief, Town of Paris
Laura Herrick	Chief Environmental Engineer, Southeastern Wisconsin Regional Planning Commission
John Holloway	Chairman, Town of Paris
Mark Jenks	Conservationist, Kenosha County Department of Planning & Development
Randall Kerkman	Administrator, Village of Bristol
David Kopczynski	Director of Planning & Development, Village of Salem Lakes
Jim Lejcar	Fire Chief, Village of Salem Lakes
Ryan McNeely	Battalion Chief, Kenosha Fire Department
Mark Melotik	Director of Environmental Health, Kenosha County Health Department
John Niederer	Fire Chief, Village of Bristol
Nikki Payne	Public Involvement Manager, Southeastern Wisconsin Regional Planning Commission
Jason Peters	Administrator, Village and Town of Somers
Kevin Poirier	Assistant to the Administrator, Village and Town of Somers
James Poltrock	EMS Coordinator, Aurora Medical Center - Kenosha
Sharon Pomaville	Executive Director, Sharing Center, Inc.
Craig Roepke	Chief of Fire and Rescue, Village of Pleasant Prairie
Nathan Thiel	Administrator, Village of Pleasant Prairie
Daniel Tilton	Assistant Fire Chief, Kenosha Fire Department

Figure A.2
Agenda and Summary Notes for Local Planning Team Meeting: March 28, 2022

Kenosha County Division of Emergency Management
Southeastern Wisconsin Regional Planning Commission

Notice of Meeting and Agenda

KENOSHA COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM

DATE: Monday, March 28, 2022

TIME: 2:00 p.m. to 3:00 p.m.

PLACE: Kenosha County Public Safety Building
Emergency Operations Center
1000 - 55th Street
Kenosha, Wisconsin

AGENDA:

1. Welcome and introductions: Lt. Horace Staples, Kenosha County Director of Emergency Management
2. Overview of hazard mitigation plan updating process: Chris Parisey, SEWRPC Senior Planner
    a. Hazard mitigation goals as revised by the second plan update (Attachment 1)
3. Background on the third update to the Kenosha County Hazard Mitigation Plan: Chris Parisey
    a. Overview of first three editions of plan
    b. Main components to be reviewed and revised
    c. Schedule for the plan update (Attachment 2)
    d. Local Planning Team role
4. Hazard and vulnerability assessment exercise (Attachment 3): Chris Parisey
5. Adjourn

Chris Parisey
Secretary

Enclosures

CAPR-278 4TH ED MEETING AGENDA MAR 2022 (00261954).DOC
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Figure A.2 (Continued)

Attachment 1

HAZARD MITIGATION GOALS AND OBJECTIVES
FOR KENOSHA COUNTY HAZARD MITIGATION PLAN

The following goals were established for the initial Kenosha County hazard mitigation planning program,[1] based, in part, upon goals previously established in watershed, park and open space, and land use planning programs.

1. **Land Use:** A spatial distribution of the various land uses that minimizes hazards and dangers to health, welfare, and safety, as well as further enhancing the economic base of the County, and will result in a compatible arrangement of land uses properly related to the existing and proposed supporting transportation, utility, public safety systems, and public facility systems.

2. **Natural Resources:** A spatial distribution of the various land uses which maintains biodiversity and will result in the protection and wise use of the natural resources of the County, including its soils, inland lakes and streams, groundwater, wetlands, woodlands, wildlife, and natural areas and critical species habitats.

3. **Transportation:** An integrated transportation system that, through its location, capacity, and design, will safely, economically, and effectively serve the existing and proposed land use pattern and promote the implementation of the land use plan, meeting the current and anticipated travel demand and minimizing the potential for accidents and the associated toll on life and property damage.

4. **Fire, Police, and Emergency Medical Services:** The provision of facilities necessary to maintain a high quality of fire and police protection and emergency medical services throughout the County.

5. **Stormwater and Floodland Management:** The development of a stormwater and floodland management system that reduces the exposure of people to drainage- and flooding-related inconvenience and to health and safety hazards and that reduces the exposure of real and personal property to damage through inundation resulting from flooding and inadequate stormwater drainage.

6. **Lake Michigan Coastal Erosion:** The identification of high erosion risk Lake Michigan shoreline areas and the development of a coastal erosion control program that reduces the exposure of people and real and personal property to shoreline erosion and bluff recession.

7. **Unpredictable Hazards:** The identification and development of programs that complement County and local emergency operations plans to mitigate the potential exposure to health and safety and the exposure of real and personal property resulting from a broad range of hazards which are unpredictable and not geographically specific in nature.

8. **Communications:** Communications interoperability throughout the County amongst all First Responders, so as to be able to quickly and effectively respond to any incident to prevent the loss of life and to save property.

[1]SEWRPC Community Assistance Planning Report No. 278, *Kenosha County Hazard Mitigation Plan Update: 2017-2022 (3rd Edition)*, November 2017.

Figure A.2 (Continued)

Attachment 2

WORK SCHEDULE AND DIVISION OF RESPONSIBILITIES FOR UPDATING THE KENOSHA COUNTY HAZARD MITIGATION PLAN

Task	Estimated Completion Date	Responsible Agency
Update Local Planning Team Membership	January 31, 2022	Kenosha County and SEWRPC
Local Planning Team Kickoff Meeting	March 28, 2022	Kenosha County and SEWRPC
Initiate Public Participation and Outreach	March 31, 2022	SEWRPC and Kenosha County
Survey Management Agencies Regarding Status of current Plan Implementation	May 30, 2022	SEWRPC
Develop Updated Community Profile	October 31, 2022	SEWRPC
Review and Update Identification and Description of Hazards	November 30, 2022	SEWRPC
Update Risk and Vulnerability Assessments	December 31, 2022	SEWRPC
Local Planning Team Meeting	**January/February, 2023**	**SEWRPC and Kenosha County**
1st Public Meeting to Review Hazard Identification and Risk Assessment	**February 28, 2023**	**SEWRPC and Kenosha County**
Revise Draft Plan Based on Public Comment	March 31, 2023	SEWRPC
Review and Update Established Hazard Mitigation Goals and Objectives	April 30, 2023	SEWRPC
Develop Updated Mitigation Actions	May 15, 2023	SEWRPC
Develop Updated Plan Maintenance Process	May 31, 2023	SEWRPC
Local Planning Team Meeting	**March/June, 2023**	**SEWRPC and Kenosha County**
2nd Public Meeting to Review Draft Plan	**June 30, 2023**	**SEWRPC and Kenosha County**
Revise Draft Plan Based on Public Comment	July 15, 2023	SEWRPC
Submit Draft Plan Update to WEM for Review	July 31, 2023	SEWRPC on Behalf of Ken County
Revise Plan Based on State Review	November 30, 2023	SEWRPC
Submit to FEMA for Approval Pending Adoption	December 31, 2023	SEWRPC on Behalf of Ken County
Formal Adoption	April 30, 2024	Kenosha Co.
End of Performance Period	May 24, 2024	

Source: SEWRPC

Figure A.2 (Continued)

Attachment 3

HAZARD AND VULNERABILITY ASSESSMENT TOOL
KENOSHA COUNTY HAZARD MITIGATION PLAN UPDATE

EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)				RISK
		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS AND AGENCY IMPACT	PREPAREDNESS	
	Likelihood This Will Occur	*Possibility of Death or Injury*	*Physical Losses and Damages*	*Interruption of Services*	*Preplanning*	*Relative Threat**
SCORE	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = High 2 = Moderate 3 = Low or none*	*0 - 100%*
A1. Riverine flooding						**0%**
A2. Stormwater flooding						**0%**
A3. Lake flooding						**0%**
A4. Tornado						**0%**
A5. Earthquake						**0%**
A6. Thunderstorm						**0%**
A7. High straight-line wind						**0%**
A8. Lightning						**0%**
A9. Hail						**0%**
A10. Heavy snow storm						**0%**
A11. Blizzard						**0%**
A12. Ice storm						**0%**
A13. Extreme cold						**0%**
A14. Extreme heat						**0%**
A15. Drought						**0%**
A16. Fog						**0%**
A17. Dust storm						**0%**
A18. Lake Michigan Erosion						**0%**
G1. Wildfire						**0%**
H1. Dam failure						**0%**
H2. Landslide						**0%**
H3. Land subsidence						**0%**
Other Event (Write in)						**0%**
Other Event (Write in)						**0%**
AVERAGE SCORE	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0%**

**Threat increases with percentage.*
Source: Kaiser Permanente and SEWRPC.

RISK = PROBABILITY * SEVERITY
0.00 0.00 0.00

Shaded hazards are profiled in the current Kenosha County hazard mitigation plan.

Figure A.2 (Continued)

SUMMARY NOTES OF THE MARCH 28, 2022 MEETING OF THE KENOSHA COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM

INTRODUCTION

The March 28, 2022 meeting of the Kenosha County Hazard Mitigation Plan Local Planning Team was convened at the Kenosha County Public Safety Building at 2:01 p.m. Online attendance was also available via Microsoft Teams. The meeting was called to order by Lieutenant Horace Staples, Director of the Kenosha County Division of Emergency Management. Attendance was taken by circulating a sign-in sheet.

In attendance at the meeting (either virtually or in-person) were the following individuals:

Local Planning Team Members

Lt. Horace Staples, Chair	Director, Kenosha County Division of Emergency Management
Chris Parisey, Secretary	Senior Planner, SEWRPC
Ben Andersen	Fire Chief, Village and Town of Somers
Ray Arbet	Director, Kenosha County Department of Public Works
James Beller	Captain, Kenosha Police Department
Christopher Bigley	Fire Chief, Kenosha Fire Department
Shelly Billingsley	Director of Public Works, City of Kenosha
Dr. Joseph Boxhorn	Principal Planner, SEWRPC
Andy Buehler	Director, Kenosha County Department of Planning and Development
Thomas Cousino	Associate V.P. of Facilities and Security, Gateway Technical College
Susan Crane	Chairwoman, Town of Brighton
Curt Czarnecki	General Manager, City of Kenosha Water Utility
Derek Ferguson	Director of Public Safety, Carthage College
Chase Forster	Kenosha County Sheriff's Department
Robert Grieshaber	Safety- Risk Manager, University of Wisconsin-Parkside
Adam Grosz	Police Chief, Village of Twin Lakes
Sgt. Chris Hannah	Deputy Director, Kenosha County Division of Emergency Management
Colin Hennessey	Rescue Assistant Chief, Town of Paris
Laura Herrick	Chief Environmental Engineer, SEWRPC
John Holloway	Chairman, Town of Paris
Mark Jenks	Conservationist, Kenosha County Planning and Development
Randall Kerkman	Administrator, Village of Bristol
David Kopczynski	Director of Planning and Development, Village of Salem Lakes
Jim Lejcar	Fire Chief, Village of Salem Lakes
Ryan McNeely	Battalion Chief, Kenosha Fire Department
Mark Melotik	Director of Environmental Health, Kenosha County Dept. of Health
John Niederer	Fire Chief, Village of Bristol
Jason Peters	Administrator, Village and Town of Somers
Craig Roepke	Chief of Fire and Rescue, Village of Pleasant Prairie
Nathan Thiel	Administrator, Village of Pleasant Prairie
Daniel Tilton	Assistant Fire Chief, Kenosha Fire Department

Figure A.2 (Continued)

In addition, the following attendees (non-Planning Team members) were present (either virtually or in-person):

Tamarra Coleman	Director, Shalom Center
Sharon Pomaville	Executive Director, Sharing Center, Inc.
Alyssa Werfelmann	Administrative Secretary, Kenosha County Division of Emergency Mgt

Lt. Staples welcomed all attendees to the meeting and thanked them for their participation. He noted that the Kenosha County hazard mitigation plan is required to be updated every five years, and that this would be the third update to the original plan. At the request of Lt. Staples, the team members introduced themselves.

OVERVIEW OF HAZARD MITIGATION AND HAZARD MITIGATION PLAN UPDATING PROCESS

Lt. Staples introduced Chris Parisey, Senior Planner, Southeastern Wisconsin Regional Planning Commission (SEWRPC). Mr. Parisey presented an overview of hazard mitigation and the hazard mitigation plan updating process.

[Secretary's Note: A copy of the work schedule for the Hazard Mitigation Plan Update is attached herein as Exhibit A.]

BACKGROUND ON THE CURRENT EDITION OF THE KENOSHA COUNTY HAZARD MITIGATION PLAN AND DEVELOPMENT OF THE PLAN UPDATE

Mr. Parisey presented a brief background on SEWRPC and its role in hazard mitigation planning. He then discussed the previous (2017) update of Kenosha County's hazard mitigation plan.

After discussion of the current edition of the County's plan, Mr. Parisey presented the main components that are developed as part of SEWRPC's hazard mitigation planning format. He also presented a tentative schedule for the current plan updating process. In addition, Mr. Parisey explained the main functions of the Local Planning Team in the plan development process. Mr. Parisey noted, and Ms. Herrick emphasized, that since FEMA is primarily interested in funding mitigation efforts for natural hazards, this plan update will be for natural weather-related hazards only and other types of hazards will not be included.

[Secretary's Note: A copy of the presentation can be found on the SEWRPC website at: https://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm under "Kenosha County Hazard Mitigation Plan Update"]

HAZARD AND VULNERABILITY ASSESSMENT EXERCISE

Mr. Parisey stated that as part of the hazard and vulnerability analysis for the plan, it will be necessary to decide which hazards will be addressed by the plan. He indicated that a hazard and vulnerability assessment tool and instructions for completing the tool were included with the agenda for this meeting.

[Secretary's Note: A copy of the hazard and vulnerability assessment tool and the instructions for completing the tool are attached herein as Exhibit B.]

Mr. Parisey asked the members of the Local Planning Team to complete the hazard and vulnerability assessment tool. He explained that the results of this exercise would be used to help determine which

hazards are addressed by the hazard mitigation plan update. Mr. Parisey asked that completed surveys be submitted via email and that there is no deadline for submission.

Mr. Buehler asked whether the assessment tool should be completed utilizing their experience in their own communities or through their perception of the entire County. Mr. Parisey replied that their assessment should be applicable to the entire County, if possible, but people may fill out the survey based on the community they represent and record the name of the community on the worksheet.

GENERAL INFORMATION

Mr. Parisey stated that the first public hearing is tentatively scheduled for February 2023, during which the first three plan chapters will be reviewed. He added that the public hearings are typically held during the draft stage of the plan update so there is opportunity for comments or questions to be addressed. Lt. Staples stated that it does not matter where the public hearings are held, and the County will try to make them accessible to everyone in the County.

Lt. Staples stated that electronic and hard copies of the final plan update will be sent to all who participated in the update. Mr. Parisey stated that emails will be sent to Local Planning Team members periodically to provide updates, reminders, and pertinent information. Lt. Staples asked that if an elected, appointed, or public official would like to delegate planning team duties to other staff, that they please inform his office so they can be included in future communications.

ADJOURNMENT

There being no further business, the meeting was adjourned by unanimous consent at 2:41 p.m.

SUMMARY NOTES KEN CO HMP LPT MTG 3/28/22 (#263263-1).DOC
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Figure A.2 (Continued)

Exhibit A

WORK SCHEDULE AND DIVISION OF RESPONSIBILITIES FOR UPDATING THE KENOSHA COUNTY HAZARD MITIGATION PLAN

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Formal Adoption	April 30, 2024	Kenosha Co.
End of Performance Period	May 24, 2024	

Source: SEWRPC

Figure A.2 (Continued)

Exhibit B

HAZARD AND VULNERABILITY ASSESSMENT TOOL
KENOSHA COUNTY HAZARD MITIGATION PLAN UPDATE

EVENT	PROBABILITY	SEVERITY = (MAGNITUDE - MITIGATION)				RISK
		HUMAN IMPACT	PROPERTY IMPACT	BUSINESS AND AGENCY IMPACT	PREPAREDNESS	
	Likelihood This Will Occur	*Possibility of Death or Injury*	*Physical Losses and Damages*	*Interruption of Services*	*Preplanning*	*Relative Threat**
SCORE	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = Low 2 = Moderate 3 = High*	*0 = N/A 1 = High 2 = Moderate 3 = Low or none*	*0 - 100%*
A1. Riverine flooding						**0%**
A2. Stormwater flooding						**0%**
A3. Lake flooding						**0%**
A4. Tornado						**0%**
A5. Earthquake						**0%**
A6. Thunderstorm						**0%**
A7. High straight-line wind						**0%**
A8. Lightning						**0%**
A9. Hail						**0%**
A10. Heavy snow storm						**0%**
A11. Blizzard						**0%**
A12. Ice storm						**0%**
A13. Extreme cold						**0%**
A14. Extreme heat						**0%**
A15. Drought						**0%**
A16. Fog						**0%**
A17. Dust storm						**0%**
A18. Lake Michigan Erosion						**0%**
G1. Wildfire						**0%**
H1. Dam failure						**0%**
H2. Landslide						**0%**
H3. Land subsidence						**0%**
Other Event (Write in)						**0%**
Other Event (Write in)						**0%**
AVERAGE SCORE	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0%**

**Threat increases with percentage.*
Source: Kaiser Permanente and SEWRPC.

RISK = PROBABILITY * SEVERITY
0.00 0.00 0.00

Shaded hazards are profiled in the current Kenosha County hazard mitigation plan.

Figure A.2 (Continued)

INSTRUCTIONS FOR COMPLETING
HAZARD VULNERABILITY AND ASSESSMENT TOOL

The purpose of this Hazard Vulnerability and Assessment Tool is to evaluate the potential that specific hazards may occur, the likely severity of impacts resulting from these hazards, and the extent to which these impacts may be mitigated by current levels of preparedness. The tool uses estimates of probability of occurrence, likely severity of impacts, and level of preparedness to estimate the risk posed by each hazard.

Please address all of the potential threats that are listed. Instructions for completing entries in each column are given below.

Probability
For each of the listed hazards, please indicate the likelihood that it will occur, with 1 indicating a low probability of occurrence, 2 indicating a moderate probability of occurrence, and 3 indicating a high probability of occurrence. Issues to consider for probability include, but are not limited to:

- Known risk,
- Historical data and experience, and
- Local government or agency experience.

Human Impacts
For each of the listed hazards, please indicate what you consider to be the likely level of impacts to human life if the hazard occurs, with 1 indicating a low level of impacts, 2 indicating a moderate level of impacts, and 3 indicating a high level of impacts. Issues to consider for human impacts include, but are not limited to:

- Potential of the hazard to cause death, and
- Potential of the hazard to cause injury requiring medical treatment.

Property Impacts
For each of the listed hazards, please indicate the likely level of physical losses and damages to property if the hazard occurs, with 1 indicating a low level of losses and damages, 2 indicating a moderate level of losses and damages, and 3 indicating a high level of losses and damages. Issues to consider for property impacts include, but are not limited to:

- The potential of the hazard to cause damage to property or crops,
- The cost to replace damaged property,
- The cost to set up a temporary replacement for damaged property,
- The cost to repair damaged property, and
- The time to recover from the property damage.

Business and Government Agency Impacts
For each of the listed hazards, please indicate what the likely level of impacts to the operations of businesses and government agencies is if the hazard occurs, with 1 indicating a low level of impacts, 2 indicating a moderate level of impacts, and 3 indicating a high level of impacts. Issues to consider for business impacts include, but are not limited to:

- Business or agency interruption,
- Employees unable to report to work,
- Customers or clients unable to reach facility,
- Company or agency in violation of contractual agreements,
- Imposition of fines and penalties or legal costs,
- Interruption of access to critical supplies,
- Interruption of product or service distribution,
- Financial impact or burden, and

Figure A.2 (Continued)

- Interruption of critical care and emergency services.

Preparedness
For each of the listed hazards, please indicate the current level of preparedness for dealing with the hazard and its impacts, with 1 indicating a high level of preparedness, 2 indicating a moderate level of preparedness, and three indicating a low level of preparedness or no preparedness. Issues to consider for preparedness include, but are not limited to:

- The status of current plans that address the hazard,
- The frequency of drills that address the hazard,
- The status of training related to the hazard and its impacts,
- Insurance,
- The availability of back-up systems, and
- The availability of community resources.

This survey will be compiled and the results will be reported during the hazard identification phase of developing or updating the hazard mitigation plan.

Figure A.3
Agenda and Summary Notes for Local Planning Team Meeting: March 15, 2023

Notice of Meeting and Agenda

KENOSHA COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM

DATE: Wednesday, March 15, 2023

TIME: 3:00 p.m. to 4:00 p.m.

PLACE: Kenosha County Center
Large Hearing Room
19600 – 75th Street
Bristol, Wisconsin

AGENDA:

1. Roll Call

2. Consideration of Summary Notes of March 28, 2022 Local Planning Team meeting (a copy of the draft summary notes is available for download from the SEWRPC website at: www.sewrpc.org/hazard-mitigation

3. Consideration of Chapter 1, "Introduction and Background," of SEWRPC Community Assistance Planning Report No. 278 (4th Edition), *Kenosha County Hazard Mitigation Plan* (a copy of the draft chapter is available for download from the SEWRPC website at: www.sewrpc.org/hazard-mitigation
    a. Highlight the importance of community participation during the planning process as part of FEMA's new Local Mitigation Planning Policy Guide
    b. Note the change in community adoption guidelines

4. Consideration of Chapter 2, "Basic Study Area Inventory and Analysis," of SEWRPC Community Assistance Planning Report No. 278 (4th Edition), *Kenosha County Hazard Mitigation Plan* (a copy of the draft chapter is available for download from the SEWRPC website at: www.sewrpc.org/hazard-mitigation

5. Consideration of Chapter 3, "Analysis of Hazard Conditions," of SEWRPC Community Assistance Planning Report No. 278 (4th Edition), *Kenosha County Hazard Mitigation Plan* (a copy of the draft chapter is available for download from the SEWRPC website at: www.sewrpc.org/hazard-mitigation
    a. Review of results from the online hazard and vulnerability assessment exercise

6. Discussion of upcoming public meeting

7. Adjourn

Chris Parisey
Secretary

Figure A.3 (Continued)

SUMMARY NOTES OF THE MARCH 15, 2023 MEETING OF THE KENOSHA COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM

INTRODUCTION

The March 15, 2023 meeting of the Kenosha County Hazard Mitigation Plan Local Planning Team was convened at the Kenosha County Center at 3:04 p.m. The meeting was called to order by Sergeant Chris Hannah, Director of the Kenosha County Division of Emergency Management. Attendance was taken by circulating a sign-in sheet.

In attendance at the meeting were the following individuals:

Local Planning Team Members	
Sgt. Chris Hannah, Chair	Director, Kenosha County Division of Emergency Management
Chris Parisey, Secretary	Senior Planner, SEWRPC
Andy Buehler	Director, Kenosha County Department of Planning and Development
Richard Caravetta	Salvation Army
Curt Czarnecki	General Manager, City of Kenosha Water Utility
Laura Herrick	Chief Environmental Engineer, SEWRPC
John Holloway	Chairman, Town of Paris
Mark Jenks	Conservationist, Kenosha County Planning and Development
Randall Kerkman	Administrator, Village of Bristol
Mark Melotik	Director of Environmental Health, Kenosha County Dept. of Health
Nikki Payne	Public Involvement and Outreach Manager, SEWRPC
Craig Roepke	Chief of Fire and Rescue, Village of Pleasant Prairie

In addition, the following attendees (non-Planning Team members) were present:

Alyssa Werfelmann	Administrative Secretary, Kenosha County Division of Emergency Mgt

Sgt. Hannah welcomed all attendees to the meeting and thanked them for their participation. Sgt. Hannah introduced Chris Parisey, Senior Planner, Southeastern Wisconsin Regional Planning Commission (SEWRPC). Mr. Parisey briefly reviewed the meeting agenda and noted that this meeting was originally scheduled to be held on February 22, 2023, but was postponed due to a winter storm affecting the area. He also noted that copies of draft chapters 1-3 were posted on the SEWRPC website and LPT members were made aware of the posting via email on March 3, 2023. Summary notes from the March 28, 2022 LPT meeting were also made available on the SEWRPC website. There were no questions or comments from the LPT regarding the summary notes.

CHAPTER 1 "INTRODUCTION AND BACKGROUND"

Mr. Parisey began his presentation with an overview of draft Chapter 1. He gave a brief description of the study area (Kenosha County) as well as the relationship of hazard mitigation planning to other County efforts. Mr. Parisey stated that adoption of the plan update is required for the County and its communities to be eligible for FEMA funding for projects related to hazard mitigation. Mr. Parisey also emphasized that this edition of the plan will focus only on natural hazards as required by FEMA. Ms. Herrick noted

that the human-induced hazards included in previous editions are better served in other guidance documents.

Mr. Parisey indicated that Tables 1.2 through 1.4 list the plan participation, outreach, and implementation efforts undertaken by each local government. These tables will not be completed until the end of the planning process and asked that if any LPT members notice any missing items that they please notify him or Sgt. Hannah. There were no questions or comments related to this material.

Mr. Parisey continued with a short discussion on plan adoption. Ms. Herrick confirmed that Kenosha County will need to adopt the plan update by resolution after FEMA approval and before the end of the grant in May 2024. She stated that there will be enough time to accomplish this and then the incorporated municipalities (cities and villages) will have a year after County adoption to also adopt the plan update.

No additional comments or questions were given from the LPT for draft Chapter 1.

[Secretary's Note: A copy of the presentation can be found on the SEWRPC website at: https://www.sewrpc.org/hmp under "Kenosha County Hazard Mitigation Plan Update"]

CHAPTER 2, "BASIC STUDY AREA INVENTORY AND ANALYSIS"

Mr. Parisey continued with an overview of draft Chapter 2. Mr. Parisey briefly described the inventory data that was collected and analyzed, including the County's current and projected demographic trends, and current and planned land use characteristics. It was noted that planned year 2050 data was provided by SEWRPC's *VISION 2050: A Regional Land Use and Transportation Plan*. Mr. Parisey emphasized that the background and inventory information for the County is an important element of the planning process. He also noted that a detailed list of critical community facilities in Kenosha County is included in Appendix C and to notify him or Sgt. Hannah if any corrections or additions are necessary. Mr. Jenks stated that the new Pleasant Prairie Police Department building should be completed in 2024. Ms. Herrick stated that this change will be reflected in the next edition of the plan.

Concluding Chapter 2, Mr. Parisey gave a general overview on climate change and its relative importance for hazard mitigation planning. He also emphasized that FEMA now considers this information essential and necessary for hazard mitigation. The source of climate change data and how it is presented throughout the plan was explained to the LPT attendees. Mr. Parisey stated that Figures 2.1 through 2.4 illustrate temperature and precipitation trends and projections. Mr. Buehler asked why the historical data in the WICCI reports started in 1950 and not an earlier date. Ms. Herrick said that she was not sure why WICCI chose that as a starting date, but she has seen even later start dates (1980s) for describing current climate conditions.

There were no further questions or comments on draft Chapter 2.

CHAPTER 3, "ANALYSIS OF HAZARD CONDITIONS"

Mr. Parisey began with a general overview of draft Chapter 3 and its main components. He gave a brief discussion on the hazard identification and ranking process; the risk analysis portion; and how each hazard was profiled. He then presented and explained the hazards considered for this plan update (Table 3.2).

With no questions or comments related to the layout of draft Chapter 3, Mr. Parisey continued to discuss the profiled hazards analyzed in the plan, including tornadoes, flooding, severe weather (i.e., thunderstorm-related events), extreme temperatures, Lake Michigan coastal hazards, winter storms,

and drought hazard events in Kenosha County, giving particular focus on the flooding and Lake Michigan coastal hazards.

Mr. Parisey reviewed the different types of flooding concerns, recently reported flood events, and different County assets vulnerable to flooding impacts, including agriculture, transportation, and structural damages. For structural impacts caused by flooding, Mr. Parisey described the parcel-based loss analysis used to estimate potential damages caused by a 100-year flood event.

Mr. Parisey then reviewed the Lake Michigan coastal hazards, noting that the Lake is experiencing high water levels making hazard problems more evident in the County. Mr. Parisey went on to describe the current problems with unstable or failing bluffs along the shoreline in the Village of Somers and with shoreline recession and coastal flooding in the City of Kenosha and Village of Pleasant Prairie.

Following the review of hazard conditions, Mr. Holloway suggested developing a strategy or project idea to maintain current waterways in the County, particularly in response to rising water levels in the Des Plaines River watershed. Ms. Herrick asked if the suggested project to be included in the plan would be to develop a guide for maintaining the flow carrying capacity of waterways, or a pilot project. Mr. Holloway indicated this idea needed additional thought and local buy-in and offered to provide more information as the potential strategy or project is developed. Additionally, Mr. Buehler suggested including a recommendation in the plan to have the coastal communities adopt a bluff setback ordinance in response to Lake Michigan coastal hazards.

The LPT also suggested adding a table and/or map to Chapter 3 showing locations where Kenosha County roadways have been frequently overtopped during flood events. Mr. Buehler offered to provide whatever data he has, as well as coordinate with the communities in the County to collect this data. Sgt. Hannah stated that he will look into what information the Sheriff's Department may have on road closures through their dispatch records.

[Secretary's Note: After the meeting, maps of frequently flooded roadways were provided to Mr. Parisey by the Villages of Bristol, Paddock Lake, and Twin Lakes. Mr. Parisey will work to incorporate data from these maps, as well as any additional data subsequently provided, into the revised draft of Chapter 3.]

With no more questions or comments, Mr. Parisey concluded the review of draft Chapters 1 through 3.

LOCAL PLANNING TEAM INPUT ON POTENTIAL HAZARD MITIGATION PROJECTS

Before the meeting concluded, Mr. Parisey asked the LPT for additional input on hazard mitigation projects recently completed or planned to be completed during the lifespan of this plan. He presented a list of project examples and reminded the LPT that projects added to the plan can facilitate federal funding opportunities to help communities complete the project.

Mr. Parisey mentioned that the next and final LPT meeting is scheduled to be held in late 2023.

ADJOURNMENT

There being no further business, Mr. Parisey thanked the participating LPT members for their attendance and any additional contributions to the draft plan. The meeting was adjourned at 3:47 p.m.

Figure A.4
Agenda and Summary Notes for Local Planning Team Meeting: December 6, 2023

Notice of Meeting and Agenda

KENOSHA COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM

DATE: Wednesday, December 6, 2023

TIME: 3:00 p.m. to 4:00 p.m.

PLACE: Kenosha County Center
Large Hearing Room
19600 – 75th Street
Bristol, Wisconsin

AGENDA:

1. Roll Call
2. Consideration of Summary Notes of March 15, 2023 Local Planning Team meeting
3. Consideration of Chapter 4, "Hazard Mitigation Goals," of SEWRPC Community Assistance Planning Report No. 278 (4th Edition), *Kenosha County Hazard Mitigation Plan*
4. Consideration of Chapter 5, "Hazard Mitigation Strategies," of SEWRPC Community Assistance Planning Report No. 278 (4th Edition), *Kenosha County Hazard Mitigation Plan*
5. Consideration of Chapter 6, "Plan Adoption, Implementation, Maintenance, and Revision," of SEWRPC Community Assistance Planning Report No. 278 (4th Edition), *Kenosha County Hazard Mitigation Plan*
6. Discussion of upcoming public meeting
7. Review of plan approval and adoption process
8. Adjourn

Chris Parisey
Secretary

The summary notes and preliminary draft chapters can be found on the Hazard Mitigation webpage at www.sewrpc.org/hmp

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Figure A.4 (Continued)

SUMMARY NOTES OF THE DECEMBER 6, 2023 MEETING OF THE KENOSHA COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM

INTRODUCTION

The December 6, 2023 meeting of the Kenosha County Hazard Mitigation Plan Local Planning Team (LPT) was convened at the Kenosha County Center at 3:05 p.m. The meeting was called to order by Sergeant Chris Hannah, Director of the Kenosha County Division of Emergency Management. Attendance was taken by circulating a sign-in sheet.

In attendance at the meeting were the following individuals:

Local Planning Team Members

Sgt. Chris Hannah, Chair	Director, Kenosha County Division of Emergency Management
Chris Parisey, Secretary	Senior Planner, SEWRPC
Ben Anderson	Fire Chief, Village of Somers
Benny Benedict	Salvation Army
Jeff Berard	Director, Journey Disaster Response Team
Shelly Billingsley	Public Works Director, Kenosha County
Andy Buehler	Director, Kenosha County Department of Planning and Development
Richard Caravetta	Salvation Army
Brian Cater	Public Works – Interim Director, City of Kenosha
Colin Hennessey	Rescue – Assistant Chief, Town of Paris
Laura Herrick	Chief Environmental Engineer, SEWRPC
Mark Jenks	Conservationist, Kenosha County Planning and Development
Mark Melotik	Director of Environmental Health, Kenosha County Dept. of Health
John Niederer	Fire Chief, Village of Bristol
Kevin Poirier	Assistant to the Administrator, Village and Town of Somers
Jim Poltrock	Aurora

In addition, the following attendees (non-Planning Team members) were present:

Alyssa Werfelmann	Administrative Secretary, Kenosha County Division of Emergency Mgt

Sgt. Hannah welcomed all attendees to the meeting and thanked them for their participation. Sgt. Hannah introduced Chris Parisey, Senior Planner, Southeastern Wisconsin Regional Planning Commission (SEWRPC). Mr. Parisey briefly reviewed the meeting agenda and noted that copies of draft Chapters 4-6 were posted on the SEWRPC website and LPT members were made aware of the posting via email on November 16, 2023. Summary notes from the March 15, 2023 LPT meeting were also made available on the SEWRPC website. Mr. Parisey noted that a flooded roadways table has been added to the Chapter 3 text at the direction of the LPT. There were no questions or comments from the LPT regarding the summary notes.

Figure A.4 (Continued)

CHAPTER 4 "HAZARD MITIGATION GOALS"

Mr. Parisey began his presentation with a listing of the seven hazard mitigation goals included in draft Chapter 4. These are overarching goals for the hazard plan and hazard mitigation efforts in Kenosha County. There were no comments or questions from the LPT for draft Chapter 4.

[Secretary's Note: A copy of the presentation can be found on the SEWRPC website at: https://www.sewrpc.org/hmp under "Kenosha County Hazard Mitigation Plan Update"]

CHAPTER 5, "HAZARD MITIGATION STRATEGIES"

Mr. Parisey continued with an overview of draft Chapter 5. He reminded the LPT that this hazard plan only includes natural weather hazards. Mr. Parisey outlined the seven natural hazard types included the plan, and then went into detail on some of the major mitigation strategies for flooding, coastal hazards, and strategies that were found for multiple weather-related hazards. Mr. Buehler commented that he would like to see text added to the flooding section to implement a pre-disaster floodplain buyout program that is being considered by the State Legislature. He will share draft text with Mr. Parisey to include in Chapter 5.

[Secretary's Note: The draft text was added to section 5.4]

There were no further questions or comments on draft Chapter 5.

CHAPTER 6, "PLAN ADOPTION, IMPLEMENTATION, MAINTENANCE, AND REVISION"

Mr. Parisey began with a general overview of draft Chapter 6 and its main components. He gave a brief summary of the refinement, review, and adoption efforts included in the plan. Specifically noted was the need to adopt the Fox (IL) River Watershed Mitigation Plan (SEWRPC CAPR No. 343) separately in order to be able to pursue projects in that plan related to flooding, dams, and drought. Kenosha County plans to adopt the hazard plan in early 2024, and the incorporated municipalities have a year to adopt from plan approval by FEMA to remain eligible for federal mitigation funds. Mr. Parisey then reviewed Table 6.1 in brief, noting that this table summarizes the mitigation measures in the plan as well as potential funding sources. And finally, he summarized the appendices for the hazard plan, noting that due to time constraints Appendix B for adoption resolutions may be removed. No questions or comments were received from the LPT on draft Chapter 6.

REMAINING ITEMS TO COMPLETE THE PLANNING EFFORT

Before the meeting concluded, Mr. Parisey indicated that the LPT members will be receiving an online survey on local municipality capabilities to implement the strategies in this plan. This is a newer requirement from FEMA, and the results will be included in an appendix to the plan.

Mr. Parisey also noted that the final public meeting for the complete draft hazard plan will occur immediately following the LPT meeting from 4-5 pm in this same room.

Figure A.4 (Continued)

ADJOURNMENT

There being no further business, Sgt. Hannah thanked the participating LPT members for their attendance and contributions to the draft hazard plan. The meeting was adjourned at 3:52 p.m.

SUMMARY NOTES KEN CO HMP LPT MTG 12/6/23 (#271311).DOC
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LKH/CDP
12/15/23

Figure A.5
Notices and Summary Notes for Public Meeting #1: March 15, 2023

COUNTY OF KENOSHA

OFFICE OF THE SHERIFF
David Zoerner, Sheriff
Division of Emergency Management
Sgt. Christopher Hannah, Director

1000 - 55th Street
Kenosha, WI 53140
Telephone: (262) 605-7900
Fax: (262) 605-7905
E-mail: christopher.hannah@kenoshacounty.org

KENOSHA SHERIFF'S DEPARTMENT
DIVISION of EMERGENCY MANAGEMENT

For Immediate Release:

On Wednesday, March 15, 2023, at 4:00 PM, the Southeastern Wisconsin Regional Planning Commission (SEWRPC) in cooperation with the Kenosha County Division of Emergency Management will host a Hazard Mitigation Plan Update Meeting, at the Kenosha County Center, Hearing Room, 19600 – 75th Street, Bristol, WI 53104. This meeting is related to the mitigation of impacts from natural hazards in Kenosha County, WI.

The Hazard Mitigation Plan Update Meeting will cover:

- Presentation by SEWRPC staff
- Discuss purpose of plan update
- Review work completed to date including a study area inventory and analysis and an analysis of hazard conditions
- Discuss remaining work including recommending hazard mitigation measures and plan adoption, implementation, and maintenance measures.

Citizens of Kenosha County are welcome to attend. If you have any questions or wish to submit a written comment about the Hazard Mitigation Plan Update Meeting, please contact:

Mr. Chris Parisey, SWERPC Senior Planner, at (262) 953-3236 or email Cparisey@sewrpc.org

END

Figure A.5 (Continued)

SUMMARY OF THE MARCH 15, 2023 PUBLIC INFORMATION MEETING FOR THE KENOSHA COUNTY HAZARD MITIGATION PLAN UPDATE

INTRODUCTION

The March 15, 2023 public information meeting for the Kenosha County Hazard Mitigation Plan update was convened at the Kenosha County Center at 4:00 p.m. The meeting was called to order by Sergeant Chris Hannah, Director of the Kenosha County Division of Emergency Management. Attendance was taken by circulating a sign-in sheet.

In attendance at the meeting were the following individuals:

Attendees

Brian Bashaw	County Board Supervisor, Kenosha County District 19
Tim Stocker	County Board Supervisor, Kenosha County District 14

Staff

Sgt. Chris Hannah	Director, Kenosha County Division of Emergency Management
Chris Parisey	Senior Planner, SEWRPC
Laura Herrick	Chief Environmental Engineer, SEWRPC
Alyssa Werfelmann	Administrative Secretary, Kenosha County Division of Emergency Mgt

Mr. Parisey gave a short presentation on the plan update effort.

[Secretary's Note: A copy of the presentation can be found at: http://www.sewrpc.org/HMP]

There being no further business, the meeting was adjourned at 5:00 p.m.

SUMMARY NOTES KEN CO HMP LPT MTG 3/15/23 (#271369).DOC
500-1148
LKH/CDP
12/18/23

Figure A.6
Notices and Summary Notes for Public Meeting #2: December 6, 2023

Customer Ad Proof

130-60071897 **Kenosha County Sheriffs Dept., Process Unit** **Order Nbr 134457**

Publication	Kenosha News		
Contact	Kenosha County Sheriffs Dept., Process Unit	PO Number	
Address 1	1000 55TH STREET	Rate	Legal Liners
Address 2		Order Price	42.67
City St Zip	KENOSHA WI 53140	Amount Paid	0.00
Phone	2626055104	Amount Due	42.67
Fax			
Section	Legal	Start/End Dates	11/10/2023 - 11/10/2023
SubSection		Insertions	1
Category	0099 Legal Notices	Size	40
Ad Key	134457-1	Salesperson(s)	Legal Rep
Keywords	SEWRPC Meeting Notice	Taken By	Jamie Narjes
Notes			

Ad Proof

KENOSHA SHERIFF' S
DEPARTMENT
DIVISION of EMERGENCY
MANAGEMENT

For Immediate Release:
On Wednesday, December 6, 2023, at 4:00 PM, the Southeastern Wisconsin Regional Planning Commission (SEWRPC) in cooperation with the Kenosha County Division of Emergency Management will host a Hazard Mitigation Plan Update Meeting, at the Kenosha County Center, Hearing Room, 19600 – 75th Street, Bristol, WI 53104. This meeting is related to the mitigation of impacts from natural hazards in Kenosha County, WI.
The Hazard Mitigation Plan Update Meeting will cover:
- Presentation by SEWRPC staff
- Discuss purpose of plan update
- Review work completed to date including a study area inventory and analysis and an analysis of hazard conditions
- Discuss remaining work including recommending hazard mitigation measures and plan adoption, implementation, and maintenance measures.

Citizens of Kenosha County are welcome to attend. If you have any questions or wish to submit a written comment about the Hazard Mitigation Plan Update Meeting, please contact: Mr. Chris Parisey, SWERPC Senior Planner, at (262) 953-3236 or email Cparisey@sewrpc.org
PUB: November 10, 2023 134457
WNAXLP

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Figure A.6 (Continued)

JOIN US!

at a public meeting for the 2023-2028 Update of the Kenosha County Hazard Mitigation Plan

Wednesday, December 6, 2023
4:00 p.m. to 5:00 p.m.
Kenosha County Center
Large Hearing Room
19600 – 75th Street, Bristol, WI 53104

*Bus service to the Kenosha County Center is provided by Western Kenosha County Transit, for information call **1-888-203-3498** or visit **www.kenoshacounty.org/579/Western-Kenosha-County-Transit***

Public Meeting Information

- Review draft plan, including: study area inventory and analysis, analysis of hazard conditions, hazard mitigation goals, and more!
- Open discussion to answer questions and take comments on plan update
- Visit **www.sewrpc.org/hmp** to view draft plan chapters and provide written feedback
- Written comments may be provided through December 31, 2023

The Kenosha County Hazard Mitigation Plan identifies areas of risk, assesses the magnitude of the risk, and develops strategies for reducing the risk natural hazards pose throughout the County. Completion and approval of the plan will maintain the eligibility of Kenosha County and its communities to apply for FEMA mitigation project funds to implement mitigation strategies.





Figure A.6 (Continued)

SUMMARY OF THE DECEMBER 6, 2023 PUBLIC INFORMATION MEETING FOR THE KENOSHA COUNTY HAZARD MITIGATION PLAN UPDATE

INTRODUCTION

The December 6, 2023 public information meeting for the Kenosha County Hazard Mitigation Plan update was convened at the Kenosha County Center at 4:00 p.m. The meeting was called to order by Sergeant Chris Hannah, Director of the Kenosha County Division of Emergency Management. Attendance was taken by circulating a sign-in sheet.

In attendance at the meeting were the following individuals:

Attendees

None

Staff

Sgt. Chris Hannah	Director, Kenosha County Division of Emergency Management
Chris Parisey	Senior Planner, SEWRPC
Laura Herrick	Chief Environmental Engineer, SEWRPC
Alyssa Werfelmann	Administrative Secretary, Kenosha County Division of Emergency Mgt

A short presentation on the plan update effort was prepared, but not given.

[Secretary's Note: A copy of the presentation can be found at: http://www.sewrpc.org/HMP]

There being no further business, the meeting was adjourned at 5:00 p.m.

SUMMARY NOTES KEN CO HMP LPT MTG 12/6/23 (#271368).DOC
500-1148
LKH/CDP
12/18/23

Figure A.7
Correspondence to Neighboring Counties

From: Christopher Hannah
Sent: Monday, February 5, 2024 9:17 AM
To: Jason Rowland; Freeman, Alexander

Cc: Kumar, Rebecca; Parisey, Christopher D.; Christopher Parisey
Subject: Kenosha County Hazard Mitigation Plan: 2023-2028

I am reaching out to local neighboring emergency management (EM) agencies to emphasize the crucial role of collaboration in developing the Kenosha County Hazard Mitigation Plan. By involving your agency in the review process, we can ensure that Kenosha's plan is comprehensive, effective, and aligned with your Hazard Mitigation Plan. This collaborative approach will enhance the quality of our plan and benefit from your agency's expertise, ultimately reducing the risk and impact of disasters on our communities.

A draft of the Kenosha County Hazard Mitigation Plan: 2023-2028 (4th edition) is complete and available for review and comment on the Southeastern Wisconsin Regional Planning Commission's (SEWRPC) website (Hazard Mitigation Planning (sewrpc.org)), specifically under the Kenosha County section.

Your participation and input are invaluable in this process, and the Kenosha County Division of Emergency Management (KSDEM) is committed to working together to create a robust hazard mitigation plan that reflects the collective expertise and insights of all involved parties. I look forward to our continued collaboration and its positive impact on our community's resilience.

If you would like to provide feedback, please submit feedback by Wednesday, February 28th directly to SEWRPC using the comments section located at the bottom of the website.

Thank you,

Sgt. Chris Hannah #236
Director of Emergency Management
Kenosha County Sheriff's Division of Emergency Management

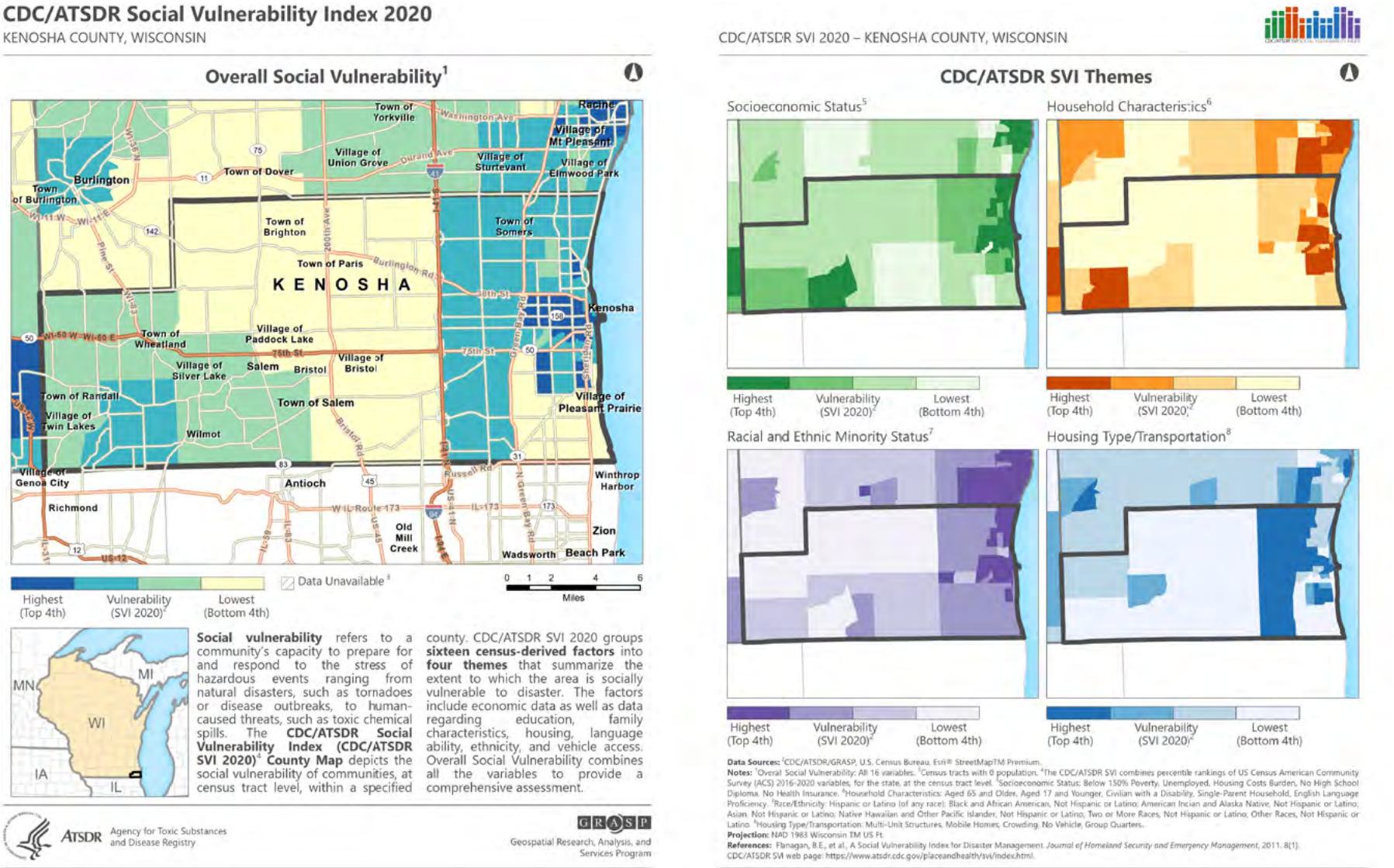
T: (262) 605-7900
F: (262) 605-7905
christopher.hannah@KenoshaCounty.Org - www.KenoshaCounty.Org/Sheriff
1000 55th Street. Kenosha, WI 53140
#KSDPROUD

1

APPENDIX B

SOCIAL VULNERABILITY INDEX

Figure B.1
CDC Social Vulnerability Index for Kenosha County: 2020



Source: CDC/ATSDR Social Vulnerability Index, 2020, Kenosha County, Wisconsin, svi.cdc.gov/Documents/CountyMaps/2020/Wisconsin/Wisconsin2020_Kenosha.pdf

APPENDIX C
CRITICAL COMMUNITY FACILITIES IN KENOSHA COUNTY

Table C.1
Selected Critical Community Facilities in Kenosha County: 2022

Name	Community	Address
Kenosha County Administration Building	City of Kenosha	1010 56th Street
Kenosha County Courthouse	City of Kenosha	912 56th Street
Kenosha County Dept of Human Services	City of Kenosha	8600 Sheridan Road
Social Security Administration	City of Kenosha	5624 6th Avenue
U.S. Coast Guard	City of Kenosha	5036 4th Avenue
Northside Kenosha Public Library	City of Kenosha	1500 27th Avenue
Simmons Kenosha Public Library	City of Kenosha	711 59th Place
Southwest Kenosha Public Library	City of Kenosha	7979 38th Avenue
Uptown Kenosha Public Library	City of Kenosha	2419 63rd Street
City of Kenosha Fleet Maintenance	City of Kenosha	3725 65th Street
City of Kenosha Municipal Building	City of Kenosha	625 52nd Street
City of Kenosha Parks Department	City of Kenosha	3617 65th Street
City of Kenosha Street Department	City of Kenosha	6415 35th Avenue
City of Kenosha Traffic Operations Building	City of Kenosha	3735 65th Street
City of Kenosha Waste Division	City of Kenosha	1001 50th Street
City of Kenosha Waste Transfer Building	City of Kenosha	919 50th Street
Kenosha Area Transit	City of Kenosha	4303 39th Avenue
Joseph McCarthy Transit Center	City of Kenosha	724 54th Street
Kenosha Wastewater Treatment Plant	City of Kenosha	7843 3rd Avenue
Kenosha Water Production Plant	City of Kenosha	100 51st Place
Kenosha Water Utility	City of Kenosha	4401 Green Bay Road
Kenosha Post Office	City of Kenosha	5605 Sheridan Road
Kenosha Regional Airport (ENW)	City of Kenosha	9900 52nd Street
National Guard Amory	City of Kenosha	4200 43rd Avenue
WDOT – Division of Motor Vehicles	City of Kenosha	4911 88th Avenue
Brighton Town Hall	Town of Brighton	25000 Burlington Road
Paris Town Hall	Town of Paris	16607 Burlington Road
Randall Town Hall	Town of Randall	34530 Bassett Road
Wheatland Town Hall	Town of Wheatland	34315 Geneva Road
New Munster Post Office	Town of Wheatland	34315 Geneva Road
Powers Lake Post Office	Town of Wheatland	39705 Bloomfield Road
Kenosha County Center	Village of Bristol	19600 75th Street
Bristol Public Works and Wastewater Utility	Village of Bristol	8101 195th Avenue
Bristol Village Hall	Village of Bristol	19801 83rd Street
Bristol Post Office	Village of Bristol	8223 199th Avenue

Table continued on next page.

Table C.1 (Continued)

Name	Community	Address
Woodworth Post Office	Village of Bristol	8105 160th Avenue
Paddock Lake Village Hall	Village of Paddock Lake	6969 236th Avenue
Village of Paddock Lake Wastewater Treatment Plant	Village of Paddock Lake	23201 62nd Street
Pleasant Prairie Public Works	Village of Pleasant Prairie	8600 Green Bay Road
Pleasant Prairie Village Hall	Village of Pleasant Prairie	9915 39th Avenue
Kenosha Carrier Annex Post Office	Village of Pleasant Prairie	4225 101st Street
Pleasant Prairie Post Office	Village of Pleasant Prairie	4225 101st Street
Salem Lakes Community Library	Village of Salem Lakes	24615 89th Street
Salem Lakes Sewerage Treatment Plant	Village of Salem Lakes	113 S. First Street
Salem Lakes Village Hall	Village of Salem Lakes	9814 Antioch Road
Salem Utility District Wastewater Treatment Plant	Village of Salem Lakes	28733 Wilmot Road
Village of Salem Lakes Highway Building	Village of Salem Lakes	11200 258th Court
Village of Salem Lakes Public Works	Village of Salem Lakes	123 E. Northwater Street
Camp Lake Post Office	Village of Salem Lakes	9540 Camp Lake Road
Salem Lakes Post Office	Village of Salem Lakes	739 S. Cogswell Drive
Salem Lakes Post Office	Village of Salem Lakes	24913 83rd Place
Trevor Post Office	Village of Salem Lakes	25930 Wilmot Road
Wilmot Post Office	Village of Salem Lakes	30725 113th Street
Somers Village Hall	Village of Somers	7511 12th Street
Somers Post Office	Village of Somers	7621 12th Street
Twin Lakes Community Library	Village of Twin Lakes	110 S. Lake Avenue
Twin Lakes Public Works	Village of Twin Lakes	800 Burlington Avenue
Twin Lakes Village Hall	Village of Twin Lakes	108 E. Main Street
Twin Lakes Wastewater Treatment Plant	Village of Twin Lakes	901 Gatewood Drive
Twin Lakes Post Office	Village of Twin Lakes	170 Lance Drive
Law Enforcement		
City of Kenosha Police	City of Kenosha	1000 55th Street
Rotary Safety Center	City of Kenosha	5716 14th Avenue
Kenosha Correctional Center	City of Kenosha	6353 14th Avenue
Kenosha County Sheriff's Department	City of Kenosha	1000 55th Street
Kenosha County Sheriff's Department Detention Center	City of Kenosha	4777 88th Avenue
Kenosha County Sheriff's Department Pretrial Facility	City of Kenosha	927 54th Street
Pleasant Prairie Police	Village Pleasant Prairie	8600 Green Bay Road
Twin Lakes Police	Village of Twin Lakes	920 Lance Drive
UW-Parkside Police and Public Safety	Village of Somers	900 Wood Road

Table continued on next page.

Table C.1 (Continued)

Name	Community	Address
Fire Stations and Medical Rescue		
Bristol Fire Department	Village of Bristol	8301 198th Avenue
Kansasville Fire Department	Kansasville/Union Grove	2730 Durand Avenue
Kenosha Fire Department – Station 2 (Engine)	City of Kenosha	8530 30th Avenue
Kenosha Fire Department – Station 3 (Medical Unit)	City of Kenosha	2121 Roosevelt Road
Kenosha Fire Department – Station 4 (Engine, Medical Unit, Admin)	City of Kenosha	4810 60th Street
Kenosha Fire Department – Station 5 (Engine, Medical Unit)	City of Kenosha	2125 Washington Road
Kenosha Fire Department – Station 6 (Engine)	City of Kenosha	2615 14th Place
Kenosha Fire Department – Station 7 (Engine, Medical Unit)	City of Kenosha	9700 52nd Street
LJH Ambulance	City of Kenosha	6611 28th Avenue
Medix Ambulance	City of Burlington	147 Industrial Drive
Paris Fire and Rescue Department	Town of Paris	16607 Burlington Road
Pleasant Prairie Fire Department – Station 1	Village of Pleasant Prairie	3801 Springbrook Road
Pleasant Prairie Fire Department – Station 2	Village of Pleasant Prairie	8044 88th Avenue
Randall Fire Department	Town of Randall	34524 Bassett Road
Randall Fire Department	Town of Randall	38820 93rd Street
Salem Lakes Fire and Rescue – Station 1	Village of Salem Lakes	11252 254th Court
Salem Lakes Fire and Rescue – Station 2	Village of Salem Lakes	8339 Antioch Road
Salem Lakes Fire and Rescue – Station 3	Village of Salem Lakes	30400 Wilmot Road
Salem Lakes Fire and Rescue – Station 4	Village of Salem Lakes	113 S. First Street
Salem Lakes Fire and Rescue – Station 5	Village of Salem Lakes	209 E. Lake Street
Somers Fire and Rescue Department – Station 1	Village of Somers	7511 12th Street
Somers Fire and Rescue Department – Station 2	Village of Somers	812 12th Street
Twin Lakes Fire and Rescue Department	Village of Twin Lakes	236 E. Main Street
Wheatland Fire Department	Town of Wheatland	34011 Geneva Road
Hospitals		
Aurora Medical Center—Kenosha	City of Kenosha	10400 75th Street
St. Catherine's Medical Center Campus	Village of Pleasant Prairie	9555 76th Street
Kenosha Medical Center Campus	City of Kenosha	6308 8th Avenue
Clinics		
Aurora Advanced Healthcare-Kenosha 118th Avenue	City of Kenosha	6811 118th Avenue
Aurora Advanced Healthcare-Gateway	City of Kenosha	3601 30th Avenue
Aurora Health Center-Kenosha 15th Place	City of Kenosha	2707 15th Place
Aurora Health Center-Kenosha 35th Street	City of Kenosha	1020 35th Street
Aurora Health Center—Kenosha	City of Kenosha	7540 22nd Avenue
Aurora Health Center—Paddock Lake	Village of Paddock Lake	25320 75th Street

Table continued on next page.

Table C.1 (Continued)

Name	Community	Address
Clinics (continued)		
Aurora Health Center—Twin Lakes	Village of Twin Lakes	700 N. Lake Avenue
Children's Hospital-Kenosha Clinic	City of Kenosha	8500 75th Street
Family Medical Center North	City of Kenosha	3200 Sheridan Road
Family Practice Associates	City of Kenosha	3535 30th Avenue
Kenosha Community Health Center	City of Kenosha	4536 22nd Avenue
Kenosha Community Health Center	City of Kenosha	6226 14th Avenue
Kenosha Community Health Center	City of Kenosha	1330 52nd Street
Kenosha Pediatrics	City of Kenosha	6125 Green Bay Road
Kenosha Pediatrics at Paddock Lake	Village of Paddock Lake	24906 75th Street
Sheridan Medical Complex	City of Kenosha	8400 Sheridan Road
Twin Lakes Clinic	Village of Twin Lakes	118 S. Lake Avenue
United Health System Physician Clinic—Northcentral	City of Kenosha	6127 Green Bay Road
United Health System Physician Clinic—Northside	City of Kenosha	3601 30th Avenue
United Health System Physician Clinic—Paddock Lake	Village of Paddock Lake	7322 236th Avenue
Kenosha County Public Health	City of Kenosha	8600 Sheridan Road
Kenosha County Public Health	Village of Bristol	19600 75th Street
Public Schools		
Brighton Elementary School	Town of Brighton	1200 248th Avenue
Bristol Elementary School	Village of Bristol	20121 83rd Street
Westosha Central High School	Village of Paddock Lake	24617 75th Street
Edward Bain School of Language and Art	City of Kenosha	2600 50th Street
Bose Elementary School	City of Kenosha	1900 15th Street
Bradford High School	City of Kenosha	3700 Washington Road
Brass Community School	City of Kenosha	6400 15th Avenue
The Brompton School	City of Kenosha	8518 22nd Avenue
Bullen Middle School	City of Kenosha	2804 39th Street
Cesar Chavez Learning Station (Head Start)	City of Kenosha	6300 27th Avenue
Dimensions of Learning (Charter School K-8)	City of Kenosha	6218 25th Avenue
Forest Park Elementary School	City of Kenosha	6810 45th Avenue
Frank Elementary School	City of Kenosha	1816 57th Street
Grant Elementary School	City of Kenosha	1716 35th Street
Grewenow Elementary School	City of Kenosha	7714 20th Avenue
Harborside Academy	City of Kenosha	913 57th Street
Harvey Elementary School	City of Kenosha	2012 19th Avenue
Hillcrest High School	City of Kenosha	4616 24th Street

Table continued on next page.

Table C.1 (Continued)

Name	Community	Address
Public Schools (continued)		
Indian Trail Academy	City of Kenosha	6800 60th Street
Jefferson Elementary School	City of Kenosha	1832 43rd Street
Jeffery Elementary School	City of Kenosha	4011 87th Street
Kenosha 4-Year-Old Kindergarten	City of Kenosha	3600 52nd Street
Kenosha eSchool	City of Kenosha	4808 41st Place
Kenosha School of Enhanced Technology Curriculum	City of Kenosha	6811 18th Avenue
Lakeview Technology Academy	Village of Pleasant Prairie	9449 88th Avenue
Lance Middle School	City of Kenosha	4515 80th Street
Lincoln Middle School	City of Kenosha	6729 18th Avenue
Mahone Middle School	City of Kenosha	6900 60th Street
McKinley Elementary School	City of Kenosha	5520 32nd Avenue
Nash Elementary School	City of Kenosha	6801 99th Avenue
Phoenix Project	City of Kenosha	4777 88th Avenue
Pleasant Prairie Elementary School	Village of Pleasant Prairie	9208 Wilmot Road
Prairie Lane Elementary School	Village of Pleasant Prairie	10717 47th Avenue
Reuther Central High School	City of Kenosha	913 57th Street
Roosevelt Elementary School	City of Kenosha	3322 Roosevelt Road
Somers Elementary School	City of Kenosha	1245 72nd Avenue
Southport Elementary School	City of Kenosha	723 76th Street
Stocker Elementary School	City of Kenosha	6315 67th Street
Strange Elementary School	City of Kenosha	5414 49th Avenue
Tremper High School	City of Kenosha	8560 26th Avenue
Vernon Elementary School	City of Kenosha	8518 22nd Avenue
Washington Middle School	City of Kenosha	811 Washington Road
Whittier Elementary School	Village of Pleasant Prairie	8542 Cooper Road
Wilson Elementary School	City of Kenosha	4520 33rd Avenue
Paris Consolidated Elementary School	Town of Paris	1901 176th Avenue
Randall Consolidated School	Town of Randall	37101 87th Street
Salem Consolidated Elementary School	Village of Salem Lakes	8828 Antioch Road
Riverview Elementary School	Village of Silver Lake	300 Prosser Street
Trevor Grade School	Village of Salem Lakes	26325 Wilmot Road
Lakewood Elementary School	Village of Twin Lakes	1218 Wilmot Avenue
Wheatland Center School	Town of Wheatland	6606 368th Avenue
Wilmot Union High School	Village of Salem Lakes	11112 308th Avenue

Table continued on next page.

Table C.1 (Continued)

Name	Community	Address
Private Schools		
All Saints Catholic School – South Campus	City of Kenosha	7400 39th Avenue
All Saints Catholic School – North Campus	City of Kenosha	4400 22nd Avenue
Providence Catholic School – West Campus	Town of Brighton	1714 240th Avenue
Bethany Lutheran	City of Kenosha	2100 75th Street
Christ Lutheran Academy	City of Kenosha	2026 22nd Avenue
Christian Life School	City of Kenosha	10700 75th Street
Friedens Lutheran	City of Kenosha	5043 20th Avenue
Good Shepard Lutheran	Village of Pleasant Prairie	4311 104th Street
Kenosha Montessori	City of Kenosha	2401 69th Street
Montessori Children's House	City of Kenosha	920 61st Street #103
Pleasant Prairie Renaissance School	Village of Pleasant Prairie	10450 72nd Avenue
St. Joseph Catholic Academy-Upper Campus	City of Kenosha	2401 69th Street
St. Joseph Catholic Academy-Lower Campus	City of Kenosha	7207 14th Avenue
St. Peter Grade School	City of Kenosha	2224 30th Avenue
Shoreland Lutheran High School	Town of Somers	9026 12th Street
Providence Catholic School	Town of Paris	1481 172nd Avenue
St. Alphonsus School	Town of Wheatland	6211 344th Avenue
Higher Education		
Carthage College	City of Kenosha	2001 Alford Park Drive
Gateway Technical College – Kenosha Campus	City of Kenosha	3520 30th Avenue
Gateway Technical College – Aviation Center	City of Kenosha	4940 88th Avenue
Herzing University	City of Kenosha	4006 Washington Road
University of Wisconsin – Parkside	Town of Somers	900 Wood Road Kenosha
Assisted Living Facilities for People with Disabilities		
Adult Family Homes		
Alder Home	City of Kenosha	8212 61st Street
Aleph Southern Hope Homes LLC	City of Kenosha	3511 59th Street
Alpha Homes of Wisconsin IX	City of Kenosha	5603 49th Avenue
Alpha Homes of Wisconsin VIII	Village of Somers	101 11th Avenue
Alpha Homes of Wisconsin X	City of Kenosha	1822 12th Place
Alpha Homes of Wisconsin XI	City of Kenosha	2922 22nd Street
Alpha Homes of Wisconsin XII	City of Kenosha	8114 60th Avenue
Alpha Homes of Wisconsin XIII	City of Kenosha	1481 39th Avenue
Alpha Homes of Wisconsin XIV	City of Kenosha	3506 85th Place
Alpha Homes of Wisconsin XVI	City of Kenosha	3820 29th Street

Table continued on next page.

Table C.1 (Continued)

Name	Community	Address
Assisted Living Facilities for People with Disabilities (continued)		
Adult Family Homes (continued)		
An Innovative Care	Village of Pleasant Prairie	4297 123rd Street
An Innovative Care II	Village of Pleasant Prairie	1214 43rd Avenue
Brown House	City of Kenosha	1407 79th Street
Calvins House of No More Payne	City of Kenosha	3207 45th Street
Community of Life AFH	Village of Bristol	7645 128th Avenue
Creative Living Homes	City of Kenosha	1811 62nd Street
Danoski Adult Family Home	City of Kenosha	5615 46th Avenue
Dee Monis Place	City of Kenosha	3203 45th Street
Emerald Home	City of Kenosha	5044 32nd Avenue
Gimmel Southern Hope Homes	City of Kenosha	7727 35th Street
Hawthorne Home	City of Kenosha	6244 95th Avenue
Heart to Heart AFH (formerly CLA Twin Lakes)	Village of Twin Lakes	1222 Winged Foot Drive
Heavenly Love AFH	City of Kenosha	2722 25th Avenue
Hickory Home	City of Kenosha	5915 67th Street
Independent Living Adult Family Home	City of Kenosha	4004 29th Avenue
James Alan Home	City of Kenosha	604 46th Street
Journey Homes	City of Kenosha	2002 87th Place
Juniper Home	City of Kenosha	3513 29th Street
Lauer Adult Family Home	Village of Pleasant Prairie	8770 83rd Place
Lillians House	City of Kenosha	3205 – 45th Street
New Seasons Winter Home	City of Kenosha	7003 92nd Avenue
New Seasons Summer Manor	City of Kenosha	1619 24th Avenue
Our Caring Hands LLC	City of Kenosha	934 43rd Street
Papaya Home	City of Kenosha	4510 56th Street
Peace and Serenity Residential AFH	City of Kenosha	5405 42nd Avenue
Phoenix Home	City of Kenosha	6434 21st Avenue
Raymond John and Stephen Lloyd, LLC	City of Kenosha	5500 41st Street
Royale Transitional Living Homes	City of Kenosha	4047 32nd Avenue
Serenity Home Health Care, LLC	City of Kenosha	6038 49th Avenue
Serenity Home Health Care, LLC II	Village of Pleasant Prairie	12129 43rd Avenue
Serenity Home Health Care, LLC III	City of Kenosha	7409 Pershing Boulevard
Southern Hope Homes, LLC	City of Kenosha	4202 45th Street
Southern Hope Homes, LLC - BET Home	City of Kenosha	1506 74th Street
Willies Residential	City of Kenosha	3209 45th Street
Willow Home	City of Kenosha	3102 15th Street

Table continued on next page.

Table C.1 (Continued)

Name	Community	Address
Assisted Living Facilities for People with Disabilities (continued)		
Community-Based Residential Facilities		
Addison of Pleasant Prairie	Village of Pleasant Prairie	9651 Prairie Ridge Boulevard
Advocate Homes, LLC	City of Kenosha	6555 Pershing Boulevard
An Innovative Care CBRF (formerly Carey Manor)	Village of Pleasant Prairie	10628 22nd Avenue
Archwood Senior Living	Village of Salem Lakes	25025 75th Street
Aspen Home	City of Kenosha	6225 91st Street
Azalea Place	City of Kenosha	8322 14th Avenue
Azura Memory Care of Kenosha North	City of Kenosha	4600 52nd Avenue
Birch Home	City of Kenosha	1549 25th Avenue
Brookdale Kenosha	City of Kenosha	10108 74th Street
Casa del Mare	City of Kenosha	3508 7th Avenue
Dayton Residential Care	City of Kenosha	521 59th Street
Excel East	City of Kenosha	1130 82nd Street
Excel North (formerly Cottonwood)	City of Kenosha	5415 Adams Road
Harbor Village West	City of Kenosha	1150 82 Street
Home Inspired Senior Living	City of Kenosha	1201 Village Centre Drive
Kare Center	City of Kenosha	510 60th Street
Kenosha Place	City of Kenosha	5048 Green Bay Road
Kenosha Senior Living (formerly Harmony of Kenosha)	City of Kenosha	3109 30th Avenue
Lakeshore Health Kenosha (formerly Transition House I)	City of Kenosha	6024 18th Avenue
Lakeshore Health Kenosha 2 (formerly Transition House II)	City of Kenosha	5905 19th Avenue
(Lakeshore Health Kenosha 3 (formerly Transitional Living Services)	City of Kenosha	1834 60th Street
Legacy at St. Joseph's	City of Kenosha	9244 29th Avenue
Library Terrace Suites (formerly Canterbury Home of Kenosha)	City of Kenosha	7924 36th Avenue
Linden Home	City of Kenosha	3216 29th Street
North Point Senior Living (formerly Brookdale Kenosha North)	City of Kenosha	3109 12th Street
Open Arms	City of Kenosha	2217 56th Street
Parkside Manor	City of Kenosha	6300 67th Street
Robin Way (formerly Brookdale Pleasant Prairie)	Village of Pleasant Prairie	7377 88th Avenue
South Winds	City of Kenosha	6305 7th Avenue
Sycamore Home	City of Kenosha	9211 66th Street
Windy Oaks	Village of Pleasant Prairie	11831 120th Court
Willowbrook Assisted Living	City of Kenosha	3508 Washington Road

Table continued on next page.

Table C.1 (Continued)

Name	Community	Address
Assisted Living Facilities		
Adult Day Care		
Easter Seals Adult Day Care Services at Kenosha YMCA	City of Kenosha	7101 53rd Street
Lake View Recplex	Village of Pleasant Prairie	9900 Terwall Terrace
Matthias Academy	Village of Salem Lakes	12605 224th Avenue
Nursing Homes		
Brookside Care Center	City of Kenosha	3506 Washington Road
Claridge House	City of Kenosha	1519 60th Street
Crossroads Care Center of Kenosha	City of Kenosha	8633 32nd Avenue
Kenosha Estates Rehabilitation and Care Center	City of Kenosha	1703 60th Street
The Manor Kenosha	City of Kenosha	3100 Washington Road
The Bay at Sheridan Health	City of Kenosha	8400 Sheridan Road
The Bay at Water's Edge Rehabilitation and Care Center	City of Kenosha	3415 N. Sheridan Road
Grande Prairie Health and Rehabilitation Center	Village of Pleasant Prairie	10330 Prairie Ridge Boulevard
Residential Care Apartments		
Casa del Mare	City of Kenosha	3508 7th Avenue
Celebre Place	City of Kenosha	1870 27th Avenue
Cedarhurst of Kenosha (formerly Meadowmere Southport)	City of Kenosha	8351 Sheridan Road
Library Terrace Apartments (formerly Regent Manor)	City of Kenosha	7905 36th Avenue

Source: Kenosha County and SEWRPC

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HAZARD MITIGATION MATERIALS AND RELATED RESOURCES

APPENDIX D

Additional Items to Consider Adding to an Emergency Supply Kit:

- ❑ **Prescription medications and glasses**
- ❑ **Infant formula and diapers**
- ❑ **Pet food and extra water for your pet**
- ❑ **Important family documents such as copies of insurance policies, identification and bank account records in a waterproof, portable container**
- ❑ **Cash or traveler's checks and change**
- ❑ **Emergency reference material such as a first aid book or information from www.ready.gov**
- ❑ **Sleeping bag or warm blanket for each person. Consider additional bedding if you live in a cold-weather climate.**
- ❑ **Complete change of clothing including a long sleeved shirt, long pants and sturdy shoes. Consider additional clothing if you live in a cold-weather climate.**
- ❑ **Household chlorine bleach and medicine dropper** – When diluted nine parts water to one part bleach, bleach can be used as a disinfectant. Or in an emergency, you can use it to treat water by using 16 drops of regular household liquid bleach per gallon of water. Do not use scented, color safe or bleaches with added cleaners.
- ❑ **Fire Extinguisher**
- ❑ **Matches in a waterproof container**
- ❑ **Feminine supplies and personal hygiene items**
- ❑ **Mess kits, paper cups, plates and plastic utensils, paper towels**
- ❑ **Paper and pencil**
- ❑ **Books, games, puzzles or other activities for children**

Ready

Prepare. Plan. Stay Informed.®



Emergency Supply List

FEMA

www.ready.gov



Recommended Items to Include in a Basic Emergency Supply Kit:

- **Water, one gallon of water per person per day for at least three days, for drinking and sanitation**
- **Food, at least a three-day supply of non-perishable food**
- **Battery-powered or hand crank radio and a NOAA Weather Radio with tone alert and extra batteries for both**
- **Flashlight and extra batteries**
- **First aid kit**
- **Whistle to signal for help**
- **Dust mask, to help filter contaminated air and plastic sheeting and duct tape to shelter-in-place**
- **Moist towelettes, garbage bags and plastic ties for personal sanitation**
- **Wrench or pliers to turn off utilities**
- **Can opener for food (if kit contains canned food)**
- **Local maps**

Through its *Ready* Campaign, the Federal Emergency Management Agency educates and empowers Americans to take some simple steps to prepare for and respond to potential emergencies, including natural disasters and terrorist attacks. *Ready* asks individuals to do three key things: get an emergency supply kit, make a family emergency plan, and be informed about the different types of emergencies that could occur and their appropriate responses.

All Americans should have some basic supplies on hand in order to survive for at least three days if an emergency occurs. Following is a listing of some basic items that every emergency supply kit should include. However, it is important that individuals review this list and consider where they live and the unique needs of their family in order to create an emergency supply kit that will meet these needs. Individuals should also consider having at least two emergency supply kits, one full kit at home and smaller portable kits in their workplace, vehicle or other places they spend time.

Ready

FEMA

Federal Emergency Management Agency
Washington, DC 20472

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COMMUNITY CAPABILITY ASSESSMENT

APPENDIX E

Kenosha County Hazard Mitigation Capability Survey

INSTRUCTIONS

Each community has a unique set of capabilities available to them to accomplish mitigation and reduce long-term vulnerability to natural hazard events. These capabilities include authorities, policies, programs, staff, technical knowledge, and funding, among others. By reviewing the existing capabilities in your jurisdiction, we can identify capabilities that are currently effective in reducing disaster impacts to your community and identify those areas where increased capacity may improve your community's ability to reduce risk. Please take a few minutes to complete this important survey to tell us about your community's current capabilities.

Your input will serve as part of your jurisdiction's participation in the Hazard Mitigation Plan update, which is required under federal guidelines to maintain eligibility for FEMA hazard mitigation funding.

DEADLINE: Please complete the survey by December 21, 2023.

Thank you for your participation!
If you have any questions, please contact Chris Parisey, Southeastern Wisconsin Regional Planning Commission, at 262.953.3236 or cparisey@sewrpc.org.

Please indicate which jurisdiction you are representing (include municipality and department/jurisdiction):

PLANNING

Does your community have the following capabilities to implement hazard mitigation strategies?

	Yes	No	Unsure
Comprehensive or Community Master Plan	○	○	○
Capital Improvement Plans	○	○	○
Economic Development Plan	○	○	○

Operations Plan	○	○	
Continuity of Operations Plan	○	○	○
Transportation Plan	○	○	○
Stormwater Management Plan	○	○	○
Disaster Recovery Plan	○	○	○
Watershed Restoration Plan	○	○	○

PLANNING: Other (please specify below)

If you would like to include other planning capabilities not already listed, please do so here.

ORDINANCES/ZONING

Does your community have the following capabilities to implement hazard mitigation strategies?

	Yes	No	Unsure
General Zoning Ordinance	○	○	○
Building Code	○	○	○
Floodplain Zoning	○	○	○
Shoreland or Shoreland/Wetland Zoning	○	○	○
Farmland Preservation	○	○	○

ORDINANCES/ZONING: Other (please specify below)

If you would like to include other ordinances/zoning capabilities not already listed, please do so here.

PERSONNEL/TECHNICAL

Does your community have the following capabilities to implement hazard mitigation strategies?

	Yes	No	Unsure
Designated Emergency Management Manager	○	○	○
Planner/Engineer with land development knowledge	○	○	○
Engineer or other professional with building and infrastructure construction training	○	○	○
Planner/Engineer with understanding of natural hazards	○	○	○
Public Works	○	○	○
Building Inspector or Official	○	○	○
Floodplain Manager or Administrator	○	○	○
Grant writing	○	○	○

GIS analysis	○	○	
Hazard data and information	○	○	○
Warning Systems/Services	○	○	○
Maintenance programs to reduce risk (i.e., tree trimming, clearing drainage systems)	○	○	○
Mutual aid agreements	○	○	○

PERSONNEL/TECHNICAL: Other (please specify below)

If you would like to include other personnel and technical capabilities not already listed, please do so here.

FINANCIAL/FUNDING

Does your community have the following capabilities to implement hazard mitigation strategies?

	Yes	No	Unsure
Capital Improvements Project Funding	○	○	○
Authority to levy taxes for special purposes	○	○	○
Stormwater Utility Fee	○	○	○
Community Development Block Grant	○	○	○

sewer, gas, or electrical services			
Impact fees for new development	○	○	○

FINANCIAL/FUNDING: Other (please specify below)

If you would like to include other financial/funding capabilities not already listed (i.e., Federal, State, or other funding sources), please do so here.

OUTREACH/ENGAGEMENT

Does your community have the following capabilities to implement hazard mitigation strategies?

	Yes	No	Unsure
Staff with knowledge in natural hazards to attend expos and community gatherings	○	○	○
Ongoing public education or informational programs (e.g. household preparedness, fire safety)	○	○	○
Local Citizen or Non-Profit groups focused on vulnerable populations	○	○	○
Local Citizen or Non-Profit groups focused on environmental protection	○	○	○

Profit groups focused on emergency preparedness			
Municipal Newsletter	○	○	○
Emergency notification apps	○	○	○

OUTREACH/ENGAGEMENT: Other (please specify below)

If you would like to include other outreach and engagement capabilities not already listed, please do so here.

COMMUNITY CAPACITY

Considering the five categories of community capabilities, rate the capacity of your community to implement hazard mitigation projects and strategies.

	Low	Moderate	High
Planning	○	○	○
Ordinances/Zoning	○	○	○
Personnel and Technical	○	○	○
Financial/Funding	○	○	○
Outreach and Engagement	○	○	○

PLANNING

List specific planning capabilities that, if improved upon, would advance your community's ability to implement hazard mitigation projects or strategies.

ORDINANCES/ZONING

List specific ordinances/zoning capabilities that, if improved upon, would advance your community's ability to implement hazard mitigation projects or strategies.

PERSONNEL/TECHNICAL

List specific personnel/technical capabilities that, if improved upon, would advance your community's ability to implement hazard mitigation projects or strategies.

FINANCIAL/FUNDING

List specific financial/funding capabilities that, if improved upon, would advance your community's ability to implement hazard mitigation projects or strategies.

OUTREACH/ENGAGEMENT

List specific outreach/engagement capabilities that, if improved upon, would advance your community's ability to implement hazard mitigation projects or strategies.

GREATEST NEEDS

What do you consider the top three needs to improve your community's capacity to implement hazard mitigation projects and strategies?

1000

Submit

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POTENTIAL FUNDING PROGRAMS TO IMPLEMENT PLAN RECOMMENDATIONS WITHIN KENOSHA COUNTY

APPENDIX F

Table F.1
Potential Funding Programs to Implement Plan Recommendations

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided
1	U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA)	Hazard Mitigation Grant Program	State agencies and participating National Flood Insurance Program (NFIP) communities; federally recognized tribes, tribal agencies, private nonprofits, and local government/communities	1. Floodproofing 2. Relocation of structures 3. Elevation of structures 4. Property acquisition 5. Conformity with approved state and local mitigation plan 6. Plan preparation 7. Safe room construction 8. Construction or modification of dikes, levees, floodwalls, seawalls, groins, jetties, breakwaters, and stabilized sand dunes	75 percent Federal cost-share assistance; 12.5 percent State match and 12.5 percent local match required[a]
2	FEMA	Flood Mitigation Assistance Grant Program	State agencies and participating NFIP communities; federally recognized tribes, tribal agencies, local governments/communities	1. Elevation, relocation, or demolition of insured structures 2. Acquisition 3. Dry floodproofing 4. Minor structural projects 5. Beach nourishment activities 6. Projects must be consistent with the goals and objectives identified in the State, tribal, or local mitigation plans	Funding is appropriated by Congress;[b] 75 percent Federal cost-share assistance; 25 percent local match required; two types of grants: Planning grant and project grant[c]
3	FEMA	Public Assistance Grant Program	State, tribal, territorial, and local governments; certain types of private nonprofit organizations	1. Rebuilding infrastructure damaged during a flood 2. Building infrastructure for portions of a community that are to be relocated outside of floodplains 3. Limited assistance with structural elevation and relocation	75 percent Federal cost-share assistance; the State determines the local match
4	FEMA	National Training and Education Division	State and local first responders; private sector and tribal entities	1. Provides preparedness training and exercise support to first responders in the event of a manmade or natural catastrophic event 2. Provides educational services in 18 professional disciplines	Provides over 150 training courses for first responders
5	FEMA	Building Resilient Infrastructure and Communities Program	Applicants: States, Territories, and Tribal governments Sub-applicants: Local and Tribal governments and State and Tribal agencies	1. Capability- and capacity-building activities 2. Hazard mitigation projects 3. Management costs	Funding is appropriated by Congress;[b] 75 percent Federal cost-share assistance provided (small, impoverished communities may be eligible for up to 90 percent federal cost-share); 25 percent State or local match is required

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Table F.1 (Continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided
6	FEMA	Homeland Security Preparedness Technical Assistance Program	State, local, and tribal governments	1. Activities that help achieve the National Preparedness Goal 2. Education and training on emerging homeland security issues	No statutory matching requirements; Amounts awarded vary based on the scope of the project
7	FEMA	Assistance to Firefighters Grant Program	City, County, Village, Tribal, and Township Fire Departments; nonaffiliated emergency medical services (EMS) organizations, State Fire Training Academies (SFTA)	1. Firefighter and EMT training 2. Firefighting and EMS equipment 3. Firefighter personal protective equipment	Cost-share matching fund requirements dependent upon size of population served by Fire Department
8	FEMA	Staffing for Adequate Fire and Emergency Response Grants (SAFER)	City, County, Village, Tribal, and Township Fire Departments (volunteer, combination, and career fire departments)	1. Hiring of new, additional firefighters to improve staffing levels 2. Recruitment and retention of volunteer firefighters involved with or trained in the operations of firefighting and emergency response	Salary and associated benefits for new firefighters and volunteer firefighters; Recipients of SAFER Recruitment and Retention of Volunteer Firefighters Activity grants are not required to contribute matching funds; Firefighters Activity grant recipients are required to contribute non-federal funds subject to a Position Cost Limit and a Cost Share (see program guidance)
9	U.S. Army Corps of Engineers (USACE)	Continuing Authorities Program—Snagging and Clearing for Flood Risk Management Program	State and local units of government	1. Removal of obstructions that restrict flood flows of navigable waters 2. Projects must be designed and constructed by the Corps	Federal share cannot exceed $500,000 for a given project; cost-share program with local match of 35 percent for design and preparation; construction cost varies between 30 percent and 65 percent federal share
10	USACE	Continuing Authorities Program—Emergency Streambank and Shore Protection Program	Local governments	1. Bank protection of highways, highway bridges, essential public works, churches, hospitals, schools, and other nonprofit public services from flood induced erosion	Federal share cannot exceed $5,000,000 for a given project; cost-share program with local match of 35 percent for design and construction required
11	USACE	Small Hurricane and Storm Damage Reduction Program	State agencies and local units of government	1. Beach nourishment 2. Floodproofing 3. Other structural and nonstructural storm damage reduction projects	Federal share cannot exceed $5,000,000 for a given project; cost-share program with local contribution of 35 percent for design and construction required
12	USACE	Water Resources Development and Flood Control Acts	Local governments	1. Water resources planning assistance 2. Emergency streambank and shoreline protection	50 percent for studies and 65 percent for project implementation of Federal cost-share assistance; 35 to 50 percent local match is required
13	USACE	Continuing Authorities Program—Flood Risk Management Program	Local governments and special authorities	Assistance for planning, design, and construction of structural and non-structural flood control projects. Projects are not limited to any particular type of improvement.	Feasibility study is 100 percent federally funded up to $100,000; 50 percent local match required for any costs exceeding $100,000; 65 percent federal cost share for project implementation with 35 percent local match required

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Table F.1 (Continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided
14	USACE	Floodplain Management Services Program	State, regional, and local governments; federally recognized Native American Tribes; other non-federal public agencies	1. Floodplain delineation 2. Flood hazard evaluation 3. Dam break analysis 4. Stormwater management 5. Flood risk reduction	100 percent federal cost-share assistance provided; entities may provide voluntary contributions
15	USACE	Flood Damage Reduction Program	State and local units of government	1. Projects designed to reduce the impact of flood events 2. Projects must be designed and constructed by the Corps	50 to 65 percent Federal cost-share assistance above $100,000 and cannot exceed $10 million; 35 to 50 percent local match is required
16	National Oceanic and Atmospheric Administration (NOAA)	Coastal Estuarine Land Conservation Program	Public agencies	1. Protect, restore, and enhance Great Lakes coastal wetlands 2. Protect restore, and enhance coastal and riparian habitats in the Great Lakes basin	50 percent Federal cost-share not to exceed $1.5 million; requires 50 percent non-federal match
17	U.S. Department of Agriculture (USDA)	Water and Waste Disposal Loan & Grant Program	Local units of government, nonprofit organizations; Meant for rural areas and towns of less than 10,000 people	Funds may be used to finance the acquisition, construction, or improvement of: 1. Drinking water sourcing, treatment, storage, and distribution 2. Sewage collection, transmission, treatment, and disposal 3. Stormwater collection, transmission, and disposal	Long-term, low interest loans. If funds are available, grants may be combined with a loan if necessary to keep user costs reasonable
18	U.S. Department of Agriculture, Farm Services Agency (FSA)	Conservation Reserve Program	Individual landowners in a 10- or 15-year contract	1. Riparian buffers 2. Trees 3. Windbreaks 4. Grassed waterways 5. Farmer must have owned or operated the land for at least 12 months prior to the previous program sign-up period	50 percent Federal cost-share assistance; 50 percent local match from individual; an annual rental payment for the length of the contract is also provided
19	FSA	Conservation Reserve Enhancement Program	Individual landowners who have owned or operated land for at least 12 months prior to submitting an offer	1. Filter strips 2. Riparian buffers 3. Grassed waterways 4. Permanent grasses (only in specially designated grassland project areas) 5. Wetland development and restoration	50 percent Federal cost-share assistance; one-time signing incentive payment of $100 per acre for installing grass waterways, filter strips, and riparian buffers; one-time practice incentive payment equal to 40 percent of the eligible reimbursable cost to install grass waterways, filter strips, and riparian buffers; an annual rental payment; State of Wisconsin provides an incentive payment (equal to 20 percent of the eligible reimbursable cost of installing the approved practice), a one-time payment for land enrolled in the State's perpetual easement, and a one-time payment for land enrolled in the State's agreement program

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Table F.1 (Continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided
20	FSA	Emergency Conservation Program	Individual landowners	1. Grading and shaping farmland 2. Restoring conservation structures 3. Redistribution of eroded soil 4. Debris removal 5. Projects must be in response to a natural disaster	Up to 75 percent Federal cost-share assistance, the remaining is determined by the committee reviewing the application
21	FSA	Farmable Wetland Program	Individual agricultural landowners in 10- or 15- year contracts	1. Restore currently farmed wetland	One-time $100 per acre Federal signing incentive; up to 50 percent Federal cost share assistance for installation of practices plus one-time incentive payment of 40 percent of practice installation cost; annual rental payments based on the weighted average dryland cash rate
22	U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS)	Agricultural Conservation Easement Program-Wetlands Reserve Easements	Local government and individual landowners	1. Purchase agricultural land easements that protect the conservation values of eligible land 2. Wetland protection, restoration, and enhancement	Permanent easement: NRCS pays 100 percent of easement value and 75 to 100 percent of restoration cost 30-year easement: NRCS pays 50 to 75 percent of easement value and 50 to 75 percent of restoration cost
23	NRCS	Conservation Stewardship Program	Individual landowners in a five-year contract	1. Filter strips 2. Riparian Buffers 3. Wildlife corridors 4. Stream habitat improvement	Payments for maintaining and/or enhancing natural resources not to exceed $40,000 per year or $200,000 over a five-year period
24	NRCS	Watershed Protection and Flood Prevention Program	State and local units of government; tribal governments	1. Watershed protection 2. Flood prevention measures 3. Benefits that are directly related to agriculture must be at least 20 percent of the total project benefits 4. Watersheds can be no larger than 250,000 acres	Cost-share rates vary depending on the type of measure and the purpose to which the cost is allocated; total average annual monetary benefits equal $2.2 billion
25	NRCS	Emergency Watershed Protection Program – Floodplain Easement Option	Individual landowners provided they have a local sponsor such as a local unit of government	1. Sale of agricultural flood prone lands to NRCS for floodplain easements 2. Land must have a history of repeated flooding (at least twice in the past 10 years) 3. Landowner retains most of the rights as before the sale 4. NRCS has authority to restore the floodplain function and value	The USDA pays the landowner the lowest of three options: a geographic rate, the fair market value of the land, or an offer made by the landowner; 75 percent Federal cost-share assistance; 25 percent local match is required[d]
26	NRCS	Emergency Watershed Protection Program - Recovery Assistance	Individual landowners provided they have a local sponsor such as a local unit of government	1. Debris removal 2. Reshaping and protection of eroded streambanks 3. Repair levees and structures 4. Repair damaged drainage facilities	Up to 75 percent Federal cost-share assistance; 25 percent local match is required
27	NRCS	Environmental Quality Incentives Program	Agricultural producers, owners of non-industrial private forestland, Indian Tribes, and those with an interest in the agricultural or forestry operations	1. Animal waste management practices 2. Soil erosion and sediment control practices 3. Nutrient management 4. Groundwater protection 5. Habitat improvement	Up to 75 percent Federal cost-share assistance; 25 percent local match is required

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Table F.1 (Continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided
28	USDA Risk Management Agency	Federal Crop Insurance	Agricultural producers	1. Insurance of selected crops against losses due to natural hazards 2. USDA Risk Management Agency administers this program; however producers purchase Federal crop insurance through private insurance agents	Insurance of selected crops against losses due to natural hazards
29	U.S. Fish and Wildlife Service (FWS)	North American Wetlands Conservation Grants Program	Private or public organizations	1. Land acquisition 2. Restoration, management, and enhancement of wetland ecosystems and other habitat for migratory birds and other fish and wildlife	Applicants must match their grant request at no less than a 1-to-1 ratio; requests for small grants may not exceed $100,000
30	FWS	Partners for Fish and Wildlife Habitat Restoration Program	Private landowners for a 10-year-minimum contract	1. Restoration of degraded wetlands, native grasslands, stream and riparian corridors, and other habitat areas	Full cost-share and technical assistance; individual projects cannot exceed $25,000
31	U.S. Department of Housing and Urban Development (HUD)	Community Development Block Grant Program	Local governments	1. Public Facilities Grants to fund tornado shelters and safe houses 2. Housing Grants to fund the rehabilitation of housing to meet current building codes 3. Funds continuous training course for the building code authority	No matching requirements; Amounts awarded vary based on assessed community needs
32	HUD and Wisconsin Department of Administration, Division of Energy, Housing, and Community Resources	Community Development Block Grant Program-Emergency Assistance Program	Local governments	1. Repair of public infrastructure 2. Housing rehabilitation to low-and moderate-income homeowners 3. Business assistance	75 percent Federal cost-share assistance; 25 percent local match required; maximum grant award equals $500,000
33	HUD	Healthy Homes Technical Studies Grant Program	State, tribal, and local governments; non-profit organizations, for-profit firms, educational institutions	1. Improve methods for detecting and controlling key housing-related health and safety hazards and improve environmental sampling protocols 2. Evaluate efficacy and cost-effectiveness of interventions to address high-priority residential health and safety hazards	Approximately $6 million available nationally;[b] awards range from $300,000 to a maximum grant award of $1,000,000; No match is required, applicant leveraging contributions are encouraged
34	U.S. Small Business Administration	Disaster Loan Program	Homeowners, renters, and businesses	1. Property repair 2. Property replacement 3. Meeting building code requirements 4. Involuntary relocations out of a special flood hazard area	Low interest loans
35	U.S. Environmental Protection Agency (USEPA)	Pesticide Environmental Stewardship Grants	Companies and organizations that use pesticides, represent pesticide users, or implement or influence pest management practices of pesticide users (pesticide manufacturers and producers are not eligible)	1. Implementation of pollution control measures 2. Plan development that includes strategies to reduce pesticide risk	Approximately $500,000 available nationally;[b] locally grants are provided up to a maximum of $50,000

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Table F.1 (Continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided
36	USEPA	Environmental Education Grants Program	Local or State education agencies, colleges, and nonprofit organizations; State environmental agencies, tribal education agencies, and noncommercial educational broadcasting agencies	1. Improving environmental education teaching skills 2. Educating teachers, students, or the public about human health problems 3. Building capacity for environmental education programs 4. Education communities 5. Educating the public through print, broadcast, or other media	$3 million available nationally,[b] grants range from $50,000 to $100,000; up to 75 percent federal cost share assistance, 25 percent local match is required
37	USEPA	Targeted Watershed Grants	Watershed organizations nominated by State Governors or Tribal leaders	1. Watershed-based projects to protect water resources (i.e., wetland restoration) 2. Training and technical assistance to local partnerships	75 percent maximum Federal cost-share assistance; Minimum 25 percent non-Federal match
38	U.S. Department of Health and Human Resources, National Institutes of Health	National Institute of Environmental Health Sciences (NIEHS) Hazardous Waste Worker Health and Safety Training	Public and private nonprofit organizations involved in hazardous waste removal, containment, or chemical emergency response	1. Assists organizations in the development of institutional competency to provide appropriate training and education to hazardous waste workers 2. Assists in development of model worker health and safety training programs consisting of classroom and practical health and safety training of workers in the treatment, storage, disposal, removal, containment, transportation or hazardous materials 3. Aids with training and education, emergency response in regard to a hazardous waste incident	No statutory matching requirements; Grants generally range from $26,960 to $2.7 million; Average grant awarded is $833,895 (2018)
39	U.S. Department of Transportation (USDOT), Federal Highway Administration (FHWA)	Surface Transportation Block Grant Program	State and local units of government	Provides funding assistance for smaller-scale transportation projects and activities such as improvements to pedestrian and bicycle facilities and recreational trails; provides assistance for community improvements such as historic preservation and vegetation management, and environmental mitigation related to stormwater and habitat connectivity	80 percent Federal cost-share assistance; 20 percent local match is required
40	USDOT	Transportation Enhancement Program	State and local units of government	1. Wetland preservation and restoration 2. Stormwater treatment systems to address runoff from roads and highways 3. Land acquisition for scenic easements, pedestrian and bike trails, and abandoned railway corridors	80 percent Federal cost-share assistance; 20 percent local match is required For land acquisition: 50 percent Federal cost-share assistance; 50 percent local match is required
41	Wisconsin Department of Administration	Wisconsin Coastal Management Grant Program	State and local units of government, nonprofit organizations, and tribal agencies	Enhancement and restoration of coastal resources within the state's coastal zone; eligible activities include wetland protection, nonpoint source pollution control, and historic preservation projects	Approximately $1.5 million is available biennially to all counties adjacent to Lakes Superior and Michigan

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Table F.1 (Continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided
42	Wisconsin Department of Agriculture, Trade, and Consumer Protection (DATCP)	Farmland Preservation Program	Individual landowners for a period of 10 years	Best management practices that will lower the soil erosion rate to the tolerable soil loss rate or below and improve water quality	Tax incentives on an annual basis
43	DATCP	Land and Water Resource Management Program	Individual landowners	1. Grassed waterways 2. Manure storage systems 3. Grade stabilization structures 4. Well abandonment 5. Conservation tillage	50 to 70 percent State cost-share assistance; 30 to 50 percent individual cost-share is required; in the case of financial hardship, up to 90 percent cost-share assistance can be obtained from State
44	DATCP	Soil and Water Resource Management Program	Individual landowners	1. Wetland restoration 2. Filter strip, riparian buffers 3. Subsurface drainage 4. Well abandonment	Program funds 70 percent of the cost of conservation project
45	Wisconsin Department of Natural Resources (WDNR)	Municipal Flood Control Grants Chapter NR 199 of the *Wisconsin Administrative Code*	Cities, villages, towns, metropolitan sewerage districts	1. Acquisition and removal of structures 2. Flood proofing and elevation of structures 3. Riparian restoration projects 4. Acquisition of vacant land or purchase of easements 5. Construction of stormwater and groundwater facilities related to flood control and riparian restoration projects 6. Flood mapping	50 percent State cost-share assistance; 50 percent local match
46	WDNR	Urban Green Space Program	Local units of government, tribal governments, lake protection and rehabilitation districts, and nonprofit conservation organizations	Land acquisition for greenway space in urban areas, protection of scenic or ecological features, and wildlife habitat improvement; local governments must have a WDNR accepted comprehensive outdoor recreation plan or master plan that has been approved by resolution by the local governing unit	50 percent State cost-sharing assistance; 50 percent local match is required
47	WDNR	Remediation and Redevelopment Program	Responsible Party	Oversees the investigation and cleanup of environmental contamination and the redevelopment of contaminated properties; consolidates state and federal cleanups into one program	Provide technical assistance and support
48	WDNR	Lake Classification and Local Ordinance Development Grants, Section NR 191.30 of the *Wisconsin Administrative Code*	Local units of government, lake districts	Development or improvement of ordinances related to conservancy, wetland, shoreland, floodplain, construction erosion control, stormwater control or other ordinances with water quality or lake protection benefit	75 percent State cost-share, not to exceed $50,000

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Table F.1 (Continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided
49	WDNR	Lake Management Planning Grant Program, Chapter NR 190 of the *Wisconsin Administrative Code*	Local units of government, lake districts, town sanitary districts, qualified school districts, and nonprofit conservation organizations	1. Gathering and analyzing water quality information 2. Land use planning within lake watersheds 3. Gathering and compiling demographic information pertinent to individual lakes 4. Developing lake management plans	Up to 67 percent State cost-share assistance for small-scale lake planning grants, not to exceed $3,000; 33 percent local match is required; up to 67 percent State cost-share assistance for large-scale lake planning grants, not to exceed $25,000; 33 percent local match is required; lakes are eligible for more than one grant, however, the total amount of State dollars cannot exceed $100,000; maximum grant award of $50,000 in any one year for each lake
50	WDNR	Lake Protection and Classification Grant Program, Chapter NR 191 of the *Wisconsin Administrative Code*	Local units of government, lake districts, and nonprofit conservation organizations	1. Land acquisition for easement establishment 2. Wetland restoration 3. Lake restoration projects 4. Other projects involving lake improvement	75 percent State cost-share which cannot exceed $200,000 for land/easement acquisition projects; cannot exceed $100,000 for wetland and shoreline habitat restoration projects; 25 percent local match is required
51	WDNR	Land and Water Conservation Fund Program	Counties, cities, villages, towns, school districts	1. Land acquisition or development that will provide opportunities for outdoor recreation 2. Property with frontage on rivers, streams, lakes, estuaries, and reservoirs that will provide water-based outdoor recreation 3. Property that provides special recreation opportunities, such as floodplains, wetland, and areas adjacent to scenic highways	50 percent State cost-share assistance; 50 percent local match is required
52	WDNR	Land/Easement Acquisition for River Management Section NR 195.13 of the *Wisconsin Administrative Code*	Local units of government, lake districts, town sanitary districts, qualified river management associations, and qualified nonprofit conservation organizations	Land acquisition and easements for river protection	75 percent State cost-share assistance; 25 percent local match is required; Grant not to exceed $50,000
53	WDNR	Knowles-Nelson Stewardship Grant Program, Chapter NR 51 of the *Wisconsin Administrative Code*	Local government and nonprofit conservation organizations	1. Streambank protection projects 2. Land acquisition of stream corridors for water quality improvement	50 percent State cost-share assistance; 50 percent local match is required
54	WDNR	Municipal Dam Grant Program	Counties, cities, villages, tribes, inland lake protection and rehabilitation districts	1. Dam repair, reconstruction, or modification to improve safety 2. Dam abandonment and removal	For repair, reconstruction, or modification projects grant awards cover 50 percent of the first $400,000 and 25 percent of the next $800,000 of eligible project costs For abandonment and removal projects, grant awards will cover 100 percent of the first $400,000 of eligible project costs
55	WDNR	Urban Rivers Grant Program. Funding is through Chapter NR 51 of the *Wisconsin Administrative Code*	Local governments, tribal governments, and nonprofit conservation organizations	Land acquisition to preserve open areas in urban environments adjacent to streams and rivers	50 percent State cost-share assistance; 50 percent local match is required

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Table F.1 (Continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided
56	WDNR	Urban Nonpoint Source and Stormwater Grants Program. Funding is through Chapter NR 155 of the *Wisconsin Administrative Code*	Local units of government, tribal governments, regional planning commissions, and special purpose lake, sewerage and sanitary districts	1. Planning 2. Educational and information activities 3. Ordinance development and enforcement 4. Land acquisition and easement purchase 5. Storm water detention ponds 6. Streambank and shoreline stabilization	70 percent State cost-share assistance for projects not involving construction, requiring a 30 percent local match; 50 percent State cost-share assistance for projects involving construction, requiring a 50 percent local match
57	WDNR	Targeted Runoff Management Grants, Chapter NR 153 of the *Wisconsin Administrative Code*	Local units of government, tribal governments, regional planning commissions, and special purpose lake, sewerage, and sanitary districts	1. Complying with nonpoint source performance standards 2. Improving 303(d) waters 3. Protecting outstanding water resources 4. Compliance with a notice of discharge for an animal feeding operation 5. Addressing a water quality concern of national or statewide importance, such as the Upper Mississippi River concerns	70 percent State cost-share assistance; 30 percent local match is required. Grant awards not to exceed $150,000 for small-scale TMDL and non-TDML projects
58	WDNR	River Protection Grant Program, Chapter NR 195 of the *Wisconsin Administrative Code*	Local units of government and nonprofit conservation organizations, qualified river management organizations	1. Activities designed to develop partnerships that protect river ecosystems 2. Educational projects 3. Activities associated with river management plan development 4. Land acquisition 5. Ordinance development 6. Installation of practices to control nonpoint source pollution	75 percent State cost-share assistance; 25 percent local match is required; Planning grants not to exceed $10,000, and Management grants not to exceed $50,000
59	WDNR	Safe Drinking Water Loan Program	Local units of government, sanitary and utility districts, and federally recognized tribes	Drinking water infrastructure projects	Loans at 55 percent of market share
60	WDNR	Clean Water Fund Program	Local units of government, sanitary and utility districts, and federally recognized tribes	1. Compliance with nonpoint source performance standards 2. Stormwater management projects 3. Projects seeking water conservation, efficiency, and reuse 4. Construction or maintenance of water treatment facilities	Loans at 55 percent of market rate
61	WDNR	Wisconsin Forest Landowner Grant Program	Individual landowners with a Forest Stewardship Plan prepared by a forester	1. Stream buffer establishment 2. Streambank stabilization 3. Wetland restoration	Up to 50 percent cost-share assistance; 50 percent local match is required
62	Wisconsin Department of Transportation (WisDOT)	Transportation Alternatives Program	Local governments, regional transportation authorities, transit agencies, natural resources or public land agencies, school districts, tribal governments	1. Infrastructure-related projects and systems that will provide safe routes for non-drivers 2. Community improvement projects 3. Environmental mitigation activities	80 percent State match; Minimum of $300,000 for infrastructure projects, minimum of $50,000 for non-infrastructure projects; No maximum, but grants exceeding $1 million are unlikely

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Table F.1 (Continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided
63	WisDOT	Highway Safety Improvement Program	Local governments	1. Intersection safety improvements 2. Installing guardrails, signs, pavement markings 3. Corridor signal upgrades 4. Warning devices	90 percent Federal reimbursement; 10 percent match required; State pays match on projects on State trunk highways, local government pays match on local streets and highways
64	Wisconsin Public Service Commission	Telecommunications, Water, Energy Divisions	Local governments	Incorporate disaster resilience into regulation development, land use practices and environmental impacts of public utilities	General Utility Assistance
65	University of Wisconsin Cooperative Extension	Extension Disaster Education Network	Local governments	Provides community education and public information programs promoting hazard awareness and mitigation concepts	Education and Information provided through the University of Wisconsin System
66	Great Lakes Protection Fund	Great Lakes Protection Fund Grants Program	State and local units of government, nonprofit organizations, for-profit businesses, educational institutions, and individuals	1. Protect and restore the health of the Great Lakes 2. Promote the interdependence of healthy ecological and economic systems 3. Support innovative, creative, and venturesome ideas	Matching funds not required; past awards have ranged from $20,000 to $1.6 million; average award $460,000
67	Great Lakes Restoration Initiative	Multiple funding programs available	Varies by program	Clean toxins, combat invasive species, protect water quality, restore wetlands and other habitats	Varies by program
68	Joyce Foundation	Joyce Foundation Grant Program	State and local units of government, nonprofit organizations and individuals, educational institutions	1. To protect and restore the health of the Great Lakes 2. To promote the interdependence of healthy ecological and economic systems 3. To support innovative, creative, and venturesome ideas 4. Developing improved regulatory approaches 5. Better understanding of the supply of and demand for Great Lakes 6. Creating transportation alternatives to reduce over reliance on automobiles	Finance the total cost of accepted projects
69	National Fish and Wildlife Foundation (NFWF)	Wal-Mart Stores, Inc. Acres for America Program	State and local units of government, nonprofit organizations, Indian Tribes, educational institutions	Acquisition of permanent easement for conservation of habitat	$3.5 million available nationally annually; minimum 1:1 match ratio required; higher local match preferred
70	NFWF	Five-star and Urban Waters Restoration Grant Program	Nonprofit organizations, local governments, municipal governments, Indian tribes, educational institutions	1. Wetland restoration projects 2. Riparian restoration projects 3. Coastal and forest restoration projects 4. Projects must be part of a larger watershed project 5. Projects must have at least five contributing parties	$2,000,000 available nationally annually; project awards range from $20,000 to $50,000, average award $30,000; 1:1, non-federal match ratio required, higher local match preferred
71	NFWF	Resilient Communities Grant Program	Local governments 501(c) nonprofit organizations	1. Green infrastructure 2. Stream buffer enhancements	Awards range between $200,000 and $500,000

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Table F.1 (Continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided
72	NFWF	Sustain Our Great Lakes Community Grant Program	State and local units of government, tribal governments, nonprofit organizations, educational institutions	1. Wetland restoration, enhancement, and protection projects 2. Tributary restoration, enhancement, and protection projects 3. Shoreline restoration, enhancement, and protection projects 4. Projects must be in the Great Lakes basin (current and historic)	Grant awards range from $25,000 to $1,500,000; No match is required, however, the ratio of matching funds offered is considered during review
73	Kenosha/Racine Land Trust	Stewardship Grant Program, Urban Green Space Program	Land trusts, local units of government, and nonprofit organizations	1. Land acquisition for greenway space in urban areas 2. Protection of scenic or ecological features 3. Wildlife habitat improvement	Funding depends on specific projects
74	State Farm Companies Foundation	State Farm Good Neighbor Citizenship Company Grants	Government entities, educational institutions, 501(c)(3) nonprofit organizations, 501(c)(4) volunteer fire companies, 501(c)(6) chambers of commerce	1. Auto and road safety 2. Teen driver education 3. Home safety and fire prevention 4. Disaster preparedness and recovery	Grants of $5,000 or more

Note: Cost-share and local match requirements reported in this table can vary depending on specific details for individual projects.

[a] *The non-Federal share is 25 percent. In Wisconsin, the State Division of Emergency Management pays 12.5 percent, and the local community pays 12.5 percent.*

[b] *Funding available on an annual basis.*

[c] *Municipalities must have a flood mitigation plan to be eligible for a project grant.*

[d] *In kind services are allowed as a part of the local cost-share assistance.*

Source: FEMA, Department of Homeland Security, U.S. Environmental Protection Agency, Wisconsin Department of Natural Resources, U.S. Department of Justice, Wisconsin Emergency Management, the State of Wisconsin and SEWRPC

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TOWN OF SOMERS
TOWN BOARD
SESSION ITEM MEMORANDUM

WORK SESSION: August 14th, 2024

TO: Village President Stoner and Village Trustees

FROM: Wendy Burnette, Clerk-Treasurer

AGENDA ITEM: #8 Discussion and possible action Cigarette and Tobacco License Application for Superb Video

BACKGROUND:

Superb Video has held a Cigarette & Tobacco Product License for the last several years.

COMMENTS:

The current Cigarette & Tobacco Product licenses expired on June 30, 2024. Superb Video was missed when the renewal packets went out at the beginning of April.

After receiving notice from Superb Video, Clerk Burnette did investigate to make sure they had previously held this license.

SUGGESTED ACTION/ACTION REQUESTED/COMMENTS:

Staff would recommend approval. In the event that the Town Board proceeds with suggested action, a suggested motion to approve would be as follows:

"Motion to approve Superb Video Renewal Cigarette and Tobacco License for 2024-2025"

ATTACHMENTS:

Superb Video Cigarette and Tobacco Product Application

Form
CTV-100

Cigarette, Tobacco, and Electronic Vaping Device Retail License Application

FOR CLERKS ONLY	
Municipality	Town
License Period	7/1/24 - 6/30/25

Part A: Premises/Business Information

1. Legal Business Name (individual name if sole proprietor)
Suburban Inc.

2. Business Trade Name or DBA
Superb Video

3. FEIN	4. Wisconsin Seller's Permit Number
39-1609019	456-0000300746-03

5. Entity Type *(check one)*
☐ Sole Proprietor ☐ Partnership ☐ Limited Liability Company ☑ Corporation

6. State of Organization	7. Date of Organization	8. Wisconsin DFI Registration Number
Wisconsin	11/27/2085	S036226

9. Premises Address (do not use PO Box)
6005 120th Ave

10. City	11. State	12. Zip Code
Kenosha	WI	53142

13. County	14. Governing Municipality: ☑ City ☐ Town ☐ Village	15. Aldermanic District
Kenosha	of: Kenosha	

16. Mailing Address (if different from premises address)

17. City	18. State	19. Zip Code

20. Premises Phone	21. Premises Email	22. Website
(262) 857-9922	store6005@temptationsgroup.cc	

23. Premises Description - Describe the building or buildings where cigarettes, tobacco products, and electronic vaping devices are to be sold and stored. Describe all rooms including living quarters, if used, for the sales and/or storage of cigarettes, tobacco products, and electronic vaping devices and records. Cigarettes, tobacco products, and electronic vaping devices may be sold and stored ONLY on the premises described in this application. Attach a floor plan if possible.
Retail store with electronic vaping devises and tobacco products sold by front sales counters. Stock is stored by front counters.

Part B: Questions

1. What products will be sold at this business location? (check all that apply)
☐ Cigarettes ☑ Tobacco Products ☑ Electronic Vaping Devices

2. How will cigarettes, tobacco, and/or electronic vaping devices be sold? (check all that apply)
☑ Over the counter ☐ Vending machine

3. Is the applicant business owned by another business entity? ..... ☐ Yes ☑ No

If yes, provide the name and FEIN of the parent company below, identify parent company members in Part C, and attach Form CTV-101 for all of the parent company's members, partners, or officers.

3a. Name of Parent Company: _____

3b. FEIN of Parent Company: _____

Part C: Individual Information

An Individual Questionnaire, Form CTV-101, must be completed and attached to this application for each person involved in the applicant business and any parent company indicated in Part B. Such persons include: sole proprietor, all officers and agents of a corporation, all partners of a partnership, and all members and agents of a limited liability company.

List the full name, title, and phone number for each person below. Attach additional sheets if necessary.

Last Name	First Name	Title	Phone
Bishop	Ben	GM	(262) 633-9699

Part D: Attestation

One of the following must sign and attest to this application:

• sole proprietor • one general partner of a partnership • one corporate officer • one managing member of an LLC

READ CAREFULLY BEFORE SIGNING:

I understand and agree to the following:

- I will only purchase cigarettes, tobacco, and vapor products from distributors, jobbers, or subjobbers permitted by the Wisconsin Department of Revenue, unless I also hold the proper distributor's permit and pay all applicable excise taxes.
- I will not purchase or exchange products from another retailer, including transferring existing stock to a new owner.
- I will provide tobacco sales training that has been approved by the Wisconsin Department of Health Services to my employees. (https://witobaccocheck.org).
- I will not sell single cigarettes.
- I will not sell, give, or otherwise provide cigarettes, tobacco, or any nicotine products to minors.
- I will keep product invoices on the licensed premises for two years and ensure the records are available for inspection by law enforcement. Failure to comply with this will result in criminal penalties, including loss of inventory.
- I will not sell cigarettes or roll-your-own (RYO) tobacco products unless listed on the Wisconsin Department of Justice's directory of certified tobacco manufacturers and brands.

Further, under penalty provided by law, I state that this application has been truthfully answered to the best of my knowledge. I agree to operate this business according to law and that the rights and responsibilities conferred by the license(s), if granted, cannot be assigned to another. Any lack of access to any portion of a licensed premises during inspection will be deemed a refusal to permit inspection. Such refusal is a misdemeanor and grounds for revocation of this license. Any person who knowingly provides materially false information on this application may be required to forfeit not more than $1,000.

Signature	Date
[signature]	6.7.2024

Name (Last, First, M.I.)
Bishop, Ben J.

Title	Email	Phone
GM	ben@dlbpurchasing.com	(262) 633-9699

Part E: For Clerk Use Only

Date application was filed with clerk	Date license issued	Date license expires	License number
License fees	Signature of Clerk/Deputy Clerk		

Date 08/07/24

Form **CTV-101**

Cigarette, Tobacco, and Electronic Vaping Device License - Individual Questionnaire

Part A: Business Information

1. Legal Business Name (individual name if sole proprietor)
Suburban Inc.

2. Business Trade Name or DBA
Superb Video

3. Entity Type *(check one)*
☐ Sole Proprietor ☐ Partnership ☐ Limited Liability Company ☑ Corporation

Part B: Individual Information

1. Name (Last)	2. Name (First)	3. Name (M.I.)
Bishop	Ben	J

4. Relationship to Business (Title)	5. Email	6. Phone
GM	ben@dlbpurchasing.com	(262) 633-9699

7. Home Address
2924 Rapids Drive

8. City	9. State	10. Zip Code	11. Date of Birth
Racine	WI	53404	07/27/71

12. Drivers License/State ID Number	13. Drivers License/State ID State of Issuance
ON FILE	WI

Part C: Individual's Address History

List in chronological order all of your addresses within the last 5 years. Attach additional sheets if necessary.

Previous Address 1 2924 Rapids Drive	City Racine	State WI	Zip Code 53404
Previous Address 2	City	State	Zip Code
Previous Address 3	City	State	Zip Code
Previous Address 4	City	State	Zip Code
Previous Address 5	City	State	Zip Code
Previous Address 6	City	State	Zip Code

If applicable, list all states and counties you have lived in as an adult. Attach additional sheets if necessary.

State	County	State	County	State	County	State	County
State	County	State	County	State	County	State	County

Continued ⟶

Part D: Individual's Criminal History

1. Have you ever been convicted of any offenses (other than traffic offenses) for violation of any federal, Wisconsin, or another state's laws, or of any county or municipal ordinances? ☑ Yes ☐ No

If yes to question 1, please list details of each conviction below:

Law/Ordinance Violated	Location	Trial Date
Possession of TCH	Waukesha	
Penalty Imposed	Was sentence completed? ☑ Yes ☐ No	
Fine		
Law/Ordinance Violated	Location	Trial Date
Penalty Imposed	Was sentence completed? ☐ Yes ☐ No	
Law/Ordinance Violated	Location	Trial Date
Penalty Imposed	Was sentence completed? ☐ Yes ☐ No	

2. Are charges for any offenses currently pending against you (other than traffic offenses) for violation of any federal, Wisconsin, or another state's laws or any county or municipal ordinances? ☐ Yes ☑ No

If yes to question 2, describe nature and status of pending charges using the space below. Attach additional sheets as needed.

Part E: Attestation by Individual

READ CAREFULLY BEFORE SIGNING: I understand that I may be prosecuted for submitting false statements and affidavits in connection with this application, and that any person who knowingly provides materially false information on an application for cigarette, electronic vaping devices, and tobacco products retail license may be required to forfeit not more than $1,000 if convicted. I declare under penalties of the law that I have examined this information and, to the best of my knowledge, it is true, correct, and complete to the best of my knowledge and belief.

Signature	Date
[signature]	8-7-2024

Part F: Licensing Authority Approval

I hereby certify that I have checked municipal and state criminal records. To the best of my knowledge, with the available information, this individual qualifies to serve in the reported role with the above-named business.

Name of Local Official	Title
Signature of Local Official	Date

Form **CTV-102**

Cigarette, Tobacco, and Electronic Vaping Device Appointment of Agent

Date: 08/07/2024

Agent Type (check one): ☐ Original ☐ Change

Part A: Agent Information

1. Last Name	2. First Name	3. M.I.
Bishop	Ben	J

4. Email	5. Phone
ben@dlbpurchasing.com	(262) 633-9699

6. Home Address
2924 Rapids Drive

7. City	8. State	9. Zip Code
Racine	WI	53404

10. Date of Birth	11. Drivers License/State ID Number	12. Drivers License/State ID State of Issuance
07/27/1971		WI

Part B: Questions

1. Have you completed Form CTV-101, *Cigarette, Tobacco, and Electronic Vaping Device License - Individual Questionnaire*? Submit a completed Form CTV-101 with this form. ☑ Yes ☐ No

2. If this is a change of agent, please describe the reason for the agent change. Attach additional sheets if necessary.

Part C: Business Information

1. Legal Business Name (individual name if sole proprietor): Suburban Inc.

2. Business Trade Name or DBA: Superb Video

3. Entity Type (check one): ☐ Limited Liability Company ☑ Corporation

4. Premises Address: 6005 120th Ave

5. City	6. State	7. Zip Code
Kenosha	WI	53142

Part D: Attestations

READ CAREFULLY BEFORE SIGNING: I, the **Licensee**, authorize the above-named individual to act for the above-named corporation or limited liability company with full authority and control of the premises and of all business relative to cigarettes, tobacco products, and/or electronic vaping devices conducted therein. I certify that I am authorized by the entity to authorize this individual to act on behalf of the entity. If I am appointing a successor agent, I rescind all previous agent appointments for this premises. Further, I understand that I may be prosecuted for submitting false statements and affidavits in connection with this application, and that any person who knowingly provides materially false information on this application may be required to forfeit not more than $1,000 if convicted.

Signature of Licensee (officer, member, or authorized signatory)	Date
	8-7-2024

Name of Person Signing for Licensee	Title
Ben Bishop	GM

READ CAREFULLY BEFORE SIGNING: I, the **Agent**, herby accept this appointment as agent for the above-named corporation or limited liability company and assume full responsibility for the conduct of all business relative to sales of cigarettes, tobacco products, and/or electronic vaping devices conducted on the premises for the above-named business. I further understand that I may be prosecuted for submitting false statements and affidavits in connection with this form, and that any person who knowingly provides materially false information on this form may be required to forfeit not more than $1,000 if convicted.

Signature of Agent	Date
	8-7-2024 ✓