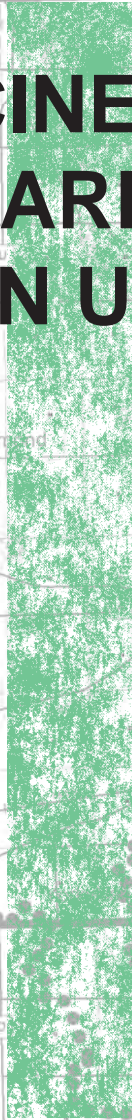


# RACINE COUNTY HAZARD MITIGATION PLAN UPDATE: 2017-2022



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COMMUNITY ASSISTANCE PLANNING REPORT  
NUMBER 266, 3rd Edition

**RACINE COUNTY HAZARD  
MITIGATION PLAN UPDATE: 2017-2022**

Prepared by the

Southeastern Wisconsin Regional Planning Commission  
Racine County Office of Emergency Management  
Racine County Public Works and Development Services

In Cooperation with

Federal Emergency Management Agency  
Wisconsin Department of Military Affairs, Division of Emergency Management

December 2017

\$20.00

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## Chapter I

# INTRODUCTION AND BACKGROUND

## INTRODUCTION

In December 2000, the Southeastern Wisconsin Regional Planning Commission (SEWRPC) and the Racine County Office of Emergency Management and Department of Planning and Development agreed to cooperatively prepare an all hazards mitigation plan for Racine County. The plan was 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). The plan was directed to the “all hazards” mitigation approach which the Wisconsin Division of Emergency Management and FEMA recommend as an option to single hazard mitigation planning. As such, consideration was given to many hazard conditions, including flooding; lakeshore bluff failure episodes; severe weather conditions, including wind storms, tornadoes, periods of extreme heat or cold, and winter storms; terrorism; civil disorder; urban fire or mass casualty; and hazardous materials situations. While the plan considered all of the potential hazards, it must be recognized that only limited mitigative actions were feasible for some of these hazards, since they are not site-specific or repetitive in nature.

This planning effort focused upon activities which are most directly related to the Racine County Office of Emergency Management. However, because of the importance in developing a partnership approach to coordinate emergency mitigation programs, the plan also incorporated consideration of programs involving other agencies, units of government, and private interests both inside and outside of the boundaries of Racine County.

The plan was prepared by the staffs of the Racine County Office of Emergency Management and Department of Planning and Development, and the Southeastern Wisconsin Regional Planning Commission. In preparing the plan, 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 Racine County Hazard Mitigation Plan Task Force, which was created by the County specifically for plan development purposes and was comprised of elected and appointed officials; agency and business representatives; and citizens from throughout the County knowledgeable in hazard mitigation matters.

The initial Racine County Hazard Mitigation Plan was adopted by the County and approved in 2004. It was subsequently adopted by the Cities and Villages within the County. The mitigation planning requirements of 44 *Code of Federal Regulations*, Section 201.6 (d) (44 CFR 201.6(d)) 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 March 2009 Racine County in cooperation with its 17 municipalities and the Southeastern Wisconsin Regional Planning Commission began preparation of an update of the initial hazard mitigation plan. The participating munic-

ipalities included the Cities of Burlington and Racine; the Villages of Caledonia, Elmwood Park, Mount Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford, and Wind Point; and the Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville. The updated plan was prepared by the staffs of the Racine County Office of Emergency Management and Department of Planning and Development, and the Southeastern Wisconsin Regional Planning Commission. In preparing the updated plan, 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 Racine County Hazard Mitigation Plan Task Force, which was created by the County specifically for plan development purposes and was comprised of elected and appointed officials; agency and business representatives; and citizens from throughout the County knowledgeable in hazard mitigation matters.

In April 2015, Racine County in cooperation with its 17 municipalities and the Southeastern Wisconsin Regional Planning Commission, began preparation of a second update of the Racine County hazard mitigation plan. The participating municipalities include the Cities of Burlington and Racine; the Villages of Caledonia, Elmwood Park, Mount Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford, and Wind Point; and the Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville. The participating jurisdictions are listed in Table 1. The updated plan was prepared by the staffs of the Racine County Office of Emergency Management, the Racine County Department of Planning and Development, and the Southeastern Wisconsin Regional Planning Commission. In addition, the planning was coordinated with the related activities of other concerned units of government and was developed under the guidance of the Racine County Hazard Mitigation Local Planning Team,<sup>1</sup> which was formed by the County specifically for plan development purposes and is comprised of elected and appointed officials; agency, business, and non-profit representatives; and citizens from throughout the County knowledgeable in hazard mitigation matters.

In assembling the Racine County Hazard Mitigation Plan Local Planning Team, the County Planning and Development Department and Office of Emergency Management sought representatives from a cross-section of community interests. Representatives from each municipality in the County were invited to participate. In addition, invitations were sent by e-mail to elected and appointed officials and representatives of law enforcement agencies, fire departments, public health departments, public works departments, engineering departments, private sector firms, and nonprofit organizations.

The mitigation planning requirements identified in 44 CFR 201.6 call for all jurisdictions participating in a multi-jurisdictional hazard mitigation plan to actively take part in the planning process. Examples of participation include, but are not limited to, attending planning meetings, contributing research, data, or other information, and commenting on drafts of the plan. Table 2 and 3 summarize municipal participation in the planning process and outreach activities, respectively, for the updated plan. Table 4 lists hazard mitigation activities undertaken by the municipalities in the County since the first plan update was issued in 2010.

For more complete details on the level of participation of local citizens and community groups in the Task Force for the initial plan and the first plan update, the public involvement process, and summary notes for each Local Planning Team meeting, see Appendix A.

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<sup>1</sup> For the development of the initial plan and the 2009-2010 update, this group was called the Racine County Hazard Mitigation Plan Task Force. For the current plan update, the name of this group has been changed to reflect the current terminology used by FEMA.

Table 1

JURISDICTIONS PARTICIPATING IN THE RACINE COUNTY ALL HAZARDS MITIGATION PLAN UPDATE: 2015-2017

Civil Division	Jurisdiction Status			
	New to the Plan	Continuing Participation	No Longer Participating	Never Participated
<b>Cities</b>				
Burlington .....	--	X	--	--
Racine .....	--	X	--	--
<b>Villages</b>				
Caledonia .....	--	X	--	--
Elmwood Park .....	--	X	--	--
Mt. Pleasant .....	--	X	--	--
North Bay .....	--	X	--	--
Rochester .....	--	X	--	--
Sturtevant .....	--	X	--	--
Union Grove .....	--	X	--	--
Waterford .....	--	X	--	--
Wind Point .....	--	X	--	--
<b>Towns</b>				
Burlington .....	--	X	--	--
Dover .....	--	X	--	--
Norway .....	--	X	--	--
Raymond .....	--	X	--	--
Waterford .....	--	X	--	--
Yorkville .....	--	X	--	--
<b>County</b>				
Racine County .....	--	X	--	--

Source: SEWRPC.

The procedures utilized in the plan are based upon guidance provided by the Federal Emergency Management Agency and the Wisconsin Department of Military Affairs, Wisconsin Emergency Management.<sup>2</sup> As such, the plan is consistent with the requirements and procedures defined in the Disaster Mitigation Act of 2000. The analysis includes three components: 1) profile and analysis of hazard events, 2) inventory of vulnerability assessment of community assets, and 3) development of hazard mitigation strategies.

**OVERVIEW OF STUDY AREA**

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

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<sup>2</sup> 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 2013 See also Federal Emergency Management Agency, State and Local Plan Interim Criteria under the Disaster Mitigation Act of 2000, July 11, 2002.

Table 2

**PARTICIPATION IN THE RACINE COUNTY ALL HAZARDS MITIGATION PLAN UPDATE PLANNING PROCESS**

Civil Division	Attendance at Task Force Planning Meetings				Provision of Data <sup>a</sup>	Review of Report
	June 2, 2015	October 27, 2015	June 20, 2016	April 26, 2017		
<b>Cities</b>						
Burlington .....	X	--	--	--	--	X
Racine .....	X	X	X	X	X	X
<b>Villages</b>						
Caledonia .....	X	X	X	X	X	X
Elmwood Park .....	--	--	--	--	X	X
Mt. Pleasant .....	X	--	X	X	X	X
North Bay .....	--	--	--	--	X	X
Rochester .....	X	X	X	X	X	X
Sturtevant .....	X	--	--	--	X	--
Union Grove .....	X	--	--	--	X	--
Waterford .....	X	X	X	--	X	X
Wind Point .....	X	--	--	--	--	--
<b>Towns</b>						
Burlington .....	X	X	--	--	X	X
Dover .....	X	X	X	--	X	X
Norway .....	X	X	X	--	X	X
Raymond .....	--	--	--	--	X	--
Waterford .....	X	X	--	--	X	X
Yorkville .....	X	--	--	--	--	--
<b>County</b>						
Racine County .....	X	X	X	X	X	X
<b>Other</b>						
State of Wisconsin	X	--	--	--	X	X
SEWRPC	X	X	X	X	X	X
Central Racine County Health Department .....	X	X	X	--	X	X
City of Racine Health Department	X	X	X	--	X	X
American Red Cross—Southeastern Wisconsin Chapter	X	--	--	--	--	--
YMCA of Racine	X	--	--	--	--	--
Wheaton Franciscan Healthcare .....	X	X	X	--	X	X
Great Lakes Community Conservation Corps .....	X	X	X	--	X	X
Accu-Temp Heat Treating	X	--	--	--	--	--
Cree Inc.	X	--	--	--	--	--
In-Sink-Erator	X	--	--	--	--	--
S.C. Johnson & Sons	X	X	X	--	--	--

NOTE: X indicates participation by at least one representative of the municipality.

<sup>a</sup>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.

**Table 3**

**OUTREACH ACTIVITIES BY LOCAL COMMUNITIES IN RACINE COUNTY RELATED TO HAZARD MITIGATION: 2009-2014**

Community	Activity
Racine County	County Website Office of Emergency Management webpages Ready Racine County Facebook page Ready Racine quarterly newsletter Contract with Root-Pike WIN for stormwater education and outreach
City of Burlington	Quarterly newsletter City website Email and text message information notices City Facebook page City Twitter account City Fire Department Facebook page City Police Department Facebook page Contract with Central Racine County Health Department for public health services and outreach
City of Racine	City website Email newsletter City Twitter account City Police Department Twitter account Health Department Facebook and Twitter page Contract with Nixle to send out geographically specific emergency alerts to wireless devices Contract with Root-Pike WIN for stormwater education and outreach
Village of Caledonia	Village website Village Police Department Facebook page Village Fire Department Facebook page Village Fire Department open house Village Fire Department yearly fire safety school program Village Police and Fire Department Safety Day Contract with Root-Pike WIN for stormwater education and outreach Contract with Central Racine County Health Department for public health services and outreach
Village of Elmwood Park	Village website Village Facebook page Village Email Informational Notices
Village of Mount Pleasant	Village website Village Facebook page Village Twitter account Village Police Department Facebook page Contract with Root-Pike WIN for stormwater education and outreach Contract with Central Racine County Health Department for public health services and outreach
Village of North Bay	Village website Quarterly Newsletter Village Email Informational Notices Contract with Central Racine County Health Department for public health services and outreach
Village of Rochester	Quarterly newsletter Compiling list of special needs residents who would need special assistance in the event of a disaster Visits by public works staff to homes at risk of flooding in the event of upstream dam failure to inform and advise residents Email and text message information notices Village Facebook page Contract with Central Racine County Health Department for public health services and outreach

**Table 3 (continued)**

Community	Activity
Village of Sturtevant	Quarterly newsletter Village website Village Police Department Facebook page Contract with Root-Pike WIN for stormwater education and outreach Contract with Central Racine County Health Department for public health services and outreach
Village of Union Grove	Quarterly newsletter Village website Village Facebook page Contract with Central Racine County Health Department for public health services and outreach
Village of Waterford	Quarterly newsletter Village website Press releases Contract with Central Racine County Health Department for public health services and outreach
Village of Wind Point	Monthly E-newsletter Village website Village Facebook page Village Twitter account Contract with Root-Pike WIN for stormwater education and outreach
Town of Burlington	Town website Contract with Central Racine County Health Department for public health services and outreach
Town of Dover	Town of Dover website Kansasville Fire and Rescue website Town of Dover Water Patrol Facebook page Contract with Central Racine County Health Department for public health services and outreach
Town of Norway	Town website Quarterly newsletter Town Facebook page Wind Lake Fire Department website Contract with Central Racine County Health Department for public health services and outreach
Town of Raymond	Town website Yearly newsletter Contract with Central Racine County Health Department for public health services and outreach
Town of Waterford	Town website Town Police Department Facebook page Contract with Central Racine County Health Department for public health services and outreach
Town of Yorkville	Town website Biannual newsletter Town Facebook page Contract with Central Racine County Health Department for public health services and outreach

Source: Racine County Office of Emergency Management, Local Municipalities, and SEWRPC.

Racine County covers about 340 square miles and contains two cities, nine villages, and six towns as shown on Map 1. There are all or parts of five natural watersheds and a total of about 4,000 acres of inland surface waters within the County. The County has a diversified natural resource base, including the Lake Michigan nearshore area and several inland lakes, as well as major river systems.

The majority of the population resides in the eastern portion of the County, within the City of Racine and the Villages of Caledonia, Mt. Pleasant, and Sturtevant. However, population centers are also found in the western communities, including the City of Burlington and Villages of Rochester, Union Grove, and Waterford, and in the vicinity of the major lakes, including the Wind Lake, Tichigan Lake, Eagle Lake, Browns Lake, and Bohner Lake areas. Much



**Table 4**

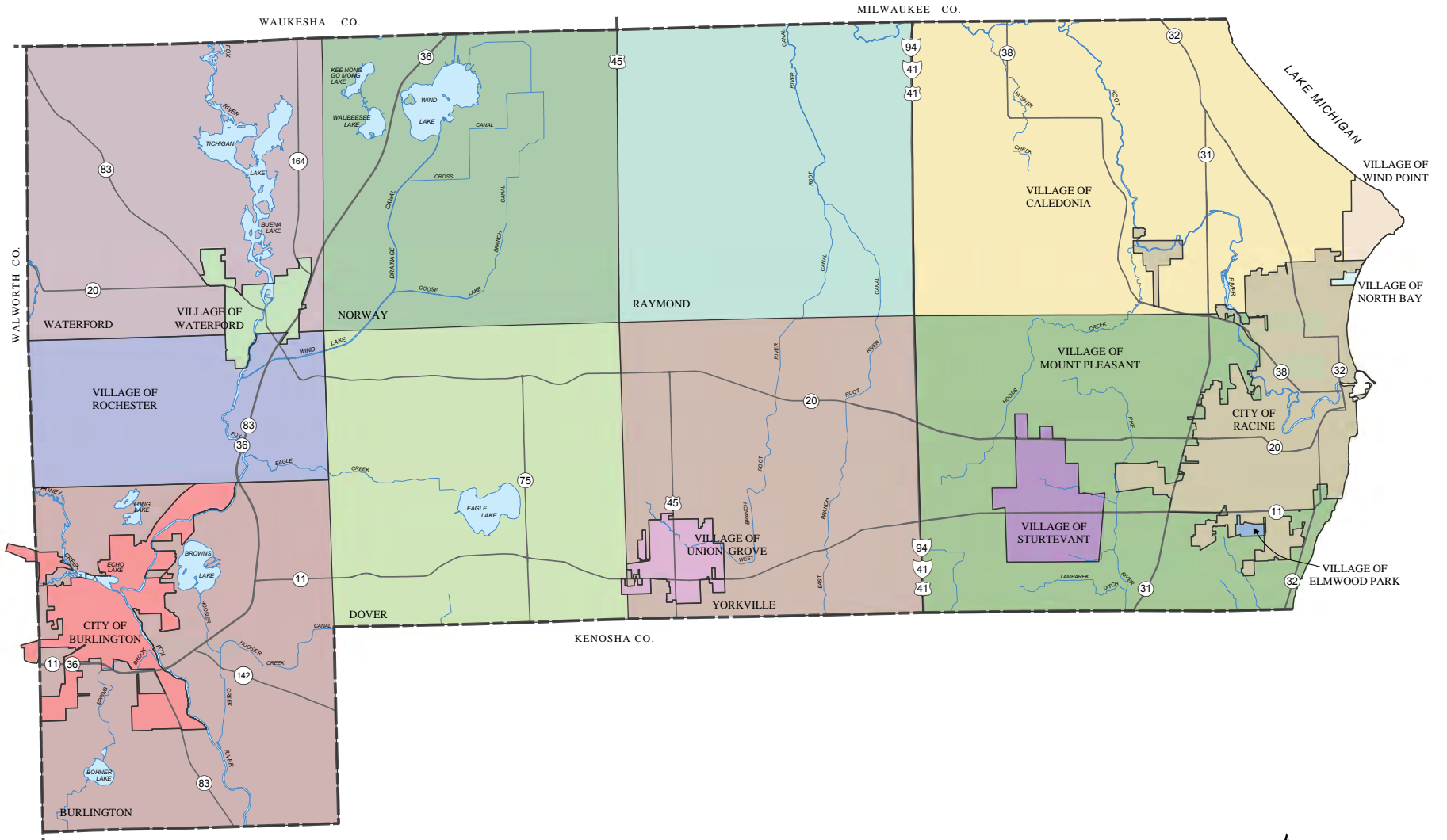
**HAZARD MITIGATION ACTIVITIES IN RACINE COUNTY: 2010-2015**

Community	Project	Funding Source	Completion Date
City of Racine	Root River Streambank Erosion and Outfall Assessment	City	2013
	Installed new battery powered emergency siren at Starbuck Middle School	City	2014
	Installed new battery powered emergency siren at Goodland School	City	2011
	Planning to install new battery powered emergency siren at Knapp School	City	2016
Village of Mount Pleasant	Pike River channel restoration	FEMA, WDNR	Ongoing
Village of Rochester	Village established a storm water utility	Village	2012
	Repaired several storm sewer inlets in the Fox River Prairie subdivision to improve drainage	Village	2012
	Conducted comprehensive drainage plan prior to reconstruction of N. River Road and completed two ditching projects to improve drainage in the area of N. River Road	Village	2013 and 2015
	Moved and improved the outlet for the former Agricultural School drainage system to decrease flooding on Maryl Street and decrease standing water in road ditches	Village	2014
	Removed and replaced a series of rock check dams on Rookery Glen Drive to improve drainage	Village	2014
	Replaced culvert at June Lane to allow the road ditches to drain into adjacent wetland	Village	2014
	Replaced failed culvert at Ryan Avenue	Village	2015
	Reconstructed 1,320 feet of road ditch on Oak Knoll Road to prevent sheet flowing runoff	Village	2015
Village of Sturtevant	Cleaned ditches along N. River Road, Fox Knoll Road, and Clover Lane to improve drainage	Village	2013 and 2015
	Awarded grant to purchase and raze home plagued by flooding for years	WDNR, Village	--
Village of Union Grove	Village established a storm water utility	Village	2012
	Drainage ditch was dredged and riprap was installed to alleviate flooding in Fox Creek Crossing subdivision	Village	2013
	300 feet of drainage ditch near Industrial Park Drive was dredged and riprap was installed to provide better drainage and alleviate flooding	Village	2013
	Electronics upgraded on tornado siren at 12th Avenue and Center Street	Village	2013
	Electronics upgraded on tornado siren at New Street and 14th Avenue	Village	2015
	Stormwater grate redesigned and installed on unnamed tributary to West Branch Root River Canal. Banks were also reshaped and riprap was installed to eliminate flooding at STH 45 and 7th Avenue	Village	2015
Village of Waterford	Stormwater drainage improvement project to relieve stormwater flooding in the neighborhood near Conservancy Park	U.S. Department of Housing and Urban Development Community Development Block Grant-Emergency Assistance program	2013
Town of Burlington	Wheatland Road and Hoosier Creek Road were raised to alleviate flooding	Town	2010
Town of Dover	Dredging project for Wind Lake Canal	Racine County Drainage District	--
	Replaced a failing culvert under McKee Road causing sink hole on roadway.	Town	2013
Town of Raymond	Stormwater drainage work on the Root River Mainstem, Root River Canal, Kilbournville Tributary, and East Branch Root River Canal	Town	2015

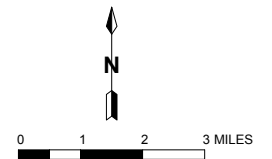
Source: Racine County Office of Emergency Management, Local Municipalities, and SEWRPC.

Map 1

CIVIL DIVISION BOUNDARIES IN RACINE COUNTY: 2015



Source: SEWRPC.



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.

## **RELATIONSHIP OF HAZARD MITIGATION PLANNING TO EMERGENCY OPERATIONS PLANNING**

The focus of this planning effort is upon 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 community.

The mitigation plan should be distinguished from, but compatible with, an emergency operations plan. Such a 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 Racine County. Plans for mitigating 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.

## **SCOPE AND PURPOSE OF PLAN**

This plan updates the 2010 hazard mitigation plan which was an update of the initial 2004 County Hazard Mitigation plan. The scope of this plan is countywide, and is intended to set forth the most appropriate, feasible, and effective hazard mitigation strategy for Racine County and the local units of government within the County. The plan complements, refines and focuses the *State Hazard Mitigation Plan of Wisconsin*<sup>3</sup> on local conditions and hazards likely to occur or be experienced within Racine County and Southeastern Wisconsin. The plan development process is intended to encourage innovative programming and leadership and to build constructive partnerships with local units of government, business, and other stakeholders with a shared interest and obligation in protecting the safety and economic stability of Racine County, and to provide information and guidance to neighboring communities as they develop jurisdictional hazard mitigation plans at the local and subregional levels.

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, and 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 Racine 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.

The Racine County Hazard Mitigation Plan was developed in 2004, updated in 2009 and 2010, and updated again in 2015 and 2016 through a collective effort of a number of agencies, organizations, and business representatives. These efforts were conducted under the guidance of the Racine County Local Planning Team which was created by

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<sup>3</sup> *Wisconsin Emergency Management, State Hazard Mitigation Plan of Wisconsin, October 2011.*

the County specifically for plan development purposes. That group is comprised of elected and appointed officials and business representatives knowledgeable about, and directly involved in, hazard mitigation matters. The membership, formation, and active participation of the Local Planning Team is documented in Appendix A of this report. In addition to formation and active participation of the Local Planning Team, the initial plan development included the following steps:

- Collation and review of all pertinent reports relating to the hazard mitigation activities in Racine County;
- Inventory mapping and analysis of hazards pertinent to Racine County;
- Identification of the facilities and ongoing programs related to hazard mitigation;
- Assessment of the vulnerability of the County assets to each hazard;
- 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 Racine County;
- Development and evaluation of alternatives to address the identified needs;
- 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; and
- Adoption of a strategy for monitoring and refining the plan.

Additional activities conducted as a part of the updating process for the first plan update included:

- Collation and review of all pertinent reports relating to the hazard mitigation activities in Racine County since adoption of the initial plan;
- Review of materials developed as a part of the multi-jurisdictional comprehensive planning process for Racine County;<sup>4</sup>
- Review and updating of inventories developed for the initial plan;
- Review and updating of hazard and risk assessments;
- Review of implementation activities; and
- Review and updating of plan recommendations and the initial implementation plan.

The activities listed immediately above were also conducted as part of the updating process for the second plan update.

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<sup>4</sup> *SEWRPC Community Assistance Planning Report No. 301, A Multi-Jurisdictional Comprehensive Plan for Racine County: 2035, November 2009.*

## **PLAN MAINTENANCE AND IMPLEMENTATION ACTIVITIES**

### **Outreach Activities**

#### ***County Activities***

Since the adoption of the initial hazard mitigation plan, the Racine County Office of Emergency Management has conducted a number of outreach activities to educate the public about emergency preparedness, including hazard mitigation. As part of these activities, a number of campaigns have been conducted on hazard awareness, including campaigns related to winter weather awareness, tornado awareness, hazardous materials awareness, heat awareness, pandemic influenza, and family preparedness. Specific activities include publication of quarterly preparedness newsletters, presentations to schools and community groups, safety and preparedness seminars, interviews on local radio stations, a monthly column in the Racine Journal Times, and display presentations at fairs and expos, such as the Racine County Fair. In addition, the Racine County Office of Emergency Management makes information about emergency preparedness, including hazard mitigation, available to the public through its Ready Racine County website and its Facebook page. The resources available on the Ready Racine County website include information about various hazards and how to be prepared to take action before, during, and after these events. The site also has information regarding training and volunteer opportunities and a link to the Racine County Office of Emergency Management's annual report. In addition, the website provides alerts for any watches, warnings, and advisories currently issued by the National Weather Service for Racine County.

The Racine County Sheriff's Department has the ability to send out text message alerts to residents in a selected area informing them of a hazard. Also, Racine County has a contract with the Root-Pike Watershed Initiative Network to conduct the educational and outreach programs required as a condition of their municipal separate storm sewer system discharge permit.

#### ***Local Government Activities***

Since the adoption of the initial hazard mitigation plan, local municipalities in Racine County have conducted outreach activities to educate the public about emergency preparedness, including hazard mitigation. These activities are summarized in Table 3. The most common methods used by the communities include making information available through posting on the municipality's website and mailing or emailing periodic newsletters to residents of the municipality. These methods have been used to distribute information on hazard awareness and preparedness related to topics such as flooding, winter weather awareness, tornado awareness, hazardous materials awareness, heat awareness, pandemic influenza, fire safety, and family preparedness. In recent years, local municipalities have also begun reaching the public through social media sites such as Facebook® and Twitter®. In some municipalities, residents can also sign up to receive text message alerts. In certain circumstances, law enforcement will also request a reverse 911 call to landline telephones to quickly distribute important information or instructions regarding an emergency.

In addition, several municipalities contract with organizations to provide outreach and other services to the public on specific issues. The City of Racine and the Villages of Caledonia, Mt. Pleasant, Sturtevant, and Wind Point contract with the Root-Pike Watershed Initiative Network to conduct the education and outreach programs required as a condition of their municipal separate storm sewer system discharge permits. Likewise, the Central Racine County Health Department (CRCHD) contracts with many communities in Racine County to provide public health services. A large focus of the CRCHD's mission is to provide outreach to the public to improve health through health promotion, disease prevention, and protection from health and environmental hazards. In addition to health educational programs, the CRCHD provides public outreach through a biannual newsletter, brochures, fact sheets, and reports which are available for download on their website. The CRCHD is also active on Facebook® and Twitter®.

### **Implementation Activities**

Since the adoption of the first update to the hazard mitigation plan, Racine County and the local municipalities have conducted several projects intended to implement recommendations of the plan. These projects are summarized in Table 4.

In 2014, a consultant for Racine County completed a dam failure analysis for the Horlick dam to determine the dam's hazard rating. Based on the analysis, the Wisconsin Department of Natural Resources (WDNR) determined that a low hazard rating was appropriate for the dam.<sup>5</sup> Chapter NR 333, "Dam Design and Construction," of the *Wisconsin Administrative Code* requires that a low hazard dam must safely convey the 1-percent-annual probability (100-year recurrence interval) flood event. However, hydraulic analyses completed by the consultant as part of the dam failure analysis determined that the dam spillway is not able to safely pass the peak flow during a 1-percent-probability flood. Thus, the WDNR has established the requirement that, within 10 years from the date of the completed study (April 2024), the spillway capacity of the dam must be increased to safely pass the peak flow during a 1-percent-probability flood.

The City of Racine installed new emergency warning sirens at Goodland Elementary School on the City's west side in 2011, and at Starbuck Middle School on the City's southwest side in 2014. The City also plans to install a new emergency warning siren at Knapp School in 2016. The new warning sirens have a louder output and reach a larger area. In addition, the new sirens are battery powered units and will continue to operate even if electrical power is lost during a severe storm.

In 2013, a consultant for the City of Racine completed an update to a Root River streambank erosion and outfall assessment.<sup>6</sup> The study surveyed streambank erosion and stormwater outfall conditions along the Root River within the City of Racine and calculated an erosion severity index that assessed both active erosion and erosion potential. The study also provided GIS data, photos, and costs to stabilize and/or repair each priority site.

The Village of Mt. Pleasant Stormwater Utility District has continued its multi-year, multi-phase project to restore the riverine environment along the Pike River in the Village limits. In addition to the goal of controlling flooding along the River, the project restores natural stream features, enhances aquatic habitat, improves water quality, and installs a trail system providing connectivity from existing on-road trails. Within Phases 1-5 of the project, 206 acres of land has been acquired for Pike River riparian corridor development. Phases 4 and 5 of the project were completed in 2010. Phase 6 was completed in 2012 and included flood channel expansion, demolition of an abandoned sanitary sewer lift station, and installation of recreational trails. Final Phases 7-9 are currently under construction and anticipated to be completed by 2017. The Utility District has received over three million dollars in local, State, and Federal grants for this project.

The Village of Rochester Stormwater Utility was established in 2012. Since its inception, the utility has completed several projects to address long-neglected stormwater infrastructure within the Village. In 2012, the utility repaired several storm sewer inlets in the Fox River Prairie Subdivision to improve stormwater drainage in the neighborhood. A comprehensive drainage plan was completed in 2013 related to the future reconstruction of N. River Road. Also related to the planned N. River Road reconstruction, two ditching projects were completed to improve drainage. In 2014, a series of rock check dams on Rookery Glen Drive were removed and replaced to help improve drainage. In the same year, the utility designed and relocated an outlet from tile that drained land of a former agricultural school. This project decreased flooding on Maryl Street and reduced standing water in road ditches that often occurred in

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<sup>5</sup> According to Section 333.06(1)(a), a low hazard rating would apply to a dam that has 1) no development unrelated to allowable open space use in the hydraulic shadow where the failure or mis-operation of the dam would result in probable loss of human life, 2) anticipated low economic losses due to failure of the dam (losses are principally limited to the owners property), 3) low environmental damage due to failure of the dam, 4) no significant disruption of lifeline facilities due to failure of the dam, and 5) downstream land use controls in place to restrict future development in the hydraulic shadow ("that area of land downstream from a dam that would be inundated by water upon failure of the dam during the" 1-percent-annual probability flood).

<sup>6</sup> AECOM, Root River Streambank Erosion and Outfall Assessment, December 2013.

the neighborhood. The Village replaced failing culverts at June Lane and Ryan Avenue in 2014 and 2015, respectively. In 2015, 1,320 feet of road ditch was constructed along Oak Knoll Road. Prior to this project, runoff would sheet-flow over Oak Knoll Road forming dangerous sheets of ice in winter months. In 2013 and 2015, the Village cleaned sections of drainage ditches along N. River Road, Fox Knoll Drive, and Clover Lane to improve stormwater drainage in the area.

In 2015, the Village of Sturtevant was awarded a Municipal Flood Control Grant from the WDNR to purchase and raze a home that has been plagued by flooding from a nearby unnamed stream. The Village plans to remove the building and hard surfaces on the property and turn the lot into green space. The Village also plans to apply for future grants to return the stream to its more natural state.

In 2010, the Village of Union Grove enacted an ordinance to create a stormwater utility district to oversee necessary stormwater management activities within the Village. The ordinance also created a stormwater management fee based on the amount of impervious surface area located on the property. In 2013, the Village completed two projects to improve stormwater drainage. One ditch was dredged and riprap was installed to alleviate flooding in the Fox Creek Subdivision. Another drainage ditch near Industrial Park Drive was dredged and riprap was installed to provide better stormwater drainage and alleviate flooding. In 2015, the Village redesigned and installed a new stormwater debris grate on an unnamed tributary to the West Branch Root River Canal to eliminate flooding near STH 45 and 7th Avenue. The grate can be lifted up in heavy rains if it becomes plugged by debris. The banks on the unnamed tributary were also reshaped and riprap was installed. Also, the Village updated the electronics on a tornado siren located at 12th Avenue and Center Street in 2013, and on a siren located at New Street and 14th Avenue in 2015.

In 2013, the Village of Waterford and the Racine County Farm Drainage District No. 1 completed a stormwater drainage project to alleviate stormwater flooding in the neighborhood near Conservancy Park. The project included a new lift station, installation of new storm sewers, and installation of a force main. Flooding in this neighborhood often caused damage to Conservancy Park, water in basements, and closure of a local road. The project was funded with \$1.1 million grant from the Federal Community Development Block Grant-Emergency Assistance program.

In 2010, the Town of Burlington completed two projects to raise sections of Wheatland Road and Hoosier Creek Road. An approximately 500-foot-long section of Wheatland Road was raised about three feet in elevation to alleviate flooding that occurred when Hoosier Creek overtopped the road. An approximately 1,650-foot-long section of Hoosier Creek Road was raised about four feet in elevation to alleviate flooding from both Hoosier Creek and the Fox River.

In 2013, the Town of Dover completed the replacement of a culvert under McKee Road that conveys an unnamed tributary to Eagle Creek. The project started in response to the formation of a sink hole in the road in April of 2013. It was determined that the existing culvert was failing and the roadway was immediately closed to traffic. The project required WDNR approval for wetland and waterway disturbance.

In 2015, the Racine County Drainage District received WDNR approval for Phase 2 of their dredging project of the Wind Lake Canal in the Town of Dover. The District plans to dredge the Canal from Dover Line Road southwest to State Trunk Highway (STH) 36. Currently, winter ice dams block the conveyance of runoff which is coming from developed areas to the north, sending the water over the banks of the Canal. The dredging project intends to prevent these blockages and alleviate the threat of topsoil erosion and flooding. The dredging permit is for three years and can be extended to five years.

In 2015, the Town of Raymond Stormwater Utility District completed a stormwater drainage project to clear brush and improve drainage on the mainstem of the Root River Canal, the East Branch Root River Canal, and the Kilbournville Tributary. The mainstem of the Root River Canal portion of the project includes an unnamed tributary and extends from County Trunk Highway (CTH) G north to the Milwaukee County line; the East Branch Root River

Canal portion of the project extends from 3 Mile Road to the confluence with the mainstem of the Root River Canal; the Kilbournville Tributary portion of the project extends from 6 ½ Mile Road north to the Milwaukee County line. Roadways in the vicinity of these projects have overtopped during heavy rainfall events.

## **PLAN DEVELOPMENT REVIEW PROCESS AND ADOPTION**

As previously noted, the first update of the Racine County all hazards mitigation plan was prepared under the guidance of a County advisory task force comprised of representatives of all of the incorporated communities within the County, as well as County businesses and agency representatives. That task force met three times during the plan preparation period to provide input on the types of hazards to be considered, and the appropriate mitigation strategies, and to review the draft report chapters with each report chapter then being refined to reflect the comments and recommendations of the Task Force.

Following completion of the plan in draft form, a public informational meeting was held to review the plan with local officials, businesses and industry, and citizens. Following plan finalization, copies of the report were sent to each of the local units of government requesting adoption of the plan and advising them of the need for such action in order to retain future eligibility for mitigation funding for the FEMA Hazard Mitigation Grant, Flood Mitigation Assistance, Pre-Disaster Mitigation, Repetitive Flood Claims Grant, and Severe Repetitive Loss Programs administered by the Wisconsin Department of Military Affairs, Division of Emergency Management. In addition, County and SEWRPC staffs were available to meet with communities on an individual basis to review the plan update and consider adoption and implementation steps.

This second update to the plan was also prepared under the guidance of a County Local Planning Team comprised of representatives of all of the incorporated communities within the County including elected officials, law enforcement and fire personnel, engineering and public works departments, and planning departments. In addition the Local Planning Team included representatives from utilities, the business community, nonprofit organizations, and churches. Where appropriate, the members of the original Task Force and/or the Task Force from the first plan update were reappointed for this plan update. The Local Planning Team met four 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 Local Planning Team (see Appendix A).

As draft chapters of this second update to the 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 and the risk and vulnerability assessments sections of the plan and review of drafts of the corresponding chapters by the Local Planning Team, 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.

After the second update of 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 Racine County Office 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 Pre-Disaster Mitigation programs administered by the Wisconsin DMA, DEM. Copies of the adopted resolutions approving the plan by the local units of government are included in Appendix M. In addition, County and SEWRPC staffs were available to meet with communities on an individual basis to review the plan update and consider adoption and implementation steps.



## **Chapter II**

# **BASIC STUDY AREA INVENTORY AND ANALYSIS**

### **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.

### **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 civil divisions in Racine County are shown on Map 2 in Chapter I of this report. There are six towns in Racine County, including Burlington, Dover, Norway, Raymond, Waterford, and Yorkville. In addition, there are nine villages located within the County, including Caledonia, Elmwood Park, Mt. Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford, and Wind Point; and the City of Racine and the majority of the City of Burlington. The total land area and proportion of the County within each civil division is presented in Table 5.

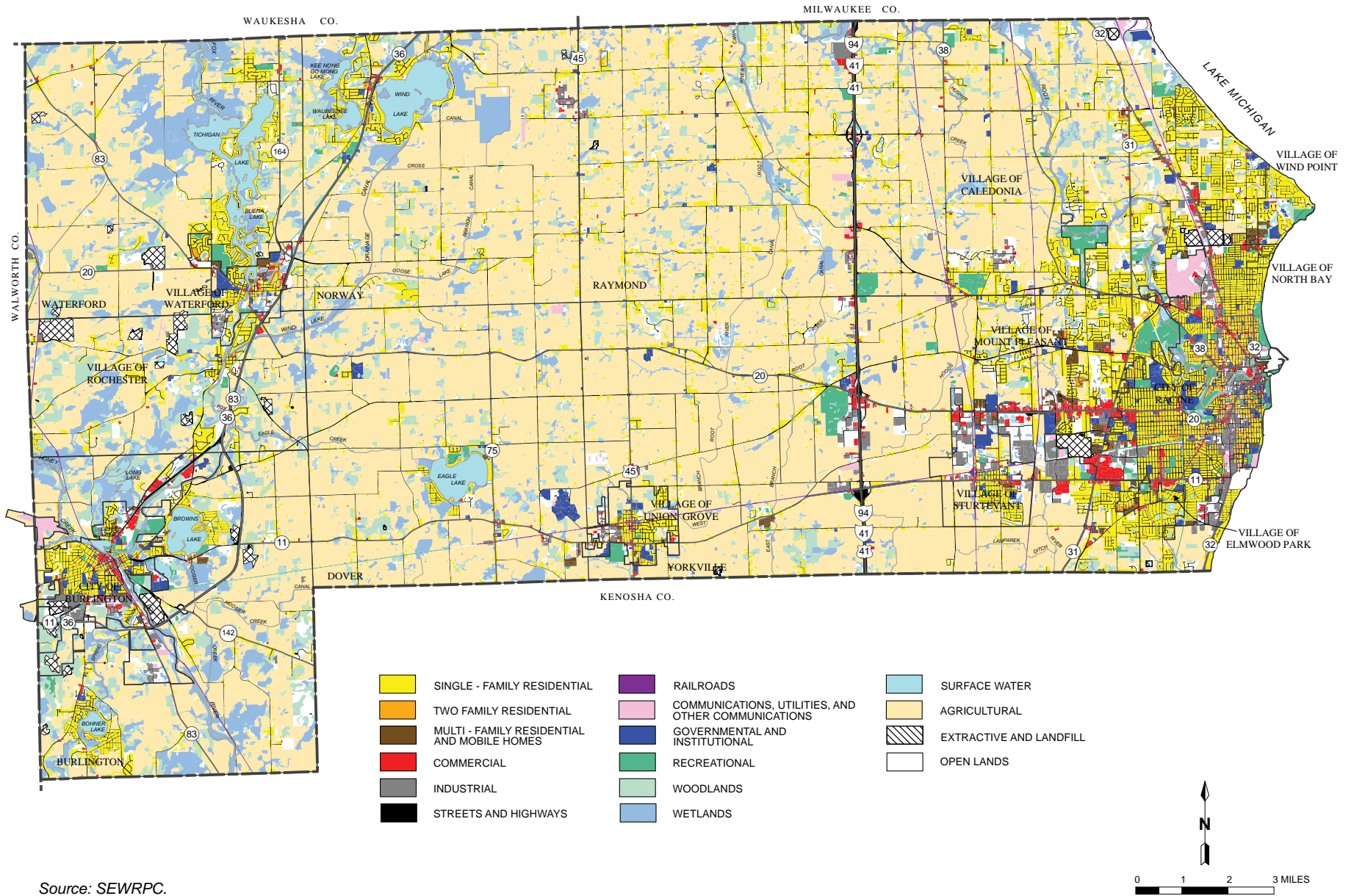
### **DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS**

#### **Population**

The area that is now Racine County was first included in the Federal census in 1850. Historical population levels in Racine County are provided in Table 6. In 1850, Racine County had a resident population of about 15,000. The County's population rose gradually from 1850 through 1890, and then began to increase at a greater rate until 1930, when population growth leveled off. Following 1940, the resident population increased rapidly, with the highest rate of growth, over 32,000 persons, or a 29 percent increase during 1950 and 1960. A high rate of population growth also occurred between 1960 and 1970, about 20 percent. Population growth occurred at more moderate levels in decades between 1970 and 1980 and between 1980 and 1990. Between 1980 and 1990, the County population increased by only 1 percent, while the population increased by about 8 percent, from 175,000 to 188,800 persons between 1990 and 2000. As of 2010, there were 195,408 individuals residing in the County (Table 6). This represents an increase of about 3.5 percent between 2000 and 2010. The population in Racine County is expected to increase through the year 2035 by approximately 11 percent.

Map 2

EXISTING LAND USE IN RACINE COUNTY: 2010



Source: SEWRPC.

Table 5

**AREAL EXTENT OF CIVIL DIVISIONS  
IN RACINE COUNTY: 2015**

Civil Division	Area (acres)	Percentage of County Area
<b>Cities</b>		
Burlington <sup>a</sup> .....	4,832	2.2
Racine.....	10,054	4.6
<b>Villages</b>		
Caledonia.....	29,184	13.4
Elmwood Park.....	98	<0.1
Mt. Pleasant.....	21,624	9.9
North Bay.....	68	<0.1
Rochester.....	11,312	5.2
Sturtevant.....	2,757	1.3
Union Grove.....	1,576	0.7
Waterford.....	1,620	0.7
Wind Point.....	827	0.4
<b>Towns</b>		
Burlington.....	21,996	10.1
Dover.....	23,146	10.6
Norway.....	22,838	10.5
Raymond.....	22,878	10.5
Waterford.....	21,541	9.9
Yorkville.....	21,621	9.9
<b>Total</b>	<b>217,972</b>	<b>100.0</b>

<sup>a</sup>Does not include 162 acres in Walworth County.

Source: SEWRPC.

The City of Racine is the most populous community in the County, with 78,860 residents, or about 40 percent of the County's population, in 2010. The next most populous communities are the Village of Mt. Pleasant, with 26,180 residents, and the Village of Caledonia, with 24,680 residents, each about 13 percent of the County's population; and the City of Burlington, with 10,464 residents, or about 5 percent of the County's population. Based upon the 2010 census data, the Villages of Sturtevant and Waterford experienced a relative population increase of more than 20 percent from 2000 to 2010. The Villages of Mount Pleasant and Union Grove, as well as the Town of Raymond each experienced a relative population increase of 10 percent or more during that time period.

### Households

Trends in the number of households in the County are shown in Table 7. The County experienced significant gains in the number of new households between 1970 and 2010. The rate of increase in the number of households has exceeded the rate of population increase. Between 1970 and 2010, the number of households increased by about 52 percent, compared to a population increase of about 14 percent. With the number of households increasing at a faster rate than the population, the number of persons per household has decreased.

### Employment

Trends in job growth in the County are set forth in Table 8. 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

Table 6

**HISTORICAL RESIDENT POPULATION  
LEVELS IN RACINE COUNTY: 1850-2035**

Year	Population	Change from Preceding Census	
		Incremental	Percent
1850	14,973	--	--
1860	21,360	6,387	42.7
1870	26,740	5,380	25.2
1880	30,922	4,182	15.6
1890	36,268	5,346	17.3
1900	45,644	9,376	25.9
1910	57,424	11,780	25.8
1920	78,961	21,537	37.5
1930	90,217	11,256	14.3
1940	94,047	3,830	4.2
1950	109,585	15,538	16.5
1960	141,781	32,196	29.4
1970	170,838	29,057	20.5
1980	173,132	2,294	1.3
1990	175,034	1,902	1.1
2000	188,831	13,797	7.9
2010	195,408	6,577	3.5
2035 <sup>a</sup>	217,000	21,516	11.0

<sup>a</sup>Intermediate growth projection from SEWRPC Technical Report No. 11, The Population of Southeastern Wisconsin (5th Edition), April 2013.

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

**Table 7**

**NUMBER OF HOUSEHOLDS IN RACINE COUNTY: CENSUS YEARS 1970-2035**

Year	Number of Households	Change from Preceding Census	
		Number	Percent
1970	49,796	--	--
1980	59,418	9,622	19.3
1990	63,736	4,318	7.3
2000	70,819	7,083	10.0
2010	75,651	4,832	6.8
2035 <sup>a</sup>	87,200	10,000	13.0

<sup>a</sup>Intermediate growth projection from SEWRPC Technical Report No. 11, The Population of Southeastern Wisconsin, (5th Edition), April 2013.

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

ever, that the County lost 9,600 jobs from 2000 to 2010, likely an effect of the nation-wide recession that was experienced in the late 2000s. Furthermore, a substantial number of Racine County employed residents —28,344 of the 88,300 workers in 2010, or about 32.1 percent—worked outside the County, and 2,207 workers, or 2.5 percent, worked outside the State.<sup>1</sup>

**Property Value**

The value of the real estate and personal property in a community reflects the upper end of the potential for property damages in each community. The equalized value of the real estate and personal property in Racine County and each of the general-purpose units of government in the County as of 2014 is shown in Table 9.

**LAND USE**

Land use is an important determinant in the potential impact a particular hazard may have, and in 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 Racine County in 2010 are set forth on Map 2 and in Table 10. Urban land uses occupied about 55,955 acres, or 25.6 percent of the County in 2010. Intensive urban development, including most commercial, industrial, and multi-family residential development, is concentrated within or near the communities of Racine, Burlington, Waterford, Sturtevant, and Union Grove or along the Interstate Highway (IH) 94 corridor. Much of the single-family residential development also occurred within or surrounding these urban centers, while scattered low-density development occurred outside these communities amid predominantly rural areas. Single-family residential development was the largest component of urban land uses, encompassing about 24,942 acres, or 44.6 percent of the urban land uses and 11.4 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 2010, encompassing about 14,465 acres, or 25.9 percent of the area of all urban land and 6.6 percent of the total area of the County. Major arterial highways serving the County include IH 94/IH 41/US Highway

**Table 8**

**NUMBER OF JOBS IN RACINE COUNTY: CENSUS YEARS 1970-2010**

Year	Number of Jobs	Change from Previous Time Period	
		Number	Percent
1970	64,506	--	--
1980	80,900	16,394	25.4
1990	88,768	7,868	9.7
2000	97,900	9,132	10.3
2010	88,300	-9,600	-9.8

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

growth. As indicated in Table 8, employment growth was significant in the County between 1970 and 2010, with an increase in the number of jobs from 64,506 to 88,300, or an increase of about 37 percent. It should be noted, however,

<sup>1</sup>Based on U.S. Census Bureau 2010 American Community Survey estimates.

Table 9

## EQUALIZED VALUE OF PROPERTY IN RACINE COUNTY BY COMMUNITY: 2014

Community	2014 Equalized Value	Percent Change from 2008
<b>Cities</b>		
Burlington.....	\$ 807,245,600	11.9
Racine .....	3,208,322,900	-17.4
Subtotal	\$ 4,015,568,500	-12.9
<b>Villages</b>		
Caledonia.....	\$ 1,963,451,300	-15.1
Elmwood Park.....	35,755,900	-25.4
Mt. Pleasant.....	2,380,865,300	-14.8
North Bay.....	34,684,900	-13.9
Rochester <sup>a</sup> .....	352,204,300	-0.5
Sturtevant .....	501,791,000	44.4
Union Grove.....	294,630,900	-7.3
Waterford.....	418,418,100	-5.5
Wind Point .....	230,252,400	-20.4
Subtotal	\$ 6,212,054,100	-10.5
<b>Towns</b>		
Burlington.....	\$ 620,480,000	-15.3
Dover .....	321,999,200	-13.0
Norway.....	788,026,700	-12.6
Raymond .....	443,875,700	-6.5
Waterford.....	723,806,800	-9.6
Yorkville .....	498,601,900	-1.5
Subtotal	\$ 3,396,790,300	-10.1
<b>Total</b>	<b>\$13,624,412,900</b>	<b>-11.1</b>

Source: Wisconsin Department of Revenue.

(USH )41 and USH 45, which traverse the County in a north-south direction; and STH 20 and STH 11, which traverse the County in a generally east-west direction. Other uses in the transportation, communications, and utilities category within the County include four railway freight service lines and six airports which serve the public. A more detailed description of the County's transportation system is given later in this chapter.

Map 3 shows lands in agricultural uses in Racine County in 2010. According to the National Agricultural Statistics Service, in 2012, there were 575 farms in the County, a decrease of 12 percent from 2007.<sup>2</sup> The average farm size was about 191 acres, although it is important to note that the size of about half of the farms in the County was 49 acres or less. The estimated value of land and farm buildings associated with these farms was about \$599 million, in 2012 dollars. Common crops grown in the County include corn for grain and silage, soybeans, wheat, hay, vegetables, and some specialty crops such as sod. Common livestock raised in the County include dairy and beef cattle, hogs, and poultry.

Lands in agricultural land uses are inventoried by municipality and class of agricultural land use in Table 11. In 2010, about 115,740 acres in the County were in agricultural land uses. All of the towns and two of the villages, the Villages of Caledonia and Mt. Pleasant, had over 10,000 acres in agricultural land uses. In addition, the Village of

<sup>2</sup> U.S. Department of Agriculture National Agricultural Statistics Service, 2012 Census of Agriculture: Wisconsin State and County Data, May 2014.

Table 10

LAND USES IN RACINE COUNTY: 2010

Land Use Category <sup>a</sup>	Acres	Percent of Subtotal	Percent of County
<b>Urban</b>			
Single-Family Residential .....	24,942	44.6	11.4
Multi-Family Residential <sup>b</sup> .....	1,814	3.2	0.8
Commercial .....	2,298	4.1	1.1
Industrial.....	2,743	4.9	1.3
Transportation, Communications, and Utilities.....	14,465	25.9	6.6
Governmental and Institutional .....	2,519	4.4	1.1
Recreational .....	3,381	6.1	1.6
Unused Urban .....	3,793	6.8	1.7
Subtotal	55,955	100.0	25.6
<b>Nonurban</b>			
Agricultural.....	115,737	71.4	53.1
Woodlands.....	12,535	7.7	5.8
Wetlands.....	19,071	11.8	8.7
Surface Water .....	5,999	3.7	2.8
Landfill and Extractive .....	1,627	1.0	0.7
Other Open Lands .....	7,211	4.4	3.3
Subtotal	162,180	100.0	74.4
<b>Total</b>	<b>218,135</b>	<b>--</b>	<b>100.0</b>

<sup>a</sup>Parking lots are included with the associated use.

<sup>b</sup>Includes two-family residential.

Source: SEWRPC.

Rochester had over 5,000 acres in agricultural land uses. Cultivated lands comprised the largest category of agricultural land uses, accounting for about 95,630 acres, or about 83 percent of agricultural lands in the County. Pasture and unused lands accounted for about 13,875 acres, or about 12 percent of the County’s agricultural lands. Special agricultural uses and farm buildings accounted for about 3,600 acres and 2,070 acres, respectively, representing about 3 percent and 2 percent, respectively, of the County’s agricultural lands. Grazed wetlands and orchards, nurseries, and Christmas tree farms were relative small components of the County’s agricultural lands, representing less than 1 percent of the agricultural land uses in the County in 2010.

Map 3 also shows the agricultural lands that are within the one-percent-annual-probability floodplain in Racine County in 2010. About 10,672 acres of agricultural land, or about 9 percent of the agricultural lands in the County, were in the floodplain. Lands in agricultural land uses that are within the one-percent-annual-probability floodplain in Racine County are inventoried by municipality and class of agricultural land use in Table 12.

Mobile homes are a type of structure that can be particularly vulnerable to some hazards such as high winds. Map 4 shows the locations of mobile home parks and individual mobile homes in Racine County. In 2010 there were 666 mobile homes located in the County. Most of these were located in seven mobile home parks. In addition, there were three sites in the County that contained one mobile home each. Mobile home parks and small groupings are listed in Table 13.

Table 11

## AGRICULTURAL LANDS IN RACINE COUNTY: 2010

Municipality	Cultivated Lands (acres)	Pasture and Unused Lands (acres)	Grazed Wetlands (acres)	Orchards, Nurseries, and Christmas Tree Farms (acres)	Special Agricultural Uses (acres)	Farm Buildings (acres)	Total Agricultural Lands (acres)
<b>Cities</b>							
Burlington <sup>a</sup> .....	433.6	43.0	0.0	0.0	0.0	3.1	479.7
Racine.....	15.4	8.9	0.0	0.0	0.0	0.0	24.3
<b>Villages</b>							
Caledonia.....	11,763.2	2,256.1	14.7	80.5	35.2	221.9	14,371.6
Elmwood Park.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mt. Pleasant.....	9,721.1	614.6	0.0	30.6	135.7	148.6	10,650.6
North Bay.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rochester.....	3,674.3	1,140.4	15.1	69.4	0.0	113.1	5,012.3
Sturtevant.....	740.6	98.6	0.0	9.2	0.0	3.8	852.2
Union Grove.....	390.4	45.3	0.0	0.0	0.0	6.7	442.4
Waterford.....	38.3	42.7	0.0	0.0	0.0	0.0	81.0
Wind Point.....	10.8	0.0	0.0	0.0	0.0	0.0	10.8
<b>Towns</b>							
Burlington.....	8,099.6	1,532.1	39.6	2.1	419.5	176.8	10,269.7
Dover.....	15,158.5	1,188.7	2.8	24.0	195.0	292.7	16,861.7
Norway.....	9,419.6	1,389.6	5.8	23.7	2,600.0	223.2	13,661.9
Raymond.....	12,672.2	2,796.9	7.2	124.1	27.2	315.8	15,943.4
Waterford.....	9,345.2	1,503.2	12.6	5.6	178.7	222.3	11,267.6
Yorkville.....	14,147.0	1,215.0	2.9	67.9	36.4	341.7	15,810.9
<b>Total</b>	<b>95,629.8</b>	<b>13,875.1</b>	<b>100.7</b>	<b>437.1</b>	<b>3,627.7</b>	<b>2,069.7</b>	<b>115,740.1</b>

<sup>a</sup>These totals do not include agricultural lands within the portion of the City of Burlington in Walworth County. That portion of the City of Burlington contains 97.5 acres of cultivated lands, and 1.0 acre of pasture and unused lands.

Source: SEWRPC.

### Planned Land Use

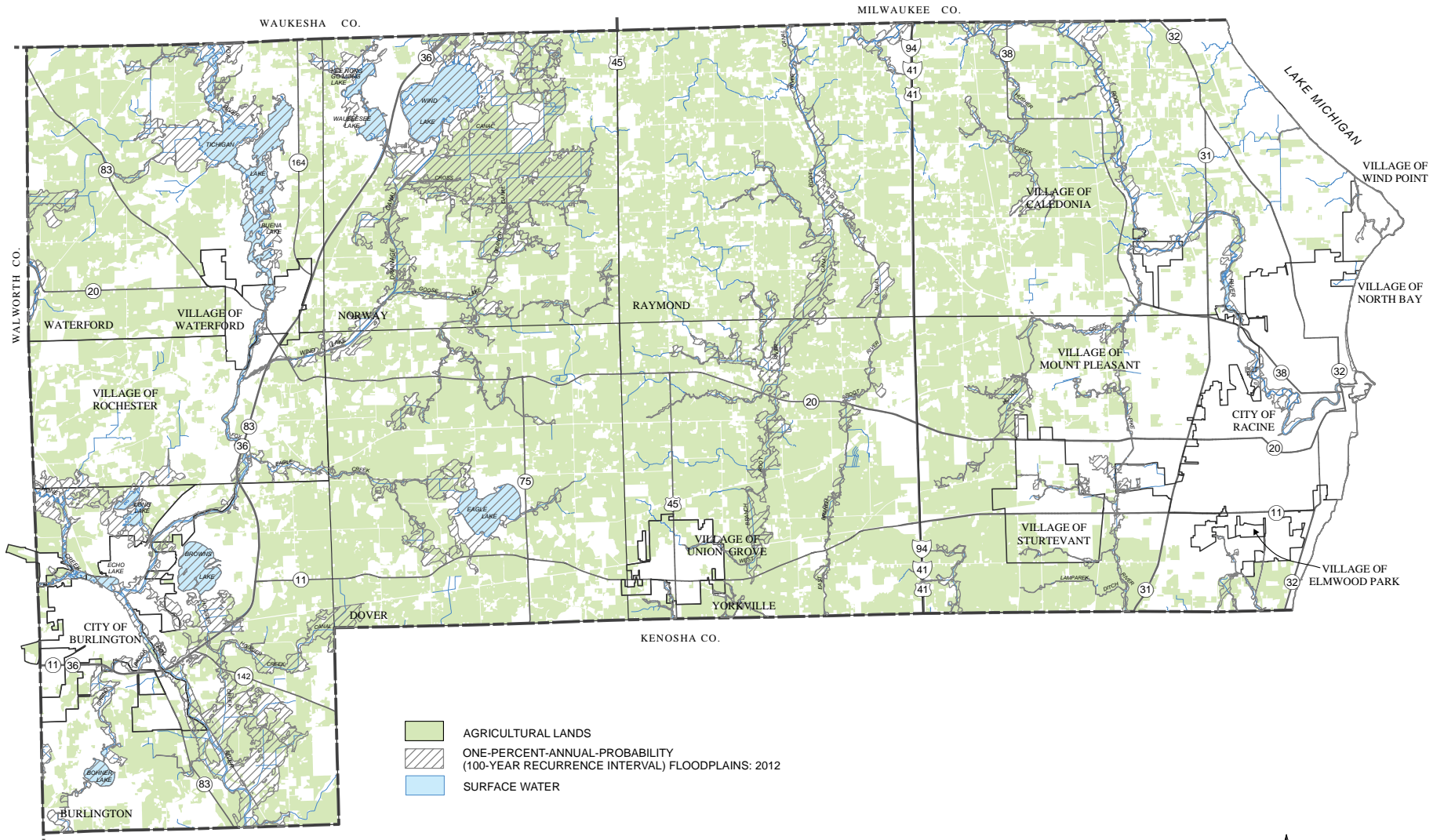
The planned urban service areas delineated in the adopted year 2035 regional land use plan serve as the basis for the identification of all planned urban areas within the County. The year 2035 regional land use plan, as it applies to Racine County, is shown on Map 5. Planned urban areas, which are shown on Map 5, are associated with the City of Burlington; the City of Racine; and the Villages of Caledonia, Elmwood Park, Mt. Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford, and Wind Point. There are also several scattered unincorporated communities included as planned urban areas, the largest of which are the Wind Lake area in the Town of Norway, and the Tichigan and Buena Lake areas in the Town of Waterford.

### ENVIRONMENTAL CORRIDORS

The Southeastern Wisconsin Regional Planning Commission has identified and delineated those areas of Racine County having concentrations of natural, recreational, historic, aesthetic, and scenic resources that should be preserved and protected 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,

Map 3

AGRICULTURAL LANDS IN RACINE COUNTY: 2010



Source: SEWRPC.

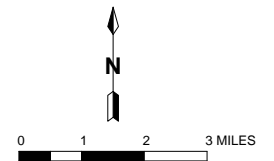




Table 12

**AGRICULTURAL LANDS WITHIN THE ONE-PERCENT-ANNUAL-PROBABILITY FLOODPLAIN IN RACINE COUNTY: 2010**

Municipality	Cultivated Lands (acres)	Pasture and Unused Lands (acres)	Grazed Wetlands (acres)	Orchards, Nurseries, and Christmas Tree Farms (acres)	Special Agricultural Uses (acres)	Farm Buildings (acres)	Total Agricultural Lands (acres)
<b>Cities</b>							
Burlington.....	76.9	6.0	0.0	0.0	0.0	0.0	82.9
Racine.....	1.7	0.1	0.0	0.0	0.0	0.0	1.8
<b>Villages</b>							
Caledonia.....	376.3	85.3	12.6	2.2	0.0	1.8	478.2
Elmwood Park.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mt. Pleasant.....	569.4	78.9	0.0	0.1	1.1	1.5	651.0
North Bay.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rochester.....	38.8	43.8	6.6	0.0	0.0	0.5	89.7
Sturtevant.....	10.6	5.4	0.0	0.0	0.0	0.0	16.0
Union Grove.....	8.0	2.0	0.0	0.0	0.0	0.8	10.8
Waterford.....	0.0	5.8	0.0	0.0	0.0	0.0	5.8
Wind Point.....	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Towns</b>							
Burlington.....	1,266.6	219.9	21.0	0.0	11.1	4.5	1,523.1
Dover.....	912.2	32.1	0.2	1.1	41.4	2.5	989.5
Norway.....	2,001.3	158.2	3.1	0.0	2,187.5	9.3	4,359.4
Raymond.....	783.4	89.2	3.6	30.2	0.0	1.0	907.4
Waterford.....	210.3	24.5	0.0	0.0	124.4	0.1	359.3
Yorkville.....	1,057.6	87.8	0.6	0.1	34.9	15.4	1,196.4
<b>Total</b>	<b>7,313.1</b>	<b>839.0</b>	<b>47.7</b>	<b>33.7</b>	<b>2,400.4</b>	<b>37.4</b>	<b>10,672.3</b>

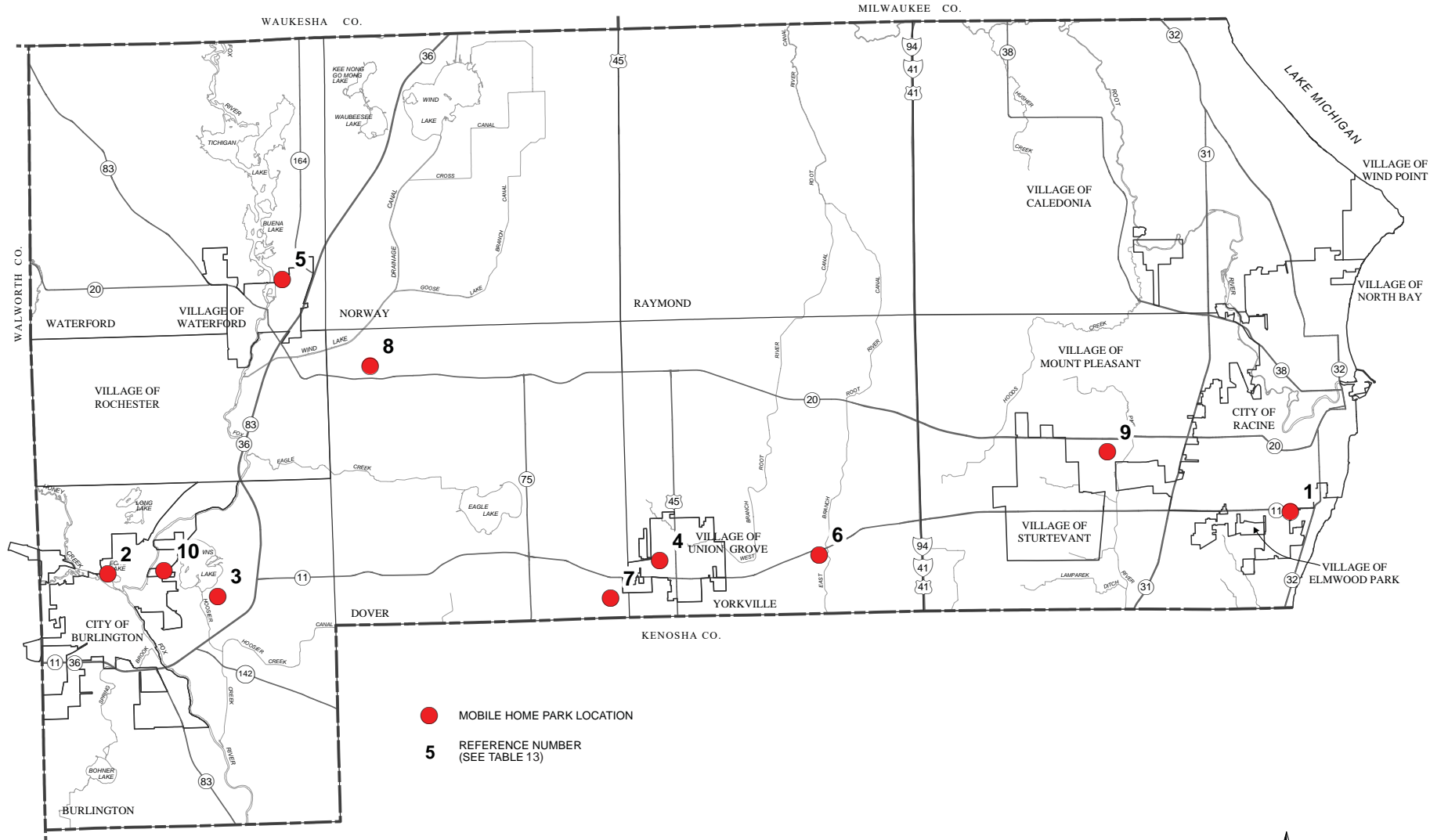
Source: SEWRPC.

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 Racine County in 2010 there were 23,877 acres of primary environmental corridors, or about 11 percent of the land area in the County. These generally lie along rivers and streams and adjacent to lakes, or are associated with woodlands, wetlands, or park and open space sites. Secondary environmental corridors generally connect with the primary environmental corridors and are at least 100 acres in size and one mile long. In Racine County there are 7,347 acres of secondary environmental corridors, or about 3 percent of the total land area in the County. These are located chiefly along the smaller perennial streams and intermittent streams in the County, including wetlands associated with these streams. In addition, smaller concentrations of natural resource features that have been separated physically from the environmental corridors by intensive urban or agricultural land uses

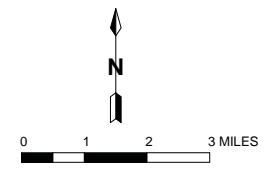
Map 4

MOBILE HOMES AND MOBILE HOME PARKS IN RACINE COUNTY: 2010



● MOBILE HOME PARK LOCATION  
 5 REFERENCE NUMBER  
 (SEE TABLE 13)

Source: Wisconsin Department of Safety and Professional Services and SEWRPC.



**Table 13**

**MOBILE HOME PARKS AND MOBILE HOMES IN RACINE COUNTY: 2010**

Number on Map 4	Mobile Home Park Name	Size (acres)	Number of Mobile Homes	Location
Mobile Home Parks				
1	Mount Pleasant Mobile Home Court	1.5	17	Village of Mt. Pleasant
2	Echo Lake Mobile Home Court	0.8	7	Town of Burlington
3	Brown's Lake Mobile Home Court	18.4	104	Town of Burlington
4	Garden Grove Mobile Home Park	7.2	90	Village of Union Grove
5	Harbor Heights	26.2	131	Village of Waterford
6	Harvest View Estates	30.8	189	Town of Yorkville
7	Hickory Haven	23.7	125	Town of Dover
Single-Family or Small Groupings				
8	--	0.5	1	Town of Dover
9	--	0.9	1	Village of Mt. Pleasant
10	--	0.5	1	Town of Burlington

Source: Wisconsin Department of Safety and Professional Services and SEWRPC.

have also been identified. These areas which are at least five acres in size are referred to as isolated natural resource areas. In Racine County there are 4,361 acres of isolated natural resource areas, or about 2 percent of the land area of the County. The Racine County environmental corridors are shown on Map 6.

**SURFACE WATER RESOURCES AND FLOOD HAZARD AREAS**

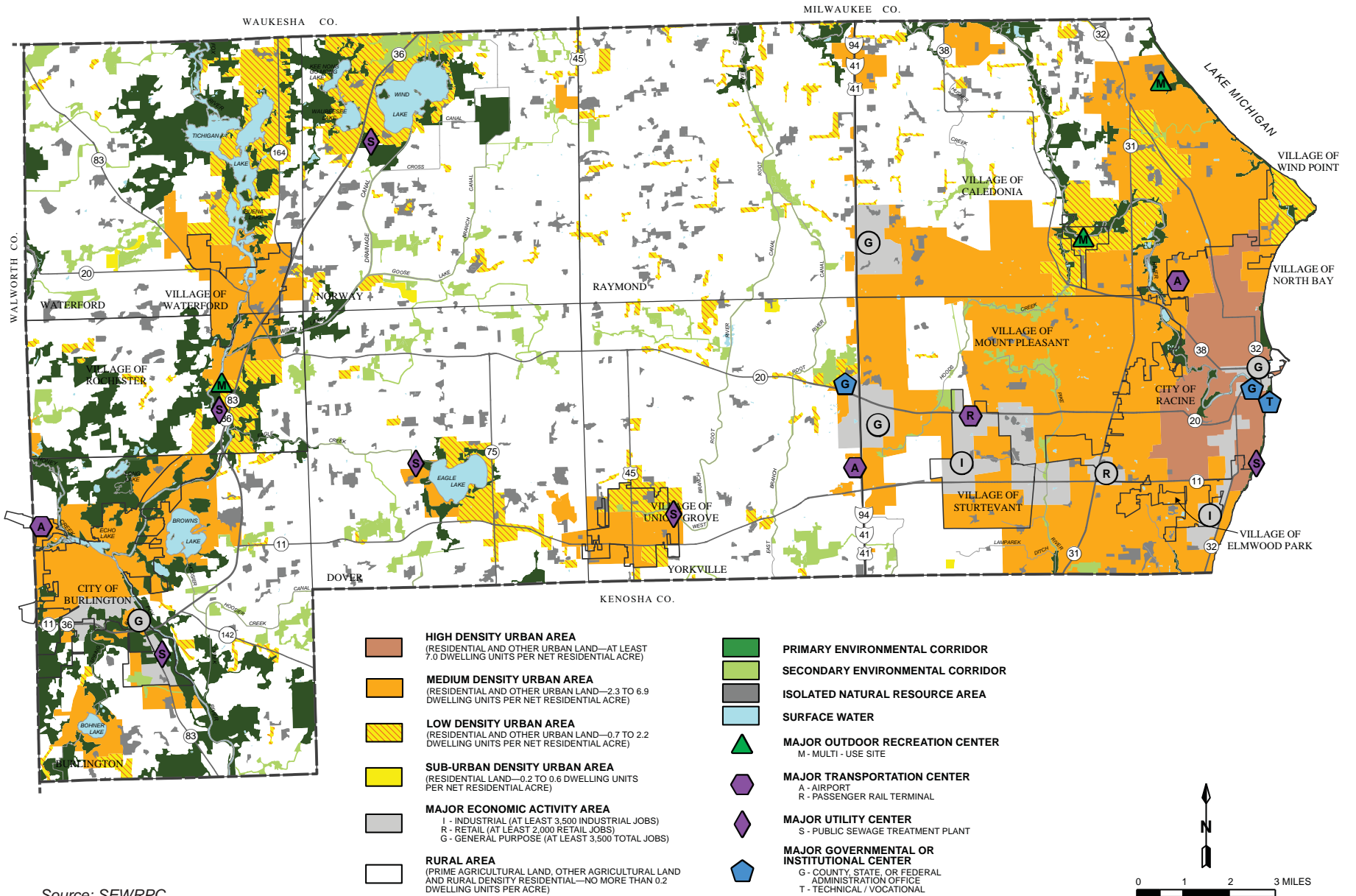
Surface water resources, consisting of streams and lakes, form a particularly important element of the natural resource base. Surface water resources provide recreational opportunities, influence the physical development of the County, and enhance its aesthetic quality. Watershed boundaries, wetlands, and major streams and lakes within the County are shown on Map 7.

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 101 miles of such streams in Racine County, located within four watersheds: the Fox (Illinois) River, Root River, Pike River, and Des Plaines 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 half of the County and includes the Fox River, Honey Creek, White River, Wind Lake Drainage Canal, Goose Lake Drainage Canal, Eagle Creek, Hoosier Creek, and Spring Brook. The Des Plaines River watershed covers a small portion of the extreme southern part of the County and includes the Kilbourn Road Ditch, and the beginning of the mainstem of the Des Plaines River near Union Grove. The Root River watershed encompasses most of the eastern half of the County and includes the Root River, East Branch Root River Canal, West Branch Root River Canal, Husher Creek, and Hoods Creek. The Pike River watershed, in the County's southeastern corner, includes the beginning of the mainstem of the Pike River.

There are 10 major lakes—that is, lakes of 50 acres or more—in Racine County. All of the major lakes lie within the Fox River watershed. The major lakes include Bohner Lake, Browns Lake, Buena Lake, Eagle Lake, Echo Lake, Kee Nong Go Mong Lake, Long Lake, Tichigan Lake, Waubeesee Lake, and Wind Lake.

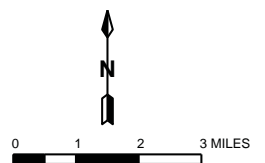
Floodplains are the wide, gently sloping areas contiguous to, and usually lying on both sides of, a stream channel. For planning and regulatory purposes, floodplains are normally defined as the areas, excluding the stream channel, subject to inundation by the one-percent-annual-probability (100-year recurrence interval) flood event. There

## Map 5 2035 REGIONAL LAND USE PLAN AS IT PERTAINS TO RACINE COUNTY

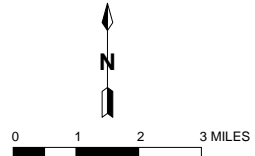
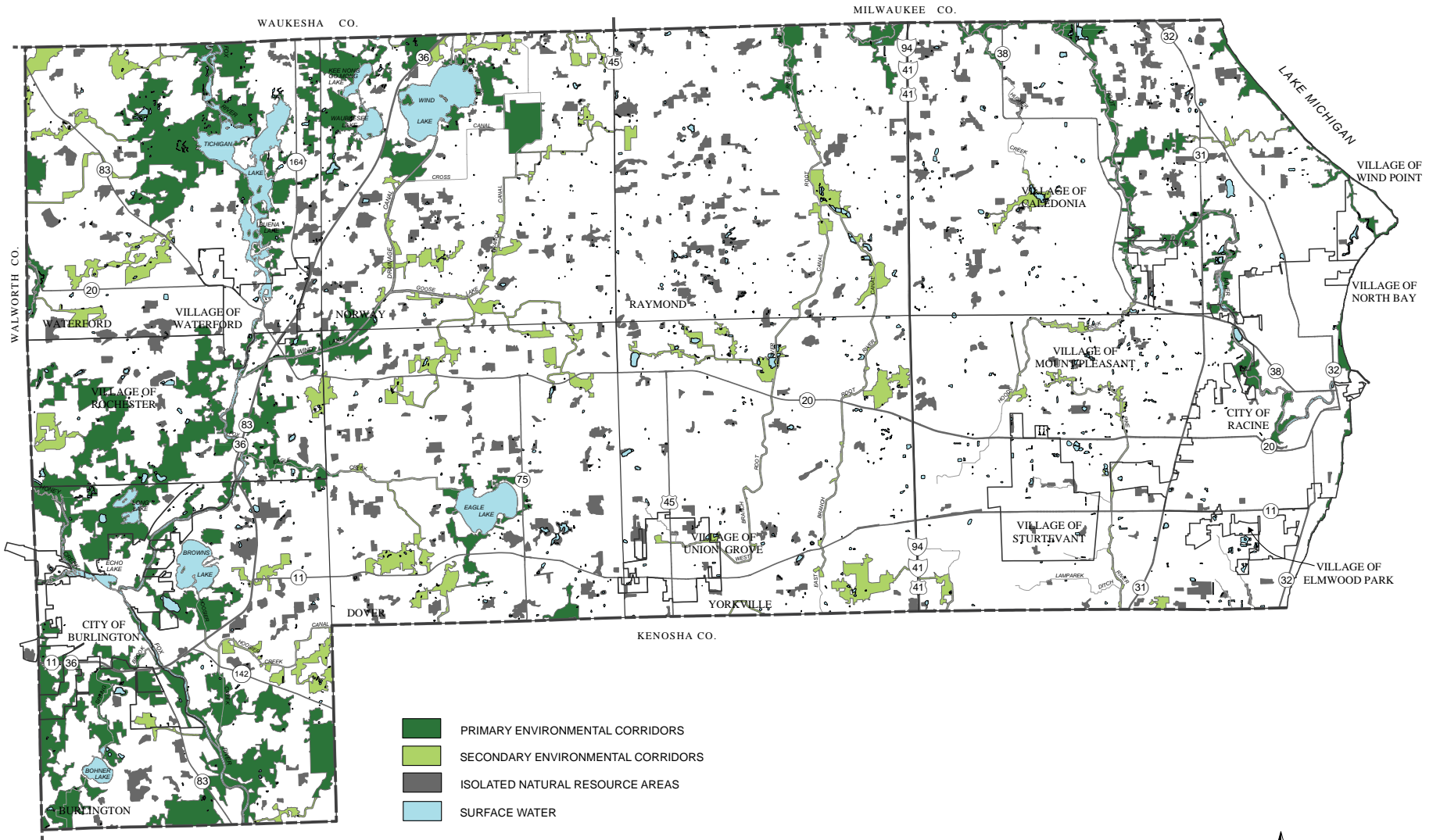


- HIGH DENSITY URBAN AREA**  
(RESIDENTIAL AND OTHER URBAN LAND—AT LEAST 7.0 DWELLING UNITS PER NET RESIDENTIAL ACRE)
- MEDIUM DENSITY URBAN AREA**  
(RESIDENTIAL AND OTHER URBAN LAND—2.3 TO 6.9 DWELLING UNITS PER NET RESIDENTIAL ACRE)
- LOW DENSITY URBAN AREA**  
(RESIDENTIAL AND OTHER URBAN LAND—0.7 TO 2.2 DWELLING UNITS PER NET RESIDENTIAL ACRE)
- SUB-URBAN DENSITY URBAN AREA**  
(RESIDENTIAL LAND—0.2 TO 0.6 DWELLING UNITS PER NET RESIDENTIAL ACRE)
- MAJOR ECONOMIC ACTIVITY AREA**  
I - INDUSTRIAL (AT LEAST 3,500 INDUSTRIAL JOBS)  
R - RETAIL (AT LEAST 2,000 RETAIL JOBS)  
G - GENERAL PURPOSE (AT LEAST 3,500 TOTAL JOBS)
- RURAL AREA**  
(PRIME AGRICULTURAL LAND, OTHER AGRICULTURAL LAND AND RURAL DENSITY RESIDENTIAL—NO MORE THAN 0.2 DWELLING UNITS PER ACRE)

- PRIMARY ENVIRONMENTAL CORRIDOR**
- SECONDARY ENVIRONMENTAL CORRIDOR**
- ISOLATED NATURAL RESOURCE AREA**
- SURFACE WATER**
- MAJOR OUTDOOR RECREATION CENTER**  
M - MULTI - USE SITE
- MAJOR TRANSPORTATION CENTER**  
A - AIRPORT  
R - PASSENGER RAIL TERMINAL
- MAJOR UTILITY CENTER**  
S - PUBLIC SEWAGE TREATMENT PLANT
- MAJOR GOVERNMENTAL OR INSTITUTIONAL CENTER**  
G - COUNTY, STATE, OR FEDERAL ADMINISTRATION OFFICE  
T - TECHNICAL / VOCATIONAL



**Map 6**  
**ENVIRONMENTAL CORRIDORS AND ISOLATED NATURAL RESOURCE AREAS IN RACINE COUNTY: 2010**



Source: SEWRPC.



**Table 14**

**AREAL EXTENT OF ONE-PERCENT-ANNUAL-PROBABILITY FLOODPLAIN BY CIVIL DIVISION IN RACINE COUNTY: 2015**

Civil Division	Area (acres)
<b>Cities</b>	
Burlington .....	597.5
Racine .....	409.3
<b>Villages</b>	
Caledonia .....	1,502.3
Elmwood Park .....	0.0
Mt. Pleasant.....	1,150.6
North Bay.....	1.4
Rochester .....	608.8
Sturtevant .....	86.2
Union Grove .....	36.9
Waterford.....	58.7
Wind Point.....	36.9
<b>Towns</b>	
Burlington .....	4,265.2
Dover .....	1,540.0
Norway .....	6,459.8
Raymond .....	1,666.7
Waterford.....	1,904.1
Yorkville .....	1,596.7
<b>Total</b>	<b>21,921.1</b>

Source: Federal Emergency Management Agency and SEWRPC.

is a 1 percent chance of this event being reached or exceeded in any given year. 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.

Floodplains identified by Racine County, the South-eastern Wisconsin Regional Planning Commission (SEWRPC), and the Federal Emergency Management Agency (FEMA) are shown on Map 7. Approximately 21,921 acres, not including surface water in lakes and existing stream channels, or about 10 percent of the total area of the County, were located within the one-percent-annual-probability flood hazard area. This total includes about 3,214 acres of approximately-delineated floodplains. The land area within the one-percent-annual-probability floodplain in each community, not including surface water in lakes, ponds, and stream channels, is given in Table 14. Stream rehabilitation and flood mitigation efforts along the Pike River and its tributaries in the Village of Mt. Pleasant are ongoing and are expected to result in changes to the associated floodplain. Final Phases 7 through 9 of the Pike River project are currently under construction and are anticipated to be completed by 2017.

A consideration in flood hazard mitigation is the potential for increased flooding due to dam failures. Since there are several major and minor dams in Racine County, future evaluation of floodplain areas related to dam failure should be considered. The area that would potentially be inundated by failure of a private earth embankment dam on Tributary No. 2 to the West Branch of the Root River Canal was delineated by the SEWRPC staff in 2003 and 2004. Dams in the County that have been identified by the Wisconsin Department of Natural Resources (WDNR) are inventoried in Table 15, and locations of each are shown on Map 8. As shown on this map, of the 20 dams identified, two have been assigned a high hazard rating by the WDNR,<sup>3</sup> indicating the potential for loss of human life as well as economic loss, environmental damage, or disruption of lifeline facilities during failure or mis-operation of the dam. Another two dams have been assigned significant hazard ratings indicating the potential for economic loss, environmental damage, or disruption of lifeline facilities.

<sup>3</sup> Racine County hired a consultant in 2012 to prepare a dam failure analysis for the Waterford dam, which is currently assigned a high hazard rating by the WDNR. The analysis results indicated that the hazard rating of the dam could be lowered to a significant hazard rating. The WDNR is waiting on downstream communities that would be affected in the event of a failure of the Waterford dam to adopt the hydraulic shadow that was developed under the dam failure analysis. Once this hydraulic shadow has been adopted by the communities, the WDNR may assign a significant hazard rating for the Waterford dam.

Table 15

## WISCONSIN DEPARTMENT OF NATURAL RESOURCES DAM INVENTORY INFORMATION: 2015

Number on Map 8	WDNR Dam Sequence Number	Dam Name		Owner	Township	WDNR Field File Number	Size	Hydraulic Height (feet)	Structural Height (feet)	Impoundment Surface Area (acres)	Maximum Impoundment Storage (acre-feet)	Hazard Potential
		Official	Local									
1	288	Horlick Dam	--	Racine County	Mt. Pleasant	51.03	Large	12.0	19.0	60.0	460.0	Low
2	289	Waterford	Buena Lake Dam	Racine County	Waterford	51.05	Large	5.0	10.0	1133.0	7500.0	High <sup>a</sup>
3	316	Honey Lake <sup>b</sup>	Sugar Creek	Honey Lake Protection & Rehabilitation District	Spring Prairie	64.21	Large	7.0	12.0	44.0	330.0	Low
4	602	Burlington	Echo Lake Dam	City of Burlington	Rochester	51.01	Large	6.0	10.0	100.0	450.0	Significant
5	879	Reischl <sup>c</sup>	--	Norris, Inc.	Vernon	67.44	Large	11.0	13.0	20.0	80.0	Low
6	953	Rochester	--	Racine County	Rochester	51.04	Large	4.0	9.0	46.0	300.0	High
7	1003	Eagle Lake	Eagle Lake Property Owners Association	Racine County	Dover	51.10	Large	5.0	8.0	515.0	3600.0	Low
8	1004	Wind Lake	--	Racine County	Norway	51.06	Large	3.0	7.0	936.0	6550.0	Low
9	1439	Lake Denoon	Riparians	Riparians	Norway	51.07	Small	1.0	2.0	162.0	150.0	Low
10	1440	Waubeesee	--	Town of Norway	Norway	51.08	Large	2.0	6.5	129.0	500.0	Low
11	1441	Browns Lake	Even J. Sells	Even J. Sells	Rochester	51.09	Small	2.0	4.0	396.0	1600.0	Low
12	1442	Bohner Lake	Wisconsin Department of Natural Resources	Racine County	Burlington	51.12	Small	2.0	5.0	135.0	500.0	Low
13	1443	Long Lake	--	Riparians	Rochester	51.13	Small	1.0	2.0	102.0	200.0	Low
14	1444	Lake Kee Nong A Mong	--	Town of Norway	Norway	51.14	Small	1.0	4.0	88.0	860.0	Low
15	2123	Colonial Park Environmental Center	--	City of Racine	Mt. Pleasant	51.00	Small	5.0	6.0	5.0	30.0	--
16	2404	Joseph Shaffer	--	--	Waterford	51.00	Small	10.0	13.0	1.0	2.0	--
17	3070	Bohner Pond	--	Racine County	Burlington	51.12	Small	6.0	12.0	10.0	25.0	--
18	3073	Tichigan Wildlife Area	Wisconsin Department of Natural Resources	Wisconsin Department of Natural Resources	Waterford	51.00	Small	3.0	6.0	16.0	50.0	--
19	5757	Hickory Lake	Dremel	--	Yorkville	51.15	Large	8.0	20.0	10.4	115.0	Significant
20	6117	Pleasant Valley Lake	--	--	Mt. Pleasant	51.00	--	--	--	--	--	Low

<sup>a</sup> Racine County hired a consultant in 2012 to prepare a dam failure analysis for the Waterford dam, which is currently assigned a high hazard rating by the WDNR. The analysis results indicated that the hazard rating of the dam could be lowered to a significant hazard rating. The WDNR is waiting on downstream communities that would be affected in the event of a failure of the Waterford dam to adopt the hydraulic shadow that was developed under the dam failure analysis. Once this hydraulic shadow has been adopted by the communities, the WDNR may assign a significant hazard rating for the Waterford dam.

<sup>b</sup> Dam is located in Walworth County immediately west of the Racine County Line.

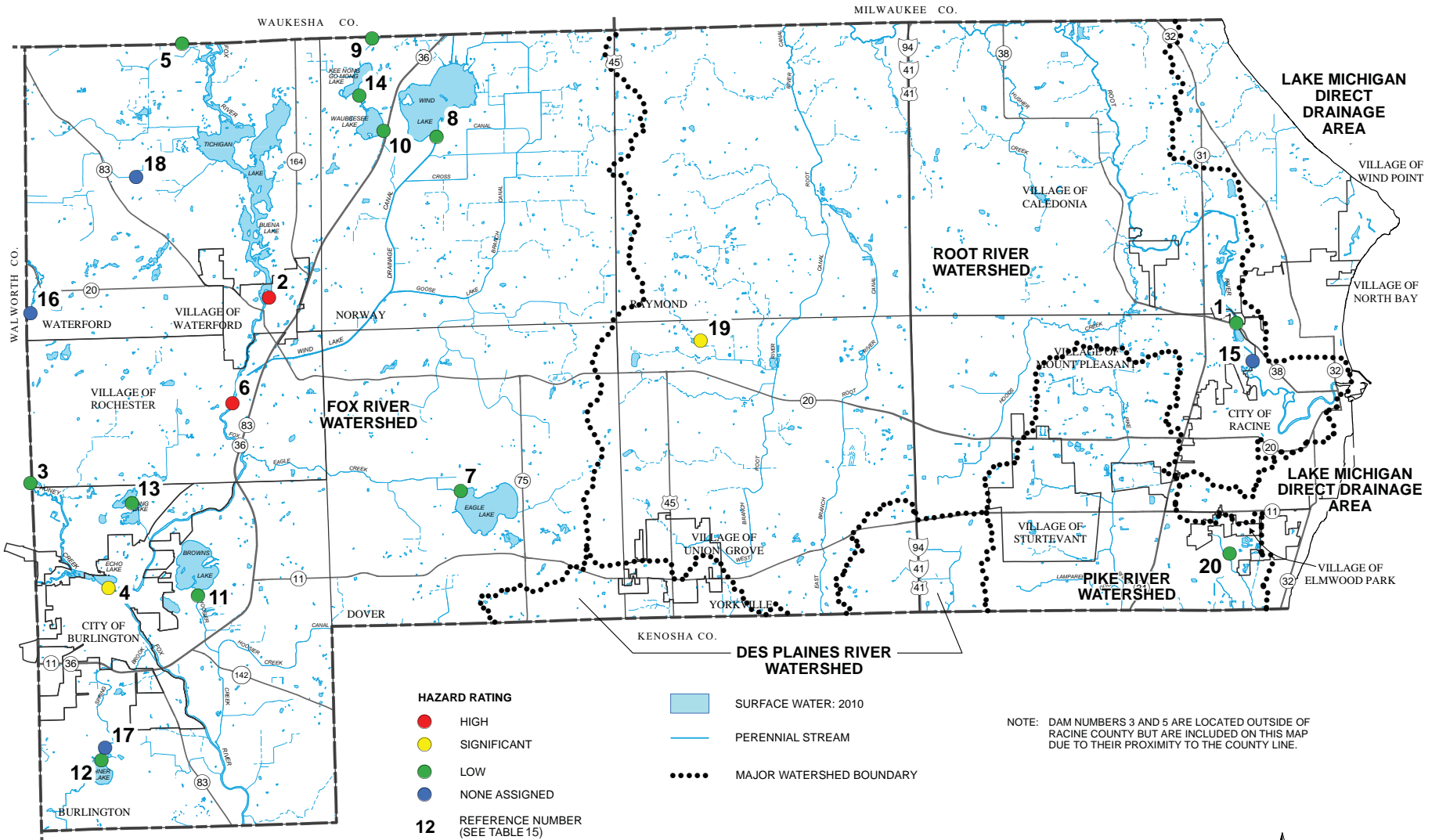
<sup>c</sup> Dam is located in Waukesha County immediately west of the Racine County Line.

Source: Wisconsin Department of Natural Resources and SEWRPC.

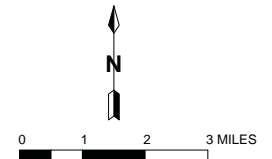


Map 8

WISCONSIN DEPARTMENT OF NATURAL RESOURCES DAM LOCATIONS: 2015



Source: Wisconsin Department of Natural Resources and SEWRPC.



All of the floodplain areas have been 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 Racine County which were finalized in 2012 and are available as a digital file layer for the Racine County cadastral mapping system which covers the entire County.

## **LAKE MICHIGAN SHORELINE EROSION HAZARD AREAS**

### **Shoreline Erosion and Bluff Stability Conditions**

Shoreline erosion and bluff stability conditions are important considerations in planning for the protection and sound development and redevelopment of lands located along the Lake Michigan shoreline. Shoreline erosion and bluff stability conditions in Southeastern Wisconsin were surveyed in 1977<sup>4</sup> and 1997,<sup>5</sup> and in Racine County in 1978<sup>6</sup> and 1982.<sup>7</sup> Such conditions can change over time since they are related to changes in, among other related factors, climate, water levels, the geometry of the onshore beach and nearshore areas, the extent and condition of shore protection measures, the type and extent of vegetation, and the type of land uses in shoreland areas. As of August 2015, water levels in Lake Michigan were nearly one foot above average levels, about 2.5 feet below the record high levels which occurred in 1986, and about 3.7 feet above the low levels that occurred in 2013. While higher water levels can benefit communities, businesses, and industries that depend on Great Lakes waters for commercial shipping, hydropower, recreational boating, and tourism, they can lead to negative impacts such as coastal erosion, flooding, and property damage along the shoreline. While low water levels have the effect of reducing the shoreline erosion due to scour at the base, there are other situations where the shoreline can be negatively affected by low levels. In addition, low water levels can adversely affect shipping, power generation, and tourism. Given the cyclic nature of water levels in the Great Lakes, a return to lower lake levels may occur in the future.

The 1997 Lake Michigan shoreline recession and bluff stability study in Southeastern Wisconsin included evaluations of lands along the Lake Michigan shoreline in Kenosha, Racine, Milwaukee, and Ozaukee Counties that directly affect, or are directly affected by shoreline erosion, bluff recession, and storm damage processes. This relatively narrow strip of land along the Lake Michigan shoreline extends approximately 89 miles from the Wisconsin-Illinois state line to the Ozaukee-Sheboygan county line, including 14.8 miles in Racine County. For analytical purposes, the Lake Michigan shoreline was divided into 17 reaches, including four reaches within or partially within Racine County, as shown on Map 9. These reaches were selected to have relatively uniform beach and bluff characteristics. These reaches generally correspond to those utilized in the 1977 shoreline erosion study, with some refinement to reflect 1997 conditions.

During 1995, field surveys were conducted to measure the geometry of the bluff slope at 192 sites in Southeastern Wisconsin, including 34 sites in Racine County. These measurements provided a basis for site-specific assessments of the bluff conditions at the selected locations. In addition, beach and nearshore lakebed conditions were measured for selected sites in Racine County.

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<sup>4</sup> *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, Shore Erosion Study, Technical Report, Shoreline Erosion and Bluff Stability Along Lake Michigan and Lake Superior Shorelines of Wisconsin, Wisconsin Coastal Management Program, February 1977.*

<sup>5</sup> *SEWRPC Technical Report No. 36, Lake Michigan Shoreline Recession And Bluff Stability in Southeastern Wisconsin: 1995, December 1997.*

<sup>6</sup> *J.P. Keillor and R. DeGroot, Recent Recession of Lake Michigan Shorelines in Racine County, Wisconsin, University of Wisconsin Sea Grant Program, 1978.*

<sup>7</sup> *SEWRPC Community Assistance Planning Report No. 86, A Lake Michigan Coastal Erosion Management Study for Racine County, Wisconsin, October 1982.*

Based upon the data collected and the assessment and analysis of that data, bluff stability and shoreline erosion conditions were developed and are summarized graphically on Map 9. Within Racine County, at 20 of the 34 sites evaluated, the bluffs were found to be stable with the remaining sites having unstable or marginally stable conditions based upon the 1995 survey. Where comparable data existed, the 1995 survey generally found bluff stability had improved compared to 1977 conditions. This is likely due to the construction of shoreline protection measures in areas of development.

Increases in offshore depths can cause increased shore erosion problems. At the seven sites in Racine County where offshore bathymetry was measured in 1995 and compared to 1977 data, four showed decreases in depth, while the others showed little change. The sites with the greatest decrease in offshore depths were located north of Wind Point, where such a trend would be expected due to littoral drift deposition.

A 1997 study<sup>8</sup> commissioned by the Wisconsin Department of Administration, Wisconsin Coastal Management Program, developed estimates of recession rates for the Lake Michigan shoreline in Racine County and two other counties. This study identified bluff recession rates of up to 5.5 feet per year, with an average erosion rate of less than one foot per year.

The current Lake Michigan shoreline conditions indicate relatively stable conditions for the most part in areas where shoreline development exists. The areas with unstable bluffs are limited to the northern part of the County. However, there is the potential for shoreline and bluff erosion to impact structures over time. In addition, during severe climatic conditions, such as high water levels or saturated ground conditions, large episodic bluff erosion events could occur. Accordingly, these conditions are an important consideration in the County hazard mitigation planning.

### **Lake Michigan Shoreline Erosion Protection**

In 2005, Dr. Scudder Mackey of Habitat Solutions NA and the SEWRPC staff completed a study of shoreline erosion control structures along Lake Michigan for its entire length in Racine County.<sup>9</sup> The findings for shoreline protection and nonprotection areas are depicted in Map 10. Of approximately 14.8 miles of Lake Michigan shoreline along Racine County, about 73 percent is designated as protected. That protection is provided by approximately 380 separate shoreline protection structures consisting of groins, revetments, and seawalls or bulkheads, representing about 220 individual or composite structures. While the study found that about 70 percent of the structures were in good condition and about 15 percent of the structures were in fair condition, it indicated that many of the structures would require maintenance in three to five years of 2005, especially if water levels in the Lake rise. Finally, the study concluded that at 2005 Lake levels, the effectiveness of the structures for preventing erosion was generally high; however, when water levels in Lake Michigan rise above 2005 levels, as is the case at the time of this update, the effectiveness of the structures will decrease.

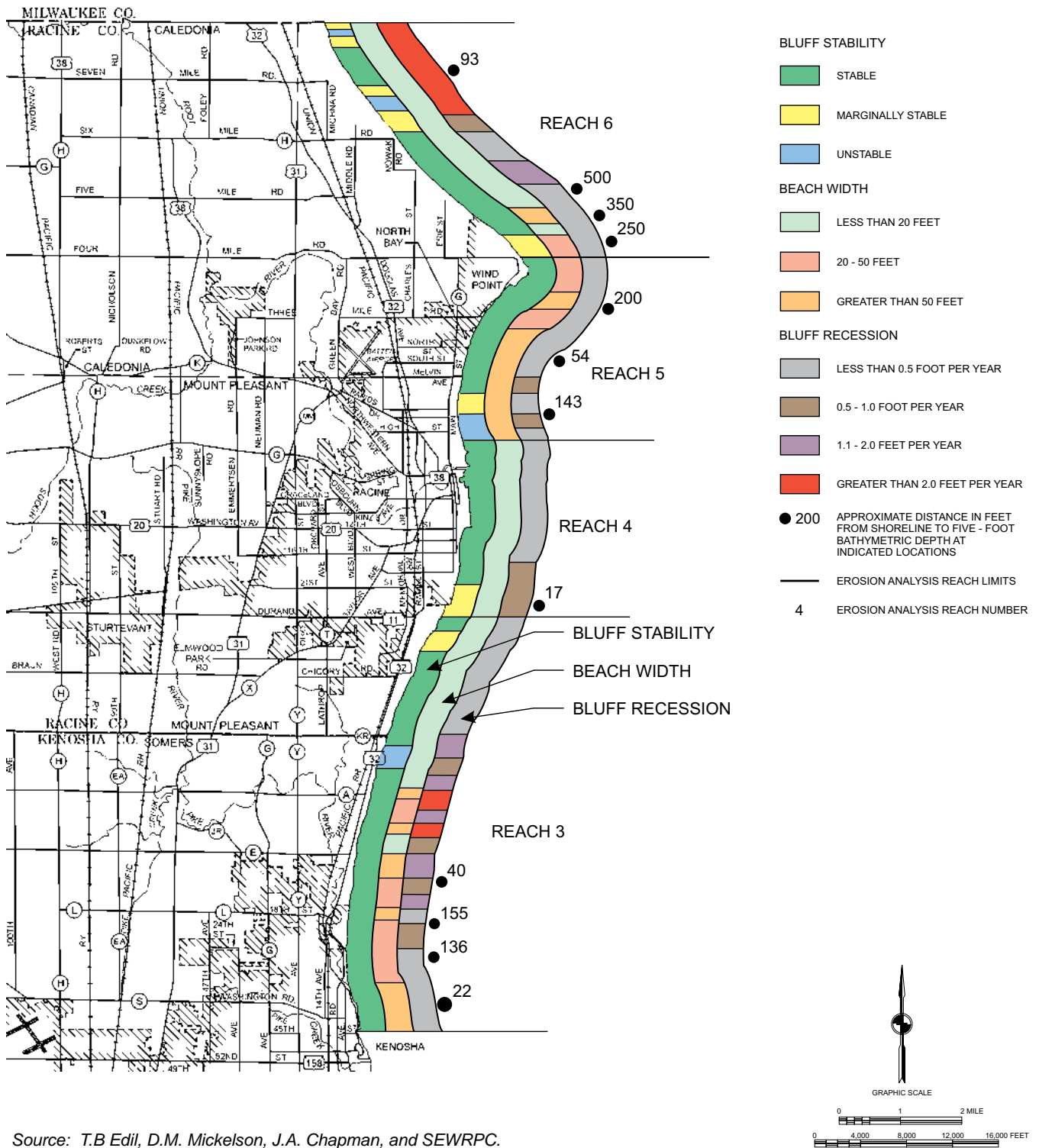
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<sup>8</sup> *Short Elliot Hendrickson Inc., and Michael Baker Jr., Inc., Lake Michigan Recession Rate Study, Wisconsin Coastal Management Council, Manitowoc, Ozaukee, and Racine Counties, November 1997.*

<sup>9</sup> *SEWRPC Memorandum Report No. 171, Assessment of Lake Michigan Shoreline Erosion Control Structures in Racine County, January 2008.*

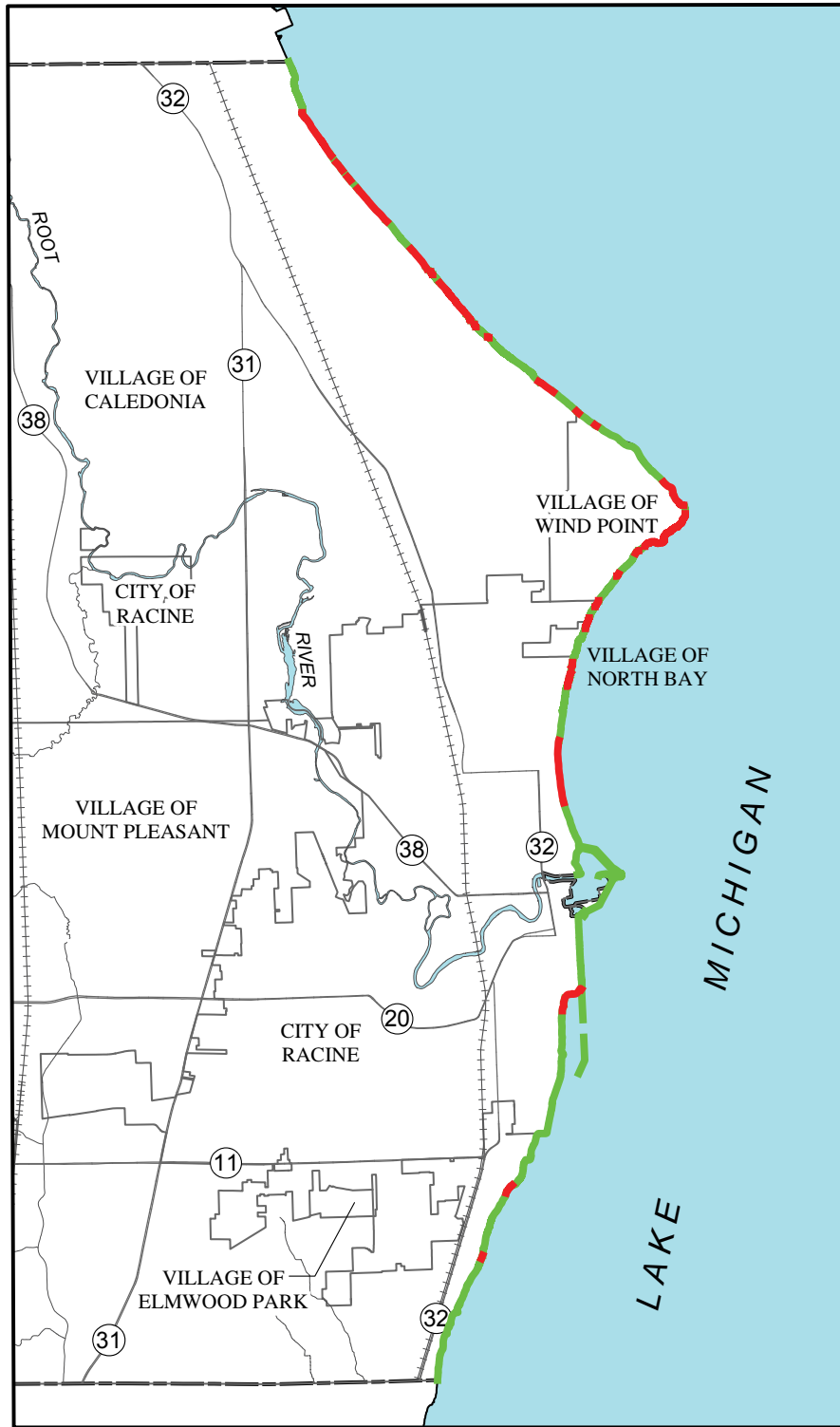
Map 9

**SUMMARY OF LAKE MICHIGAN SHORELINE EROSION AND BLUFF STABILITY ANALYSES IN RACINE COUNTY: 1995**



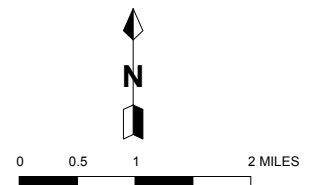
Source: T.B Edil, D.M. Mickelson, J.A. Chapman, and SEWRPC.

LAKE MICHIGAN SHORELINE / EROSION PROTECTION IN RACINE COUNTY: 2005



- PROTECTED SHORELINE
- UNPROTECTED SHORELINE

Source: S. D. Mackey Habitat Solutions NA and SEWRPC.



## **TRANSPORTATION SYSTEM**

The transportation system of Racine County provides the basis for movement of goods and people into, out of, through, and within the County. An efficient transportation system is essential to the sound social and economic development of the County and of the Region. An understanding of the existing transportation system is also a factor to be considered in the preparation of a hazard mitigation plan for the County. Accordingly, this section presents a description of existing transportation facilities in Racine County. Included are descriptions of the existing arterial street and highway system, public transit facilities, railway facilities, and airport facilities.

### **Arterial Streets and Highways**

The arterial street and highway system serving Racine County is shown on Map 11. As shown on Map 11, the existing arterial network in the eastern portion of the County is relatively densely spaced, arterials occurring at about one-mile intervals in both the north-south and east-west directions. IH 94 traverses the entire County in a north-south direction. The existing arterial network in the rest of the County is less-densely spaced, with arterials occurring at about two- to three-mile intervals. In 2010, the Burlington Bypass was completed, allowing motorists to bypass the City of Burlington while continuing on STH 36 and STH 11. This addition to the state trunk highway system has changed the designations of some arterial streets and highways within the City and Town of Burlington, as shown on Map 11.

The traffic-carrying capacity of the arterial street system, while dependent upon a number of factors, is primarily a function of the number of traffic lanes and the type of facility. As shown in Table 16, a two-lane arterial generally has a design capacity of about 14,000 vehicles, per average weekday, a four-lane undivided arterial has a design capacity of about 18,000 vehicles per average weekday, a four-lane arterial with a two-way left turn lane has a design capacity of about 21,000 vehicles per average weekday, a four-lane divided arterial has a design capacity of about 27,000 vehicles per average weekday, a six-lane divided arterial has a capacity of about 38,000 vehicles per average weekday, and an eight-lane divided arterial has a capacity of about 50,000 vehicles per average weekday. The design capacities cited are for urban arterials typically having urban cross-sections with curb and gutter and auxiliary parking lanes, which can also serve as distress lanes and, importantly, serve as bypass lanes at intersections. The traffic capacities of urban arterials are established by the capacity of the intersections with other arterial streets, which are typically controlled by traffic signals. As also shown in Table 16, a four-lane freeway has a design capacity of about 60,000 vehicles per average weekday, a six-lane freeway has a design capacity of about 90,000 vehicles per average weekday, and an eight-lane freeway has a design capacity of about 120,000 vehicles per average workday.

### **Public Transit Facilities**

#### ***City of Racine System***

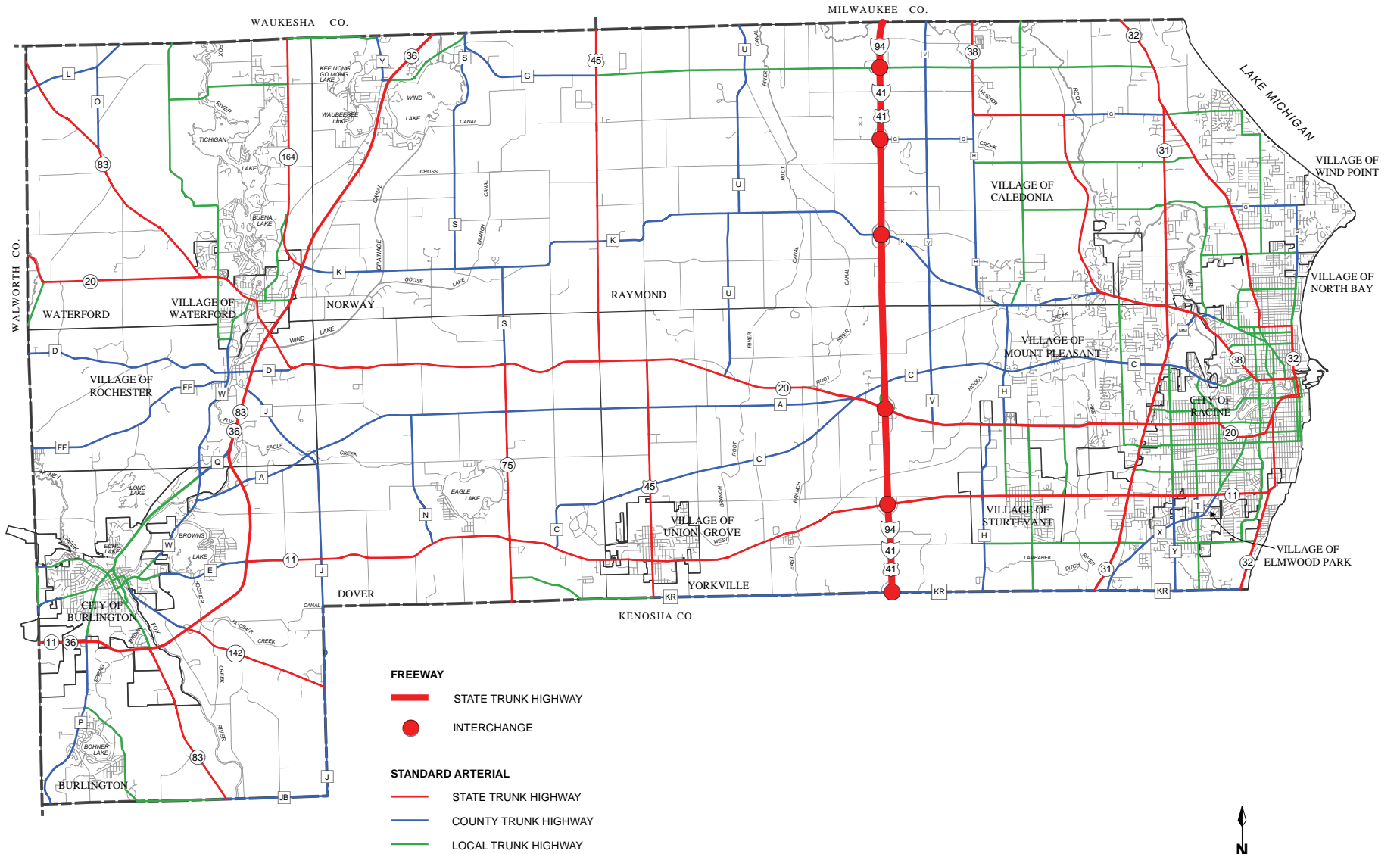
The City of Racine provides local fixed-route bus service, the Belle Urban System (BUS), which serves the City of Racine and the southeastern portion of the Village of Caledonia. The system includes nine routes extending to serve businesses west of the City along Washington Avenue (STH 20) in the Villages of Mt. Pleasant and Sturtevant and the Grand View Business Park in the Town of Yorkville. The City of Racine also provides paratransit services which are designed to provide door-to-door transportation for disabled individuals who are unable to use the City's fixed-route bus service. That service is provided on a contract basis using a private provider. Because the paratransit service is actually part of the Countywide paratransit program of the Racine County Human Services Department, disabled individuals who live within the BUS fixed route service area can also utilize the service to travel anywhere within Racine County.

#### ***Kenosha-Racine-Milwaukee Service***

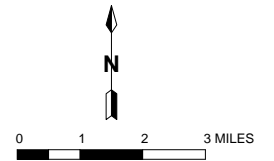
The City of Racine, in a joint effort with the City of Kenosha and with Racine and Kenosha Counties, provides commuter bus service between downtown Milwaukee and the Racine and Kenosha areas. The commuter bus service is provided through a contract with a private transit operator.

Map 11

ARTERIAL STREET AND HIGHWAY SYSTEM IN RACINE COUNTY: 2015



- FREEWAY**
- STATE TRUNK HIGHWAY
- INTERCHANGE
- STANDARD ARTERIAL**
- STATE TRUNK HIGHWAY
- COUNTY TRUNK HIGHWAY
- LOCAL TRUNK HIGHWAY



Source: SEWRPC.

**Table 16**

**ESTIMATED FREEWAY AND SURFACE ARTERIAL FACILITY DESIGN CAPACITY AND ATTENDANT LEVEL OF CONGESTION<sup>a</sup>**

Facility Type	Average Weekday Traffic Volumes (vehicles per 24 hours)			
	Design Capacity and Upper Limit of Level of Service C	Upper Limit of Moderate Congestion and Level of Service D	Upper Limit of Severe Congestion and Level of Service E	Extreme Congestion and Level of Service F
Freeway				
Four-Lane.....	60,000	80,000	90,000	>90,000
Six-Lane.....	90,000	121,000	135,000	>135,000
Eight-Lane.....	120,000	161,000	180,000	>180,000
Standard Arterial				
Two-Lane.....	14,000	18,000	19,000	>19,000
Four-Lane Undivided.....	18,000	23,000	24,000	>24,000
Four-Lane with Two-way Left Turn Lane.....	21,000	29,000	31,000	>31,000
Four-Lane Divided.....	27,000	31,000	32,000	>32,000
Six-Lane Divided.....	38,000	45,000	48,000	>48,000
Eight-Lane Divided.....	50,000	60,000	63,000	>63,000

The level of congestion on arterial streets and highways may be summarized by the following operating conditions:

Freeway			
Level of Traffic Congestion	Level of Service	Average Speed	Operating Conditions
None	A and B	Freeway free-flow speed	No restrictions on ability to maneuver and change lanes
None	C	Freeway free-flow speed	Ability to maneuver and change lanes noticeably restricted
Moderate	D	1 to 2 mph below free-flow speed	Ability to maneuver and change lanes more noticeably limited; reduced driver physical and psychological comfort levels
Severe	E	Up to 10 mph below free-flow speed	Virtually no ability to maneuver and change lanes. Operation at maximum capacity. No usable gaps in the traffic stream to accommodate lane changing
Extreme	F	Typically 20 to 30 mph or less	Breakdown in vehicular flow with stop-and-go, bumper-to-bumper traffic

Surface Arterial			
Level of Traffic Congestion	Level of Service	Average Speed	Operating Conditions
None	A and B	70 to 100 percent of free-flow speed	Ability to maneuver in traffic stream is unimpeded. Control delay at signalized intersections is minimal
None	C	50 to 100 percent of free-flow speed	Restricted ability to maneuver and change lanes at mid-block locations
Moderate	D	40 to 50 percent of free-flow speed	Restricted ability to maneuver and change lanes. Small increases in flow lead to substantial increases in delay and decreases in travel speed
Severe	E	33 to 40 percent of free-flow speed	Significant restrictions on lane changes. Traffic flow approaches instability
Extreme	F	25 to 33 percent of free-flow speed	Flow at extremely low speeds. Intersection congestion with high delays, high volumes, and extensive queuing

<sup>a</sup>Design capacity is the maximum level of traffic volume a facility can carry before beginning to experience morning and afternoon peak traffic hour traffic congestion, and is expressed in terms of number of vehicles per average weekday.

Source: SEWRPC.



## **Railway Facilities**

As of 2015, railway freight service was being provided within Racine County by three railway companies operating active mainline railway lines. As shown on Map 12, the Union Pacific Railroad provided freight service over two parallel segments emanating from Chicago, both traversing the eastern tier of communities in a north-south direction. The Canadian Pacific Rail System, formerly known as the Soo Line, provided freight service over a line emanating from Chicago and traversing the entire County east of IH 94 in a north-south direction. The Canadian Pacific Rail System included branch line connections to the west which serves customers in the Village of Union Grove. A short spur line served industries east of the Village of Sturtevant. The Canadian National Railway, formerly the Wisconsin Central Ltd., provided freight service over a north-south main line, traversing the western edge of the County. An intercity passenger rail service operated by Amtrak utilizes the Canadian Pacific Railway line. This service, which operates between Milwaukee and Chicago, has a stop in the Village of Sturtevant.

There are a total of 185 railway crossings within Racine County. Of these crossings, 131 are public road at-grade crossings; 15 are public road crossings with the railway crossing either above or below the road; and 39 are private road crossings. Private railway crossings usually cross either private industrial roads or farm roads.

## **Airports**

Racine County also has six airports which serve the public: Burlington Municipal Airport, owned by the City of Burlington; and five others under private ownership: John H. Batten International Airport (City of Racine), Fox River Airport (Town of Rochester), Cindy Guntly Memorial Airport (Town of Norway), Sylvania Airport (Town of Yorkville), and Valhalla Airport (Town of Raymond). As of the year 2012, there were about of 200 aircraft based in Racine County, a level which has been relatively constant over the past 15 years. The public-use airports in the County are shown on Map 13. In addition to these public-use airports, there are a number of private airports and heliports in and adjacent to Racine County, also shown on Map 13.

## **UTILITY SYSTEMS**

Utility systems are among the most important and permanent elements of urban growth and development, as urban development is highly dependent upon utility systems providing electricity, natural gas, communications, water, and sewerage. Because of this reliance, utility systems are an important consideration in hazard mitigation planning.

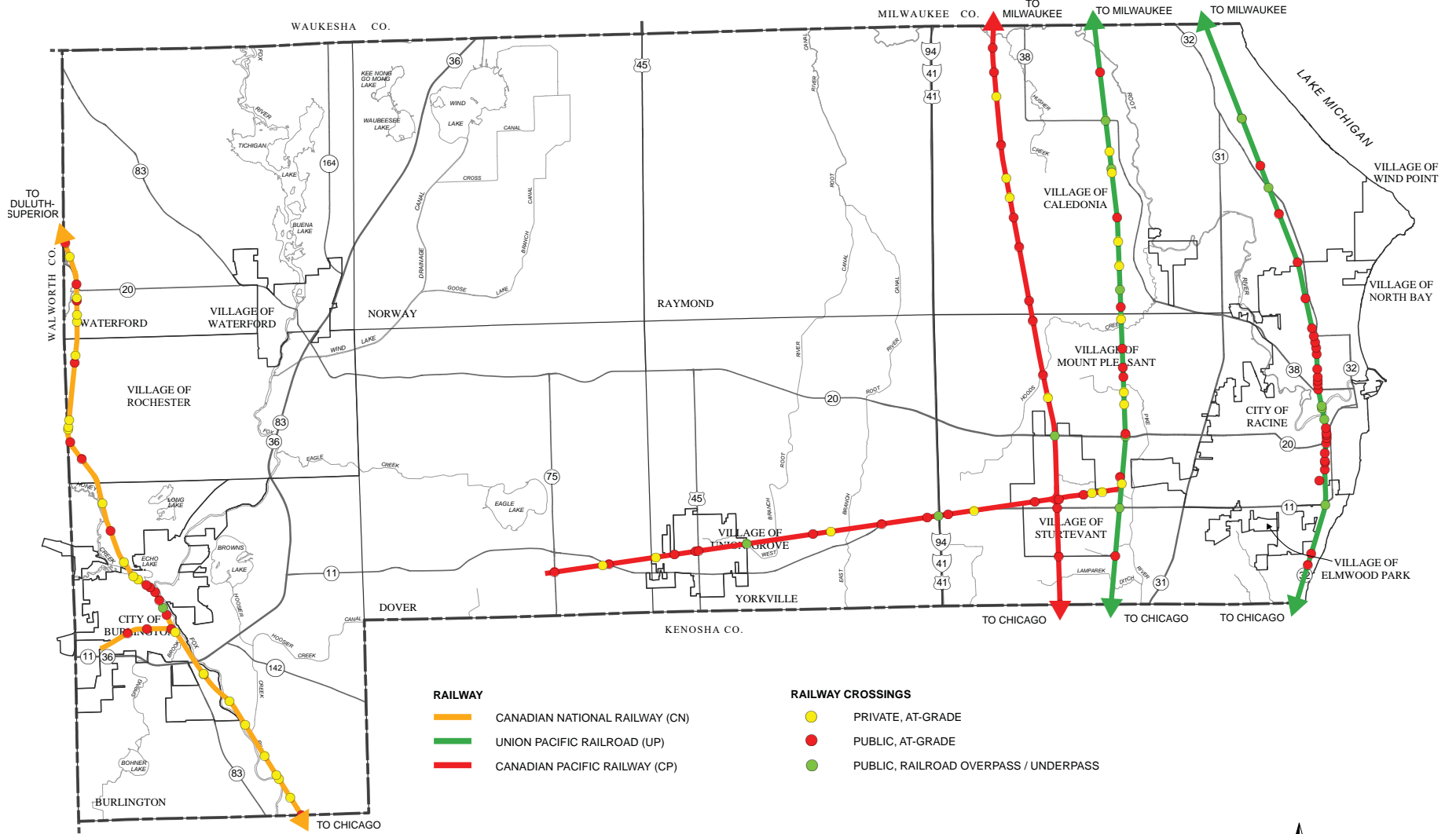
### **Public and Private Water Supply Systems**

As of the year 2010, about 17 percent of the residents of the County utilized private systems relying on groundwater as a water supply source for domestic use. The remaining 83 percent of the County residents have access to public water supply systems, with about 73 percent being served by systems that use surface water as a source of supply and about 10 percent being served by systems that use groundwater as a source of supply. The areas served by public community water supply systems are shown on Map 14. The Racine Water Utility which uses Lake Michigan as its supply, is a public water supply system serving the City of Racine and the Villages of Elmwood Park, North Bay, Sturtevant, and Wind Point and portions of the Villages of Caledonia and Mt. Pleasant. In addition, portions of the Village of Caledonia are served by a Lake Michigan supply from the City of Oak Creek. The public water supply systems serving the City of Burlington, the Villages of Union Grove and Waterford, the North Cape Sanitary District, and the Yorkville Utility District utilize groundwater as a source of supply. In addition, there are nine privately owned water systems operating in Racine County. These systems provide water primarily to residential subdivisions, apartments and condominium developments, and mobile home parks. These other than municipal community water systems utilize groundwater as a source of supply. As of 2014, about 2,150 County residents were served by private residential community water systems. These systems are listed in Table 17 and their service areas are shown on Map 15.

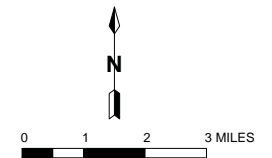
The uses of groundwater, as well as surface water, are summarized in Table 18. As shown in Table 18, approximately 18.7 million gallons per day (mgd) of Lake Michigan-derived surface water and about 2.7 mgd of groundwater

Map 12

COMMON CARRIER RAIL FREIGHT LINES IN RACINE COUNTY: 2015

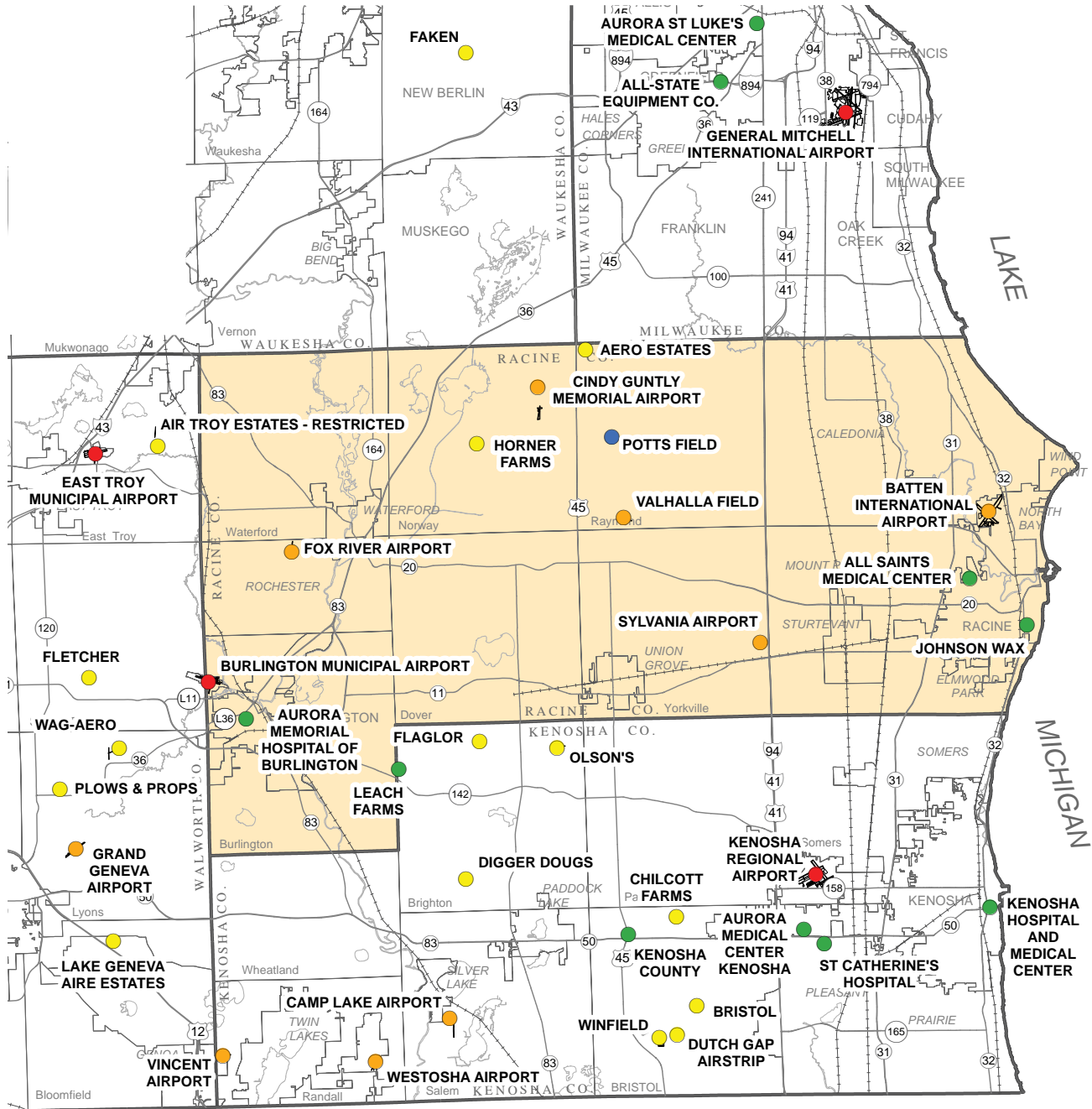


Source: Wisconsin Department of Transportation and SEWRPC.



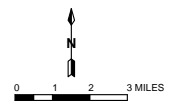
Map 13

EXISTING AIRPORTS IN RACINE COUNTY AND VICINITY: 2015



- PUBLIC-USE AIRPORT - PUBLIC OWNERSHIP
- PUBLIC-USE AIRPORT - PRIVATE OWNERSHIP
- PRIVATE-USE AIRPORT - PRIVATE OWNERSHIP
- PRIVATE-USE HELIPORT - PRIVATE OWNERSHIP
- PRIVATE-USE ULTRALIGHT - PRIVATE OWNERSHIP

Source: Wisconsin Bureau of Aeronautics and SEWRPC.



supply were used by public water utility systems in the County in 2010. Considering all water uses, including industrial, commercial, agricultural, and private water supply, approximately 20.7 mgd of surface water and 7.9 mgd of groundwater are used in Racine County.

The protection of the public water supply facilities from potential contamination is a consideration for hazard mitigation planning. As such, well head protection planning and protection and monitoring of water supply intake, treatment, storage, and distribution systems is an important potential plan element.

### **Sanitary Sewer Service Systems**

Much of Racine County lying east of IH 94 is served by public sanitary sewer service. The eastern portion of the County has the highest concentration of areas served by public sanitary sewer systems, with other public sanitary sewer service areas located in the City of Burlington; the Villages of Rochester, Union Grove, and Waterford; and portions of the Towns of Burlington, Dover, Norway, Waterford, and Yorkville. The existing and planned sewer service areas within the County are shown on Map 16.

### **Private Utilities**

Racine County is provided with electric power service by We Energies. Electric power service is available on demand throughout the County. As of early in 2001, an independent company, American Transmission Company, owned, maintained, and operated the major transmission facilities located in portions of the State of Wisconsin, including Racine County. The general locations of the major electrical transmission facilities, owned by American Transmission Company and including transmission lines and substations, are shown on Map 17. There are no major electric power generation facilities located within the County, however small private renewable energy generation facilities are becoming more common. S.C. Johnson & Son, Inc. owns and operates two wind turbines at their Waxdale facility in Mt. Pleasant. In addition, the company employs two cogeneration systems at the facility which use methane gas from the nearby Kestrel Hawk Landfill to generate a large portion of the facility's electrical energy.

Natural gas distribution service is provided for the entire County by We Energies-Gas Operations. In Racine County the main gas supply is provided by ANR Pipeline Company which owns main and branch gas pipelines in Racine County and the surrounding area. In addition, the We Energies natural gas system is connected to other major gas pipelines outside of, but in the vicinity of, Racine County. Natural gas service is available on demand throughout Racine County. Liquid petroleum is also transported through Racine County by a main line owned and operated by West Shore Pipeline. The natural gas and liquid petroleum pipelines that cross Kenosha County are mainly used as major feeder lines between the Cities of Milwaukee and Chicago. The locations of natural gas and petroleum pipelines are shown on Map 17.

Telephone service within Racine County is provided through a number of telephone companies. The service areas of the various operators are shown on Map 18. In general, telephone service is available on demand throughout the County.

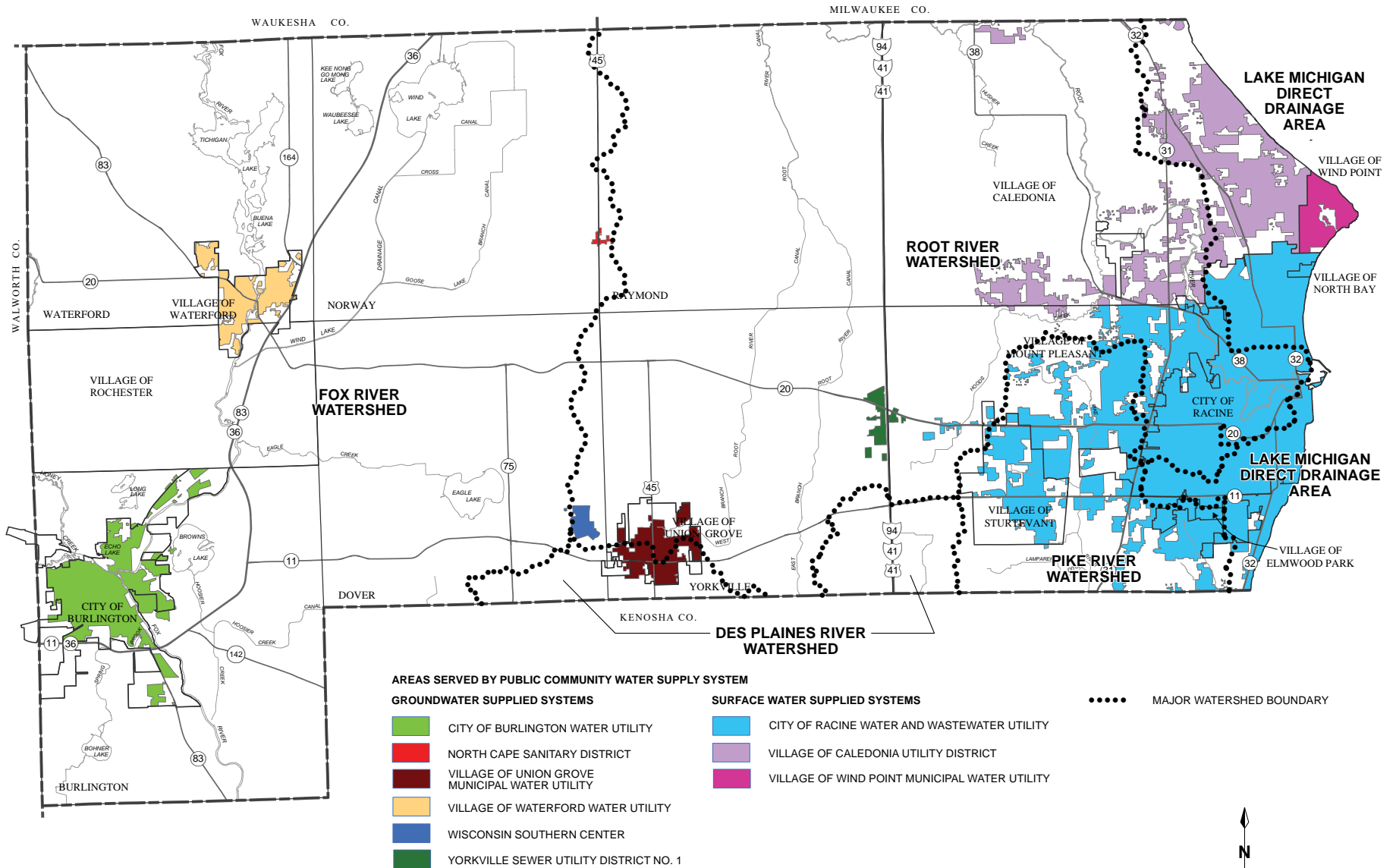
### **Solid Waste Disposal**

Landfilling and recycling are the primary methods of managing solid wastes generated in Racine County. As of 2015, there was one active, licensed, privately owned and operated sanitary landfill accepting municipal wastes; the Kestrel Hawk Park Landfill, within the City of Racine. In addition, one active landfill within the Village of Caledonia was licensed to accept fly ash. In addition to these two active landfill sites, there are 23 inactive landfill sites located throughout the County. Most of these sites have gone through proper closure procedures specified by the Wisconsin Department of Natural Resources (WDNR). One of these sites, the Hunts Disposal site in the Village of Caledonia, was a Superfund site and has been classified as remediated. The location of the solid waste disposal sites in Racine County are shown on Map 19. Appendix B lists the owner and activity status of these sites.

Map 19 also shows the locations of recycling service centers in Racine County. As of 2015 there were six recycling centers in the County.

Map 14

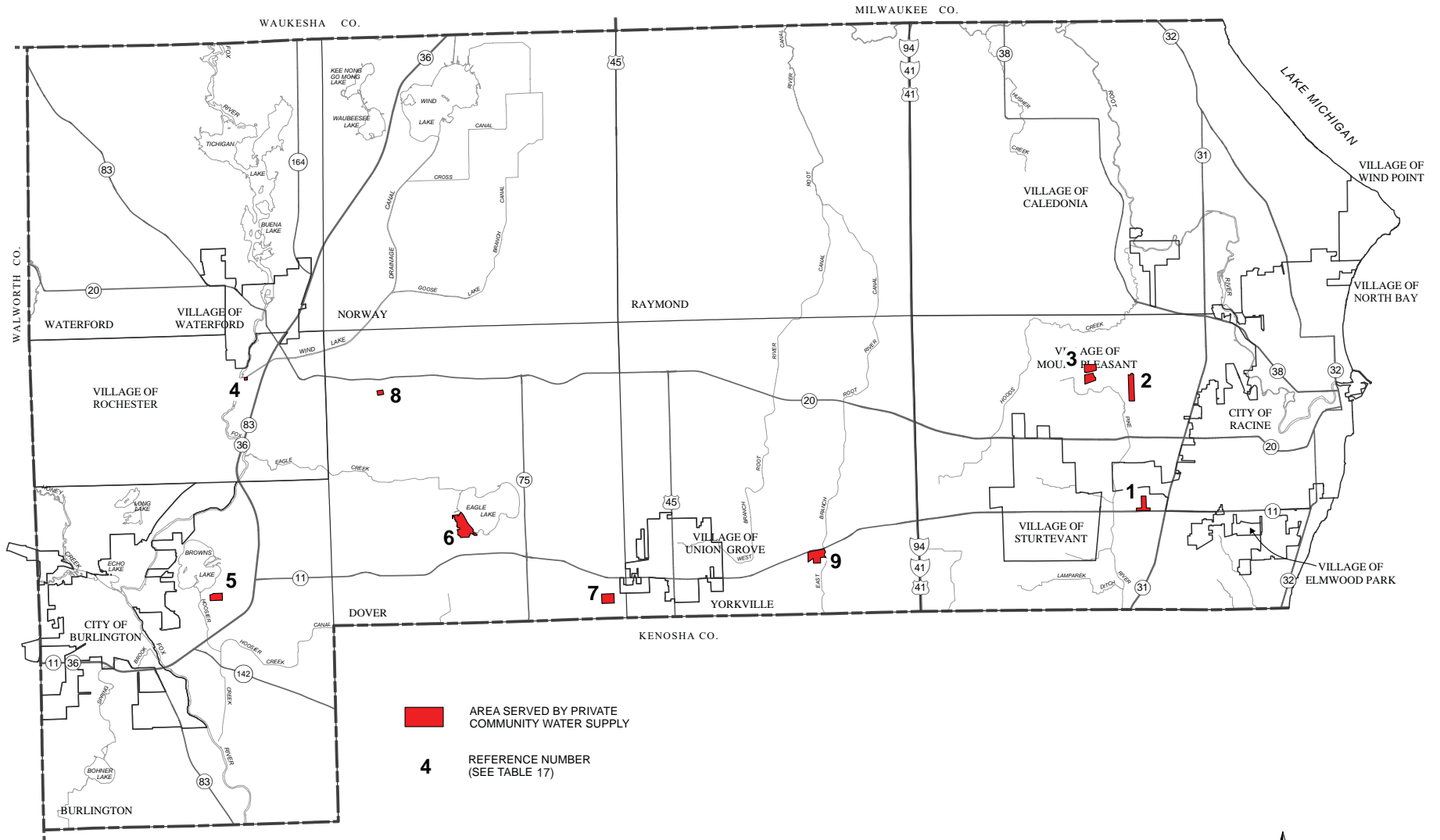
**PUBLIC COMMUNITY WATER SUPPLY SYSTEMS AND AREAS SERVED IN RACINE COUNTY: 2010**




Source: Wisconsin Public Service Commission, Water Utilities, and SEWRPC.

Map 15

PRIVATE RESIDENTIAL COMMUNITY WATER SYSTEMS IN RACINE COUNTY: 2014



 AREA SERVED BY PRIVATE COMMUNITY WATER SUPPLY

**4** REFERENCE NUMBER (SEE TABLE 17)

Source: Wisconsin Department of Natural Resources and SEWRPC.

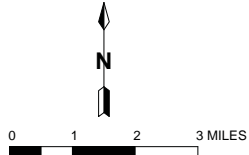


Table 17

PRIVATE RESIDENTIAL COMMUNITY WATER SYSTEMS IN RACINE COUNTY: 2014

Number on Map 15	Civil Division	System Name	Population Served <sup>a</sup>
1	Village of Mt. Pleasant	Cozy Acres Subdivision	120
2		Peterson/Nason Well Association	134
3		Spring Green Subdivision	346
4	Village of Rochester	River Springs FLP	38
5	Town of Burlington	Browns Lake Mobile Home Court	225
6	Town of Dover	Eagle Lake Manor	200
7		Hickory Haven	303
8		Lakeview Specialty Hospital	384
9	Town of Yorkville	Harvest View Estates	400
Total	--	--	2,150

NOTE: Systems serving less than 25 people are not listed.

<sup>a</sup>Per Wisconsin Department of Natural Resources files.

Source: Wisconsin Department of Natural Resources and SEWRPC.

**PUBLIC SAFETY FACILITIES AND SERVICES**

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, emergency medical rescue service areas, police stations, sheriff offices, and correctional facilities in Racine County are shown on Maps 20 through 22. A listing of these facilities is included in Appendix C. The location of these stations in relationship to the floodplain areas are indicated and further analyzed and described in Chapter IV.

**Fire Suppression and Rescue Services**

Eleven of the 17 local units of government in Racine County independently or jointly provide fire suppression services. Three of the local units and a portion of the Town of Waterford rely on private departments which are nonprofit corporations. The remaining municipalities utilize service agreements with adjacent municipalities. The location of each of the fire stations and the fire service areas within Racine County are shown on Map 20. Table 19 provides information about the working status of fire fighters within each system—that is, whether they are full-time, volunteer, or paid on-call volunteer, or some combination thereof.

Table 18

ESTIMATED USE OF WATER IN RACINE COUNTY IN 2010 IN MILLION GALLONS PER DAY

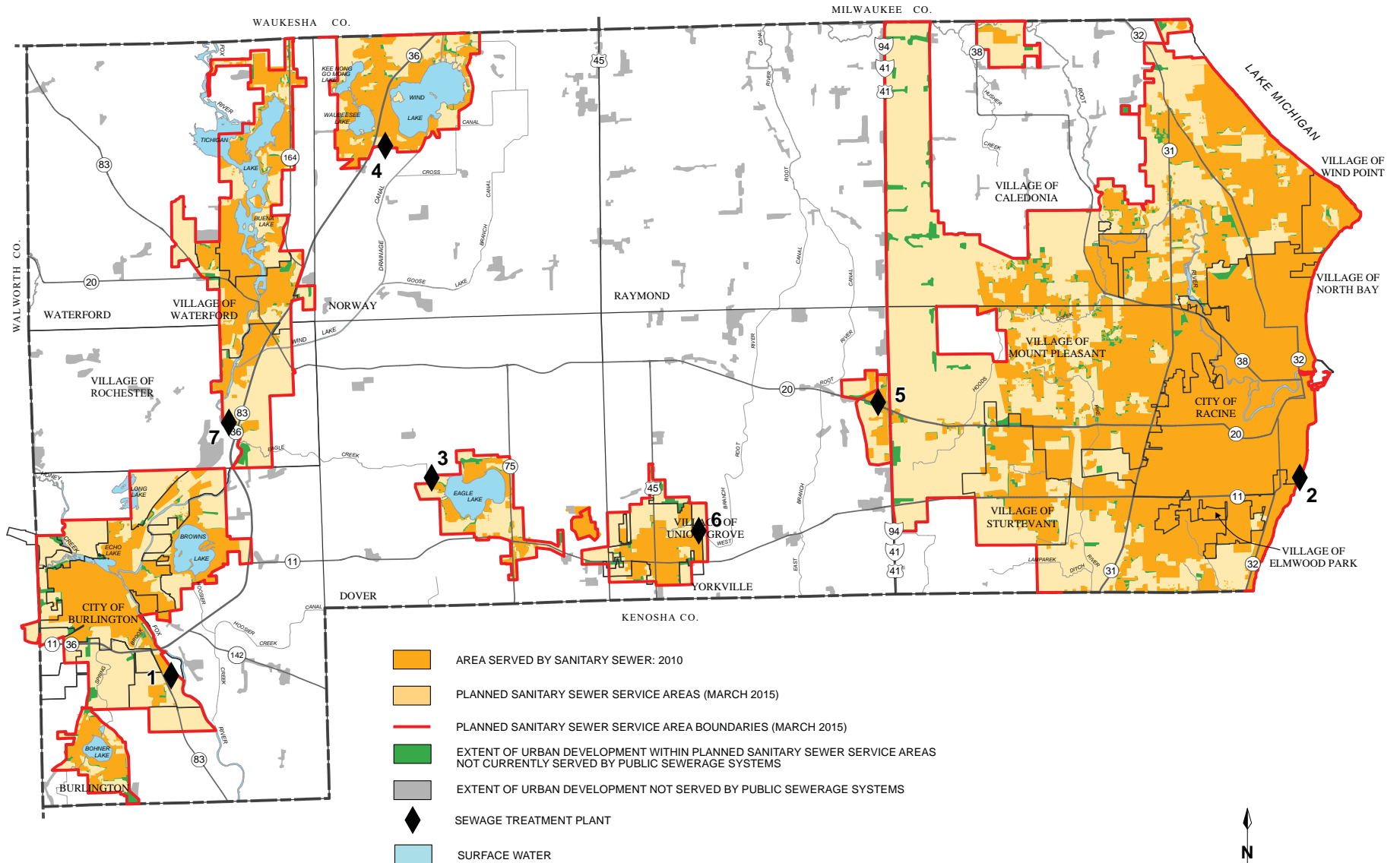
Usage Category	Water Source	
	Surface Water (Lake Michigan)	Groundwater
Public <sup>a</sup> .....	18.74	2.72
Industrial.....	1.32	0.04
Commercial.....	--	--
Irrigation.....	--	2.43
Agricultural.....	0.02	0.22
Aquaculture.....	0.15	0.04
Mining.....	0.46	0.51
Domestic.....	--	1.96
Total	20.69	7.92

<sup>a</sup>Includes water delivered to residents, industry, and commerce within the served area.

Source: U.S. Geological Survey and SEWRPC.

Map 16

**PLANNED SANITARY SEWER SERVICE AREAS AND AREAS SERVED BY SEWER IN RACINE COUNTY**

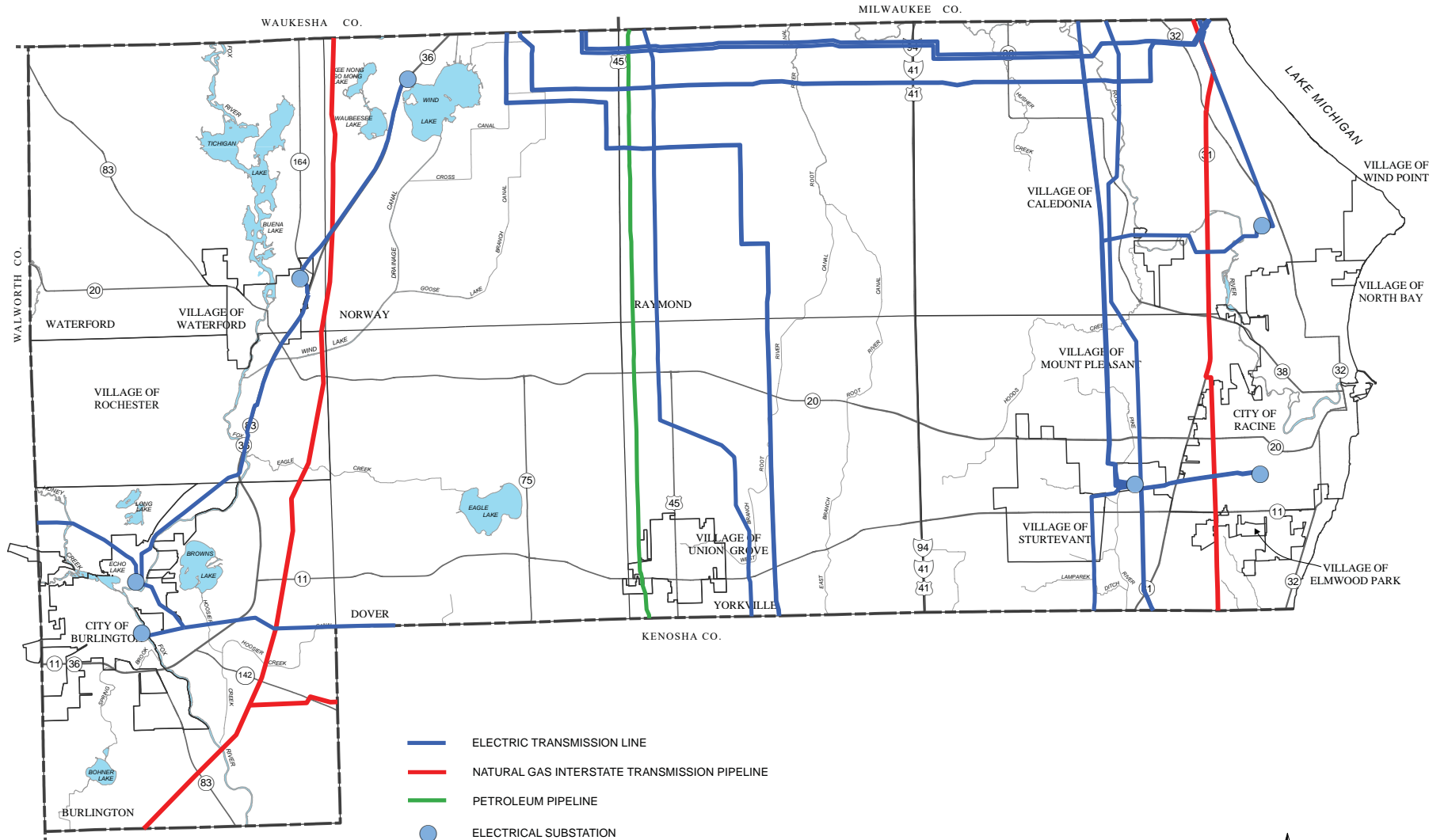


Source: Wisconsin Department of Natural Resources and SEWRPC.

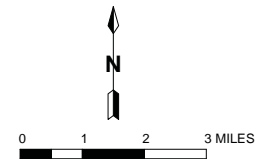


Map 17

**ELECTRIC TRANSMISSION LINES, NATURAL GAS INTERSTATE TRANSMISSION PIPELINES, AND PETROLEUM PIPELINES IN RACINE COUNTY**

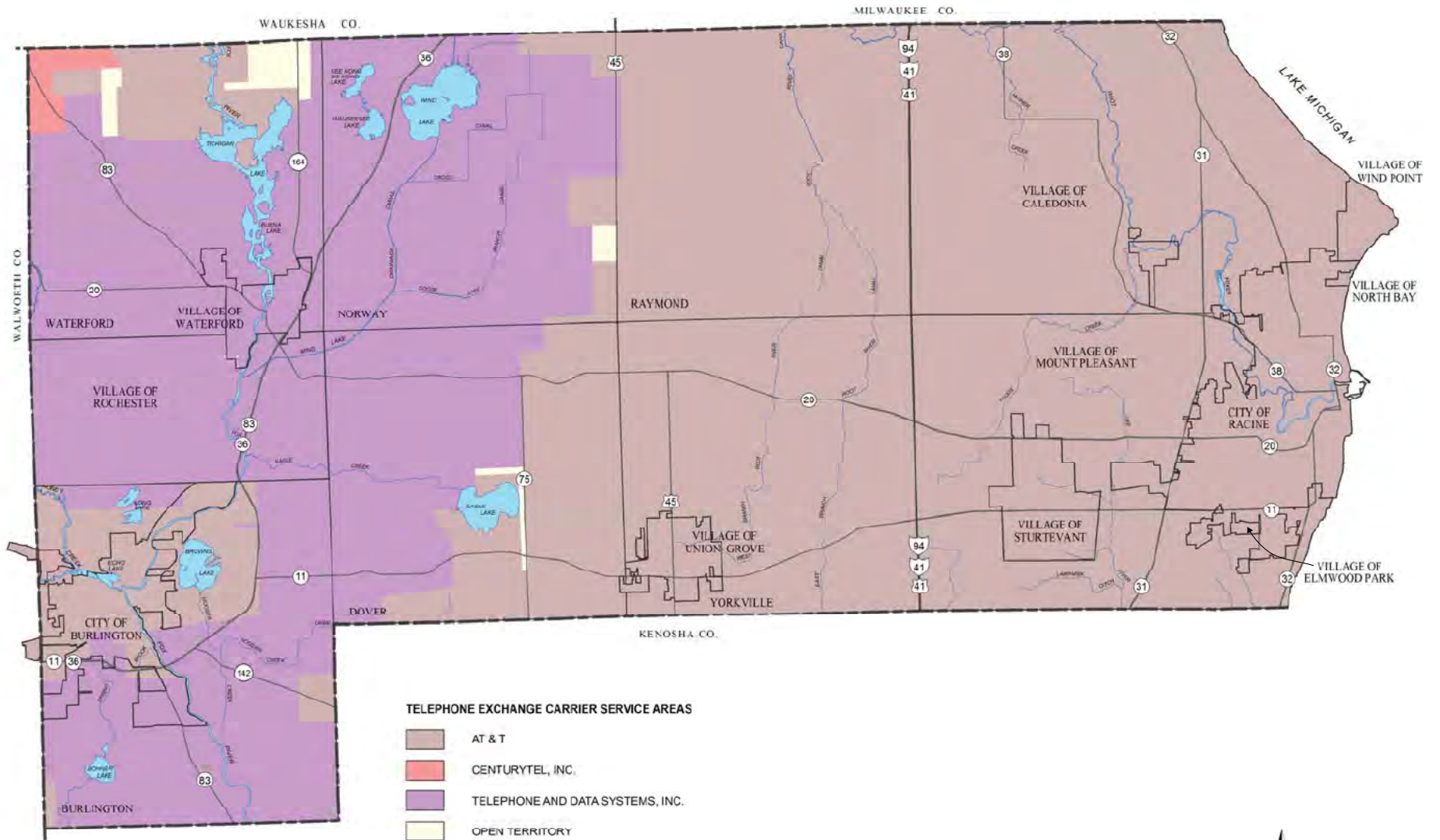


Source: Wisconsin Public Service Commission and SEWRPC.

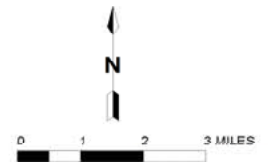


Map 18

TELEPHONE EXCHANGE CARRIER SERVICE AREAS IN RACINE COUNTY: 2011

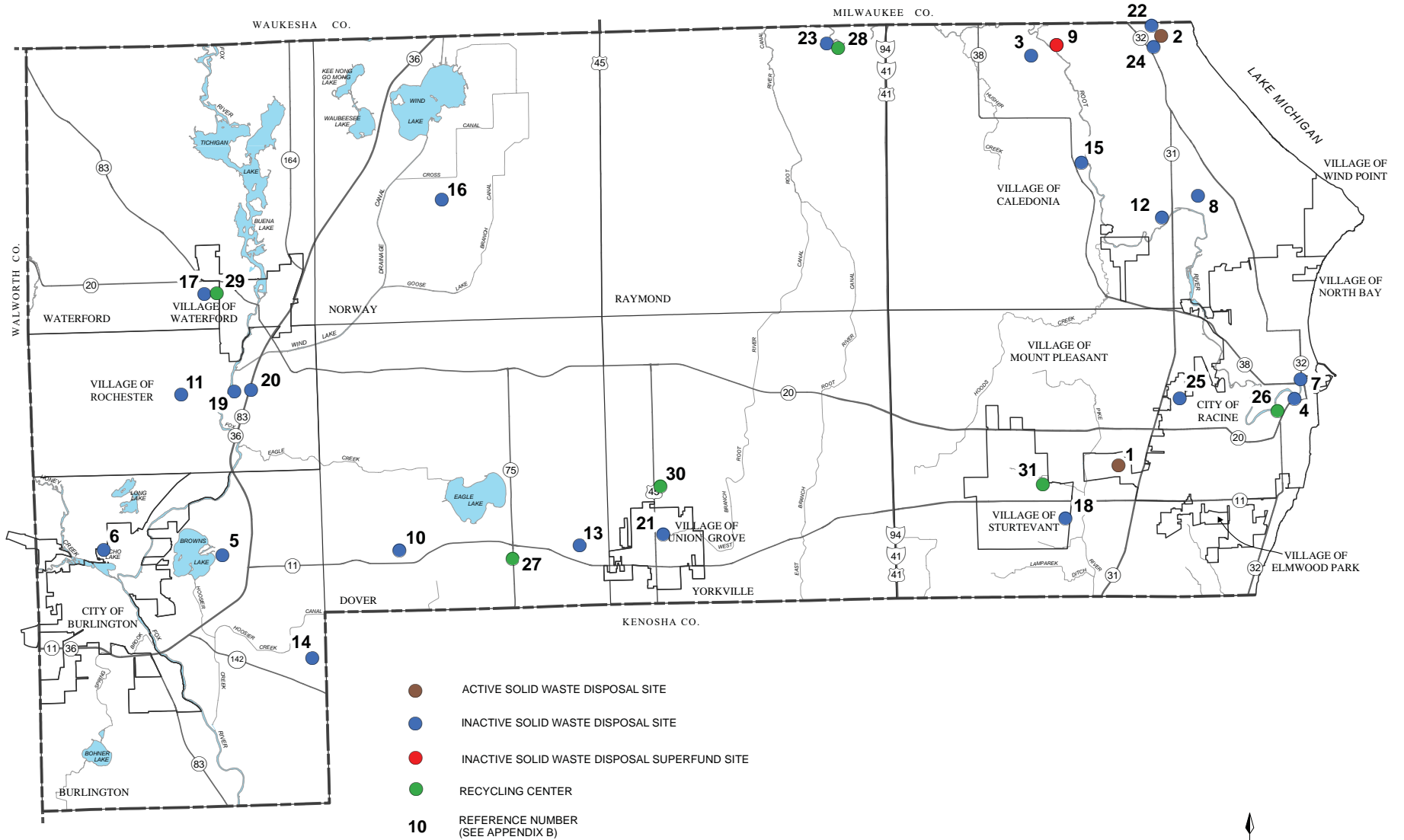


Source: Wisconsin Public Service Commission and SEWRPC.

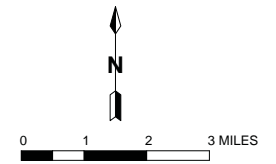


Map 19

SOLID WASTE DISPOSAL AND RECYCLING CENTERS IN RACINE COUNTY: 2015

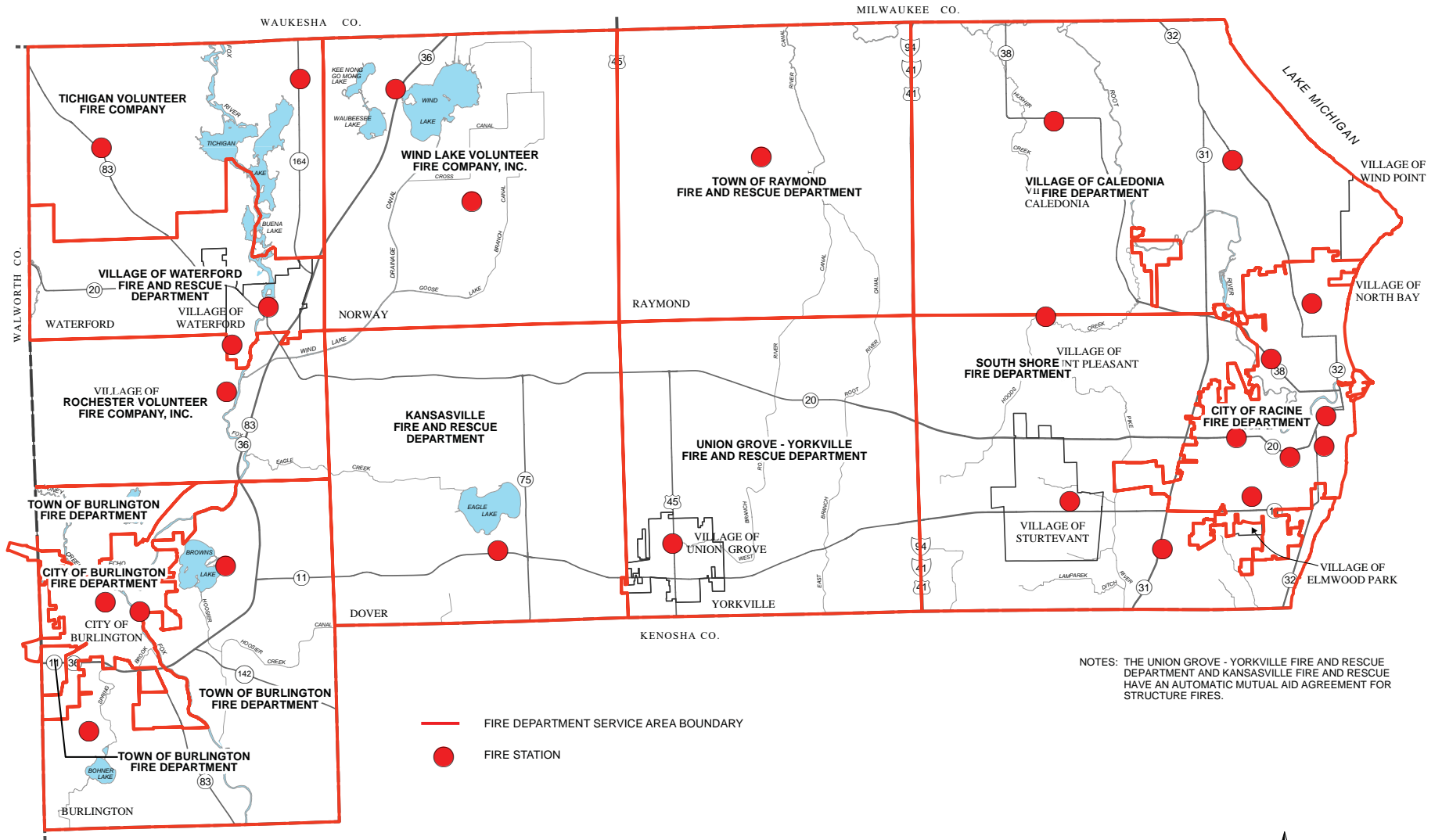


Source: Wisconsin Department of Natural Resources, Racine County, and SEWRPC.



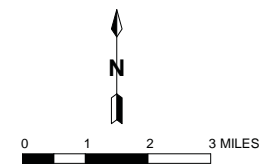
Map 20

FIRE STATIONS AND FIRE DEPARTMENT SERVICE AREAS IN RACINE COUNTY: 2016



NOTES: THE UNION GROVE - YORKVILLE FIRE AND RESCUE DEPARTMENT AND KANSASVILLE FIRE AND RESCUE HAVE AN AUTOMATIC MUTUAL AID AGREEMENT FOR STRUCTURE FIRES.

Source: Racine County Office of Emergency Management Department and SEWRPC.



**Table 19**

**WORKING STATUS OF FIRE DEPARTMENTS, EMERGENCY MEDICAL SERVICE PROVIDERS,  
AND LAW ENFORCEMENT DEPARTMENTS SERVING RACINE COUNTY: 2016**

Fire/Rescue Department	Working Status of Fire Suppression Department	Emergency Medical Service Arrangement	Working Status of Law Enforcement Department
City of Burlington	Full-time and part-time volunteers (City Fire Department <sup>a</sup> )	Volunteer (Burlington Rescue Squad, Inc. <sup>b</sup> )	Full-time (City Police Department)
City of Racine	Full-time (City Fire Department <sup>a</sup> )	Full-time (City Fire Department <sup>a</sup> )	Full-time (City Police Department)
Village of Caledonia	Full-time (Village Fire Department <sup>a</sup> )	Full-time (Village Fire Department)	Full-time (Village Police Department)
Village of Elmwood Park	Contract with South Shore Fire Department <sup>a</sup>	Contract with South Shore Fire Department <sup>a</sup>	Contract with County Sheriff Department with local constable
Village of Mt. Pleasant	Full-time (South Shore Fire Department <sup>a</sup> )	Full-time (South Shore Fire Department <sup>a</sup> )	Full-time (Village Police Department)
Village of North Bay	Village of Caledonia Fire Department <sup>a</sup>	Village of Caledonia Fire Department <sup>a</sup>	Contract with Village of Wind Point Police, Village also has a local constable
Village of Rochester	Volunteer (Rochester Volunteer Fire and Rescue Company, Inc. <sup>b</sup> )	Volunteer (Rochester Volunteer Fire and Rescue Company, Inc. <sup>b</sup> )	Contract with County Sheriff Department
Village of Sturtevant	Full-time and part-time (South Shore Fire Department <sup>a</sup> )	Full-time and part-time (South Shore Fire Department <sup>a</sup> )	Full-time (Village Police Department)
Village of Union Grove	Volunteer (Union Grove-Yorkville Fire and Rescue Department <sup>a</sup> )	Volunteer (Union Grove-Yorkville Fire and Rescue Department <sup>a</sup> )	Contract with County Sheriff Department
Village of Waterford	Full-time command staff and volunteers (Village of Waterford Fire and Rescue Department <sup>a</sup> )	Full-time command staff and volunteers (Village of Waterford Fire and Rescue Department <sup>a</sup> )	Contract with the Town of Waterford Police Department
Village of Wind Point	Village of Caledonia Fire Department <sup>a</sup>	Village of Caledonia Fire Department <sup>a</sup>	Part-time (Village Police Department)
Town of Burlington	Volunteer (Town Fire Department <sup>a</sup> )	Volunteer (Burlington Rescue Squad, Inc. <sup>b</sup> )	Full-time (Town Police Department), Town Water Patrol
Town of Dover	Volunteer (Kansasville Fire and Rescue <sup>a</sup> )	Volunteer (Kansasville Fire and Rescue <sup>a</sup> ) and Full-time <sup>c</sup>	Contract with County Sheriff, Town Water Patrol
Town of Norway	Volunteer (Wind Lake Volunteer Fire Company, Inc. <sup>b</sup> )	Volunteer (Wind Lake Volunteer Fire Company, Inc. <sup>b</sup> )	Part-time (Town Police Department), Town Water Patrol
Town of Raymond	Volunteer (Town Fire and Rescue Department <sup>a</sup> )	Volunteer (Town Fire and Rescue Department <sup>a</sup> )	Contract with County Sheriff Department
Town of Waterford	Volunteer (contracts with Village of Waterford Fire and Rescue Department <sup>a</sup> and Tichigan Volunteer Fire Department <sup>b</sup> )	Volunteer (contracts with Village of Waterford Fire and Rescue Department <sup>a</sup> and Wind Lake Volunteer Fire Company, Inc. <sup>b</sup> )	Full-time (Town Police Department)
Town of Yorkville	Volunteer (Union Grove-Yorkville Fire and Rescue Department <sup>a</sup> )	Volunteer (Union Grove-Yorkville Fire and Rescue Department <sup>a</sup> )	County Sheriff Department with local constable

NOTES: The Union Grove-Yorkville Fire and Rescue Department and Kansasville Fire and Rescue have an automatic mutual aid agreement for structure fires. Any time a structure fire is reported in the Village of Union Grove, the Town of Dover, or the Town of Yorkville, both fire departments are automatically called to assist.

The City and Town of Burlington Fire Departments have an informal mutual aid agreement. The City of Burlington Fire Department will send a ladder truck to any structure fire in the Town of Burlington. The Town of Burlington Fire Department will send an engine truck to any structure fire or fire with trapped victims in the City of Burlington.

The Village of Rochester, Village of Waterford, and Tichigan Fire Departments maintain an automatic aid agreement. If there is a structure fire or fire alarm in any of these jurisdictions, all three Departments are automatically dispatched. If the call is in the Village of Rochester, the Town of Burlington is also dispatched.

<sup>a</sup>Public departments.

<sup>b</sup>Private, nonprofit company.

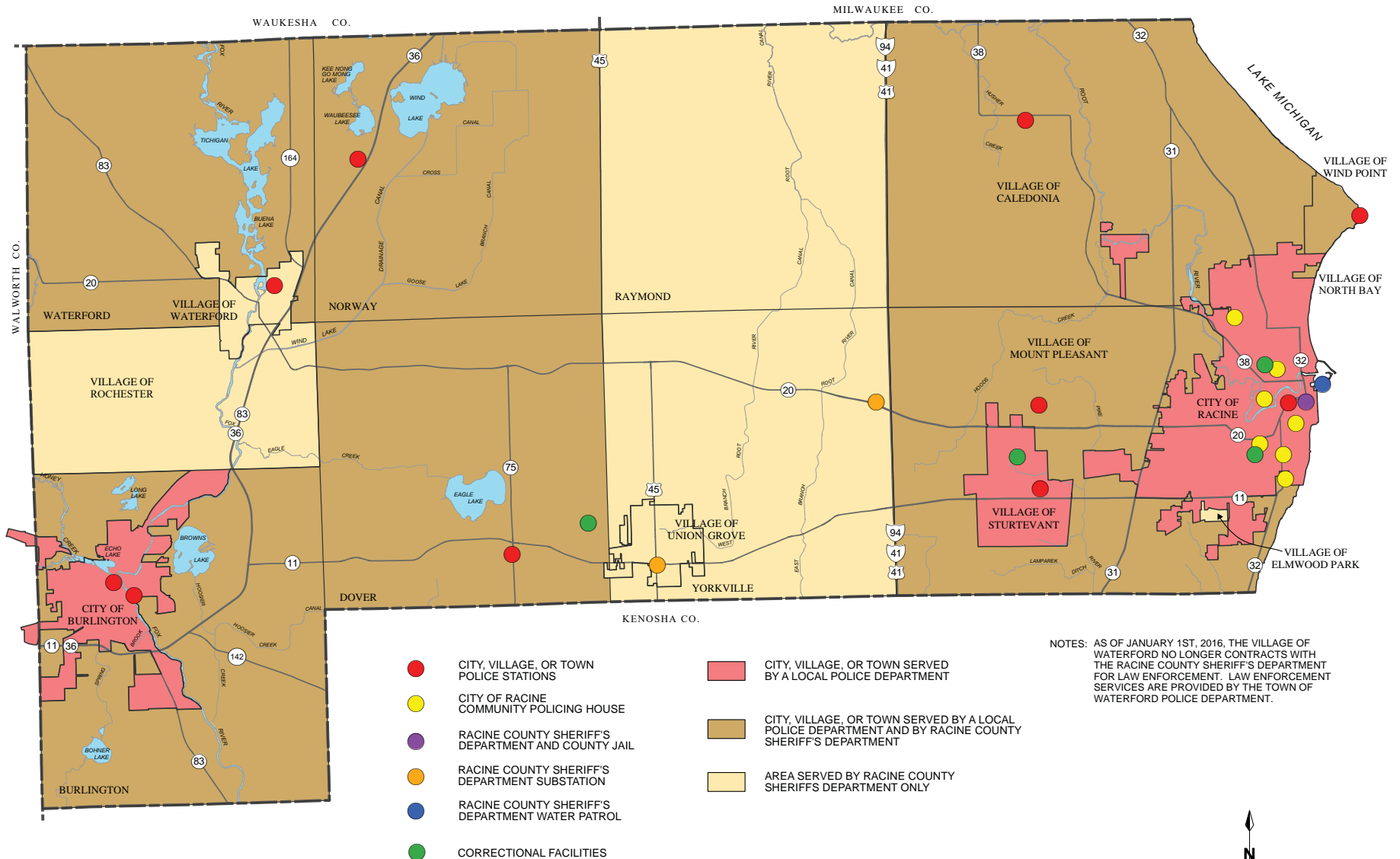
<sup>c</sup>The Kansasville Fire Department provides an ambulance and has volunteer emergency medical technicians (EMTs). In addition, the Town of Dover contracts with Medix Ambulance Services, a private, for-profit company, to provide advanced certified EMTs to staff the fire department's rescue squad.

Source: Racine County Office of Emergency Management, local municipalities, and SEWRPC.

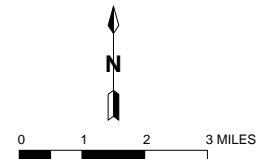


Map 22

**POLICE AND SHERIFF'S STATIONS AND SERVICE AREAS IN RACINE COUNTY: 2015**



Source: Wisconsin Department of Justice (WILENET), Racine County, and SEWRPC.



Each of the fire departments in Racine County, except the City of Burlington, Town of Burlington, and the Tichigan Volunteer Fire Company, Inc., also independently maintains an emergency medical service. The Burlington Rescue Squad, Inc., a nonprofit corporation provides rescue services in the City and Town of Burlington. The Village of Waterford Fire and Rescue Department and the Wind Lake Volunteer Fire Company, Inc., provide emergency medical service in the Town of Waterford area served by the Tichigan Volunteer Fire Company for fire suppression service. The emergency medical service areas in Racine County are shown on Map 21.

All of the fire and rescue departments in Racine County participate in the 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 extrication equipment, which they themselves do not possess and which they may only need infrequently. In addition, MABAS allows communities and fire departments to request fire and rescue resources from outside of Racine County using the standardized MABAS agreement. MABAS agreements are pre-approved by each municipality and emergency responses are pre-planned using a standardized Box Alarm Card form.

Several departments have reciprocal mutual aid 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.

### **Law Enforcement**

Seven of the 17 municipalities in Racine County provide for law enforcement through full-time police departments. In the remaining municipalities, law enforcement is provided through a combination of part time police departments and/or contracting the services of the County Sheriff's Department to provide primary law enforcement. In addition, the Village of Waterford has a limited police presence and the Village of North Bay and the Towns of Dover and Yorkville provide limited law enforcement through part-time town constables. The location of each local law enforcement station in Racine County is shown on Map 22. That map also shows the location of the State of Wisconsin Department of Corrections, correctional facilities and County detention centers in the County.

In 2014 Racine County joined the Suburban Mutual Assistance Response Team (SMART). The agreement was made in recognition that situations may occur which are beyond the ability of a local law enforcement agency to deal with effectively in terms of personnel, equipment, and available resources. Under this system Racine County agencies have cooperative agreements with agencies in Jefferson, Milwaukee, Walworth, and Waukesha Counties that allows for mutual aid during a significant emergency or disaster. Within one hour, a community that is a member of SMART can have up to 65 law enforcement officers respond to the community to help where needed.

### **Specialized Response Teams**

Some fire departments and law enforcement agencies in the County participate in several specialized response teams. The Racine County Water Rescue Response Team consists of members of public safety agencies throughout Racine County. 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. The Racine County Sheriff's Office Water Patrol operates water safety patrols on Lake Michigan and inland lakes and rivers throughout the County to assist boaters with accidents, engine failures, rescue, and to provide enforcement activities. The Racine County Sheriff's Office also leads a Community Emergency Response Team (CERT) that can provide assistance to communities before, during, and after disasters. The Racine County Sheriff's Office and the City of Racine Police Department each have their own Special Weapons and Tactics (SWAT) and crisis negotiators teams. The SWAT teams are comprised of personnel specially trained in serving high risk search warrants, fugitive



apprehension, and resolving barricaded subject and hostage situations. Both SWAT teams are also equipped with an armored personnel carrier. In addition, the Racine Police Department operates a Crowd Control Team.

The City of Racine Fire Department is one of five representatives of the Southeast Wisconsin Hazardous Materials Task Force. The department is a Type II Hazardous Materials Response Team and operates a fully equipped hazmat trailer.<sup>10</sup> In addition, the City of Racine Fire Department's specialized operations include a Local Technical Rescue Team, which involves collapse, confined space, trench, and high/low angle rescues; water rescue divers and boat including side scan sonar; Tactical Emergency Medical Technicians; an Active Shooter Rescue Task Force; and a Regional Command Post. The South Shore Fire Department (Villages of Mount Pleasant and Sturtevant) is equipped with a Mass Casualty Incident Trailer to deliver supplies to an incident where the normal personnel and equipment would be overwhelmed by the number and severity of casualties.

## **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. Maps 23 through 28 show the location of selected types of critical community facilities within Racine County. Because of the need for access to and from these facilities, the hazard mitigation plan includes their location. Their relationship to flood hazard areas is discussed in Chapter IV. A listing of the critical community facilities is included in Appendix D.

## **HAZARDOUS MATERIAL STORAGE AND USE**

Public Law 99-499, the Superfund Amendment and Reauthorization Act (SARA/Title III) of 1986, and Wisconsin Act 342 sets forth requirements for hazardous material reporting and safety planning. The primary reporting and centralized record-keeping related to hazardous materials is carried out under a partnership program involving the industries and other users of hazardous materials, the Wisconsin Division of Emergency Management, county emergency management departments/local emergency planning committees, and the local fire departments. In 2015, there were 67 identified users of extremely hazardous substances (EHS) classified as planning facilities and 149 users classified as reporting facilities. Reporting facilities are any facility that uses, stores, or produces chemicals at or above 10,000 pounds. Because there is no "hazardous chemical" list, the general assumption is that anything requiring the completion of a material safety data sheet (MSDS) is included as a reporting requirement. Reporting facilities include manufacturers, warehouses, and petroleum storage site operators. Planning facilities include a wide range of users of limited amounts of hazardous materials. In addition to industrial materials, the agricultural industry routinely uses materials considered extremely hazardous. These uses range from individual farm use materials to large chemical storage facilities.

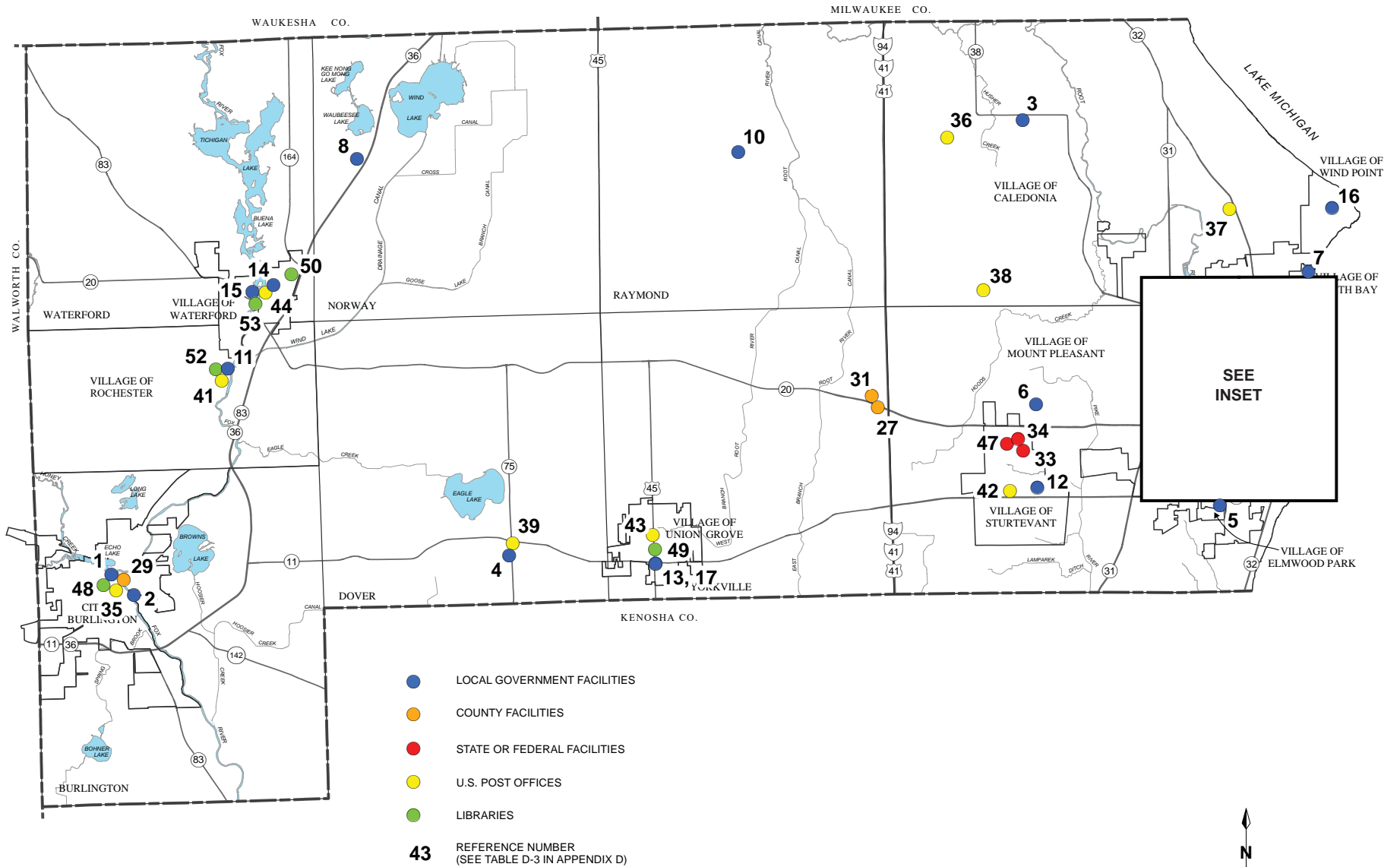
The facilities which are noted above as storing or producing hazardous materials are located throughout Racine County, as summarized in Table 20. A detailed listing of these facilities and location by address is available at the Racine County Office of Emergency Management.

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<sup>10</sup> *Wisconsin Emergency Management contracts and manages 22 Regional Hazardous Materials Response Teams. These teams are divided into four Regional Hazardous Materials Task Forces. The Hazardous Materials Response System may be activated for an incident involving a hazardous materials spill, leak, explosion, injury or the potential of immediate threat to life, the environment, or property. The Hazardous Material Response system responds to the most serious of spills and releases requiring the highest level of skin and respiratory protective gear. This includes all chemical, biological, or radiological emergencies. Type II Hazardous Materials Response Teams, such as the City of Racine Fire Department, include response capabilities to all known chemicals and fuels and the ability to perform mitigation operations. Type II Teams also have the capability to analyze unknown substances and to make entry to an unknown substance response with the proper number of personnel.*

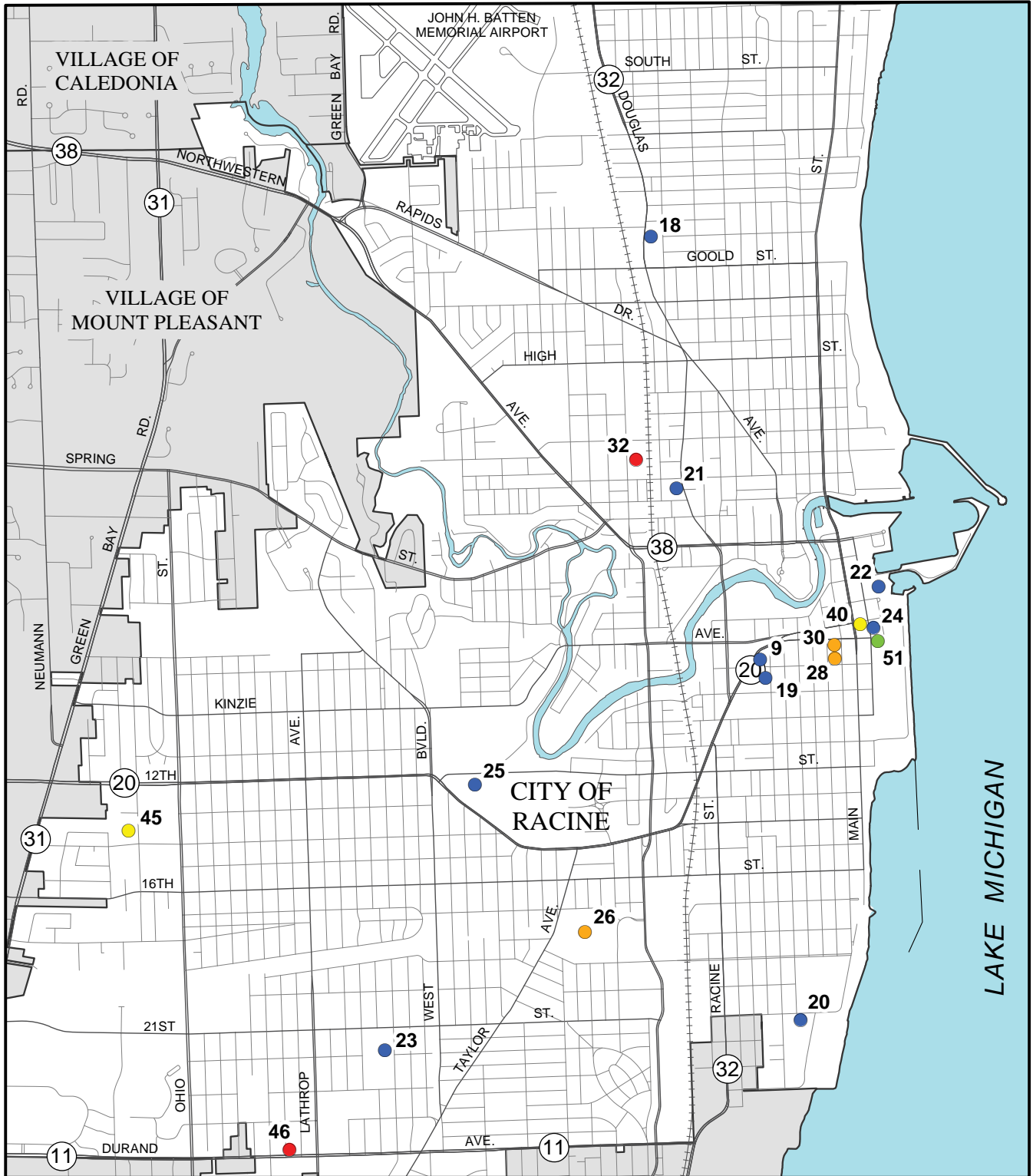
Map 23

SELECTED GOVERNMENT BUILDINGS IN RACINE COUNTY: 2015



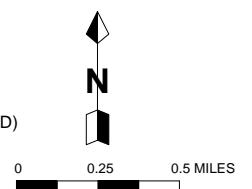
Source: Racine County and SEWRPC.

INSET to Map 23



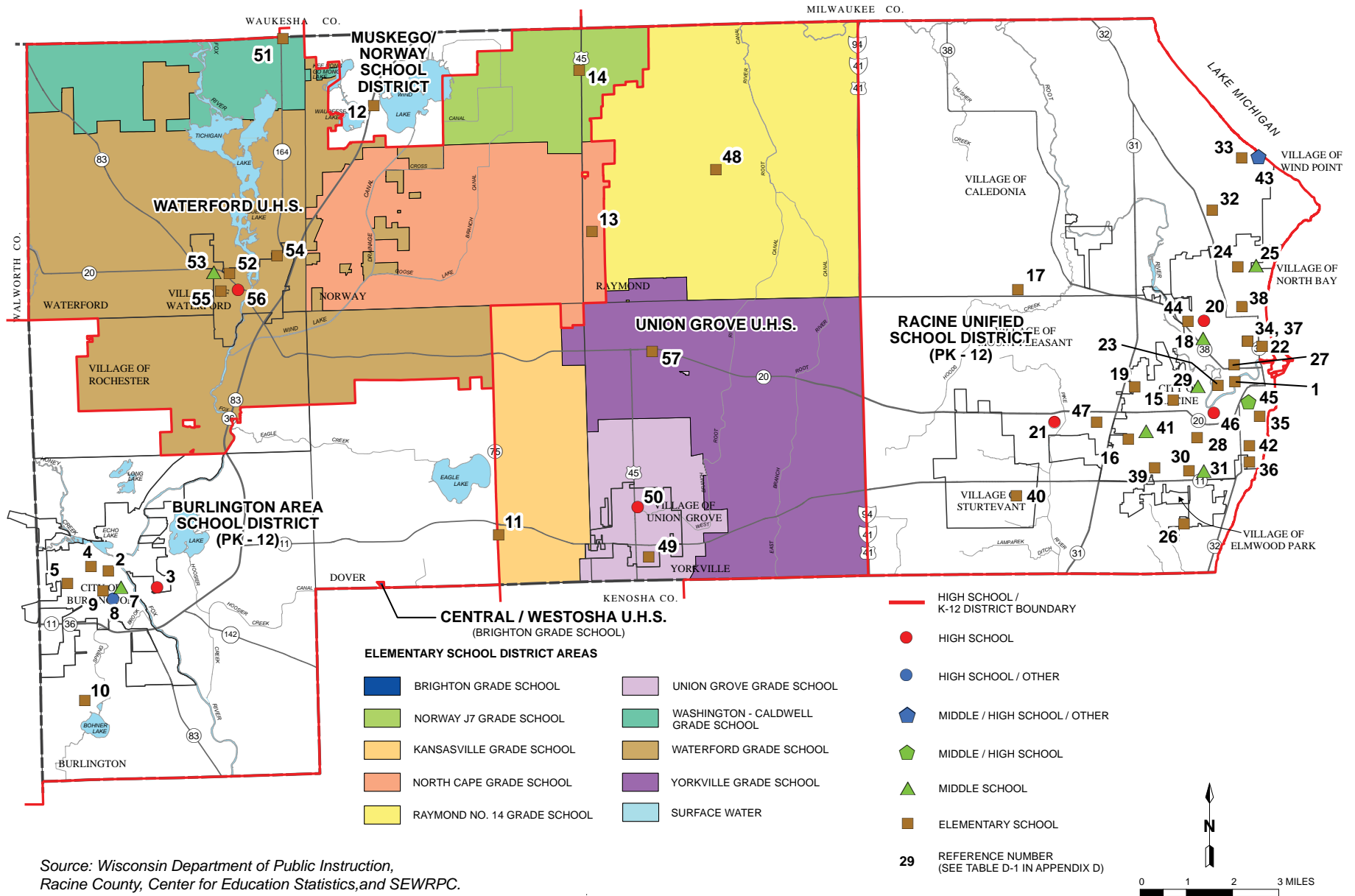
- |   |  |   |
|---|--|---|
| <span style="color: blue;">●</span> LOCAL GOVERNMENT FACILITIES | <span style="color: red;">●</span> STATE OR FEDERAL FACILITIES | <span style="color: green;">●</span> LIBRARIES              |
| <span style="color: orange;">●</span> COUNTY FACILITIES         | <span style="color: yellow;">●</span> U.S. POST OFFICES        | <b>26</b> REFERENCE NUMBER<br>(SEE TABLE D-3 IN APPENDIX D) |

Source: Racine County and SEWRPC.



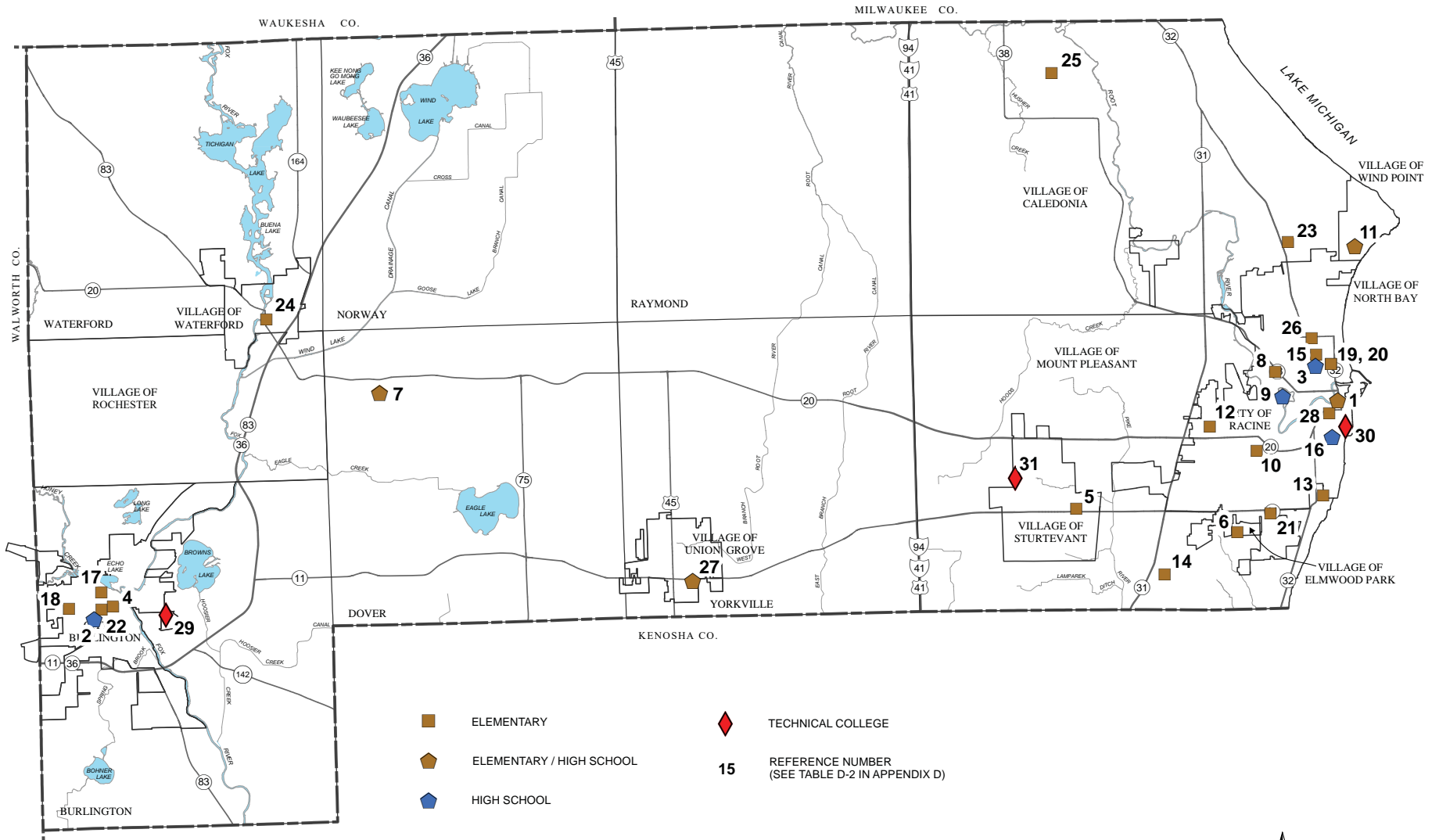
Map 24

**PUBLIC SCHOOLS AND SCHOOL DISTRICTS IN RACINE COUNTY: 2015**

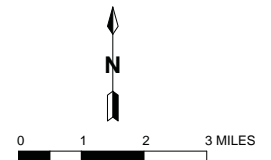


Map 25

PRIVATE SCHOOLS AND TECHNICAL COLLEGES IN RACINE COUNTY: 2015

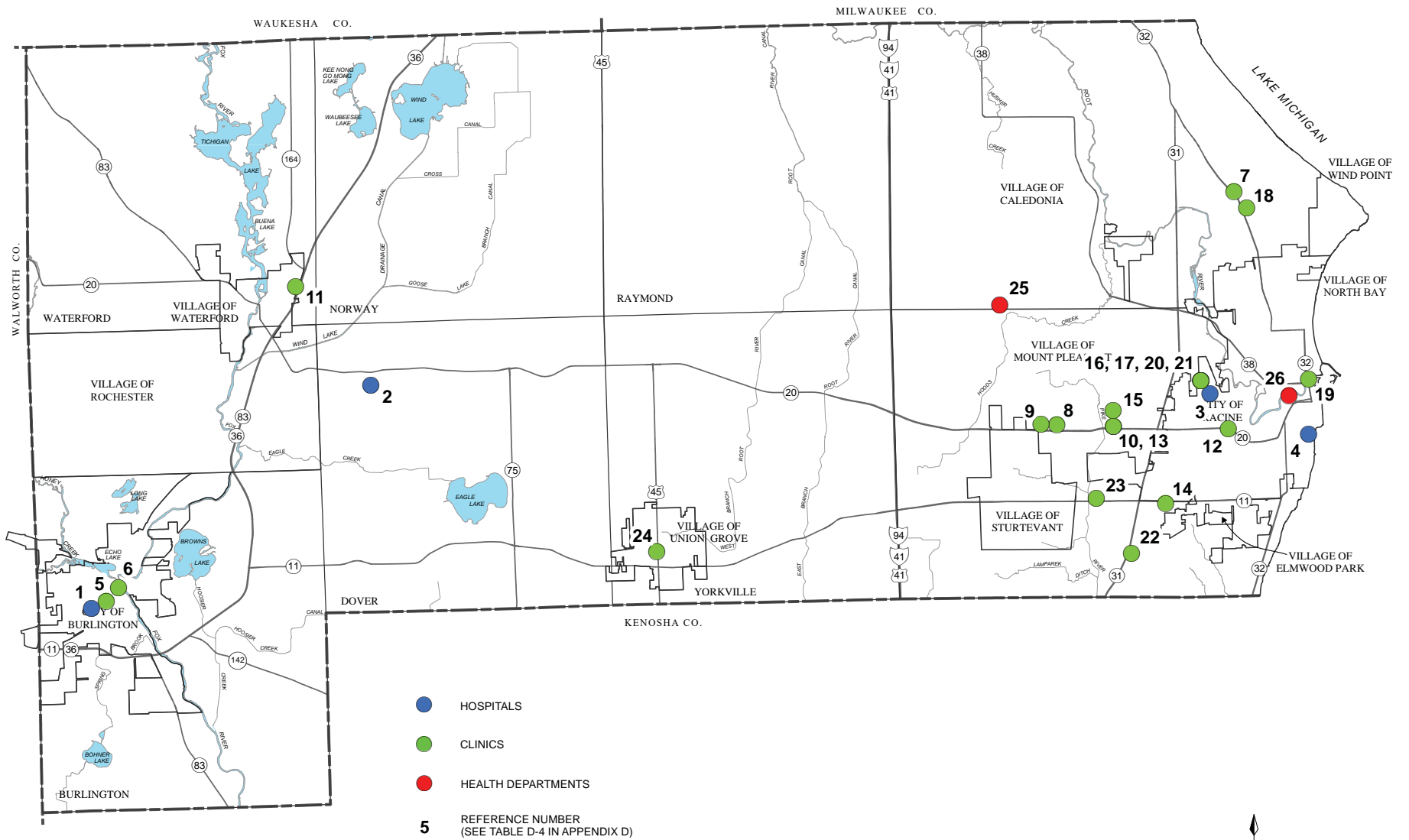


Source: Wisconsin Department of Public Instruction and SEWRPC.

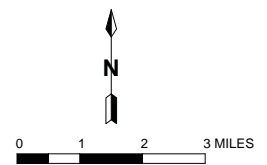


Map 26

HOSPITALS AND MAJOR CLINICS IN RACINE COUNTY: 2015

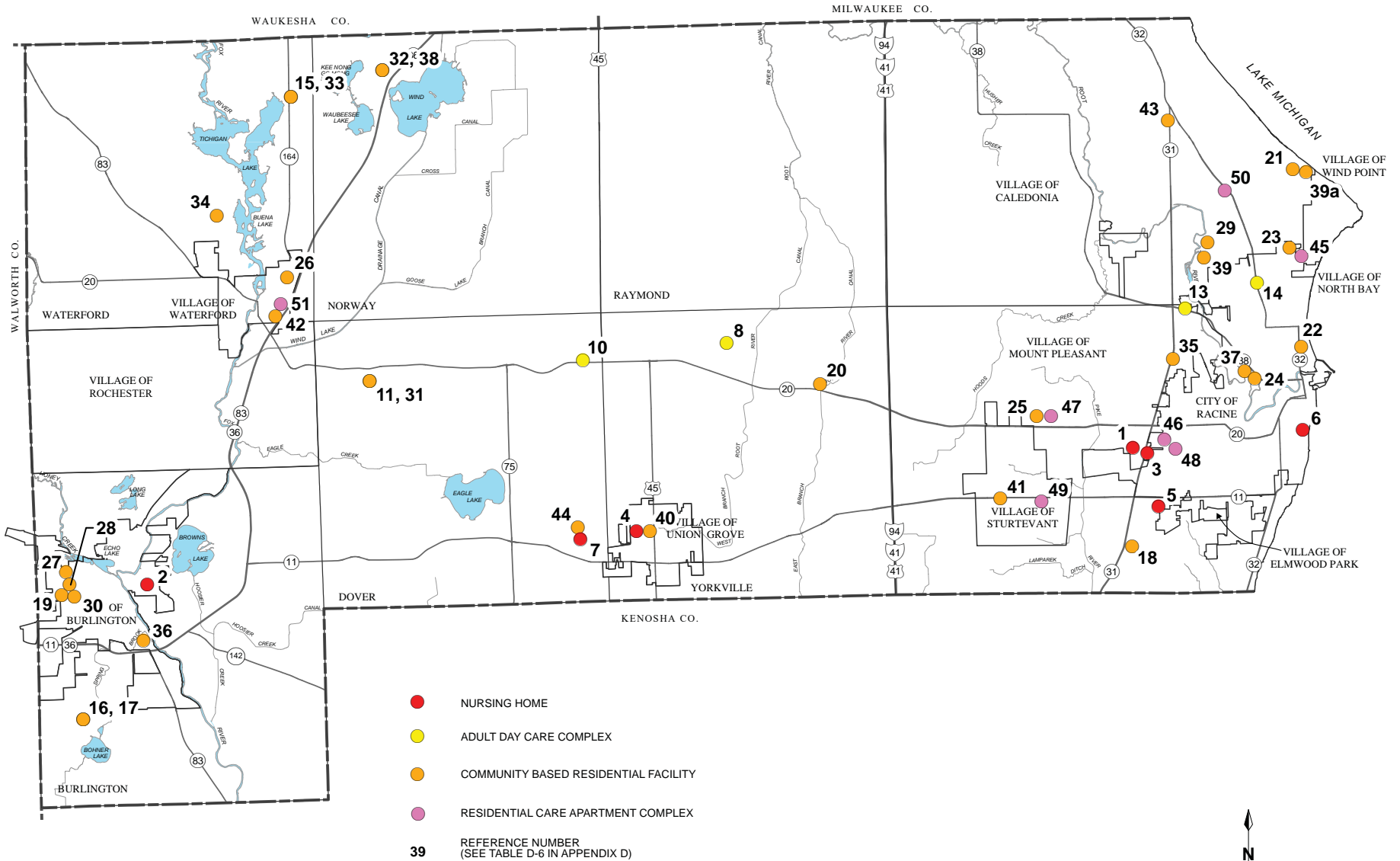


Source: Wisconsin Department of Health and Social Services, Racine County, and SEWRPC.

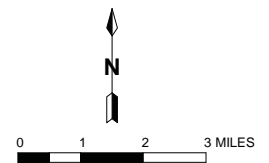


Map 27

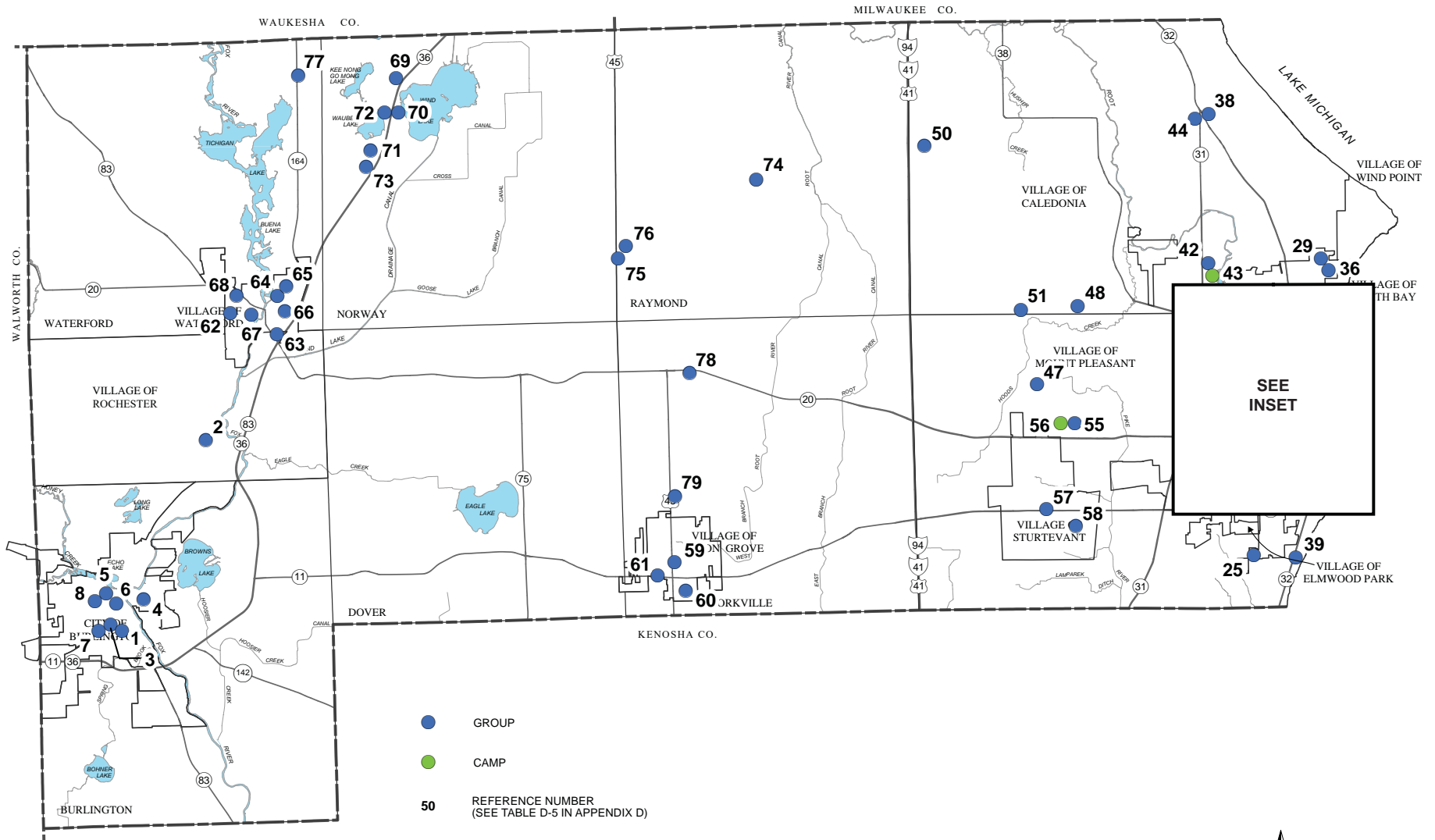
**NURSING HOMES, ADULT DAY CARE CENTERS, AND SELECTED ASSISTED LIVING FACILITIES IN RACINE COUNTY: 2015**



Source: Wisconsin Department of Health and SEWRPC.



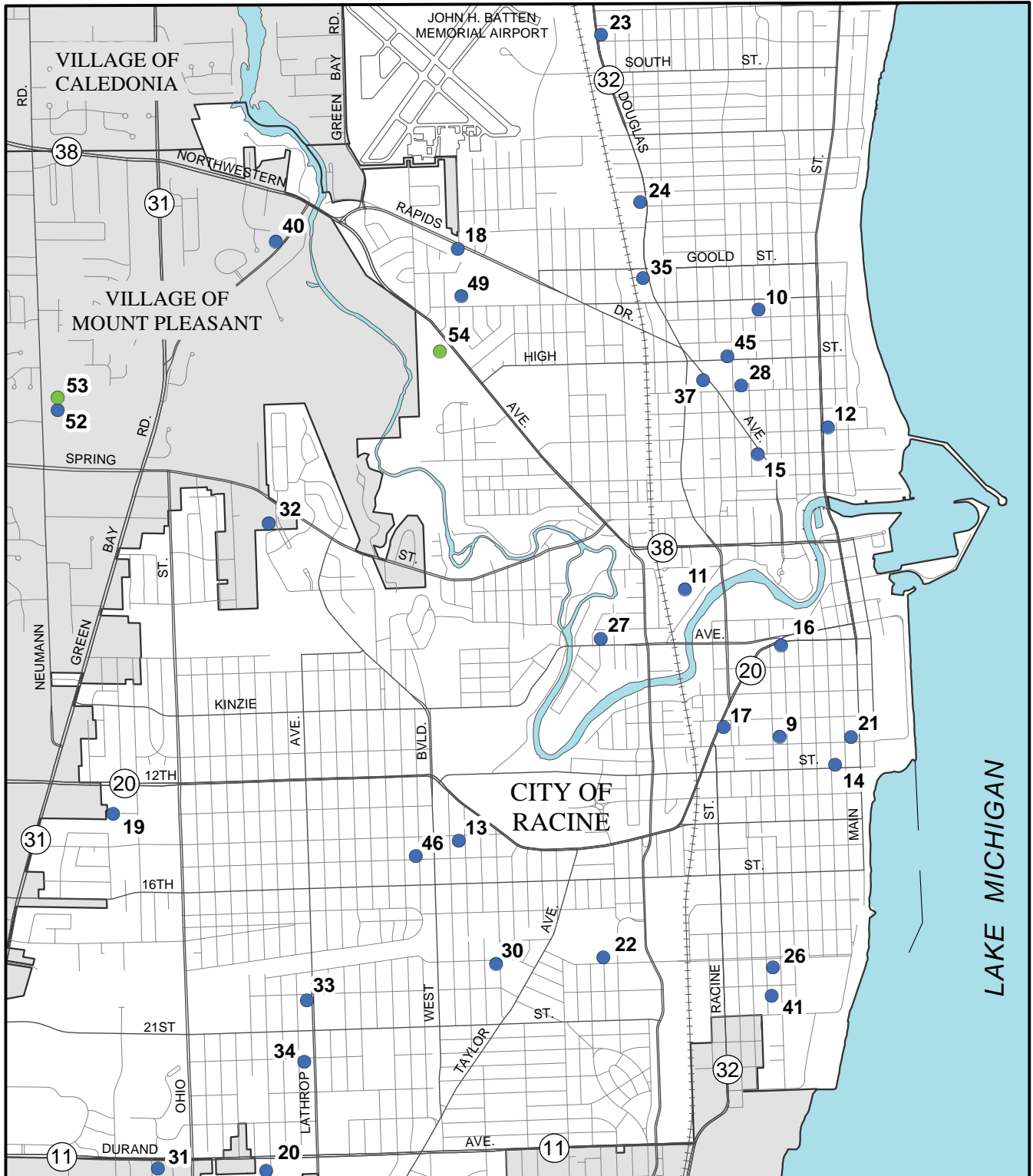
### Map 28 CHILD CARE CENTERS IN RACINE COUNTY: 2015



Source: Wisconsin Department of Children and SEWRPC.

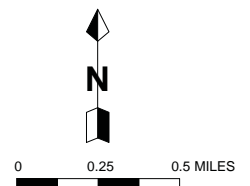


INSET to Map 28



- GROUP
  - CAMP
- 37** REFERENCE NUMBER  
(SEE TABLE D-5 IN APPENDIX D)

Source: Wisconsin Department of Children and Families and SEWRPC.



**Table 20**

**LOCATION OF FACILITIES WHICH STORE HAZARDOUS MATERIALS: 2015**

Community	Number of Facilities	
	Reporting Facilities	Planning Facilities
<b>Cities</b>		
Burlington.....	22	12
Racine .....	48	20
Subtotal	70	32
<b>Villages</b>		
Caledonia.....	8	1
Elmwood Park.....	0	0
Mt. Pleasant.....	11	9
North Bay.....	0	0
Rochester .....	2	1
Sturtevant .....	22	14
Union Grove.....	8	2
Waterford.....	5	2
Wind Point .....	1	0
Subtotal	57	29
<b>Towns</b>		
Burlington.....	6	3
Dover .....	5	1
Norway.....	1	1
Raymond .....	4	0
Waterford .....	1	0
Yorkville .....	5	1
Subtotal	22	6
<b>Total</b>	<b>149</b>	<b>67</b>

Source: Racine County Office of Emergency Management.

Over the period from 2009 through 2015, there were about 11 spills of hazardous materials per year reported in Racine County. The majority of these were minor spills of petroleum products. However, there have been releases of chlorine gas, ammonia, mercury, sodium hydroxide, and other hazardous substances. These spills have typically been properly handled through local emergency response actions.

**HISTORIC SITES**

Historic sites in Racine County often have important recreational, educational, and cultural value. Certain sites of known historic significance are listed on the National Register of Historic Places. In 2014, there were 45 individual sites and eight historic districts<sup>11</sup> within the County listed on the National Register. The location of sites and districts in Racine County listed on the National Register of Historic Places in 2014 are presented on Table 21 and on Map 29, respectively. In addition, the Caledonia Historical Society also maintains several historic building in Linwood Park in the Village of Caledonia that are not listed on the National Register of Historic Places.

<sup>11</sup> 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.

Table 21

**HISTORIC SITES AND DISTRICTS IN RACINE COUNTY  
LISTED ON THE NATIONAL REGISTER OF HISTORIC PLACES: 2014**

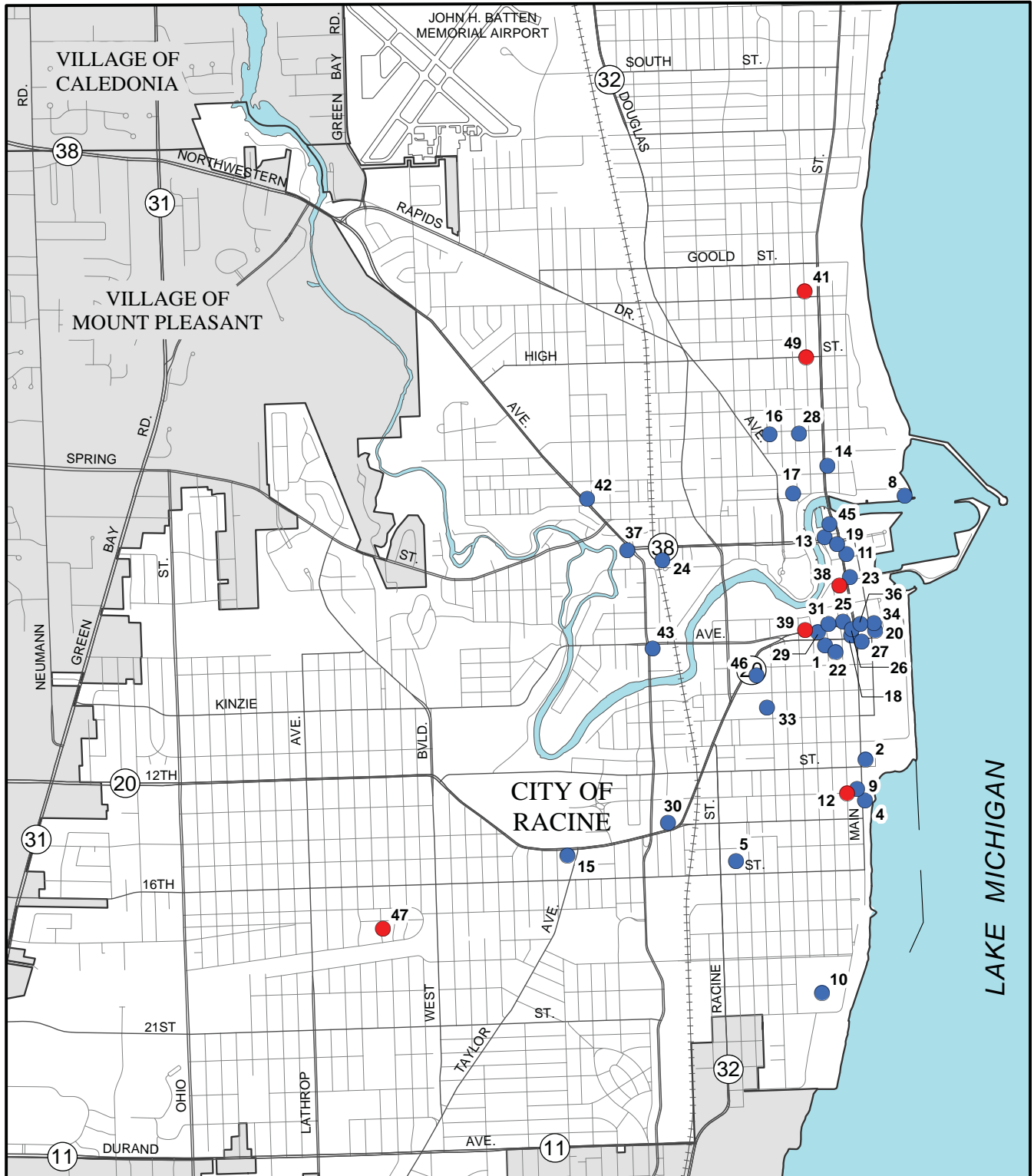
Number on Map 29	Site Name	Location <sup>a</sup>	Civil Division	Year Listed
1	First Presbyterian Church .....	T3N, R23E, Section 16	City of Racine	1973
2	Eli R. Cooley House.....	T3N, R23E, Section 16	City of Racine	1973
3	John Collins House.....	T4N, R22E, Section 15	Village of Caledonia	1974
4	Thomas P. Hardy House.....	T3N, R23E, Section 16	City of Racine	1974
5	S. C. Johnson & Son, Inc. Adm. Bldg. and Research Tower.....	T3N, R23E, Section 16	City of Racine	1974
6	Franklyn Hazelo House .....	T3N, R19E, Section 7	Village of Rochester	1974
7	Herbert F. Johnson House (Wingspread).....	T4N, R23E, Section 27	Village of Wind Point	1975
8	Racine Harbor Lighthouse and Life Saving Station.....	T3N, R23E, Section 9	City of Racine	1975
9	Chauncey Hall House .....	T3N, R23E, Section 16	City of Racine	1976
10	Racine College .....	T3N, R23E, Section 21	City of Racine	1976
11	McClurg Building.....	T3N, R23E, Section 9	City of Racine	1977
12	Southside Historic District.....	T3N, R23E, Section 16	City of Racine	1977
13	Shoop Building .....	T3N, R23E, Section 9	City of Racine	1978
14	Hansen House.....	T3N, R23E, Section 9	City of Racine	1979
15	George Murray House .....	T3N, R23E, Section 17	City of Racine	1979
16	No. 4 Engine House.....	T3N, R23E, Section 9	City of Racine	1979
17	St. Patrick's Roman Catholic Church .....	T3N, R23E, Section 9	City of Racine	1979
18	St. Luke's Episcopal Church/Chapel/Guildhall & Rectory .....	T3N, R23E, Section 9	City of Racine	1979
19	Whitman-Belden House.....	T3N, R19E, Section 2	Village of Rochester	1980
20	Memorial Hall.....	T3N, R23E, Section 9	City of Racine	1980
21	Norwegian Buildings at Heg Park .....	T4N, R20E, Section 18	Town of Norway	1980
22	Racine County Courthouse.....	T3N, R23E, Section 16	City of Racine	1980
23	Chauncey Hall Building.....	T3N, R23E, Section 9	City of Racine	1980
24	Racine Depot (Chicago & Northwestern).....	T3N, R23E, Section 8	City of Racine	1980
25	Kaiser's.....	T3N, R23E, Section 9	City of Racine	1980
26	Badger Building .....	T3N, R23E, Section 9	City of Racine	1980
27	Racine Public Library.....	T3N, R23E, Section 16	City of Racine	1981
28	Karel Jonas House .....	T3N, R23E, Section 9	City of Racine	1982
29	Rickeman Grocery Building .....	T3N, R23E, Section 9	City of Racine	1982
30	Uptown (Majestic Theater).....	T3N, R23E, Section 17	City of Racine	1982
31	YMCA Building.....	T3N, R23E, Section 9	City of Racine	1982
32	Beardsley-Elam Farmhouse .....	T4N, R19E, Section 21	Town of Waterford	1982
33	United Laymen Bible Student Tabernacle .....	T3N, R23E, Section 16	City of Racine	1983
34	Racine Elks Club .....	T3N, R23E, Section 9	City of Racine	1984
35	Wind Point Light Station.....	T4N, R23E, Section 27	Village of Wind Point	1984
36	Racine Post Office .....	T3N, R23E, Section 9	City of Racine	1985
37	Peter Johnson House .....	T3N, R23E, Section 8	City of Racine	1986
38	Old Main Street Historic District .....	T3N, R23E, Section 9	City of Racine	1987
39	Historic 6th Street Business District.....	T3N, R23E, Section 9	City of Racine	1988
40	Southern Wisconsin Home Historic District .....	T3N, R20E, Section 25	Town of Dover	1991
41	Northside Historic District of Cream Brick Workers' Cottages.....	T3N, R23E, Section 4	City of Racine	1994
42	Lincoln School .....	T3N, R23E, Section 8	City of Racine	1994
43	Wilmanor Apartment .....	T3N, R23E, Section 17	City of Racine	1994
44	Burlington Downtown Historic District.....	T3N, R19E, Section 32	City of Burlington	2000
45	The Thomas Driver and Sons Manufacturing Company .....	T3N, R23E, Section 9	City of Racine	2004
46	Mitchell Lewis Building.....	T3N, R23E, Section 16	City of Racine	2005
47	Racine Rubber Company .....	T3N, R23E, Section 19	City of Racine	2006
48	Kate Kelly Shipwreck.....	Lake Michigan	Village of Wind Point	2007
49	Melvin Avenue Residential Historic District.....	T3N, R23E, Section 4	City of Racine	2011
50	Yorkville #4 School .....	T3N, R21E, Section 9	Village of Yorkville	2011
51	Burlington Cemetery Chapel.....	T3N, R19E, Section 22	City of Burlington	2013
52	Burlington Community Swimming Pools and Bathhouse.....	T3N, R19E, Section 32	City of Burlington	2013
53	Kane Street Historic District .....	T3N, R19E, Section 32	City of Burlington	2014

<sup>a</sup>Location given in U.S. Public Land Survey Township, Range, and Section.

Source: State Historical Society of Wisconsin and SEWRPC.

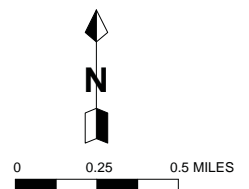


INSET to Map 29



- HISTORIC SITE
- HISTORIC DISTRICT
- 33** REFERENCE NUMBER (SEE TABLE 21)

Source: SEWRPC.



## 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 Racine County and the local units of government in the County are summarized in Table 22, and below.

### 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. Alternatively, towns may adopt a zoning ordinance under Section 60.61 of the *Wisconsin Statutes* where a general county zoning ordinance has not been adopted, but only after the county board fails to adopt a county ordinance at the petition of the governing body of the town concerned. General zoning is in effect in all communities in Racine County. The six towns, Burlington, Dover, Norway, Raymond, Waterford, and Yorkville, are under the jurisdiction of the County zoning ordinance which is administered jointly by Racine County and the towns.

### 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 one-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 one-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 one-percent-annual-probability flood. Permitting 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 of the unincorporated areas of the towns in Racine County. All incorporated cities and villages where floodplains have been identified have adopted floodplain zoning ordinances. The two municipalities without floodplain ordinances, the Villages of Elmwood Park and North Bay have no identified flood hazard areas within their boundaries.

### 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*.<sup>12</sup> Chapter NR 115 sets forth requirements regarding lot sizes and building setbacks;

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<sup>12</sup> *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.*

**Table 22**

**REGULATIONS AND PROGRAMS WITHIN RACINE COUNTY RELATED TO HAZARD MITIGATION**

Community	Type of Ordinance or Program				
	General Zoning	Floodland Zoning	Shoreland or Shoreland Wetland Zoning	Emergency Operations Plan	Floodland and Shoreland Zoning Reference Data
Racine County	Adopted	Adopted	Adopted	Adopted	SWO Shoreland-Wetland Overlay District-Chapter 20, Article VI, Division 38 Shoreland-Chapter 20, Article VII, Division 3 Shoreland Uses-Chapter 20, Article VIII, Division 8 Floodlands-Chapter 20, Article XII
City of Burlington	Adopted	Adopted	Adopted	Adopted	Floodplans-Chapter 119 adopted March 6, 2012 by Ord. 1942(19) Shoreland Chapter 315 Section 12.1, May 6, 2003
City of Racine	Adopted	Adopted	Adopted	Adopted	Flood Regulations-Chapter 114, Article VIII of Municipal Code Shoreland-Chapter 114, Article IX of Municipal Code
Village of Caledonia	Adopted	Adopted	Adopted	Adopted	Floodplain—Title 16, Chapter 8, of Municipal Code Shoreland—Title 16, Chapter 10 of Municipal Code
Village of North Bay	Adopted	-- <sup>a</sup>	-- <sup>b</sup>	-- <sup>c</sup>	--
Village of Elmwood Park	Adopted	-- <sup>a</sup>	-- <sup>b</sup>	Adopted	--
Village of Mt. Pleasant	Adopted	Adopted	County Ordinance <sup>d</sup>	-- <sup>c</sup>	Floodplain—Chapter 90, Article VIII of Municipal Code, March 26, 2012
Village of Rochester	Adopted	Adopted	Adopted	Adopted	Floodplain Zoning-Chapter 37 of Municipal Code Shoreland-Wetland and Shoreland Zoning Districts-Chapter 36 of Municipal Code
Village of Sturtevant	Adopted	Adopted	Adopted	Adopted	Floodplain Zoning-Chapter 20 of Municipal Code Shoreland/Wetland Zoning-Chapter 16 of Municipal Code
Village of Union Grove	Adopted	Adopted	-- <sup>b</sup>	-- <sup>c</sup>	Floodplain—Chapter 118 of Municipal Code, Article 2, Divisions 3, 5, and Articles III and IV
Village of Waterford	Adopted	Adopted	Adopted	Adopted	Floodplain—Chapter 256 of Municipal Code, April 9, 2012 Shoreland—Chapter 255 of Municipal Code; Revision in effect June 9, 2014
Village of Wind Point	Adopted	Adopted	Adopted	Adopted	Floodplain—Chapter 10, Sections 1, 4, 5, 7, and 8, of Municipal Code. Revised April 12, 2012 Shoreland—Chapter 10, Sections 3, 5, 7, 8, of Municipal Code Revised April 12, 2012
Town of Burlington	County Ordinance	County Ordinance	County Ordinance	Adopted	-- <sup>d</sup>
Town of Dover	County Ordinance	County Ordinance	County Ordinance	-- <sup>c</sup>	-- <sup>d</sup>
Town of Norway	County Ordinance	County Ordinance	County Ordinance	-- <sup>c</sup>	-- <sup>d</sup>
Town of Raymond	County Ordinance	County Ordinance	County Ordinance	-- <sup>c</sup>	-- <sup>d</sup>
Town of Waterford	County Ordinance	County Ordinance	County Ordinance	Adopted	-- <sup>d</sup>
Town of Yorkville	County Ordinance	County Ordinance	County Ordinance	-- <sup>c</sup>	-- <sup>d</sup>

<sup>a</sup>Not required, since community has no floodplain.

<sup>b</sup>Not required, since community has no shoreland wetlands.

<sup>c</sup>Not reported by municipality.

<sup>d</sup>Covered under County Ordinance.

Source: Racine County Office of Emergency Management and Department of Planning and Development and SEWRPC.

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. Aside from wetlands within the shoreland zone, selected wetlands generally five acres and larger are also placed into conservancy zoning outside the shoreland zone in the unincorporated areas of the County.

In 1982, the State Legislature extended shoreland-wetland zoning requirements to cities and villages in Wisconsin. Under Sections 62.231 and 61.351, respectively, of the *Wisconsin Statutes* cities and villages in Wisconsin are required to place wetlands five acres or larger and located in statutory shorelands into a shoreland-wetland conservancy zoning district to ensure their preservation. 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 Racine County. The incorporated Cities of Burlington and Racine, Villages of Caledonia, Mt. Pleasant, Rochester, Sturtevant, Waterford, and Wind Point, have adopted their own shoreland-wetland zoning ordinances pursuant to Sections 62.231 and 61.351, respectively, of the Wisconsin Statutes. The remaining three Villages of Elmwood Park, North Bay, and Union Grove, did not contain shoreland wetlands and were thus not required to adopt such ordinances.

An important element of the Racine County and City of Racine shoreland zoning ordinances relates to the regulation of land use activities and facilities along the Lake Michigan shoreline where shoreline erosion hazards exist. In the case of the County ordinance, provisions are included related 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 provisions of the ordinance 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<sup>13</sup> for Racine 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. Additional information on the erosion management study is provided in Chapters IV and V.

### **Emergency Operations Planning**

Racine County has developed a comprehensive emergency management plan<sup>14</sup> 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 which complement the County plan and which also sets forth procedures and actions to deal with a range of situations and events. Racine County’s comprehensive emergency management plan notes that the County is exposed to many hazards that have the potential for disrupting the community, causing damage, and creating casualties. In addition to flooding, the plan recognizes that the County is vulnerable to other natural hazards, including tornadoes and severe weather; technological hazards; accidents involving hazardous materials; terrorism and civil disorder; and utility hazards, such as power failure and water shortages or contamination.

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<sup>13</sup> *SEWRPC Community Assistance Planning Report No. 86*, op. cit.

<sup>14</sup> Racine County, Wisconsin, Comprehensive Emergency Management Plan (CEMP), [*Racine County, Racine Wisconsin*], 2013.



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 the core of the Racine 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 government and the County to respond, assistance will be requested from the State of Wisconsin. The Federal government will provide assistance to the State of Wisconsin when all local and State resources have been exhausted. The County plan includes elements on direction and control, warning and communications, and management of resources during emergency situations.

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## Chapter III

# HAZARD MITIGATION GOALS

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 Racine 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 than goals.

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

Racine County and 16 of its local units of government have prepared a comprehensive plan that will provide 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.<sup>1</sup> The City of Racine endorsed the multi-jurisdictional comprehensive plan and adopted a city comprehensive plan based upon the multi-jurisdictional plan.<sup>2</sup> These plans incorporate and update elements from other pertinent County and Regional plans as appropriate. Racine County has prepared and adopted a park and open space plan<sup>3</sup> to guide the County and local units of government in

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<sup>1</sup> *SEWRPC Community Assistance Planning Report No. 301, A Multi-Jurisdictional Comprehensive Plan for Racine County: 2035, November 2009.*

<sup>2</sup> *SEWRPC Community Assistance Planning Report No. 305, A Comprehensive Plan for the City of Racine: 2035, November 2009.*

<sup>3</sup> *SEWRPC Community Assistance Planning Report No. 134, 3rd Edition, A Park and Open Space Plan for Racine County, February 2013.*

preserving and developing recreational and other open space uses throughout the County. The County has also assisted communities in developing land use plans which are prepared within the framework of the regional land use plan.<sup>4</sup>

Comprehensive watershed plans<sup>5</sup> have been developed for each of the major watershed areas which include areas in Racine County. These plans included evaluation of alternatives and recommended flood mitigation plans developed on a comprehensive, watershedwide basis. As comprehensive planning, park and open space planning, land use, and floodplain management planning has been carried out in Racine County and in the related watersheds, an integration and coordination of the goals and objectives has taken place. This is accomplished at the watershed level by developing comprehensive watershed plans which include floodplain management, land use, park and open space, and water quality planning in one integrated planning program. These watershed plans form a potential framework for subwatershed-level planning programs. As an example, the comprehensive watershed planning objectives, principles, and standards for the comprehensive plan for the Pike River watershed include six specific objectives and supporting standards related to land use and park and open space use, as well as objectives and standards relating to flood control. Similarly, the Racine County park and open space plan contains a specific plan element for wetland and floodplain preservation.

## **HAZARD MITIGATION GOALS AND OBJECTIVES**

The following goals have been established for the Racine 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 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.
2. A spatial distribution of the various land uses which maintains biodiversity and which 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. An integrated transportation system which, 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. The provision of facilities necessary to maintain a high quality of fire and police protection and emergency medical services throughout the County.

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<sup>4</sup> *SEWRPC Planning Report No. 48, A Regional Land Use Plan for Southeastern Wisconsin: 2035, June 2006.*

<sup>5</sup> *SEWRPC Planning Report No. 9, A Comprehensive Plan for the Root River Watershed, July 1966; SEWRPC Planning Report No. 12, A Comprehensive Plan for the Fox River Watershed, Volume One, Inventory Findings 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; and SEWRPC Planning Report No. 44, A Comprehensive Plan for the Des Plaines River Watershed, June 2003.*

5. The development of 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.
6. The identification of high erosion risk Lake Michigan shoreline areas and the development of a coastal erosion management program which reduces the exposure of people and real and personal property to shoreline erosion and bluff recession.
7. 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.

Complementing each of these goals is a set of objectives and standards which can be used to define more-specific actions or strategies to achieve the goals. The goals, objectives, and standards which are set forth in Table 23 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 which 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.

Table 23

**GOALS AND OBJECTIVES FOR RACINE COUNTY ALL HAZARD MITIGATION PLAN**

**GOAL NO. 1**

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.

**OBJECTIVES AND STANDARDS**

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.
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.
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 not be intermixed with commercial, residential, governmental, recreational, or institutional land uses; and should be provided with readily available fire and police protection and emergency medical services.
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 NO. 2**

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.

**OBJECTIVES AND STANDARDS**

1. Floodplains should not be allocated to any urban development which would cause or be subject to flood damage.
2. No unauthorized structure or fill should be allowed to encroach upon and obstruct the flow of water in perennial stream channels.
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.
4. All remaining undeveloped lands within the designated primary environmental corridors in the County should be preserved in essentially natural, open uses.
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.
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.

## Table 23 (continued)

### GOAL NO. 3

An integrated transportation system which, 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.

#### OBJECTIVES AND STANDARDS

1. Because accidents take a heavy toll on life and cause property damage and human suffering, contribute substantially to overall transportation costs, and increase public costs for police and welfare services, every attempt should be made to reduce both the incidence and severity of accidents through proper design and operation of the arterial street and highway system.
2. The total number of accidents, and the severity of traffic accidents, on arterial highways should be minimized by the identification and improvement of those facilities which exhibit above average accident rates based upon accepted standards.

### GOAL NO. 4

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

#### OBJECTIVES AND STANDARDS

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 NO. 5

The development of 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.

#### OBJECTIVES AND STANDARDS

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.
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.
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.
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.
5. Plan components shall be designed to comply with the requirements of Chapter NR 116 of the *Wisconsin Administrative Code*.
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.

**Table 23 (continued)**

- a. Minor and collector streets used or intended to be used primarily for access to abutting properties: a 10-year recurrence interval flood discharge.
  - b. 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.
  - c. Freeways and expressways: a 100-year recurrence interval flood discharge.
  - d. Railways: a 100-year recurrence interval flood discharge.
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.
  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.

**GOAL NO. 6**

The identification of 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.

**OBJECTIVES AND STANDARDS**

1. Erosion risk areas and structure setback distances from the Lake Michigan shoreline should be established based upon the recommendations included in the Racine County coastal erosion management study.<sup>a</sup>

**GOAL NO. 7**

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.

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<sup>a</sup>SEWRPC Community Assistance Planning Report No. 86, A Lake Michigan Coastal Erosion Management Study for Racine County, Wisconsin, October, 1982.

Source: SEWRPC.



## **Chapter IV**

# **ANALYSIS OF HAZARD CONDITIONS**

To evaluate various potential hazard mitigation alternatives for Racine County and select the most effective and feasible hazard mitigation strategies, the existing potential 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 Racine County;
- Profiles of the extent and severity of hazard events which occurred in the County;
- Assessment of the vulnerability and risk associated with each type of hazard; and
- Identification of the potential for changes in hazard severity and risk under future conditions.

The vulnerability assessment focused on the County and community assets described in Chapter II.

In preparing both the previous update and this current update to the plan, the analysis of the existing potential hazard problems and the documentation of the vulnerability to such hazards were reviewed and updated as warranted by the review. This review and updating included:

- Reevaluation of the identification of the hazards likely to affect Racine County;
- Updating of the data upon which the profiles of the extent and severity of hazard event which 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.

### **HAZARD IDENTIFICATION**

The process of identifying those hazards that should be specifically addressed in the Racine County hazard mitigation plan was based upon consideration of a number of factors. The process included input from the Racine County

Hazard Mitigation Local Planning Team,<sup>1</sup> including a priority rank ordering 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 Racine County was reviewed and reevaluated. This reevaluation included additional input from the Racine County Hazard Mitigation Local Planning Team.

### **Local Input**

The Racine County Hazard Mitigation Plan was developed through a collective effort of a number of agencies, organizations, and business representatives under the guidance of the Racine County Hazard Mitigation Task Force, which was created by the County specifically for plan development purposes. That committee is comprised of elected and appointed officials and business representatives from throughout the County knowledgeable about, and directly involved in, hazard mitigation matters.

During the drafting of the initial plan, two meetings of the Racine County Hazard Mitigation Task Force were devoted, in part, to hazard identification. At the first meeting, an initial listing of hazards to be considered was presented. The Task Force was asked to expand upon that listing. At a subsequent meeting, each Task Force member was asked to select the three hazards which were considered most important. The listing of the potential hazards identified at the initial meeting, along with the number of committee members who indicated the importance of each hazard, is shown in Table 24.

As part of the updating process for the first plan update, the Task Force reevaluated the hazards to be considered using a hazard and vulnerability assessment tool. Members of the Task Force indicated the likelihood of each hazard occurring in Racine County and evaluated the severity of each hazard on the basis of possible impacts to people, property, and commerce. Finally, the Task Force evaluated the relative state of preparedness for each hazard. The ratings given by the Task Force for each hazard were used to derive a perceived level of risk posed by each hazard. Following this, the hazards were ranked by this perceived level of risk. The results from the assessment tool for the first plan update are summarized in Table 25.

As part of the updating process for this second plan update, the Local Planning Team reevaluated the hazards to be considered using a hazard and vulnerability assessment tool similar to the one used for reviewing hazard identification for the first plan update. A copy of this tool is included in Appendix A. Members of the Local Planning Team indicated the likelihood of each hazard occurring in Racine County and evaluated the severity of each hazard on the basis of possible impacts to people, property and business. Finally, the Local Planning Team evaluated the relative state of preparedness for each hazard. The ratings given by the Local Planning Team 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.

### ***Summary of Hazard and Vulnerability Assessment Tool Results***

#### ***Methods***

The assessment tool was completed at the June 2, 2015 meeting of the Racine County Hazard Mitigation Local Planning Team, with 40 surveys being returned and analyzed. For each of 45 hazards, a risk was computed for each survey using the formula:

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<sup>1</sup> For the development of the initial plan and the 2010 update, this group was called the Racine County All Hazards Mitigation Plan Task Force. For the current plan update, the name of this group has been changed to the Racine County Hazard Mitigation Plan Local Planning Team to reflect the current terminology used by FEMA. The term Task Force will be used when referring to actions taken during the development of the initial plan and the first plan update.

Table 24

**HAZARD IDENTIFICATION SUMMARY BASED UPON  
RACINE COUNTY HAZARD MITIGATION TASK FORCE INPUT: 2001**

Number of Priority Votes Received at Task Force 12/05/01 Meeting	Hazard Types
--	A. Natural Hazards
7	1. Flooding and stormwater drainage
15	2. Tornado or high straight-line wind event
0	3. Earthquake
1	4. Lake Michigan coastal erosion (long-term lake level changes)
2	5. Other natural hazards
--	a. Lightning
--	b. Snow and ice
--	c. Extreme heat
--	d. Extreme cold
--	e. Fog
--	f. Blizzard or extreme snowfall
--	g. Hail
--	h. Ice storm
--	i. Drought
--	j. Dust storm
1	B. Loss of Infrastructure Systems
8	1. Contamination or loss of water supply system
0	2. Loss of sewerage system
1	3. Loss of telecommunication
3	4. Electrical system outage
0	5. Computer system incident
--	C. Hazardous Material Incidents and Transportation Incidents
11	1. Railroad incidents
9	2. Roadway incidents
0	3. Pipeline incidents
2	4. Fixed facility incidents (industries, bulk fuel storage sites, grain elevators, agricultural chemical storage, and explosives, including fireworks storage)
1	5. Aircraft (flight path)
--	D. Violence and Terrorism
0	1. Correctional center incident
0	2. Civil unrest
4	3. Terrorism incident (bomb threat, hostage situation, biological incident)
0	4. Workplace violence
1	5. School violence
--	E. Biological/Health Risks
0	1. Radon gas
2	2. Communicable disease outbreak or epidemic
1	3. Biological contaminants (anthrax, smallpox, etc.)
--	F. Mass Fire or Emergency Medical Incidents
3	1. Major fire (structure(s) or rural area wild fire or grain field fire)
0	2. Explosion
4	3. Mass casualty incident
0	4. Building collapse or cave-in
--	G. Miscellaneous Hazards
0	1. Quarries
0	2. Landfills
0	3. Wild animals
0	4. Insects
0	5. Recreational vehicles (snowmobiles)

Source: Racine County Hazard Mitigation Task Force.

Table 25

## PERCEIVED RISKS OF HAZARDS AS DETERMINED BY HAZARD AND VULNERABILITY ASSESSMENT TOOL: 2009

Event	Minimum (percent) <sup>a</sup>	Maximum (percent) <sup>a</sup>	Average (percent) <sup>a</sup>	Rank	Interquartile Range (percent) <sup>b</sup>
A1. Flooding and stormwater damage	0.0	100.0	68.3	1	42
A2. Tornado or high straight-line wind event	0.0	100.0	59.4	2	49
A3. Earthquake	0.0	33.3	15.4	35	6
A4. Lake Michigan coastal erosion	0.0	75.0	27.4	25	28
A4.1. Long-term lake level changes	0.0	75.0	28.6	22	27
A5. Other natural hazards	--	--	--	--	--
A5a. Lightning	0.0	91.7	45.4	6	39
A5b. Snow and ice	0.0	100.0	52.4	3	25
A5c. Extreme heat	0.0	75.0	35.9	13	33
A5d. Extreme cold	0.0	100.0	42.1	8	21
A5e. Fog	0.0	75.0	31.9	15	19
A5f. Blizzard or extreme snowfall	0.0	100.0	50.8	4	28
A5g. Hail	0.0	83.3	38.5	10	24
A5h. Ice storm	0.0	100.0	45.7	5	17
A5i. Drought	0.0	83.3	25.8	28	33
A5j. Dust storm	0.0	33.3	14.1	38	10
B1. Contamination or loss of water supply system	0.0	91.7	29.4	20	26
B2. Loss of sewerage system	0.0	91.7	25.0	29	8
B3. Loss of telecommunication	0.0	91.7	27.7	24	19
B4. Electrical system outage	0.0	91.7	37.8	11	15
B5. Computer system incident/cyber attack	5.6	91.7	37.7	12	31
C1. Railroad incidents	0.0	91.7	29.7	18.5	31
C2. Roadway incidents	0.0	100.0	45.1	7	49
C3. Pipeline incidents	0.0	83.3	27.1	26	21
C4. Fixed facility incidents (industries, bulk fuel storage sites, grain elevators, agricultural chemical storage, and explosives, including fireworks storage)	0.0	83.3	34.2	14	25
C5. Aircraft (flight path)	0.0	75.0	22.6	31	10
D1. Correctional center incident	0.0	58.3	18.5	33	10
D2. Civil unrest	0.0	66.7	22.4	32	11
D3. Terrorism incident (CBRNE)	0.0	83.3	29.7	18.5	14
D4. Workplace violence	0.0	83.3	28.5	23	24
D5. School violence	0.0	83.3	30.2	17	11
E1. Radon gas	0.0	44.4	17.5	34	5
E2. Communicable disease outbreak or epidemic	0.0	75.0	28.8	21	26
F1. Major fire (structure(s) or rural area wild fire or grain field fire)	0.0	83.3	40.9	9	34
F2. Explosion	0.0	83.3	30.6	16	28
F3. Mass casualty incident	0.0	91.7	27.0	27	16
F4. Building collapse or cave-in	0.0	44.4	23.5	30	8
G1. Quarries	0.0	38.9	15.3	36	10
G2. Landfills	0.0	58.3	15.1	37	10
G3. Wild animals	0.0	33.3	13.6	40	10
G4. Insects	0.0	33.3	13.8	39	10

<sup>a</sup>Perceived threat increases with percentage.

<sup>b</sup>Interquartile range acts as a measure of agreement upon the perceived level of threat with a smaller interquartile range indicating stronger agreement and a larger interquartile range indicating weaker agreement.

Source: SEWRPC.

$$\text{Risk(in \%)} = [(\text{Probability}/3) \times (\text{Human impact} + \text{Property impact} + \text{Business impact} + \text{Preparedness})/(4*3)] * 100$$

Where 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 (preplanning) 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 result returned by this formula is that the perceived threat increases with increasing percentage risk.

For each hazard, an average risk was calculated using the results of all the returned surveys. The hazards were then ranked by average risk, with a rank of 1 indicating the highest perceived risk. For each hazard, minimum and maximum risks were calculated. The results from the assessment tool were analyzed for 45 hazards.

In order to assess the degree of agreement among Local Planning Team members in the assessment of average risk, the interquartile range was calculated for each hazard. This quantity indicates the range of the half of the responses that are in middle. A smaller interquartile range indicates greater agreement among Task Force members as to the level of risk, while a larger interquartile range indicates less agreement.

### *Results*

The results from the assessment tool are summarized in Table 26. Hazard events are listed in order of highest perceived risk to lowest perceived risk, with hazards that were profiled in the last plan update highlighted in bold font. The average level of risk for hazards ranged from 9.4 percent for the lowest ranked hazard (dust storm) to 54.0 percent for the highest ranked hazard (heavy snow storm). Eight of the 10 highest average risks belonged to natural hazards related to meteorological causes, mostly causes associated with either winter weather, severe storms, or flooding. The two hazards with average perceived risks in the top 10 that were not weather related were roadway accidents and large structure fires. The interquartile ranges for the 10 hazards with the highest average risks tended to be relatively large, with all but two being above the mean range, indicating a diversity of opinion among Local Planning Team members as to the level of risk posed by each of these hazards. For example, high perceived risk was associated with tornadoes and riverine flooding however both had interquartile ranges of 35 and 36, respectively. This indicates there was a general agreement among Local Planning Team members that the risk was relatively high from tornadoes and riverine flooding, but disagreement as to just how high. The lowest interquartile range of the top ten hazards was associated with lightning. This suggests there was a high level of agreement among members of the Local Planning as to the relatively high risk associated with this hazard.

The 10 lowest average perceived risks belonged to hazards related to a variety of causes, including hazards related to public health, such as large-scale food contamination; hazards related to meteorological events such as dust storms, drought, lake flooding, and wildfires; natural hazards related to geological events, such as earthquake, land subsidence, and landslides; hazards related to infrastructure, such as dam failures; and hazards related to human behavior, such as correctional center incidents. The interquartile ranges for the 10 hazards with the lowest average perceived risks were relatively low, indicating strong agreement among Local Planning Team members as to the level of risk posed by each of those hazards.

### **Past Hazard Experience**

Past experiences with disasters is an indication of the potential for future disasters for which Racine County would be vulnerable. Accordingly, a review was made of the hazards that have faced Racine County in the past and a ranking by risk was made based upon disaster history and emergency management experience. As a part of this plan update, the review of hazards faced by the County was updated to include experiences that have occurred since the first plan update was completed and the ranking by risk was reevaluated in light of this updated disaster history.

If the recovery phase of a disaster is determined to exceed the capabilities of local communities and State agencies, Federal assistance may be requested by the Governor. Federal disaster assistance may be offered through a variety

Table 26

## PERCEIVED RISKS OF HAZARDS AS DETERMINED BY HAZARD AND VULNERABILITY ASSESSMENT TOOL: 2015

Event	Minimum (percent) <sup>a</sup>	Maximum (percent) <sup>a</sup>	Average (percent) <sup>a</sup>	Rank	Interquartile Range (percent) <sup>b</sup>
<b>Heavy Snow Storm</b>	13.9	91.7	54.0	1	29
<b>Tornado</b>	13.9	100.0	52.2	2	35
<b>Blizzard</b>	8.3	83.3	50.1	3	28
<b>Extreme Cold</b>	13.9	91.7	47.6	4	28
<b>Thunderstorm</b>	11.1	91.7	46.7	5	25
<b>Ice Storm</b>	8.3	83.3	46.3	6	28
<b>Roadway Transportation Accidents</b>	0.0	91.7	45.6	7	39
<b>Lightning</b>	5.6	100.00	43.8	8	17
<b>Riverine Flooding</b>	11.1	83.3	43.8	9	36
Large Structure Fire	0.0	100.0	42.5	10	35
<b>Stormwater Flooding</b>	0.0	91.7	42.4	11	26
<b>High Straight-Line Wind</b>	0.0	91.7	41.5	12	26
<b>Hazardous Materials Roadway Incident</b>	0.0	91.7	41.3	13	30
<b>Hazardous Materials Railroad Incident</b>	0.0	100.0	40.6	14	35
<b>Hazardous Materials Fixed Facilities</b>	0.0	91.7	39.2	15	41
<b>Hail</b>	11.1	83.3	39.2	16	29
<b>Railway Transportation Accidents</b>	0.0	100.0	38.4	17	42
<b>Electrical System Outage</b>	0.0	75.0	38.1	18	27
Fog	0.0	91.7	35.6	19	31
Computer System Incident/Cyber Attack	0.0	75.0	34.0	20	25
Mass Casualty Incident	0.0	91.7	33.5	21	31
<b>Extreme Heat</b>	8.3	91.7	33.1	22	21
Explosion	0.0	91.7	32.7	23	24
Civil Unrest	0.0	91.7	30.6	24	31
Workplace Violence	8.3	83.3	30.1	25	26
Building Collapse or Cave-In	0.0	75.0	30.0	26	13
<b>Terrorism Incident</b>	0.0	91.7	28.9	27	16
Loss of Telecommunication	0.0	66.7	28.4	28	24
School Violence	0.0	66.7	27.7	29	31
<b>Aviation Accidents</b>	0.0	75.0	27.2	30	15
<b>Communicable Disease Outbreak or Epidemic</b>	0.0	91.7	26.1	31	15
<b>Lake Michigan Coastal Erosion</b>	0.0	66.7	25.7	32	42
Hazardous Materials Pipeline Incident	0.0	75.0	24.3	33	22
<b>Contamination or Loss of Water Supply</b>	0.0	61.1	23.5	34	8
Loss of Sewerage System	0.0	61.1	23.4	35	10
Large-scale Food Contamination	0.0	75.0	22.6	36	13

**Table 26 (continued)**

Event	Minimum (percent) <sup>a</sup>	Maximum (percent) <sup>a</sup>	Average (percent) <sup>a</sup>	Rank	Interquartile Range (percent) <sup>b</sup>
<b>Drought</b>	0.0	66.7	22.6	37	18
Dam Failure	0.0	61.1	22.6	38	19
Lake Flooding	0.0	75.0	22.1	39	24
Wildfire	0.0	66.7	20.9	40	16
<b>Earthquake</b>	0.0	33.3	18.8	41	18
Correctional Center Incident	0.0	58.3	17.1	42	26
Land Subsidence	0.0	44.4	13.0	43	19
Landslide	0.0	30.6	10.7	44	19
Dust Storm	0.0	22.2	9.4	45	17

NOTE: Two events that do not appear in this table were written in on one survey. Electromagnetic pulse and climate change had a perceived risk of 61.1 and 50 percent, respectively.

Events in **bold** are hazards that were profiled in the first update to the Racine County Hazard Mitigation Plan.

<sup>a</sup>Perceived threat increases with percentage.

<sup>b</sup>Interquartile range acts as a measure of agreement upon the perceived level of threat with a smaller interquartile range indicating stronger agreement and a larger interquartile range indicating weaker agreement.

Source: SEWRPC.

of programs. Assistance may be directed to agricultural producers, individuals and families, businesses, or local governments. An emergency disaster declaration can be made when the President determines assistance is needed to supplement State and local efforts in providing services such as the protection of lives, property, public health and safety, and to lessen the threat of a disaster. A presidential major disaster declaration puts into motion long-term Federal recovery programs, some of which are matched by State programs. This declaration is designed to help disaster survivors, businesses, and public entities. Lastly, agricultural related disaster designations are enacted by the U.S. Department of Agriculture (USDA) and are known as secretarial disaster designations. The Secretary of Agriculture is authorized to designate counties as disaster areas to make available emergency loans for agricultural producers that have suffered severe production losses due to a natural disaster.

Between 1993 and 2014 Racine County has had seven Presidential disaster declarations, two presidential emergency declarations, three secretarial disaster declarations by the USDA, and one additional disaster in which a declaration was requested by the State but was not granted. The total documented estimated damages of these 13 events exceeded \$17.3 million. It should be noted that damage estimates generally underestimate the actual damages that occurred. In addition, an undetermined amount of damages may have been covered by insurance. Almost every year there are significant weather events causing millions of dollars of damage for which no Federal disaster assistance is requested. Thus, losses that were sustained from hazards in Racine County over the period 1993 through 2014 are significantly greater than the \$17.3 million estimate shown in Table 27.

Major indicators of hazard severity are the deaths, injuries, and economic losses resulting from natural hazards and disasters. The National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC) publishes National Weather Service (NWS) data describing recorded weather events and resulting deaths, injuries, and damages. For economic losses resulting from damages to crops, the data from the NCDC can be supplemented with records of crop insurance indemnities from the U.S. Department of Agriculture Risk Management Agency. It should be noted, the NCDC relies on damages reported by county, state, and federal emergency management of-

**Table 27**

**SUMMARY OF ESTIMATED DISASTER DAMAGES AND ASSISTANCE IN RACINE COUNTY FOR SELECTED FEDERALLY DECLARED AND NON DECLARED DISASTERS EMERGENCIES: 1993-2014**

Date of Disaster	Estimated Damages (property and crop)	State and Federal Assistance		
		Public Assistance <sup>a</sup>	Individual Assistance <sup>b</sup>	Total Assistance
1993—Flood (DR-994) <sup>c</sup> .....	\$ 135,370	\$ 344,000	N/A	\$ 344,000
1998—Severe Storms/Flooding (DR-1238) <sup>c</sup> .....	200,000	--	N/A	N/A
2000—Heavy Rains/Severe Storms/Flooding (DR-1332) <sup>c</sup> .....	2,055,000	--	\$ 353,000	353,000
2000—Snow (EM-3163) <sup>d</sup> .....	N/A	279,000	--	279,000
2004—Severe Storms/Flooding (DR-1526) <sup>c</sup> .....	6,622,000	--	127,000	127,000
2005—Drought <sup>e</sup> .....	453,000	N/A	N/A	N/A
2007—Severe Storms/Flooding (DR-1719) <sup>c</sup> .....	2,570,000	--	190,000	190,000
2008—Snow (EM-3285) <sup>d</sup> .....	N/A	471,000	--	471,000
2008—Severe Storms/Tornadoes/Flooding (DR-1768) <sup>c</sup> .....	3,770,000	1,155,000	1,894,000 <sup>d</sup>	3,049,000
2009—Severe Storms/Flooding.....	347,000	N/A	N/A	N/A
2011—Severe Winter Storm/Snowstorm (DR-1966) <sup>c</sup> .....	N/A	824,800	--	824,800
2012—Drought (S3305) <sup>e</sup> .....	1,175,400	N/A	N/A	N/A
2012 (S3444) <sup>e</sup> —Unseasonably Warm Weather Followed by Frost and Freezes.....	N/A	N/A	N/A	N/A
<b>Total</b>	<b>\$17,327,770</b>	<b>\$3,073,800</b>	<b>\$2,564,000</b>	<b>\$5,637,800</b>

NOTE: N/A indicates data not available.

<sup>a</sup>Public assistance includes assistance to local units of government and nonprofit organizations.

<sup>b</sup>Individual assistance includes disaster assistance through FEMA programs and disaster loans from the U.S. Small Business Administration to individuals, households, and businesses.

<sup>c</sup>Presidential major disaster declaration.

<sup>d</sup>Presidential emergency declaration.

<sup>e</sup>Secretarial disaster declarations issued by the U.S. Department of Agriculture.

<sup>d</sup>Includes about \$855,000 from individual assistance programs and \$1,039,000 in loans through the Small Business Administration.

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

officials, local law enforcement officials, volunteer weather spotters, NWS damage surveys, newspaper articles, the insurance industry, and the general public. Often property damage and crop damage due to weather events will go unreported. Thus, property damages and crop damages discussed below clearly represent an underestimate of actual damages that have occurred in weather events. In addition, previous editions of this report include deaths, injuries, property damage, and crop damage estimates that were reported, in some cases, based upon a larger geographic area than Racine County itself. The NCDC storm events database has since been refined to include data specific to Racine County for weather events. Therefore, deaths, injuries, and damages due to weather events reported in this 3rd Edition are specific to Racine County and may be lower than previous editions of this report.

Since 1950, Racine County has experienced 666 weather hazard events, as summarized in Table 28. To illustrate the broader hazard damage potential, Table 28 summarizes the reported damages associated with the 666 weather hazard events which have occurred in Racine County since 1950. Those hazard events were estimated to have caused over \$94 million in damages, about 48 percent of that total being crop damages.

The amount of estimated losses reported from major weather events has been increasing. Based upon the date of the occurrence in the events summarized in Table 28, there were over \$19.5 million in hazard-related property damages



Table 28

**WEATHER HAZARD EVENTS RECORDED IN RACINE COUNTY, WISCONSIN  
FROM 1950 THROUGH 2014 (SORTED BY NUMBER OF EVENTS)**

Event	Total	Deaths	Injuries	Property Damage <sup>a</sup>	Crop Damage <sup>a</sup>
Dust Storms.....	0	0	0	\$ 0	\$ 0
Wild Fires/Forest Fires.....	0	0	0	0	0
Drought.....	18	0	0	0	5,278,404
Tornado.....	21	0	10	29,767,965	14,509
Lightning.....	31	1	8	1,532,502	0
Flood.....	53	1	0	10,074,276	38,514,360
Temperature Extremes.....	54	2	2	5,709	111,248
Non-Thunderstorm High-Winds.....	58	1	12	1,323,225	108,930
Fog.....	75	0	0	0	0
Hail.....	86	0	0	236,679	84,255
Snow and Ice.....	120	1	0	25,117	8,438
Thunderstorm Winds.....	150	0	6	6,080,503	1,067,977
<b>Total</b>	<b>666</b>	<b>6</b>	<b>38</b>	<b>\$49,045,976</b>	<b>\$45,188,121</b>

<sup>a</sup>Dollar values were adjusted to year 2014 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.

NOTE: Previous editions of this report include deaths, injuries, property damage, and crop damage estimates that were reported by the National Climatic Data Center (NCDC), in some cases, based upon a larger geographic area than Racine County itself. The NCDC storm events database has since been refined to include data specific to impacts on Racine County.

Source: *The National Climatic Data Center (NCDC) a part of the Department of Commerce, 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.*

and expenses and over \$17 million in crop damages reported to be associated with weather related hazards which took place between 2000 and 2014. This is 40 percent of all reported damages over the period 1950 to 2014. One possible factor accounting for this is that the decade of the 2000s was an unusually active one for natural disasters in the State of Wisconsin as a whole, including large flood events in southeastern Wisconsin in 2008 and 2010. Another possible reason for the increase in reported damage estimates may be improvements in how local community and County officials report damages. However, it is apparent that Racine County is experiencing significant rates of loss due to natural hazards.

The NWS and crop insurance data summarized in Table 28 shows that thunderstorm winds are the most frequent weather hazards, followed by snow and ice, hail storms, fog, non-thunderstorm high-winds, and temperature extremes. Flooding is the most damaging weather hazard, followed by tornadoes and thunderstorm winds. Extreme temperature accounted for the most deaths caused by a weather hazard with two deaths reported in Racine County. Non-thunderstorm high-winds, floods, lightning, and snow each accounted for one documented death. This data only accounts for deaths directly related to the weather hazard. Numerous deaths caused indirectly by weather hazards also occur, but are not included in these totals. In addition, weather events are often complex and damages may occur from multiple hazards, such as when hail, rain, wind, and tornadoes strike during a single storm.

To illustrate the potential frequency of thunderstorms and tornadoes, a review was made of the warnings historically issued by the National Weather Service (NWS), as shown in Table 29. Over the period 1990 through 2014, there have been 436 thunderstorm-related watches or warnings and 98 tornado-related watches or warnings.

Improved weather forecasting and warning systems, as well as stronger building codes, help explain why tornado mortality has not been prevalent in the recent past, although tornadoes remain a very serious threat to human life. The sudden emergence of temperature extremes as a cause for mortality nationwide is most likely due to a combi-

Table 29

## RACINE COUNTY SEVERE WEATHER HISTORY

Year	Severe Thunderstorm		Tornado	
	Watch	Warning	Watch	Warning
1990	5	3	4	0
1991	10	2	2	0
1992	4	0	3	2
1993	12	5	4	1
1994	9	4	2	0
1995	10	9	2	2
1996	5	5	10	0
1997	9	6	2	1
1998	10	10	2	0
1999	8	10	0	0
2000	8	14	3	1
2001	10	7	1	1
2002	7	6	1	0
2003	9	4	3	0
2004	15	16	5	0
2005	11	5	0	3
2006	19	19	3	0
2007	2	11	3	0
2008	9	19	5	4
2009	8	8	1	2
2010	7	9	8	7
2011	10	17	2	0
2012	7	11	0	0
2013	5	8	2	4
2014	8	11	1	1
Total	217	219	69	29

Source: National Oceanic Atmospheric Administration, National Weather Service.

nation of improved record keeping by health organizations and the longer life expectancy of individuals. Mortality from heat waves affects the elderly disproportionately.

A similar review can be performed for human-induced and technological hazards. As with the meteorological hazards summarized in Table 28, the major indicators of human-induced and technological hazard severity are the deaths, injuries, and economic losses resulting from hazard events and disasters. Several agencies compile data on individual human-induced and technological hazards and make it available. For example, the Wisconsin Department of Transportation (WisDOT) compiles and publishes data on roadway traffic accidents on an annual basis.<sup>2</sup> Based upon the four technological hazards for which data are available, since 1971 Racine County has experienced 58,523 technological hazard events. These events are summarized in Table 30. Technological hazards were estimated to have caused nearly \$918 million in economic losses.

<sup>2</sup> For example, Wisconsin Department of Transportation, 2013 Wisconsin Traffic Crash Facts, July 2015.

Table 30

**TECHNOLOGICAL HAZARD EVENTS RECORDED IN RACINE COUNTY,  
WISCONSIN FROM 1971 THROUGH DECEMBER 2014 (SORTED BY NUMBER OF EVENTS)**

Event <sup>a</sup>	Total	Deaths	Injuries	Property Damage <sup>b</sup>	Crop Damage <sup>b</sup>
Hazardous Material Events (Pipeline) .....	11	0	2	\$ 124,891	\$0
Hazardous Material Events (Transportation) ...	145	1	7	227,552	0
Railroad Accidents .....	186	14	58	7,745,960	0
Roadway Traffic Accidents <sup>c</sup> .....	58,181	260	31,358	909,726,422	0
Total	58,523	275	31,425	\$917,824,825	\$0

<sup>a</sup>The table lists only those hazards for which data were available.

<sup>b</sup>Dollar values were adjusted to year 2014 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.

<sup>c</sup>Data for roadway traffic accidents were only available for the years 1999 through 2013.

Source: U.S. Department of Transportation Office of Pipeline Safety, Federal Railroad Administration, Wisconsin Department of Transportation, and SEWRPC.

The data summarized in Table 30 show that roadway traffic accidents constitute the most frequent, damaging, and deadly technological hazard occurring in Racine County. This hazard accounts for over 99 percent of the incidents, injuries, and economic losses and over 94 percent of all of the deaths attributed to technological hazards. Railroad accidents, hazardous material events involving pipelines, and transportation-related hazardous material events accounted for the other reported incidents, deaths, injuries, and economic losses.

**Summary and Ranking of Hazards**

There are several ways the Racine County hazards can be ranked and summarized to be specifically considered in the County hazard mitigation plan. Current guidance for all hazard mitigation plans promotes comprehensive consideration of all natural hazards. These 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 Racine County Hazard Mitigation Local Planning Team.

In addition, selected hazards other than natural hazards have been identified for consideration in the Racine County hazard mitigation plan based upon input from the Local Planning Team. The hazards to be specifically considered in this plan are summarized in Table 31, along with qualitative information on the hazard severity. As part of the updating process, the hazards considered in the first plan update were reevaluated giving consideration to data related to the occurrence of hazards since the plan update and to the perceived risk associated with each hazard as summarized in Table 26.<sup>3</sup> In addition to the hazards identified for consideration in the original plan, and first update to the plan, the Local Planning Team agreed to include cyber-attacks on local governments and active shooter incidents as hazards considered for this 3rd edition of the report.

<sup>3</sup> The rankings in Table 31 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 26. It is important to note that some of the natural hazards listed in Table 31 represent combinations of hazards listed in Table 26. For example, while specific risks associated with thunderstorms, such as hail and lightning are listed separately in Table 26, they are combined into one category in Table 31. It should also be noted that prior to 1994, the reports of certain weather hazards in the NCDC database are somewhat incomplete.

Table 31

SUMMARY OF HAZARDS TO BE CONSIDERED IN THE RACINE COUNTY HAZARD MITIGATION PLAN

Hazard	Risk of Occurrence (high, medium, or low)	Warning Time (short, medium, or long)	Damage to Property (high, moderate, 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)
<b>Natural Hazards</b>						
Flooding .....	High	Medium	High	Low	Moderate	Large
Thunderstorm, High Wind, Hail, Lightning....	High	Short	High	High	Long	Large
Tornadoes .....	Low	Medium	High	Medium	Short	Small
Temperature Extremes .....	Medium	Long	Low	High	Long	Large
Winter Storms .....	Medium	Medium	Low	Medium	Moderate	Large
Coastal Erosion.....	Medium	Long	High	Low	Long	Small
Drought .....	Medium	Medium	Low	Low	Long	Large
<b>Other Hazards</b>						
Transportation Accidents .....	Medium	Short	Moderate	High	Short	Small
Contamination or Loss of Water Supply.....	Low	Short	Moderate	Medium	Moderate	Medium
Hazardous Materials Incident.....	High	Short	Low	Medium	Moderate	Small
Public Health Emergencies .....	Low	Short	Low	High	Moderate to long	Small to large
Terrorism Incident .....	Low	Short	Moderate to high	High	Short	Small to medium
Cyber Attack on Local Government .....	Low	Short	Moderate	Low	Moderate	Small to medium
Active Shooter Incident .....	Low	Short	Low to moderate	Medium	Short	Small
Power Outage Incident.....	Medium	Short	Low	Low	Short	Small to medium

Source: Racine County Office of Emergency Management and Department of Planning and Development, Racine County All Hazards Mitigation Local Planning Team, and SEWRPC.

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—mapping, building codes, zoning laws, insurance, elevation or acquisition of floodprone 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 Racine County disasters are probably 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 Table 31 does include some hazards, as originally developed by the Committee, which have been found to have minimal chance of occurring or offer only limited applicable mitigation options. The identified hazards listed below will either receive less emphasis in the subsequent sections of the report or were incorporated as subelements among existing categories, as summarized in Table 31.

## *Natural Hazards*

### *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 75 fog events reported in and around Racine County in the period from December 3, 1999, through December 31, 2014. 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. It will, however, be discussed as part of the transportation system accident hazards.

### *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 most common of these in Racine County is marsh fires which do occasionally occur. However, these are normally responded to by local fire suppression departments in accordance with established response procedures and no specific mitigation actions are deemed warranted. 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.

Only about 6 percent of the land area in Racine County is woodland, as summarized in Chapter II of this report. 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 Racine County in the period from 1976 through 2014. 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 Racine 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 Racine County, from January 1, 1950, through December 31, 2014. 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 Racine County would be atypical, therefore, mitigation strategies will not be recommended for this hazard 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 earth's surface. 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, and 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 Racine 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  $g$ .<sup>4</sup>

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<sup>4</sup> U.S. Geological Survey, 2008 United States National Seismic Hazard Maps, *USGS Fact Sheet 2008-3018*, April 2008.

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 Racine County is considered low, therefore earthquakes will not be considered further in subsequent sections of this report.

### ***Human-Induced Hazards***

#### *Industries, Bulk Fuel Storage, Chemical Storage*

This category heading has been incorporated into the Hazardous Materials Incidents within the fixed facility category.

#### *Nuclear Power Plant Incidents*

Nuclear power plant incidents involve the uncontrolled release of potentially dangerous radioactive materials into the environment from a commercial nuclear power plant. Nuclear energy provides approximately 7.6 percent of the electricity produced in Wisconsin.<sup>5</sup> This is produced by one nuclear power plant with two reactors located in the State. This power plant, Point Beach Unit 1 and Unit 2, is located in Two Creeks, Wisconsin, which is approximately 13 miles north by northwest of Manitowoc. There are also two nuclear power plants, each with two reactors, located in close proximity to Wisconsin, which produce electrical power for Illinois and Minnesota. The Illinois power plants Byron Unit 1 and Unit 2 are located in Byron, Illinois, approximately 17 miles southwest of Rockford. The Prairie Island Nuclear Power Plants Unit 1 and 2 are located in Red Wing, Minnesota, approximately 28 miles southeast of Minneapolis. It is likely that a greater threat posed by the plants involves the transportation of radioactive fuel and wastes to and from the plant. The interim and terminal storage of these wastes is an issue which Federal, State and local officials are working to resolve. No commercial nuclear power plants incidents have occurred which have affected the State.

The Kewaunee Nuclear Power plant, located in Carlton, Wisconsin, was permanently shut down on May 7, 2013. The plant's owners submitted their post-shutdown decommissioning activities report (PSDAR) and conducted a public meeting near the site on April 24, 2013. The facility retains its license but is no longer authorized to operate or emplace fuel in the reactor vessel. The facility has spent fuel stored in both its spent fuel pool and a generally licensed Independent Spent Fuel Storage Installation (ISFSI). The site is preparing for a significant campaign to offload the remaining spent fuel from the spent fuel pool into dry cask storage at its onsite ISFSI. After offloading the fuel, the licensee plans to enter a long-term safe storage (SAFSTOR) condition. Current planning is to transfer the entire spent fuel pool inventory to dry cask storage by December 2016 and enter SAFSTOR period in January 2017. Major decommissioning and dismantlement activities are scheduled to begin in 2069. License termination is scheduled for 2073.

There are two additional nuclear power plants (Units 1 and 2 in Zion, Illinois) that were permanently shut down on February 13, 1998.<sup>6</sup> The fuel was transferred to the spent fuel pool, and the owner submitted the certification of fuel transfer on March 9, 1998. A public meeting was held on June 1, 1998, to inform the public of the shutdown plans. The owner submitted the post-shutdown decommissioning activities report (PSDAR), site-specific cost estimate, and fuel management plan on February 14, 2000. A public meeting to discuss the PSDAR was held on April 26, 2000.<sup>7</sup> In September 2010, the facility license was transferred from Exelon to ZionSolutions for the express purpose of expediting the decommissioning of the site. Decontamination and dismantlement began in 2011. Completion of

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<sup>5</sup> U.S. Energy Information Administration, *Wisconsin State Profile and Energy Estimates*, <http://www.eia.gov/state?sid=WI>, accessed January 26, 2016.

<sup>6</sup> U.S. Nuclear Regulatory Commission, *Fact Sheet on Decommissioning Nuclear Power Plants*, <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/decommissioning.html#table1>, May 2004.

<sup>7</sup> Ibid.

fuel transfer to the independent spent fuel storage installation facility was completed in January 2015. Submittal of the License Termination Plan occurred in December 2014 and a public meeting was held in April 2015. License termination is slated for 2020.<sup>8</sup>

A 10-mile Primary Emergency Planning Zone (EPZ) radius and a 50-mile Secondary Emergency Planning Zone (EPZ) radius were established to determine which areas could potentially suffer the greatest consequences of an incident at a nuclear plant and where the State focuses its Radiological Emergency Response Planning and Exercising Program. The southwest corner of Racine County is approximately 30 miles outside the Secondary Emergency Planning radius extending from the nuclear power plants Byron Units 1 and 2 located in Byron, Illinois.

Host counties are counties that adjoin one of the risk counties and have agreed to “host” a share of the risk county’s population if a nuclear plant incident requires evacuation of the public. Racine and Kenosha are both host counties which support Walworth County. Due to Racine County’s limited threat from a nuclear power plant incident and the limited mitigation options, it will not be considered further in subsequent sections of this report.

#### *Major Structure Fire*

Major structure fire is an important type of hazardous event that can cause significant potential serious injury, death, and property damages. Local authorities and fire departments adequately maintain their own services to those affected by fire incidents, coordinate with various organizations which are supporting the emergency services, and have established lines of communication with neighboring fire departments, including in areas outside of Racine County. In addition, Racine County, like all emergency management programs, is required to conduct disaster exercises. Disaster exercises are valuable from a variety of standpoints, because they allow organizations to test emergency management plans and procedures, bring together people and various emergency response departments who must work together when disaster strikes, help break down barriers and foster communication between departments, allow simulation of emergency incidents, and provide valuable training. Therefore, due to establishment of the cooperative mutual aid agreements as summarized in Chapter II of this report and ongoing development of multi-jurisdictional and interdepartmental safety and rescue training exercises, the issue of major structure fire is currently being adequately addressed within Racine County and will not be considered further in subsequent sections of this report.

#### *Mass Casualty Incident*

This category was considered to be a significant potential component of and, therefore, incorporated as part of all of the human-induced hazard categories, as shown in Table 31.

#### *Miscellaneous Hazards*

##### *Quarries*

Mines and quarries can be dangerous places to recreate. Each year, dozens of children and adults are injured or killed in accidents that occur at active, inactive, and abandoned underground mines, sinkholes, pits, and quarries. According to the Federal Mine Safety and Health Administration (MSHA) statistics, between 2004 and 2008, six people died and 13 people were injured in the State of Wisconsin in such non-mining incidents. MSHA has established “Stay Out–Stay Alive,” a nationwide public awareness campaign, to warn people about the dangers of exploring, playing, or using recreational vehicles on mine property. The hazards are not always apparent, but excavated vertical cliffs (highwalls) in quarries can be unstable and prone to collapse. Hills of loose material in stockpiles or refuse heaps can easily collapse upon an unsuspecting bicyclist or climber. Water-filled quarries and pits hide rock ledges, old machinery, and other hazards. The water can be deceptively deep and dangerously cold. Steep, slippery walls can make exiting these swimming holes extremely difficult. However, there are no mines and only a limited

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<sup>8</sup> U.S. Nuclear Regulatory Commission, “Zion Units 1 & 2,” <http://www.nrc.gov/info-finder/power-reactor/zion-nuclear-power-station-units-1-2.html>, accessed March 1, 2016.

number of quarries within Racine County, and no quarry related accidents or deaths have been reported. Due to Racine County's limited threat from quarry incidents and the limited mitigation options, it will not be considered further in subsequent sections of this report.

### *Landfills*

Landfills are designed and operated to control potential disease vectors, protect surface water and groundwater sources, control litter, and protect air quality. The U.S. Environmental Protection Agency (USEPA) and the WDNR, have each established criteria that municipal solid waste landfills must meet in order to ensure the protection of human health and safety that include: 1) restrictions on the location of such facilities (e.g. a ban on construction in wetlands); 2) operating criteria such as procedures to control disease vectors and a ban on non-containerized liquids; 3) design criteria; 4) groundwater monitoring and corrective action requirements (e.g., a groundwater monitoring system); and 5) closure and post-closure criteria (e.g., installation and maintenance of the integrity of a final cover).<sup>9</sup>

As summarized in Chapter II, as of 2015, there were two active and 23 inactive landfill sites located throughout Racine County, as shown on Map 19 in Chapter II of this report, and summarized in Appendix B. Most of these sites have gone through proper closure procedures specified by the WDNR. One of these sites, the Hunts Disposal site in the Village of Caledonia, is classified as a Superfund site and has been classified as remediated based upon WDNR and SEWRPC files. The active landfill sites are licensed facilities and meet the required aforementioned State and Federal public health and safety design, management and safety programs criteria outlined previously.<sup>10</sup> In addition, public access is currently controlled at both active landfill sites in order to ensure public health and safety by controlling illegal dumping, decreasing public exposure to hazards, and controlling unauthorized vehicular traffic. There have not been any landfill related injuries or deaths reported within Racine County to date. Therefore, due to Racine County's limited threat from landfill incidents, it will not be considered further in subsequent sections of this report.

### *Wild Animals*

Wisconsin's wildlife includes more than 450 species of birds, mammals, reptiles, and amphibians. The vast majority of these species are harmless to human beings.<sup>11</sup> Some, however, can inflict physical harm through biting, but this generally causes limited physical injury and is seldom fatal. Some animals can cause significant human injury and death through vehicle accidents, and/or be vectors for transmission of infectious diseases (i.e., zoonoses). Deer are very abundant throughout Wisconsin resulting in over 18,000 deer-vehicle collisions in 2013,<sup>12</sup> which is why it was considered to be a significant potential component of and, therefore, incorporated as part of the transportation-related hazard category. Zoonoses are most simply defined as human infections derived from animals. Humans infected

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<sup>9</sup> See *Code of Federal Regulations Title 40, Part 258* (<http://www.epa.gov/epacfr40/chapt-I.info/subch-I/>), which indicates that each state must meet these criteria in its own rules and regulations; the Wisconsin Administrative Code Chapters NR 500-520 (<http://www.legis.state.wi.us/rsb/code/nr/nr500.html>) contain rules for siting, construction, operation, and closure of municipal and other solid waste landfills. The general rules, which apply to all solid waste landfills, except for small demolition landfills, require licensing of such facilities before they can be constructed and operated.

<sup>10</sup> See Wisconsin Department of Natural Resources, *Landfills*, <http://dnr.wi.gov/topic/Landfills/>, revised May 18, 2015; Wisconsin Department of Natural Resources, *Managing Waste and Materials*, <http://dnr.wi.gov/topic/waste/> revised August 20, 2014, and the links included on these pages.

<sup>11</sup> University of Wisconsin-Extension, *Outdoor Hazards in Wisconsin: A Guide to Noxious Insects, Plants, and Wildlife*, Report No. G3564, <http://learningstore.uwex.edu/pdf/G3564.PDF>, 2004.

<sup>12</sup> Wisconsin Department of Transportation, *2013 Wisconsin Traffic Crash Facts*, July, 2015.



with Rabies derived from a dog bite or West Nile Virus from a mosquito bite are examples of zoonoses in Wisconsin. This disease vector risk element from wild animals was considered to be a significant potential component of and, therefore, incorporated as part of the public health emergency hazard category. In contrast, due to the limited threat from physical injury incidences from wild animals throughout the State of Wisconsin and Racine County, this aspect will not be considered further in subsequent sections of this report.

### *Insects*

There are more than 10,000 different insects, spiders, and related invertebrate organisms that are known to occur within the State of Wisconsin. Over 95 percent of these organisms are completely harmless and less than 1 percent goes out of their way to afflict people.<sup>13</sup> As previously mentioned in the wild animal section above, insects can also be vectors for spreading diseases to humans (see Vulnerability Assessment for Public Health Emergencies section below). Insects and other invertebrates attack humans to either obtain food (i.e., blood) or to protect themselves. The symptoms of most bites and stings are a temporary burning at the site of the sting followed by swelling and itching. However, in rare instances, some people can develop more severe allergic or anaphylactic reactions that can be fatal without medical intervention. Due to the limited threat from physical injury and death incidences from insects in Racine County, this aspect will not be considered further in subsequent sections of this report.

## **VULNERABILITY ASSESSMENT ANALYSIS METHODS AND PROCEDURES**

In the previous section of this report the hazards considered applicable to Racine County were identified and ranked. This section of the report develops a vulnerability assessment for the identified hazards, including vulnerable asset description, hazard event profiling, and estimated losses information. This vulnerability assessment provides the basis for developing mitigation strategies that address the identified vulnerabilities.

The procedures utilized in the vulnerability analyses are based upon guidance provided by the Federal Emergency Management Agency (FEMA) and the Wisconsin Department of Military Affairs, Division of Emergency Management.<sup>14</sup> 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 17 communities within Racine County is analyzed.

In general, the procedures utilized in this analysis focused upon the methodology consistent with, and utilizing, the Hazard U.S. (HAZUS) software as maintained by the Federal Emergency Management Agency. In many cases, the mapping of assets and problem areas was done utilizing the detailed mapping and orthophotography available for Racine County in both hard copy and digital form, including general base maps, large-scale topographic and cadastral maps, and year 2010 and 2015 large-scale orthophotographs. All of the mapping was done utilizing geographic information system (GIS) ArcGIS software.

With regard to the community assets, the basic Racine County inventory data set forth in Chapter II include data and mapping on existing and planned land use, demographics, and economic characteristics of the County; property value by community; flood hazard mapping; Lake Michigan coastal erosion hazard areas; transportation and utility systems; public safety facilities and services; critical community facilities; and historic sites. These data

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<sup>13</sup> *University of Wisconsin Extension, Report No. G3564, op. cit.*

<sup>14</sup> *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.*

have been used and supplemented with information obtained from the HAZUS software; the National Oceanic and Atmospheric Administration National Climatic Data Center; the U.S. Department of Agriculture Agricultural Risk Management Agency; the Wisconsin Department of Military Affairs, Division of Emergency Management; and more hazard-specific local data, such as building-specific structure values, as the basis for the community asset data base. 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 Racine County Office 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 31.

### **Assessments of Potential Future Changes in Hazard Conditions Relative to Climate Change**

The risk posed to Racine County by many of the natural hazards profiled in this plan have been estimated based largely upon the history of occurrence of, and impacts attributed to, the hazard within the County. For example, the estimates given below for the number of thunderstorms and thunderstorm-related hazards that would be expected to impact the County and the amount of damages to property and crops in the County reflect the average number of occurrences of these storms and the associated damages that were reported over a recent 25-year period. Over the short term, such as the five-year period covered by this plan, estimates of risk and damages derived in this manner should serve as reasonably reliable indicators of the degree of risk associated with various hazards. Over longer periods of time, climate change may render estimates of risk based on historical occurrences and impacts unreliable. Recent assessments have documented changes in Wisconsin's climate over the late 20th century.<sup>15</sup> Projections of Wisconsin's climate based on downscaled data from 14 global climate models indicate that additional changes will occur through the 21st century.<sup>16</sup> 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.

Average annual temperatures in Wisconsin increased over the last half of the 20th century. Between 1950 and 2006, average annual temperature in the State increased by an average of 1.1°F.<sup>17</sup> In Racine County the increase was between 1.0°F and 1.5°F. Much of this increase in average temperature occurred in the form of higher night-time low temperatures. For example, over the period 1950 through 2006, the average number of days in Racine County in which the daily low temperature fell below 0°F decreased by about 7 days per year. The greatest increase in temperatures occurred during winter and spring months. Depending on location, average winter temperatures in Racine County increased by 2.5-3.0°F over this period.

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<sup>15</sup> For example, Christopher J. Kucharik, Shawn P. Serbin, Steve Vavrus, Edward J. Hopkins, and Melissa M. Motew, "Patterns of Climate Change across Wisconsin from 1950 to 2006," *Physical Geography, Volume 31, pages 1-28, 2010.*

<sup>16</sup> *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, 2011.*

<sup>17</sup> *Kucharik and others, 2010, op. cit.*

The consensus from downscaled results from climate models indicate that average annual temperatures will continue to increase through the 21st century.<sup>18</sup> Depending on location, it is projected that average temperatures in the State of Wisconsin will increase by between 4.0°F and 9.0°F over the period 1980 through 2055. This increase is projected to be on the order of 5.5°F to 6.0°F in Racine County. The greatest changes are projected to occur during winter months, with average winter temperatures being projected to increase by about 7.5°F in Racine County. By contrast, average temperatures in Racine County during the summer are projected to increase by about 5.5°F. Changes in extreme temperatures will accompany these 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 double to about 25 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.

Average annual precipitation in Wisconsin increased over the last half of the 20th century. Between 1950 and 2006, average annual precipitation in the State increased by an average of about 3.1 inches.<sup>19</sup> It should be noted that there was substantial variability in the change in precipitation across the State, with some areas experiencing increases of up to 7.0 inches and some areas in northern Wisconsin experiencing decreases. In Racine County annual precipitation increased over this period by between 0.5 inches and 5.5 inches, with smaller increases occurring in the western portion of the County and larger increases occurring in the central and eastern portions of the County. Most of the increase in average precipitation occurred during autumn months. In Racine County, average precipitation during autumn months increased by 2.0 inches to 2.5 inches between 1950 and 2006. Increases also occurred during winter and spring in most of the County. Throughout the State, the changes in average precipitation during summer months were highly variable. In Racine County, average precipitation during summer months decreased between 1950 and 2006. In most of the County, this decrease was on the order of 0.5 inch to 1.0 inch; however, decreases in average summer precipitation of up to 3.0 inches occurred in extreme southwestern Racine County. The frequency and magnitude of heavy precipitation events has also been increasing in Wisconsin. Extreme rainfall patterns in the City of Madison illustrate 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.

The consensus from downscaled results from climate models project several changes in precipitation through the 21st century.<sup>20</sup> Most of the models project an increase in average annual precipitation in southeastern Wisconsin of about 1.5 inches to 2.0 inches. 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.<sup>21</sup> 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

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<sup>18</sup> *Wisconsin Initiative on Climate Change Impacts, 2011, op. cit. Downscaling is an analysis approach that enables climatological data generated by Intergovernmental Panel on Climate Change general circulation models developed at a relatively coarse geographic scale (e.g., climate change data for several large regions in an entire state) to be modified to represent a finer geographic scale (e.g., at the scale of a county or smaller).*

<sup>19</sup> *Kucharik and others, 2010, op. cit.*

<sup>20</sup> *Wisconsin Initiative on Climate Change Impacts, 2011, op. cit.*

<sup>21</sup> *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.*

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.

## **VULNERABILITY ASSESSMENT FOR FLOODING AND ASSOCIATED STORMWATER DRAINAGE PROBLEMS**

Flooding is a significant hazard in Racine County. As described in Chapter II, there are approximately 101 miles of major streams in Racine County, located within four watersheds: the Fox (Illinois) River, Root River, Pike River, and Des Plaines River watersheds. A fifth watershed encompasses those areas adjacent to Lake Michigan which drain directly into the Lake through intermittent streams. There are also 10 major lakes in Racine County. 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 one-percent-annual-probability (100-year recurrence interval) flood event. The floodplains shown on Map 7 in Chapter II of this report have been identified by Racine County, SEWRPC, and FEMA. Approximately 21,921 acres, not including surface water in lakes and existing stream channels, or about 10 percent of the total area of the County, were located within the one-percent-annual-probability flood hazard area. All of the floodplain areas have been 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 available as a digital file layer for the Racine County cadastral mapping system which covers the entire County and is also shown on the FEMA digital flood insurance rate maps for Racine County which were finalized May 2, 2012, and include all of the communities in the County.

A consideration in flood hazard mitigation is the potential for increased flooding due to dam failures, as such, future evaluation of floodplain areas related to dam failure should be considered. As indicated in Table 15 in Chapter II of this report, there are 20 dams identified by the WDNR in Racine County. Both dams built according to accepted engineering principles at the time of construction and dams built without application of engineering principles can 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. Table 15 in Chapter II of this report indicates that 16 of the existing dams in Racine County have been assigned hazard ratings by the WDNR. Two of those dams are currently assigned high hazard ratings,<sup>22</sup> two have been assigned significant hazard

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<sup>22</sup> Racine County hired a consultant in 2012 to prepare a dam failure analysis for the Waterford dam, which is currently assigned a high hazard rating by the WDNR. The analysis results indicated that the hazard rating of the dam could be lowered to a significant hazard rating. The WDNR is waiting on downstream communities that would be affected in the event of a failure of the Waterford dam to adopt the hydraulic shadow that was developed under the dam failure analysis. Once this hydraulic shadow has been adopted by the communities, the WDNR may reassign a hazard rating of significant for the Waterford dam.

ratings, and the remaining 12 have been assigned low hazard ratings.<sup>23</sup> It should be noted that between 1990 and 2014 there was no loss of life associated with dam failures in Racine County. The risk of dam failure is monitored closely by the WDNR.

Horlick Dam has been assigned a low hazard rating by the WDNR, meaning dam failure would cause no probable loss of life, low economic losses, low environmental damages, and no significant disruption of lifeline facilities. However, in 2014, the WDNR found that the dam does not meet the State's dam safety standards. Specifically, the WDNR concluded that the dam spillway does not safely convey the one-percent-annual-probability flood event. The main concern is that rushing water during such an event could wash away the embankments on either side of the dam. According to a directive issued by the WDNR in April 2014, the dam will need to be modified within ten years to increase the capacity of its spillway, specifically during a one-percent-annual-probability flood event. A restoration plan for the Root River watershed in 2014<sup>24</sup> prepared by SEWRPC examined five alternatives that would bring the Horlick Dam into compliance with the State's dam safety regulations.

In addition to flooding, stormwater drainage problems exist on a scattered basis throughout Racine 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.

### **Historical Flooding Problems**

As noted earlier in this chapter, a number of major flooding events, including several that caused significant damage, have been recorded in Racine County, as well as in the watershed areas partly encompassed within the County.

#### ***Root River Watershed***

The Root River watershed is a 197-square-mile natural surface water drainage area, including 124 square miles, or about 36 percent of the land area in Racine County. A comprehensive watershed plan was prepared for that watershed in 1966<sup>25</sup> under the direction of the SEWRPC Root River Watershed Committee. That plan and a subsequent 1974 amendment indicated that, up to and including 1974, major floods had occurred within the watershed in August 1940, March 1960, July 1964, September 1972, and April 1973. The March 1960 flood caused by a combination of rainfall and snowmelt, was the most damaging in the watershed within living memory and historical records, as of 1974. This flood was determined to have approximately a one-percent-annual-probability and caused damages totaling about \$370,000 expressed in 1966 dollars. Reaches of particularly heavy damage within Racine County included portions of the City of Racine, where about 62 residences were estimated to have been directly flooded, and

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<sup>23</sup> Chapter NR 333, "Dam Design and Construction," of the Wisconsin Administrative Code states that 1) a high hazard "rating must be assigned if loss of human life during failure or mis-operation of the dam is probable," 2) a significant hazard rating would be assigned if "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," and 3) a low hazard rating would be assigned if "failure or mis-operation of the dam would result in no probable loss of life, low economic losses (losses are principally limited to the owner's property), low environmental damages, (and) no significant disruption of lifeline facilities."

<sup>24</sup> SEWRPC Community Assistance Planning Report No. 316, A Restoration Plan for the Root River Watershed, July 2014.

<sup>25</sup> SEWRPC Planning Report No. 9, A Comprehensive Plan for the Root River Watershed, July 1966.

about 260 residences were affected by basement flooding due to seepage and sewer backup. In addition, flood damages to crops and farming operations occurred in the Towns of Caledonia, Mount Pleasant, Raymond, and Yorkville, and included reaches in the City of Racine. Average annual flood damages were estimated at \$24,000 per year also expressed in 1966 dollars.<sup>26</sup> The monetary damages reflected the existing land use and channel conditions within the watershed. The study indicated that, under probable future land use and existing channel conditions, average annual damages within the watershed could be expected to almost triple.

### ***Fox River Watershed***

The Fox River watershed encompasses about 934 square miles of surface water drainage area in Wisconsin, including about 164 square miles, or about 48 percent of the total land area in Racine County. The watershed begins in Washington County, Wisconsin, and ends in the State of Illinois, where the River becomes part of a much larger watershed that continues to flow south to its confluence with the Illinois River. A comprehensive watershed plan was completed for that watershed in 1969<sup>27</sup> under the direction of the SEWRPC Fox River Watershed Committee. That plan was subsequently amended in 1975.<sup>28</sup> That plan and the subsequent 1975 amendment described three major flood events which occurred within the watershed in July 1938, April 1960, and April 1973. The April 1960 flood was caused by a combination of rainfall and snowmelt. Measurements of the snow cover at the U.S. Weather Bureau Station in Milwaukee indicate that the depth of snow on the ground immediately prior to the flood was 24 inches, equivalent to 2.8 inches of water. Studies by the U.S. Weather Bureau<sup>29</sup> indicate that a snow cover with this water equivalent has a 4 percent chance of occurring in March. Temperatures, after having been below normal for most of the month, began to rise on the 27th of March and reached a high of 62°F on the 29th. Starting in the evening of the 29th, rain fell intermittently for a period of about 24 hours. It was determined that the average depth of rainfall on the watershed during this 24-hour period was 1.5 inches. Seasonal precipitation studies conducted in 1960 by the U.S. Weather Bureau indicated that a storm of this magnitude has a 5 percent chance of occurring in March. The probability of such rain and snow cover occurring together is the product of their individual probabilities. Therefore, the probability of these two events occurring in combination in late March of any year is 0.2 percent. These two unusual events combined to produce a peak flood flow of 7,520 cubic feet per second (cfs) at the U.S. Geological Survey (USGS) gaging station at Wilmot. A discharge of 2,300 cfs was measured at Waukesha; however, it is believed that this measurement was taken after the peak flow had passed.

The 1960 Fox River mainstem flood was the highest recorded in the 53 years that the U.S. Geological Survey had operated the gaging station at Wilmot.<sup>30</sup> However, it was not an event of such rare magnitude or severity in other parts of the watershed. Generally, floods generated by snowmelt are most severe on large rivers. Smaller tributaries are more sensitive to high-intensity rainfalls and generally do not produce record flood peaks as a result of snowmelt. The flood that occurred in July 1938 is an example of how portions of the watershed may respond to high-intensity rainfalls. The storm that produced this flood appears to have been centered over the Village of Williams Bay

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<sup>26</sup> *Since this event, the Towns of Caledonia and Mount Pleasant have incorporated as villages.*

<sup>27</sup> *SEWRPC Planning Report No. 12, A Comprehensive Plan for the Fox River Watershed, April 1969.*

<sup>28</sup> *SEWRPC Community Assistance Planning Report No. 5, Drainage and Water Level Control Plan for the Waterford-Rochester-Wind Lake Area of the Lower Fox River Watershed, May 1975.*

<sup>29</sup> *U.S. Department of Commerce, Weather Bureau, Technical Paper No. 50, Frequency of Maximum Water Equivalent of March Snow Cover in North Central United States, 1964.*

<sup>30</sup> *After removal of the Fox River dam at Wilmot the U.S. Geological Survey relocated the gaging station about 11 miles upstream to CTH JB in October 1993.*

in Walworth County where 6.76 inches of rain were recorded in less than 24 hours. The storm began on June 30th and continued into July 1st. Review of the isohyetal map shows that part of the storm covered an area upstream from the Echo Lake dam in the City of Burlington, Racine County. A discharge of 4,140 cfs was measured by the U.S. Geological Survey at the outlet of Echo Lake following this storm. The discharge that occurred at the outlet of Echo Lake during the 1960 flood is not known; however, residents of the area upstream from the dam indicated that the 1938 flood was much more severe.

The April 1973 flood event was the largest flood in the memory of farmers questioned in 1975 who were located in the vicinity of the Fox River main stem between the Village of Big Bend in Waukesha County and the Village of Rochester in Racine County and in the area tributary to the Wind Lake Drainage Canal. Agricultural damage due to flooding in those areas was estimated to be \$129,000 in 1975 dollars on an average annual basis over the five-year period 1970 to 1975.

### ***Pike River Watershed***

The Pike River watershed encompasses about 51 square miles of surface water drainage area, including about 21 square miles, or six percent of the total land area in Racine County. A comprehensive watershed plan was completed for that watershed in 1983<sup>31</sup> under the direction of the SEWRPC Pike River Watershed Committee. That plan was subsequently amended in 1996.<sup>32</sup> That plan described major flood events which occurred within the watershed in March 1960, March 1962, April 1965, June 1969, spring and summer of 1972, April 1973, February 1974, March 1976, and the summer of 1976.

The March 1960 flood was caused by a combination of rainfall and snowmelt and was considered the largest flood in the then recent history with an annual probability of occurrence of about 2 percent. Because this flood event occurred in early spring, no significant crop damages were known to have occurred. However, if another flood of the same magnitude as the 1960 flood would occur during the summer growing season, it was estimated that the damages would approximate \$950,000 (1980 dollars) based upon application of a flood economics model.

Although the flood of April 21, 1973, was one of the largest ever recorded in some watersheds in Southeastern Wisconsin, the annual probability of occurrence for this event was only about 50 percent throughout the Pike River watershed. In the Pike River estuary, in Kenosha County just downstream of Racine County, however, significant flooding occurred which was caused by a combination of factors, including possible backwater effects from a storm-induced seiche on Lake Michigan aggravated by static lake levels about two feet higher than normal, and by backwater from a bar at the mouth of the Pike River at Lake Michigan, as well as by the flood runoff from the watershed itself. Flooding occurred at the Carthage College campus and at the Valley Night Club on STH 32.

Four significant floods occurred in 1978, on July 2, July 21, August 19, and September 13. The September flood was the largest on record for the period 1960 through 1980 at the USGS gaging station on Pike Creek at STH 142 in Kenosha County, while the August flood was the largest on record for the period 1972 through 1980 at the USGS gaging station on the Pike River at the UW-Parkside campus, also in Kenosha County. The annual probability of occurrence for both of these events was about 10 percent based upon the 40 years of simulated streamflow data generated by the SEWRPC flood flow simulation model. Thirty farmers reportedly applied to the U.S. Soil Conservation Service for flood relief assistance. Road overtopping occurred at the intersection of Meacham Road and County Line Road during the July 1978 flooding. Damages incurred during the summer floods of 1978, were estimated to total \$500,000, based upon application of the SEWRPC flood economics submodel.

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<sup>31</sup> *SEWRPC Planning Report No. 35, A Comprehensive Plan for the Pike River Watershed, June 1983.*

<sup>32</sup> *SEWRPC Amendment to the Pike River Watershed Plan, Kenosha and Racine Counties, March 1996.*

The historic record for the Pike River watershed contains accounts of two incidents in which a total of three people were drowned during flood events. One of the incidents occurred in August 1980 in which two people were drowned near the mouth of the Pike River in Kenosha County just downstream of Racine County. The other incident occurred in July 1968 in which one person was drowned, also near the mouth of the Pike River. In both instances the high velocity of the flood and/or ebb flows were an important contributing factor to the loss of life.

### ***Des Plaines River Watershed***

The headwaters of the Des Plaines River begin in the south-central portion of Racine County, immediately south of the Village of Union Grove. In addition, the headwaters of the Kilbourn Road Ditch, a major tributary of the Des Plaines, are located in Racine County in the vicinity of IH 94 and STH 11. This is the smallest watershed area in the County, encompassing about 11 square miles, or about 3 percent of the total land area of the County. The eastern boundary of the watershed forms the subcontinental divide. East of the subcontinental divide, waters drain into the Great Lakes-St. Lawrence River basin, while west of the divide waters drain to the Mississippi River basin. The area within the Des Plaines River watershed in Racine County represents about 8 percent of the 134-square-mile watershed that lies within Wisconsin. The rest of the Des Plaines River watershed is located in Kenosha County and Illinois and becomes part of a much larger watershed that ultimately drains to the Mississippi River Basin, via the Illinois River, south of Chicago. A comprehensive watershed plan was completed for the watershed in 2003 under the direction of the SEWRPC Des Plaines River Watershed Committee.<sup>33</sup> The plan described flood events that occurred within the watershed in March 1943, March 1948, June 1954, April 1960, March 1962, April 1973, March 1976, August 1978, March 1979, April 1983, March 1986, September 1986, April 1993, August 1995, May 1996, and June 2000.

There is one structure located in the flood hazard area identified along the Kilbourn Road Ditch under both existing and planned land use conditions. No other significant flooding problems are expected within the Racine County portion of the Des Plaines River watershed. However, the development of flood mitigation strategies in Chapter V does address the entire area of the Des Plaines River watershed in Racine County in order to insure that consistency with ongoing watershed-wide floodplain management planning is maintained.

### **Description of Recent Flood Events**

Since 1990, there have been 39 flood events reported by the National Climatic Data Center (NCDC) affecting Racine County. Those flood events were reported to have caused property damages totaling, in 2014 dollars, about \$46.7 million in damage, of which \$38.3 million was related to crop damages. The most severe recent events occurred in June-July 1993, May 1996, June 1996, August 1998, April 1999, June 1999, June 2000, July 2000, September 2000, February 2001, October 2001, May-June 2004, September 2006, August 2007, June 2008, June 2009, July 2010, September 2011, April 2013, and May 2014. These flood events, which are significant with regard to the current hazard mitigation planning effort for the County, are described below (all damage amounts are adjusted to represent 2014 dollars using the consumer price index from the U.S. Bureau of Labor Statistics, unless otherwise noted). Detailed information for impacts on a Countywide or local community scale was not available in the NCDC database for all events.

- The June-July 1993 flood and severe winds, known as the Great Midwest Flood, affected Racine County, as well as most of the State of Wisconsin. In Racine County aggregate rainfall during June and July 1993 was about 10 inches, considerably less than was experienced in other parts of the State. The event resulted in a Presidential disaster declaration. Racine County was among the 47 counties in Wisconsin declared eligible for Federal disaster assistance and was included as one of 40 counties eligible for both public and individual assistance. One of the most severely damaged areas was in the Town of Wheatland and Village of

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<sup>33</sup> *SEWRPC Planning Report No. 44, A Comprehensive Plan for the Des Plaines Watershed, June 2003.*



Silver Lake in Kenosha County along the Fox River just downstream of Racine County. Damages reported in Racine County were due primarily to severe wind conditions and were estimated to be in excess of \$6.5 million. Nine states, including Wisconsin, were declared a national disaster area. Statewide damages were estimated at \$1.31 billion in crop damages and \$1.22 billion in other property damages. Assistance received in Racine County through the FEMA and State Hazard Mitigation Program and public assistance programs administered by the Wisconsin Division of Emergency Management associated with this 1993 event totaled about \$344,000 (1993 dollars). Racine County communities receiving the assistance related to the 1993 flooding event included, in addition to Racine County itself, the Cities of Burlington and Racine; the Villages of Sturtevant, Waterford, and Wind Point; and the Towns of Burlington, Caledonia, Dover, Mount Pleasant, Norway, Rochester, Waterford, and Yorkville.<sup>34</sup>

- An all-day rain on May 19, 1996, peaked with a late afternoon two-inch downpour in less than two hours. This resulted in widespread flooding across Racine County and over \$200,000 in crop damages. Total rainfall for the day was around three inches. Many County roads were flooded to a depth of one to two feet, and a couple feet of water accumulated in numerous basements. From time to time, scattered stretches of County roads were closed.
- The June 17, 1996, flood event, which, at that time, was characterized as the worst agricultural flooding event seen by many farmers in Racine County, resulted in \$25.6 million in crop damage and \$600,000 in other property damage in Racine County. The event was the result of two rounds of heavy rains on top of saturated ground and resulted in scattered flooding across Racine County. In the City of Racine, 1.5 inches fell between 7:30 p.m. and 8:00 p.m. on the 17th, while 1.97 inches fell overnight from the 16th to 17th. Many storm sewers became clogged with debris, causing many roads to flood. Flooding of resident basements and businesses was noted. Rural farm land sustained soil erosion and damage to crops.
- The August 5, 1998, flood event in Racine County resulted in about \$290,000 of property damage. A series of thunderstorms, slowly moving northeast at 10 miles per hour (mph), trained through western Racine County, dumping four to six inches of rain between 4:00 a.m. and 8:35 a.m. in Waterford. Water levels in some farm fields reached reported heights of five to six feet. STH 164 north of Waterford was closed due to “rivers” of water one to three feet deep surging across the road surface. Shoulder gravel washouts were noted on STH 164 and several other rural roads. A total of 10 homes were damaged. One home in the Waterford area sustained severe damage when its basement wall collapsed due to water pressure.
- On April 23 and 24, 1999, long duration showers and thunderstorms deposited two to three inches of rain on top of saturated ground in parts of south central and southeastern Wisconsin. Flooding was reported in the City of Racine. Water depths reached one to two feet on low spots in roads and there were some basement flooding reports.
- The June 13, 1999, flood event, which caused widespread flood damages in a multi-county area, resulted in \$213,000 in Racine County property damages. After experiencing several rounds of moderate to heavy rains during the week of June 6-12, parts of south-central and Southeastern Wisconsin suffered yet another round of heavy rains on June 13th. The result was widespread flooding of rivers, streams, creeks, and urban areas. Many roads were closed, and there were several cases of soil erosion, road shoulder washouts. Many basements sustained damage to personal property. From 3.1 to 4.1 inches of rain fell over the eastern parts of Waukesha and Walworth Counties, southern Milwaukee County, Kenosha, and Racine Counties in an 18-hour period from midnight to 6:00 p.m. Most of the rain fell within a few hours of 11:00 a.m. The Fox River in western Racine and Kenosha Counties flooded to levels which were reportedly the highest since the late 1980s.

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<sup>34</sup> *Since this event, the Towns of Caledonia and Mount Pleasant have incorporated as villages and the Town of Rochester has consolidated with the Village of Rochester.*

- On June 12, 2000, several rounds of thunderstorms moved west to east across Kenosha and Racine Counties and deposited enough rain to cause flash flooding at several locations. Urban and small stream flooding occurred in and near the Village of Sturtevant, where water was reported to be six inches deep on the roads and roadside ditches were reported to be full. About \$6,900 in property damage and \$274,000 in crop damage was caused by this event.
- The July 2, 2000, event in Southeastern Wisconsin was a combination of tornadoes, straight-line winds, hail, and flash flooding. Minor urban/small stream flooding affected parts of Racine County. Flash flooding occurred later in the evening on July 2nd, as additional rounds of storms, some severe, moved across the area. Torrential downpours, sometimes reaching an inch or more within 15 minutes, produced flash flooding in/near the City of Racine. Most small streams and creeks in eastern Racine County quickly exceeded flood stage by one to two feet due to the intense rainfall. In Racine County, 429 residential buildings were damaged by flash floodwaters, and about 2,800 acres of farm land had crop damage or soil erosion. The flood resulted in an estimated \$1.79 million in property damage and \$1.03 million in crop damage. Twenty-four hour rainfall amounts ending at 6:00 a.m. on July 3rd were 5.76 inches at Raymond and 3.99 inches in the City of Racine.
- On September 11, 2000, three rounds of severe thunderstorms affected south central and southeastern Wisconsin. The second round of storms produced torrential downpours. In Racine County, these rains were so heavy that visibility on IH 94 was reduced to less than 50 yards, forcing motor vehicles to pull off to the side of the road. Flooding was reported in the City of Racine and Village of Union Grove.
- On February 9, 2001, a strong low-pressure system that originated in the southern Rocky Mountains moved through the southern plains and Minnesota. Ahead of this low, southerly winds pulled warm, moist air into southern Wisconsin, with temperatures reaching the 35 to 48 degree range. The heavy rains that this system produced resulted in most rivers in south central and southeastern Wisconsin reaching or exceeding flood stage. The two-day total rainfall for February 8 and 9 was 2.48 inches in Waterford. The heavy rains and partial melt of the seven- to 12-inch snow pack led to widespread flooding of farm fields, roadside ditches, and other low spots. In addition, floodwater covered or flowed across many roads. Flooding occurred along the Root River Canal near Raymond. The stream stage at the USGS gage at 6 Mile Road went above its nine-foot flood stage on February 9 and remained above flood stage until the early morning of February 12. The stream crested at 11.11 feet on February 10. Property damages of \$100,300 were reported in Racine County as a result of this incident.
- Rare, out-of-season severe thunderstorms, with up to golf ball- to baseball-size hail, pelted parts of southern Wisconsin during the overnight hours of October 23, 2001. Based upon Doppler radar estimates, rainfall of about 1.50 inches occurred, creating three-to four-foot-deep flooding on Kearney Avenue in the City of Racine, where storm sewer inlets were clogged with leaves. An apartment building in the City of Racine was severely damaged when its basement wall collapsed due to flooding triggered by the heavy rains and leaf-clogged storm sewers. According to newspaper accounts, this storm caused about \$66,800 in property damage.
- The May-June 2004 flood event was the result of an extended period of light to moderate rain during early and mid-May followed by more severe rain occurring in late May and early June. On May 9, heavy rains of two inches in one to two hours in the Caledonia area resulted in urban-type flooding. Water depths on some roads briefly reached six to eight inches. Moderate flooding within Racine County was experienced on May 20 and 21, with a number of roads reported being flooded along with gravel washouts. Damage to lowland crops and home basements was noted along the Root River Canal. Scattered to widespread heavy rains across south-central and southeast Wisconsin during the period of June 9-16 kept rivers and streams at or above flood stage for much of the month. In general, the June flooding was the worst since 1993 on a widespread basis. Federal Disaster Declaration 1526 covered all 20 counties in south-central and southeast Wisconsin, including Racine County, for storms, tornadoes, and flooding for the period May 19 through July 3, 2004. Within Racine County, property and crop damages for the May and June flooding were es-

timated at \$1,594,000 and \$7,239,000, respectively. Total May rainfall across Racine County averaged 12.97 inches, or about 300 percent above normal, while total June rainfall averaged 5.90 inches, or about 50 percent above normal.

- Scattered flash flood events occurred on September 12, 2006, over southern Wisconsin as a result of a series of slow-moving thunderstorm clusters or short lines of thunderstorms that moved in from the northeast. Each round of these storms deposited heavy rain on soils that were nearly saturated before the rain began. Based on National Weather Service spotter reports, rainfall rates reached 3.0 to 5.5 inches per hour in some of the most intense storms. The Kansasville, Raymond, Sturtevant, and Racine areas of Racine County were among the areas in which the worst flooding problems occurred. In these areas, basements were flooded, some gravel road shoulders were washed out, and roads were flooded to depths of one to five feet. The floods caused an estimated \$234,800 in property damages.
- The August 19-22, 2007, flood event was the result of a stalled surface frontal boundary that resulted in thunderstorm generation across southern Wisconsin. Significant flash flooding occurred during the overnight hours of August 18-19, with two-day rainfall totals of about six inches being reported across Racine County. Water depths on some roads reached three to four feet and significant soil erosion was reported. The heavy rainfall resulted in the Root River Canal at Raymond reaching then-record flood status. At this gage site, the river rose to the nine-foot flood stage in the early morning of August 19, crested at 11.66 feet on August 21, and fell below flood stage in the morning of August 26. Countywide at least 40 homes sustained minor flood damages to basement contents while at least 10 homes sustained more major damage. Ten sod farms reported minor to major damage due to flood waters and erosion. A second round of storms on August 22nd produced more heavy rains which fell on already saturated soils. Water reached depths of up to two feet on roadways, forcing the temporary closure of the intersections of CTH X and Southwood Drive, STH 11 and STH 32, and CTH H and CTH KR. At least two dozen homes experienced basement flooding, some due to sewer backups, while additional soil erosion and crop damages were also reported. Property and crop damages within Racine County from this flood were estimated at \$650,800 and \$2,284,000, respectively.
- The June 7-9, 2008, flood event was the result of heavy rain producing thunderstorms. The heavy rain bands for this event ran from Sauk County southeast to Milwaukee County, just north of Racine County. Rainfall totals within southern Milwaukee County were generally in the seven- to eight-inch range, with a report of up to 11.35 inches in the City of Oak Creek. Rainfall within Racine County was lower, with reported totals falling in the 3.5- to 4.0-inch range. However, because the headwater of the Root River watershed is located in southern Milwaukee County, flooding of the Root River through Racine County was very much affected by the heavy rains that occurred there. The U.S. Geological Survey (USGS) Root River streamflow gage located at STH 38 near Racine recorded a peak flow rate of 8,050 cubic feet per second, which is the highest recorded since that gage went into service in 1963. Based on comparison to the USGS Root River gage in the City of Franklin in Milwaukee County, this event appears to have been similar in magnitude to the March 1960 event, which was considered to be the flood of record in the watershed, and may have even exceeded that event. In addition to the Root River, flooding also occurred along the Fox River and Wind Lake. Significant structural flooding occurred, particularly along the Root River in the City of Racine and along Wind Lake in the Town of Norway. Water depths on road surfaces reached three feet or more and there were gravel washouts. Several roads and bridges sustained damage. The USGS Root River stream gage located at 6 Mile Road recorded a peak flow rate of 1,560 cfs, which is the highest recorded since that gage went into service in 1963. Countywide, about 16,000 acres of cropland was flooded, although due to the timing of the flood, most of this land was able to be replanted. Crop losses were estimated at about \$1,649,000 while public sector costs were estimated at \$2,364,000. A total of nearly \$4 million (2008 dollars) in State and Federal assistance was approved for individuals, businesses, and local governments in the County as a result of this event.
- The June 19, 2009, flood event was the result of a series of thunderstorms that moved across southern Wisconsin during the overnight hours of June 18 and 19 and lasted through the evening of the 19th. These

storms produced very heavy rain over a relatively short period of time with each round. The heaviest rainfall occurred along a line through central Waukesha and Milwaukee Counties, mainly with the first round of storms in the early hours of June 19. A second round of storms occurring in the late afternoon and evening of June 19 brought heavy rains to Kenosha and southern Racine Counties. Rainfall across Racine County ranged from 1.5 inches at the Burlington airport to 4.2 inches at the Union Grove wastewater treatment plant. Approximately 50 homes in the Village of Sturtevant and another 100 homes in the Village of Union Grove were reported to have had basement flooding during this event. A retention basin in the Village of Union Grove was damaged. Total property damage in Racine County was estimated at nearly \$383,000.

- Parts of south central and southeastern Wisconsin experienced several rounds of record-setting torrential rains during the afternoon and evening hours of July 22, 2010, that led to flash flooding and damage. During the afternoon, a persistent band of strong to severe thunderstorms developed and moved very slowly over south central and southeastern Wisconsin through the evening hours. The individual storms moved quickly, about 40 to 50 mph, but the slow southward movement of the boundary these storms were developing along resulted in storms repeatedly training, or moving, over the same area. Widespread three- to four-inch rainfalls were reported along either side of the IH 94 corridor, with locally higher rainfall amounts of five to eight inches. The greatest rain amounts fell in Milwaukee County. Mitchell Field recorded 5.61 inches for the day, breaking a record for the date. The southern edge of a line of training thunderstorms pushed across northern portions of Racine County, producing between three and four inches of rain in two hours or less. Many area roads were covered with water which made them impassable. This happened along Racine CTH G at IH 94 where the flood waters washed out the gravel shoulders. Basements flooded, causing damage to contents, including in the basement of a home on Spring Street on the northwest side of the City of Racine that flooded with water from the swollen Root River. Property damages resulting from this flood were estimated to be \$21,700. Crop damages were estimated at \$1,080.
- On September 25 and 26, 2011, showers and thunderstorms associated with a cut-off upper low that stalled over northern Illinois and southern Wisconsin produced up to three inches of rain across parts of southern Wisconsin over a 48-hour period ending the morning of September 26. Between 1.5 and two inches of rain fell during the last 24 hours of that two-day period. The heavy rains flooded low-lying areas and ditches across the Region, with standing water three to four feet deep in some locations. Heavy rains resulted in flash flooding of a construction zone on the west frontage road of IH 94 between STH 20 and CTH C. A 76-year-old man died when his car stalled in the flood waters after driving into a flooded ditch in the construction zone. The preliminary cause of death was from a heart attack and hypothermia, suffered when the victim tried to leave the marooned car and walk for help. This flood caused an estimated \$6,300 of property damage and \$1,050 in crop damage.
- Repeated rounds of showers and some thunderstorms during the second half of April 2013 brought rain totals between five and eight inches, or between 150 percent and 200 percent of normal across southern Wisconsin. With some rivers already in flood stage from the previous rains in the month, additional rain on April 18, 2013, caused minor to moderate flooding in the County. Rivers crested between one and two feet above flood stage, inundating nearby land areas and roads. Property damages resulting from this flood were estimated to be \$13,200. Crop damages were estimated at \$2,030.
- On May 12, 2014, a stalled warm front over southern Wisconsin brought repeated rounds of strong to severe thunderstorms and heavy rainfall causing some flash flooding in southeastern Wisconsin. In Racine County, a strong current of water and mud flowed from a farm field onto Schaal Road near Bohner Lake. The highway department removed five truckloads of mud from the road.

### **Vulnerability and Community Impacts Assessment**

To assess the vulnerability of the Racine County area to flooding hazards and related stormwater drainage problems, applicable basic inventory asset data described in Chapter II were refined and analyzed. For this purpose, consideration was specifically given to potential structure flooding, including critical facilities, and cropland flood damages.

The floodplain areas, as well as the watershed boundaries, within Racine County are shown on Map 7 in Chapter II of this report. These areas are generally located along the major stream system throughout the County. The source of the hydrologic and hydraulic data for each stream reach is shown on Map 30. All of the floodplain areas for which detailed studies are available have been mapped on large-scale topographic mapping prepared at a scale of one inch equals 200 feet with a contour interval of two feet. Flood flows and stages are currently readily available for about 153 miles of the total stream reaches involved, while the floodplain for about 38 miles of stream is delineated by approximate methods under the Federal Flood Insurance Study for the County.

A review of the community assets described in Chapter II indicate the potential for flooding impacts to: 1) a variety of floodprone residential, commercial, and other developed land uses; 2) agricultural lands; 3) roadway transportation facilities; 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.

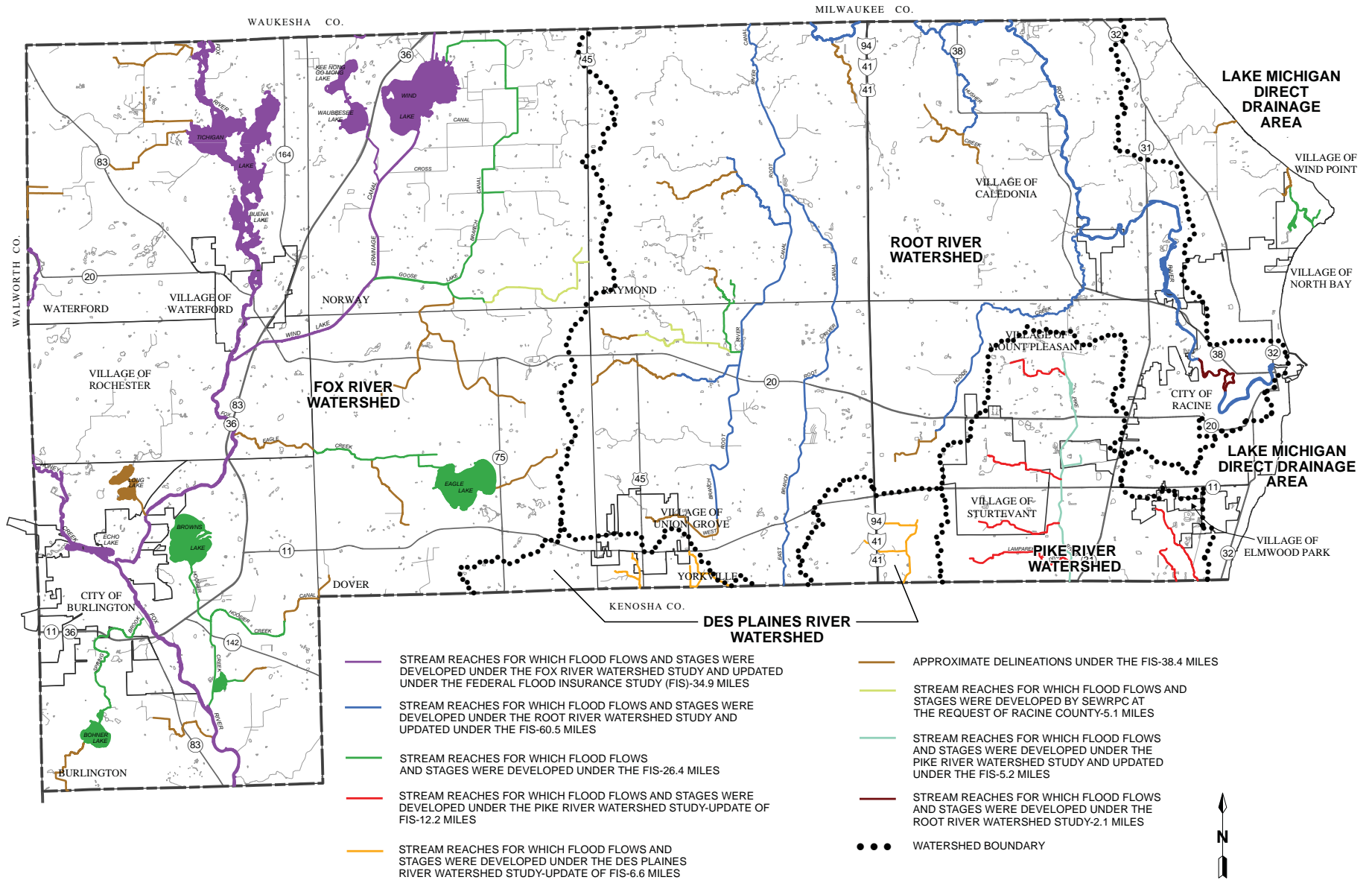
The property value data presented by community in Chapter II has been refined to reflect specific floodprone structure information. There are currently 684 structures estimated to be located within the one-percent-annual-probability (100-year recurrence interval) flood hazard areas of Racine County. The locations of these structures are shown on Maps 31 and 32. There are 604 residential structures (including 54 residential mobile homes), 25 industrial, business, and commercial structures, 33 agricultural buildings, three government buildings, six community utility buildings, and 13 other buildings (including one private school, one adult day care center, one group home, six recreational buildings, two churches, and two miscellaneous buildings). The specific location of each structure and its relationship to the floodplain is shown on the FEMA digital flood insurance rate maps for Racine County which were finalized in 2012.

It is important to note that the three government buildings and six community utility buildings located within the one-percent-annual-probability flood hazard area are not critical community facilities. The three government buildings are associated with recreational park-related uses. The six community utility buildings consist of four sewage treatment plant buildings, one electrical power company auxiliary building, and one pumping station. Each of these community utility buildings is located on the edge of the one-percent-probability floodplain boundary, except for the pump station. Detailed field surveys would be required to determine if the structures are in the flood hazard area. Such surveys are included in the hazard mitigation strategy components set forth in Chapters V and VI. In any case, the damages are infrequent and expected to be minimal during such an event. None of the six utility structures are expected to be damaged under a ten-percent-annual-probability (10-year recurrence interval) flood event, except possibly the pumping station. Discussions with the pumping station owner, the Town of Norway Sanitary District No. 1, indicate that no flooding problems have been experienced at this pumping station for at least the past 23 years, including during the large flood event in June 2008. In 2011, the Town of Norway completed significant improvements to the sewer mains on Sadler Drive and Thompson Drive, near the pumping station. These improvements helped to reduce potential flooding of the pumping station during heavy rainfall events.

As of December 31, 2015, there were six structures which are considered by FEMA to be repetitive- or substantial-loss properties in Racine County. All six structures are residential. There are two multi-family residential structures considered repetitive loss in the City of Racine, two single-family structures in the Town of Dover, and one single-family structure in both the Towns of Norway and Waterford. 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 June 7-9, 2008, flood event. The May 12, 2014 flood event was the most recent event to damage one of these repetitive loss structures.

Detailed flood hazard data are available for all flood hazard areas identified. Estimated damages are included in Table 32 for the 10-, 2-, and 1-percent-annual-probability (10-, 50-, and 100-year recurrence interval, respectively) flood events and are also summarized on an average annual basis. In 2015, the total market value of the 684 structures (not including land value) which are identified as being subject to flooding or stormwater drainage problems is about \$79 million. The total market value plus contents within these structures are estimated at over \$106 million.

SOURCES OF FLOOD HAZARD DATA FOR STREAM REACHES IN RACINE COUNTY: 2015



Source: Federal Emergency Management Agency, Racine County Office of Emergency Management and Department of Planning and Development, and SEWRPC.

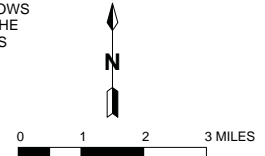


Table 32

**STRUCTURE FLOOD DAMAGE SUMMARY: RACINE COUNTY, WISCONSIN**

Annual Probability of Flood Occurrence	Number of Structures in Floodplain	Flood Damages		
		Direct	Indirect	Total
1 Percent	684	\$13,150,420	\$2,506,726	\$15,657,146
2 Percent	486	8,660,360	1,568,650	10,229,010
10 Percent	282	4,049,620	713,860	4,763,480
Average Annual	- -	\$2,566,810	\$459,080	\$3,025,890

NOTE: Estimated damages are based on assessed improvement values in 2015.

Source: Racine County Department of Planning and Development and SEWRPC.

Damages expected during a one-percent-annual-probability flood event are estimated to be nearly \$15.7 million. Average annual flood damages in Racine County are estimated to be \$3.025 million.

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 relationship to the floodplain. Some structures may be found to be outside the flood hazard areas based upon detailed field survey data.

Maps 33 and 34 show the location relative to the one-percent-annual-probability floodplain of selected types of critical community facilities in Racine County, including hospitals, nursing homes, clinics, schools, and community administration facilities (see Map 33), and fire stations, police stations, and correctional facilities (see Map 34). There are 350 buildings identified as critical community facilities that are distributed geographically throughout the County. A listing of those facilities can be found in Appendices C and D. Three of these facilities—a private high school, the Racine County Sheriff’s Department Water Patrol Office, and the City of Burlington Police Department—are located within the flood hazard area. In addition, some of these facilities are located in the immediate vicinity of the flood hazard area. 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. There are 40 buildings identified as mass care facility sites (primary shelters) in Racine County. A listing of those facilities is available from the Southeast Wisconsin Chapter of the American Red Cross. These buildings are geographically distributed throughout the County and consist mostly of churches and schools. None of these designated sites are located within the identified flood hazard areas.

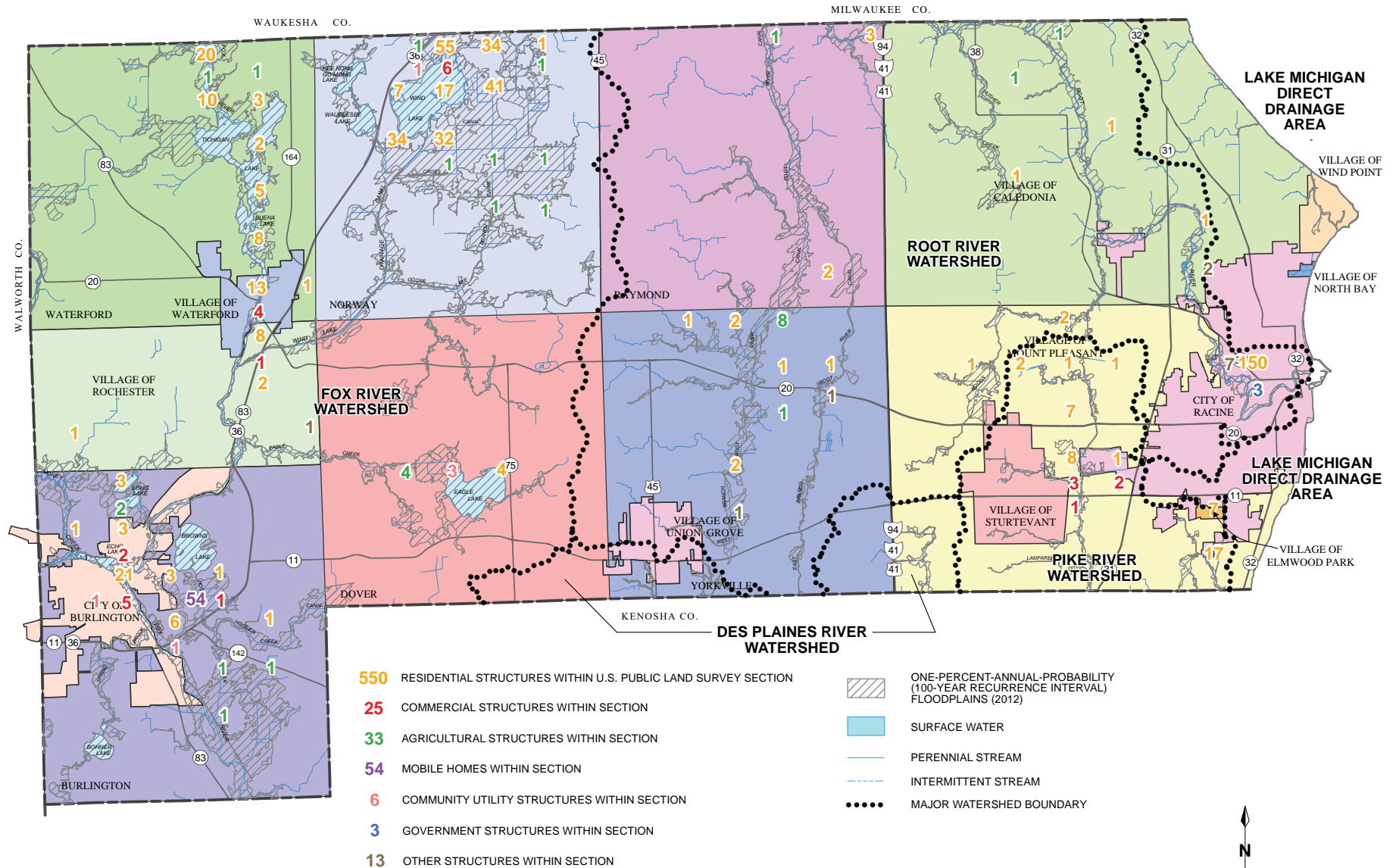
As can be seen by review of Maps 33 and 34, the floodplain overtops a number of arterial and collector streets in Racine County. This particular community impact occurs in the Wind Lake area in the Town of Norway and the City and Town of Burlington along the Fox River corridor. As described in detail in Chapter V, redevelopment programs in the City of Burlington have reduced the flood hazard in that community. In addition, east to west travel in the County could potentially be restricted during flood events due to overtopping of a number of arterial streets and highways by the Root River and Root River Canal in the northeastern portion of the County and the Fox River and its tributaries in the western portion of the County.

A review of the Root River watershed restoration plan indicates that several roads in the Town of Yorkville routinely flood during the spring and have to be closed to traffic. These include:

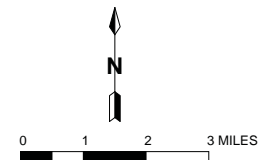
- 2 Mile Road in the intersection with Colony Avenue, at a low point in the road about 0.4 mile east of 65th Drive, and at a low point in the road about 0.2 mile west of Forest Hill Circle;

Map 31

NUMBER OF STRUCTURES WITHIN FLOOD HAZARD AREAS BY CIVIL DIVISION IN RACINE COUNTY: 2015



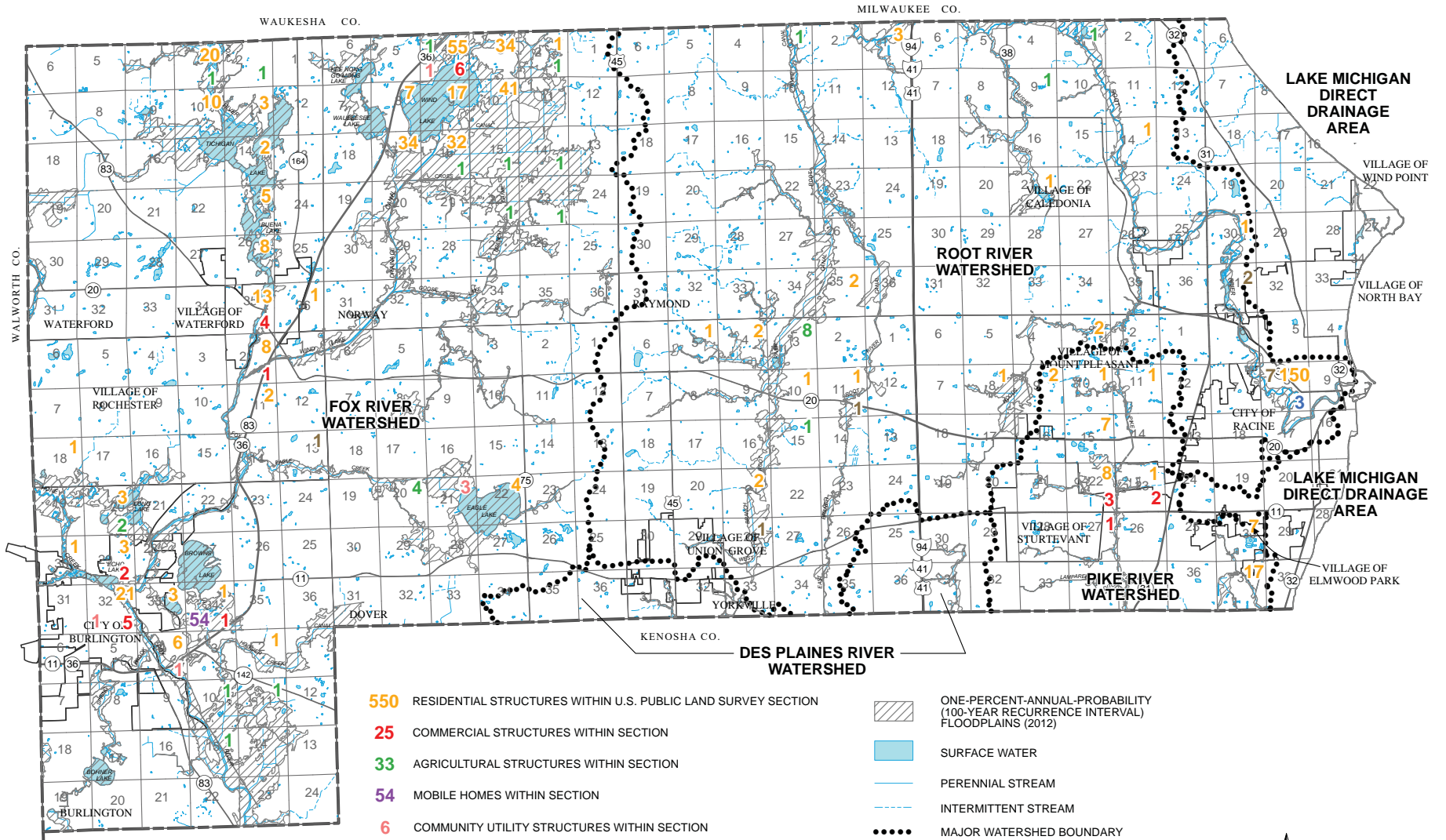
Source: SEWRPC.





Map 32

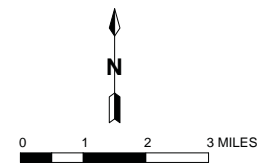
NUMBER OF STRUCTURES WITHIN FLOOD HAZARD AREAS BY U.S. PUBLIC LAND SURVEY SECTION IN RACINE COUNTY: 2015



- 550** RESIDENTIAL STRUCTURES WITHIN U.S. PUBLIC LAND SURVEY SECTION
- 25** COMMERCIAL STRUCTURES WITHIN SECTION
- 33** AGRICULTURAL STRUCTURES WITHIN SECTION
- 54** MOBILE HOMES WITHIN SECTION
- 6** COMMUNITY UTILITY STRUCTURES WITHIN SECTION
- 3** GOVERNMENT STRUCTURES WITHIN SECTION
- 13** OTHER STRUCTURES WITHIN SECTION

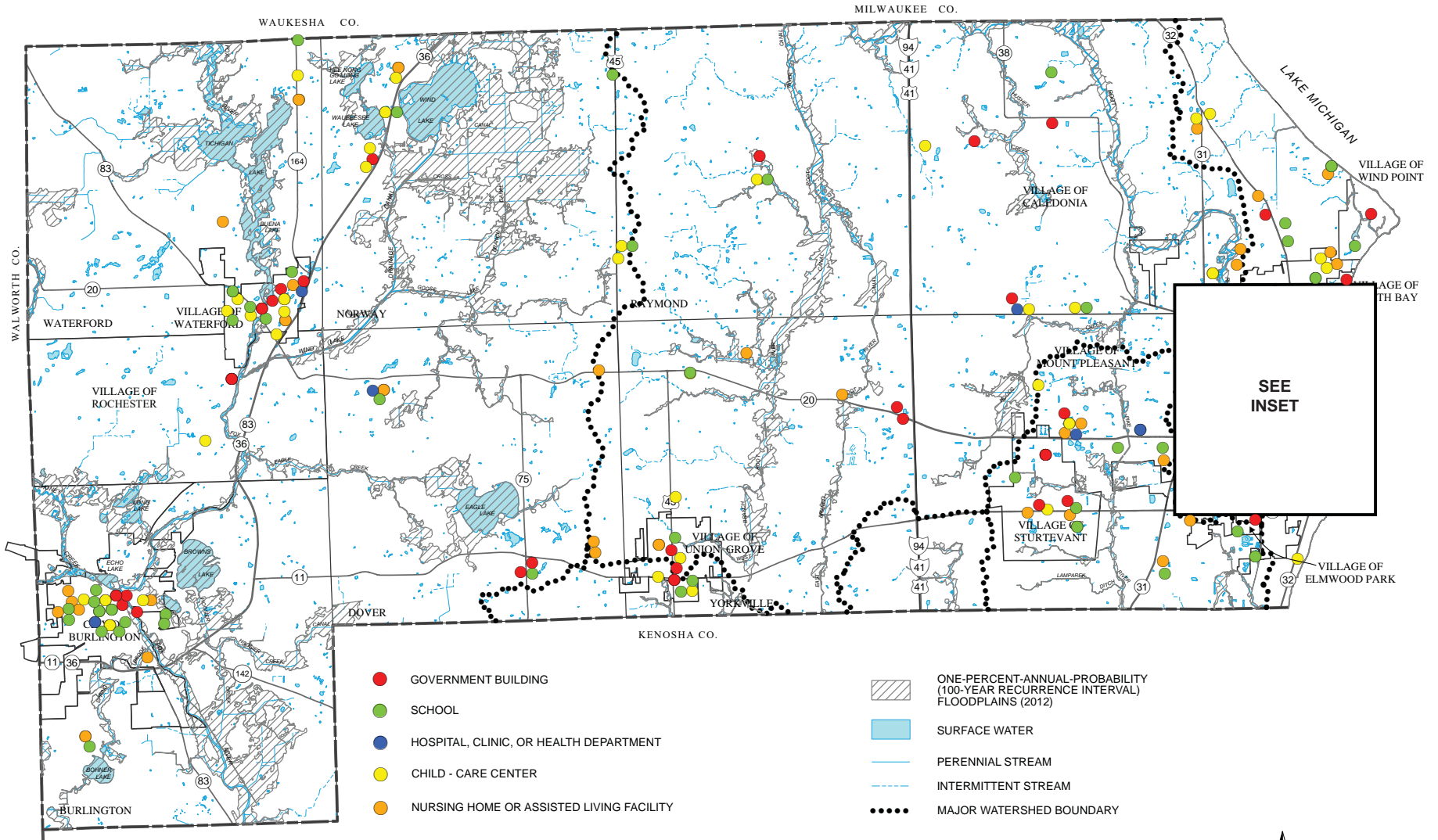
- ONE-PERCENT-ANNUAL-PROBABILITY (100-YEAR RECURRENCE INTERVAL) FLOODPLAINS (2012)
- SURFACE WATER
- PERENNIAL STREAM
- INTERMITTENT STREAM
- MAJOR WATERSHED BOUNDARY

Source: SEWRPC.

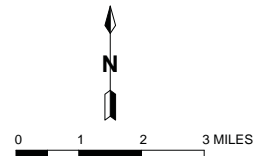


Map 33

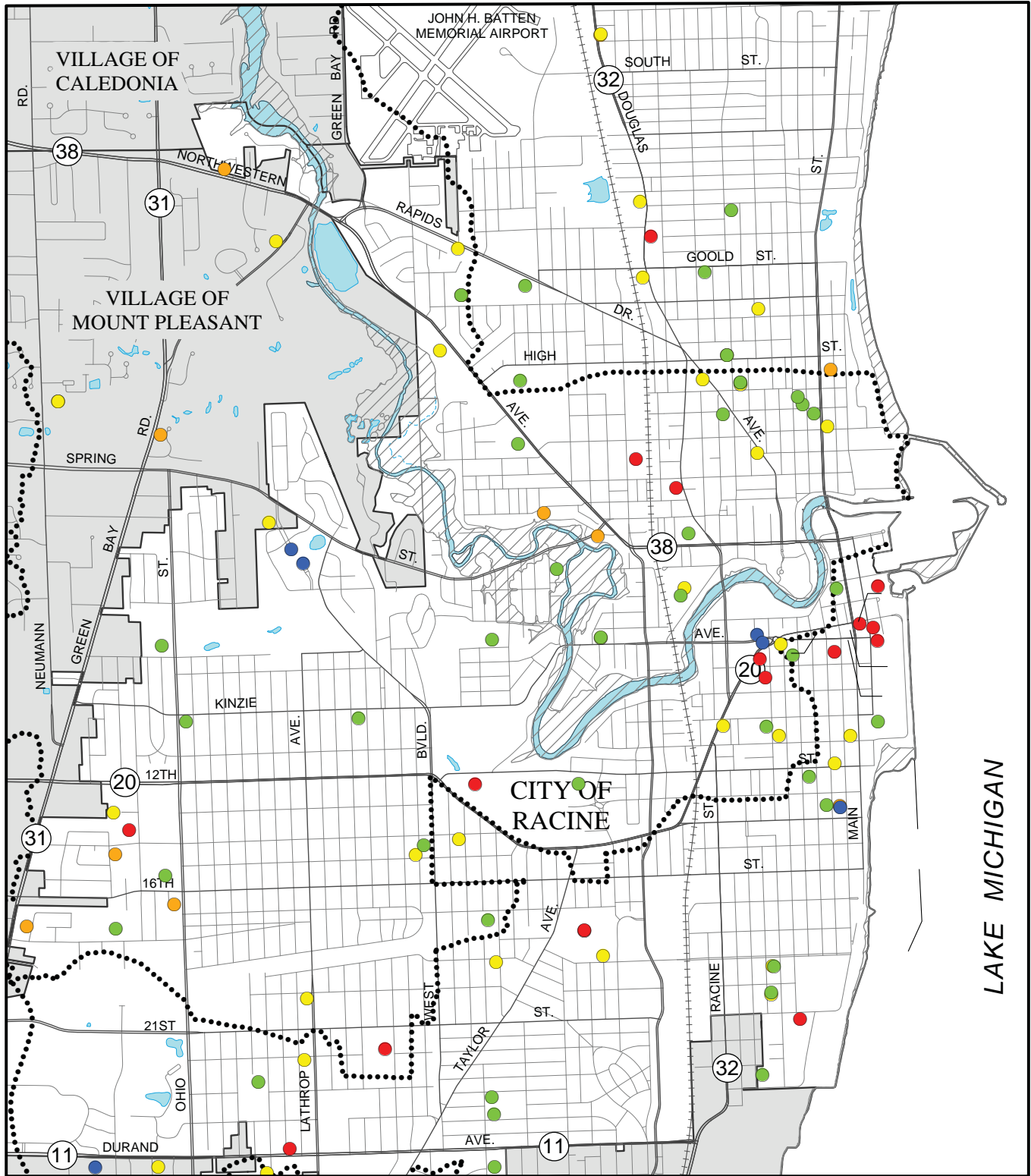
LOCATIONS OF CRITICAL COMMUNITY FACILITIES IN RELATION TO FLOODPLAINS IN RACINE COUNTY: 2015



Source: Wisconsin Department of Children and Families, Wisconsin Department of Public Instruction, Racine County, and SEWRPC.

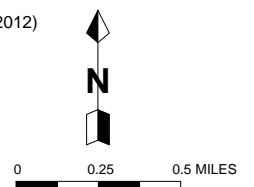


INSET to Map 33



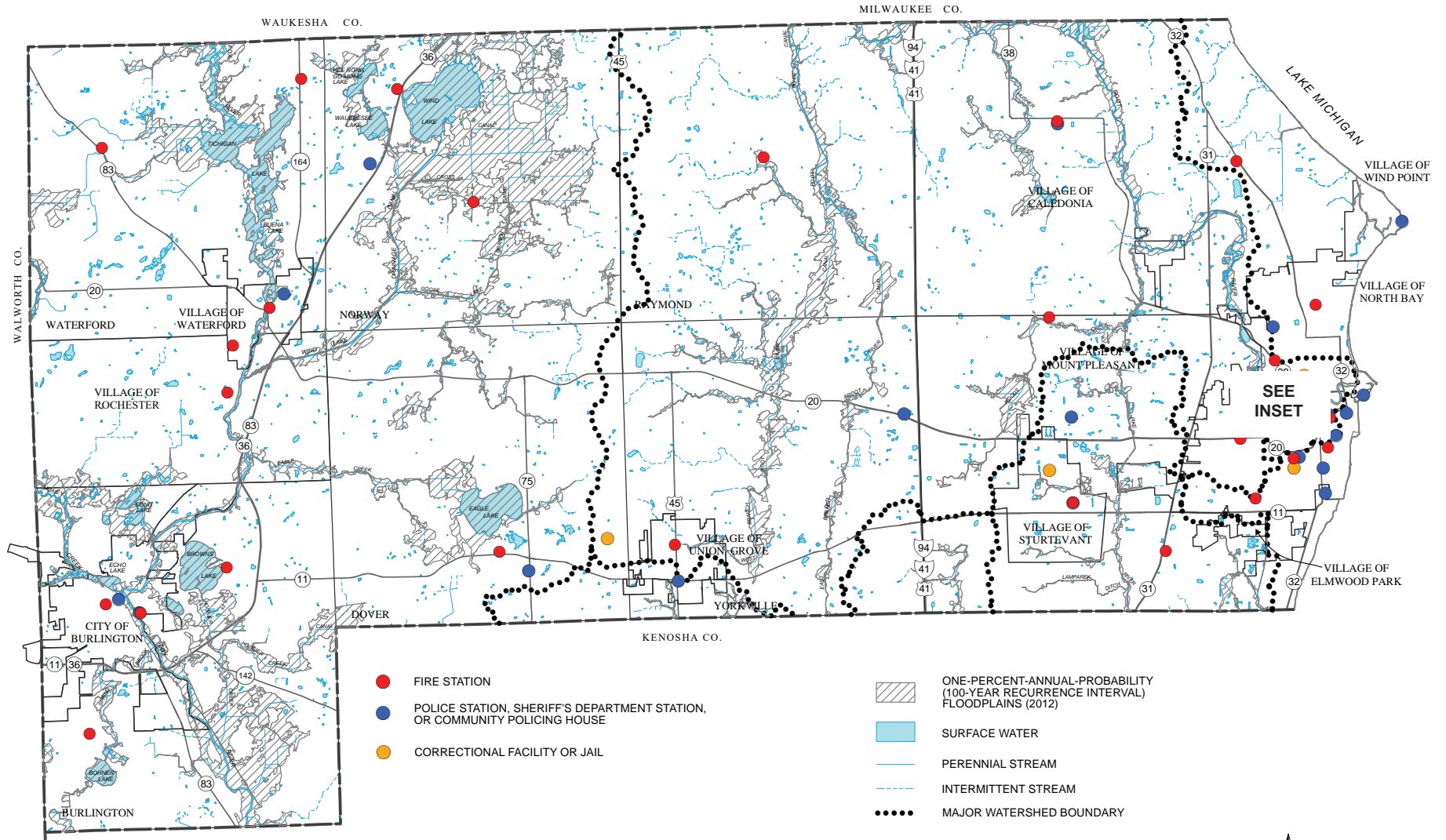
- GOVERNMENT BUILDING
- SCHOOL
- HOSPITAL, CLINIC, OR HEALTH DEPARTMENT
- CHILD - CARE CENTER
- NURSING HOME OR ASSISTED LIVING FACILITY
- ONE-PERCENT-ANNUAL-PROBABILITY (100-YEAR RECURRENCE INTERVAL) FLOODPLAINS (2012)
- SURFACE WATER
- PERENNIAL STREAM
- INTERMITTENT STREAM
- MAJOR WATERSHED BOUNDARY

Source: Wisconsin Department of Children and Families, Wisconsin Department of Public Instruction, Racine County, and SEWRPC.

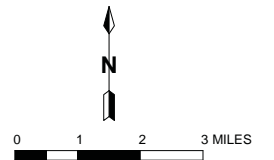


Map 34

LAW ENFORCEMENT, FIRE STATIONS, AND CORRECTIONAL FACILITIES IN RELATION TO FLOODPLAINS IN RACINE COUNTY: 2015



Source: Wisconsin Department of Justice, Racine County, and SEWRPC.



- 50th Road at the crossing of the East Branch Root River Canal;
- 55th Avenue at a low point in the road about 0.3 mile north of Spring Street;
- Church Road at a low point in the road about 0.2 mile east of S. Raynor Avenue;
- 58th Road at the intersection with 59th Drive and at a low point about 0.5 mile east of 55th Drive; and
- 67th Drive at the Union Grove wastewater treatment plant.

Similarly, several roads in the Town of Raymond routinely flood during heavy rainfalls and have been closed to traffic. These include:

- 3 Mile Road at the Crossing of the East Branch Root River Canal and between the East Branch of the Root River Canal and West Frontage Road;
- 5 Mile Road between 96th Street and 100th Street;
- 43rd Street between 7 Mile Road and 8 Mile Road; and
- The intersection of 8 Mile Road and S. 27th Street.

A review of the location of historic sites in Racine County, as documented in Chapter II of this report, indicates that none of these sites are located within the flood hazard areas.

A review of the extent and severity of flooding conditions within Racine County indicates that there is a significant community impact, in part, as a result of the damages caused by flooding of buildings, primarily basements, and due to disruption of the transportation system during extreme flooding events.

The 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 overland flooding problems. However, the ongoing coordinated Racine 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. The only impacts on County and local government operations which are relatively frequent involve posting and closure of roadways at locations where floodwaters frequently overtop structures and cause short-term roadway flooding. As indicated earlier, east-west travel in the northeastern and western portions of the County is restricted due to roadway flooding under severe flood events. Another potential impact is the need for emergency and police vehicles to consider the need to utilize alternative transportation routes when providing needed services during periods of flooding. In most of the County this is expected to be a rare occurrence. However, in the Town of Norway, where a major portion of the floodprone structures exist, there is a need for further mitigative action because of the extent of the flooding and emergency vehicle access concerns.

### **Agricultural Flood Damages**

As noted earlier in this chapter, historically flood damages to agricultural land have been significant, with crop damages totaling \$38.3 million over the period of 1990 to 2014. Thus, the average annual reported damages in the County can be approximated at \$1,532,000 per year. There are about 10,672 acres of agricultural land located within the identified flood hazard area. Thus, the average annual flood damage is about \$144 per acre.

Two particularly floodprone agricultural areas of the County can be considered on a more site-specific basis. The first area is the agricultural lands lying adjacent to the Fox River in the Town of Waterford upstream of the Village of Waterford. Specific data on flood damages was developed for these lands under a 1995 water level control plan

developed for the area.<sup>35</sup> In that planning program, 370 acres of land in the Town of Waterford were identified as being frequently flooded. Based upon estimates of the frequency of agricultural damages in a typical year, the total annual agricultural flood damages were estimated at \$44,000 in 1995 dollars, or about \$68,350 in 2014 dollars, and about \$185 per acre per year, for the floodprone lands located in the Town of Waterford.

The second area of particular concern is lands in the Town of Norway drained by the Wind Lake Canal. These lands total about 4,000 acres, of which about 2,000 acres actually sustain damage during flood events. The frequency and severity of flooding in this area was analyzed in a 1975 drainage and water level control plan.<sup>36</sup> That study estimated the average annual damages on those lands at \$186,000 in 1975, or \$92 per acre. Using the Consumer Price Index (CPI) to convert the losses from this 1975 study to 2014 dollars indicates that about \$819,423 in damages occur in this area, or about \$410 per acre per year (in 2014 dollars), assuming 2,000 acres are still impaired.

Given the abovementioned, the two agricultural areas specifically considered above account for a total of \$887,773 in agricultural damages per year, or about 58 percent of the agricultural damages in all of Racine County. The damages to the other approximately 8,300 acres in the floodplain area would be expected to have average annual losses of about \$78 per acre, or about \$644,227 in total.

### **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. Most of the communities have undertaken stormwater management planning programs or initial stormwater management system inventories as the initial step in developing comprehensive stormwater management plans. Stormwater management planning in Racine 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.

### **Potential Future Changes in Floodplain Boundaries and Problems**

Changes in land use can have a direct impact on flood flows and stages and, accordingly, can impact flooding problems. Tabular data on the projected changes in urban land use for each of the three watersheds in Racine County—the Fox River, Root River, and Pike River watersheds—where flooding occurs is summarized in Table 33. For the Root River watershed, more detailed data under current and future conditions by land use category is documented in the restoration plan for the Root River watershed.<sup>37</sup> The changes in urban land use over the 25-year period from 2010 through 2035 range from 27 percent, or about 1 percent per year, in the Fox River watershed to 124 percent, or about 5.0 percent per year, in the Pike River watershed. It is expected that these changes will 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 later in this report, there are a number of programs in place that will tend 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 considered.

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<sup>35</sup> *SEWRPC Memorandum Report No. 102, Water Level Control Plan for the Waterford-Vernon Area of the Middle Fox River Watershed, Racine and Waukesha Counties, Wisconsin, March 1995.*

<sup>36</sup> *SEWRPC Community Assistance Planning Report No. 5, op. cit.*

<sup>37</sup> *SEWRPC Community Assistance Planning Report No. 316, A Restoration Plan for the Root River Watershed, July 2014.*

**Table 33**

**SUMMARY OF PLANNED CHANGES IN LAND USE IN THE MAJOR WATERSHEDS OF RACINE COUNTY**

Watershed <sup>a</sup>	Total Watershed <sup>b</sup> Area (acres)	Area in Urban Use <sup>b</sup>				Percent Increase
		2010		2035		
		Area (acres)	Percent of Total	Area (acres)	Percent of Total	
Fox River .....	597,760	138,805	23.2	176,640	29.5	27
Pike River .....	32,640	12,375	37.9	27,712	84.9	124
Root River .....	126,535	44,389	35.1	66,067	52.2	49

<sup>a</sup>Includes the watersheds located partially within Racine County where flooding conditions occur.

<sup>b</sup>Includes entire Wisconsin watershed area within and beyond Racine County.

Source: 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 storm-water management plans and regulations, as is discussed in Chapters III and V of this report.

Changes in climate are likely to affect the potential for flooding in Racine County during the 21st century. As previously described, model projections show Wisconsin receiving more precipitation and more frequent intense precipitation events. By the mid-21st century, Racine 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. 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 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 flooding.

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 one-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 changes in 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 im-

portant 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 Flooding and Stormwater Management Risk Assessment**

Flooding and associated stormwater drainage problems have been identified as a significant risk in Racine County. As noted earlier and shown on Map 31, flood hazard areas have been identified within all of the 17 general-purpose local units of government in the County, except for the Villages of Elmwood Park and North Bay. In addition, there are related stormwater drainage problems in selected areas of many communities. Based upon the number of structures potentially impacted (see Maps 31 and 32), the extent of the agricultural flood damage potential, and the extent of roadway flooding, ten of the 17 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 34, along with the basis of special consideration over and above the countywide consideration.

**VULNERABILITY ASSESSMENT FOR THUNDERSTORM WIND, NON-THUNDERSTORM HIGH-WIND, HAIL, AND LIGHTNING**

**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 formed 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. Thunderstorms and their related high winds, lightning, hail hazards, and non-thunderstorm high winds are covered within this section. 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. However, strong frontal systems may produce more than one squall line composed of many individual thunderstorm cells. In Wisconsin, these

**Table 34**

**COMMUNITIES IN RACINE COUNTY WITH SPECIAL FLOOD AND RELATED STORMWATER DRAINAGE CONSIDERATIONS**

Community	Reason for Special Consideration
City of Burlington	More than 10 structures in flood hazard area
City of Racine	More than 10 structures in flood hazard area and two repetitive loss properties. Stormwater drainage problems in selected areas
Village of Caledonia	Stormwater drainage problems in selected areas. Transportation system is impacted by flooding
Village of Mt. Pleasant	More than 10 structures in flood hazard area. Stormwater drainage problems in selected areas
Town of Burlington	More than 10 structures in flood hazard area
Town of Dover	More than 10 structures in flood hazard area and two repetitive loss properties
Town of Norway	More than 10 structures in flood hazard area and one repetitive loss property. Substantial agricultural flood damages. Transportation system is impeded by flooding
Town of Raymond	Substantial agricultural flood damages
Town of Waterford	More than 10 structures in the flood hazard area and one repetitive loss property. Substantial agricultural flood damages
Town of Yorkville	More than 10 structures in the flood hazard area

NOTE: See Maps 31 and 32.

Source: SEWRPC.



fronts can often be tracked across the entire State from west to east.<sup>38</sup> 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.<sup>39</sup> A thunderstorm with wind speeds equal to or greater than 40 miles per hour 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 these storm events are characterized by damaging straight-line winds, 38 percent are hail events, and the remaining 6 percent are made up of tornadoes. Severe thunderstorms can 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 monitors severe weather for 20 southern Wisconsin counties, including Racine County, from its Milwaukee/Sullivan office.<sup>40</sup> 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 National Weather Service operates two 24-hour weather radio transmitters that serve all of Racine County. KZZ76, operating at a frequency of 162.450 megahertz (MHz), transmits from a location at CTH KR and Wood Road in Racine County. KEC60, operating at a frequency of 162.400 MHz, transmits from a location near Delafield in Waukesha County.

### **Thunderstorm Winds**

High-velocity, straight-line winds that are produced by thunderstorms and widespread non-thunderstorm high winds are the third most destructive natural hazard in Wisconsin and are responsible for most wind-related damages to property.<sup>41</sup> Thunderstorm winds can also be fatal. During the period from 1982 to 2008 in the State of Wisconsin, 28 fatalities were attributed to wind from severe thunderstorms. 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.

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<sup>38</sup> *National Weather Service Forecast Office.*

<sup>39</sup> *Prior to 2010, the National Weather Service criteria for severe thunderstorm was production of hail at least 0.75 inch in diameter, wind speeds equal to or greater than 58 miles per hour, or a tornado.*

<sup>40</sup> *National Weather Service, Milwaukee/Sullivan Weather Forecast Office.*

<sup>41</sup> *Wisconsin Emergency Management Department of Military Affairs, State of Wisconsin Hazard Mitigation Plan, July 2001.*

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.

### **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.

### **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. Hailstones form when subfreezing temperatures cause water in thunderstorm clouds to accumulate in layers around an icy core. When strong underlying, updraft winds no longer can support their weight, the hailstones 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 rarely associated with hailstorms. 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 April through August, although hail has been reported with thunderstorms in every month of the year.

### **Lightning**

Every thunderstorm produces lightning, and lightning has been shown to kill more people within the United States each year than tornadoes.<sup>42</sup> 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

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<sup>42</sup> *National Oceanic and Atmospheric Administration.*

20 miles before striking the ground. The air near a lightning bolt can be heated to 50,000 degrees Fahrenheit (°F), which is 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.

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. Counties in southern Wisconsin have been observed to experience a higher number of lightning events than to 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. In addition, 63 percent of lightning-associated deaths occur within one hour of injury and persons with cranial burns or leg burns from lightning are at higher risk for death than others struck by lightning.

### **Historical Thunderstorm Wind, Non-Thunderstorm High-Wind, Hail, and Lightning Problems**

Historically, the State of Wisconsin averages over 30 days each year with thunderstorms across the northern region to about 40 days per year across the southern region. However, Racine County averages only about 10 days per year in which thunderstorms inflict wind, hail, or lightning damage. These thunderstorms and related high winds, hail, and lightning hazards can occur throughout Racine County during any month of the year, with little or no notice. However, their highest frequency has been shown to occur during the period of May through September and between the hours of noon and 10:00 p.m. Racine County is subject to damage caused by thunderstorms and their related hazards, which can be severe and affect large areas of the County at a time, as well as potentially cause substantial loss of life and damage to property.

### **Description of Recent Thunderstorm Wind, Non-Thunderstorm High-Wind, Hail, and Lightning Events**

The gravity of any particular thunderstorm wind, non-thunderstorm high-wind, hail, and lightning hazard event is measured in terms of resulting deaths, injuries, and economic losses. Despite their relatively small size when compared with winter storms, thunderstorms and their related hazard events occur frequently and are dangerous. When combined together, thunderstorm related hazard events and high wind events have caused a greater number injuries than any other natural hazards examined in Racine County, as shown in Table 28. In addition, these hazard events are the third most costly natural hazards to impact Racine County, following stormwater damage associated with floods and damage related to tornadoes.

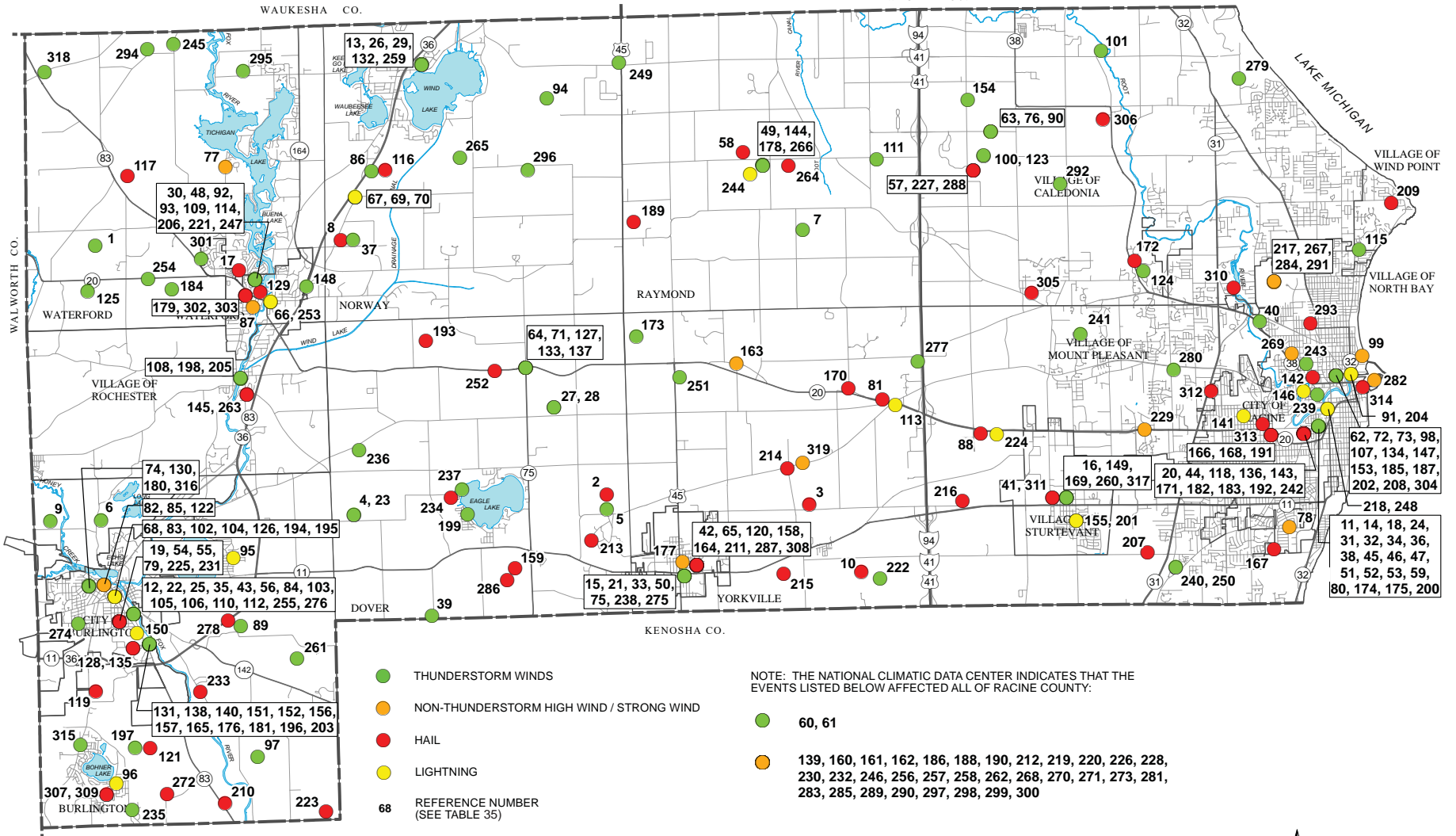
#### ***Thunderstorm Wind Events***

A total of 150 thunderstorm wind events have been recorded in Racine County during the 47-year period from 1961 through December 2014. These events are shown on Map 35, and documented in terms of their magnitude and impact in Table 35, based upon data published by the National Climatic Data Center. As shown in Table 35 these storms can range from one or two events per year, up to 10 events per year, which demonstrates the high unpredictability of these events. In total, these thunderstorm wind events have resulted in six injuries and over \$7.15 million in property and crop damages within Racine County. Several examples of recent events follow (all damage amounts are adjusted to 2014 dollars using the consumer price index from the U.S. Bureau of Labor Statistics, unless otherwise noted).

- An unexpected severe thunderstorm impacted Racine County on June 3, 2002. This storm event released an inch of rain. Associated high winds of up to 67 mph caused excessive debris accumulation and caused approximately 18,000 customers to lose electrical power. Trees and power lines fell throughout the Village of Sturtevant, the Town of Mount Pleasant (now the Village of Mount Pleasant), and the City of Racine. Property damages resulting from this storm were estimated at \$263,000.

Map 35

### THUNDERSTORM WIND, NON-THUNDERSTORM HIGH-WIND, HAIL, AND LIGHTNING EVENTS REPORTED WITHIN RACINE COUNTY: SEPTEMBER 1961 - DECEMBER 2014



Source: National Climatic Data Center and SEWRPC.

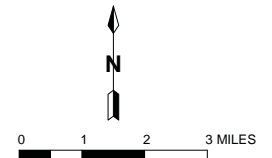


Table 35

**THUNDERSTORM WIND, NON-THUNDERSTORM HIGH-WIND, HAIL, AND LIGHTNING  
EVENTS REPORTED IN RACINE COUNTY FROM SEPTEMBER 22, 1961 THROUGH DECEMBER 31, 2014**

Number on Map 35	Date	City/Village/Town	Event Type				Magnitude	Reported Damages <sup>a</sup>			
			Thunderstorm Winds	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (in dollars) <sup>b</sup>	Crop Damage (in dollars) <sup>b</sup>
1	September 22, 1961	Town of Waterford	X	--	--	--	0 knots	0	0	--	--
2	July 21, 1964	Town of Yorkville	--	--	X	--	1.25 inches	0	0	--	--
3	July 13, 1965	Town of Yorkville	--	--	X	--	0.75 inches	0	0	--	--
4	August 25, 1965	Town of Dover	X	--	--	--	50 knots	0	0	--	--
5	March 21, 1966	Town of Yorkville	X	--	--	--	0 knots	0	0	--	--
6	March 21, 1966	City of Burlington	X	--	--	--	0 knots	0	0	--	--
7	June 29, 1968	Town of Raymond	X	--	--	--	0 knots	0	0	--	--
8	August 11, 1969	Town of Norway	--	--	X	--	1.0 inch	0	0	--	--
9	June 16, 1973	City of Burlington	X	--	--	--	0 knots	0	0	--	--
10	May 16, 1974	Town of Yorkville	--	--	X	--	0.75 inch	0	0	--	--
11	June 13, 1975	City of Racine	X	--	--	--	0 knots	0	0	--	--
12	June 13, 1976	City of Burlington	X	--	--	--	52 knots	0	0	--	--
13	June 13, 1976	Town of Norway	X	--	--	--	0 knots	0	0	--	--
14	July 14, 1976	City of Racine	X	--	--	--	0 knots	0	0	--	--
15	June 5, 1977	Village of Union Grove	X	--	--	--	0 knots	0	0	--	--
16	August 28, 1977	Village of Sturtevant	X	--	--	--	0 knots	0	0	--	--
17	June 7, 1978	Village of Waterford	--	--	X	--	1.0 inch	0	0	--	--
18	July 22, 1978	City of Racine	X	--	--	--	0 knots	0	0	--	--
19	June 20, 1979	City of Burlington	--	--	X	--	1.75 inches	0	0	--	--
20	June 5, 1980	City of Racine	--	--	X	--	1.75 inches	0	0	--	--
21	July 15, 1980	Village of Union Grove	X	--	--	--	52 knots	0	0	--	--
22	July 16, 1980	City of Burlington	X	--	--	--	0 knots	0	0	--	--
23	July 20, 1980	Town of Dover	X	--	--	--	61 knots	0	0	--	--
24	May 29, 1981	City of Racine	X	--	--	--	63 knots	0	0	--	--
25	June 24, 1981	City of Burlington	X	--	--	--	60 knots	0	0	--	--
26	June 20, 1982	Town of Norway	X	--	--	--	0 knots	0	0	--	--
27	July 6, 1982	Town of Yorkville	X	--	--	--	61 knots	0	0	--	--
28	August 3, 1982	Town of Yorkville	X	--	--	--	0 knots	0	0	--	--
29	March 6, 1983	Town of Norway	X	--	--	--	0 knots	0	0	--	--
30	July 19, 1983	Village of Waterford	X	--	--	--	0 knots	0	0	--	--
31	July 19, 1983	City of Racine	X	--	--	--	0 knots	0	0	--	--
32	August 10, 1983	City of Racine	X	--	--	--	54 knots	0	0	--	--
33	May 18, 1984	Village of Union Grove	X	--	--	--	0 knots	0	0	--	--
34	May 18, 1984	City of Racine	X	--	--	--	55 knots	0	0	--	--
35	June 6, 1984	City of Burlington	X	--	--	--	0 knots	0	0	--	--
36	June 6, 1984	City of Racine	X	--	--	--	54 knots	0	0	--	--
37	July 9, 1984	Town of Raymond	X	--	--	--	0 knots	0	0	--	--
38	August 7, 1984	City of Racine	X	--	--	--	70 knots	0	0	--	--

Table 35 (continued)

Number on Map 35	Date	City/Village/Town	Event Type				Magnitude	Reported Damages <sup>a</sup>			
			Thunderstorm Winds	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (in dollars) <sup>b</sup>	Crop Damage (in dollars) <sup>b</sup>
39	August 7, 1984	City of Burlington	X	--	--	--	0 knots	0	0	--	--
40	August 7, 1984	City of Racine	X	--	--	--	61 knots	0	0	--	--
41	August 9, 1984	Village of Sturtevant	--	--	X	--	1.0 inch	0	0	--	--
42	May 26, 1985	Village of Union Grove	--	--	X	--	0.75 inch	0	0	--	--
43	June 27, 1986	City of Burlington	X	--	--	--	0 knots	0	0	--	--
44	July 19, 1986	City of Racine	--	--	X	--	0 knots, 1.0-inch hail	0	0	--	--
45	July 19, 1986	City of Racine	X	--	--	--	0 knots	0	0	--	--
46	July 29, 1987	City of Racine	X	--	--	--	52 knots	0	0	--	--
47	August 3, 1988	City of Racine	X	--	--	--	0 knots	0	0	--	--
48	August 4, 1988	Village of Waterford	X	--	--	--	0 knots	0	0	--	--
49	August 4, 1988	Town of Raymond	X	--	--	--	0 knots	0	0	--	--
50	June 26, 1989	Village of Union Grove	X	--	--	--	0 knots	0	0	--	1,805
51	June 26, 1989	City of Racine	X	--	--	--	0 knots	0	0	--	1,805
52	July 27, 1989	City of Racine	X	--	--	--	0 knots	0	0	--	--
53	August 4, 1989	City of Racine	X	--	--	--	50 knots	0	0	--	985
54	March 13, 1990	City of Burlington	--	--	X	--	0.75 inch	0	0	--	--
55	March 13, 1990	City of Burlington	--	--	X	--	1.75 inches	0	0	--	--
56	August 18, 1990	City of Burlington	X	--	--	--	0 knots	0	0	--	--
57	March 27, 1991	Town of Caledonia	--	--	X	--	1.75 inches	0	0	--	--
58	July 7, 1991	Town of Yorkville	--	--	X	--	1.0-inch hail	0	0	--	--
59	July 7, 1991	Town of Yorkville	X	--	X	--	0 knots	0	0	--	--
60	June 17, 1992	City of Burlington	X	--	--	--	0 knots	0	0	--	--
61	June 17, 1992	Town of Caledonia	X	--	--	--	65 knots	0	0	--	--
62	August 30, 1993	City of Racine	X	--	--	--	0 knots	0	0	81,915	8,191
63	April 18, 1994	Town of Caledonia	X	--	--	--	0 knots	0	0	7,987	--
64	July 6, 1994	Town of Dover	X	--	--	--	0 knots	0	0	798,700	79,870
65	April 18, 1995	Village of Union Grove	--	--	X	--	0.75 inch	0	0	--	--
66	June 6, 1995	Village of Waterford	X	--	--	X	0 knots	0	0	--	886
67	June 7, 1995	City of Burlington	X	--	--	X	0 knots	0	0	--	886
68	July 15, 1995	Town of Norway	--	--	--	X	N/A	0	1	--	--
69	July 27, 1995	City of Burlington	X	--	--	--	0 knots	0	0	--	3,230
70	July 27, 1995	Towns of Norway and Raymond	X	--	--	--	0 knots	0	0	--	3,230
71	July 27, 1995	Town of Union Grove	X	--	--	--	0 knots	0	0	--	3,230
72	August 9, 1995	City of Racine	--	--	--	X	N/A	0	0	14,293	--
73	August 28, 1995	Town of Caledonia	X	--	--	X	0 knots	0	0	--	--
74	August 28, 1995	City of Racine	X	--	--	--	73 knots	0	0	155,340	--
75	August 28, 1995	City of Burlington	X	--	--	--	0 knots	0	0	--	--
76	August 28, 1995	Village of Union Grove	X	--	--	X	0 knots	0	0	--	--
77	October 10, 1995	Town of Waterford	--	X	--	--	0 knots	0	9	--	--
78	March 20, 1996	City of Racine	--	X	--	--	0-60 miles per hour	0	0	1,509	--
79	April 19, 1996	City of Racine	--	--	X	--	0.75-inch hail	0	0	--	--

Table 35 (continued)

Number on Map 35	Date	City/Village/Town	Event Type				Magnitude	Reported Damages <sup>a</sup>			
			Thunderstorm Winds	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (in dollars) <sup>b</sup>	Crop Damage (in dollars) <sup>b</sup>
80	April 19, 1996	City of Racine	X	--	--	--	0 knots	0	0	7,544	--
81	June 2, 1996	Town of Yorkville	--	--	X	--	1 inch	0	0	--	--
82	October 29, 1996	Town of Caledonia	--	X	--	--	0-60-70 miles per hour	0	0	75,440	--
83	October 29, 1996	City of Burlington	--	--	--	X	0 knots	0	0	1,207	--
84	October 29, 1996	Town of Yorkville	X	--	--	--	0-60-70 miles per hour	0	0	22,632	--
85	October 30, 1996	City of Burlington	--	X	--	--	65 knots	0	0	30,176	--
86	April 5, 1997	Town of Norway	X	--	--	--	0 knots	0	0	22,125	--
87	April 6, 1997	Village of Waterford	--	X	--	--	0 knots	0	0	147	--
88	May 5, 1997	City of Racine	--	--	X	--	1.75 inches	0	0	--	--
89	June 24, 1997	Town of Burlington	X	--	--	--	0 knots	0	1	4,425	5,845
90	June 30, 1997	Town of Caledonia	--	--	--	X	N/A	1	0	--	--
91	July 2, 1997	City of Racine	--	--	--	X	N/A	0	0	147	--
92	July 18, 1997	Village of Waterford	X	--	--	--	0 knots	0	0	590	381
93	July 26, 1997	Village of Waterford	X	--	--	--	0 knots	0	0	1,475	381
94	August 3, 1997	Town of Norway	X	--	--	--	0 knots	0	0	737,500	590
95	September 16, 1997	Town of Burlington	--	--	--	X	N/A	0	0	44,250	--
96	September 16, 1997	Town of Burlington	--	--	--	X	N/A	0	0	1,475	--
97	September 19, 1997	Town of Burlington	X	--	--	--	0 knots	0	0	2,950	--
98	September 29, 1997	City of Racine	--	X	--	--	38 knots	0	0	1,475	--
99	March 8, 1998	City of Racine	--	X	--	--	0 knots	0	0	72,620	--
100	May 28, 1998	Town of Caledonia	X	--	--	--	0 knots	0	0	145,240	962
101	May 31, 1998	Town of Caledonia	X	--	--	--	0 knots	0	0	1,452	962
102	June 25, 1998	City of Burlington	--	--	--	X	0 knots	0	0	108,930	2,566
103	June 25, 1998	City of Burlington	X	--	--	--	50 knots	0	0	4,357	--
104	July 20, 1998	City of Burlington	--	--	--	X	0 knots	0	0	2,905	--
105	July 20, 1998	City of Burlington	X	--	--	--	0 knots	0	0	4,357	--
106	July 21, 1998	City of Burlington	X	--	--	--	87 knots	0	1	363,100	--
107	November 10, 1998	City of Racine	--	X	--	--	54 knots	0	3	871,440	108,930
108	February 11, 1999	Town of Rochester	X	--	--	--	0 knots	0	1	2,842	--
109	May 16, 1999	Village of Waterford	X	--	--	--	56 knots	0	0	--	45,841
110	June 6, 1999	City of Burlington	X	--	--	--	0 knots	0	0	1,421	26,000
111	June 6, 1999	Town of Raymond	X	--	--	--	0 knots	0	0	7,105	26,000
112	June 10, 1999	City of Burlington	X	--	--	--	0 knots	0	0	1,421	26,000
113	June 22, 1999	Town of Yorkville	--	--	--	X	N/A	0	0	21,315	--
114	July 23, 1999	Village of Waterford	X	--	--	--	0 knots	0	0	2,842	175
115	July 23, 1999	City of Racine	X	--	--	--	0 knots	0	0	4,263	175
116	August 10, 1999	Town of Norway	--	--	X	--	0.75 inch	0	0	--	--
117	March 8, 2000	Town of Waterford	--	--	X	--	1.0 inch	0	0	--	--
118	May 8, 2000	City of Racine	--	--	X	--	0.75 inch	0	0	--	--
119	May 8, 2000	Town of Burlington	--	--	X	--	1.0 inch	0	0	--	--
120	May 12, 2000	Village of Union Grove	--	--	X	--	1.75 inches	0	0	6,874	--

Table 35 (continued)

Number on Map 35	Date	City/Village/Town	Event Type				Magnitude	Reported Damages <sup>a</sup>			
			Thunderstorm Winds	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (in dollars) <sup>b</sup>	Crop Damage (in dollars) <sup>b</sup>
121	May 18, 2000	Town of Burlington	--	--	X	--	1.75 inches	0	0	--	--
122	May 24, 2000	City of Burlington	--	X	--	--	N/A	0	0	--	--
123	July 2, 2000	Town of Caledonia	X	--	--	--	0 knots	0	0	274,960	1,318
124	July 2, 2000	Town of Mount Pleasant	X	--	--	--	0 knots	0	0	206,220	1,318
125	August 5, 2000	Town of Waterford	X	--	--	--	0 knots	0	0	2,750	4,636
126	February 9, 2001	City of Burlington	--	--	--	X	N/A	0	0	40,101	--
127	April 7, 2001	Towns of Dover and Norway	--	X	--	--	57 knots	0	0	--	--
128	May 14, 2001	City of Burlington	--	--	X	--	1.5 inches	0	0	--	--
129	May 14, 2001	Village of Waterford	--	--	X	--	1.5 inches	0	0	66,835	--
130	June 11, 2001	City of Burlington	X	--	--	--	54 knots	0	0	20,050	75,510
131	August 9, 2001	City of Burlington	X	--	--	--	52 knots	0	0	--	--
132	September 3, 2001	Town of Norway	X	--	--	--	50 knots	0	0	--	--
133	September 19, 2001	Towns of Dover and Norway	--	X	--	--	N/A	0	0	--	--
134	September 20, 2001	City of Racine	--	--	--	X	N/A	0	0	12,030	--
135	October 23, 2001	City of Burlington	--	--	X	--	0.75 inch	0	0	--	--
136	October 24, 2001	City of Racine	--	--	X	--	2.75 inches	0	0	133,670	--
137	December 5, 2001	Towns of Dover and Norway	--	X	--	--	N/A	0	0	6,683	--
138	April 18, 2002	City of Burlington	X	--	--	--	52 knots	0	0	--	--
139	June 3, 2002	Cities of Burlington and Racine; Villages of Mt. Pleasant, Sturtevant, and Union Grove; Towns of Burlington, Dover, and Yorkville	--	X	--	--	58 knots	0	0	263,180	--
140	June 3, 2002	City of Racine	X	--	--	--	50 knots	0	0	--	--
141	June 4, 2002	City of Racine	--	--	--	X	N/A	0	0	6,579	245
142	June 15, 2002	Village of Caledonia	--	--	X	--	0.88 inch	0	0	--	--
143	June 15, 2002	City of Racine	--	--	X	--	0.75 inch	0	0	--	--
144	July 26, 2002	Town of Raymond	X	--	--	--	56 knots	0	0	3,948	--
145	August 1, 2002	Village of Rochester	--	--	X	--	1.75 inch	0	0	--	76,571
146	August 21, 2002	City of Racine	--	--	--	X	N/A	0	0	13,159	--
147	August 21, 2002	City of Racine	--	--	--	X	N/A	0	0	6,580	--
148	August 21, 2002	Village and Town of Waterford	X	--	--	--	61 knots	0	0	--	2,015
149	August 21, 2002	City of Racine and Villages of Mt. Pleasant, Sturtevant, and Wind Point	X	--	--	--	74 knots	0	0	1,315,900	2,015
150	September 19, 2002	City of Burlington	--	--	--	X	0 knots	0	0	2,632	--
151	September 19, 2002	City of Burlington	X	--	--	--	56 knots	0	0	--	--
152	October 4, 2002	City of Burlington	X	--	--	--	54 knots	0	0	--	--
153	May 11, 2003	City of Racine	--	X	--	--	43 knots	0	0	19,299	--
154	July 4, 2003	Village of Caledonia	X	--	--	--	52 knots	0	0	--	--
155	July 6, 2003	Village of Mt. Pleasant	--	--	--	X	N/A	0	0	1,286,600	--
156	July 6, 2003	City of Burlington	X	--	--	--	52 knots	0	0	--	--
157	July 15, 2003	City of Burlington	X	--	--	--	52 knots	0	0	--	--
158	August 3, 2003	Village of Union Grove	--	--	X	--	0.75 inch	0	0	--	110



Table 35 (continued)

Number on Map 35	Date	City/Village/Town	Event Type				Magnitude	Reported Damages <sup>a</sup>			
			Thunderstorm Winds	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (in dollars) <sup>b</sup>	Crop Damage (in dollars) <sup>b</sup>
159	August 25,2003	Town of Dover	--	--	X	--	0.75 inch	0	0	--	110
160	November 12, 2003	City of Racine	--	X	--	--	49 knots	0	0	3,860	--
161	March 7, 2003	City of Racine	--	X	--	--	48 knots	0	0	3,760	--
162	March 14, 2003	City of Racine	--	X	--	--	43 knots	0	0	5,013	--
163	April 18, 2004	Town of Yorkville	--	X	--	--	44 knots	0	0	12,532	--
164	May 8, 2004	Village of Union Grove	--	--	X	--	0.75 inch	0	0	--	--
165	May 9, 2004	City of Burlington	X	--	--	--	50 knots	0	0	--	--
166	May 20, 2004	Village of Mt. Pleasant	--	--	X	--	1.00 inch	0	0	--	--
167	May 20, 2004	Village of Mt. Pleasant	--	--	X	--	1.75 inch	0	0	--	--
168	May 20, 2004	Village of Mt. Pleasant	--	--	X	--	3.00 inch	0	0	--	--
169	May 21, 2004	Village of Sturtevant	X	--	--	--	56 knots	0	0	--	--
170	June 23, 2004	City of Racine	--	--	X	--	0.88 inch	0	0	--	--
171	June 23, 2004	Town of Yorkville	--	--	X	--	0.75 inch	0	0	--	--
172	June 23, 2004	City of Racine and Village of Caledonia	--	--	X	--	1.00 inch	0	0	--	--
173	June 23, 2004	City of Racine and Village of Mt. Pleasant	X	--	--	--	69 knots	0	0	--	--
174	June 23, 2004	City of Racine	X	--	--	--	52 knots	0	0	--	--
175	July 21, 2004	City of Racine	X	--	--	--	55 knots	0	0	12,532	--
176	August 27, 2004	City of Burlington	X	--	--	--	52 knots	0	0	--	--
177	December 12, 2004	Village of Union Grove	--	X	--	--	43 knots	0	0	1,253	--
178	March 30, 2005	Town of Raymond	X	--	--	--	60 knots	0	0	60,610	--
179	June 4, 2005	Village of Waterford	--	--	X	--	0.88 inch	0	0	--	--
180	July 23, 2005	Town of Burlington	X	--	--	--	52 knots	0	0	1,212	--
181	July 23, 2005	City of Burlington	X	--	--	--	56 knots	0	0	3,637	--
182	August 18, 2005	City of Racine	--	--	X	--	0.75 inches	0	0	--	--
183	August 18, 2005	City of Racine	--	--	X	--	1.00 inches	0	0	--	--
184	August 18, 2005	Village of Rochester	X	--	--	--	61 knots	0	0	1,212	--
185	November 13, 2005	City of Racine	--	X	--	--	53 knots	0	0	12,122	--
186	January 24, 2006	City of Racine	--	X	--	--	39 knots	0	0	5,871	--
187	March 13, 2006	City of Racine	--	X	--	--	51 knots	0	0	--	--
188	March 31, 2006	City of Racine	--	X	--	--	42 knots	0	0	2,349	--
189	April 22, 2006	Towns of Norway and Raymond	--	--	X	--	0.75 inch	0	0	--	--
190	May 11, 2006	City of Racine	--	X	--	--	39 knots	0	0	1,174	--
191	May 17, 2006	Village of Mt. Pleasant	--	--	X	--	0.88 inch	0	0	--	--
192	May 17, 2006	City of Racine	--	--	X	--	0.75 inch	0	0	3,522	--
193	May 17, 2006	Town of Dover	--	--	X	--	0.75 inch	0	0	--	--
194	May 29, 2006	City of Burlington	--	--	--	X	N/A	0	5	--	--
195	May 29, 2006	City of Burlington	--	--	--	X	N/A	0	2	--	--
196	June 21, 2006	City of Burlington	X	--	--	--	52 knots	0	0	--	19,929
197	June 21, 2006	Town of Burlington	X	--	--	--	52 knots	0	0	--	19,929
198	June 21, 2006	Village of Rochester	X	--	--	--	56 knots	0	0	--	19,929
199	July 17, 2006	Town of Dover	X	--	--	--	56 knots	0	0	11,743	--

Table 35 (continued)

Number on Map 35	Date	City/Village/Town	Event Type				Magnitude	Reported Damages <sup>a</sup>			
			Thunderstorm Winds	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (in dollars) <sup>b</sup>	Crop Damage (in dollars) <sup>b</sup>
200	July 17, 2006	City of Racine	X	--	--	--	52 knots	0	0	5,871	--
201	July 20, 2006	Village of Sturtevant	--	--	--	X	N/A	0	0	11,743	--
202	July 20, 2006	City of Racine	--	--	--	X	N/A	0	0	11,743	--
203	July 20, 2006	City of Burlington	X	--	--	--	52 knots	0	0	11,743	--
204	July 24, 2006	City of Racine	--	--	--	X	N/A	0	0	2,349	--
205	July 27, 2006	Village of Rochester	X	--	--	--	52 knots	0	0	--	--
206	July 27, 2006	Village of Waterford	X	--	--	--	52 knots	0	0	5,871	--
207	July 30, 2006	Village of Mt. Pleasant	--	--	X	--	0.75 inch	0	0	--	930
208	July 30, 2006	City of Racine	--	--	--	X	N/A	0	0	3,523	--
209	August 23, 2006	Village of Wind Point	--	--	X	--	0.75 inch	0	0	--	948
210	August 25, 2006	Town of Burlington	--	--	X	--	0.75 inch	0	0	--	948
211	October 2, 2006	Village of Union Grove	--	--	X	--	0.88 inch	0	0	--	--
212	February 22, 2007	City of Racine	--	X	--	--	41 knots	0	0	2,284	--
213	March 21, 2007	Town of Yorkville	--	--	X	--	0.88 inch	0	0	--	--
214	March 21, 2007	Town of Yorkville	--	--	X	--	0.75 inch	0	0	--	--
215	March 21, 2007	Town of Yorkville	--	--	X	--	0.75 inch	0	0	--	--
216	March 21, 2007	Village of Mt. Pleasant	--	--	X	--	0.88 inch	0	0	--	--
217	April 4, 2007	City of Racine	--	X	--	--	42 knots	0	0	5,709	--
218	April 30, 2007	City of Racine	--	--	--	X	N/A	0	0	3,425	--
219	May 24, 2007	City of Racine	--	X	--	--	39 knots	0	0	2,284	--
220	June 7, 2007	City of Racine	--	X	--	--	39 knots	0	0	5,709	--
221	June 7, 2007	Village of Waterford	X	--	--	--	61 knots	0	0	11,418	--
222	June 18, 2007	Villages of Caledonia, Mt. Pleasant, and Sturtevant	X	--	--	--	74 knots	0	0	685,080	--
223	June 21, 2007	Town of Burlington	--	--	X	--	0.75 inch	0	0	--	--
224	June 21, 2007	Village of Mt. Pleasant	--	--	--	X	N/A	0	0	3,425	--
225	July 9, 2007	City of Burlington	--	--	X	--	1.00 inch	0	0	--	--
226	August 27, 2007	Racine Zone	--	X	--	--	39 knots	0	0	11,418	--
227	September 27, 2007	Village of Caledonia	--	--	X	--	0.75 inch	0	0	--	2,149
228	November 5, 2007	Racine Zone	--	X	--	--	39 knots	0	0	5,709	--
229	December 23, 2007	Village of Mt. Pleasant	--	X	--	--	57 knots	0	0	11,418	--
230	December 23, 2007	Racine Zone	--	X	--	--	43 knots	0	0	5,709	--
231	January 7, 2008	City of Burlington	--	--	X	--	0.75 inch	0	0	--	2,342
232	April 26, 2008	Racine Zone	--	X	--	--	39 knots	0	0	5,497	--
233	June 6, 2008	Town of Dover	--	--	X	--	0.75 inch	0	0	--	--
234	June 6, 2008	Town of Burlington	--	--	X	--	0.88 inch	0	0	--	--
235	June 6, 2008	Town of Burlington	X	--	--	--	50 knots	0	0	--	--
236	June 6, 2008	Town of Yorkville	X	--	--	--	50 knots	0	0	--	--
237	June 6, 2008	Town of Dover	X	--	--	--	50 knots	0	0	--	--
238	June 6, 2008	Village of Union Grove	X	--	--	--	52 knots	0	0	--	--
239	June 6, 2008	City of Racine	X	--	--	--	56 knots	0	0	82,462	--
240	June 8, 2008	City of Racine	X	--	--	--	56 knots	0	0	--	--

Table 35 (continued)

Number on Map 35	Date	City/Village/Town	Event Type				Magnitude	Reported Damages <sup>a</sup>			
			Thunderstorm Winds	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (in dollars) <sup>b</sup>	Crop Damage (in dollars) <sup>b</sup>
241	June 28, 2008	City of Racine and Village of Mt. Pleasant	X	--	--	--	56 knots	0	0	27,487	--
242	July 2, 2008	City of Racine	X	--	--	--	51 knots	0	0	--	6,606
243	July 2, 2008	City of Racine	--	--	X	--	0.75 inch	0	0	--	--
244	July 7, 2008	Town of Raymond	--	--	--	X	N/A	0	0	3,298	--
245	July 10, 2008	Town of Waterford	X	--	--	--	56 knots	0	0	5,497	6,606
246	October 26, 2008	Racine Zone	--	X	--	--	39 knots	0	0	2,199	--
247	June 8, 2009	Town of Raymond	X	--	--	--	50 knots	0	0	--	17,308
248	June 19, 2009	City of Racine	--	--	--	X	N/A	0	0	27,587	--
249	June 19, 2009	Towns of Norway and Raymond	X	--	--	--	52 knots	0	0	--	17,308
250	June 19, 2009	City of Racine	X	--	--	--	56 knots	0	0	--	17,308
251	June 19, 2009	Village of Union Grove	X	--	--	--	59 knots	0	0	--	17,308
252	July 23, 2009	City of Racine and Village of Mt. Pleasant	--	--	X	--	1 inch	0	0	--	--
253	August 9, 2009	Town of Waterford	--	--	--	X	N/A	0	0	22,070	--
254	August 9, 2009	Town of Waterford	X	--	--	--	75 knots	0	0	220,700	16,552
255	August 9, 2009	Town of Burlington	X	--	--	--	61 knots	0	0	16,552	--
256	September 27, 2009	City of Racine	--	X	--	--	26 knots	0	0	5,517	--
257	October 6, 2009	City of Racine	--	X	--	--	41 knots	0	0	5,517	--
258	May 5, 2010	City of Racine	--	X	--	--	39 knots	0	0	10,857	--
259	June 21, 2010	Towns of Norway and Raymond	X	--	--	--	60 knots	0	0	--	27,497
260	June 21, 2010	Village of Sturtevant	X	--	--	--	52 knots	0	0	--	27,497
261	July 18, 2010	Town of Burlington	X	--	--	--	52 knots	0	1	27,142	--
262	September 7, 2010	City of Racine	--	X	--	--	41 knots	0	0	5,428	--
263	September 21, 2010	Village of Rochester	--	--	X	--	0.75 inch	0	0	--	--
264	September 21, 2010	Village of Caledonia	--	--	X	--	1 inch	0	0	--	148
265	September 21, 2010	Town of Norway	X	--	--	--	52 knots	0	0	--	--
266	September 21, 2010	Village of Caledonia	X	--	--	--	52 knots	0	0	--	--
267	September 24, 2010	Racine Zone	--	X	--	--	40 knots	0	0	5,428	--
268	September 24, 2010	Racine Zone	--	X	--	--	39 knots	0	0	1,086	--
269	October 26, 2010	Racine Zone	--	X	--	--	55 knots	0	0	32,571	--
270	February 18, 2011	Racine Zone	--	X	--	--	26 knots	0	0	2,105	--
271	April 15, 2011	Racine Zone	--	X	--	--	31 knots	0	0	3,157	--
272	May 11, 2011	Town of Burlington	--	--	X	--	0.88 inch	0	0	--	--
273	May 15, 2011	Racine Zone	--	X	--	--	40 knots	0	0	5,262	--
274	May 22, 2011	Town of Burlington	X	--	--	--	70 knots	0	0	157,860	123,620
275	May 22, 2011	Village of Union Grove	X	--	--	--	52 knots	0	0	--	123,620
276	June 8, 2011	Town of Burlington	X	--	--	--	56 knots	0	0	--	2,128
277	June 8, 2011	Village of Sturtevant	X	--	--	--	56 knots	0	2	--	2,128
278	June 21, 2011	Town of Burlington	--	--	X	--	1.25 inches	0	0	--	--
279	June 30, 2011	Village of Wind Point	X	--	--	--	71 knots	0	0	105,240	2,128
280	August 2, 2011	City of Racine	X	--	--	--	56 knots	0	0	--	--
281	September 29, 2011	Racine Zone	--	X	--	--	41 knots	0	0	2,105	--

Table 35 (continued)

Number on Map 35	Date	City/Village/Town	Event Type				Magnitude	Reported Damages <sup>a</sup>			
			Thunderstorm Winds	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (in dollars) <sup>b</sup>	Crop Damage (in dollars) <sup>b</sup>
282	October 19, 2011	City of Racine	--	X	--	--	63 knots	0	0	10,542	--
283	November 13, 2011	Racine Zone	--	X	--	--	26 knots	0	0	1,052	--
284	November 29, 2011	Racine Zone	--	X	--	--	46 knots	0	0	1,052	--
285	January 1, 2012	Racine Zone	--	X	--	--	39 knots	0	0	1,031	--
286	March 12, 2012	Town of Dover	--	--	X	--	1 inch	0	0	--	--
287	March 12, 2012	Village of Union Grove	--	--	X	--	1 inch	0	0	--	--
288	March 12, 2012	Village of Caledonia	--	--	X	--	1.75 inches	0	0	--	--
289	April 16, 2012	Racine Zone	--	X	--	--	26 knots	0	0	1,031	--
290	April 16, 2012	Racine Zone	--	X	--	--	41 knots	0	0	1,031	--
291	June 18, 2012	Racine Zone	--	X	--	--	39 knots	0	0	1,031	--
292	July 18, 2012	City of Racine	X	--	--	--	56 knots	0	0	--	--
293	July 31, 2012	City of Racine	--	--	X	--	1 inch	0	0	25,777	--
294	July 31, 2012	Town of Waterford	X	--	--	--	56 knots	0	0	--	--
295	September 4, 2012	Town of Waterford	X	--	--	--	56 knots	0	0	10,311	--
296	September 4, 2012	Town of Norway	X	--	--	--	52 knots	0	0	5,155	--
297	November 11, 2012	City of Racine	--	X	--	--	40 knots	0	0	3,093	--
298	January 18, 2013	City of Racine	--	X	--	--	39 knots	0	0	5,081	--
299	January 19, 2013	City of Racine	--	X	--	--	44 knots	0	0	5,081	--
300	April 11, 2013	City of Racine	--	X	--	--	44 knots	0	0	10,162	--
301	July 21, 2013	Town of Waterford	X	--	--	--	56 knots	0	0	14,227	2,178
302	August 21, 2013	Town of Waterford	--	--	X	--	0.88 inches	0	0	--	--
303	August 21, 2013	Town of Waterford	--	--	X	--	1 inch	0	0	--	--
304	November 17, 2013	City of Racine	--	X	--	--	48 knots	0	0	5,081	--
305	May 6, 2014	Village of Caledonia	--	--	X	--	0.75inches	0	0	--	--
306	May 6, 2014	Village of Caledonia	--	--	X	--	0.75 inches	0	0	--	--
307	May 12, 2014	Town of Burlington	--	--	X	--	2 inches	0	0	--	--
308	May 12, 2014	Village of Union Grove	--	--	X	--	0.88 inches	0	0	--	--
309	May 12, 2014	Town of Burlington	--	--	X	--	2 inches	0	0	--	--
310	May 12, 2014	Town of Yorkville	--	--	X	--	0.75 inches	0	0	--	--
311	May 12, 2014	Village of Sturtevant	--	--	X	--	1.25 inches	0	0	--	--
312	May 12, 2014	City of Racine	--	--	X	--	1 inch	0	0	--	--
313	May 12, 2014	City of Racine	--	--	X	--	1.5 inches	0	0	--	--
314	May 12, 2014	City of Racine	--	--	X	--	2.5 inches	0	0	--	--
315	May 12, 2014	Town of Burlington	X	--	--	--	61 knots	0	0	--	55,139
316	May 12, 2014	City of Burlington	X	--	--	--	50 knots	0	0	--	55,139
317	May 12, 2014	Village of Sturtevant	X	--	--	--	50 knots	0	0	--	55,139
318	June 1, 2014	Town of Waterford	X	--	--	--	52 knots	0	0	--	93,878
319	October 31, 2014	Racine Zone	--	X	--	--	42 knots	1	0	--	--
--	Total	--	150	58	86	31	--	2	26	9,172,909	1,261,162

<sup>a</sup>Deaths, injuries, and property damages reported were based upon a geographic area impacted by the hazard event, which affected Racine County and, in some cases, a larger area of impact than the County itself, generally within the southeast regional area of Wisconsin.

<sup>b</sup>Dollar values were adjusted to year 2014 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) a part of the Department of Commerce, 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.

- A severe thunderstorm impacted Racine County on August 21, 2002. Thunderstorm winds caused about \$1.3 million in property damage. Clusters and short lines of thunderstorms ahead of a cold front eventually merged into a single complex that moved west to east across southern Wisconsin. Within southern and southeastern Wisconsin, just about every type of weather phenomena was observed: a tornado; a funnel cloud; powerful, hurricane-force, downburst winds that uprooted trees and damaged buildings; torrential rains reducing visibilities to 100 feet; urban and small stream flooding; and numerous lightning strikes—resulting in nearly \$20,000 in fire damage. At least 56,000 customers in southeastern Wisconsin lost electrical power as a result of lightning strikes and tree damage to power lines. A powerful hurricane-force microburst moved northeast through the Village of Sturtevant through the north side of the City of Racine to the Village of Wind Point. The roof of an apartment building in Racine was partially ripped off by the winds. In addition, large trees were uprooted and several other homes suffered slight damage from felled trees and tree branches. Farther west in the Waterford area, a two-story tall grain bin was lifted off the ground and moved 15 feet by the winds, while nearby large trees were damaged.
- A powerful macroburst moved northeast through the eastern half of Racine County on June 18, 2007 and tore up hundreds of trees, blew over several semi-tractor trailers on IH 94 between STH 11 and STH 20, leveled a barn, destroyed a pole shed, ripped the roof off a home, and toppled about 30 power poles and 59 spans of wire. In addition, winds damaged the Ives Grove Golf Course, the County Board chambers, a Sheriff’s Department storage building, and a Public Works Department garage. About six campers were overturned by the powerful winds. Several homes and cars sustained damage from flying debris or fallen trees. Total property damages were estimated to exceed \$685,000. Damage to the power-poles and power-lines was approximately \$99,000. Based on the structural damage, peak wind gusts were approximated at 100 mph.
- On August 9, 2009, thunderstorm winds blew down numerous trees and powerlines in a band from just west of Waterford to the City of Racine. In Waterford a large tree fell on and damaged a commercial building and on the north side of Racine two power poles were blown down. Several homes lost roof shingles and there were several reports of tree debris damaging home siding and roofs. Piers and docks were lifted and twisted on Wind Lake and a camper was lifted by wind gusts and slammed into a car. In the Village of Caledonia a large section of corn field was flattened by the strong winds. Property damages from this storm totaled over \$237,000 and crop damages were estimated at \$16,500.
- On May 22, 2011, the combination of a deep low pressure system and an associated cold front ignited a strong thunderstorm that moved from the City of Burlington to the Village of Caledonia. Severe winds of up to 80 mph knocked many trees and power lines to the ground. In the City of Burlington 1,000 households experienced power outages. In Caledonia, a stretch of 4 Mile Road near IH 94 was impassable due to numerous downed trees. Several homes and cars were also damaged. Property damages of nearly \$158,000 were reported throughout the County.
- A large supercell thunderstorm produced strong outflow winds that moved across southeast Milwaukee County and eastern sections of Racine and Kenosha Counties during the evening of June 30, 2011. Severe thunderstorm winds that gusted up to 82 mph knocked down many large tree branches and blew off shingles off several homes. At Racine’s Batten Airport a C-130 cargo airplane parked at a terminal was spun around and moved 30 feet by the severe winds. Law enforcement reported numerous power lines down across far eastern Racine County. Officials estimated 500 to 800 trees were destroyed or badly damaged by the winds. At one point, 26,000 customers were without power in southeastern Wisconsin and it took crews several days to restore power to all customers. Property damage was estimated at over \$105,000 and crop damages were estimated at \$2,100 from this storm.

### ***Hail Events***

From 1964 through 2014, 86 major hailstorms were reported in Racine County that resulted in significant property damage throughout the County (see Map 35). In all, the National Climatic Data Center has recorded nearly \$237,000

in property damage from these hailstorm events as shown in Table 35. In addition, over \$84,000 in crop insurance indemnities have been paid in Racine County between the period of 1997 to 2014 for damage to crops due to hail.

Most of the property damages described above occurred as a result of two hailstorm events on May 14, and October 23, 2001, which struck south-central and southeastern Wisconsin and caused about \$66,800 and \$134,000 in property damages, respectively. The October storm had golf ball sized hailstones that dented many vehicles in the City of Racine. Several skylight windows were smashed and the roofs of several homes were damaged. Two stalled motorists in the City of Racine had to climb onto the top of their vehicle to escape rising stormwater that was due to storm sewer inlets becoming clogged by tree leaves and branches brought down by the hailstones. Several City of Racine roads needed to be plowed to clear the accumulated hailstones.

### ***Lightning Events***

From 1995 through 2014, 31 lightning events were reported in Racine County that resulted in significant property damage throughout the County (see Map 35). In all, the National Climatic Data Center has recorded \$1.53 million in property damage, one death, and eight injuries from these lightning events, as shown in Table 35. Most of these damages occurred as a result of an event on July 6, 2003, when fire resulting from a lightning strike caused about \$1.29 million in damages to an apartment complex in the Village of Sturtevant. At least 3,000 customers lost electrical power due to tree limbs falling on power lines or lightning strikes.

### ***Non-Thunderstorm High-Wind Events***

A total of 58 non-thunderstorm high-wind events occurred in Racine County from 1995 through 2014. Non-thunderstorm high-wind events have injured 12 people (the highest injury total of all natural hazards), and caused one death in the County. This type of weather hazard is also costly. In all, the National Climatic Data Center has recorded over \$1.3 million in property damages and nearly \$109,000 in crop damages from these events, as shown in Table 35.

Most of the above-mentioned damages occurred as a result of one wind storm in south central and southeastern Wisconsin that occurred over a 17-hour period on November 10, 1998. The sustained southwesterly winds of 30 to 40 mph gusted to 80 mph in some locations. Close to 125,000 customers lost electrical power throughout the Southeastern Wisconsin Region, and many were without power for four days. Thousands of trees were damaged or destroyed along with power lines, street lights, road signs, billboards, barns, sheds, boats, and airplanes. The NCDC estimated over \$871,000 in property damage and over \$108,000 in crop damage occurred in Racine County from this wind storm. Property damage totals in south central and southeastern Wisconsin were estimated to be \$14.97 million, with an additional \$2.36 million in crop damages.

### **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. As can be seen from the distribution of thunderstorm related hazard events and non-thunderstorm high-wind events during the past 53-years reported to be impacted by Racine County, shown on Map 35, the locations of storm impact points are widely scattered throughout the County.

In order to assess the vulnerability of the Racine County area to thunderstorm related hazards and non-thunderstorm high-winds, a review of the community assets described in Chapter II 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 record have resulted in about \$48,500 of reported damages per event in the County, consisting of about \$28,800 of damages to property and \$19,700 in damages to crops. 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 about five thunderstorm related events per year and three non-thunderstorm high-wind events per year in Racine County.

Over the 20-year period 1995 through 2014 thunderstorm related hazards and non-thunderstorm high-wind events have averaged about \$454,900 in property damages and about \$58,400 in crop damages per year, or for an average annual total of about \$513,300. In 2014, total equalized assessed property value in Racine County was estimated at \$13.6 billion. Based on the current average estimate of \$454,900 in reported property damages per year it can be expected that approximately 0.003 percent of the value of all property, including buildings and infrastructure, in Racine County will be damaged from these events each year. Due to the unpredictability of thunderstorm wind, hail, lightning, and non-thunderstorm high-wind events, all buildings, infrastructure, and critical facilities within the County are considered at risk.

#### **Potential Future Changes in Thunderstorm Wind, Non-Thunderstorm High-Wind, Hail, and Lightning Conditions**

Based upon recent historical data from the period 1995-2014, Racine County can expect to experience averages of 5.0 thunderstorm wind events per year, 1.4 lightning events per year, 3.5 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 thunderstorm and high-wind 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.<sup>43</sup> It should also be noted that wind strengths over the Great Lakes have increased and are expected to continue increasing in the future.<sup>44</sup> 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 thunderstorm related events and non-thunderstorm high winds. Such changes relate to the potential future increase in development within the County. Changing land use patterns within Racine County, as documented in the adopted regional land use plan and County land and water resource management plan, and summarized in Chapter II, 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 V.

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<sup>43</sup> 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.

<sup>44</sup> 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.

Table 36

**FUJITA SCALE CHARACTERISTICS**

F-Scale	Wind Speed (miles per hour) <sup>a</sup>	Character of Damage	Relative Frequency (percent)
F0 (weak)	40-72	Light damage	29
F1 (weak)	73-112	Moderate damage	40
F2 (strong)	113-157	Considerable damage	24
F3 (strong)	158-206	Severe damage	6
F4 (violent)	207-260	Devastating damage	2
F5 (violent)	261-318	Incredible damage (rare)	<1

<sup>a</sup>Equivalent wind speeds associated with the Fujita Scale represent the fastest one-quarter mile wind.

Source: National Oceanic and Atmospheric Administration.

**Multi-Jurisdictional Thunderstorm Wind, Non-Thunderstorm High-Wind, Hail, and Lightning Risk Management**

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

**VULNERABILITY ASSESSMENT FOR 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 is the one of the most tornado-prone areas of the United States. 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 frontal boundaries, affecting large areas of the State at one time. Tornadoes generally occur near the trailing edge of a thunderstorm. 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. This scale is shown in Table 36. Tornado intensities under this scale range from F0 events, representing the tornadoes doing the smallest amount of damage, to F5 events, representing the tornadoes doing the greatest amount of damage. Wind velocities necessary to produce the particular damage are often associated with ratings along the Fujita Scale, but that practice is often misleading. The wind estimates associated with the Fujita Scale are intended to be based upon the expected damage to a well-built residential structure. Poorly built structures can suffer significant structural damage under lesser winds than the Fujita Scale might suggest. Other sorts of structures may or may not experience the same failures under high wind speeds that a house might. Thus the Fujita Scale is largely a



Table 37

ENHANCED FUJITA SCALE CHARACTERISTICS

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

<sup>a</sup>Equivalent wind speeds associated with the Enhanced Fujita Scale represent a three-second gust of wind.

Source: National Oceanic and Atmospheric Administration.

residential scale, with much more care required in assessment after wind damage to other sorts of structures. 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. This scale is shown in Table 37. The newer scale reflects more refined assessments of tornado damage surveys, more standardization, and consideration of damage over a wider range of structures. Because the National Weather Service has decided not to reclassify tornadoes that occurred prior to the implementation of the Enhanced Fujita Scale, the Fujita Scale classifications have been retained for those storms which occurred prior to February 2007.

The destructive power of the 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 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 monitors severe weather nationwide from its Norman, Oklahoma office. This office is the only entity that can issue a tornado watch. The National Weather Service office in Milwaukee/ Sullivan, and the Racine County Emergency Services, 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. Over the period 1990 through 2014, there have been 69 tornado watches and 29 tornado warnings in Racine County. Tornado shelters are identified by appropriate signage in public buildings. The National Weather Service operates two 24-hour weather radio transmitters that serve all of Racine County. KZZ76, operating at a frequency of 162.450 megahertz (MHz), transmits from a location at CTH KR and Wood Road in Racine County. KEC60, operating at a frequency of 162.400 MHz, transmits from a location near Delafield in Waukesha County.

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.

### **Historical Tornado Events**

Historically, a devastatingly powerful tornado, classified as an F4 event, occurred on May 18, 1883. This tornado tracked 20 miles through Kenosha and Racine Counties, killing eight people and injuring 85 people before it exited onto Lake Michigan. On June 20, 1924, a tornado of unknown intensity touched down in the Towns of Yorkville, Mount Pleasant, and Caledonia, destroying 100 barns but causing no serious injuries. Although such tornadoes are relatively rare natural hazards in Racine County, they can cause substantial loss of life and damage to property.<sup>45</sup>

### **Description of Recent Tornado 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 United States. 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 F0 or weak F1 events on the Fujita scale, or EF0 or EF1 events on the Enhanced Fujita Scale (see Table 38). Nevertheless, tornadoes are second only to stormwater damage associated with floods, as the most costly natural hazards to impact Southeastern Wisconsin.

A total of 21 tornadoes have been recorded in Racine County during the 58-year period from January 1957 through December 2014, or about one tornado every 2.75 years. These are shown on Map 36, and documented in terms of their magnitude and impact in Table 38, based upon data published by the National Climatic Data Center. In total, these 21 tornadoes have resulted in 10 injuries and nearly \$30 million in reported property and crop damages, with the average damage being \$575,000 (not including one very large event in March, 1966). On average, there are about 22 tornadoes reported each year within the State of Wisconsin.

Of the tornadoes reported from Racine County during the aforementioned 58-year period, four were categorized as F2 events on the Fujita scale. These four tornado events collectively resulted in more than \$20.7 million in property damage in the County adjusted to reflect 2014 costs. The worst of these events was the tornado that occurred on March 21, 1966, which caused over \$18 million in property damage adjusted to 2014 dollars. Of the remaining tornado events, nine were classed as F1 or EF1 tornadoes and eight were classed as F0 or EF0 events.

- On July 2, 2000, severe weather in the form of a tornado, damaging straight-line downburst winds, large hail, and flash flooding hammered a small piece of south central and much of southeastern Wisconsin during the late afternoon and evening hours. This supercell spawned a tornado near South 27th Street and STH 100 in the City of Franklin in Milwaukee County. The tornado continued east-southeast through Oak Creek and then into Racine County near STH 32 where it stayed on the ground for about 0.2 miles before dissipating. This tornado caused an estimated \$13,748 (2014 dollars) in property damage. No injuries or deaths were reported.

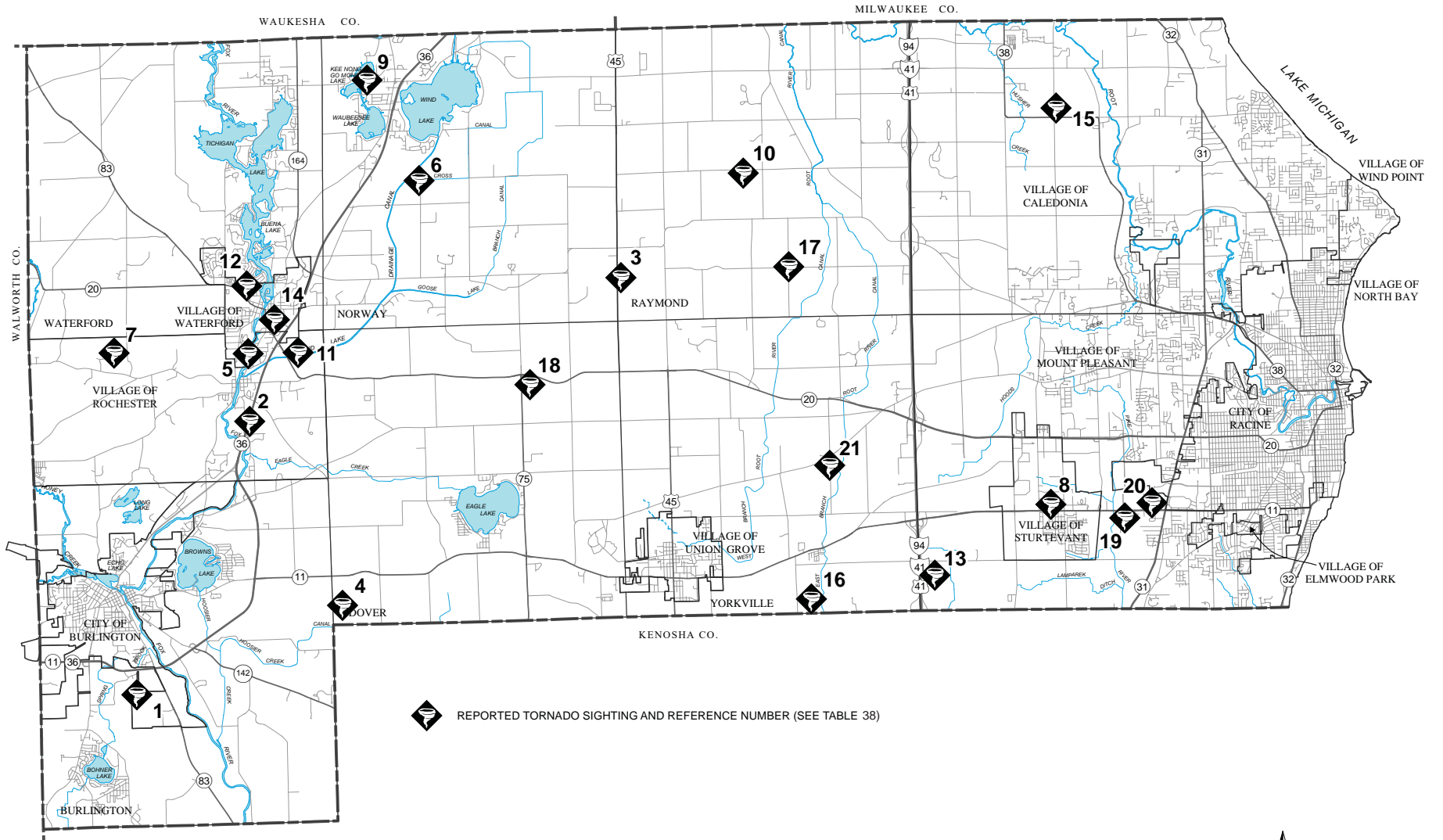
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<sup>45</sup> *Since this event the Towns of Caledonia and Mount Pleasant have incorporated as villages.*

- On August 25, 2001, a tornado spun up in north-central Kenosha County and moved into Racine County about three miles east-southeast of the Village of Union Grove. It continued northeast toward the intersection of IH 94 and STH 11, and eventually dissipated 1.8 miles northwest of the Village of Sturtevant. The tornado intensified to the top of the F1 rating (winds about of about 100 to 110 mph), and demolished a hay shed, damaged a pole barn, knocked down fences, uprooted or snapped many trees, damaged road signs, damaged a Sheriff's Department speed trailer, and flattened some corn crop. Several power poles were snapped. This tornado caused over \$33,000 (2014 dollars) in property damage and over \$13,000 (2014 dollars) in crop damage. No injuries or deaths were reported.
- On June 27, 2010, scattered thunderstorms developed and moved east from southwestern Wisconsin to southeastern Wisconsin during the late morning and early afternoon. A tornado spun up just northwest of the intersection of STH 11 and Wisconsin Street in the Village of Sturtevant and moved east-southeast through the northern part of the Village before dissipating near the Village of Elmwood Park. The tornado damaged roofs and windows of several homes, uprooted a tree that fell into a home, knocked over another tree that damaged a truck, and damaged two overhead doors at the Sturtevant Fire Department. One person was injured when the tornado winds blew into her home and pushed her three feet against a banister. Numerous vehicles in a Walmart parking lot had broken windows from airborne debris. A local business had two trailers overturned and three light poles snapped. At least two to three dozen trees were uprooted or had broken limbs. Nearly \$81,500 (2014 dollars) in property damages were caused by this tornado.
- On October 26, 2010, an EF1 tornado developed in far northern Kenosha County and entered Racine County near the intersection of CTH KR and 90th Street in the Village of Mount Pleasant. The tornado moved northeast and dissipated in the northeast section of Graceland Cemetery on the west side of the City of Racine, nearly 6 miles from where it began. The tornado blew a weakly anchored barn off its foundation in the southern portion of the County and damaged an industrial building south of STH 11. As it moved northeast into the City of Racine, the tornado tore off a 100-foot by 200-foot roof section of the Case New Holland building, damaged several HVAC units on the roof, and tore off some of the building's garage doors, injuring two employees. Additionally, a tractor and its semi-trailer on the Case New Holland site were blown over and damaged. Other businesses on STH 11 reported roof damage and at least three homes sustained damage. STH 11 was closed for a time in eastern Racine County due to debris and fallen power lines, closing or disrupting business at stores along that stretch. Numerous trees and a few power lines were blown down or broken along the path of the tornado. At one point, about 2,700 customers lost electrical power. The tornado path averaged 50 yards in width, with a maximum width of 100 yards. Property damages from this tornado were estimated at nearly \$1.09 million (2014 dollars).
- On November 22, 2010, an out-of-season round of severe thunderstorms developed in southeastern Wisconsin during the mid-afternoon and produced an EF1 tornado. The tornado moved into southern Racine County about two miles southwest of the Village of Union Grove and moved northeast before dissipating near the intersection of CTH K and CTH H, about a half-mile southeast of Franksville. The total path of the tornado measured over 10 miles long. Most of the damage from this tornado occurred in the Village of Union Grove. Eleven buildings along with fencing and trees were damaged on the Racine County Fairgrounds. Two businesses on STH 11 had large pieces of roof covering peeled off. One of these businesses had 10,000 square feet of its roof ripped off, which allowed rain to damage the inside offices and equipment. A residential-care facility had several of its buildings damaged. Nearly 100 homes in the Village of Union Grove sustained light to moderate damage to roofs, windows, and/or siding. Numerous gas leaks were reported. One home was extensively damaged and had to be demolished. On IH 94 near STH 20, a semi-trailer truck overturned, blocking the northbound lanes, as the tornado crossed the interstate. Another semi-trailer was blown over on eastbound STH 20 near the west frontage road next to the interstate. A number of campers were overturned and one was destroyed at the Burlington RV store at the intersection of STH 20 and IH 94. We Energies estimated that 3,200 customers lost electrical power in Racine County. Property damages from this tornado were estimated at over \$5.42 million (2014 dollars). There were no fatalities, but two people were injured in storm-related vehicle accidents.

Map 36

TORNADO EVENTS IN RACINE COUNTY: APRIL 1957 THROUGH DECEMBER 2014



Source: National Climatic Data Center and SEWRPC.

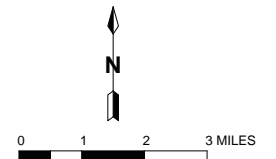


Table 38

TORNADO EVENTS REPORTED IN RACINE COUNTY: JANUARY 1, 1957 THROUGH DECEMBER 31, 2014

Number on Map 36	Date	City/Town/Village <sup>a</sup>	Magnitude (Fujita)	Length (miles)	Width (yards)	Deaths	Injuries	Property Damage (dollars) <sup>b</sup>	Crop Damage (dollars) <sup>b</sup>
1	April 19, 1957	Town of Burlington	F2	3	50	0	2	2,106,200	--
2	September 26, 1959	City of Racine	F1	19	50	0	2	2,033,825	--
3	October 8, 1959	Town of Raymond	F2	2	33	0	2	203,382	--
4	March 21, 1966	Village of Union Grove	F2	13	200	0	0	18,266,750	--
5	July 10, 1966	Town of Rochester	F1	1	33	0	0	182,668	--
6	September 28, 1972	Town of Norway	F2	1	50	0	0	141,588	--
7	June 20, 1978	Town of Waterford	F0	2	33	0	0	--	--
8	June 20, 1979	Village of Sturtevant	F1	--	--	0	1	81,520	--
9	June 6, 1980	Town of Norway	F1	<1	33	0	0	7,183	--
10	July 3, 1983	Town of Raymond	F1	<1	20	0	0	59,423	--
11	May 26, 1985	Town of Rochester	F0	<1	30	0	0	5,500	--
12	August 16, 1987	Village of Waterford	F0	<1	23	0	0	--	--
13	August 16, 1987	Town of Mt. Pleasant	F0	<1	23	0	0	--	--
14	August 18, 1997	Village of Waterford	F0	--	--	0	0	14,000	--
15	July 2, 2000	Town of Caledonia	F0	<1	30	0	0	13,748	--
16	August 25, 2001	Town of Yorkville	F1	4	50	0	0	33,418	13,367
17	September 27, 2007	Town of Raymond	EF0 <sup>c</sup>	<1	20	0	0	1,142	1,142
18	June 6, 2008	Town of Dover	EF0 <sup>c</sup>	3	50	0	0	21,990	--
19	June 27, 2010	Village of Elmwood Park	EF1 <sup>c</sup>	5	100	0	1	81,428	--
20	October 26, 2010	Village of Sturtevant	EF1 <sup>c</sup>	5	100	0	2	1,085,700	--
21	November 22, 2010	Village of Union Grove	EF1 <sup>c</sup>	11	150	0	0	5,428,500	--
Total	--	--	--	--	--	0	10	29,767,965	14,509

<sup>a</sup>Since these events, the Towns of Caledonia, Mt. Pleasant, and Rochester have incorporated as villages..

<sup>b</sup>Dollar values were adjusted to year 2014 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.

<sup>c</sup>Effective February 2007, the National Weather Service adopted a modified version of the Fujita Scale, the Enhanced Fujita Scale, for reporting magnitudes of tornado events.

Source: National Climatic Data Center and SEWRPC.

## **Vulnerability and Community Impact Assessment**

In order to assess the vulnerability of the Racine County area to tornado and related storm hazards, a review of the community assets described in Chapter II 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) 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, 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 can form quickly without ample warning. Because Doppler radar does not see below the cloud base, these tornadoes can be difficult to detect. As can be seen from the distribution of historic tornado events during the past 58 years, shown on Map 36, the locations of tornado impact points is widely scattered throughout the County, although the northwestern 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 nearly \$29.8 million of reported damages in Racine County (see Table 38). On average, the reported damages due to tornadoes have resulted in over \$1.4 million in damages per event. It should be noted that one event was responsible for over 61 percent of the total damages, so the average damages per event may not be representative of the damages that could be expected from a tornado affecting the County. On average, there is one tornado every 2.75 years (or about 0.36 tornado events per year) in Racine County. Over this period of record, tornado hazards have resulted in an average of about \$513,000 in property damages per year.

During a tornado, 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, also can be damaged by exposure to high winds, although more 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 a F4 event, the force of the wind alone can cause tremendous devastation, uprooting trees, toppling power lines, and inducing the failure of weak structural elements in homes and buildings.

In 2014, the total equalized assessed property value in Racine County was estimated at about \$13.6 billion. Based on the current average estimate of \$513,000 in reported damages per year, it can be expected that approximately 0.004 percent of the value of all property, including buildings and infrastructure, in Racine County will be damaged from these events each year. Due to the unpredictability of tornado events, all buildings, infrastructure, and critical facilities within the County are considered at risk.

## **Potential Future Changes in Tornado Conditions**

Changes in land use can have an impact on the potential for damage due to tornadoes and related hazards to occur. Such changes relate to the potential future increase in development within the County. As noted above, changing land use patterns within Racine County, as documented in the adopted regional land use plan and County land and water resource management plan, and summarized in Chapter II, 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 the 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 V.

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 that examined trends in tornados rated F1 or EF1 and higher over the period 1954 through 2013 found that the frequency of

outbreaks of multiple tornadoes may be changing.<sup>46</sup> While the study found no change in the frequency at which tornadoes occur, it found a decrease in the number of days per year on which at least one tornado occurs. At the same time, it found an increase in the number of days per year on which multiple tornadoes occur. Increasing trends were found at several different threshold for defining outbreaks of multiple tornadoes. Thus, the study found that the proportion of tornadoes that occur on “big tornado days” has increased. In addition, the study found that the spatial and temporal density of the tornadoes occurring has increased. The study concluded that the risk of “big tornado days” featuring clusters of densely packed tornadoes occurring is increasing. This trend could potentially increase tornado-related damages.

### **Multi-Jurisdictional Tornado Risk Management**

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

## **VULNERABILITY ASSESSMENT FOR EXTREME TEMPERATURES**

Heat and cold are two of the most underrated, least understood, and deadly of all the natural hazard events that impact Racine County. In contrast to the visible, destructive, and violent characteristics associated with floods and tornadoes, extreme high or low temperatures are “silent killers.” Deaths from extreme heat and cold occur quietly, without headline-making destruction. The Centers for Disease Control and Prevention (CDC) reports that nationwide between 2006 and 2010, excessive heat was the underlying cause of death for an average of 407 persons and a contributing cause of death for an average of 326 persons each year.<sup>47</sup> Over the same time period, the CDC reports that excessive cold was the underlying cause of death for an average of 638 persons and a contributing cause of death for an average of 693 persons each year.<sup>48</sup>

Excessive heat has become the most deadly hazard in Wisconsin. According to the National Weather Service, 116 people have died in Wisconsin directly as a result of heat waves from 1982 through 2008. This rate of mortality due to heat events during this period is almost four times greater than the next most deadly natural hazards, cold waves (31 deaths). Temperature data for two selected observation stations in the Cities of Burlington and Racine in Racine County are shown in Table 39. The table shows extreme high and low temperatures and the departure from average temperatures recorded in the period from 1990 through 2014. The average annual high and low extreme temperatures for these two stations are 94.5°F and 11.7°F for the City of Burlington and 95.2°F and 7.5°F for the City of Racine during this period. Prolonged exposure to either of these temperatures could present a significant danger. It should be noted that Lake Michigan may be exerting some effect on the average and the extreme cold temperature, but is not appreciably 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

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<sup>46</sup> James B. Elsner, Svetoslava C. Elsner, and Thomas H. Jagger, “The Increasing Efficiency of Tornado Days in the United States,” *Climate Dynamics*, Volume 45, pages 651-659, 2015.

<sup>47</sup> Jeffrey Berko, Deborah D. Ingram, Shubhayu Saha, and Jennifer D. Parker, “Deaths Attributed to Heat, Cold, and Other Weather Events in the United States, 2006-2010,” *National Health Statistics Reports*, No. 76, July 30, 2014.

<sup>48</sup> *Ibid.*

Table 39

**EXTREME TEMPERATURE AND DEPARTURE FROM AVERAGE  
TEMPERATURE CHARACTERISTICS WITHIN RACINE COUNTY: 1990-2014**

Date	Burlington Inland Site				Racine Lakeshore Site			
	High Temperature (°F)	Low Temperature (°F)	Average Annual Temperature (°F)	Departure from Average Temperature (°F)	High Temperature (°F)	Low Temperature (°F)	Average Annual Temperature (°F)	Departure from Average Temperature (°F)
1990	N/A	N/A	N/A	N/A	96.0	-7.0	48.7	+1.0
1991	98.0	-10.0	-.a	-.a	94.0	-6.0	48.2	+0.5
1992	90.0	-15.0	45.9	0.0	88.0	-7.0	46.0	-1.7
1993	92.0	-13.0	45.1	-0.8	94.0	-5.0	45.9	-1.8
1994	96.0	-26.0	45.6	-0.3	93.0	-24.0	46.9	+0.3
1995	105.0	-8.0	45.9	0.0	104.0	-5.0	46.6 <sup>b</sup>	-1.1
1996	95.0	-27.0	43.5 <sup>b</sup>	-2.4	96.0	-24.0	44.7	-3.0
1997	93.0	-13.0	44.5	-1.4	95.0	-11.0	46.5	-1.2
1998	94.0	-7.0	49.4	+3.5	95.0	-4.0	51.2	+3.5
1999	100.0	-22.0	47.2 <sup>b</sup>	+1.3	102.0	-16.0	49.3	+1.6
2000	96.0	-15.0	46.1 <sup>b</sup>	+0.2	90.0	-9.0	48.2	+0.5
2001	94.0	-8.0	-.a	-.a	97.0	1.0	49.4	+1.7
2002	97.0	-9.0	47.1	+1.2	98.0	-7.0	48.9	+1.2
2003	94.0	-.a	-.a	-.a	98.0	-5.0	46.9	-0.8
2004	90.0	-13.0	45.7	+0.2	91.0	-11.0	-.a	-.a
2005	95.0	10.0	46.9	+1.0	-.a	-.a	-.a	-.a
2006	95.0	14.0	47.6	+1.7	98.0	11.0	49.5	+1.8
2007	90.0	-19.0	46.5 <sup>b</sup>	+0.6	93.0	-13.0	48.3 <sup>b</sup>	+0.6
2008	92.0	-10.0	44.3	-1.6	90.0	-7.0	46.5	-1.2
2009	92.0	-23.0	44.4	-1.5	91.0	-16.0	46.3	-1.4
2010	91.0	-8.0	47.5	+1.6	91.0	1.0	49.0	+1.3
2011	97.0	-14.0	46.4 <sup>b</sup>	+0.5	100.0	-8.0	48.1 <sup>b</sup>	+0.4
2012	102.0	-4.0	48.6 <sup>b</sup>	+2.7	104.0	-1.0	51.1 <sup>b</sup>	+3.4
2013	94.0	-10.0	44.2 <sup>b</sup>	-1.7	96.0	-6.0	-.a	-.a
2014	87.0	-19.0	42.6	-3.3	90.0	-1.0	43.9	-3.8
Average	94.5	-11.7	45.9	--	95.2	-7.5	47.7	--

NOTE: N/A indicates data not available.

<sup>a</sup>Ten or more daily values missing.

<sup>b</sup>Average and/or total values computed with one to nine daily values missing.

Source: National Oceanic and Atmospheric Administration, National Climatic Data Center, and SEWRPC.

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 Table 40). 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 41.<sup>49</sup> 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. For example, during 2001 and 2002, there were 10 and 11 days, respectively, when weather conditions were forecast in Southeastern Wisconsin which could result in unhealthy levels of ozone (the main component of smog).

<sup>49</sup> High-risk groups include the very young, the old, and persons with chronic health conditions.



**Table 40**  
**HEAT INDEX CHART**

Temperature (°F)	Relative Humidity (percent)												
	100	95	90	85	80	75	70	65	60	55	50	45	40
	Heat Index (°F)												
80	87.2	86.4	85.6	84.9	84.2	83.6	83.0	82.4	81.8	81.3	80.8	80.3	79.9
82	94.5	93.0	91.5	90.1	88.8	87.6	86.4	85.4	84.4	83.6	82.8	82.5	81.5
84	102.7	100.3	98.0	95.9	94.0	92.2	90.5	88.9	87.5	86.3	85.1	84.1	83.3
86	111.5	108.3	105.3	102.5	99.8	97.3	95.1	93.0	91.1	89.4	87.9	86.6	85.4
88	121.2	117.1	113.2	109.6	106.3	103.1	100.2	97.6	95.1	93.0	91.0	89.4	87.4
90	131.6	126.6	121.9	117.5	113.3	109.5	105.9	102.7	99.7	97.0	94.6	92.5	90.7
92	142.8	136.9	131.3	126.0	121.0	116.4	112.2	108.3	104.7	101.4	98.5	96.0	93.8
94	154.8	147.9	141.3	135.2	129.4	124.0	119.0	114.4	110.2	106.3	102.9	99.8	97.2
96	167.5	159.6	152.1	145.0	138.3	132.1	126.4	121.0	116.1	111.7	107.6	104.0	100.9
98	181.0	172.0	163.5	155.5	147.9	140.9	134.3	128.2	122.6	117.4	112.8	108.6	104.9
100	195.3	185.2	175.7	166.7	158.2	150.2	142.8	135.9	129.5	123.6	118.3	113.5	109.3
102	210.4	199.2	188.5	178.5	169.0	160.1	151.8	144.1	136.9	130.3	124.3	118.8	113.9
104	226.2	213.8	202.1	191.0	180.5	170.7	161.4	152.8	144.8	137.4	130.6	124.4	118.9
106	242.7	229.2	216.4	204.2	192.6	181.8	171.6	162.0	153.1	144.9	137.3	130.4	124.2
108	260.1	245.4	231.3	218.0	205.4	193.5	182.3	171.1	161.9	152.8	144.4	136.7	129.8
110	278.2	262.2	247.0	232.5	218.8	205.8	193.5	182.0	171.2	161.2	152.0	143.4	135.7

Source: National Weather Service.

**Table 41**  
**LEVEL OF RISK FOR PERSONS IN HIGH RISK GROUPS ASSOCIATED WITH THE HEAT INDEX**

Heat Index (degrees Fahrenheit)	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.

The following definitions/criteria 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 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°, or 95°-99° for four or more consecutive days, and nighttime heat indices are greater than or equal to 75°. 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; and
- **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° for three or more hours, and nighttime heat indices are greater than or equal to 75°. 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 heat. 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 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.

Extreme cold is also a deadly hazard. Exposure to extreme cold temperatures can 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. Mild frostbite, known as frostnip, does not cause permanent skin damage and can be treated with first aid measures. More 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 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. Relative to temperature extremes, this occurs due to exposure to cold or frigid environments. As with frostbite, wind or wetness can contribute to producing hypothermia. Symptoms of mild hypothermia can include shivering, dizziness, hunger, nausea, fatigue, increased heart and respiration rates, lack of coordination, and difficulty speaking. As hypothermia worsens, shivering may end. 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 42 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

**Table 42**  
**WIND CHILL TEMPERATURES<sup>a</sup>**

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

<sup>a</sup>Wind Chill (°F) = 35.74 + 0.6215T - 35.75(V<sup>0.16</sup>) + 0.4275T(V<sup>0.16</sup>), 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.

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 temperature. 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 Racine 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.

### **Historical Extreme Temperature Problems**

Historically, most of the all-time maximum daily temperatures in Wisconsin were recorded during the Dust Bowl years between 1934 and 1936. The City of Racine reached a high temperature of 106°F on June 1, 1934. The highest temperature ever recorded in Wisconsin was 114°F, which occurred on July 13, 1936, at the Wisconsin Dells.

A severe heat wave in the summer of 1995 affected most of Wisconsin and resulted in 154 fatalities, 82 direct and 72 indirect. In addition, approximately 400 people received medical treatment due to heat-related causes. The 1995 summer heat wave holds the record as the number one weather-related killer in Wisconsin since it became a state in 1848. The heat wave was a highly rare and, in some respects, unprecedented event in terms of both unusually high maximum and minimum temperatures and the accompanying high relative humidity. In Racine County, on July 12, 1995, the National Weather Service issued a heat advisory, the next day that advisory was upgraded to an excessive heat warning. Temperatures reached 104°F and the heat index peaked at 125°F. This was the very first time that the National Weather Service in Sullivan, Wisconsin, had issued a heat advisory and an excessive heat warning.

On December 9, 1999, bitter-cold arctic air swept into Wisconsin on northwest winds of 20 to 40 mph. Temperatures dropped as much as 15°F in 15 minutes as the strong front moved through. Wind chill values ranged from -25°F to -50°F. In Milwaukee County, just north of Racine County, two people died directly from hypothermia, while hypothermia was a secondary cause indirectly related for one death in Dane County and one death in Kenosha County. An episode of extreme cold, which started in late January 1996, continued through the first four days of February across south-central and Southeastern Wisconsin. Wind chills were in the -35°F to 60°F range many times during this event that resulted in four cold-weather hypothermia deaths. In addition, there were 18 reported cases of sustained frostbite in Milwaukee County and a low temperature of -23°F recorded in the City of Racine.

### **Description of Recent Extreme Temperature Events**

Extreme temperatures that affect Racine 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 43 lists the extreme and record high and low temperature events in southeastern Wisconsin from October 1995 through December 2014.

#### ***Extreme Heat***

During the last two weeks of July 1999 an oppressive heat wave enveloped Racine County, peaking during the four days of July 28 through 31, 1999. Throughout these four days, high humidity and temperatures in the 90s and 100s produced heat index values from 110°F to as high as 125°F. The heat wave was directly and indirectly responsible

Table 43

**EXTREME TEMPERATURE EVENTS IN SOUTHEASTERN WISCONSIN  
OCTOBER 12, 1995 THROUGH DECEMBER 31, 2014**

Date	Type	Deaths	Injuries	Property Damage (dollars)	Crop Damage (dollars)
October 12, 1995	Record warmth	0	0	--	--
December 9, 1995	Extreme cold	0	0	--	--
January 30, 1996	Extreme wind chill	0	0	--	1,186
January 31, 1996	Extreme cold	0	2	--	1,186
February 1, 1996	Extreme cold	0	0	--	--
January 17, 1997	Extreme cold	0	0	--	--
March 26, 1998	Record warmth	0	0	--	--
November 23, 1998	Heat	0	0	--	--
December 1, 1998	Heat	0	0	--	--
January 5, 1999	Extreme cold	0	0	--	--
July 4, 1999	Excessive heat	0	0	--	--
July 23, 1999	Excessive heat	0	0	--	--
July 29, 1999	Excessive heat	1	0	--	--
November 8, 1999	Record warmth	0	0	--	--
November 13, 1999	Record warmth	0	0	--	--
July 21, 2001	Excessive heat	0	0	--	--
August 6, 2001	Excessive heat	0	0	--	--
April 15, 2002	Excessive heat	0	0	--	--
June 20, 2002	Excessive heat	0	0	--	--
June 22, 2002	Excessive heat	1	0	--	--
June 30, 2002	Excessive heat	0	0	--	--
July 1, 2002	Excessive heat	0	0	--	--
July 8, 2002	Excessive heat	0	0	--	--
July 21, 2002	Excessive heat	0	0	--	--
July 24, 2005	Excessive heat	0	0	--	--
December 18, 2005	Cold/wind chill	0	0	--	--
February 17, 2006	Cold/wind chill	0	0	--	--
February 18, 2006	Cold/wind chill	0	0	--	--
July 16, 2006	Heat	0	0	--	--
July 30, 2006	Heat	0	0	--	104
August 1, 2006	Heat	0	0	--	--
February 3, 2007	Cold/wind chill	0	0	--	--
February 5, 2007	Extreme cold/wind chill	0	0	5,709	--
January 19, 2008	Cold/wind chill	0	0	--	2,068
January 30, 2008	Cold/wind chill	0	0	--	2,068
February 10, 2008	Extreme cold/wind chill	0	0	--	2,511
December 15, 2008	Cold/wind chill	0	0	--	--
December 21, 2008	Cold/wind chill	0	0	--	--
January 14, 2009	Cold/wind chill	0	0	--	5,343
January 15, 2009	Extreme cold/wind chill	0	0	--	5,343
June 23, 2009	Heat	0	0	--	--
January 21, 2011	Cold/wind chill	0	0	--	12,045
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	--	--
January 21, 2013	Cold/wind chill	0	0	--	--
July 16, 2013	Heat	0	0	--	--
August 30, 2013	Heat	0	0	--	--
January 6, 2014	Extreme cold/wind chill	0	0	--	39,645
January 27, 2014	Extreme cold/wind chill	0	0	--	39,645
Total	--	2	2	5,709	111,144

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

for 20 deaths in Wisconsin, one of which was a 59-year-old man who died in his home in the City of Racine. During this time, there was record peak daily electric power demand in the Milwaukee area, and for that summer there was a record set for the Midwest region for electrical demand.

Another heat wave occurred in the summer of 2001 with three rounds of excessive heat in July and August which affected most of southeastern Wisconsin. Heat index temperatures reached 110°F, eight people died in the southeastern Wisconsin area, and numerous people suffered from heat-related sicknesses. No deaths or injuries attributable to this heat wave were reported in Racine County.

On July 24, 2005, a mid-summer heat wave developed across the Midwest and Great Lakes. High temperatures ranged from the middle 90s to around 100°F across parts of south central and southeastern Wisconsin. A maximum temperature of 99°F was reported in the City of Racine with an associated heat index of 110°F. There were no reports of heat-related fatalities or injuries associated with this heat wave.

A period of very hot and humid weather began on the evening of July 30, 2006 and continued into August 2nd. Depending on the day, overnight temperatures fell to between 70°F and the lower 80s during this stretch. Afternoon temperatures peaked in the 95 to 100 degree range. With dew points in the low to mid-70s, heat index values dropped to only about 75 overnight on July 30th, and peaked in the 105 to 110 degree range across south-central and southeast Wisconsin during the afternoons. The oppressive conditions continued during the overnight hours of August 1st with low temperatures around 80 degrees before a cold front swept through during the afternoon, ending the heat wave. Two deaths in Milwaukee County were attributed to this heat wave and an estimated 40 people in Milwaukee County were hospitalized due to heat-related symptoms. No deaths or injuries attributable to this heat wave were reported in Racine County.

July 2012 was the second warmest July on record. There were four periods of heat or excessive heat during this month: July 3 through 6, July 16 through 17, July 23, and July 25 (see Table 43). Two of these periods are described below.

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, 2012, bringing 100-degree heat to many locations for multiple days. While humidity levels were relative low, maximum heat indices reached between 100 and 115 during this hot spell. Daily maximum temperatures at the City of Racine reached 98°F on July 3, 104°F on July 4, 102°F on July 5, and 95°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 degrees combined with dew points near 70 degrees to produce heat index values between 100 and 108 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 degrees in several counties. The maximum heat index value in neighboring Kenosha County reached 103.

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

Table 44

## 1995 NATIONWIDE HEAT-RELATED FATALITIES BY AGE AND GENDER

Age Group	Female	Male	Total	Percent of Total
0 to 9 Years Old.....	6	6	12	1
10 to 19 Years Old.....	0	2	2	<1
20 to 29 Years Old.....	2	3	5	<1
30 to 39 Years Old.....	7	27	34	3
40 to 49 Years Old.....	15	64	79	8
50 to 59 Years Old.....	22	73	95	9
60 to 69 Years Old.....	50	129	179	18
70 to 79 Years Old.....	131	122	253	25
80 to 89 Years Old.....	145	96	241	24
90 Years Old and Older.....	51	10	61	6
Unknown.....	6	54	60	6
Total	425	586	1,021	100
Percent	43	57	100	--

Source: National Weather Service and SEWRPC.

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. During the 1995 nationwide heat wave, 67 percent of the fatalities occurred in the 60-year-old to 89 year-old age group (see Table 44).

### ***Extreme Cold***

An arctic high-pressure ridge, fresh, deep snow cover, clear skies, and light winds on January 5, 1999 allowed temperatures to plunge to well below zero across south-central and Southeastern Wisconsin. Several new low temperature records were set, -23°F at Janesville (Rock County) and -20°F in the City of Kenosha.

Very cold wind chill values affected all of south-central and southeast Wisconsin during the evening hours of February 17, 2006 through the morning hours of February 18, 2006 in the wake of the winter storm on the previous two days. After daytime maximum readings mostly in the mid-20s over the southeast corner of the State on the afternoon of February 17, temperatures dropped overnight. The lowest temperature readings during the early morning hours of February 18 were 10° degrees Fahrenheit at Racine. Brisk west to northwest winds gusted to 17 to 23 mph and wind chills dropped to 20°F to -34°F. Several outdoor activities and other social functions were cancelled.

Extreme cold temperatures and wind chills occurred over the four day period of February 3-6, 2007, as a massive arctic high-pressure system pushed southeast through the Western Great Lakes Region, resulting in the coldest temperatures and lowest wind chills of the 2006-2007 winter season. Low temperatures in southeastern Wisconsin were below 0 degrees Fahrenheit, ranging from -10 to -15 degrees on February 4. Afternoon high temperatures were in the single digits or below zero during this cold wave. On February 3rd and 4th, west to northwest winds were 15 to 30 mph, which generated wind chills generally in the 20°F to 30°F degree range, reaching lows of 35°F to 38°F in Racine County during the early morning hours of February 5.

One of the coldest arctic blasts in 10 to 15 years affected residents of south central and southeastern Wisconsin on January 15 and 16, 2009. Minimum air temperatures during the morning of January 15 ranged from -10°F in Sheboygan to -24°F in Sauk City. Maximum air temperatures on January 15 ranged from -8°F at Monroe to +1°F in the

several locations in Washington and Milwaukee Counties. Minimum air temperatures during the pre-dawn hours of January 16 were even colder, ranging between -11°F in Sheboygan to -35°F at the Lone Rock Airport in Sauk County. Dangerous wind chill values accompanied the arctic blast that occurred during the pre-dawn hours of January 16 and ranged from -35 in West Bend to -42 in Middleton. Numerous schools closed down on January 15 and 16, and many civic clubs activities were cancelled.

On January 21, 2013, 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 to -30. 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.

An arctic cold wave affected southern Wisconsin during the period of January 27 through 29, 2014. West to north-west winds of 10 to 20 mph with the passage of an arctic cold front brought wind chill temperatures of -20 to 38 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 to 38. 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. Two cold weather deaths occurred in the southeastern Wisconsin area.

Between October 1995 and December 2014, about \$5,700 in property damages and \$111,000 in crop damages, in 2014 dollars, have been reported as a result of extreme cold temperatures.

### **Vulnerability and Community Impact Assessment**

Temperature 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.

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 or 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. In some instances, a break may only affect a small local area. Other breaks may affect large portions of the distribution system. Frozen service laterals can also interrupt water supply to individual buildings. Water main breaks can also be costly to municipalities. In the first three months of 2014 alone, the City of Racine responded to 103 water main breaks, costing nearly \$450,000 to repair. Water main breaks are discussed further in the contamination or loss of water supply section below.

Property and crop damages have occasionally been reported as resulting from extreme temperature events. Table 43 shows that between 1995 and 2014, extreme temperature events have been reported as causing about \$5,700 in property damages and \$111,100 in crop damages (2014 dollars) in Racine County, with almost all of those damages resulting from extreme cold events. All of the property damages reported were from a single event. The property damages reported do not include municipal damage costs, and are assumed to be underestimates of actual damage



caused by extreme temperatures. On average, there are about 2.7 extreme temperature events per year in Racine County. Over this period of record, extreme temperature hazards have resulted in about \$5,850 in crop damages per year.

A review of the community assets described in Chapter II indicate the potential for extreme temperature 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. No specific cost data are estimated for temperature extreme events, because the nature of such events does not readily permit direct cost analysis.

### **Potential Future Changes in Extreme Temperature Conditions**

Based upon recent historical data, Racine County can expect to experience an average of 2.7 extreme temperature events per year. On average, these occur as 1.6 extreme heat events and 1.1 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 and 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, average summertime temperatures in Racine County are projected to increase by 5.5 to 6.0°F by year 2055. The number of days per year in which temperatures in southern Wisconsin exceed 90°F is expected to double from about 12 to about 25 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.

By contrast, the frequency of extreme cold events may decrease by the middle of the century. The projected warming trends are expected to be greatest during the winter. Average winter temperatures in Racine County are projected to increase by about 7.5°F. This may result in a reduction of some risks associated with extreme cold.

### **Multi-Jurisdictional Extreme Temperature Risk Management**

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

## **VULNERABILITY ASSESSMENT FOR LAKE MICHIGAN COASTAL HAZARDS**

The Lake Michigan coast in Racine County consists of about 14.8 miles of shoreline, encompassing portions of five local units of government, including the City of Racine, and the Villages of Caledonia, Mount Pleasant, North Bay, and Wind Point. 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 45. The land uses along the shoreline are documented in Chapter II.

There are three types of Lake Michigan coastal hazards which potentially affect Racine County, including:

- Erosion of coastal bluffs, beaches, and nearshore lakebeds;

- Flooding from high lake levels and storm-induced surge (temporary water level changes); and
- Damage to shoreline structures, such as residences, businesses, and public facilities, from storm waves, including wave run-up.

The focus of this vulnerability assessment is on the first type of hazard noted above, erosion of bluffs, beaches, and nearshore areas as that phenomenon is a documented hazard in Racine County where bluff recession rates exceeding 10 feet per year have been reported.<sup>50</sup> Bluff recession has destroyed, damaged, or jeopardized the integrity of private property such as homes, garages, sheds, and trees, as well as public property and infrastructure such as parklands, roads, and utilities.

The second hazard, flooding from high Lake levels, is being considered, along with flooding in other areas of the County. As shown on Maps 31 and 32, there are no structures identified in the floodplain associated with Lake Michigan. Those floodplain areas are delineated on the County large-scale topographic maps.

With regard to the third hazard, storm wave damage, there are assets in the County, primarily in the City of Racine, that are protected by sheet piling, breakwaters, and revetments. 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 County continues to routinely monitor and maintain the structures as needed.

### Historical Coastal Hazard Conditions

Coastal hazard problems have been most evident in Racine 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 record high levels occurring in 1986, surpassing the previous record high level set in 1886. Lake Michigan levels, as of April 2015, were about three inches above average levels, but well below the historic record high levels set in 1986.

In the fall of 1951, with Lake Michigan levels at its highest point in 91 years, a series of high wind events sent large waves shoreward that beat against the land and structures.<sup>51</sup> Six to eight ton boulders that were stacked to protect property were tossed over nearshore roads. Currents caused by the high winds produced eddying and scouring of the Lake bottom, uprooting masonry, piling, and piers. At the Racine Yacht Club, massive blocks of concrete were knocked down and water poured into the basement, causing over \$45,000 in damages.<sup>52</sup>

Table 45

### LAKE MICHIGAN SHORELINE LENGTH OF CIVIL DIVISIONS IN RACINE COUNTY

Civil Division	Lake Michigan Shoreline Length (feet)	Percent of County Total
Village of Caledonia .....	23,600	30.2
Village of Mt. Pleasant .....	13,360	17.1
Village of Wind Point .....	12,690	16.3
Village of North Bay .....	3,300	4.2
City of Racine .....	25,140	32.2
Total	78,090	100.0

Source: SEWRPC.

<sup>50</sup> J.P. Keillor and Robert DeGroot, Recent Recession of Lake Michigan Shorelines in Racine County, Wisconsin, University of Wisconsin Sea Grant College Program Advisory Services, April 1, 1978; SEWRPC Community Assistance Planning Report No. 86, A Lake Michigan Coastal Erosion Management Study for Racine County, Wisconsin, October 1982; and SEWRPC Technical Report No. 36, Lake Michigan Shoreline Recession and Bluff Stability in Southeastern Wisconsin: 1995, December 1997.

<sup>51</sup> Frank Sinclair, "Hungry Waves Take Big Bites Out of Shores," Milwaukee Journal, Page 1, November 18, 1951.

<sup>52</sup> Damages are expressed in 2014 dollars.

On March 9, 1987, 45- to 60 mph winds led to 10-foot waves that damaged beaches, flooded roads, and tossed debris onto the shore along Lake Michigan.<sup>53</sup> Severe shore erosion was reported in Racine County where some homeowners reported losing four feet of land. Pershing Park Drive in the City of Racine was closed after waves moved rocks as large as 18 inches in diameter over 300 feet inland. The roadway was also under a foot of water.

Low water levels can also cause problems with shore protection structures, such as rotting of normally submerged timber pilings being exposed to air. Low Lake levels can also significantly affect shipping, boating, and marina activity. During a March 2002 workshop,<sup>54</sup> Lake Michigan low-water-level problems were discussed as an important topic. With regard to Racine County, those problems include the potential for a rotted timber sheet pile-supported breakwater (constructed as a Federal breakwater). The damaged breakwater has since been repaired at a cost of about \$8 million to the County. Racine County hires a consultant every five years since it took ownership of the harbor in the 1980s to inspect all structures in the harbor. The study includes divers that inspect the bottom of each structure.<sup>55</sup>

A 1982 Lake Michigan coastal erosion management study,<sup>56</sup> prepared for Racine County with assistance from the Wisconsin Coastal Management Program, identified the extent of erosion at 101 locations along the shoreline. The study identified erosion rates of up to 10 feet per year over the period 1963 to 1980, with an average rate of 1.5 feet per year. That study included estimates of the economic value of the land and facilities within the 25-year and 50-year erosion risk distances within the County at \$6.4 million and \$12.9 million, respectively, in 1980 dollars. That study also noted that there were 216 shore protection structures in place in Racine County as of 1980, with about 30 percent either failing or not functional and 70 percent functional.

During the 1985-1986 period of high water levels, data collected by the Wisconsin Coastal Management Program indicated an estimated \$1.68 million of damages had occurred to public facilities in Racine County. During this same period, there was also a reported concern raised with regard to the City of Racine sewage treatment plant out-fall capacity which was noted could potentially be limited, should the lake levels continue to rise beyond the 1986 level, a phenomenon which did not occur.

### **Description of Recent Coastal Hazard Conditions**

As described in Chapter II, a 1997 study was prepared by SEWRPC and others in cooperation with the Wisconsin Coastal Management Program to evaluate shoreline erosion and bluff stability conditions along the Lake Michigan shoreline in southeastern Wisconsin, including Racine County.<sup>57</sup> That study found erosion 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.

The 1997 Lake Michigan shoreline evaluation reported Racine County had relatively stable conditions for the most part in areas where shoreline development exists. The areas with severely unstable bluffs were limited to the largely undeveloped shoreline in the northern part of the County. However, there is the potential for shoreline and bluff erosion to impact structures over the long term. In addition, during severe climatic conditions, such as high water

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<sup>53</sup> Don Behm, "Lake Michigan Waves Batter Pleasant Prairie," Milwaukee Journal, Page 4A, March 10, 1987.

<sup>54</sup> University of Wisconsin-Sea Grant Institute and Bay Lake Regional Planning Commission, Living with the Lakes Workshop, at University of Wisconsin-Green Bay, March 22, 2002.

<sup>55</sup> Schaaf, Mark, "County to Study Racine Harbor," Racine Journal Times, March 12, 2016.

<sup>56</sup> SEWRPC Community Assistance Planning Report No. 86, op. cit.

<sup>57</sup> SEWRPC Technical Report No. 36, op. cit.

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 seven sites in northern Racine County, offshore bathymetry was measured in 1995 and compared to 1977 data. Four sites showed significant improvement in shore erosion conditions with decreases in depth, while the others showed little change.

A Lake Michigan bluff recession rate study<sup>58</sup> covering the areas in three counties, including Racine County, was undertaken in 1997 by the Wisconsin Coastal Management Program. That study developed and evaluated alternative techniques for estimating bluff recession rates and included recession rates in the portions of Racine County which have bluff features. That study estimated rates of recession which ranged from no recession to up to 5.5 feet per year and an average erosion rate of less than 1.0 foot per year. The Wisconsin Coastal Management program staff submitted the recession rate data to the Federal Emergency Management Agency. That agency then incorporated the data in an April 2000 national study prepared by The Heinz Center,<sup>59</sup> which used the information, as well as numerous other study data, to estimate potential costs associated with lakeshore erosion on the Great Lakes to be \$30 million per year, in year 2000 dollars. The study also found that less than 5 percent of structures within 500 feet of the shore were within the 30-year erosion hazard zone as defined under the study.

A study of shoreline erosion and shoreline erosion control structures showed that in 2005 about 73 percent of the approximately 14.8 miles of Lake Michigan shoreline along Racine County are protected by a total of 350 shoreland protection structures consisting of groins, revetments, and seawalls or bulkheads.<sup>60</sup> Most of these structures were found to consist either of large dolomite/limestone blocks or large granite/metamorphic rock blocks. Structures consisting of poured concrete were also common. While the study found that about 70 percent of the structures were in good condition and about 15 percent of the structures were in fair condition, it indicated that many of the structures would require maintenance in three to five years from 2005, especially if water levels in the Lake rise. The study also concluded that at 2005 Lake levels, the effectiveness of the structures at preventing erosion was generally high; however, when water levels in Lake Michigan rise above 2005 levels, the effectiveness of the structures will decrease. The study identified 28 unprotected reaches along the Lake Michigan shoreline, eight of which were found to be actively eroding at the relatively low Lake Michigan water levels existing in 2005. These reaches are shown on Map 37. These actively eroding areas represent about 1.4 miles, or about 10 percent, of the Racine County coastline. The actively eroding reaches can be considered high-risk erosion areas. The study concluded that it is likely that significant erosion will occur at these sites if the frequency and severity of storms increase and/or if Lake Michigan water levels rise. In addition, this study identified two shoreline reaches with moderate erosion and six shoreline reaches with minor erosion.

Lake Michigan water levels are 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 and 2014 has led to less evapotranspiration, contributing to rising Lake levels. Beginning in 2015, residents in the Lake Park neighborhood of the Village of Mount Pleasant, whose homes reside on a bluff overlooking Lake Michigan, have

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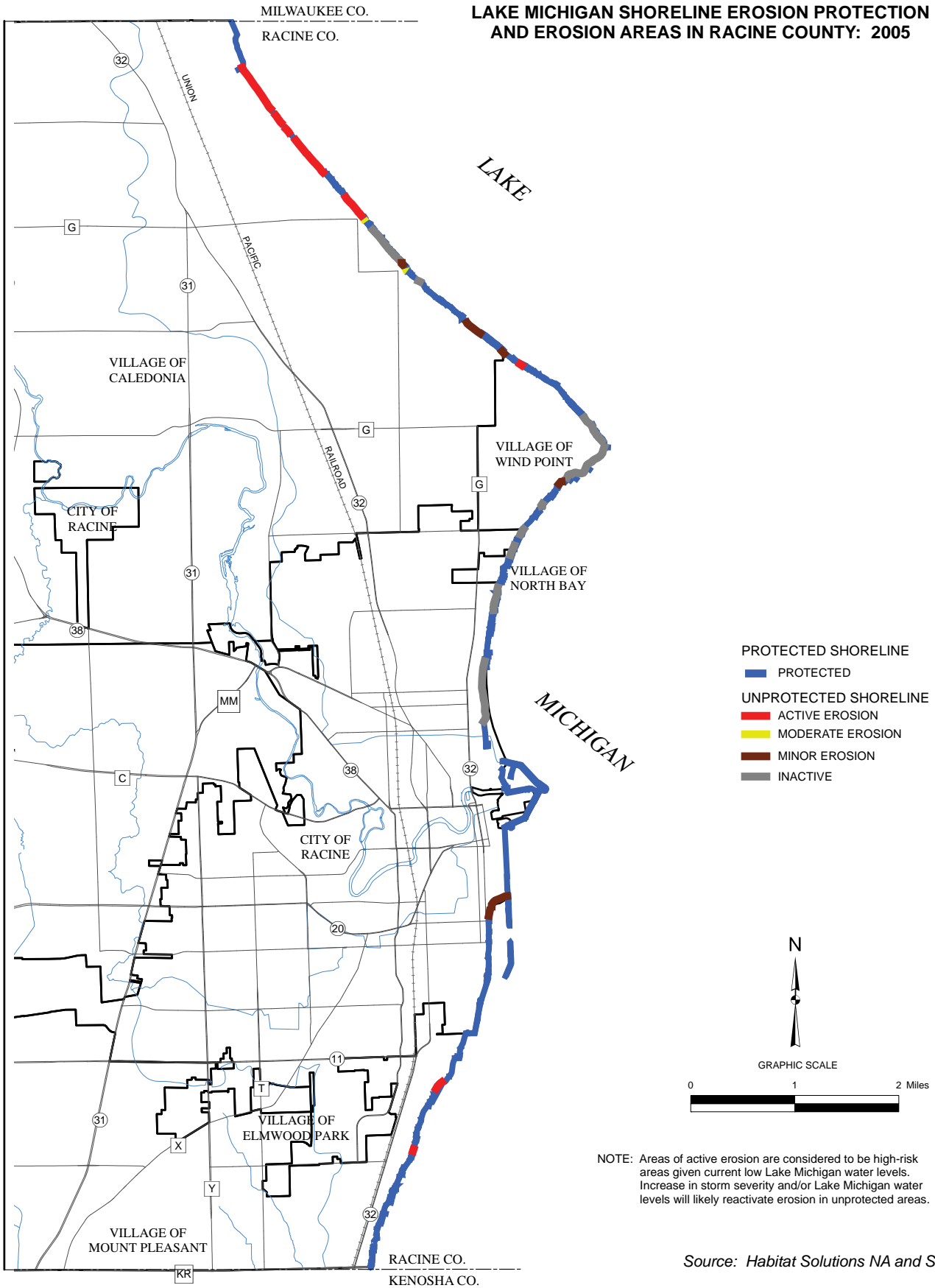
<sup>58</sup> *Wisconsin Department of Administration, Wisconsin Coastal Management Program, Mapping Erosion Hazard Areas (Lake Michigan), Racine, Ozaukee, and Manitowoc Counties, November 1997; and Short Elliot Hendrickson Inc., and Michael Baker Jr., Inc., Lake Michigan Recession Rate Study, Wisconsin Coastal Management Council, Manitowoc, Ozaukee, and Racine Counties, November 1997.*

<sup>59</sup> *The H. John Heinz III Center for Science, Economics and the Environment, Evaluation of Erosion Hazards, April 2000.*

<sup>60</sup> *SEWRPC Memorandum Report No. 171, Assessment of Lake Michigan Shoreline Erosion Control Structures in Racine County, January 2008.*

Map 37

LAKE MICHIGAN SHORELINE EROSION PROTECTION AND EROSION AREAS IN RACINE COUNTY: 2005



NOTE: Areas of active erosion are considered to be high-risk areas given current low Lake Michigan water levels. Increase in storm severity and/or Lake Michigan water levels will likely reactivate erosion in unprotected areas.

Source: Habitat Solutions NA and SEWRPC.

experienced significant erosion and bluff recession issues. The erosion has been caused by a combination of wave action reaching up to the bottom of the bluff and groundwater seepage from the top of the bluff. Some property owners have reported losing 40 feet or more of land due to the erosion. One home on Sheridan Road needed to be removed in April 2016, while another 10 to 12 homes are threatened by the receding bluff. In addition, public utilities and roads are at risk. In addition, several homes in the Village of Caledonia were also at risk due to Lake Michigan bluff erosion. As of June 2016, a project was underway to stabilize and reinforce the shoreline on a private property on Waters Edge Road. On Novak Road erosion had undercut the bluff where a home resides and the home's deck was at risk of falling into the Lake.

In May 2016 the Racine County Executive issued a declaration of emergency to better position the County to receive State and Federal assistance as well as to make personnel and resources available to assist affected residents. Several public meetings were hosted in the Village of Mount Pleasant in the summer of 2016 that included local, County, State, and Federal officials. The meetings provided information for property owners on temporary actions they can take to stabilize the bluff while more permanent solutions are explored. Long term solutions to stabilize bluffs could cost property owners tens of thousands of dollars, or more.<sup>61</sup>

The City of Racine beaches have seen little impact due to recent higher Lake levels. 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.

### **Vulnerability and Community Impact Assessment**

Shoreline erosion risk distances for 25 and 50 years were developed under the previously noted 1982 Racine County erosion management study. These distances were mapped on the County large-scale topographic maps. A review of the community assets described in Chapter II indicate the potential for coastal hazard impacts to: 1) a variety of floodprone residential, commercial, and other developed land uses; 2) agricultural lands; 3) a very limited extent of the roadway transportation system; 4) utilities associated with the potentially impacted roadways; and 5) some utilities located immediately along the lakeshore. No significant impacts are expected to other infrastructure or utility systems, solid waste disposal sites, or hazardous material storage sites. A review of mapping of critical community facilities, as shown on Maps 33 and 34, and the historic sites indicate that none of the facilities are at risk from erosion of coastal bluffs or beaches.

The 1982 plan also provided estimates of potential property losses due to Lake Michigan shoreline erosion and identified areas with the most severe hazards based on calculated nonstructural erosion risk distances. The nonstructural erosion risk distances indicate the future bluff edge location assuming shore protection structures were not implemented and maintained. The economic land and facilities located within the 25-year nonstructural erosion risk distance is approximately \$9.3 million in 1982 dollars, of which \$2.9 million, or 31 percent, represents the value of the land, and \$6.4 million, or 69 percent, the value of the facilities and improvements thereto. The economic value of the land and facilities located within the 50-year erosion risk distance is about \$12.9 million, of which \$4.0 million, or 31 percent, is the value of the land, and \$8.9 million, or 69 percent, is the value of the facilities.

The potential for bluff recession pose problems for both developed and undeveloped portions of the Racine County coastline. Some of the most severe potential erosion hazards in the coastal area identified in the 1982 study include:

1. Lake Park Neighborhood, Village of Mt. Pleasant: Bluff erosion was identified as a potential threat to public and private property in the Lake Park neighborhood in the Village of Mt. Pleasant, including several residences; a town park; and street ends. The 2005 assessment of Lake Michigan shoreline erosion control structures identified two actively eroding reaches along the shoreline totaling 530 feet in this general

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<sup>61</sup> Mark Schaaf, "Significant Erosion Due to Lake Surge," Racine Journal Times, August 23, 2015.

vicinity (see Map 37). Recent bluff failures affecting properties in the Lake Park neighborhood are described in the description of recent coastal hazard conditions section above.

2. City of Racine: Two reaches were identified as particularly subject to shoreline erosion in the City of Racine. One was the coastal reach between William Street and Augusta Street, north of the City of Racine Zoo. The City has installed shoreline protection measures along this reach and no further recession occurred between 1975 and 1995.<sup>62</sup> The second actively eroding reach extended from 14th Street to a point south of 16th Street. The erosion problems there being associated with a gap in the harbor breakwater to the east. The City has installed shore protection structures at this site and no recession was reported in the 1997 shoreline recession and bluff stability study or the 2005 assessment of shoreline erosion control structures.
3. Village of Caledonia: The highest recession rates in Racine County were observed in Section 6 of the Village of Caledonia. The area adjacent to the lake shore includes a village park, the Crestview Subdivision, Cliffside County Park, a rifle club target range, and private open space land. Shore protection measures were subsequently installed along the village park. The 2005 study identified five actively eroding reaches along the shoreline between the Racine-Milwaukee County line and Six Mile Road (see Map IV-8).

A potential utility problem relates to the potential impact of extreme high lake levels on the City of Racine wastewater treatment plant outfall and related facility hydraulic capacity. That vulnerability and the potential vulnerability of other public facilities is understandable, given historic and current Lake Michigan design levels. J. Philip Keilor, Coastal Engineer, with the University of Wisconsin-Sea Grant Institute (personal communication) reported that, since 1920, the U.S. Army Corps of Engineers used a method of selecting design high water elevation for Lake Michigan based upon a 20-year average of highest mean monthly water levels, plus a value for a short-term rise. It seems likely that most municipalities and their consulting engineers would have been influenced by Corps practice in selecting design water elevations for lakeside plants. A design high water elevation selected in 1930-1950 would have been significantly lower than a design high water elevation selected after 1970. The 1999 Corps of Engineers Lake Michigan Potential Damages Study has produced a set of high and low lake levels anticipated in Lake Michigan over the next 50 years.

In addition to major facility impacts, there are local utilities located in road rights-of-way which could be impacted if Lake erosion were to be severe enough to endanger portions of the street. One such site was identified<sup>63</sup> in the past adjacent to the Crestview Subdivision and the Village of Caledonia Chapla Park. However, the lakeshore in that area has since been stabilized.

A review of the Lake Michigan lakeshore erosion conditions within Racine 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. 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.

### **Potential Future Changes in Coastal Hazard 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

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<sup>62</sup> *SEWRPC Technical Report No. 36*, op. cit.

<sup>63</sup> *SEWRPC Community Assistance Planning Report No. 86*, A Lake Michigan Coastal Erosion Management Study for Racine County, Wisconsin, October 1982.

communities of Racine 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 provides for a larger setback for development in areas where structural protection is not envisioned to be used due to limited planned urban development.

As discussed in the sections above, Lake Michigan water levels have risen more than three feet since January 2013, causing some residents in the Villages of Caledonia and Mount Pleasant 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 fluctuate but are currently higher than the long-term average. 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 V.

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; increase in precipitation, especially during fall, winter, and spring months; and increases in the frequency of heavy precipitation events. Wind strengths have increased over the Great Lakes and are expected to continue increasing into the future.<sup>64</sup> In addition, wind patterns over Lake Michigan have altered. Prevailing winds during summer months shifted from coming from the southwest during the 1980s to coming from the east after 1990.<sup>65</sup> 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 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.<sup>66</sup> 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. The Third National Climate Assessment in 2014 adopted the conclusions of the 2012 International Upper Great Lakes Study on Lake Superior Regulation, which predicted a slight decrease or even a slight rise in Great Lakes water levels by 2040.<sup>67</sup>

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<sup>64</sup> *Desai, Austin, Bennington, and McKinnley, 2009, op.cit.*

<sup>65</sup> *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.*

<sup>66</sup> *Wisconsin Initiative on Climate Change Impacts, 2011, op. cit.*

<sup>67</sup> *U.S. Global Change Research Program, 2014 National Climate Assessment; International Upper Great Lakes Study Board, Lake Superior Regulation: Addressing Uncertainty in Upper Great Lakes Water Levels, Final Report to the International Joint Commission, March 2012.*



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 will 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. This could cause a major slope failure.

#### **Multi-Jurisdictional Coastal Hazard Conditions Risk Assessment**

Coastal erosion and bluff stability hazards have been identified as a moderate risk in Racine County. As shown on Map 37 and Map 9 in Chapter II of this report, hazard areas, including areas of recent active erosion, have been identified within four of the 17 general-purpose local units of government in the County, including the City of Racine and the Villages of Caledonia, Mount Pleasant, and Wind Point. In addition, there is a need for continued surveillance of coastal conditions in the Villages of North Bay and Wind Point. Those communities are noted in Table 46, along with the basis of special consideration over and above the countywide consideration.

### **VULNERABILITY ASSESSMENT FOR WINTER STORMS**

Winter storms can vary in size and strength and include heavy snow storms, 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:

- **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 degrees Fahrenheit 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 midwinter. Snowfall amounts in Racine County average 38 inches per season in the far southwest corner to about 45 inches near Lake Michigan.

### Historical Winter Storm Problems

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, northwest wind storms can reach higher speeds. Blizzards are more likely to occur in northwestern Wisconsin than in southern portions of the State, even though heavy snowfalls are more frequent in the southeast. Blizzard-like conditions often exist during heavy snowstorms when gusty winds cause severe blowing and drifting of snow. Heavy snow and ice storms have been a part of nearly every winter in Racine County history. There have been 120 winter weather events reported since 1994. All of these storms contained some form of snow, sleet, freezing rain, or slippery road conditions (see Table 47). A heavy snowstorm may cause schools and businesses to close, delay or cancel airline flights, and create treacherous roadway travel conditions.

Ice and sleet storms can occur at any time throughout the winter season from October into April. The majority of these storms occur in west-central to north-east Wisconsin, based on data from 1982-2014. In a typical winter season there are three to five light freezing rain events. On average, a major ice storm occurs about once every other year somewhere in the State, once every seven years over southeastern Wisconsin, and about once in every four years in west-central Wisconsin. If one-half inch of rain freezes on trees and utility wires, extensive damage can occur, especially if accompanied by high winds that compound the effects of the added weight of the ice. There are also between three and five instances of glazing (less than one-quarter of an inch of ice) throughout the State during a normal winter.

In March 1976 a disastrous ice storm occurred in the southern portion of the State. This storm was of such magnitude and caused such a significant amount of damage that a Presidential disaster declaration was obtained. This storm affected 22 counties, resulted in extensive power outages and caused over \$50 million in damage in 1976 dollars.

Near-blizzard conditions occurred in January 1979 when record snowfalls were recorded in many areas of the State and winds gusted to over 30 mph. Many persons were isolated from assistance and services as roads drifted shut and highway crews were unable to keep them open. Conditions were extremely hazardous in the City of Milwaukee and Racine County where a Presidential Emergency Declaration was obtained to assist in snow removal operations. The

Table 46

### COMMUNITIES IN RACINE COUNTY WITH SPECIAL COASTAL HAZARD CONDITIONS

Community	Reason for Special Consideration
City of Racine	Identified historic and potential future hazard areas for high water level to affect sewage treatment plant
Village of Caledonia	Identified historic and potential future hazard areas and areas of active erosion
Village of Mt. Pleasant	Identified historic hazard areas and areas of active erosion
Village of Wind Point	Identified area of active erosion, need for surveillance
Village of North Bay	Need for surveillance

NOTE: See Map 9 and Map 37 in Chapter II of this report.

Source: SEWRPC.

winter of 1981-82 recorded a storm event, with extremely cold temperatures, accompanied by high winds gusting to 50 mph. Wind chill factors reached 100 degrees below zero and severely affected the health and safety of those who ventured outdoors. A statewide blizzard occurred December 2-4, 1990, depositing 10 or more inches of snow across the central and southern portions of the State. This excessive snowfall throughout such a large area of the State severely hampered capabilities to clear and remove snow.

### **Description of Recent Winter Storm 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 Racine County is approximately 85 days.

The winter of 1998-99 was quite mild, however a heavy snowfall occurred on January 1-3, 1999. More than 10 inches fell in most southern counties with parts of Racine, Kenosha, Milwaukee, Ozaukee, Walworth, Washington, and Waukesha Counties receiving more than 18 inches of snow.

December 2000 was one of the 10 coldest Decembers on record for most of the State. In addition, record or near record snow depths of 15 to 34 inches occurred in much of southern Wisconsin during December. Racine County was included in a Presidential Emergency Declaration area, receiving a total of \$279,000 in Federal funds for extraordinary expenses associated with clearing roads and emergency response efforts.

Two heavy snowfalls occurred in Racine County during January 2005. Over the period January 4-6, 2005, low pressure in the southwestern United States pulled large amounts of moisture from the Gulf of Mexico and eastern Pacific Ocean over a stationary front located over Illinois, Iowa, and Missouri. Widespread heavy snow developed in northern Illinois and moved into southern Wisconsin, resulting in heavy snowfall in Racine County. Accumulations of snow ranged between 10 and 12 inches in southern portions of the County and between eight and 10 inches in northern portions of the County. Heavy snow also developed in Southeastern Wisconsin on the evening of January 21, 2005 and persisted into January 22. Snowfall rates overnight were in the two to three inch per hour range at times. Total storm accumulations ranged generally from seven to 11 inches, with the heaviest accumulations near Lake Michigan. After the storm was over, lake effect snow produced an additional three to four inches of snow across the Region for a two-day total accumulation of 10 to 15 inches. In addition to heavy snow, winds began to strengthen to 20 to 30 miles per hour, with gusts up to 45 miles per hour, by the morning of January 22. This produced considerable blowing and drifting snow and blizzard conditions at times. Although hundreds of traffic accidents were reported, the storm swept through on a Friday night and road crews had an easier time clearing roadways without the presence of rush hour traffic on Saturday. An elderly man in the City of Racine died from a heart attack while shoveling the snow that fell from this storm.

The 2007-2008 winter season in Wisconsin was “one-for-the ages.” Numerous winter storms, including a couple of blizzards and four ice storms, heavily affected the southern half of the State. Winter snowfall totals of 70 to 122 inches across the southern counties established new all-time winter snowfall records at many locations. Portions of eastern Racine County received in excess of 100 inches of snow during this winter. These totals were roughly 200 to 240 percent of normal, and many communities ran out of salt, or were unable to purchase additional supplies due to increased demand. The worst storm of the winter occurred on February 5-6, 2008, southeast of a line from Dubuque, Iowa to Madison to Sheboygan when 12 to 21 inches of snow fell. About 15 inches fell in Rochester, Union Grove, and Wind Point. Several roads in southeast Wisconsin were closed by the intense snowfalls and blowing snow. Racine County was included in a Presidential Emergency Declaration area, receiving a total of \$475,000 in Federal funds for extraordinary expenses associated with clearing roads and emergency response efforts.

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

Table 47

## WINTER STORM AND ICE STORM EVENTS IN RACINE COUNTY: JANUARY 5, 1994 THROUGH DECEMBER 31, 2014

Date	Location (description)	Type	Deaths	Injuries	Property Damages (dollars) <sup>a</sup>	Crop Damages (dollars) <sup>a</sup>
January 5, 1994	Central and southern Wisconsin	Heavy snow	0	0		
January 26, 1994	All but far northwest Wisconsin	Heavy snow/ice storm	0	0		
February 7, 1994	Southern and eastern Wisconsin	Heavy snow	0	0		
February 12, 1994	Southeastern Wisconsin	Heavy snow	0	0		
February 22, 1994	Southern half of Wisconsin	Heavy snow	0	0		
February 25, 1994	Southern half of Wisconsin	Heavy snow	0	0		
December 5, 1994	Southern Wisconsin	Heavy snow	0	0		
January 1, 1995	Southeastern Wisconsin	Heavy snow	0	0		
February 26, 1995	Southern Wisconsin	Ice storm	0	0		
November 26, 1995	Central and southern Wisconsin	Heavy snow	0	1		
December 13, 1995	Southern Wisconsin	Glaze	0	0		
January 5, 1996	Southeastern Wisconsin	Heavy snow	0	0		
January 16, 1996	South-central and southeastern Wisconsin	Winter Weather	0	0	0	0
January 23, 1996	South-central and southeastern Wisconsin	Winter Weather	0	0	0	0
January 29, 1996	South-central and southeastern Wisconsin	Blizzard	0	0	0	0
January 15, 1997	Southeastern Wisconsin	Heavy snow	0	0		
January 16, 1997	South-central and southeastern Wisconsin	Blizzard	0	0	0	0
January 8, 1998	Eastern one-third of Wisconsin	Winter storm	0	0		
January 2, 1999	South-central and southeastern Wisconsin	Blizzard	0	0	2,842	0
March 9, 1999	Southeastern Wisconsin	Winter storm	0	0		
February 18, 2000	Southern Wisconsin	Winter storm	0	0		
April 7, 2000	Southeastern Wisconsin	Winter storm	0	0		
December 11, 2000	Southeastern Wisconsin	Heavy snow	0	0		
December 18, 2000	South-central and southeastern Wisconsin	Heavy snow	0	0		
March 2, 2002	South-central and southeastern Wisconsin	Heavy snow	0	0		
February 3, 2003	South-central and southeastern Wisconsin	Winter weather/mix	0	0		
April 4, 2003	Southeastern Wisconsin	Winter weather/mix	0	0		
April 7, 2003	Southern Wisconsin	Winter weather/mix	0	0		
January 4, 2004	South-central and southeastern Wisconsin	Winter weather/mix	0	0		
January 16, 2004	South-central and southeastern Wisconsin	Winter weather/mix	0	0		
February 8, 2004	South-central and southeastern Wisconsin	Winter weather/mix	0	0		
November 30, 2004	Southeastern Wisconsin	Winter weather/mix	0	0		
December 18, 2004	South-central and southeastern Wisconsin	Winter weather/mix	0	0		
January 6, 2005	South-central and southeastern Wisconsin	Winter storm	0	0		
January 22, 2005	Southern Wisconsin	Winter storm	0	0		
January 20, 2006	Southeastern Wisconsin	Heavy snow	0	0		
December 1, 2006	South-central and southeastern Wisconsin	Blizzard	0	0	0	0
January 12, 2007	Southeastern Wisconsin	Winter weather	0	0	0	0
January 14, 2007	Southeastern Wisconsin	Winter weather	0	0	0	0
January 21, 2007	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
February 13, 2007	Southeastern Wisconsin	Winter weather	0	0	0	0
February 23, 2007	Southeastern Wisconsin	Winter weather	0	0		
March 2, 2007	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
April 11, 2007	South-central and southeastern Wisconsin	Winter storm	0	0	11,418	0
November 21, 2007	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 1, 2007	Southeastern Wisconsin	Winter storm	0	0		
December 4, 2007	Racine County	Lake-effect snow	0	0	0	0
December 11, 2007	South-central and southeastern Wisconsin	Ice storm	0	0	0	0
December 15, 2007	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 28, 2007	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
January 21, 2008	Racine County	Winter weather	0	0	0	0
January 29, 2007	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
January 31, 2007	Southeastern Wisconsin	Winter storm	0	0	0	0
February 3, 2008	Southeastern Wisconsin	Winter weather	0	0		
February 9, 2008	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
February 11, 2008	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
February 17, 2008	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
February 25, 2008	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
March 21, 2008	South-central and southeastern Wisconsin	Winter storm	0	0	0	0
November 24, 2008	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
November 30, 2008	South-central and southeastern Wisconsin	Winter storm	0	0	0	0
December 1, 2008	South-central and southeastern Wisconsin	Winter storm	0	0	0	0
December 3, 2008	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 16, 2008	South-central and southeastern Wisconsin	Winter weather	0	0	0	0

Table 47 (continued)

Date	Location (description)	Type	Deaths	Injuries	Property Damages (dollars) <sup>a</sup>	Crop Damages (dollars) <sup>a</sup>
December 18, 2008	South-central and southeastern Wisconsin	Winter storm	0	0	0	0
December 21, 2008	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 23, 2008	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 24, 2008	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 25, 2008	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
January 3, 2009	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
January 9, 2009	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
January 12, 2009	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
January 13, 2009	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
January 14, 2009	Racine County	Lake-effect snow	0	0	0	0
February 21, 2009	South-central and southeastern Wisconsin	Winter storm	0	0	0	0
February 26, 2009	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
March 28, 2009	Southeastern Wisconsin	Winter storm	0	0	0	0
December 8, 2009	Southern Wisconsin	Winter storm	0	0	0	4,219
December 23, 2009	South-central and southeastern Wisconsin	Winter storm	0	0	0	4,219
January 7, 2010	South-central and southeastern Wisconsin	Winter storm	0	0	0	0
February 9, 2010	Southern Wisconsin	Winter storm	0	0	0	0
February 24, 2010	Southeastern Wisconsin	Winter weather	0	0	0	0
March 19, 2010	Southern Wisconsin	Winter weather	0	0	0	0
December 3, 2010	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 9, 2010	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 12, 2010	Southeastern Wisconsin	Winter weather	0	0	10,857	0
December 20, 2010	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 25, 2010	Southeastern Wisconsin	Lake-effect snow	0	0	0	0
January 17, 2011	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
February 1, 2011	Southern Wisconsin	Blizzard	1	0	0	0
February 6, 2011	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
February 21, 2011	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 29, 2011	Southern Wisconsin	Winter weather	0	0	0	0
January 12, 2012	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
January 17, 2012	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
January 20, 2012	Southern Wisconsin	Winter weather	0	0	0	0
February 23, 2012	Southern Wisconsin	Winter weather	0	0	0	0
March 2, 2012	South-central and southeastern Wisconsin	Winter storm	0	0	0	0
January 27, 2013	Southern Wisconsin	Winter weather	0	0	0	0
January 30, 2013	Southeastern Wisconsin	Winter weather	0	0	0	0
February 7, 2013	South-central and southeastern Wisconsin	Winter storm	0	0	0	0
February 22, 2013	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
February 26, 2013	South-central and southeastern Wisconsin	Winter storm	0	0	0	0
March 5, 2013	South-central and southeastern Wisconsin	Winter storm	0	0	0	0
March 18, 2013	Southern Wisconsin	Winter weather	0	0	0	0
November 25, 2013	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 8, 2013	South-central and southeastern Wisconsin	Winter weather	0	0	0	0
December 19, 2013	Southern Wisconsin	Winter weather	0	0	0	0
December 22, 2013	Southern Wisconsin	Winter storm	0	0	0	0
December 31, 2013	Southern Wisconsin	Winter weather	0	0	0	0
January 1, 2014	Southern Wisconsin	Winter weather	0	0	0	0
January 10, 2014	Southern Wisconsin	Winter weather	0	0	0	0
January 14, 2014	Southern Wisconsin	Winter weather	0	0	0	0
January 24, 2014	Southern Wisconsin	Winter weather	0	0	0	0
January 26, 2014	Southern Wisconsin	Winter weather	0	0	0	0
February 4, 2014	Southeastern Wisconsin	Winter weather	0	0	0	0
February 13, 2014	Southern Wisconsin	Winter weather	0	0	0	0
February 17, 2014	Southeastern Wisconsin	Winter storm	0	0	0	0
March 4, 2014	Southern Wisconsin	Winter weather	0	0	0	0
November 22, 2014	Southern Wisconsin	Winter weather	0	0	0	0
--	--	Total	1	1	25,117	8,438

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 occur somewhat frequently but are not included in this table.

Source: National Climatic Data Center.

into the State through the evening. Twenty-four hour snowfall totals were between 20 and 26 inches, with 24 inches of snow reported at the Racine Wastewater Treatment Plant, setting a one-day record. This was in addition to several inches of snow that had fallen on January 31. In the City of Racine, this storm set new two-day and three-day snowfall records, with snowfall totals of 26 inches. Very strong winds were associated with this storm for an extended period of time. Sustained northeast winds of 30 to 40 mph were common through 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 four to 12 feet were common, with reports of some drifts reaching up to 15 feet in open rural areas. Drifting snow closed county highways and roads with many stranded motorists having to be rescued from vehicles buried in the drifting snow. The Racine Fire Department responded to 150 emergency calls related to the storm. About 100 National Guardsmen were mobilized statewide 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 Yorkville woman died from exposure when she became disoriented in the whiteout conditions, after she was dropped off by a tow truck driver at her driveway and was unable to find her way into her home. An estimated \$1.4 million was spent in Racine County for snow removal. Trucks were forced to dump snow cleared from roadways at Pershing Park, where snow piles reached 70 feet in height. A Presidential disaster declaration was issued for 11 Wisconsin Counties, including Racine County, as a result of the Groundhog Day Blizzard of 2011. Racine County received almost \$825,000 in public assistance under this declaration.

### **Vulnerability and Community Impact Assessment**

Prior to 1994, the reports of winter storms in the NCDC database are irregular. Between 1994 and 2014, 120 winter weather events have affected Racine County. Based on this, it is estimated that Racine County experiences an average of 5.7 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 zero winter storm events in some years and as many as 21 winter storm events in other years (Table 47).

The NCDC database contains few reports of property damages and crop damages for winter storms. For Racine County, records of crop insurance indemnities from the U.S. Department of Agriculture Risk Management Agency show that about \$8,400 (2014 dollars) have been paid out due to damage caused by winter storms. Since 1994, about \$25,100 (2014 dollars) in property damages have been reported as having been caused by winter weather events in Racine County. Given that the County received almost \$825,000 in public assistance under the disaster declaration related to the Groundhog Day blizzard of 2011, the reported damages in the NCDC database clearly represent an underestimate of the potential damages associated with severe winter storms impacting Racine 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 and 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, 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.

A review of the community assets described in Chapter II indicates there is a potential for winter storm hazard events to impact: 1) residents at a countywide level, 2) roadway transportation system, 3) utilities, and 4) the operation of critical community facilities.

### **Potential Future Changes in Winter Storm Conditions**

Based upon recent historical data from the period 1994-2014, Racine County can expect to experience an average of 5.7 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 Racine County over the 21st century. It is projected that by 2055, the average amount of precipitation that Racine County receives during the winter will increase by about 0.5 to 1.0 inch (measured as water), an increase of about 25 percent. 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 affected by climate change. A lack of ice cover over Lake Michigan during the winter promotes the development of lake effect snow. Rising temperatures during the winter will reduce the frequency and extent of ice cover over the Lake. Because the increase in temperature may also result in some of this precipitation falling as rain, it is not clear whether this will lead to an increase in the frequency of lake effect snow events.

### **Multi-Jurisdictional Winter Storm Risk Management**

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

## **VULNERABILITY ASSESSMENT FOR 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:

1. 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;
2. Hydrological drought: The effects of precipitation shortfalls on streamflows, reservoir, lake, and groundwater levels;
3. Agricultural drought: Soil moisture deficiencies relative to water demands of crop life; and
4. Socioeconomic drought (or water management drought): Occurs when the demand for water exceeds the water supply, resulting in a water shortage.

A drought's severity depends on several factors, including its duration, its intensity, its geographic extent, and the demands for water for use by both humans 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 the lingering of its effects after its apparent end. 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.

Wisconsin is vulnerable to agricultural drought. The State has approximately 14.6 million acres of farmland on 70,000 farms.<sup>68</sup> 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 Racine County due to drought over the period 1963 through 2014 are shown in Table 48. These estimates come from two sources: event descriptions in the NCDC storm events database and records of indemnities paid to agricultural operators by Federal crop insurance programs.<sup>69</sup> For those years in which loss estimates were available from both the NCDC and crop insurance indemnities, the larger value was used to estimate losses due to drought for that year. The loss estimates 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, loss estimates derived from these two sources are likely to represent 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 Racine County experienced crop damages in excess of \$4.94 million (2014 dollars) between 1963 and 2014. Based on this, average annual crop losses due to drought in Racine County are estimated to be about \$95,100.

### **Historical Drought Problems**

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 had at least a 75-year recurrence interval in most of the State and over 100-year recurrence interval in certain areas. The severe economic impact of the Depression compounded its effects. The drought continued with somewhat decreased effect until the early 1940s in some parts of the State.

The drought that occurred during 1948-1950 was most significant in the northern part of the State. In the most severely affected areas, the drought had a recurrence interval of greater than 70 years. The drought of 1955-1959 had a recurrence interval of between 30 and 70 years in all but the northwestern corner of Wisconsin.

The drought of 1976-1977 was most severe in a wide band stretching from north to south across the State. Stream flow measuring stations recorded low flow recurrence intervals from 10 to 30 years. Agricultural losses during this drought were set at \$624 million. Sixty-five counties, not including Racine County, were declared Federal drought

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<sup>68</sup> *U.S. Department of Agriculture National Agricultural Statistics Service, 2012 Census of Agriculture: Wisconsin State and County Data, Volume 1, Geographic Area Series, Part 49, May 2014.*

<sup>69</sup> *Payments of crop insurance indemnities are reported by the U.S. Department of Agriculture Risk Management Agency.*



Table 48

## ESTIMATES OF CROP LOSSES DUE TO DROUGHT IN RACINE COUNTY: 1963-2014

Year	NCDC Loss Estimate (dollars) <sup>a</sup>	Crop Insurance Indemnity Paid (dollars) <sup>a</sup>	Loss Estimate Used in Risk Assessment (dollars) <sup>a,b</sup>
1963	--	29,252	29,252
1964	--	10,348	10,348
1965	--	33,211	33,211
1966	--	17,171	17,171
1970	--	9,250	9,250
1971	--	3,916	3,916
1973	--	6,302	6,302
1974	--	17,200	17,200
1975	--	17,337	17,337
1976	--	66,391	66,391
1977	--	1,387	1,387
1979	--	19,134	19,134
1981	--	20,244	20,244
1985	--	26,133	26,133
1988	--	286,782	286,782
1989	--	17,880	17,880
1990	--	2,168	2,168
1991	--	137,388	137,388
1992	--	73,523	73,523
1994	--	33,173	33,173
1995	--	41,541	41,541
1996	--	87,189	87,189
1997	--	1,676	1,676
1998	--	12,944	12,944
1999	--	191,215	191,215
2000	--	6,030	6,030
2001	--	197,897	197,897
2002	657,950	318,271	657,950
2003	--	415,061	415,061
2004	--	12,518	12,518
2005	--	498,357	498,357
2006	--	2,533	2,533
2007	28,545	11,440	28,545
2008	--	616,347	616,347
2009	--	8,341	8,341
2010	--	1,538	1,538
2011	--	58,901	58,901
2012	--	1,211,969	1,211,969
2013	--	60,947	60,947
2014	--	5,556	5,556
Total	686,495	4,588,461	4,945,245

<sup>a</sup>Dollar values were adjusted to year 2014 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.

<sup>b</sup>For those years in which loss estimates were available from both the NCDC and crop insurance indemnities, the larger value was used.

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

areas and deemed eligible for assistance under the Disaster Relief Act. Additionally, numerous private and municipal wells went dry due to the lowered groundwater tables. Federal assistance was also obtained to assist communities in drilling new wells and obtaining new water supplies.

In 1987 and 1988 Wisconsin experienced one of the most severe droughts in recent history. It was characterized not only by below normal precipitation, but also by persistent dry air and above normal temperatures throughout the Midwest. Streamflow measuring stations indicated low flow recurrence intervals of between 75 and 100 years. The drought's effects were most severe in north central and northeastern Wisconsin. The drought occurred early in the growing season and resulted in a 30 to 60 percent crop loss, with agricultural losses set at \$1.3 billion. Fifty-two percent of the State's farms were estimated to have crop losses of 50 percent or more, with 14 percent estimated having losses of 70 percent or more. Agricultural operators in Racine County received about \$287,000 in crop insurance indemnities for losses caused by drought in 1988 (2014 dollars, see Table 48). In addition to crop losses, fish, birds, and wildlife were adversely affected. The amount of electric power generated by hydroelectric plants was reduced by as much as 80 percent as a result of the low water levels associated with this drought. A combination of State and Federal drought assistance programs helped the State's farmers recover a portion of their losses. All Wisconsin counties were designated eligible for this drought assistance. The effect of this drought on municipal and private water supplies was not as severe, with only a few reports of individual wells drying up. A number of municipal water utilities experienced maximum use of their water delivery systems and imposed some type of water-use reduction rules or restrictions, usually involving the limitation of lawn sprinkling and yard watering.

### **Description of Recent Drought Events**

The summer of 2002 was a drought period in south-central and southeastern Wisconsin. Mild drought began in early July, and intensified in early August. Most locations received less than one inch of rain for the first 11 days of August, with General Mitchell International Airport in Milwaukee reporting only 0.24 inch during this period. This drought affected much of the country, with about 45 percent of the territory in the country's contiguous states experiencing a severe or extreme drought. Crop yields were reduced due to this drought. Many farmers reported that their corn crops had withered and that soybeans had stopped growing. Drought related crop losses of about \$658,000 (2014 dollars) were reported in Racine County.

Drought conditions continued in Racine County during 2003. For much of the year, the jet stream and associated low pressure systems stayed north of Wisconsin resulting in few cold front passages. As a result, precipitation was far below normal for the year. For example, at General Mitchell International Airport in Milwaukee 22.3 inches of precipitation were recorded for the year—about 12.5 inches less than normal—making 2003 the driest year since 1963. By October, soils in southeastern Wisconsin were reported to be dry to depths of 18 to 30 inches. The drought resulted in estimated losses of 25 to 50 percent of the corn crop and about 50 percent of the soybean crop. On July 28, 2003, the Governor declared a statewide drought emergency. This emergency declaration included provisions permitting the WDNR to grant farmers' requests for permits to irrigate dry crops by diverting streams or lakes. Subsequently, the U.S. Department of Agriculture designated 59 counties in the State of Wisconsin as primary agricultural disaster areas due to damages and losses caused by drought conditions over the period May 1, 2003 through October 31, 2003, and the Federal Small Business Administration (SBA) declared 70 Wisconsin counties as disaster areas due to drought conditions over the same period. Both of these declarations included Racine County. Monetary estimates of crop losses due to this drought in Racine County were not available; however, about \$415,000 (2014 dollars) in indemnities were paid to farmers in the County from Federal crop insurance programs in 2003 for damages related to drought.

Drought conditions developed in southeastern Wisconsin during the summer and fall of 2005 following a persistent dry spell which began in March and lasted most of the year coupled with warm dry air. By mid-July, only 12.5 inches of precipitation had been recorded for the year at General Mitchell International Airport—about 9.5 inches less than normal. By July 19, the drought in Racine County had worsened to extreme drought conditions. Some relief was provided by heavy rains in September; however, severe drought conditions persisted in Racine County into November. Reported impacts from the drought include reports of grass fires, reports of a 30-acre wheat field

burning, lower than average streamflow, and substantial increases in water use by municipal water utilities utilizing groundwater. During July, outdoor burning restrictions were imposed in Racine County and restrictions on lawn watering were imposed in the Village of Waterford. On July 15, 2005, the Governor declared a statewide drought emergency. This emergency declaration again included provisions permitting the WDNR to grant farmers' requests for permits to irrigate dry crops by diverting streams or lakes. The U.S. Department of Agriculture issued a Secretarial Disaster Declaration for drought for portions of Wisconsin, including Racine County, for the period March 1, 2005 through September 30, 2005. In addition, the SBA made Federal disaster loans available to nonfarm agriculture-dependent business for drought-related losses from the period March 1, 2005 through September 30, 2005. The drought resulted in estimated losses of 35 to 40 percent of the corn crop and 50 percent of the soybean crop. Monetary estimates of crop losses due to this drought in Racine County were not available; however, over \$498,000 (2014 dollars) in indemnities were paid to farmers in the County from Federal crop insurance programs in 2005 for damages related to drought.

A lack of rain over south central and southeastern Wisconsin during June 2012 allowed a drought to slowly develop. The intensity of this drought increased rapidly. By July 3, conditions in Racine County had progressed from abnormally dry to moderate drought. By July 17, Racine 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 Racine County until late August and moderate drought conditions persisted until the end of October. Conditions remained abnormally dry in Racine County into March 2013. The drought reduced crop yields. Agricultural operators in Racine County received over \$1.21 million in crop insurance indemnities in 2012 due to drought (Table 48). 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 purpose of watering crops.

### **Vulnerability and Community Impact Assessment**

Racine County is vulnerable to agricultural drought. There are about 116,000 acres of farmland on 650 farms. 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 Racine County economy and the potential for large crop losses, drought is a major natural hazard threat. There are also 101 miles of major streams, five major and numerous smaller lakes, and over 19,000 acres of wetlands which can also be negatively impacted due to drought conditions. In addition, groundwater levels can be affected 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 the 1976 drought proves that, while severe droughts are rare, they can be devastating to agriculture, damaging to the local economy, and negatively impact the natural surface water system and groundwater supply system.

In 2012, the most recent year for which data are available, the market value of agricultural products sold by farms in Racine County was about \$94.8 million. This was comprised of about \$73.6 million in crops and \$21.2 in live-stock, poultry, and their products.<sup>70</sup> Based on the current average estimate of \$95,100 in crop losses per year, it can be expected that approximately 0.13 percent of the market value of all crops, or about 0.10 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.

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<sup>70</sup> U.S. Department of Agriculture National Agricultural Statistics Service op. cit.

The ample supply of fresh water available in the Great Lakes and the Mississippi River basins help to minimize water supply problems in Racine 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 Racine County do not irrigate.

A review of the community assets described in Chapter II 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.

### **Potential Future Changes in Drought Conditions**

Based upon recent historical data, Racine County has about a 45 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. It is not expected that the probability of drought will change during the five-year term of this plan update.

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 Racine 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.

### **Multi-Jurisdictional Drought Risk Management**

Based upon a review of the potential impacts of droughts in Racine 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 includes all of the communities in the County, except the City of Racine and the Villages of Elmwood Park, North Bay, Sturtevant, and Wind Point. The events are of a uniform countywide concern, with those communities with largely agricultural land uses being the most vulnerable to risk.

## **VULNERABILITY ASSESSMENT FOR TRANSPORTATION ACCIDENTS**

Geographically, Racine County is located in a relatively good position with regard to continued growth and development. It is bounded on the east by Lake Michigan, which provides an ample supply of fresh water for both domestic and industrial uses and is an integral part of a major international transportation network. It is in close proximity to the expanding metropolitan region in northeastern Illinois to the south and the Milwaukee metropolitan area to the north. Racine County is also surrounded on the west and further north, beyond Milwaukee, by fertile agricultural lands and desirable agricultural areas of the rest of the State of Wisconsin. Many of the most important industrial areas and heaviest population concentrations in the Midwest lie within a 250-mile radius of the Southeast Region of Wisconsin.<sup>71</sup> Hence, the transportation system of Racine County serves both personal and goods movements for a variety of private business, public transport, and recreational purposes. The transportation system within Racine County consists of an arterial street and highway system, public transit facilities, railway facilities, and airport facilities.

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<sup>71</sup> *SEWRPC Planning Report No. 49, A Regional Transportation System Plan for Southeastern Wisconsin: 2035, June, 2006.*

Transportation accident categories addressed in this section were divided among arterial street and highway systems, railway systems, and airport facilities, which include crashes or collisions involving any type of motorized vehicles, railroad cars, and aircraft. Transportation accidents can result from a number of causes, including but not limited to, human error, mechanical failure, weather conditions, and sabotage. All of these issues are addressed within this section, except for the issue of sabotage, which is included within the terrorism section below. Recreational boating and shipping accidents were not considered within the scope of this plan. In addition, transportation accidents involving hazardous materials incidents are addressed separately within the hazardous materials incidents section below.

### **Roadways**

As described in Chapter II, the existing arterial street network in the eastern portion of the County is relatively densely spaced, with arterials occurring at about one-mile intervals in both the north-south and east-west directions (see Map 11 in Chapter II). IH 94 traverses the entire County in a north-south direction. The existing arterial network in the rest of the County is less-densely spaced, with arterials occurring at about two- to three-mile intervals.

Within the State of Wisconsin the fatality rate per 100 million miles of travel was 1.02 in the year 2012, with a total of 601 persons being killed in Wisconsin motor vehicle traffic crashes. Of those crashes with fatalities, 37 percent involved alcohol, 28 percent involved speed, and 10 percent involved both alcohol and speed as primary driver contributing factors. Crashes that occurred on county trunk highways and local roads accounted for 57 percent of all crashes within Wisconsin. Among the fatalities within Wisconsin in the year 2012, 44 were pedestrians, 11 bicyclists, and 112 motorcyclists.<sup>72</sup>

### **Railways**

As described in Chapter II, railway freight service is provided within Racine County by three railway companies operating active mainline railway lines (see Map 12 in Chapter II). The Union Pacific Railroad provides freight service over two parallel segments emanating from Chicago, both traversing the eastern tier of communities in a north-south direction. The CP Rail System, formerly known as the Soo Line, provides freight service over a line emanating from Chicago and traversing the entire County east of IH 94 in a north-south direction. The Canadian National System, formerly the Wisconsin Central Ltd., provides freight service over a north-south main line, traversing the western edge of the County. Amtrak operates passenger rail service on the Canadian Pacific railway line.

Railway crashes/accidents were separated into several basic categories, including collisions, derailments, train yard accidents, railway-crossing incidents, and other incidents. Within the United States from 1994 through 2014 there were approximately 190 collisions, 1,800 derailments, 1,350 train yard accidents, 2,600 railway-crossing incidents per year. These averages hide one important trend: the number of railway-crossing incidents has decreased steadily at an average rate of slightly more than 2 percent per year, from about 12,000 incidents per year in the mid-to-late 1970s to about 1,800 incidents per year over the period 2010 through 2014. Despite this decrease, the risk of railway accidents is generally greatest at railway crossings, where one or more railroad tracks cross a highway, road, street, sidewalk, pathway, or private drive (see Map 12 in Chapter II). Approximately 89 percent of the railway crossings in the State of Wisconsin are at-grade crossings.<sup>73</sup> The remaining railway crossings are grade-separated overpasses or underpasses. Within the State of Wisconsin from 1995 through 2014, there were an average of 122 train accidents (not including railway-crossing incidents) per year and 43 railway-crossing incidents per year. Over the same period, there was an average of eight trespasser-related rail fatalities per year in Wisconsin.

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<sup>72</sup> *Wisconsin Department of Transportation, 2012 Wisconsin Traffic Crash Facts, March 2014.*

<sup>73</sup> *U.S. Department of Transportation, National Highway-Rail Crossing Inventory File, April 12, 2009.*

## **Airports**

As described in Chapter II, there are 12 aircraft landing areas known to exist in Racine County (see Map 13 in Chapter II). Six of these airports are open to the public and six others are for private use. In addition to these airports, there are a number of private airports and heliports in and adjacent to Racine County. The most notable airport within or adjacent to Racine County in terms of size and amount of air traffic, which includes commercial airlines, is General Mitchell International Airport in Milwaukee County.

The risk of airplane crashes/accidents is greatest during landing and take-off operations. As a result, the developed areas adjacent to airports and in airport approach and departure paths are most vulnerable to this hazard. With air accidents, emergency response personnel may also have to confront secondary effects like fires and hazardous material spills. Responder actions may need to include search and rescue efforts for survivors, establishing field medical or mortuary facilities for victims, and crash-site security for crowd and traffic control. Local law enforcement agencies will provide crash security and may initially investigate the incident if they have the capability. It must be stressed that when a commercial passenger airplane accident occurs or any type of aircraft crashes into a densely populated area, area response teams and emergency facilities must be prepared to find, rescue, transport, and medically treat mass casualties. Most serious air transportation accidents have primarily involved large commercial passenger airlines, however, commercial airline accidents are rare. Most accidents involve small privately owned airplanes.

## **Description of Recent Transportation Accident Events**

### ***Roadways***

From 1999 through 2013, there were an average of 3,879 motor vehicle crashes reported within Racine County as indicated in Table 49, based upon data published by the Wisconsin Department of Transportation. These crashes were responsible for an average of 17 fatalities per year, 2,091 injuries per year, and over \$60.6 million in economic losses per year (2014 dollars). Table 49 indicates that the number of accidents and fatalities has decreased slightly during this 15-year time period, after peaking in 2005 with 26 fatalities. The data show that, during the period 1999 through 2003, there were an average of 3,910 accidents per year and an average of 20 fatalities per year in Racine County. The averages for the County over the period 2004 through 2008 were 4,163 accidents per year and 21 fatalities per year. Since that period, the number of crashes and fatalities in the County has decreased. For the most recent period of record, 2009 through 2013, there were an average of 3,562 accidents and 11 fatalities per year in the County. Racine County data for the years 1999-2013, further indicated that the total number of fatalities and injuries associated with vehicle crashes are greatest during the summer months of June through September and lowest during the months of February through April, compared to other months of year. During this period the number of vehicle crashes involving injuries ranged from lows of 61 crashes and 91 injuries in March 2009 and a high of 179 crashes and 265 injuries in July 2001.

In 2013, accidents reported in the six largest municipalities in Racine County, the Cities of Burlington and Racine and the Villages of Caledonia, Mount Pleasant, Sturtevant, and Waterford, resulted in a total of four deaths, 1,255 injuries, and an estimated economic loss of \$59 million in total damages (see Table 50). In total, 514 of these accidents were speed related, 120 were alcohol related, 51 involved motorcycles, 29 involved bicycles, and 63 involved pedestrians.

### ***Railways***

From 1975 through 2014 there were a total of 186 railway accidents were reported within Racine County. These events are documented in terms of their type of accident and casualties in Table 51, are based upon data published by the Federal Railroad Administration. As shown in Table 51, the annual number of accidents ranged from zero to 20 events per year. These accidents have resulted in 14 deaths and 58 injuries within Racine County since 1975. In addition, the accidents caused over \$7.7 million (2014 dollars) in damages to railway property.

The number of both rail equipment and railway-crossing accidents demonstrates a significant reduction in the number of accidents in recent years compared to previous years. The average number of accidents per year over the period 1975 through 1984 was about 10.5, compared to 3.7 over the period 1985 through 1994, 3.1 over the

Table 49

**MOTOR VEHICLE RELATED-ACCIDENTS, FATALITIES, AND  
ECONOMIC LOSSES REPORTED IN RACINE COUNTY: 1999-2013**

Year	Registered Vehicles	Automobile Accidents	Fatalities	Injuries	Economic Losses (2014 dollars) <sup>a</sup>
1999	148,476	4,038	13	2,514	45,262,687
2000	150,427	3,020	27	2,660	58,128,056
2001	154,539	4,199	22	2,555	48,133,230
2002	157,378	4,177	22	2,263	50,132,632
2003	160,674	4,119	18	2,329	46,957,040
2004	162,947	4,385	20	2,360	68,258,044
2005	161,021	4,303	26	2,287	69,531,792
2006	162,641	4,016	21	2,253	84,723,866
2007	165,756	4,165	17	2,109	75,077,460
2008	164,995	3,948	20	1,834	67,715,126
2009	169,232	3,606	7	1,852	61,892,556
2010	166,920	3,437	10	1,585	56,801,653
2011	167,437	3,378	19	1,607	59,809,997
2012	168,569	3,536	10	1,521	57,297,196
2013	170,880	3,854	8	1,629	60,005,086
Total	- -	58,181	260	31,358	909,726,421
Average	162,126	3,879	17	2,091	60,648,428

<sup>a</sup>The Wisconsin Department of Transportation reports economic losses for only those accidents occurring in incorporated municipalities with populations of 5,000 or more. Thus, the losses reported here represent a minimum estimate for economic losses related to traffic accidents occurring in Racine County.

Source: Wisconsin Department of Transportation and SEWRPC.

period 1995 through 2004, and 1.2 over the period 2005 through 2014. The apparent reduction in railway accidents is contrary to the local observations of increased rail traffic, particularly on the CN Railway in the Burlington area.

On September 15, 2006, a 53-year-old grandmother and her 4-year-old granddaughter were killed after their car was struck by a northbound Union Pacific train at the North Frontage Road railroad crossing near STH 20 in the Village of Mount Pleasant. The collision pushed the minivan about a half-mile before the train could stop. Witnesses said the flashing lights were working properly, however the area was extremely foggy. At the time of the accident there were no crossing gates, however gates have since been installed at the crossing.

On January 19, 2014, a Union Pacific train carrying coal derailed, leaving 19 rail cars off the track. The derailment occurred at the Five Mile Road crossing near STH 38, in the Village of Caledonia. No hazardous waste was spilled; however, about 1,900 tons of coal spilled as the result of the derailment. About 20 tons of coal from one car spilled onto a frozen stream adjacent to the site. The Wisconsin Department of Natural Resources examined the site and determined that the frozen stream prevented coal debris from washing downstream. It took several weeks to clean the derailment site. Officials determined the derailment was caused by the train hitting a portion of cracked rail which was likely caused by severely cold temperatures in the days leading up to the accident. No injuries were reported.

Table 50

**MOTOR VEHICLE ACCIDENT TYPES, FATALITIES, INJURIES, AND ECONOMIC LOSSES REPORTED AMONG MUNICIPALITIES WITHIN RACINE COUNTY: 2013**

Municipality	Types of Accidents							Property Damage Accidents	Total Estimated Economic Loss <sup>a, b</sup>
	Bike	Pedestrian	Motorcycle	Alcohol	Speed	Fatalities	Injuries		
City of Burlington.....	3	5	3	6	20	2	56	122	\$ 5,585,800
City of Racine.....	19	49	25	66	235	2	650	1,254	31,194,600
Village of Caledonia	2	1	9	18	82	0	137	233	6,722,500
Village of Mt. Pleasant ....	4	6	11	24	158	0	374	482	13,601,300
Village of Sturtevant.....	0	0	2	4	12	0	21	71	1,198,500
Village of Waterford.....	1	2	1	2	7	0	17	24	745,800
Total	29	63	51	120	514	4	1,255	2,186	\$59,048,500

<sup>a</sup>Economic loss was calculated using 2012 National Safety Council estimates plus 3.0 percent to account for inflation. Cost multipliers used were: Fatality: \$1,452,000, Incapacitating injury: \$74,800, Nonincapacitating injury: \$24,100, Possible injury: \$13,600, and Property damage: \$9,200.

<sup>b</sup>The Wisconsin Department of Transportation reports economic losses for only those accidents occurring in incorporated municipalities with populations of 5,000 or more. Thus, the losses reported here represent a minimum estimate for economic losses related to traffic accidents occurring in Racine County.

Source: Wisconsin Department of Transportation and SEWRPC.

On June 12, 2015, a person suffered severe injuries after he failed to stop at a railroad crossing gate and crashed into an Amtrak train. The crash occurred at the CTH KR railroad crossing in the Village of Mount Pleasant. Police indicated that the car struck the railroad crossing gates, which were operating properly, and continued past them and hit the side of the train. The impact pushed the vehicle a significant distance down the tracks until the train was able to stop. Three train cars sustained moderate damage. None of the 70 passengers aboard the train were injured.

**Airports**

According to the National Transportation Safety Board there were 32 air traffic accidents in Racine County between January 1, 1996, and December 31, 2014.<sup>74</sup> Each of these accidents involved private aircraft. Events on June 29, 1996; December 13, 1997; and September 9, 2012, each resulted in one fatality; an event on November 18, 2012, resulted in two fatalities; and an event on September 30, 2004, resulted in three fatalities. In total, aviation accidents during this period resulted in 13 injuries and 8 fatalities. None of the accidents involved regularly scheduled commercial passenger airlines. Wisconsin’s worst air crash killed 31 people at Milwaukee’s General Mitchell International Airport, which is adjacent to Racine County, on September 6, 1985. A Midwest Express Airline DC-9 jet aircraft went into a roll shortly after takeoff, crashed and burst into flames, killing all passengers and crewmembers.

**Vulnerability, Community Impact, and Multi-Jurisdictional Assessment**

There are several factors that should be considered when attempting to identify the potential number and vulnerability in terms of motor vehicle transportation-related accidents within specific areas of Racine County, which include type of vehicle, density of traffic, type of roadway, type of driver, road conditions, weather conditions, and safety equipment. In 2012, the age group with the greatest fatalities and injuries for males and females was 15 to 24 years of age in the State of Wisconsin. This age group accounted for about 26 percent of the traffic-related fatalities and injuries that occurred in 2012. In addition, traffic-related accidents are the leading cause of death to children in America. The highest numbers of fatalities throughout the State of Wisconsin in the year 2012 occurred on

<sup>74</sup> National Transportation Safety Board, Aviation Accident Database: accessed March 20, 2016.



Table 51

## RAILWAY ACCIDENTS REPORTED WITHIN RACINE COUNTY: 1975-2014

Year	Type of Accident						Losses		
	Track, Road Bed and Structures	Signals and Communication	Mechanical or Electrical Failure	Human Error	Railway Crossing	Other	Fatalities	Injuries	Damages to Railway Property (2014 dollars) <sup>a</sup>
1975	1	0	1	1	0	0	0	0	584,236
1976	1	0	1	0	10	1	1	2	473,364
1977	0	0	2	1	13	0	1	3	938,166
1978	0	0	0	0	15	4	1	9	105,942
1979	1	0	1	1	9	1	0	2	1,542,932
1980	1	0	0	1	5	1	0	2	43,991
1981	2	0	1	0	16	1	1	6	134,770
1982	0	0	0	0	5	1	1	1	36,798
1983	0	0	0	0	3	0	0	4	--
1984	1	0	1	0	1	1	0	2	506,057
1985	1	0	1	2	1	1	0	0	353,384
1986	0	0	0	0	5	1	0	3	64,800
1987	0	0	0	0	5	0	2	2	--
1988	0	0	0	0	3	0	0	3	--
1989	0	0	0	0	4	1	0	4	33,411
1990	0	0	0	1	0	0	0	0	11,139
1991	0	0	1	0	0	0	0	0	8,862
1992	0	0	0	0	2	0	2	0	--
1993	1	0	0	0	1	0	0	1	133,374
1994	1	0	0	0	5	0	0	2	12,380
1995	0	0	0	1	1	1	0	1	73,165
1996	0	0	0	0	4	0	1	3	--
1997	0	0	1	0	2	0	0	1	430,263
1998	1	0	1	0	3	0	0	4	342,252
1999	0	0	0	0	2	0	0	1	--
2000	0	0	0	0	2	0	0	1	--
2001	0	0	0	1	1	0	0	0	680,050
2002	0	0	0	0	2	0	0	0	--
2003	1	0	0	0	2	0	0	0	10,626
2004	0	0	2	0	3	0	2	0	104,016
2005	0	0	0	0	1	0	0	0	--
2006	0	0	0	1	3	0	2	0	38,258
2007	0	0	1	0	0	0	0	0	91,406
2008	0	0	0	0	1	0	0	0	--
2009	0	0	0	1	0	0	0	0	11,250
2010	0	0	0	0	0	0	0	0	--
2011	0	0	0	0	1	0	0	0	--
2012	0	0	0	0	1	0	0	0	--
2013	0	0	0	0	0	0	0	0	--
2014	1	0	0	0	1	0	0	1	981,068
Total	13	0	14	11	133	15	14	58	7,745,960

<sup>a</sup>Dollar values were adjusted to year 2014 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.

Source: Federal Railroad Administration and SEWRPC.

Saturdays between hours of 2:00 p.m. to 10:00 p.m., followed by Tuesdays between the hours of 2:00 p.m. to 10:00 p.m. and Saturdays between the hours of 10:00 p.m. to 6:00 a.m. During the week from Monday through Friday the greatest risk of an accident is between the 2:00 p.m. and 10:00 p.m.

Traffic safety problems are typically identified by reviewing a five year history of traffic crash records and determining the crash rate—the number of crashes per 100 million vehicle-miles of travel—on a road segment. Using the traffic crash history of the freeway and state trunk highway surface arterial systems over a recent five year period of 2008 through 2012, the traffic crash rate for each segment of the freeway system and state trunk highway surface arterial system in Racine County was estimated. The estimated traffic crash rate for each freeway segment within Racine County was compared to the average crash rate for freeway segments within the County, the Southeastern Wisconsin Region, and the State of Wisconsin. Similar comparisons were made for the average crash rate for each segment of the state trunk highway surface arterial system within Racine County.

The average crash rate on freeway segments in Racine County over the period 2008 through 2012 was 33.7 crashes per 100 million vehicle miles.<sup>75</sup> This average was the lowest freeway crash rate of any county in the Southeastern Wisconsin Region (average of 72.5 crashes per 100 million vehicle miles) and lower than the average freeway segments in the State of Wisconsin (average of 58.6 crashes per 100 million vehicle miles). The average crash rate on segments of the state trunk highway surface arterial system in Racine County over the same period was 234.9 crashes per 100 million vehicle miles. This average was also lower than the average crash rate for segments of the state trunk highway surface arterial system in the Southeastern Wisconsin Region (265.0 crashes per 100 million vehicle miles), but considerably greater than the average crash rate for segments of the state trunk highway surface arterial system in the State of Wisconsin (149.8 crashes per 100 million vehicle miles).

Map 38 shows the relationship between average crash rates on segments of freeway and state trunk highway surface arterials relative to the countywide average crash rate for Racine County. On the freeway system, some of the segments with crash rates exceeding the County-wide average are located at on/off ramp locations, with the most dangerous freeway segments being near the IH 94 interchanges with STH 20, CTH C, CTH K, CTH G, and Seven Mile Road. On the state trunk highway surface arterial system, the most dangerous segments are found mostly in the eastern portions of the County. Several of the most dangerous state trunk highway surface arterial segments are located in the City of Racine along STH 11, STH 20, STH 32, STH 31, and STH 38.

Weather conditions can also significantly contribute to the numbers of vehicle-related accidents and associated injuries and deaths as shown in Tables 52 and 53. Rain and snow were associated with some of the highest numbers of fatalities, injuries, and property damages. Fog-related accidents also seem to be a significant contributing factor in vehicle-related accidents in Wisconsin in 2013, in terms of fatalities, which were associated with 12 fatalities and 327 injuries (see Table 52). In dry road conditions, foggy weather is also associated with some of the greatest number of vehicle accidents compared to other weather conditions, as shown in Table 53. However, snow and slush road conditions, combined with snowy weather, were associated with the greatest numbers of vehicle-related accidents within Wisconsin in 2013.

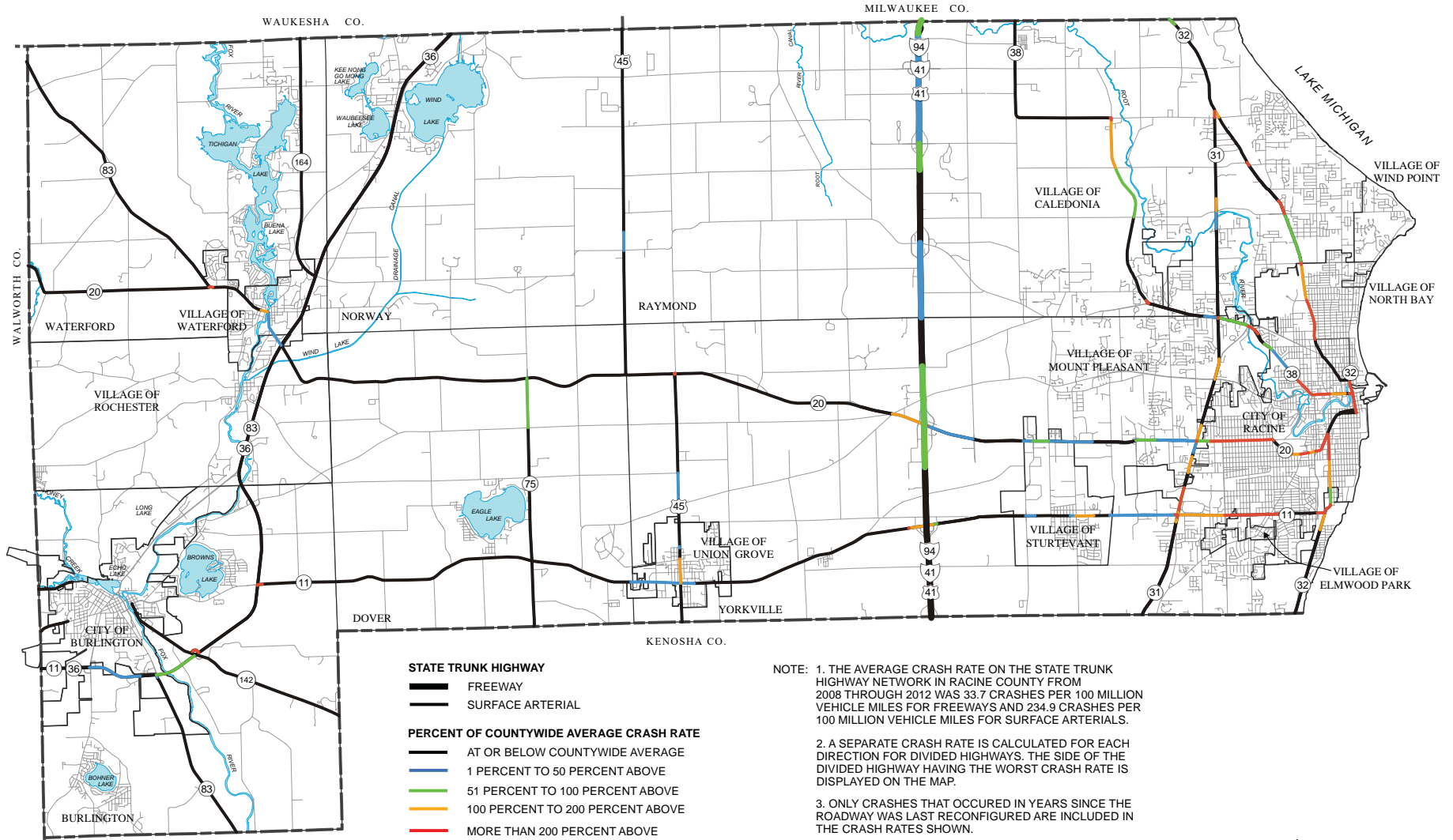
All of the communities of the County are vulnerable to roadway accidents. The areas east of IH 94 and the far western and south-central portions of Racine County along the major freight railways are obviously more vulnerable to railway-related accidents, as these areas contain the highest traffic railways in the County. Vulnerable communities include the Cities of Burlington and Racine; the Villages of Caledonia, Mount Pleasant, Rochester, Sturtevant, and Union Grove; and the Towns of Burlington, Dover, Waterford, and Yorkville.

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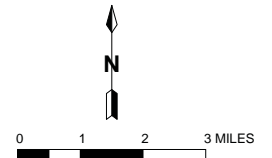
<sup>75</sup> *In all of the crash rates presented, only crashes that have occurred in years since a roadway segment was last reconfigured are included in the crash rate.*

Map 38

**AVERAGE VEHICULAR CRASH RATE OF FREEWAYS AND STATE TRUNK HIGHWAYS IN RACINE COUNTY: 2008-2012**



Source: Wisconsin Department of Transportation and SEWRPC.



**Table 52**

**SUMMARY OF ACCIDENT FATALITIES, INJURIES, AND PROPERTY DAMAGES  
AMONG WEATHER CONDITIONS REPORTED WITHIN THE STATE OF WISCONSIN: 2013**

Weather Conditions	Fatal Crashes	Injury Crashes	Property Damage Crashes	Total Crashes	Total	
					Fatalities	Injuries
Clear .....	271	14,501	31,588	46,360	287	20,248
Cloudy .....	137	8,764	20,836	29,737	150	12,140
Snow.....	33	2,399	10,130	12,562	38	3,282
Rain .....	22	2,225	5,238	7,485	23	3,065
Fog/Smog/Smoke.....	12	246	474	732	12	327
Sleet/Hail .....	8	318	1,284	1,610	8	434
Blowing Sand/Dirt/Snow .....	3	145	478	626	3	204
Severe Crosswinds.....	0	21	54	75	0	23
Other.....	0	10	13	23	0	14
Unknown.....	5	118	18,921	19,044	6	134
<b>Total</b>	<b>491</b>	<b>28,747</b>	<b>89,016</b>	<b>118,254</b>	<b>527</b>	<b>39,872</b>

Source: Wisconsin Department of Transportation Bureau of Transportation Safety and SEWRPC.

**Table 53**

**TOTAL NUMBER OF ACCIDENTS AMONG WEATHER AND ROAD CONDITIONS  
REPORTED WITHIN THE STATE OF WISCONSIN: 2013**

Weather Conditions	Road Conditions							Total
	Dry	Wet	Snow/Slush	Ice	Sand/Mud/Dirt/Oil	Other	Unknown	
Clear .....	40,907	1,423	2,417	1,356	115	70	72	46,360
Cloudy .....	19,306	4,660	3,864	1,757	68	29	53	29,737
Snow.....	61	693	10,525	1,264	0	2	17	12,562
Rain .....	60	6,880	166	366	6	3	4	7,485
Fog/Smog/Smoke.....	234	356	48	84	2	2	6	732
Sleet/Hail .....	4	153	502	947	1	1	2	1,610
Blowing Sand/Dirt/Snow .....	3	12	361	248	1	1	0	626
Severe Crosswinds.....	28	12	14	20	0	1	0	75
Other.....	9	4	3	5	0	0	2	23
Unknown.....	202	38	99	25	5	2	18,673	19,044
<b>Total Accidents</b>	<b>60,814</b>	<b>14,231</b>	<b>17,999</b>	<b>6,072</b>	<b>198</b>	<b>111</b>	<b>18,829</b>	<b>118,254</b>

Source: Wisconsin Department of Transportation Bureau of Transportation Safety and SEWRPC.

The risk of airplane accidents is greatest during landing and take-off operations. As a result, the developed areas adjacent to airports and in airport approach and departure paths are most vulnerable to this hazard. In addition, a segment of IH 94 between STH 20 and STH 11 has an increased vulnerability to the risk of airplane accidents due to its close vicinity to Sylvania Airport. Conditions of runways and seasonal weather effects likely increase the risk of accidents within these areas of Racine County.

**Potential Future Changes in Transportation Accident Conditions**

Transportation-related accidents are not expected to change significantly in the future. Changes in land use can have an influence on the potential for increased incidents to occur. Such changes relate to the potential future increase in development and population growth within the County. Changing land use patterns within Racine

County, as documented in Chapter II, would result in a potential increased risk of transportation accidents damage and related losses in the expanding urbanized areas within the County. However, this increase in population growth and associated increased risk of transportation accidents may also be offset by improvements in roadways, railway intersections, education, or some other related feature.

## **VULNERABILITY ASSESSMENT FOR CONTAMINATION OR LOSS OF WATER SUPPLY**

Water supply systems are among the most important infrastructure facilities affecting the economic development and environmental quality of Racine County. Such systems directly affect the health and welfare of the resident and transient populations of an area, and the viability of commercial and industrial activities in an area. Accordingly, the availability of an ample supply of high-quality water for domestic, commercial, and industrial use and the protection and wise use of the available sources of supply is an important consideration.

As noted in Chapter II, about 22 million gallons per day (mgd) of surface water and 8 mgd of groundwater are utilized as the source of supply by all water users in the County. An ample supply of clean, wholesome water is essential to urban development. Indeed, without a reliable water supply, urban areas become unhealthy places in which to live and work, subject to epidemics of such waterborne diseases as cholera, dysentery, typhoid fever, and parasitic infections, such as *Cryptosporidium*. In addition to providing safe drinking water, a reliable water supply system is also essential in other ways to good sanitation in urban areas. An adequate and reliable water supply system is essential for bathing, laundering, and other forms of cleaning and washing, and provides the basis for the water carriage system of sanitary sewage conveyance essential to a high level of quality in urban life. An adequate and reliable water supply system is essential to good fire protection, and is also essential to all types of commercial and industrial development. Table 54 lists the active public and community private water supply systems in Racine County, along with the population that they serve, and the primary water source.

### **Water Supply Issues Related to Groundwater**

Groundwater serves as the source of supply for four municipal water utilities in Racine County—the City of Burlington Water Utility, which serves nearly 10,000 customers in the City of Burlington and a small portion of the Town of Burlington; the North Cape Sanitary District, which serves about 170 customers in the Towns of Norway and Raymond; the Village of Union Grove Water Utility, which serves about 4,900 customers throughout most of the Village of Union Grove; and the Village of Waterford Water Utility, which serves about 5,400 customers throughout most of the Village of Waterford.

### ***Groundwater Quality***

Approximately 40 percent of the Region's residents use groundwater, so the knowledge of the chemical character of groundwater and its variations is crucial for effective planning, management, and protection of groundwater resources. Systematic gathering of information on groundwater chemistry provides the base for determining future changes in groundwater quality; however, the available data are not adequate to fully describe groundwater quality and its trends. Systematic studies of groundwater chemistry have not been conducted in Racine County; but some data are available from sampling of wells in the County which are summarized on a county basis in the Wisconsin Department of Natural Resources Groundwater Retrieval Network (GRN) database. It is important to note that the data summarized in this database represent the number of wells that have been sampled, the number of wells in which the substance was detected, and the number of wells in which the concentrations detected exceeded groundwater quality criteria established by the State of Wisconsin. In addition, the summaries do not indicate whether an individual well was sampled more than once, and, if a well was sampled more than once, whether the pattern of detections and exceedance of standards for the compound of interest was the same in all samplings. Beyond being located in Racine County, the summaries do not indicate the locations of the wells sampled. Because of this, the summaries do not indicate whether exceedances of groundwater quality criteria represent conditions in a limited local area, conditions in a larger portion of the County, or conditions over the entire County. Similarly, the summaries do not indicate from which aquifers the wells sampled draw water. Finally, for most substances of concern, the number of wells sampled is small.

Table 54

ACTIVE COMMUNITY WATER SUPPLY SYSTEMS IN RACINE COUNTY

Water System Name	Population Served	Primary Water Source Type
Browns Lake Mobile Home Court .....	225	Groundwater
City of Burlington Water Utility .....	9,958	Groundwater
Village of Caledonia Water Utility <sup>a,b</sup> .....	21,819	Purchased surface water <sup>c</sup>
Eagle Lake Manor .....	200	Groundwater
Harvest View Estates .....	400	Groundwater
Hickory Haven.....	303	Groundwater
Lakeview Specialty Hospital.....	384	Groundwater
North Cape Sanitary District.....	170	Groundwater
City of Racine Water Utility <sup>d</sup> .....	105,100	Surface water
River Springs FLP.....	38	Groundwater
Southern Wisconsin Center .....	950	Groundwater
Spring Green Subdivision .....	346	Groundwater
Village of Union Grove Water Utility .....	4,900	Groundwater
Village of Waterford Water Utility .....	5,368	Groundwater
Village of Wind Point Water Utility.....	1,804	Purchased surface water <sup>e</sup>

<sup>a</sup>The Village of Caledonia Utility District serves portions of the Village of Caledonia and a small area in the Village of Mount Pleasant.

<sup>b</sup>The City of Oak Creek Water and Sewer Utility provides treated Lake Michigan surface water to northern portions of the Village of Caledonia Utility District's service area on a wholesale basis.

<sup>c</sup>The Village of Caledonia Water Utility purchases treated Lake Michigan surface water from the City of Racine Water and Wastewater Utility on a wholesale basis.

<sup>d</sup>The Village of Sturtevant Water Utility was purchased by the City of Racine Water and Wastewater Utility and is served by the City Utility on a retail basis. The City of Racine Water and Wastewater Utility also serves all of the Villages of Elmwood Park, and North Bay, and portions of the Villages of Mount Pleasant and Sturtevant.

<sup>e</sup>The Village of Wind Point Water Utility purchases Racine Water and Wastewater Utility treated Lake Michigan surface water from the Village of Caledonia Utility District.

Source: U.S. Environmental Protection Agency, Safe Drinking Water Information System, February 8, 2016, and Wisconsin Department of Natural Resources Public Water Supply Systems Database, February 7, 2016.

Additional groundwater quality data should be collected and assessed in the future in order to fully address groundwater quality issues within the County.

The chemical composition of groundwater largely depends on the composition and physical properties of the soil and rocks it is in contact with, the length of the groundwater flow path, the residence time of the water, and the antecedent water quality. The composition of groundwater in the County is primarily a result of its movement through and interaction with Pleistocene unconsolidated materials (glacial drift) and Paleozoic rocks containing large amounts of dolomite, CaMg (CO<sub>3</sub>)<sub>2</sub>, which is dissolved by water passing through it. In general, groundwater quality tends to be relatively uniform within a given aquifer basin, both spatially and temporally, but in different locations major contrasts in natural quality of groundwater can be observed. The current quality of groundwater in both the shallow and deep aquifers through the County is generally good and suitable for most uses, although localized water quality problems occur.

Table 55

**HUMAN ACTIVITIES THAT MAY CREATE GROUNDWATER QUALITY PROBLEMS IN RACINE COUNTY**

Originating on the Land	Originating Below Land Surface
Above-Ground Storage Tanks	Above Water Table
Accidental Spills	Animal waste storage facilities
Agricultural Activities:	Landfills
Animal Feedlots	Leakage:
Fertilizer and Pesticide Storage, Mixing, and Loading	Underground storage tanks
Fertilizer and Pesticide Application	Underground pipelines
Irrigation Return Flow	Sewers
Silage and Crop Residue Piles	Septic tanks
Highway Deicing	Surface wastewater impoundments
Liquid waste Spreading or Spraying (sewage, sludge, septage, whey)	Sumps, dry wells
Stockpiles (chemicals, salt), Dumps	Waste disposal in dry excavations
Infiltration of Contaminated Surface Water or Precipitation	Below Water Table
	Ground water development:
	Abandoned wells and holes
	Improper well construction
	Overpumping
	Illegal drainage or disposal wells
	Waste disposal in wet excavations

Source: Wisconsin Geological and Natural History Survey and SEWRPC.

**Groundwater Quality Concerns**

Some water quality problems are caused by natural factors, which cannot be controlled. For example, the abundant dolomite material in the County releases calcium and magnesium, which form about one-half of all ions in groundwater and are the principal components of hardness. Therefore, hardness is objectionably high in groundwater in most of the County and softening is required for many water uses. Additionally, radioactivity from radium is also a potential concern in Racine County for groundwater supplies utilizing the deep aquifer.

Potential sources of groundwater contamination are many and varied. In addition to some natural processes, human-installed facilities or structures and many human activities have the potential to eventually contribute to groundwater quality problems. Many of the sources of contamination are summarized according to their place of origin in Table 55. There are several potential water quality concerns that affect groundwater that are created from human activities. Specifically, these include bacteria, nitrate, pesticides, and volatile organic chemicals (VOCs). The first three can affect quality of water in the private wells, but generally they do not cause major problems in the County. Volatile organic chemicals are also a water quality concern that stems from landfills, leaking underground storage tanks, and spills from hazardous substances. Generally, groundwater quality in Racine County is good. There are not widespread problems with VOCs, bacteria, or agri-chemical contamination in groundwater supplies.

In areas where well histories show contamination of groundwater, Section NR 812.12(3) of the *Wisconsin Administrative Code* requires that the WDNR designate special well casing pipe depth areas. When wells are drilled in these areas, it also requires that they be provided with well casings that extend to sufficient depth to reduce the possibility that new wells will produce water containing significant concentrations of contaminants. As of 2015, one

area requiring special well casing depths has been designated in Racine County. This area in the Town of Burlington is designated as the NW 1/4 of Section 10, Town 2N, Range 19E. The area includes a development of roughly 50 homes along Brever Road, Running Fox Trail, and Wild Goose Lane in the Town of Burlington. This area requires cement-grouted casing to extend to a minimum of 120 feet below the ground surface due to livestock waste contamination.

### ***Recent Instances of Groundwater Contamination in Racine County***

In 2008, the WDNR and the Western Racine County Health Department (WRCHD) contacted the Wisconsin Division of Public Health (WDPH) regarding elevated levels of arsenic that had been detected in two public drinking water wells that serve a public school and a private daycare center in the Wind Lake area of the Town of Norway. The WDPH conducted a coordinated response with the WDNR and WRCHD to investigate private wells in the area.<sup>76</sup> Water samples from 70 wells were analyzed for 14 metals, including arsenic. Samples from 22 of these wells had concentrations of arsenic above the Wisconsin public health groundwater quality enforcement standard of 10 micrograms per liter, representing 31 percent of the wells tested. The elevated levels of arsenic appear to come from a natural geological source. Some of the tested wells had concentrations of aluminum, cadmium, copper, lead, manganese, or nickel that were above their applicable enforcement standard or advisory level. The WDPH indicated that, if similar levels of these metals were present in untested wells in the Wind Lake area of the Town of Norway at the same frequency found in their 2008 investigation, about 2,000 area residents might be consuming drinking water containing metals associated with possible health effects. Arsenic has not been reported to exceed standards in public water supplies elsewhere in Racine County.

Contamination of wells with molybdenum has also been reported in many parts of Racine County. Molybdenum is a metallic element that is naturally present, usually at low levels, in the earth's crust. Naturally-occurring levels of molybdenum in groundwater are low; the USGS found a median value of 1 microgram per liter ( $\mu\text{g/l}$ ) nationwide. Trace amounts of molybdenum are necessary for human health, and are obtained from common foods in the diet such as leafy vegetables, legumes, grains, and organ meats. Higher concentrations have been found in soil or groundwater, typically in conjunction with spills or some historic waste disposal practices. In 2009, the WDNR learned of 18 private wells in the City of Oak Creek in Milwaukee County and the Village of Caledonia in Racine County that had exceeded the Wisconsin Groundwater Enforcement Standard of 40  $\mu\text{g/l}$  for molybdenum during routine water sampling at least once since 1993. In 2010, the WDNR in collaboration with the Wisconsin Department of Health Services tested private wells from an additional 120 homes in the area. Additional testing was conducted over the period 2011 through 2013. Testing included wells located in Milwaukee, Waukesha, Racine, and Kenosha Counties.

Map 39 shows results from testing of wells in Racine County through August 2013. The data are presented by U.S. Public Land Survey section. Samples were collected from wells located in 138 sections in Racine County. In 55 of these sections, representing about 40 percent of the sections tested in the County, at least one sample was collected that had concentrations of molybdenum equal to or greater than 90  $\mu\text{g/l}$ . These sections contain portions of the Villages of Caledonia, Mount Pleasant, and Union Grove, and the Towns of Norway, Raymond, and Yorkville. The Town of Raymond had samples analyzed from at least one well in every section of the Town, with 29 of the sections, or nearly 81 percent, containing at least one sample with concentrations of molybdenum greater than or equal to 90  $\mu\text{g/l}$ .

At the request of the WDNR, the Wisconsin Department of Health Services reviewed the published information on molybdenum toxicity in light of the requirements for establishing groundwater quality enforcement standards under Chapter 160, "Groundwater Protection Standards," of the *Wisconsin Statutes*. Based upon their review of the toxicological literature and the fact that Wisconsin's molybdenum enforcement standard was developed using a value

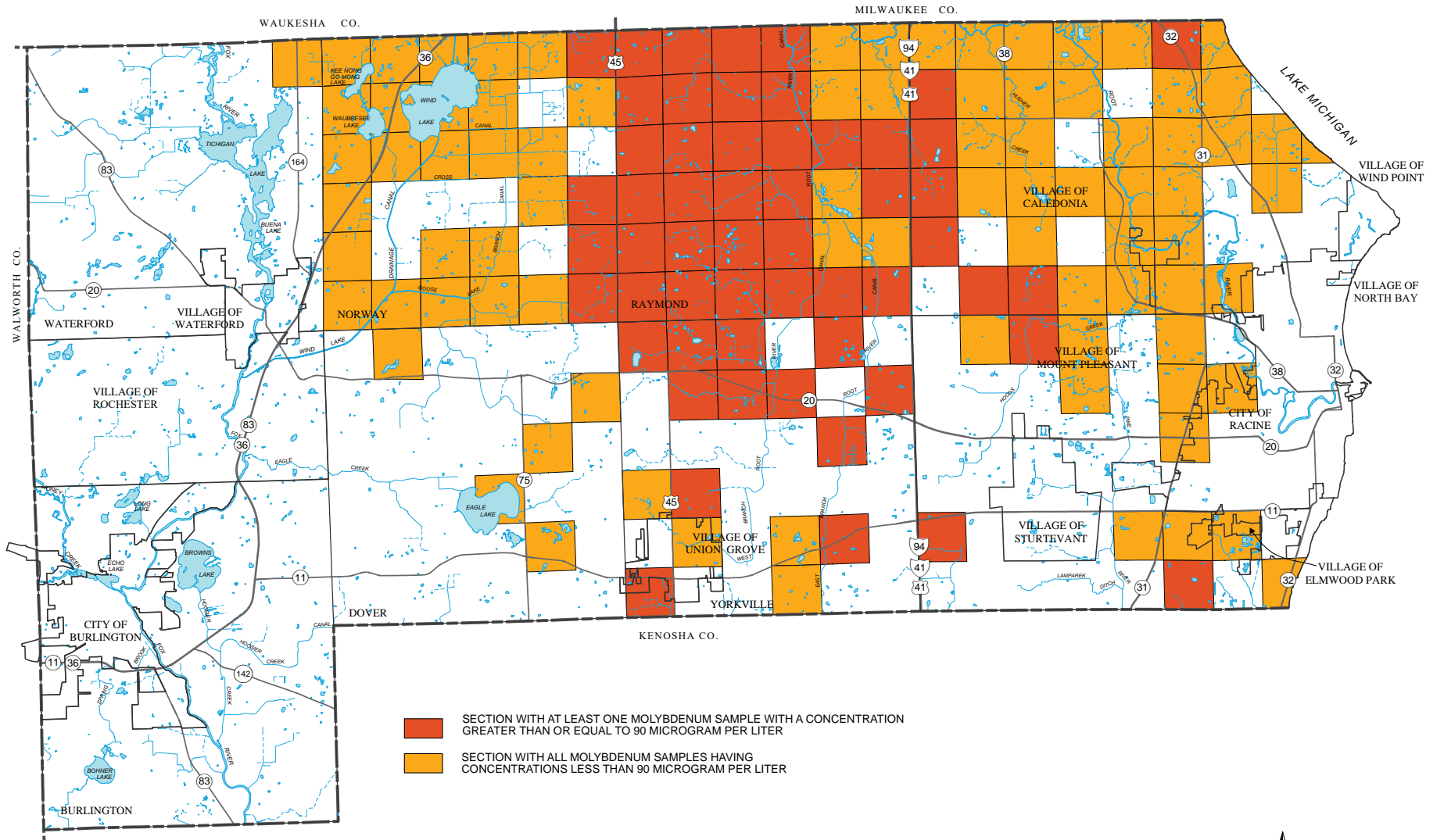
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<sup>76</sup> *Wisconsin Department of Health Services Division of Public Health*, "Health Consultation: Arsenic in Wind Lake Private Wells, Town of Norway, Racine County, Wisconsin," April 28, 2009.

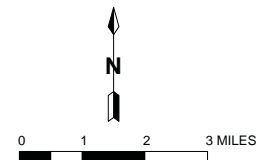


Map 39

TEST RESULTS FOR MOLYBDENUM IN PRIVATE WELLS IN RACINE COUNTY: 2013



Source: Wisconsin Department of Natural Resources and SEWRPC.



recommended by the USEPA that in 2013 was under active review, the Wisconsin Department of Health Services recommended that the WDNR use an interim health advisory level of 90 µg/l when advising about the safety of private drinking water supplies.<sup>77</sup> This interim health advisory level was developed using methods consistent with Wisconsin law.

The source of the molybdenum has not been definitively determined. Based upon relationships between concentrations of molybdenum measured in wells and the distances to sites where coal ash has been disposed of in reuse projects such as structural fill, embankments, and road base, one study attributes the source of the molybdenum to the reuse of unencapsulated coal ash.<sup>78</sup> Another study analyzed samples collected from private water supply wells and from groundwater monitoring wells located near ash fill areas and near the Hunts Disposal Landfill, a remediated Superfund site located in the Village of Caledonia in Racine County. In this study, samples of water, ash, and leachate were collected and tested in an attempt to determine the source or sources of the elevated molybdenum concentrations. Samples were analyzed for a suite of organic and inorganic parameters as well as for tritium and for isotopes of boron, strontium, and molybdenum. These isotopes have been used in other studies to help identify contaminant sources. The investigation did not succeed in identifying the source of the molybdenum. It did rule out the Hunts Landfill as a likely source based on the fact that the concentrations of molybdenum leachate from the landfill are much lower than those in the area's groundwater. The study also found that the tritium data suggested that most of the water in the private water supply wells may be older than 1953. This could indicate that molybdenum may have entered the water before ash from the Oak Creek power plant was disposed of on the We Energies property; however, mixing of older and younger water may complicate interpretation of the tritium results.<sup>79</sup>

### **Water Supply Issues Related to Surface Water**

Surface water serves as the source of supply for three municipal water utilities in Racine County—the City of Racine Water and Wastewater Utility, which serves the City of Racine, all of the Villages of Elmwood Park and North Bay, and portions of the Villages of Mount Pleasant and Sturtevant; the Village of Caledonia Utility District, which serves portions of the Village of Caledonia and a small area in the Village of Mount Pleasant; and the Village of Wind Point Municipal Water Utility, which serves the Village of Wind Point. The City of Racine Water and Wastewater Utility, which owns and operates a surface water treatment plant with three intakes, is the largest supplier of treated surface water in Racine County, and provides wholesale water to the Village of Caledonia Utility District. The Village of Wind Point Municipal Water Utility purchases Racine Water and Wastewater Utility-treated water from the Village of Caledonia Utility District. The City of Oak Creek Water and Sewer Utility, located in Milwaukee County, provides treated Lake Michigan surface water to the northern portions of the Village of Caledonia Utility District's service area on a wholesale basis.

Supplies of surface water can potentially be interrupted by anything that would partially or fully obstruct flow of water into the utility's surface water intake. Because of this, surface water intakes are designed and sited in ways intended to minimize obstruction problems. Despite this, obstructions can sometimes occur. An example of this is formation of frazzle ice in water intakes. This happens during extremely cold weather when the water temperature is near 32°F. This ice formation can cause the level of water in the utility's raw water pump station to drop and can make it difficult to maintain the flow rates necessary to operate the treatment plant. The City of Racine Water and

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<sup>77</sup> Charles J. Warzecha, Wisconsin Department of Health Services, "Response to Request for Review of Molybdenum Toxicity Information," Letter to Jill D. Jonas, Wisconsin Department of Natural Resources, August 2, 2013.

<sup>78</sup> Tyson Cook, Paul Mathewson, and Katie Nekola, Don't Drink the Water: Groundwater Contamination and the "Beneficial Reuse" of Coal Ash in Southeast Wisconsin, *Clean Wisconsin*, November 2014.

<sup>79</sup> Joe Lourigan and William Phelps, Caledonia Groundwater Molybdenum Investigation, Southeast Wisconsin, Wisconsin Department of Natural Resources, PUB-WA 1625, January 2013.

Wastewater Utility has experienced effects on its intake system in the past from icing. The last serious episode occurred after the Groundhog Day Blizzard in February 2011. Since that episode there have been minor events where the Utility experienced reduced raw water pump flows from ice formation in intakes. When these events happen, the Utility decreases its pumping rates, thus lowering velocities, which most often decreases or eliminates the formation of frazzle ice. When the intake system recovers, normal pumping rates resume. For the most part, these icing events are considered minor in their effect on the operations of the Utility.

### **Other Water Supply Issues**

Temporary losses of water supply can also be caused by other factors. Breaks in water mains can interrupt water supply. The impacts of a water main break depend on the size and location of the main. The effects of a break can either be local or can have a large effect on a portion of the distribution system. Frozen service laterals can also interrupt water supply to individual buildings. The City of Racine Water and Wastewater Utility averages over 100 water main breaks per year.

Because of the prolonged and intense cold associated with the polar vortex, a particularly deep frost of up to 7 feet caused an exceptionally high number of water main breaks in the winter of 2013-2014 for the City of Racine Water and Wastewater Utility. In the first three months of 2014 alone, the Utility responded to 103 water main breaks, costing nearly \$450,000 to repair.

Lead is a toxic metal that is commonly found throughout the environment in lead-based paint, air, soil, food, and water. Lead in drinking water at high enough levels can pose a significant health risk, especially in young children and pregnant women. Children that are exposed to high levels of lead may experience stunted mental and physical development. Lead exposure has also been linked to deficits in attention span and learning abilities. Excessive levels of lead in adults can damage the nervous system, brain, kidneys, red blood cells, and reproductive system. Most drinking water sources in the State of Wisconsin, both groundwater and surface water, have little or no measurable lead levels. However, prior to passage of a State law in 1984, lead solder was used extensively in the construction of many household plumbing systems in the State. Some drinking water fixtures were manufactured with lead until 1996. Plumbing materials such as lead pipes, lead based solder used to join copper pipes, faucets, and lead service lines connecting the home to the water main are common in older homes. Water within plumbing systems will continuously dissolve the lead that it contacts. The rate at which lead dissolves can vary greatly depending on the age of the plumbing system and corrosive characteristics of the water. When water stands in pipes for an extended period of time, lead concentrations in the water can increase substantially.

Municipal water utilities are required by the WDNR to regularly test their water supply for lead. Under Section NR 809.54(3) of the *Wisconsin Administrative Code*, the lead action level is exceeded if the concentration of lead in more than ten percent of tap water samples collected during any monitoring period is greater than 15 µg/l, that is, if the 90th percentile lead concentration is greater than 15 µg/l, the utility is out of compliance with the WDNR lead standards.

Many homes built in the City of Racine Water and Wastewater Utility service area have plumbing and fixtures that contain lead. In addition, nearly 11,000 lead service lines are still in use in the Utility's distribution system. During a period from 2004 through 2007, testing of water from homes served by the Utility found more than ten percent of tap water samples contained lead levels that exceeded 15 µg/l. The Utility conducted investigations and changed the chemical formulations of the corrosion inhibitor, polyether phosphate, in an effort to bring the system back into compliance with Section NR 809.54(3) of the *Wisconsin Administrative Code*. As a result of the Utility being out of compliance with the lead action level, the Utility was also required to conduct more frequent testing. Beginning in 2008, and continuing through 2011, the Utility was in compliance with the lead action level. Lead levels in the system dropped significantly enough that the WDNR deemed the Utility had reached optimal corrosion control and granted the Utility monitoring waivers for 2012 and 2013. The Utility resumed monitoring for lead in 2014, which revealed the Utility again exceeded the lead action level of 15 µg/l in nine of the 71 samples tested (12.7 percent of samples), with a 90th percentile lead concentration of 25.0 µg/l. In 2015, the Utility was required to increase its

monitoring program and took extra steps to bring the lead level back into compliance. Results from monitoring in 2015 showed the lead concentration exceeded the lead action level in just two of the 205 samples tested (0.98 percent of samples), with a 90th percentile lead concentration of 5.3 µg/l, thus, the Utility is currently in compliance with WDNR lead standards. During the period 1993 through 2015, all other public water utilities in Racine County have remained in compliance with WDNR lead standards.

Cross-connections are actual or potential connections between potable water supplies and a source of contamination. The most common form of cross-connection is a garden hose, which is easily connected to the public water supply system and can be used to apply a variety of potentially dangerous substances, including chemicals and fertilizer. Other common cross-connections include dishwashers, toilets, pressure washers, boilers, pools, and lawn sprinkler systems. Water normally flows in only one direction in a plumbing system; however, under certain conditions, such as backsiphonage or backpressure, water can flow backwards, contaminating potable water supplies within a building or within a water distribution system. Backsiphonage may occur due to a loss of pressure in a water utility distribution system. Such a pressure loss can occur due to a water main break, a repair to the distribution system, or a firefighting emergency. This can create a siphon in a plumbing system which can draw water out of a sink or bucket back into a building's water system and into the municipal system. Back pressure may be created when a source of pressure such as a boiler or a pump creates pressure greater than pressure supplied through the public water system. This may cause contaminated water to be pushed into a building's water system and into the municipal system. State plumbing codes require that approved backflow prevention methods be installed at every point of potable water connection and use.

### **Vulnerability and Community Impact Assessment**

Safe water supplies could be interrupted due to the following factors:

- Contamination of a groundwater source;
- Contamination of the Lake Michigan surface water source in the vicinity of the water supply intakes used;
- Major facility malfunction or shutdown;
- Obstruction of surface water supply intake;
- Large numbers of water main breaks or breaks of particularly important water mains;
- Contamination of a water supply source due to lead in plumbing systems; and
- Cross-connections between potable water supplies and a source of contamination.

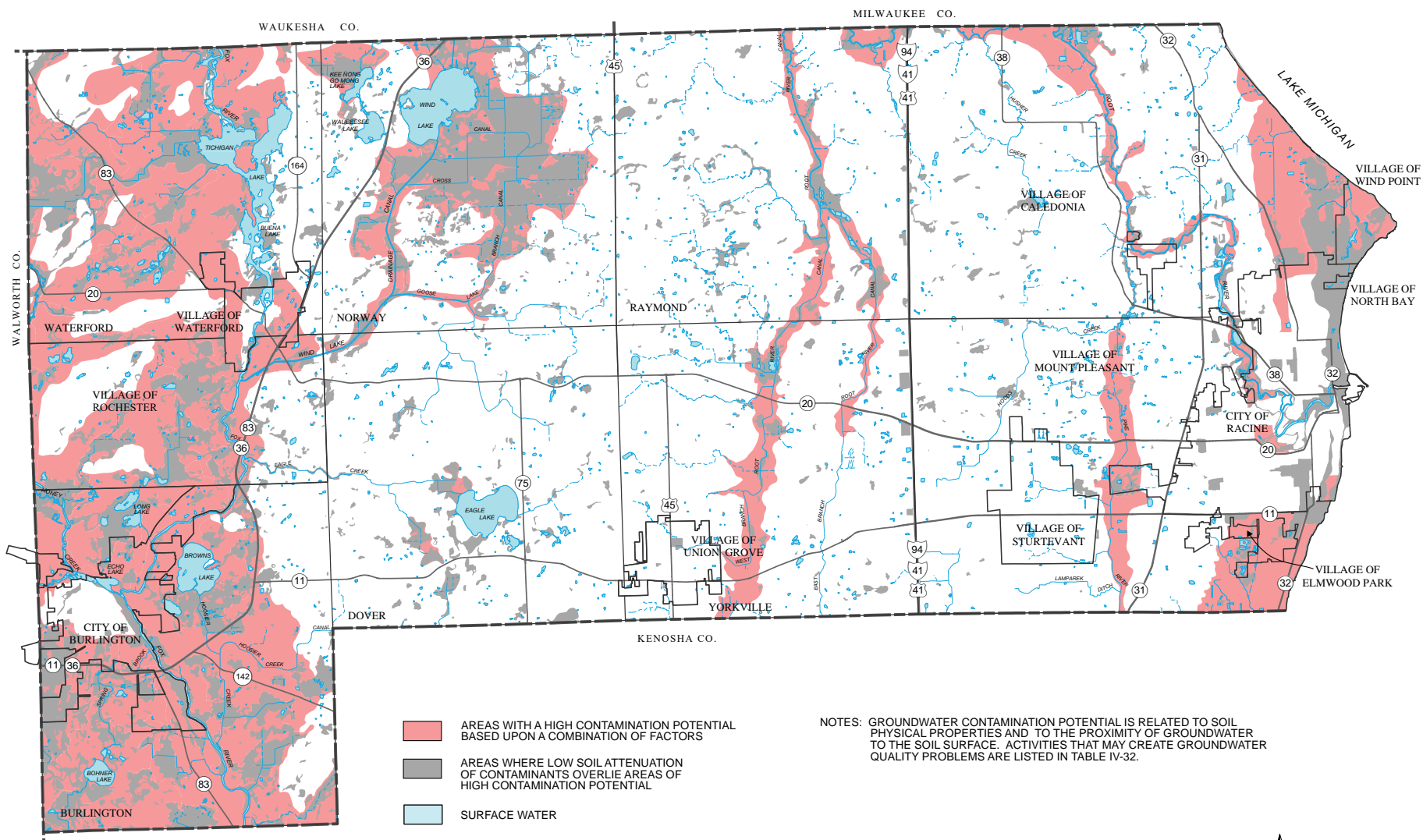
Groundwater monitoring by State agencies to determine the extent of groundwater contamination in Wisconsin and identify the sources of contamination has found that the primary contaminants of concern are volatile organic compounds, pesticides, and nitrates.

There are several factors that affect the contamination potential of groundwater resources. Many of those factors are related to soil physical properties and to the proximity of groundwater to the soils surface. Some of the soil properties that can affect groundwater quality include permeability of the subsoil, depth of the soil above the water table, clay and silt content in the soil profile, and the drainage conditions of the soil. Soils that have a high infiltration rate and high permeability with a low percentage of silt and clay increase the contamination potential of the groundwater. The potential of contamination is further enhanced when these soil conditions are coupled with a naturally occurring high water table.

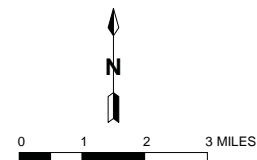
The areas in Racine County that are naturally the most vulnerable to groundwater contamination primarily occur in the Towns of Burlington and Waterford; the Village of Rochester; along the lakeshore of Lake Michigan; and in major river valleys (see Map 40). These areas have soils that consist of glacial sand and gravel outwash material that is

Map 40

AREAS NATURALLY VULNERABLE TO GROUNDWATER CONTAMINATION IN RACINE COUNTY



Source: Wisconsin Geological and Natural History Survey and SEWRPC.



very permeable, of limited thickness, and has a shallow water table, shallow to bedrock conditions, or a combination of these conditions. There are approximately 107 square miles of land, or about 32 percent of the County, that has a high potential for groundwater contamination (areas shown in red and gray on Map 40). In addition, about 59 square miles or about 18 percent of the County, has a moderate potential for groundwater contamination and approximately 169 square miles or slightly over 50 percent of the County, has a low potential for groundwater contamination (land areas are shown in white on Map 40).<sup>80</sup>

Lake Michigan has historically been a source of safe drinking water. However, no one can guarantee that an accident will not happen, and a mishap can have serious consequences. In 1993, the City of Milwaukee's public water supply became contaminated with *Cryptosporidium*, a parasite found in animal wastes. Nearly half of the 850,000 consumers were infected, 4,400 people were hospitalized, and at least 69 people died, making this the largest documented waterborne outbreak in U.S. history.<sup>81</sup> The exact source of the *Cryptosporidium* that caused this outbreak is still uncertain.

Typically, water supply facilities have a history of safe operation with very minimal malfunctions or shutdowns. The industry has been known for providing continuous service due to the use of high-quality and redundant equipment. However, the facilities are always subject to the potential for an unanticipated event that could interrupt services. Since 2002, water utilities and related organizations, such as the American Water Works Association have increased efforts to evaluate vulnerability of water supply facilities to a wide range of hazards, including acts of terrorism. The focus of these efforts has been directed toward preparation of vulnerability assessments and emergency response and mitigation plans for each facility.

### **Multi-Jurisdictional Water Supply Risk Management**

Those water supply systems serving the largest urban areas and populations would be of the most concern with regard to hazard risk. However, each municipality will have to evaluate any special water supply needs which could be a more serious problem if supplies were interrupted.

## **VULNERABILITY ASSESSMENT FOR HAZARDOUS MATERIALS INCIDENTS**

This type of hazard occurs with the uncontrolled release or threatened release of hazardous materials or substances from a fixed site or during transport that may adversely impact public health and safety and/or the environment.

Understanding the potential health effects associated with exposure to a hazardous material contaminant can be complicated and involves determining who may be exposed, how they may be exposed, and how long the exposures may last. Individuals are also known to react differently to chemical exposures depending upon their age and health. In addition, different effects may occur depending on whether a chemical is ingested versus being inhaled and the duration of exposure. There are several ways in which chemicals may enter the human body and cause detrimental health effects as summarized below:

- Inhalation-breathing the chemical into the lungs;
- Ingestion-swallowing contaminated food, water, or medication, or other chemicals;

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<sup>80</sup> *D.I. Siegel, Geochemistry of the Cambrian-Ordovician aquifer system in the northern Midwest, United States (Regional Aquifer-system Analysis report). U.S. Geological Survey Professional Paper 1405-D, 1989.*

<sup>81</sup> *Peter L. Havens and Jeffrey P. Davis, Cryptosporidium and Cryptosporidiosis, Seminars in Pediatric Infectious Diseases, October 1996.*

- Absorption-assimilation through direct contact with the skin, lungs, and eyes, or indirect contact with clothing or other contaminated items; and
- Injections-penetration through the skin, much less common than other modes of exposure, but can possibly occur due to an explosion or some other type of accident.

In dealing with chemical contaminants, there are two types of exposure, namely, acute and chronic exposure. Acute exposure is defined as short-term, high-level exposure and the effects are usually immediate, whereas chronic exposure is defined as long-term, lower-level exposure and the effects may take years to appear. Both are dangerous and have immediate and long-term health implications. General symptoms of toxic exposure can include, but are not limited to, dry and red skin upon contact, irritation of the eyes or lungs, headache, nausea, drowsiness, dizziness, insomnia, confusion, and tremors. This report only deals with acute exposure.

### **Fixed Facilities**

Over the past several decades, the use of chemicals has increased in nearly every sector of the economy. As a result, hazardous materials are present in quantities of concern in business and industry, agriculture, universities, hospitals, utilities, and other facilities in the State. There are no areas of the State that are exempt from a possible hazardous material incident. Despite extensive precautions taken to ensure careful handling during manufacture, transport, storage, use, and disposal, accidents and inadvertent releases are bound to occur. The potential impacts of such releases include short and/or long-term health hazards to those exposed, explosions, fires, and environmental contamination. An incident may also necessitate short- or long-term evacuation, which disrupts the social and economic aspects of the affected area.

The Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 also known as SARA Title III, brings industry, government, and the general public together to address emergency preparedness for accidental chemical releases.

The EPCRA program requires communities to prepare for hazardous chemical releases through emergency planning. This planning provides essential information for emergency responders and creates a database of hazardous chemical storage information for the community. The community right-to-know aspect increases public awareness of chemical hazards in their community and allows the public and local governments to obtain information about these chemical hazards.

In Wisconsin, facilities that use, store, or produce chemicals at or above the threshold quantities are required to submit a Tier II Reporting Form to the State Emergency Response Board (SERB), Local Emergency Planning Committee (LEPC) and the local fire department.<sup>82</sup> This form is usually a one or two page document, depending on the number of chemicals being reported. Basic information asked for includes the facility name and address, emergency contact person and phone number, chemical names and quantities. The SERB sends the forms out by mid-January each year and they are due back by March 1st. Failure to receive a form does not absolve a facility from their reporting obligations. A facility can be a factory, school, gas station, community center, or hospital. Farm Co-ops are exempt from reporting fertilizers and retailers are exempt from reporting goods packaged for resale. Although there are some exemptions, mainly for retailers, any facility that uses, stores, or produces hazardous chemicals may have to report the chemicals stored. However, it should also be noted that the Federal government no longer requires

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<sup>82</sup> *Wisconsin Emergency Management, Emergency Planning and Community Right-to-Know Act Section. Planning Threshold: Facility has an extremely hazardous substance present at any one time in an amount equal or exceeding the chemical-specific threshold planning quantity (TPQ). Reporting Threshold: Facility has 10,000 pounds of a hazardous substance or either 500 pounds or the threshold planning quantity of an extremely hazardous substance present at any one time and is not exempt from reporting requirements.*

retail gas stations to report. As noted in Chapter II, there are 216 facilities in Racine County that either report their inventory of hazardous materials and/or provide notification that they have an extremely hazardous substance under the requirements of EPCRA.

Under the EPCRA, a hazardous material is defined as any chemical that is a physical hazard or health hazard for which the Occupational Safety and Health Administration (OSHA) requires a facility to maintain a Material Safety Data Sheet (MSDS). Under EPCRA there is no specific list of hazardous materials, but some of the most common hazardous chemicals include propane, kerosene, fuel oil, motor oil, and gasoline. If a facility stores 10,000 pounds or more of these products the owners are required to file a report. Under the law, there are two categories of regulated chemicals: hazardous substances and extremely hazardous substances (EHS). EHS chemicals are found on an Environmental Protection Agency list of approximately 366 substances. Common EHS chemicals include chlorine, sulfuric acid, anhydrous ammonia, and nitric acid. Unlike the more common hazardous substances, the minimum reporting quantities will vary depending on the chemical.

### **Transportation**

The list of transported hazardous materials is extensive. However, the bulk of products being transported are petroleum products (gasoline, diesel fuel, jet fuel, fuel oil, asphalt, creosote, and propane), chemicals used for industrial or manufacturing processes (anhydrous ammonia, sulfuric acid, and chlorine), and waste products (industrial waste, food waste, medical waste, and animal waste). There are numerous other hazardous materials routinely transported in smaller quantities, such as pesticides, herbicides, and specialized industrial chemicals. The majority of releases are the result of transportation accidents. However, many minor releases are the result of illegal dumping of waste materials.

Demand for established and new chemical substances results in extensive hazardous materials shipments within and through Wisconsin communities daily. The major overland modes of transportation are highways, railways, and pipelines.

#### ***Highways***

Trucks are the most common way of transporting hazardous materials, accounting for more than 90 percent of all hazardous materials shipments nationwide according to the U.S. Department of Transportation. Various fuels are the most common cargo that is classified as hazardous. Every roadway in Wisconsin is a potential route for hazardous material transport. Interstate Highway 94 spans the eastern portion of Racine County between the densely populated Milwaukee-Chicago corridor. Large tankers conducting inter- and intra-state transportation of hazardous materials and substances use this highway extensively.

#### ***Rail***

There are three railroad companies that operate in Racine County, as shown on Map 12 in Chapter II of this report. Rail is used for the transport of hazardous materials because of large-load capabilities. Rail transport routes pass through the areas east of IH 94 and the far western portions of the County.

It should be noted that the shipment of crude oil by rail has increased as domestic oil production has increased. According to the Association of American Railroads, trains carrying crude oil within the United States have increased from 10,840 carloads in 2009 to more than 493,000 carloads in 2014. The typical train carrying crude oil is over a mile long and consists of 100 or more cars. Each of these cars typically carry 30,000 gallons of crude oil. Much of the increased domestic crude oil production consists of Bakken crude oil. This oil comes from a rock formation located in the States of North Dakota and Montana and the Canadian Provinces of Manitoba and Saskatchewan. Wisconsin Division of Emergency Management reported in 2015 that the Canadian Pacific Railway is running seven to 11 Bakken crude oil trains a week through Wisconsin, including Racine County which has a Canadian Pacific Railway line traversing the entire county east of IH 94 in a north-south direction (see Map 12 in Chapter II).

Derailments and incidents involving trains carrying crude oil may pose challenges for responding organizations. Such an incident could potentially involve the release and/or ignition of thousands of gallons crude oil. Because



crude oil is not a uniform substance and its physical and chemical properties can vary based upon where it was produced, responses to crude oil incidents may require specialized outside resources that will take time to arrive to the site of the incident. Crude oil often contains flammable gasses, whose presence can reduce the effectiveness of traditional firefighting techniques.

On May 1, 2015, the U.S. Department of Transportation issued rules related to enhanced tank car standards and operational controls for high-hazard flammable trains.<sup>83</sup> Key provisions include enhanced braking systems for trains considered high-hazard flammable trains (HHFT), enhanced design standards for new tank cars, retrofitting of existing tank cars, and limiting operating speeds of HHFTs to 50 mph in most areas and 40 mph in high-threat urban areas.

### ***Pipeline***

Natural gas service is provided for all of Racine County by the We Energies-Gas Operation, and We Energies is the distributor of natural gas. In Racine County the main natural gas supply is primarily provided for by ANR Pipeline Company which owns main and branch gas pipelines in Racine County and the surrounding area. In addition, the We Energies natural gas system is connected to other major gas pipelines outside of, but in the vicinity of, Racine County. Liquid petroleum is also transported through Racine County by a main pipeline owned and operated by West Shore Pipeline that traverses the County east of USH 45 in a north-south direction (see Map 17 in Chapter II).

It should be noted that natural gas service and selected other hazards could be vulnerable to events, such as an earthquake or an act of terrorism. Such possibilities should be considered as facility and system redundancy is carried out.

An incident involving any one of the above modes of hazardous material transport could result in a local emergency, with the potential to affect large numbers of people. The potential effects include health hazards to those exposed to the hazardous materials, explosions, major fires, and environmental contamination. An incident may necessitate short- or long-term evacuation that would disrupt the affected area. Accidents on major transport arteries can disrupt or stop traffic for extended periods of time. In the State of Wisconsin there were 10,632 transportation-related hazardous material incidents reported over the period 1971 through 2014.<sup>84</sup> These resulted in 11 deaths and 308 injuries. In about 75 percent of these incidents, there was no damage to property. Property damages in those incidents that had damages ranged up to about \$6.8 million. The total damages reported as resulting from these incidents were about \$61.6 million and the average amount of reported damages per incident was about \$5,800.<sup>85</sup>

### **Description of Recent Hazardous Materials Incident Events**

Between 2010 and 2014, Racine County averaged 15 hazardous material spills or releases per year, almost all of which were minor. The majority of these incidents involved vehicle fluids such as gasoline, diesel fuel, antifreeze, hydraulic fluid, or other petrochemical substances. Other releases have included mineral oils, paints, solvents, propane or natural gas, industrial process wastewater, and human waste. Historically, the most serious incidents have involved chlorine, anhydrous ammonia, hydrochloric acid, pesticides, and fertilizer. A complete file on all spills is maintained by the Racine County Office of Emergency Management.

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<sup>83</sup> 49 Code of Federal Regulations, *Parts 171, 172, 173, 174, and 179.*

<sup>84</sup> *U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration Incident Report Database, accessed on December 8, 2015.*

<sup>85</sup> *Damages are expressed in 2014 dollars.*

Over the period from 1971 to 2014, 147 transportation-related hazardous material incidents were reported in Racine County.<sup>86</sup> Most were relatively minor. Of these incidents, 137 were related to roadways, nine involved a railroad, and one incident involved air transport. These incidents resulted in one death and seven injuries. The majority of these incidents involved releases of flammable or combustible liquids such as fuel oil, acetone, gasoline, paint or paint thinner, or resin solutions. Other incidents involved corrosive materials, flammable solids, oxidizing agents, or other hazardous materials. Hazardous materials were released in 99 incidents. In the incidents involving liquids, the amounts released ranged between 0.02 and 8,048 gallons, with an average volume released of about 158 gallons. Releases of solid materials were rare. When they occurred, the amounts released ranged between 0.0625 and 8 pounds. Property damage was reported in 14 incidents, with total damages reported being about \$227,500 in 2014 dollars.

A total of 11 pipeline incidents have been recorded in Racine County during the 44-year period from 1971 through 2014. These events are documented in terms of their magnitude and impact in Table 56, based upon data published by the Federal Department of Transportation, Office of Pipeline Safety. There has not been an incident since 1990, which demonstrates a very low probability of occurrence within Racine County. In total, these pipeline incidences have resulted in no deaths, two injuries, and nearly \$124,900<sup>87</sup> in property damages within Racine County. A majority of these property damages occurred as a result of a single incident on February 26, 1988, involving a natural gas pipeline. These data indicate that hazardous material incidents are relatively rare but can cause considerable property damage, and have a relatively low risk in terms of loss of human life or injury.

#### **Vulnerability, Community Impact, and Multi-Jurisdictional Assessment**

There are several factors that should be considered when attempting to identify the scope, magnitude and vulnerability in terms of transportation-related hazardous materials incidents within specific areas of Racine County. One factor is the density of traffic and development. Certain pipeline sections, as well as certain major highways, rail lines, or pipelines may handle more hazardous material traffic than others. Therefore, the eastern and western portions of Racine County are more vulnerable than the central areas, due to the presence of major highways, rail lines, and pipelines. The condition of the transport routes and seasonal weather effects should also be considered, as well as predominant wind patterns within the County. Developing communication between planning agencies and storage site and transportation system owner/operators can be beneficial in determining the possible risks associated with transporting hazardous materials into or through a particular community.

On average, there are 15 hazardous material incidents per year from fixed facilities in Racine County. Estimated damages caused by these incidents were not available. Over a 44-year period, there was an average of 3.3 transportation-related hazardous material incidents per year in Racine County. These incidents caused about \$1,550 in property damage per incident, although most of those damages were caused by only a few incidents. On average, it would be expected that transportation-related hazardous materials incidents would cause about \$5,170 in property damages per year. Over a 44-year period, an average of 0.25 pipeline-related hazardous material incidents occurred per year. This is about one incident every four years. These incidents caused an average of about \$11,350 in property damages per incident. On average, it would be expected that pipeline-related hazardous material incidents would cause an average of \$2,850 in property damages per year. When transportation-related incidents are combined with pipeline-related incidents, it would be expected that hazardous material incidents would cause an average of \$8,020 in property damages per year.

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<sup>86</sup> *U.S. Department of Transportation Pipeline and Hazardous Materials Safety Administration Incident Report Database, accessed on December 8, 2015.*

<sup>87</sup> *Damages have been adjusted to 2014 dollars.*

**Table 56**

**NATURAL GAS AND HAZARDOUS LIQUID PIPELINE DISTRIBUTION IN RACINE COUNTY: 1971-2014**

Date	Municipality	Accident Type	Fatalities	Injuries	Property Damage <sup>a</sup>
November 16, 1971 .....	Village of Caledonia	Natural Gas Distribution	0	0	\$ 2,338
November 23, 1971 .....	Village of Caledonia	Natural Gas Distribution	0	0	19,290
March 2, 1972.....	City of Racine	Natural Gas Distribution	0	0	198
October 27, 1972.....	City of Racine	Natural Gas Distribution	0	0	1,133
June 11, 1979.....	City of Racine	Natural Gas Distribution	0	1	0
December 5, 1980.....	Village of Sturtevant	Natural Gas Distribution	0	0	575
December 9, 1981.....	City of Racine	Natural Gas Distribution	0	0	1,302
September 6, 1984.....	City of Racine	Natural Gas Distribution	0	0	0
February 28, 1986.....	City of Racine	Natural Gas Distribution	0	0	0
February 26, 1988.....	City of Burlington	Natural Gas Distribution	0	1	100,055
August 9, 1990 .....	City of Racine	Hazardous Liquid Pipeline	0	0	0
Total	--	--	0	2	\$124,891

<sup>a</sup>Dollar values were adjusted to year 2014 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.

Source: U.S. Department of Transportation Office of Pipeline Safety and SEWRPC.

In 2014, the total equalized assessed property value in Racine County was estimated at about \$13.6 billion. Based on the current average estimate of \$8,020 in reported damages per year, it can be expected that approximately 0.00006 percent of the value of all property, including buildings and infrastructure, in Racine County will be damaged from hazardous material events each year. Due to the unpredictability of hazardous material events, all buildings, infrastructure, and critical facilities within the County are considered at risk.

**Potential Future Changes in Hazardous Materials Incident Conditions**

Although significant hazardous materials incidents are not expected to change in the future, changes in land use can have an influence on the potential magnitude of any particular hazardous materials incidents that occurs. Such changes relate to the potential future increase in development within the County. Changing land use patterns within Racine County, as documented in Chapter II of this report, indicate a small potential increased risk of potential exposure to hazardous materials incidents, damage, and related losses in the expanding urbanized areas within the County. A continued increase in the volume of Bakken crude oil transported through the County by rail indicates a potential increased risk of derailment and challenges posed by the release and/or ignition of crude oil in such an incident, especially in urbanized areas.

**VULNERABILITY ASSESSMENT FOR PUBLIC HEALTH EMERGENCIES**

This type of hazard is a composite of both potential epidemics and the spread of disease from natural disasters or human-induced hazard-related events. The Center for Disease Control and Prevention (CDC) has developed a list of emerging infections priority issues which include; antimicrobial resistance, food and water safety, vectors and animal health, blood safety, infections that cause chronic diseases, opportunistic infections, maternal and child health, health of travelers and refugees, and vaccines. The potential for natural and human-induced hazardous incidents exists almost everywhere. While these incidences can be relatively infrequent, they are capable of endangering the health of the individuals involved and the emergency personnel directed to assist them.

### Historical Public Health Emergencies

The “Spanish” influenza pandemic of 1918-1920 was a world-wide disaster. This virus infected an estimated 500 million persons.<sup>88</sup> Estimates of the total number of deaths caused by this pandemic range between 50 million and 100 million.<sup>89</sup> About 675,000 people in the United States died from this disease outbreak. This strain of influenza was unusual in several ways. Influenza cases caused by this strain had a very rapid onset, and this virus was more contagious than typical influenza strains. In about 20 percent of cases, infection with this strain led to the development of pneumonia. While the fatalities caused by most strains of influenza occur among juvenile, elderly, or weakened patients, this strain predominantly killed healthy young adults. The pandemic struck the United States in three waves. The first wave erupted as a wave of mild influenza during the late spring and early summer of 1918. The second wave struck as severe influenza during fall 1918. The third wave struck during spring 1919. At least 103,000 Wisconsin residents developed “Spanish” influenza during the second wave of the outbreak and it caused about 8,460 deaths in the State. Based upon a recommendation from the U.S. Surgeon General, the Wisconsin State Health Officer ordered all public institutions in the State closed. This order included schools, churches, theaters, and other places of amusement and public gathering. Almost every local government in the State put this order into effect.<sup>90</sup>

Two other world-wide influenza pandemics occurred during the twentieth century. The “Asian flu” pandemic of 1957-1958 was responsible for an estimated two million deaths world-wide and an estimated 69,800 deaths in the United States. The “Hong Kong flu” pandemic of 1968-1969 caused an estimated one million deaths world-wide and an estimated 34,000 deaths in the United States.

Poliomyelitis is an infectious viral disease that is caused by the poliovirus. In most people, infection with poliovirus does not produce symptoms; however, in about 0.1 to 0.5 percent of cases infection results in muscle weakness that can cause paralysis. The weakness most often affects the legs, but may involve the muscles of the head and neck or the diaphragm. Poliovirus is transmitted from person to person through infected feces entering the mouth. Small, localized epidemics of paralytic poliomyelitis began to appear in the United States around 1900.<sup>91</sup> Outbreaks reached pandemic levels in the early twentieth century. Major outbreaks occurred in 1916, 1949, and 1952. The 1952 outbreak was the worst one reported in the United States. About 58,000 cases were reported in that year, resulting in 3,145 deaths and 21,269 persons left with mild to disabling paralysis. Beginning in the 1950s, the widespread availability of vaccines for the poliovirus reduced the annual number of cases. Through the use of vaccines, poliomyelitis was eradicated from the Americas by 1994.

Contamination of a public water supply source has the potential to cause large-scale public health emergencies. In 1993, there was an outbreak of cryptosporidiosis in the Milwaukee metropolitan area related to contamination of the

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<sup>88</sup> F. Burnet and E. Clark, *Influenza: A Survey of the Last 50 Years in the Light of Modern Work on the Virus of Epidemic Influenza*, Mac Millan, 1942.

<sup>89</sup> Naill P.A.S. Johnson and Juergen Mueller, “Updating the Accounts: Global Mortality of the 1918-1920 ‘Spanish’ Influenza Pandemic,” *Bulletin of the History of Medicine*, Volume 76, Pages 105-115, 2002.

<sup>90</sup> Steven Burg, “Wisconsin and the Great Spanish Flu Epidemic of 1918,” *Wisconsin Magazine of History*, Pages 37-56, Autumn 2000.

<sup>91</sup> Barry Trevelyan, Matthew Smallman-Raynor, and Andrew D. Cliff, “The Spatial Dynamics of Poliomyelitis in the United States; From Epidemic Emergence to Vaccine-Induced Retreat, 1910-1971,” *Annals of the Association of American Geographers*, Volume 95, pages 269-293, 2005.

City's water supply. This outbreak sickened approximately 400,000 people, 4,400 people were hospitalized, and at least 69 people died, making this the largest documented waterborne outbreak in U.S. history<sup>92</sup>.

### **Description of Recent Public Health Emergencies**

Table 57 lists the annual numbers of cases of reportable communicable diseases in Racine County for the years 2005 through 2013.<sup>93</sup> The annual number of cases reported in the County ranged from a high of about 1,756 cases in 2006 to low of about 1,255 in 2013, the most recent year for which data were available. Sexually transmitted diseases made up the majority of reported diseases for each year reported, ranging from a high of 1,480 cases in 2006 to a low of 940 cases in 2013. The data show considerable variation among years in the number of cases reported. Some of this variability reflects changes from year to year in which diseases are considered reportable. This variability also reflects outbreaks of individual diseases that occurred in specific years, such as the 2012 outbreak of pertussis or the 2009 pandemic of H1N1 influenza.<sup>94</sup> Despite this variability, the annual number of cases of reportable communicable diseases in the County appears to be generally decreasing over time.

Table 57 also shows the numbers of children in grades K through 12 that had received all of the appropriate immunizations. The percentage of children compliant with the recommended immunizations varied from year to year, ranging from a low of 94.6 percent in 2005 to a high of 99.4 percent in 2013. In 2013 there were 201 children in the County who were noncompliant on immunizations and posed a potential health risk in Racine County.

In the period 2005 through 2013, there were more than 1,000 deaths each year due to selected diseases within Racine County as shown in Table 58. The majority of these mortalities were due to heart and cancer related illnesses, averaging 371 and 361 deaths per year, respectively. Pneumonia and influenza accounted for 71 deaths in 2013, exceeding the average of 45 deaths per year. Other infectious diseases and parasitic illnesses accounted for an average of 33 deaths per year. Table 58 also demonstrates that 85 deaths in 2013 were associated with alcohol and drug abuse within Racine County, exceeding the average of 61 deaths per year by 40 percent.

As indicated previously, during 2009 there was a world-wide outbreak of a novel strain of type-A influenza. This new virus was designated strain H1N1 and was also known as "the swine flu." This virus is transmitted through coughing and sneezing by infected individuals. Cases caused by this influenza were first reported in the United States in April 2009. By the end of the month, cases had been confirmed in Milwaukee. The number of reported cases in Wisconsin peaked in mid-June and declined to low levels by mid-July. A second increase occurred in autumn 2009 with the number of reported cases reaching peak values in late October or early November. During 2009, 9,587 cases were reported in the State. The majority of these cases occurred in the Southeastern Wisconsin Region. In addition, 1,317 hospitalizations and 55 deaths in Wisconsin were attributed to the H1N1 virus. About 140 cases were reported in Racine County in 2009 (see "Influenza A, Novel" in Table 57).

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<sup>92</sup> Peter L. Havens and Jeffrey P. Davis, *Cryptosporidium and Cryptosporidiosis, Seminars in Pediatric Infectious Diseases, October 1996.*

<sup>93</sup> *Reportable diseases are diseases considered to be of great public health importance. Local, state, and national agencies (for example, county and state health departments or the U.S. Centers for Disease Control and Prevention) require that these diseases be reported when they are diagnosed by doctors or laboratories. The list of reportable diseases are periodically revised, with some diseases being added to the list as new pathogens emerge and others being removed from the list as their incidences decrease.*

<sup>94</sup> *The cases related to the H1N1 influenza outbreak are included in the numbers shown in Table 57 for Influenza A, Novel.*

Table 57

## REPORTED CASES OF SELECTED COMMUNICABLE DISEASES REPORTED IN RACINE COUNTY: 2005-2013

Disease	2005	2006	2007	2008	2009	2010	2011	2012	2013
<b>Communicable Diseases</b>									
Arboviral Illness, West Nile Virus .....	--	--	--	--	--	--	--	<5	--
Babesiosis .....	--	--	--	--	--	0	<5	0	<5
Blastomycosis .....	--	--	--	<5	7	<5	<5	6	6
Campylobacter Enteritis .....	45	34	23	14	30	11	26	17	19
Cryptosporidiosis .....	--	--	--	10	11	38	10	<5	6
Cryptosporosis .....	--	--	--	--	--	--	--	--	<5
<i>E. coli</i> , O157 .....	--	--	--	0	<5	--	--	--	--
<i>E. coli</i> , non-O157 .....	--	--	--	<5	<5	--	--	--	--
<i>E. coli</i> , Shiga Toxin-producing .....	--	--	--	--	--	<5	<5	6	6
Ehrlichiosis/Anaplasmosis .....	--	--	--	0	0	0	<5	0	0
Giardiasis .....	13	15	15	8	12	14	11	10	6
<i>Haemophilus influenzae</i> , Invasive .....	--	--	--	<5	<5	<5	0	<5	<5
Hepatitis Type A .....	<5	0	<5	<5	<5	<5	0	0	<5
Hepatitis Type B <sup>a</sup> .....	13	19	13	24	52	26	8	15	12
Hepatitis Type NANB/C .....	79	109	94	97	94	118	115	109	100
Histoplasmosis .....	--	--	--	--	--	--	<5	--	--
Influenza A, Novel .....	--	--	--	--	140	0	14	23	17
Kawasaki Disease .....	--	--	--	--	<5	--	--	--	--
Legionnaire's Disease .....	<5	<5	<5	<5	<5	<5	<5	8	10
Listeriosis .....	--	--	--	0	--	0	--	--	--
Lyme Disease .....	0	6	<5	5	13	8	6	13	7
Malaria .....	--	--	--	<5	--	--	--	--	--
Measles .....	0	0	0	0	0	0	0	0	0
Meningitis, Meningococcal .....	12	23	16	<5	<5	0	0	0	0
Meningitis, Bacterial .....	<5	0	<5	<5	<5	<5	0	<5	<5
Mumps .....	0	33	0	<5	<5	0	0	0	0
Pertussis .....	15	9	<5	<5	<5	<5	14	76	35
Salmonellosis .....	31	19	83	27	15	31	24	25	25
Shigellosis .....	5	6	22	6	104	<5	0	<5	6
<i>Streptococcus pneum.</i> , Invasive .....	--	--	--	23	22	22	8	15	16
All Streptococcal Diseases .....	--	--	--	14	54	17	19	26	29
Tuberculosis .....	0	0	<5	<5	<5	<5	<5	<5	<5
<b>Sexually Transmitted Diseases</b>									
Chlamydia trachomatis .....	1,028	991	881	1,016	985	1,076	920	813	741
Genital Herpes .....	128	149	153	--	--	--	--	--	--
Gonorrhea .....	304	333	316	281	201	221	177	143	187
Syphilis .....	<5	7	<5	5	<5	<5	7	13	12
<b>Immunizations (children in grades K-12) by Compliance</b>									
Compliant .....	29,465	36,109	36,605	35,251	29,311	34,774	35,442	35,197	34,633
Noncompliant .....	1,698	767	401	1,965	1,592	1,903	881	295	201
Percent Compliant .....	94.6	97.9	98.9	94.7	94.8	94.8	97.6	99.2	99.4

<sup>a</sup>Includes all positive HBsAg test results.

Source: Wisconsin Department of Health Services Division of Public Health.

Table 58

## MORTALITIES DUE TO SELECTED CAUSES REPORTED IN RACINE COUNTY: 2005-2013

Cause of Death	2005		2006		2007		2008		2009	
	Deaths	Death Rate	Deaths	Death Rate	Deaths	Death Rate	Deaths	Death Rate	Deaths	Death Rate
Heart Disease (total) .....	352	178	368	188	377	193	377	191	352	178
Ischemic Heart Disease.....	263	135	225	115	232	119	237	120	215	109
Cancer (total) .....	351	180	284	196	362	185	405	205	368	186
Tracheal/Bronchial/Lung.....	110	56	107	55	90	46	107	54	110	56
Colorectal.....	30	15	36	18	36	18	33	17	30	15
Female Breast .....	34	34	32	32	26	26	26	26	34	34
Cerebrovascular Disease .....	76	38	67	34	74	38	88	45	76	38
Lower Respiratory Disease .....	94	48	89	46	94	48	72	36	94	48
Pneumonia and Influenza .....	33	17	39	20	36	18	41	21	33	17
Accidents	78	40	102	55	64	33	73	37	64	32
Motor Vehicle.....	11	--	27	14	25	13	19	--	11	--
Diabetes .....	43	22	43	22	44	23	40	20	43	22
Infectious and Parasitic Disease .....	39	20	20	10	21	11	28	14	39	20
Suicide .....	21	11	22	11	18	--	28	14	21	11
Alcohol and Drug Abuse as Underlying Cause of Death										
Alcohol.....	30	15	34	17	25	13	45	23	30	15
Tobacco Use.....	292	148	325	166	283	145	303	153	292	148
Other Drugs .....	30	10	25	13	19	--	20	10	20	10

Cause of Death	2010		2011		2012		2013	
	Deaths	Death Rate	Deaths	Death Rate	Deaths	Death Rate	Deaths	Death Rate
Heart Disease (total) .....	361	185	393	201	401	206	360	184
Ischemic Heart Disease.....	221	113	204	104	230	118	203	104
Cancer (total) .....	412	211	368	188	343	176	363	186
Tracheal/Bronchial/Lung.....	121	62	101	52	95	49	95	49
Colorectal.....	23	12	20	10	29	15	27	14
Female Breast .....	22	22	22	22	21	21	25	25
Cerebrovascular Disease .....	95	49	29	46	83	43	78	40
Lower Respiratory Disease .....	80	41	78	40	88	45	102	52
Pneumonia and Influenza .....	40	20	50	26	59	30	71	36
Accidents	70	36	73	37	91	47	81	41
Motor Vehicle.....	11	--	20	10	11	--	11	--
Diabetes .....	37	19	40	20	46	34	41	21
Infectious and Parasitic Disease .....	36	18	43	22	38	19	39	20
Suicide .....	26	13	25	13	26	13	27	14
Alcohol and Drug Abuse as Underlying Cause of Death								
Alcohol.....	23	12	41	21	45	23	53	27
Tobacco Use.....	311	159	283	145	287	147	292	150
Other Drugs .....	20	10	27	14	27	14	32	16

NOTE: Death rates are per 100,000 people. The death rates reported for female breast cancer are based on the female population.

Source: Wisconsin Department of Health Services Division of Public Health.

In 2011 and 2012, the United States experienced an outbreak of pertussis, which is also known as whooping cough. Pertussis is a bacterial disease of the respiratory tract that is transmitted through coughing by infected individuals. The symptoms and impacts are generally most severe in infants and young children. Wisconsin had the highest incidence of pertussis during this outbreak, with an incidence of 130.7 cases per 100,000 population. The outbreak began in July 2011. From July 1, 2011, through December 31, 2012, 5,322 confirmed cases and 2,132 probable cases were reported in the State. During this outbreak, about 151 cases were reported in Racine County.<sup>95</sup>

Foodborne illness is a common and costly public health problem. An estimated one in six people in the United States gets sick from foodborne illness each year by consuming contaminated foods or beverages. There are more than 250 different disease causing pathogens that can contaminate foods. In addition to pathogens, poisonous chemicals and other harmful toxins can cause foodborne diseases when present in food. According to the Centers for Disease Control and Prevention (CDC) Foodborne Outbreak Online Database, there were 473 multi-state foodborne illness outbreaks that affected the State of Wisconsin during the period 1998 through 2014. These outbreaks caused almost 22,000 illnesses, 2,400 hospitalizations, and 71 deaths in the states affected. In 2014, the most recent year that data was available, 30 foodborne illness outbreaks were reported in the State of Wisconsin causing 594 illnesses, 79 hospitalizations, and 7 deaths. The most common pathogens that led to outbreaks in 2014 were Norovirus, *Salmonella enterica*, and *Escherichia coli*, typically originating from meats, fruits, or vegetables (see Table 59).

The West African Ebola virus disease epidemic that occurred in 2013 and 2014 was the largest Ebola outbreak in history. The epidemic began in the country of Guinea in December 2013 and spread to Liberia and Sierra Leone. Smaller outbreaks occurred in Nigeria and Mali, and isolated cases occurred in Italy, Senegal, Spain, the United Kingdom, and the United States. There were four confirmed cases of Ebola in the United States, with one case leading to a fatality. As of February 2016, the World Health Organization (WHO) reported over 28,600 confirmed or suspected cases and 11,300 deaths from this epidemic. It is not certain how an Ebola outbreak starts, however it is believed to occur after an Ebola virus is transmitted to a human by contact with an infected animal's body fluids, most likely from bats. Once a human is infected, the virus is extremely contagious. The virus is spread via direct contact with blood or other bodily fluids of an infected person, or by contact with objects that have been contaminated by an infected person. The risk of transmission is increased among medical staff caring for the infected patients. The virus causes a severe illness marked by fever, internal bleeding, organ failure, and death in 50 to 90 percent of those infected. At this time there are no vaccines to protect against the Ebola virus disease. Clinical trials for several candidate vaccines are underway.

In September 2014, the CDC declared its first case of Ebola virus disease in the United States. The individual became infected in Liberia and fell ill after he traveled to Texas. He died several weeks later. Two nurses that treated the infected individual later tested positive for Ebola. The nurses were treated for their infections and were declared free of the Ebola virus ten days later. The fourth confirmed U.S. case was a physician who had treated Ebola patients in West Africa. The physician was treated and recovered from his infection. There were no confirmed Ebola virus infections in Wisconsin.

Beginning in the fall of 2015, the State of Wisconsin experienced an outbreak of bloodstream infections caused by the bacterium *Elizabethkingia anophelis*. The Wisconsin Department of Health Services, Division of Public Health is currently investigating the outbreak. At the time of this report, the source of the infections is still unknown. The majority of patients with these infections are over 65 years old and all have a history of at least one underlying serious illness. *Elizabethkingia* bacteria are found throughout the environment and are usually not harmful. Infections and outbreaks caused by this bacterium are extremely rare. During the period of November 1, 2015, through April 8, 2016, a total of 57 infections have been confirmed in the State of Wisconsin. This is the largest known outbreak of

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<sup>95</sup> *State of Wisconsin Department of Health Services, "Annual Summary of Reported Pertussis, 2012, Wisconsin," April 30, 2013.*



Table 59

## FOODBORNE ILLNESS OUTBREAKS AFFECTING WISCONSIN: 2014

Date	Area Affected	Outbreak Pathogen	Illnesses	Hospitalizations	Deaths	Outbreak Origin	Food Vehicle
January 2014	Wisconsin	Norovirus Genogroup II	8	0	0	Restaurant	--
January 2014	Wisconsin	Norovirus Genogroup I	34	0	0	Restaurant	--
January 2014	Multi-state	<i>Escherichia coli</i> , Shiga toxin-producing	4	0	0	Private residence	Ground beef
January 2014	Multi-state	<i>Salmonella enterica</i>	31	5	0	Private residence	Chia seed powder
February 2014	Wisconsin	<i>Shigella sonnei</i>	6	0	0	Restaurant	--
March 2014	Wisconsin	Norovirus Genogroup II	14	1	0	Other	Salad dressing
March 2014	Wisconsin	Norovirus Genogroup I	10	0	0	Caterer	Lettuce; tomatoes
March 2014	Wisconsin	Norovirus Genogroup II	7	0	0	Restaurant	--
March 2014	Wisconsin	Norovirus Genogroup I	6	0	0	Private residence	--
April 2014	Wisconsin	Norovirus Genogroup II	4	0	0	Restaurant	--
April 2014	Wisconsin	Norovirus Genogroup I	22	0	0	Banquet facility	Fruit salad; cake
April 2014	Wisconsin	<i>Salmonella enterica</i>	20	6	0	Private residence	Cantaloupe
May 2014	Multi-state	Norovirus Genogroup II	33	0	0	Banquet Facility	--
May 2014	Wisconsin	Norovirus Genogroup II	33	0	0	Restaurant; Private residence; Grocery store; Long-term care/nursing home	Cucumber
June 2014	Wisconsin	Norovirus Genogroup II	21	0	0	Caterer	Fruit platter
June 2014	Wisconsin	<i>Escherichia coli</i> , Shiga toxin-producing	16	2	0	Restaurant	Cabbage
July 2014	Multi-state	<i>Streptococcus</i> Group A	54	0	0	Camp	Pasta salad
July 2014	Wisconsin	<i>Salmonella enterica</i>	47	11	0	Private residence	Ground beef
August 2014	Multi-state	<i>Salmonella enterica</i>	4	0	0	Restaurant	--
September 2014	Wisconsin	<i>Salmonella enterica</i> ;	29	0	0	Restaurant	--
September 2014	Wisconsin	<i>Escherichia coli</i> , Shiga toxin-producing	4	2	0	Private residence	--
September 2014	Wisconsin	<i>Campylobacter jejuni</i> ; <i>Escherichia coli</i> ; Giardia	38	10	0	Private residence	Unpasteurized milk
September 2014	Wisconsin	Other - Chemical/Toxin	8	0	0	Grocery store	Rotisserie chicken
September 2014	Wisconsin	<i>Cryptosporidium parvum</i>	8	0	0	Private residence	Kale
October 2014	Wisconsin	<i>Salmonella enterica</i>	42	8	0	Caterer	Baked beans
October 2014	Wisconsin	Norovirus Genogroup II	31	0	0	Grocery store	Pasta salad
October 2014	Wisconsin	<i>Listeria monocytogenes</i>	35	34	7	Other	Apples
November 2014	Multi-state	<i>Clostridium perfringens</i> ; <i>Bacillus cereus</i>	4	0	0	Restaurant	--
December 2014	Wisconsin	Norovirus Genogroup II	16	0	0	Restaurant	Artichoke dip
December 2014	Wisconsin	<i>Clostridium perfringens</i> ; <i>Bacillus cereus</i>	5	0	0	Restaurant	Pork
Total	--	--	594	79	7	--	--

NOTE: Reported illnesses, hospitalizations, and deaths for multi-state outbreaks represent cases in all states affected.

Source: Centers for Disease Control and Prevention and SEWRPC.

this particular strain. There have been a total of 18 deaths among patients with confirmed *Elizabethkingia anopheles* bloodstream infections, although it is not certain whether these deaths were caused by the infection or other serious pre-existing health conditions. Affected counties include Columbia, Dane, Dodge, Fond du Lac, Jefferson, Milwaukee, Ozaukee, Racine, Sheboygan, Washington, Waukesha, and Winnebago. The Wisconsin Department of Health Services began statewide surveillance for this disease in January 2016 and the CDC are assisting in investigating this outbreak.

### **Vulnerability and Community Impact Assessment**

The location of disease outbreaks is dictated by the proximity that residents have to infected people or to infected vectors. Residents in rural areas of the County may be at a slightly higher risk to some vector-borne diseases, but ultimately, all County residents will be at some risk to these diseases.

The severity of a public health emergency can be evaluated from the perspective of the individuals who have been infected or from the perspective of how many complications and deaths the disease causes in the population. Several factors can determine the severity of a public health emergency. For example, the severity of a pandemic influenza outbreak can be influenced by:

- Properties of the virus: The inherent virulence and contagiousness of the virus influences the severity of a pandemic's impact. Pandemics can have a concentrated adverse impact within specific age groups. Concentrated illnesses and deaths in young, economically productive age groups will be more disruptive to societies and economies than when the very young or very old are most severely affected;
- Subsequent waves of virus spread: Cases of illness in a pandemic often occur in waves. These waves may last for six to twelve weeks and recur over a period of a year or longer. For example, the "Spanish" Influenza pandemic occurred in three waves in the United States throughout 1918 and 1919. Virus mutation and the emergence of more virulent strains can influence the severity of subsequent waves;
- Vulnerability of the population: In many communicable disease outbreaks, specific populations are at a greater risk than the general population. Examples of this include people with underlying health conditions or weakened immune systems and the very young or old. Nutritional factors also play a role and may influence the severity of a disease outbreak; and
- Community capacity to respond: The quality of health services available influences the impact of any pandemic. A virus that causes only mild symptoms in communities with strong health systems can be devastating in other communities where health systems are weak. Vaccine shortages and distribution problems can also impact the ability to respond to a disease outbreak.

In general, the frequency of public health emergencies are hard to predict. This is due in part to the fact that communicable diseases differ from one another in their infectivity, virulence, and mode of transmission. For many diseases, these properties can be related to changes in the disease agent. For example, influenza pandemics have been related to genetic changes in the influenza virus.<sup>96</sup> While seasonal outbreaks of influenza occur annually, influenza pandemics are relatively rare events. A total of four influenza pandemics have occurred in the last 100 years, resulting in a rough average of one influenza pandemic every 25 years. The frequency of other diseases may be different from this. For example cases of Lyme diseases, a vector-borne disease, and Salmonella poisoning, a foodborne illness, are detected in Racine County nearly every year (see Table 57).

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<sup>96</sup> Edwin D. Kilbourne, "Influenza Pandemics of the 20th Century," *Emerging Infectious Diseases, Volume 12*, pages 9-14, 2006.

The duration of individual disease outbreaks can be similarly difficult to predict. Based on the history of previous influenza pandemics it is likely that a pandemic wave could last for three to four months, with community outbreaks lasting from six to eight weeks. Vector-borne pathogens are most prevalent during the spring through fall seasons when disease carrying agents such as mosquitos and ticks are active. Transmission of vector-borne diseases is likely to occur mostly during these seasons. Foodborne pathogens, on the other hand, can occur throughout the year.

The specific probability that a public health emergency will occur in Racine County cannot be predicted, however most health experts agree that future outbreaks and pandemic events are inevitable. It should be noted that Wisconsin, including Racine County, is located within a region of the country that has a high risk for Lyme disease. While the incidence of Lyme disease in the State varies from year to year, the average incidence for the period 2005 through 2014 was 29.9 cases per 100,000 population. This was greater than three times the national average of 8.3 cases per 100,000 population.<sup>97</sup>

The economic impact of a public health emergency is likely to be dependent upon the particular disease and disease or pathogen strain. For some diseases, the impacts could be major. A pandemic flu event, for example, could have severe economic repercussions, with significant costs associated with hospitalization and care for those afflicted. Broader economic impacts associated with lost productivity and wages could also be expected. In general, most economic functions would be challenged by the high rate of absenteeism associated with such a pandemic.

While anyone can be affected by a communicable disease outbreak or foodborne illness, some individuals may be at greater risk than others. Young persons and the elderly can be more sensitive to or suffer greater impacts from some diseases than other members of the population. In 2010, the total population of Racine County was 195,408 people (Table II-2 in Chapter II). In the same year about 27.2 percent of the County's population was between 0 and 19 years of age and about 13.2 percent of the County's population was 65 years of age or older. Thus about 40 percent of the County's population consists of members of these more sensitive age groups. Persons with some chronic medical conditions or who are immunosuppressed may be also be sensitive to some communicable diseases. Finally, for those diseases for which vaccines are available, persons who are not immunized are at greater risk than those who are. For some communicable diseases and segments of the population, the rates of vaccination in Racine County are high. As shown in Table IV-34, the vast majority of school children in the County are compliant with the required immunizations. For other diseases for which vaccines are available, immunization rates in the County are likely to be much lower. Based on survey data, the CDC estimated that only about 44 percent of people older than six months old in the State of Wisconsin received the seasonal influenza vaccine for the 2014-2015 influenza season.<sup>98</sup>

While a public health emergency will not directly impact critical facilities and infrastructure, it could severely impact local health care services. In addition, communicable diseases and foodborne illnesses can often spread faster in locations where many people congregate such as schools, day care centers, and nursing homes.

### **Potential Future Changes in Public Health Emergency Conditions**

Based upon historical national trends of infectious diseases, as well as the continued threat of bio-terrorism, there is a potential for continued risk of medical communicable disease to occur within Racine County. For the five-year

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<sup>97</sup> U.S. Centers for Disease Control and Prevention, "Lyme Disease Incidence Rates by State, 2005-2014," <http://www.cdc.gov/lyme/stats/Tables.html>, accessed January 19, 2016.

<sup>98</sup> U.S. Centers for Disease Control and Prevention, "Influenza Vaccination Coverage Estimates by State, HHS Region, and the United States, National Immunization Survey-Flu (NIS-Flu) and Behavioral Risk Factor Surveillance System (BRFSS), 2015-15 Influenza Season: Wisconsin," <http://www.cdc.gov/flu/fluview/reportshtml/reporti1415/reportii/index.html>, accessed January 19, 2016.

term of this plan, the probability of a public health emergency occurring is unknown. One reason for this is that numerous viruses, bacteria, fungi, and protozoa cause communicable diseases. Each of these disease agents have their own specific characteristics, such as source, infectivity, and mode of transmission. In addition, for some disease agents such as pandemic influenza, changes in the properties of the disease agent contribute to the development of major outbreaks.

As the 21st century proceeds, changes in climate may affect the incidence of public health emergencies in Racine County in a number of ways.

Heavy rainfalls have been shown to be associated with outbreaks of waterborne diseases. This can happen through several pathways. Runoff resulting from heavy rains can become contaminated with animal wastes from agricultural activities and/or human wastes from improperly maintained or failing septic systems. This runoff can carry disease agents into surface waters. It can also result in the contamination of wells and, in areas with aging infrastructure, water distribution systems. Depending on the disease agents that are present in the wastes, this can lead to a variety of gastrointestinal and respiratory illnesses. The projected increase in the frequency of heavy rainfall events could lead to an increase of these sorts of disease outbreaks.

The projected increase in heavy rain events could also affect the likelihood of disease outbreaks resulting from use of recreational waters. Increases in water temperatures resulting from climate change and runoff from intense storms may create environments that deposit and support pathogens on beaches. Thus, between now and the middle of the 21st century, the projected change in climate could increase the incidence of waterborne diseases among recreation water users. This would be likely to lead to more frequent closures of inland beaches in order to protect human health.

The projected changes in climate could also affect the risk posed by vector-borne diseases. The dynamics of many of these diseases are sensitive to fluctuations in climate. For example, outbreaks of West Nile virus in humans are associated with prolonged periods of hot, dry weather that are followed by a significant rain event.<sup>99</sup> Changes in temperature and moisture can change the geographic ranges of animals that carry diseases. For example, Wisconsin is currently not within the range of the mosquito *Aedes aegypti*, which is the vector for several disease-causing viruses including the Zika virus and those that cause chikungunya, dengue fever, and yellow fever. This mosquito is a tropical species and exposure to temperatures below 32°F kill it. As a result, the distribution of this species is currently restricted to southern portions of the United States. The increases in winter temperatures that are projected to occur over the 21st century could allow the range of this species to expand northward,<sup>100</sup> creating potential for the transmission of the diseases it carries to occur in areas, such as Wisconsin, where these diseases rarely occur today. While an effective vaccine exists for yellow fever, the current lack of available vaccines for chikungunya, dengue fever, and Zika suggests that there may be some potential for outbreaks to develop in Wisconsin later in the 21st century.

It should be noted that changes in the ranges of disease vectors resulting from climate change could also reduce the risks posed by some vector-borne diseases. For example, preliminary results suggest that climate change may be causing the range of the deer tick that transmits Lyme disease to shift northward. This may result in the range of the tick moving out of Wisconsin and into Minnesota and Canada by the end of the 21st century.<sup>101</sup>

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<sup>99</sup> Paul R. Epstein, "West Nile Virus and the Climate," *Journal of Urban Health, Volume 78, pages 367-371, 2001.*

<sup>100</sup> César Caphinha, Jorge Rocha, and Carla A. Sousa, "Macroclimate Determines the Global Range Limit of *Aedes aegypti*," *EcoHealth, Volume 11, pages 420-428, 2014.*

<sup>101</sup> *Wisconsin Initiative on Climate Change Impacts, 2011, op. cit.*

## VULNERABILITY ASSESSMENT FOR TERRORISM

Terrorism can be defined as acts that are violent or dangerous to human life that violate Federal or state law and that appear intended to intimidate or coerce a civilian population; influence the policy of a government by intimidation or coercion; or affect the conduct of a government by mass destruction, assassination, or kidnapping.<sup>102</sup> The Federal Bureau of Investigation categorizes two types of terrorism in the United States: domestic terrorism which involves groups or individuals whose activities are directed at elements of our government or population without foreign direction; and international terrorism which involves groups or individuals who are foreign based and/or directed by countries or groups outside the United States, or whose activities transcend national boundaries. Additionally, some acts conducted by gangs, people involved in civil unrest, radical splinter groups or activists, and people involved in illegal drug trade could also be described as terrorism.

An act of terrorism can take several forms, depending on the technological means available to the terrorist, the nature of the political issue motivating the act and the points of weakness of the terrorism target. Based on guidelines provided by the U.S. Department of Homeland Security, terrorism refers to the use of weapons of mass destruction (WMD), including biological, chemical, nuclear, and radiological weapons; arson, incendiary, explosive, and armed attacks; industrial sabotage and intentional hazardous material releases; and “cyber-terrorism.”<sup>103</sup> Several terrorist action possibilities are listed and briefly described below.

### **Terrorist Action Possibilities**

#### ***Incendiary Devices and Arson***

Most terrorist incidents in the United States have involved bombs or incendiary devices, including detonated and undetonated explosive devices, tear gas, pipe and firebombs, and rocket attacks. Often the capacity existed for large-scale damage and/or mass casualties. An example of this would be the bombing of the Federal Building in Oklahoma City in August 1995. The type of materials and method of delivery utilized in the bombing of the Murrah Federal Building are readily accessible to a potential terrorist. Because of the ready availability of such materials, and experiences to date in the nation, it is anticipated that of the various types of Weapons of Mass Destruction (WMD) explosive weapons have a high potential for use in the United States.

FEMA defines arson and incendiary attack as the initiation of fire or of explosion on or near a target either through direct contact or remotely by other means. Generally, the extent of damage can be determined by type or quantity of accelerant and the materials present at or near the target. Arson can be further defined as any willful or malicious burning or attempt to burn, with or without intent to defraud, a dwelling, public building, motor vehicle, or other properties. Fires of suspicious or unknown origin are not always classified as arson. Nationally, an estimated 19,000 fires were intentionally set in 2014. These arson incidents resulted in 157 civilian deaths and were responsible for \$729 million in property losses in 2014.<sup>104</sup>

#### ***Airline Attack***

After the events of September 11, 2001, questions were raised regarding the effectiveness of airport and airline security at the time. Since the September 11 attacks, security at airports and onboard airliners has escalated. Specific changes include the oversight and supervision of passenger and baggage screening by the Transportation Security

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<sup>102</sup> *Title 19 Section 2331 of the United States Code.*

<sup>103</sup> *Federal Emergency Management Agency, State and Local Mitigation Planning How-to Guide, Integrating Man-made Hazards into Mitigation Planning, Version 2.0, September 2003.*

<sup>104</sup> *Hylton J.G. Haynes, Fire Loss in the United States During 2014, National Fire Protection Association, September 2015.*

Administration, access to airplane boarding areas being restricted to passengers, restrictions being set on the articles that can be taken onboard airliners, deployment of additional Federal air marshals on airliners, and improvements to cockpit security. Despite these efforts, it is possible that incidents may still occur. Such incidents could include airplane bombing, sabotage or hijacking, airport bombings or shootings, or the tampering with air navigation and control systems resulting in plane crashes or collisions.

### ***Weapons of Mass Destruction: Chemical/Biological/Nuclear/Radiological Attack***

Terrorists can use chemical and biological agents or weapons to either extort or deliberately try to kill in order to further political goals. Toxins or even some radiological materials, such as water-soluble plutonium chloride, could become a credible threat to municipal water supplies. An example of this would be the gas attack on the Tokyo subway system that occurred in March 1995.

### ***Hostage Taking***

The taking of hostages can provide terrorist groups publicity for their political or social objectives, allow negotiation for furtherance of their aims or result in events which are designed to invoke sympathy for their causes. The main goal of response agencies is to end the incident, with the absolute minimum loss of innocent lives.

### ***Infrastructure Attack***

An individual or group of terrorists could coordinate an attack against utilities and other public services such as the water supply, electric power generation and transmission or telephone service. Another form of infrastructure attack is against computer resources such as networks, databanks and software by infiltrating computer networks and altering, stealing or destroying programs and data. As society becomes more dependent on computers, this form of cyber-terrorism is a legitimate concern. Attacks on computer resources are discussed further in the cyberattack section below.

### ***Response to Terrorism Incidents***

The emergency management community in the United States must accept that national security and intelligence organizations may not always be successful in preventing terrorist incidents. It is up to State and local emergency management personnel and services to respond should these attacks occur. The ramifications of responding to a terrorist incident may not be the same as traditional large-scale emergencies. The safety of emergency service providers must be an early, primary consideration. The media will take an active interest in this type of incident. The public has high expectations for emergency managers and service providers in a terrorist situation and extraordinary efforts are demanded. Federal and State government agencies depend directly on local managers and emergency response personnel for their initial and follow-up actions during any terrorist incident.

### ***Historical Terrorism Problems***

There are no reports of historical terrorism incidents within Racine County. However, several historical incidents have occurred in the State of Wisconsin.

One of the deadliest cases of domestic terrorism in the State occurred in the City of Milwaukee on November 24, 1917. A bomb suspected of having been planted by anarchists was discovered by children and brought to a police station in the Third Ward. It detonated in the police station, killing nine police officers.

A global database of terrorism incidents lists 25 incidents that occurred in the State of Wisconsin during the period 1970 through 1989.<sup>105</sup> Several of these occurred during the early 1970s and were related to protests against the Vietnam War.

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<sup>105</sup> *National Consortium for the Study of Terrorism, Global Terrorism Database*, <http://www.start.umd.edu/gtd>, accessed January 20, 2016.

In 1970, there was a series of five pipe bombings and fire bombings in the City of Milwaukee that were attributed to suspected leftist revolutionaries. Targets included two industrial research laboratories, a building containing Federal offices, a military reserve headquarters, and a fuel line at a petroleum terminal in the Milwaukee Harbor. While some of these incidents caused property damage, there were no fatalities or injuries reported.

On August 24, 1970, a stolen van containing 2,000 pounds of explosives detonated on the campus of the University of Wisconsin in Madison. This bomb was placed by an anti-war group known as the New Year's Gang and targeted the campus' Army Mathematics Research Center in Sterling Hall. A postdoctoral researcher was killed in the blast. In addition, three people were injured. The explosion caused extensive damage to Sterling Hall and damaged 26 other buildings on the campus. The estimated damages to the University exceeded \$12.8 million (2014 dollars).

### **Description of Recent Terrorism Events**

There have not been any recent reported terrorist activities within Racine County.<sup>106</sup> However, some terrorism incidents have occurred elsewhere in Wisconsin.

On July 19, 2000, a former Air National Guard pilot broke into the 128th Air Refueling Wing airbase at General Mitchell International Airport in Milwaukee, placing a bomb, as well as scrawling graffiti calling for an end to U.S. intervention in Kosovo. The bomb failed to explode and the perpetrator was arrested. No injuries or fatalities occurred as a result of this incident and only minor property damage was reported. On April 1, 2012, an assailant set fire to a Planned Parenthood clinic in the Town of Grand Chute in Outagamie County. There were no casualties. The clinic suffered minor damage to an examination room. On August 5, 2012, a member of a white supremacist group attacked a Sikh temple in the City of Oak Creek. The assailant killed six persons and wounded four others before being shot by a responding police officer. The assailant subsequently died from a self-inflicted gunshot wound. A global database of terrorism incidents lists 12 incidents that occurred in the State of Wisconsin since 1989.<sup>107</sup>

### **Vulnerability and Community Impact Assessment**

The groups that have conducted terrorism, the issues that they are concerned with, and their objectives are widely varied. The groups and individuals responsible for or participating in terrorist incidents in Wisconsin between 1970 and 2014 have cited a variety of reasons for their actions including antiwar activism, extreme left wing revolutionary activities, extreme right wing revolutionary activities, antiabortion activities, animal rights, and white supremacist activities. Because the objectives of these groups and individuals are so widely varied, there are numerous potential targets of terrorist action. Any public facility, utility, element of infrastructure, or gathering place could be a potential target for terrorist activity. In addition, certain types of businesses and governmental institutions may be more prone to terrorist activities due to the specific nature of their business or size. For example, businesses such as banks, financial institutions, malls, health care facilities, or businesses engaged in controversial activities are likely to be at risk. In addition, local, State and Federal government facilities; public and private schools; and colleges and universities are also potential terrorist targets.

As previously indicated, no terrorist incidents have been reported in Racine County. Over a 45-year period, 37 incidents have been documented in the State of Wisconsin. While the probability that the County will experience a terrorism incident and the frequency at which such incidents are likely to occur in the County are unknown, they are assumed to be very low.

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<sup>106</sup> *Ibid.*

<sup>107</sup> *National Consortium for the Study of Terrorism, Global Terrorism Database, <http://www.start.umd.edu/gtd>, accessed January 20, 2016.*

A review of the community assets described in Chapter II indicates a limited potential for terrorism-related impacts to:

1. A variety of residential, commercial, and other developed land uses;
2. The roadway and other transportation systems;
3. Utility infrastructure;
4. Critical community facilities; and
5. Historic sites in the vicinity of the incident.

It is safe to assume that any type of facility on which a terrorist attack could generate desired publicity or further terrorism objectives could be classified as a potential target for terrorist activity, including large-scale public events. Based on past events, the probability of a terrorist attack occurring in Racine County is low.

Due to the unpredictability and lack of precedent concerning terrorism events in Racine County, all buildings, infrastructure, and critical facilities within the County are considered at risk.

## **VULNERABILITY ASSESSMENT FOR CYBERATTACK ON LOCAL GOVERNMENT**

Local government uses information technology and computer networks in many of its operations and activities. While there are differences among units of local government in the functions they perform with these technologies, typical functions performed include accounting, distributing and receiving payments, budgeting, planning and engineering, correspondence, record keeping, materials management, mapping, communicating with residents, monitoring and controlling utility systems and other infrastructure, and training staff. Because of the pervasive use of these technologies, the operations of local governments depend upon having information technology systems that are reliable and secure.

The threat of cyberattack is an emerging threat to the security and reliability of local government information systems. A cyberattack on a local government is a disruption of its information system. In information technology systems, computers are connected to one another through networks, including the internet. This places them at risk of cyberattack. The nature of such an attack may vary. In some instances, an attack may be a deliberate effort to gain access to a local government's systems or processes. In other instances, an attack may be the result of a randomly initiated threat, such as a computer virus or an electronic mail phishing attempt. Unlike physical threats that are often readily apparent and prompt immediate action, cyberattacks can be difficult to identify and recover from.

### **Cyberattack Action Possibilities**

Cyberattacks can take several forms, depending on the motives of the attacker, the technological means available to the attacker, and the weakness of the information system that is attacked. The forms that a cyberattack on a local government could take include:

- Disabling an information system—Disruption of information structures to crash or disable a system or otherwise make it unavailable. Examples of this include denial of service attacks, email bombing, and spamming;
- Information theft—Penetration of a system to steal information or sensitive data. Examples of this include password cracking and packet sniffing;<sup>108</sup>

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<sup>108</sup> *A packet sniffer is a computer program that can intercept and log traffic that passes over a computer network.*



- Modifying system output—Penetration of a system to embed code, such as Trojan horses<sup>109</sup> or logic bombs,<sup>110</sup> to perform unauthorized functions at a later time;
- Modifying system data—Penetration of a system to alter data stored within the system. Examples of this include defacing of websites and ransomware software which encrypts files or data to make it inaccessible; and
- Taking control of a system—Transfer of control of all or part of an information system from the intended operator or user either to an automated function, such as inclusion in a botnet,<sup>111</sup> or an unauthorized user.

There are at least four major means through which a cyberattack could be executed. It should be noted that these means are not mutually exclusive and some attacks could involve two or more of these techniques. These major means an attacker could use to execute a cyberattack include:

- Hacking—Examples of which include gaining unauthorized access to a computer system via the use of stolen user names and passwords, exploitation of backdoors in software, and brute force attacks to discover passwords;
- Malware—Programs such as viruses, worms, and Trojans are installed in a computer system via means such as email links or attachments, websites, software upgrades, or portable data storage media. These malware programs can perform a variety of actions, including inserting backdoors allowing access into the system, disabling security controls, or capturing data and/or sending it to an external site;
- Social engineering—Using email, telephone, internet, or in person presence to gain sensitive information through posing as a trusted individual, solicitation, bribery, or extortion; and
- Physical theft or loss of information technology assets such as computers, storage media and devices, and documents.

A recent analysis of cyberattack incidents involving data breaches found that about 95 percent of the incidents that were reported during the period 2011 through 2013 fell into nine broad categories:<sup>112</sup>

1. Point of sale intrusions in which remote attacks are made against retail environments in which purchases are made with credit or debit cards,
2. Web application attacks in which the application acts as vector of the attack either by exploiting a weakness in the application or using stolen authentication credentials to impersonate a valid user,
3. Unapproved use or misuse of organizational information technology resources by authorized users, usually for personal or financial gain,

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<sup>109</sup> *A Trojan horse is a program designed to breach the security of a computer system while ostensibly performing some innocuous function.*

<sup>110</sup> *A logic bomb is a set of instructions secretly incorporated into a program so that if a particular condition is satisfied, they will be carried out, usually with harmful effects.*

<sup>111</sup> *A botnet is a group of computers connected to the internet which have been set up to forward transmissions, such as spam or viruses, to other computers on the internet. Usually, the owners of the affected computers are unaware of the fact that their computers are doing this.*

<sup>112</sup> *Verizon, 2014 Data Breach Investigations Report, 2015.*

4. Loss or theft of an information asset either through misplacement or malice,
5. Unintentional actions which directly compromise the security of an information asset,
6. Payment card skimmers implanted on a card reader such as an automatic teller machine that reads data from the card,
7. Cyber-espionage,
8. Denial of service attacks intended to compromise the availability of a site, system, or network, and
9. Miscellaneous malware not fitting the previous patterns that is intended to gain control of a system for illicit uses.

It is likely that local governments are more vulnerable to some of these types of attacks than others. The 2011 through 2013 national analysis indicated that public sector entities tend to be most affected by unapproved use or misuse of resources by authorized users, loss or theft of information assets, unintentional actions that compromise security, denial of service attacks, and miscellaneous malware. In addition, utilities operated by local governments may also be vulnerable to web application attacks. The analysis also noted that public agencies were highly affected by cyber-espionage; however, it did not indicate how much of this activity was directed at units of government other than the Federal government.

#### **Description of Recent Cyberattack Events**

Review of planning documents, news reports, and other sources turned up no recent, major cyberattack incidents on local governments in Racine County; however, there have been several recent incidents involving local governments elsewhere in Wisconsin.

In 2009, hackers used malicious keylogging software to track keystrokes on a City-owned Glenwood City computer. This allowed them to gain access to the City's bank account information. Action taken by the City's bank prevented theft from the account.

In January 2010, a computer belonging to Eau Claire County was compromised through infection with a computer virus. This virus allowed hackers to acquire the credentials necessary to attempt to transfer about \$800,000 from County accounts. The attempt was thwarted when the County's bank contacted the County Treasurer's office regarding suspicious wire transfers.

The City of Eau Claire's website was hacked and temporarily unavailable on April 5, 2012. This attack defaced the website. No other computer systems were impacted.

On or about November 21, 2012, hackers accessed and rerouted direct deposit files from the payroll system of the Stanley-Boyd School District, stealing about \$150,000. It appeared that the hackers managed to redirect the money in route between the School District's account and employee bank accounts. Investigators concluded that no other School District data were compromised.

In 2014, the Forest County Sheriff's Department's computer systems were affected by the CryptoLocker Trojan. This is a ransomware virus<sup>113</sup> that makes data stored within a computer system inaccessible. As a result of this attack, the Department lost about one month of data from its file server, including documents, pictures, and other files. In addition, one departmental database had to be rebuilt.

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<sup>113</sup> *A ransomware virus is a form of malware in which rogue software code effectively holds a user's computer hostage until a "ransom" fee is paid. Ransomware often infiltrates a PC as a computer worm or Trojan horse that takes advantage of open security vulnerabilities.*

On March 9, 2015, a cyberattack was launched against the City of Madison and Dane County computer systems. The attack affected several systems, including the City's website and email system, and internet-based connections to City government, including mobile data public safety computers used by law enforcement, fire, and emergency medical agencies. The attack affected several other City and County websites with varying levels of intensity, blocking legitimate Internet traffic to and from the governmental agencies.

On February 14, 2016, suspicious IP logins were made to approximately 190 employees and elected official's accounts on a payroll and tax portal software system for Ozaukee County government employees. During these logins, employee W-2 and 1095C tax forms were viewed. Personal information obtained of the employees potentially included names, addresses, social security numbers, as well as names and social security numbers of family members who were covered under their insurance. Ozaukee County officials received notice from County employees that they had fraudulent tax returns filed under their social security numbers. The employees involved were not aware of the theft of personal information until they filed their 2015 taxes or received a notice of suspected identity theft from the Internal Revenue Service. The investigation determined that the data security breach did not take place internally or locally. Ozaukee County's internal security network was tested and did not appear to have been breached. Initial investigations concluded that the software used by Ozaukee County for payroll and tax accounting was breached by an out of state source. More rigorous testing and recommendations from County consultants were ongoing at the time of publication of this report.

### **Vulnerability and Community Impact Assessment**

During the planning process, no data source was identified that could provide historical or current information regarding incidents of cyberattack upon local governments in Racine County, the losses caused by such attacks, and the impacts of these attacks upon local government operations. Because of this, data are not available to directly estimate the level of risk to cyberattack that local governments in the County currently face. It may be possible, however, to get a sense of the risks from other available data related to cyberattack and computer crime.

Reports from local government information technology managers suggest that a large number of attack attempts are made on a daily basis. For example, Brown County's chief information officer indicated that the County's systems experience between 8,000 and 20,000 attack attempts per day.<sup>114</sup> Other data suggest that most of these attempts are probably unsuccessful. For example, a recent study surveyed 402 information system practitioners in state and local government who are familiar with their organization's ability to defend against cyberattacks and have responsibility in directing cybersecurity activities.<sup>115</sup> About 80 percent of the respondents reported that their organization had experienced at least one material security breach over the previous 24 months. The average number of such incidents reported was 9.4 incidents over the 24-month period surveyed. This indicates an average rate of 4.7 such incidents per year or about one incident every 11 to 12 weeks.

The difference between the two estimates given in the last paragraph is large. When expressed as an annual number of incidents, the estimates differ by a factor of about one million. The likely explanation for the difference between the high number of reported attack attempts and the much lower number of reported security breaches is that a substantial portion of the attack attempts are detected and/or thwarted by the information technology security measures that local governments have in place. Still, the difference between the two estimates indicate that there is considerable uncertainty in the level of risk that cyberattack poses to local governments that take normal information technology security precautions.

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<sup>114</sup> WBAY-TV. "Brown County Unsuccessfully Cyber-Attacked Thousands of Times a Day," April 23, 2015, <http://wbay.com/2015/04/23/brown-county-unsuccessfully-cyber-attacked-thousands-of-times-a-day/>, accessed February 22, 2015.

<sup>115</sup> Ponemon Institute. LLC, State of Cybersecurity in Local, State & Federal Government, October 2015.

Other data related to internet-based crime suggest that the level risk of a local government experiencing a cyberattack that would result in serious consequences may be near the lower end of the range. Through the Internet Crime Complaint Center (IC3), the U.S. Federal Bureau of Investigation and the National White Collar Crime Center collect and disseminate statistics on complaints of internet-based crimes.<sup>116</sup> During the period 2008 through 2014, the annual number of internet-based crimes reported to IC3 from the State of Wisconsin varied between about 2,500 and 4,100, with an average of 3,394 complaints per year. When this average is prorated based on the fraction of the State's population that lives in Racine County,<sup>117</sup> it suggests that, on average, residents of Racine County are victims of about 117 internet-based crimes per year. If these data reflect the general level of cyber-threat, it would suggest that local governments in Racine County would each expect to experience a few to a few dozen serious threats of security breach per year. Given that the National White Collar Crime Center was able to document only 629 instances of data breaches over a 10-year period in which a state, county, or municipal government was the victim,<sup>118</sup> even this estimate might be on the high end.

Depending on the specific nature of the incident, a cyberattack on a local government could have a variety of impacts. The potential severity of these impacts range from relatively trivial to disastrous. A cyberattack could potentially disrupt a local government's operations and communications which could have a number of impacts. An attack could interfere with or disrupt monitoring and control of infrastructure such as sewer collection and treatment systems, municipal water systems, and traffic control systems, reducing their effectiveness or causing damage to infrastructure elements. For example, disturbance or disruption of traffic signals due to a cyberattack could result in confusion and traffic congestion, potentially causing traffic accidents. Disruption by a cyberattack could interfere with, or prevent the performance of, critical government functions, including the collection of taxes, the maintaining of tax records, and billing for services. Disruption of communications by a cyberattack could adversely impact the provision of emergency services.

Cyberattacks that result in data breaches could be problematic for local governments due to the potential release of confidential information. For example, a data breach could expose taxpayers, residents, employees, and contractors to risks of identity theft. The impacts of a data breach affecting a local law enforcement agency could be particularly severe because law enforcement agencies have access to databases and information that most other entities lack. Breach of a law enforcement agency's information technology system could compromise sensitive information related to topics such as confidential informants, witnesses in criminal prosecutions, victims of sex crimes, child abuse cases, domestic abuse cases, and legally protected information related to juvenile offenses. Such a breach could potentially compromise the administration of justice or pose a threat to the safety of crime victims, witnesses, informants, or undercover officers.

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<sup>116</sup> *U.S. Federal Bureau of Investigation and National White Collar Crime Center, 2014 Internet Crime Report, 2015; U.S. Federal Bureau of Investigation and National White Collar Crime Center, 2013 Internet Crime Report, 2014; U.S. Federal Bureau of Investigation and National White Collar Crime Center, 2012 Internet Crime Report, 2013; U.S. Federal Bureau of Investigation and National White Collar Crime Center, 2011 Internet Crime Report, 2012; U.S. Federal Bureau of Investigation and National White Collar Crime Center, 2010 Internet Crime Report, 2011; U.S. Federal Bureau of Investigation and National White Collar Crime Center, 2009 Internet Crime Report, 2010; and U.S. Federal Bureau of Investigation and National White Collar Crime Center, 2008 Internet Crime Report, 2009.*

<sup>117</sup> *Based on the 2010 census, Racine County's population was 195,408 and the State's population was 5,686,986. Dividing through gives a proration factor of 0.0344.*

<sup>118</sup> *National White Collar Crime Center, Cyber Intrusions and Data Breaches (2015), 2015.*

It should be noted that responding to, and recovering from, a cyberattack is likely to be expensive for a local government. It has been estimated that the average amount of time required to investigate a cybersecurity breach, restore service, and verify the resolution is about one month.<sup>119</sup> This could be costly for a municipal government relying on a compromised information technology system to handle even a moderate amount of routine business. For example, costs attendant to a data breach include information technology personnel to work to determine the source of the attack, determine the extent to which sensitive information was compromised, recover lost information, and plug holes; clerical personnel and other staff to make appropriate notifications, assist residents in navigating the damaged system, and perform critical services until the information technology system is back online; and investigation and prosecution of the instigators of the attack. It should also be noted that in the event of data breaches that cause the exposure of customers' personally identifiable information, private sector entities generally follow a protocol that includes providing potential victims with some level of identity theft protection, such as credit monitoring services. Taking this sort of action could greatly increase the costs of responding to a data breach. The average costs per record compromised related to data breaches for public and private sector entities have recently been estimated at \$73 and \$217, respectively.<sup>120</sup> Much of the difference between public and private sector costs are related to providing potential victims with identity theft protection.

### **Multi-Jurisdictional Cyberattack Risk Management**

All of the communities in Racine County make use of information technology. All have websites and all perform a variety of functions using computers. Thus, there are no specific municipalities that have unusual risks. Rather, the potential of a cyberattack is considered to be a countywide concern.

## **VULNERABILITY ASSESSMENT FOR ACTIVE SHOOTER INCIDENTS**

An active shooter is defined by the U.S. Department of Homeland Security as an individual or individuals actively engaged in killing or attempting to kill people in a confined and populated area. Locations such as schools, workplaces, shopping malls, movie theatres, places of worship, and public meetings have been the target of mass shooting incidents. In some cases, there is no pattern or method to the shooter's selection of victims. Active shooter incidents are unpredictable and evolve quickly. Often the shooter will continue to move throughout a building or an area until stopped by law enforcement, suicide, or other intervention.

This vulnerability assessment addresses only active shooter incidents as defined above and does not include all gun-related situations. Shootings that were the result of gang violence, drug violence, or robberies; drive-by shootings; and attacks that did not involve a firearm are not included in this assessment.

A study by the Federal Bureau of Investigation (FBI) and Texas State University identified 160 active shooter incidents that occurred in the United States during the period 2000 through 2013.<sup>121</sup> The study found that incidents had occurred in both urban and rural areas and in 40 states and the District of Columbia. The vast majority of incidents were of short duration with most ending before law enforcement arrived. In the 63 incidents where the duration of the attack could be determined, 70 percent ended within five minutes of beginning and nearly 37 percent ended within two minutes. Over the 14 year period of this study, 486 people were killed in active shooter attacks and an

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<sup>119</sup> *Ponemon Institute, LLC, Cybersecurity Incident Response: Are We As Prepared As We Think? January 2014.*

<sup>120</sup> *Ponemon Institute, LLC, 2015 Cost of Data Breach Study: United States, May 2015.*

<sup>121</sup> *Texas State University and Federal Bureau of Investigation, Active Shooter Incidents, 2000 – 2013, 2014.*

additional 557 people were wounded.<sup>122</sup> Nationally, the average annual number of active shootings increased from 6.4 incidents per year during the years 2000 through 2006 to 16.4 incidents per year during the years 2007 through 2013.

The FBI study identified 11 incident location categories to determine the locations where the public was most at risk of an active shooter incident. The location and number of incidents, number of fatalities, and number of injuries associated with each category are shown in Table 60. The study found that 45 percent of the incidents occurred in areas of commerce. Of the incidents in areas of commerce, 68 percent of them occurred at businesses that are open to pedestrian traffic.<sup>123</sup> The study also found that about 24 percent of active shooter incidents were located in an academic setting. Of the incidents in academic locations, about 31 percent occurred at institutions of higher education; 36 percent occurred at high schools; 15 percent occurred at middle schools; 10 percent occurred at elementary schools; and 7 percent occurred at locations that included school board meetings and a school that holds pre-kindergarten through 12th grade.

A study by the New York City Police Department (NYPD) found that 230 active shooter incidents occurred in the United States over the period of 1966 through 2012.<sup>124</sup> Analysis of these incidents indicated that 98 percent of them were carried out by a single attacker. The perpetrators of these attacks were often members of the communities that they targeted. In a majority of incidents, the perpetrators had a relationship (i.e., professional, academic, familial) with at least one of the victims. However, the perpetrator had no prior relationship to the victims in 26 percent of the incidents. This demonstrates that active

shooter incidents can occur without any prior interaction or altercation between the perpetrator and victims. The majority of the incidents resulted in 0 to 5 deaths, with an average of 3.1 deaths and an additional 3.9 wounded victims per incident. Approximately 83 percent of attacks ended in either suicide, attempted suicide, or applied force by law enforcement.

### **Description of Recent Active Shooter Incidents**

No active shooter incidents have been reported in Racine County. One potential incident may have been prevented through intervention by law enforcement. In November 1998, five teenagers were arrested for plotting a shooting spree at Burlington High School. Reports indicate that the teenage students planned to use guns that were to be stolen from one of the suspects' homes.<sup>125</sup> The suspects intended to target people who had bullied them in school as well as a teacher, the school principal, the assistant principal, and a school police liaison officer. The plot was foiled after police received an anonymous tip the day before the attack was supposed to take place.

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<sup>122</sup> *These totals do not include active shooters who were killed or wounded as a result of the incident.*

<sup>123</sup> *Businesses open to pedestrian traffic are defined as private properties with the primary function of making, buying, or selling goods or providing services in exchange for money where pedestrian traffic is anticipated on a daily basis. Examples include restaurants, bars, law firms, theaters, grocery stores, private civic organization spaces, and event venues. This category in the FBI study does not include locations otherwise defined more exclusively in another category, such as health care facilities, and institutions of higher education. Table 60 separates shopping malls into its own category because they typically consist of many businesses under a single roof; however, for purposes of this analysis, shopping malls are included as a business open to pedestrian traffic.*

<sup>124</sup> *New York City Police Department, Active Shooter: Recommendations and Analysis for Risk Mitigation, 2012 Edition, 2013.*

<sup>125</sup> *Wendy Park, "Police Say Revenge Was Motive in Plot to Shoot at School," Racine Journal Times, November 17, 1998.*

Six active shooter incidents have occurred in the State of Wisconsin during the period 2000 through 2013:

- On November 21, 2004, a man armed with a rifle began shooting at hunters in a wooded area near Meteor after the group of hunters found him hunting on their private land. Six people were killed and two people were wounded. The shooter was apprehended by police.
- On March 12, 2005, a man walked into a church service being held in a hotel conference room in Brookfield and fired 22 rounds at congregation members. Reports indicate that the shooter, a member of the congregation, left the building 20 minutes earlier and returned with a handgun. The gunman shot the church's pastor and the pastor's family before moving on to others in the conference room. Seven people were killed and four others were wounded before the gunman shot and killed himself.
- On September 29, 2006, a 15-year-old student walked into Weston High School in Cazenovia and aimed a shotgun at his teacher before the weapon was wrestled from him by a custodian. The school principal also confronted the student who then pulled out a handgun and shot the principal. The principal and several staff were able to wrestle the shooter to the ground and restrain him until police arrived. The principal later died from his injuries. No other injuries were reported.
- On October 7, 2007, a 20-year-old off-duty Forest County sheriff's deputy and part-time City of Crandon police officer armed with a rifle stormed into a party at his ex-girlfriend's home in Crandon and started shooting. Six people were killed, including the suspect's ex-girlfriend and two of his best childhood friends. One additional person was critically wounded in the shooting. The shooter fled the scene and later committed suicide during an exchange of gunfire with police.
- On August 5, 2012, a man armed with a handgun began shooting outside the Sikh Temple of Wisconsin in Oak Creek. The man, who had ties to multiple white supremacy groups, then moved inside and continued to shoot. The gunman exited the building and confronted a responding police officer, shooting him 17 times. The shooter committed suicide after he was shot in the stomach by a second responding officer. The officer who was shot survived, however six people were killed and four others were wounded.
- On October 21, 2012, a man armed with a handgun walked into the Azana Day Salon in Brookfield and began shooting. Three people were killed including the man's estranged wife, who was an employee at the salon. The shooter stopped to reload at least once before his gun jammed, allowing some inside the spa to escape. The shooter eventually committed suicide before police stormed the building.

**Table 60**

**ACTIVE SHOOTER INCIDENTS IN THE UNITED STATES: 2000 THROUGH 2013**

Location Type	Number of Incidents	Number of Fatalities	Number of Injuries
<b>Academic</b>			
Higher Education.....	12	60	60
High School.....	14	21	40
Middle School.....	6	2	6
Elementary School.....	4	29	8
Other <sup>a</sup> .....	3	5	6
Subtotal	39	117	120
<b>Commerce Areas</b>			
Businesses Open to Pedestrian Traffic.....	44	124	181
Businesses Closed to Pedestrian Traffic.....	23	69	73
Shopping Malls.....	6	17	18
Subtotal	73	210	272
<b>Open Spaces</b>			
Military and Other Government Properties.....	15	45	54
Residences.....	16	51	57
Houses of Worship.....	7	32	17
Health Care Facilities.....	6	21	27
	4	10	10
Total	160	486	557

NOTE: Attacks that involved more than one location occurred in 24 of the 160 incidents. In these cases, the FBI identified the location where the public was most at risk and tallied the casualties in that location category.

<sup>a</sup>This category included one incident at a school that is pre-kindergarten through 12th grade and two incidents at school board meetings. The incident at the pre-k through 12th grade resulted in 5 killed and five wounded. The two incidents at school board meetings resulted in one individual wounded.

Source: Federal Bureau of Investigation, Texas State University, and SEWRPC.

### **Vulnerability, Community Impacts, and Multi-Jurisdictional Assessment**

Active shooter incidents are media-intensive events and generate substantial amounts of public concern. While these incidents have recently increased in frequency, they are still relatively rare events. Because the objectives and motives of active shooter attacks are widely varied and in many cases unknown, there are numerous potential targets for a perpetrator of a shooting. Review of past active shooter incidents suggest that a majority of attacks occurred at areas of commerce, and of those incidents, 68 percent occurred at businesses that are open to pedestrian traffic. Academic environments were the second most common location for this type of incident, and of those events, 67 percent occurred at either institutions of higher education or high schools.

However, any type of facility or area in which groups of people congregate could be considered a potential target for an active shooter attack. Active shooter attacks have been documented at schools, shopping malls, work places, military bases, government properties, healthcare facilities, houses of worship, private residences, and city streets. These incidents have been reported in 40 states and the District of Columbia. Attacks have occurred in large cities and small towns and in both urban and rural areas.

As previously indicated, no active shooter incidents have been reported in Racine County. Over a 47-year period, seven incidents have been documented in the State of Wisconsin.<sup>126</sup> The lack of specific data for Racine County and the unpredictability of active shooter incidents makes it difficult to determine the probabilities of active shooter events likely to occur in Racine County.

A review of the community assets described in Chapter II indicates a limited potential for active shooter incident-related impacts to a variety of residential, commercial, and other developed land uses; transportation systems; and critical community facilities. There are no specific municipalities that have unusual risks. Rather, the potential of an active shooter incident is considered to be a countywide concern.

### **VULNERABILITY ASSESSMENT FOR POWER OUTAGES**

There are two categories of electrical power delivery used in Racine County. Electrical transmission lines carry high-voltage electricity from power plants to substations. The transmission system in eastern Wisconsin, including all of Racine County, is owned and operated by the American Transmission Company. Step-down transformers located at substations then decrease the voltage of electricity and transfer the electricity to distribution system wires that lead from substations to homes and businesses. The electrical distribution system in Racine County is owned and operated by We Energies. Transformers are located on some poles to further reduce voltage and then transfer electricity to homes and businesses through service drop lines which are either overhead wires or below ground cables.

Electrical transmission systems are designed with significant redundancy to withstand the unexpected loss of system elements without loss of the electrical load. While transmission system-related outages do occur, the design of the system most often keeps them localized in nature. When power outages occur, they are most often related to the electrical distribution system.<sup>127</sup>

According to We Energies, a majority of electrical system outages are caused by either equipment wear and tear (29 percent of outages) or weather related hazards such as lightning, high winds, rain, snow, heat, cold, and ice (27 percent). Power outages are also caused by fallen trees and tree growth (20 percent), animal contact (11 percent),

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<sup>126</sup> *New York City Police Department, 2013, op. cit.*

<sup>127</sup> *J. Lepinski, Public Service Commission, Division of Energy Regulation, personal communication, April 14, 2016.*



human accidents or vandalism (7 percent), and miscellaneous events such as mechanical damage, construction error, or fire (6 percent).<sup>128</sup> Loss of electrical power service was also considered to be a significant potential component of and, therefore, incorporated as part of the appropriate natural and human-induced hazards as potential utility damages among the hazard categories previously analyzed. In addition, because of the importance of this type of incident to the Racine County Hazard Mitigation Task Force during development of the original plan, and during the development of the first plan update and this second update of the plan, this section of the report specifically analyzes vulnerability to power outages. Power outages in this context are those that last for some extended period of time. Momentary outages generally are a sign that the power supply system is working. Brief outages occur when the system detects a problem which affects the flow of electricity on a power line. The brief automatic interruption is designed to prevent hazards and equipment damage. In most cases, power is restored within a few seconds.

### **Description of Power Outage Events**

An online search for media reports of power outages affecting Racine County found 56 reports of outages that occurred during the years 2010 through 2015. Estimates of the number of customers affected by a given outage were available for 53 of these incidents and ranged from 17 customers to about 13,000 customers (see Table 61). The average number of customers affected by these outages was about 2,230. Estimates of duration of the outage were available for 32 outages and ranged from less than one hour to 12 hours. The average duration of these outages was about three hours. Reported causes of outages included damage from storms and other weather-related events, equipment failure or malfunction, traffic accidents affecting utility poles, and animal contact.

Power outages in Racine County occur periodically and are usually the most widespread when caused by weather-related events. The most recent severe event in Racine County occurred on August 2, 2015. A thunderstorm with high winds and lightning knocked over trees, limbs, and power lines throughout the County. We Energies reported 4,900 customers in Racine County and 5,900 customers in Kenosha County had lost power. Power outages due to strong winds earlier in the day throughout the We Energies service area compounded the situation. Another large outage occurred on June 30, 2011. A large supercell thunderstorm that formed just off shore over Lake Michigan produced strong outflow winds that moved into far southeastern Milwaukee County, and eastern sections of Racine and Kenosha Counties. Wind gusts in excess of 70 mph downed trees and power lines, resulting in large power outages. We Energies reported power outages affecting 11,500 customers in Racine County. Most of the outages in the County occurred in the City of Racine and the Villages of Caledonia, Mount Pleasant, and Wind Point. At one point, 26,000 customers were without power in southeastern Wisconsin. It took several days to restore power in some areas of the Region. Another large outage occurred on February 6, 2011. Approximately 13,000 customers on the north side of the City of Racine and parts of Caledonia lost power for two hours. The power outage was caused by a broken insulator on a major line at a substation. According to We Energies, the insulator was most likely damaged during the Groundhog's Day blizzard that hit Racine County earlier the same week.

Most of the recent power outage events in Racine County have been short term, lasting less than an hour to, at most, 12 hours. Long-term events can happen. Two examples from outside Wisconsin illustrate this. In January 1998, an ice storm hit the Montreal, Canada area. The power outages resulting from this storm impacted over four million residents. Portions of the Montreal area were without power for over three weeks. Similarly, an ice storm hit the State of Kentucky in January 2009. At the peak of this storm, about 700,000 customers were without power. Two weeks after the storm 50,000 customers were still without power. It took 38 days to restore power to all of the affected customers.

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<sup>128</sup> *We Energies, Outage Causes and Restoration*, [http://we-energies.com/outages\\_safety/reporting/outages.htm](http://we-energies.com/outages_safety/reporting/outages.htm), accessed April 14, 2016.

Table 61

## MEDIA REPORTS OF POWER OUTAGES IN RACINE COUNTY: 2010 THROUGH 2015

Date	Area Affected	Number of Customers Affected	Duration of Outage (hours)	Cause of Outage
April 22, 2010	Sturtevant, Racine	2,500	2 hours	Faulty cable
May 7, 2010	Mount Pleasant, Racine, Sturtevant	5,000	2 hours	Birds nest debris contact with transformer
June 18, 2010	City of Racine	2,500	Unknown	Thunderstorm
June 21, 2010	Racine County	1,300	6 hours	Thunderstorm
June 27, 2010	Sturtevant	2,600	Unknown	Tornado, thunderstorm
July 18, 2010	City of Racine	1,000	Unknown	Thunderstorm
September 21, 2010	Racine County	900	Unknown	Thunderstorm
October 26, 2010	Racine County	2,700	Unknown	Thunderstorm, high winds
November 22, 2010	Racine County	3,000	Unknown	Thunderstorms
January 3, 2011	Racine County	720	1.3 hours	Damaged utility pole
January 21, 2011	Racine County	1,500	1.5 hours	Downed tree limb
February 2, 2011	Racine County	1,500	Unknown	Blizzard
February 6, 2011	Racine and Caledonia	13,000	2 hours	Broken insulator
May 22, 2011	Racine County	11,000	Unknown	Thunderstorms
June 9, 2011	Racine, Burlington	800	Unknown	Thunderstorms
June 15, 2011	Caledonia, Wind Point	3,000	1.5 hours	High winds
June 30, 2011	East Racine County, City of Racine, Caledonia, Wind Point, Mount Pleasant	11,500	12 hours	Thunderstorms, downed trees
July 11, 2011	City of Racine	Unknown	Unknown	Thunderstorms
August 2, 2011	Racine County	8,200	Unknown	Thunderstorms
November 18, 2011	City of Racine	55	3 hours	High winds
April 16, 2012	Mount Pleasant, City of Racine	900	2 hours	Thunderstorms
July 13, 2012	Racine County	200	Unknown	Thunderstorms
November 5, 2012	Caledonia	1,650	0.5 hours	Unknown
February 8, 2013	Racine County	Unknown	Unknown	Snow storm
February 20, 2013	City of Racine	580	1.5 hours	Equipment failure
March 16, 2013	Mount Pleasant	2,200	About 5 hours	Faulty insulator
May 21, 2013	City of Racine	Unknown	2.5 hours	Thunderstorms
May 23, 2013	City of Racine	2,400	1 hour	Downed tree
June 12, 2013	Yorkville, Raymond	492	Unknown	Thunderstorms
June 21, 2013	Towns of Waterford, Norway	160	1.5 hours	Thunderstorms
July 11, 2013	Racine County	3,900	1.3 hours	Raccoon contact at substation
July 12, 2013	Town of Paris	3,000	Unknown	Vehicle crash
August 14, 2013	City of Racine	850	2 hours	Unknown
August 26, 2013	Town of Raymond	225	Unknown	Vehicle crash
August 30, 2013	Racine County	2,450	Unknown	Thunderstorms
September 23, 2013	Sturtevant	1,300	1.5 hours	Hawk in substation
October 16, 2013	Town of Waterford	55	Unknown	Tree branch in contact with lines
November 14, 2013	City of Racine	17 (including city hall and police department)	12 hours	Construction damage
November 17, 2013	Caledonia	1,100	2 hours	Thunderstorms, lightning
December 10, 2013	Elmwood Park	70	1.5 hours	Equipment malfunction
January 7, 2014	South Racine Park	800	0.75 hours	Failed underground wire (severe cold)
February 18, 2014	Racine County	4,200	1.5 hours	Circuit failure at substation
October 27, 2014	Caledonia	1,100	1.5 hours	Vehicle crash
October 31, 2014	Racine County	200	Unknown	High winds
November 19, 2014	Mount Pleasant	1,143	2 hours	Faulty underground cable
December 12, 2014	City of Racine	1,500	2 hours	Vehicle crash
April 2, 2015	Mount Pleasant, City of Racine	70	8 hours	Utility pole fire
April 9, 2015	City of Racine	100	2 hours	Lightning
June 22, 2015	Racine County	2,595	Unknown	Thunderstorms
August 2, 2015	Racine County	4,900	Unknown	Thunderstorms, high winds
August 14, 2015	Racine County	7,00	Unknown	Lightning
August 18, 2015	Town of Norway	325	Unknown	Water damage to equipment
October 28, 2015	City of Burlington	1,900	1 hour	Vehicle crash
November 28, 2015	City of Racine	500	1.3 hours	Vehicle crash
December 10, 2015	Village of Union Grove	2,800	Unknown	High winds
December 23, 2015	Racine County	2,500	8 hours	High winds, tree limbs

Source: Racine Journal Times and SEWRPC.

## **Vulnerability and Community Impact Assessment**

While likely to be rare, the impacts of a long-term outage event affecting Racine County could be large. Such an event would likely involve many downed trees and power lines. Downed power lines can present safety hazards for residents, travelers, and emergency responders. The response to such an event could be hampered by roads blocked by power lines and debris.

Given experiences like the Montreal and Kentucky events, it is possible that a significant portion of Racine County's population and facilities could be without power for one to three weeks, should a particularly severe event occur. Following the 2009 Kentucky ice storm, about 37 percent of affected customers were without power one week after the storm. About 7 percent were still without power after two weeks. The Kentucky event resulted in 36 fatalities. The largest cause of death related to this event was carbon monoxide poisoning resulting from improper generator use. Given that the average high and low temperatures in Racine County during the winter are considerably colder than those in Kentucky,<sup>129</sup> the impacts on human life of an ice storm causing a power outage of similar severity in Racine County may be even greater.

A review of the community assets described in Chapter II indicates the potential for significant, yet short-term, power outage impacts to a variety of residential, commercial, and other developed land uses; including critical community facilities. Significant impacts may also be possible to other infrastructure or utility systems. During a power outage, the normal operation of homes, businesses, public buildings, and other critical community facilities may be interrupted.

## **Potential Future Changes in Power Outage Conditions**

Changes in land use can have an impact on the potential for power outage events and related hazards to occur. Such changes relate to the potential future increase in development within the County. As noted above, changing land use patterns within Racine County, as documented in the adopted regional land use plan, the County comprehensive plan, and County land and water resource management plan, and summarized in Chapter II, indicate a continuing level of moderate risk of power outages in the County. Because of the actions that have been taken by the power companies and individuals, the current vulnerability to power outages may have been decreased somewhat. These ongoing mitigation measures are described further in Chapter V.

The likely effect of climate change on power outage 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 or lightning conditions. Modeling studies utilizing the output of multiple climate models suggest that the 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.<sup>130</sup> It should also be noted that wind strengths over the Great Lakes have increased and are expected to continue increasing in the future.<sup>131</sup> Surface wind speeds above the lakes are increasing by about 5 percent per decade, exceeding trends in wind speed over land. Severe winds and lightning are a factor in many of power outages in Racine County, thus an increase in occurrence of these events could lead to more frequent and more widespread power outages.

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<sup>129</sup> For example, average high temperatures during January are 43°F and 30°F, respectively, in Louisville and Racine. Average low temperatures during January are 27°F and 16°F, respectively, in Louisville and Racine.

<sup>130</sup> 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 16,361-16,366, 2013.

<sup>131</sup> 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.

In addition, the changes in temperature and precipitation that are projected to occur between now and the middle of the century are likely to cause a greater proportion of precipitation during winter to fall as rain rather than as snow. There is a fine line between precipitation falling in the form of rain and precipitation falling in the form of ice. As seen in the Montreal and Kentucky events, ice storms have the potential to cause long-term and widespread power outages. An increase in ice storm events would almost certainly lead to more widespread and longer term power outages in Racine County.

#### **Multi-Jurisdictional Power Outage Risk Management**

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

## Chapter V

# HAZARD MITIGATION STRATEGIES

Hazard mitigation planning may be defined as the systematic evaluation of the nature and vulnerability of hazards present, along with the development and implementation of sustained actions to reduce or eliminate long-term risks from hazards and their effect. Specific purposes of hazard mitigation include eliminating loss of life, lessening of danger to human health and safety, minimizing monetary damage to private and public property, reducing the cost of utilities and services, and minimizing disruption in community affairs. Hazard mitigation also involves avoiding both intensification of existing hazards and creation of new hazards.

The preparation of an all hazards mitigation plan for Racine County involves the development and evaluation of alternative mitigation measure plan elements and the synthesis of the most effective elements into an integrated plan. Some of the mitigative measures described are ongoing or committed actions, which do not require the evaluation of alternative measures, but are proposed to be integrated into the mitigation plan as such. For other hazards, there may be only one or a number of integrated viable options. In these cases, alternatives are not presented and cost-effectiveness is not specifically addressed, but is implied by the nature of the mitigation measures. In other instances, where there are viable alternatives, such alternatives are described and evaluated. This chapter describes the hazard mitigation measures considered to resolve the identified hazard problems within Racine County.

Measures have been identified and evaluated for each of the hazards for which a vulnerability analysis was developed as set forth in Chapter IV.

In preparing updates to the plan, the Racine County Hazard Mitigation Plan Local Planning Team reviewed and reevaluated the hazard mitigation goals for the County (see Chapter III of this report). This review included consideration of whether the goals of the initial plan were still applicable and whether additional goals should be added. In addition, the Local Planning Team also reviewed and reevaluated hazard conditions within the County (see Chapter IV of this report). This review included reevaluation of the identification of the hazards likely to affect the County, updating the data upon which the profiles of the extent and severity of hazard events which 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 Racine County since the drafting of the initial plan (see Chapter II of this report) and progress in implementing the initial hazard mitigation plan and first plan update, served as the basis for the Local Planning Team's review and reevaluation of viable measures to reduce vulnerability to hazards identified in the updated risk assessment and its selection of priority mitigation measures to address those hazards. The activities of the Racine County Hazard Mitigation Plan Local Planning Team are documented in Appendix A of this report.

## **HAZARD MITIGATION PLAN COMPONENT FOR FLOODING AND RELATED STORMWATER DRAINAGE PROBLEMS**

The flooding and related stormwater drainage problem mitigation plan for Racine County consists of five elements: a floodplain and environmentally sensitive lands preservation element, a floodplain management element, a stormwater management element, a public information and education element, and a secondary plan 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 that contribute toward realizing the flood mitigation goals and objectives.

### **Floodplain and Environmentally Sensitive Lands Preservation Element**

Floodplain management regulations and programs perform critical roles toward assuring that flood mitigation efforts are properly implemented. As detailed in Chapter II, Racine County and the municipalities within the County currently have several pertinent floodplain management regulations and programs in place, most notably in the form of zoning regulations and other ordinances, and environmentally sensitive area and open space preservation policies. A significant portion of the environmentally sensitive lands within the County, including wetlands, woodlands, and floodplains, are under protective ownership and/or zoning.

#### ***Floodplain Zoning and Wetland Preservation Zoning***

As summarized in Table 22 in Chapter II of this report, floodplain management regulations include the floodplain district zoning ordinances and shoreland or shoreland wetland zoning ordinances.<sup>1</sup> 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. More information regarding each of these ordinances is set forth in Chapter II of this report. Implementation of these ordinances on an ongoing basis is an integral part of the County flood mitigation strategy.

#### ***Environmentally Sensitive Area and Open Space Preservation Actions***

As noted in Chapter II of this report, the preservation of environmental corridors and important natural features can assist in the prevention of increased flood flows and associated problems. These areas often include the most significant floodplains and wetlands within a given area. The preservation of wetlands is of particular importance because wetlands often afford natural filtration and floodwater storage. In addition, the intrusion of intensive urban land uses into environmentally sensitive areas may result in the creation of 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. Destruction of ground cover may result in soil erosion, stream siltation, more rapid runoff, and increased flooding.

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<sup>1</sup> *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 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.*

The regional land use plan described in Chapter II of this report includes provisions to preserve the environmental corridors and isolated natural resource areas. This regional plan forms the framework for local land use planning by the local units of government in the County. In 2010, there were 34 park and open space sites owned by the County, encompassing 2,788 acres. In addition, there were 21 State owned recreation and open space sites within the County, totaling 3,863 acres. The current status of ownership of park and open space sites by the County and State is shown on Map 41. In 2013, the County completed an update to their park and open space plan<sup>2</sup> which provides for the preservation of environmental corridors and isolated natural resource areas. The open space preservation element of that plan is summarized on Map 42. This element recommends that 4,964 acres be acquired by Racine County, the State of Wisconsin, local governments within the County, and nonprofit conservation organizations operating in the County.

Racine County has been active in promoting and assisting local units of government in the County in preparing land use plans which are consistent with the Regional and County objectives for preservation of environmentally sensitive lands. In addition, all of the municipalities with significant areas of environmental corridors and/or isolated natural resource areas, have local land use and/or park and open space plans completed or underway which are consistent with the Regional and County plans with regard to preservation of environmentally sensitive lands. A listing of those plans is included in Appendix E.

### ***Wetland Restoration to Reduce Crop and Property Damages***

Wetlands and floodplains can provide natural storage areas for floodwaters during heavy rain events or melting snow. Restoring the natural function of former wetland areas can be an effective strategy to reduce potential flood damages in downstream areas. According to the USEPA, a one-acre wetland can typically store about three acre-feet of water, or one million gallons. Wetland vegetation can slow flood water down in addition to providing infiltration and evapotranspiration benefits. Increasing flood storage capacity in Racine County through restoration of wetlands may also help communities adapt to, and reduce, the potential impacts of climate change.<sup>3</sup>

As discussed in Chapter II of this report, Racine County had about 19,000 acres of wetland in 2010 (see Table 10). However, this is only a fraction of the wetland that existed in pre-settlement years. Urbanization and agricultural development have altered the landscape with regard to wetlands and surface water drainage characteristics in the County, leading to increased volumes of runoff and flooding. To facilitate drainage of wetland and other low lying areas for cultivation, drain tile were installed. Through channelization and installation of these drain tile systems, farmers attempted to protect their crops by lowering the groundwater table and increasing the capacity to convey water downstream. Channelization and diking of stream channels can also reduce the connection between the channel and the overbank areas during floods, causing higher flood levels and velocities.

Examination of the Racine County 1837 plat maps indicate that large swaths of land were covered in wetlands and open marsh, particularly in the Town of Norway. Field notes from the 1837 survey indicated that some areas of “open marsh” south and east of what is now Wind Lake were too deep for the surveyor to walk through. Today much of this area is cultivated, predominantly as sod farms.

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 2010 there were approximately 10,700 acres of agricultural land located within the one-

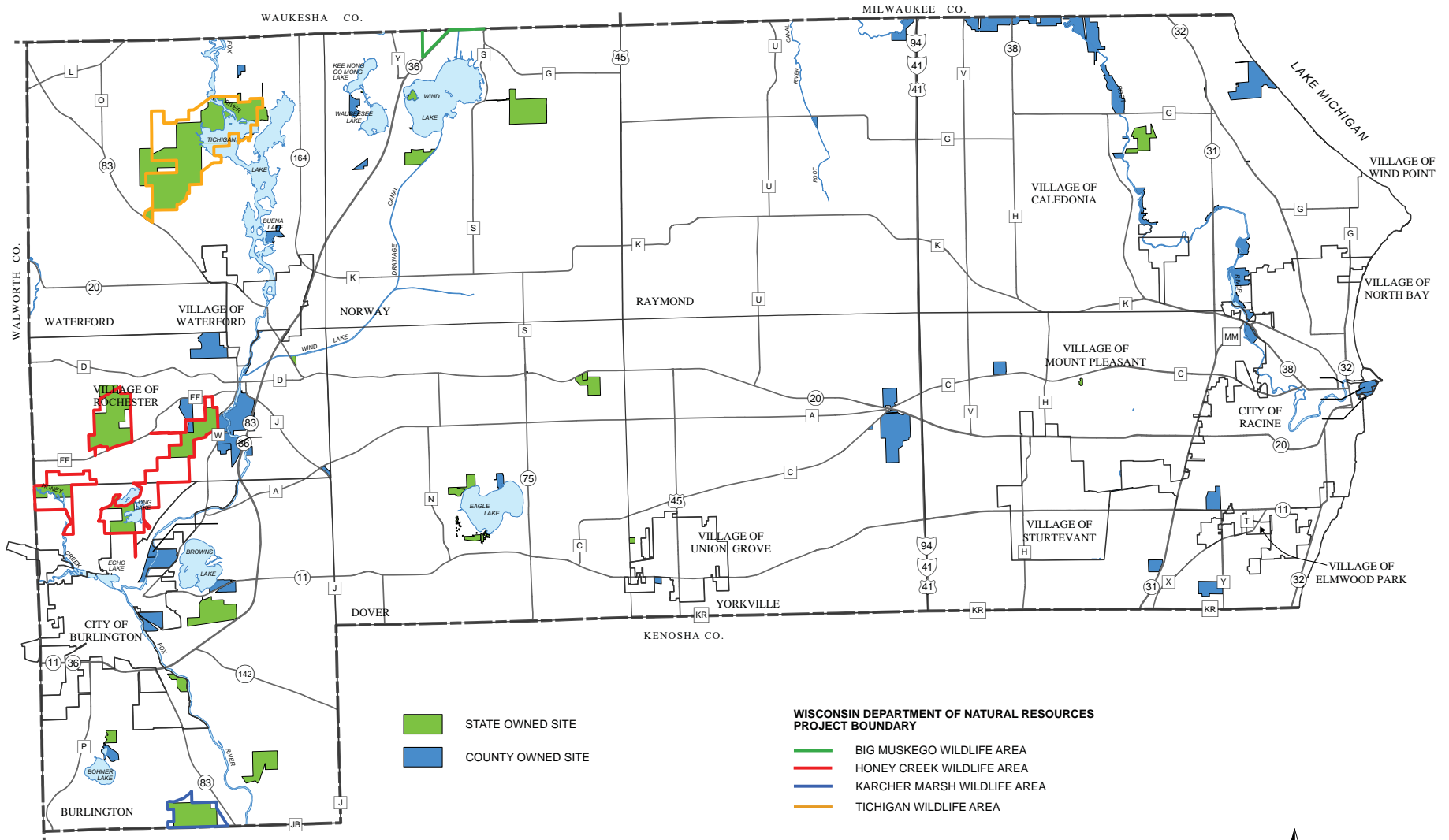
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<sup>2</sup> *SEWRPC Community Assistance Planning Report No. 134, 3rd Edition, A Park and Open Space Plan for Racine County, February 2013.*

<sup>3</sup> *Detailed modeling would need to be conducted on a subbasin or subwatershed level to estimate changes in flood flows with wetland restoration and projected climate change conditions.*

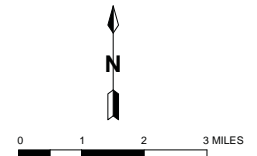
Map 41

RACINE COUNTY AND STATE OF WISCONSIN PARK AND OPEN SPACE SITES: 2016



NOTE: MORE INFORMATION ON THE MAPPED PARKS AND OPEN SPACES CAN BE FOUND ON TABLES 9 AND 11 IN SEWRPC CAPR NO. 134 (3RD EDITION), A PARK AND OPEN SPACE PLAN FOR RACINE COUNTY, FEBRUARY 2013.

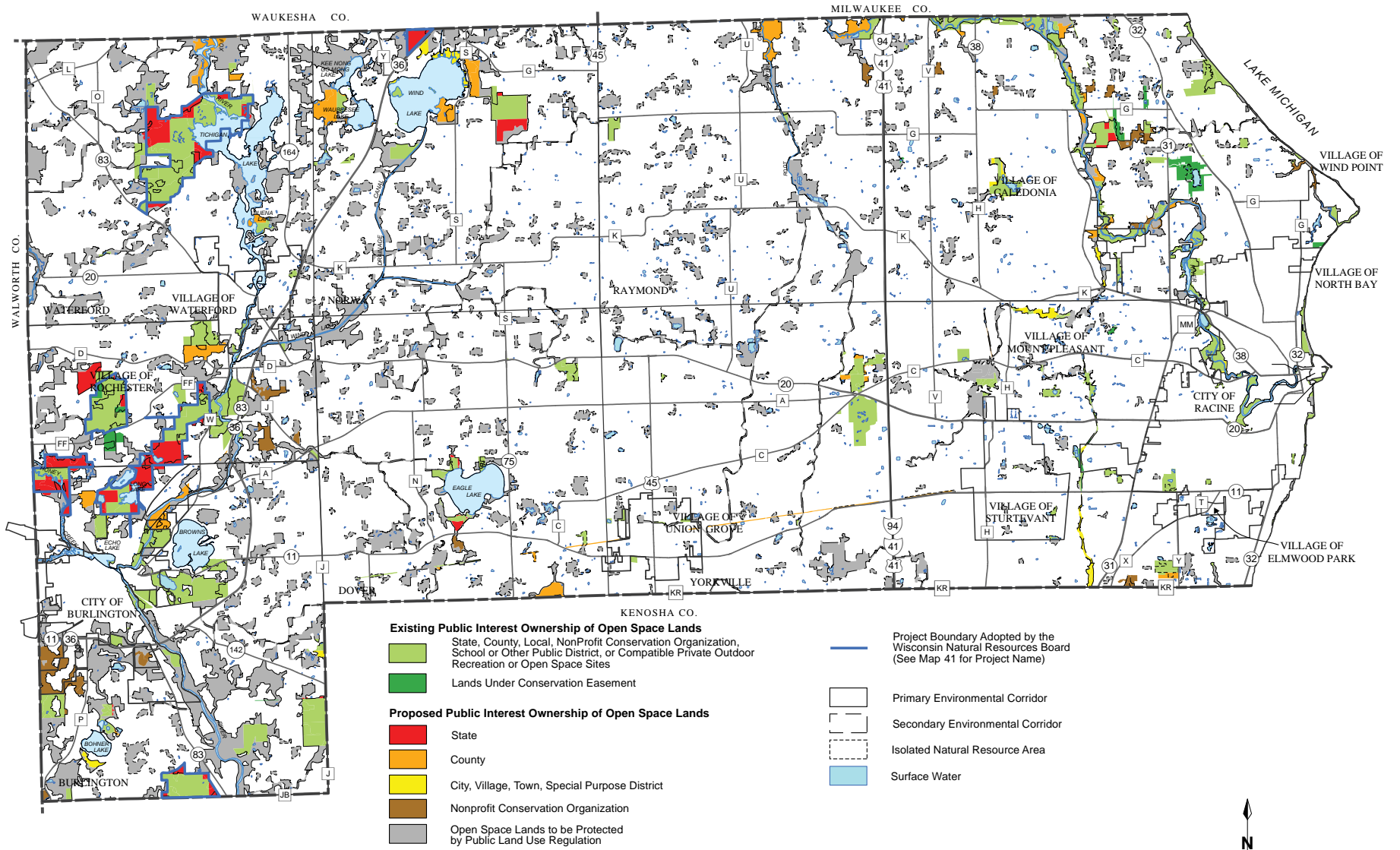
Source: Wisconsin Department of Natural Resources, Racine County, and SEWRPC.





Map 42

OPEN SPACE PRESERVATION ELEMENT OF THE RACINE COUNTY PARK AND OPEN SPACE PLAN: 2035



Source: SEWRPC.

percent-annual-probability (100-year recurrence interval) flood hazard area in Racine County, making them susceptible to riverine flooding during large storm events (see Table 12). Despite the installation of extensive drain tile systems, some agricultural areas in the County continue to have poor drainage. As indicated in Table 9, in Chapter IV of this report, over \$38.5 million in crop damages have been reported due to flooding in Racine County from 1950 through 2014 (2014 dollars). The average annual reported damages are approximately \$602,000 per year. It should be noted that economic losses resulting from damage to crops often go unreported and records of crop losses prior to 1989 are spotty. Therefore, these estimated economic losses clearly represent an underestimate of actual damages that have occurred in the County.

The WDNR has developed a digital dataset to identify areas of former wetlands that were drained and converted to agricultural uses. The WDNR refers to these areas as potentially restorable wetlands. To be considered a potentially restorable wetland, an area must have hydric soils, must not be currently mapped as a wetland, and have a land use compatible with restoration techniques.<sup>4</sup> There are almost 29,000 acres of potentially restorable wetlands in Racine County. Of the 29,000 acres of potentially restorable wetland, there are about 6,800 acres that are within the one-percent-annual probability flood hazard area and were being farmed according to the SEWRPC 2010 land use inventory. The location of these areas are shown on Map 43.

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 land owners, restricting development and eliminating the chance that these open areas may be placed into more impervious urban land uses in the future.

The floodprone agricultural areas in the Town of Norway drained by the Wind Lake Canal were analyzed in a 1975 drainage and water level control plan.<sup>5</sup> That study indicated that there were approximately 4,200 acres of cropland subject to flooding or impaired drainage during a flood which would result from a 10-year recurrence interval rainfall event. Of these 4,200 acres, about 2,000 acres of land actually sustain crop damage during flood events. The study estimated the average annual crop damages on those lands to be \$186,000, or \$92 per acre in 1975. Using the Consumer Price Index (CPI) to convert the damages to 2014 dollars, about \$819,423 in damages are estimated to occur in this area annually, or about \$410 per acre.<sup>6</sup> This floodprone area makes up about two percent of the agricultural land in Racine County and accounts for over 53 percent of the County's annual average crop damages.

The restoration of selected wetlands currently in agricultural uses in Racine County is one alternative flood mitigation measure to be considered in addition to the structural flood mitigation measures that are discussed separately for each watershed below. The implementation of this alternative may affect decisions to implement other structural alternatives. In addition, some of the areas identified on Map 43 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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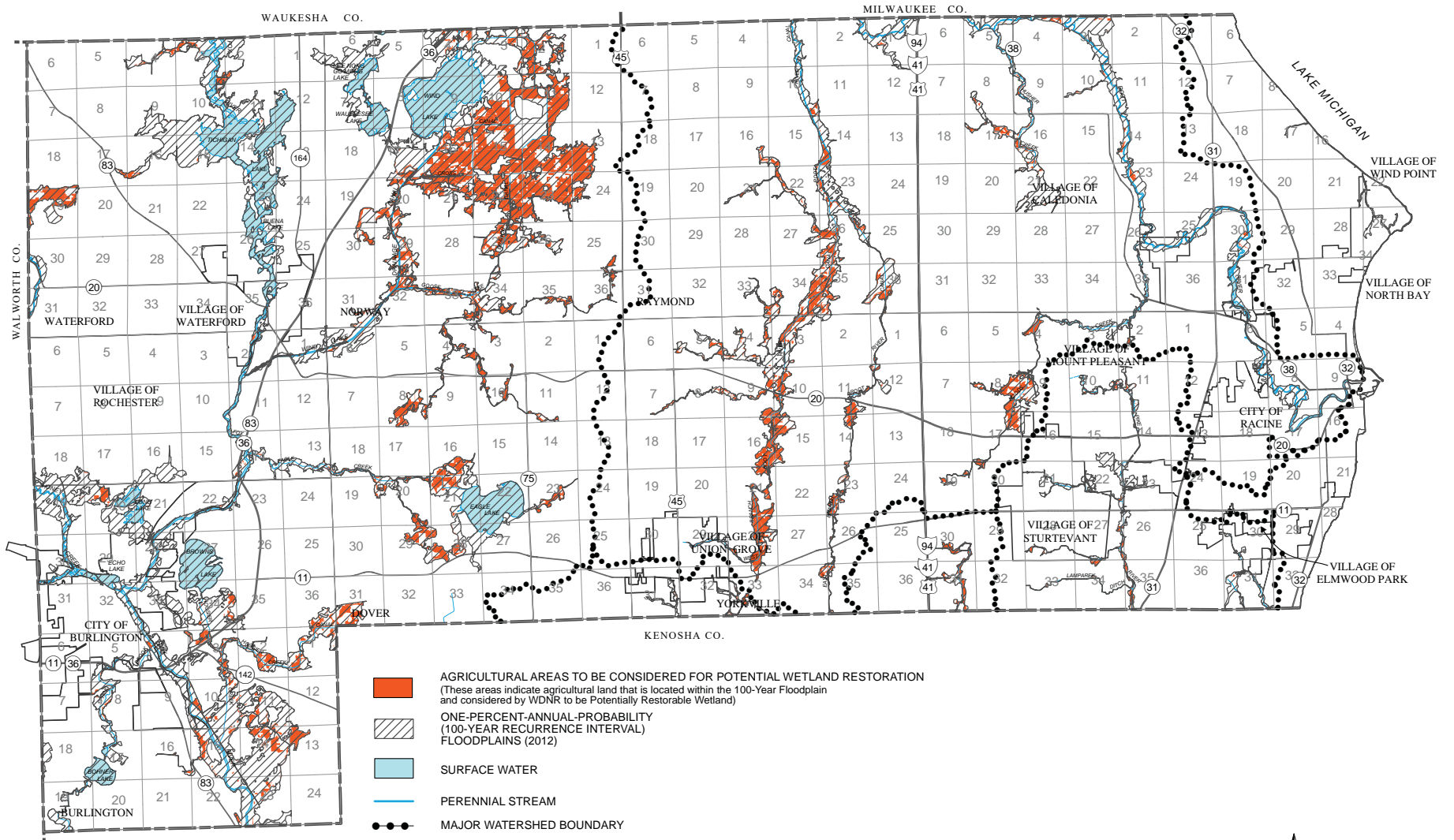
<sup>4</sup> *Wisconsin Department of Natural Resources, Mapping Potentially Restorable Wetlands in the Rock River Basin, August 2008.*

<sup>5</sup> *SEWRPC Community Assistance Planning Report No. 5, op. cit.*

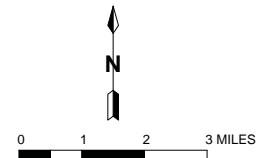
<sup>6</sup> *This estimate assumes that a similar acreage of agricultural land are still impaired under current conditions.*

Map 43

**AGRICULTURAL AREAS TO BE CONSIDERED FOR POTENTIAL WETLAND RESTORATION**



Source: SEWRPC.



If all of the areas shown on Map 43 were taken out of agricultural production, crop losses due to flooding could potentially be reduced by up to 63.5 percent, or about \$382,270 per year based on reported losses. Additional mitigation of potential downstream property damage is also possible.<sup>7</sup> 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 land, wetland restoration should be considered. This alternative would be implemented as a voluntary program, considered at the discretion of each individual property owner.

### **Floodplain Management Element**

Mitigation measures specifically pertaining to floodplain management in each watershed in the County are described in the following subsections of this report. It should be noted that, as reported in Chapter IV, as of December 2015 there are six structures considered by the Federal Emergency Management Agency (FEMA) to be repetitive- or substantial-loss properties in Racine County. This represents an increase of three structures since development of the last update to the County all hazards mitigation plan.

#### ***Floodplain Management Plan for the Fox River Watershed***

In 1970, SEWRPC adopted a comprehensive plan for the physical development of the Wisconsin portion of the Fox River watershed.<sup>8</sup> That plan was further amended as it affects Racine County in 1975 and 1995.<sup>9</sup> In preparing that plan a concerted effort was made to offer for public evaluation a full range of physically feasible alternative plan elements 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. The alternative plan elements can best be conceptualized in terms of various combinations of land use patterns and water control facilities. A number of alternatives incorporating both structural and nonstructural measures were explored in the preparation of the plan. The flood control alternatives considered for the Racine County portion of the Fox River watershed include: 1) floodplain evacuation; 2) levee and dike construction and channel improvement; 3) storage facility construction; and 4) lake level control.

#### ***Recent Local Actions***

Starting in 2001, the City of Burlington began implementing a downtown redevelopment plan which involves extensive redevelopment activities. The program includes construction of new buildings; riverfront, pedestrian, and bicycle trails; realignment of Bridge Street, which runs along the west side of the Fox River; and construction of a new State/Adams Street bridge over the Fox River. Much of the area involved in the redevelopment is in the flood fringe overlay district as defined in the City floodplain zoning ordinance. As the redevelopment program was being implemented, steps were taken to reduce the current flooding conditions in the area. All new development is being constructed at elevations two feet above the one-percent-annual-probability flood stages, with appropriate adjacent fill extending at least 15 feet beyond the buildings. In addition, existing flood walls along the developed areas have been raised to an elevation 0.5 foot above the one-percent-annual-probability flood stage.

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<sup>7</sup> *Detailed modeling would need to be conducted to determine the amount of flood flow reduction associated with wetland restoration of agricultural land.*

<sup>8</sup> *SEWRPC Planning Report No. 12, A Comprehensive Plan for the Fox River Watershed, Volume One, Inventory Findings and Forecasts, April 1969, and Volume Two, Alternative Plans and Recommended Plan, February 1970.*

<sup>9</sup> *SEWRPC Community Assistance Planning Report No. 5, Drainage and Water Level Control Plan for the Waterford-Rochester-Wind Lake Area of the Lower Fox River Watershed, May 1975. SEWRPC Memorandum Report No. 102, Water Level Control Plan for the Waterford-Vernon Area of the Middle Fox River Watershed, March 1995.*

Implementation of the downtown redevelopment plan has significantly reduce flood problems in the City. The most recent analysis of structures within the one-percent-annual-probability floodplain in the downtown Burlington area shows a decrease of 28 structures when compared to the analysis conducted for the initial Racine County hazard mitigation plan in 2004. However, the lands in the flood fringe area will still likely be considered floodplain, due to dry land access and floodwall height considerations. Additional steps which are planned include evaluation of means to prevent floodwaters from entering the area via storm sewer inlets and, once the redevelopment is completed, working with the Wisconsin Department of Natural Resources (WDNR) and FEMA to refine the City's floodplain mapping. Floodplain map updates are also being conducted as part of FEMA's Risk Mapping, Assessment, and Planning (Risk MAP) program for the Fox River watershed (further discussed below).

In 2010, the Town of Burlington completed two projects to raise sections of Wheatland Road and Hoosier Creek Road. An approximately 500-foot-long section of Wheatland Road was raised about three feet in elevation to reduce flooding that occurred when Hoosier Creek overtopped the road. An approximately 1,650-foot-long section of Hoosier Creek Road was raised about four feet in elevation to reduce flooding from both Hoosier Creek and the Fox River.

In 2011, the Town of Norway completed significant improvements to the sewer mains on Sadler Drive and Thompson Drive, near the pumping station. These improvements helped reduce potential flooding of the pumping station from the Muskego Lake Drainage Canal during heavy rainfall events.

In 2013, the Town of Dover completed the replacement of a culvert under McKee Road that conveys an unnamed tributary to Eagle Creek. The project was completed in response to the formation of a sink hole in the road in April 2013. It was determined that the existing culvert was failing and the roadway was immediately closed to traffic.

In 2015, the Racine County Drainage District received WDNR approval for Phase 2 of their dredging project of the Wind Lake Canal and Goose Lake Branch Canal in the Town of Dover. The District plan was to dredge the Canal from Dover Line Road southwest to State Trunk Highway (STH) 36. Winter ice dams in the canal block the conveyance of runoff which is coming from developed areas to the north, sending the water over the banks. The dredging project intends to prevent these blockages and alleviate the threat of topsoil erosion and flooding. The dredging permit is for three years and can be extended to five years. Due to mild winters in 2015 and 2016, the Racine County Drainage District has been unable to perform the dredging project as of fall 2016.

In 2016, a contractor hired by Racine County began replacing two 20-foot-wide radial dam gates and one actuator motor on the Waterford Dam on the Fox River. In addition, concrete repair to the dam structure was planned. The project cost was estimated to be \$98,865 and was expected to be completed in January 2017.

The FEMA Risk MAP program provides communities with flood information and tools beyond the traditional Flood Insurance Rate Maps (FIRM) that communities can use to make better informed decisions and to take action to reduce risk to life and property. In November 2012, initial meetings for the Upper Fox River watershed discovery report process were held in the Cities of Waukesha and Burlington. The discovery process is the first step in determining whether a Risk MAP project is needed within a watershed. At the meetings, communities from the Upper Fox River watershed, WDNR, and FEMA exchanged information regarding flooding history, development plans, flood risks, floodplain management activities, and study needs. Following these meetings, FEMA issued an initial discovery report.<sup>10</sup> FEMA provided funding for hydrologic and hydraulic modeling that resulted in the completion of detailed survey work for over 153 stream miles within the Upper Fox River watershed, including about 23 stream miles within Racine County.

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<sup>10</sup> *Federal Emergency Management Agency, Discovery Report: Upper Fox River Watershed, HUC 0712006, March 26, 2013.*

In February 2014, discovery meetings were held in the Upper Fox River watershed to get a better understanding of the flood mitigation and floodplain planning needs of the communities. These meetings resulted in a final discovery report<sup>11</sup> which was submitted to FEMA in support of obtaining funding for development of preliminary FIRMs. Draft floodplain workmaps for the Upper Fox River watershed were finalized in 2016 and shown to the watershed communities. WDNR anticipates completing preliminary maps for the watershed by 2019.

#### *Priority Mitigation Measures*

After consideration of the technical and economic feasibility of the various alternatives, a final strategy for alleviating problems due to flooding in the Racine County portion of the Fox River watershed was developed and adopted by the Fox River Watershed Committee. Some of these measures were then adapted for current conditions for use in the current hazard mitigation planning program. As shown on Map 44, the plan calls for the following measures:

- Preserve the remaining primary environmental corridor lands along the Fox River and its major tributaries in essentially natural open space uses (environmental corridors within Racine County are shown on Map 9). The corridors are to be preserved by a combination of public acquisition for parkway purposes and floodland and open space zoning (partially implemented).
- Reevaluate the need for dikes or additional floodwalls in the City of Burlington, considering the City redevelopment actions as well as the ongoing FEMA Risk MAP program. The 1970 Fox River study proposed a combination of earthen dikes and concrete floodwalls that would be constructed along both sides of the Fox River throughout most of the City, and along portions of both sides of the White River between the Echo Lake dam and the confluence with the Fox River. Floodwalls along the developed areas of downtown Burlington have been raised from the elevation of the one-percent-annual-probability floodplain to six inches above that elevation. The Fox River study also recommended automatic backwater gates to be installed on existing storm sewer outfalls. The need for additional facilities should be reevaluated, given the recent City of Burlington downtown redevelopment actions which have been designed to alleviate flooding problems.
- Continue implementation of the emergency action plan for flooding that was developed in 1997 for the Town of Norway Sanitary District No. 1.<sup>12</sup> As shown on Map 45, about 32 percent of the land located within the Sanitary District's boundary is identified as floodplain. The emergency action plan sets forth procedures for maintaining a flood warning system for the township, including identification of pertinent emergency agencies, locations of emergency shelters, evacuation procedures, and procedures for maintaining services in the event of flooding.
- Structure floodproofing, relocation, or removal of up to 435 structures identified using geographic information system techniques and color orthophotography as potentially being located in the one-percent-annual-probability floodplain. While this number of structures may include some agricultural structures, no garages or small outbuildings are included in this total. In this regard, when implementation of floodproofing, relocation, or removal measures is being considered, field surveys should be made of those structures identified as being located within the floodplain to obtain a more definitive assessment of their flood hazard status. Where LiDAR topographic data are available, applicants for Letters of Map Amendment (LOMA) may submit LiDAR data to FEMA in lieu of a certified elevation study by a professional engineer or land

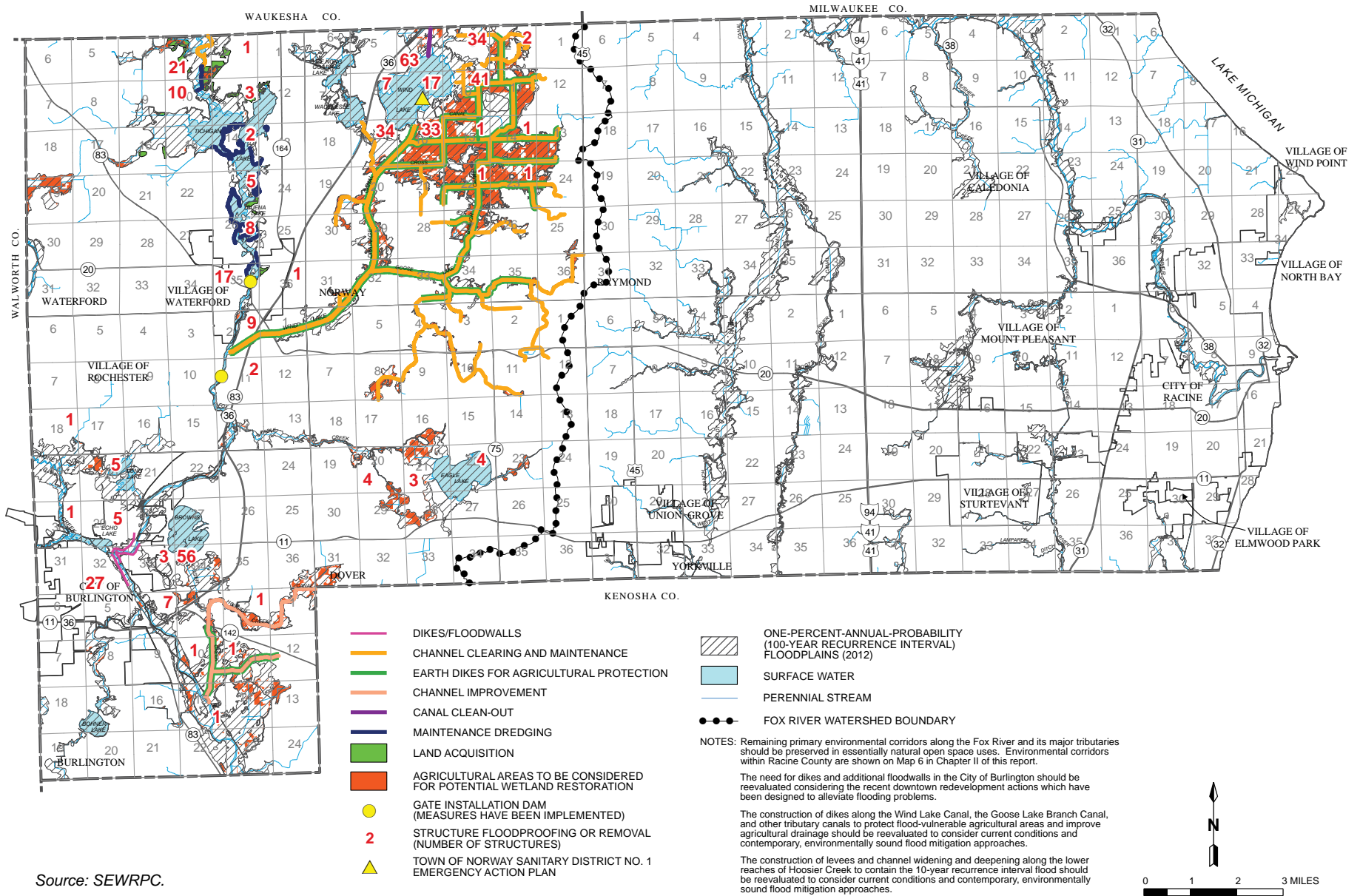
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<sup>11</sup> *Federal Emergency Management Agency, Discovery Report: Upper Fox River Watershed, HUC 07120006, November 5, 2014.*

<sup>12</sup> *Town of Norway Emergency Action Plan Task Force, Norway Emergency Action Plan, April 1997.*

Map 44

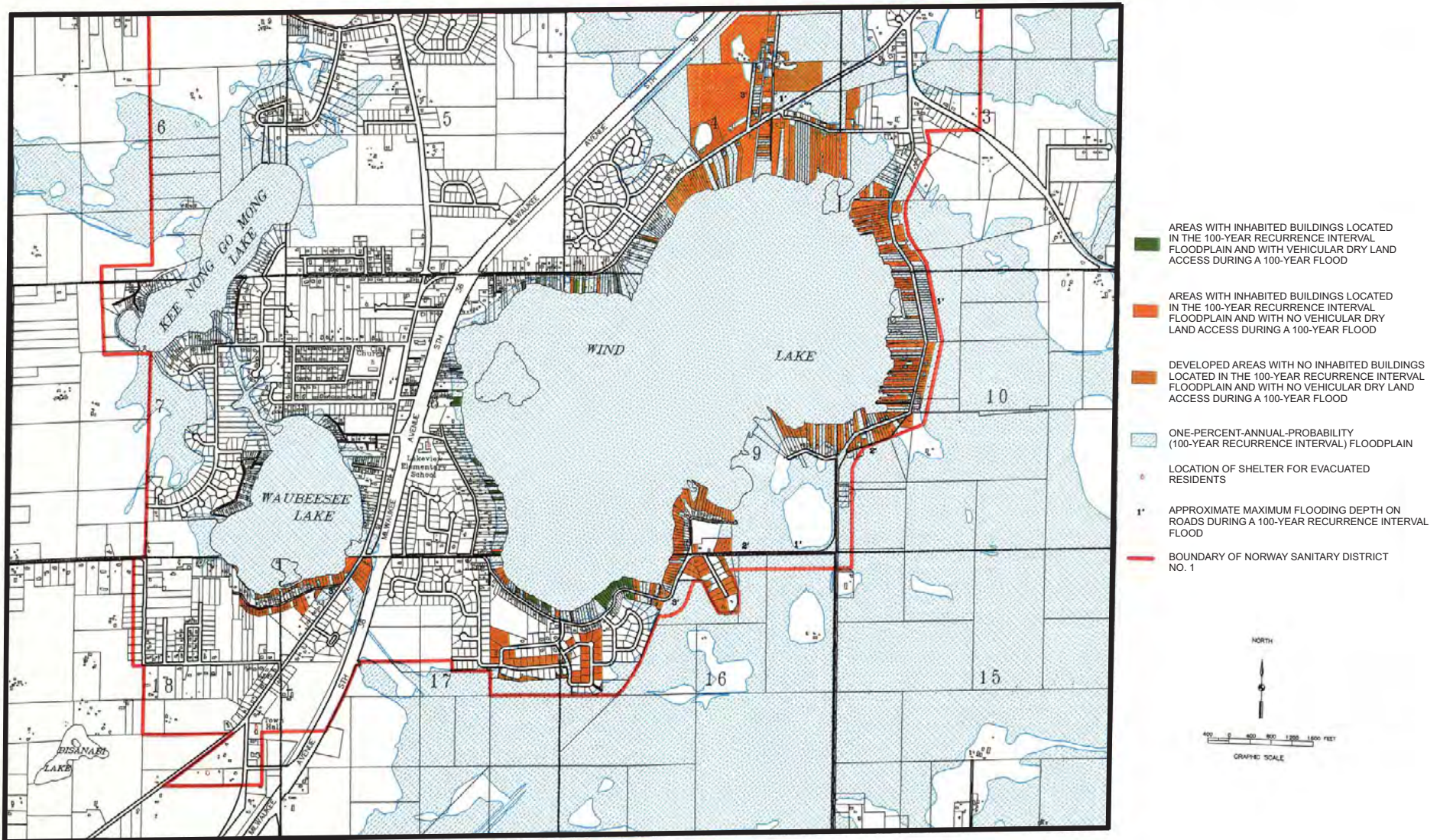
RECOMMENDED FLOODPLAIN MANAGEMENT MEASURES FOR THE FOX RIVER WATERSHED



Source: SEWRPC.

Map 45

TOWN OF NORWAY SANITARY DISTRICT NO.1 EMERGENCY ACTION PLAN



NOTE: The 100-year recurrence interval floodplain boundaries and the approximate road flooding depths shown on this map are based on large-scale topographic maps compiled in 1971 to National Map Accuracy Standards at a scale of one inch equals 200 feet and a two-foot contour interval. In the northwest one-quarter of U.S. Public Land Survey Section 16 and the northeast one-quarter of Section 17, the large-scale topographic information was supplemented by data from November 1977 road grading plans prepared for the Windermere Subdivision by Roberts & Boyd, Inc.; by data from July 20, 1989 as-built topographic surveys of Lots 14 through 18 in the Windermere Subdivision and Parcels A and B of Certified Survey Map No. 1108, all of which were prepared by Baxter & Woodman, Inc.; and by data from a June 24, 1991 as-built survey of Lots 1, 2, and 3 in the Little Norway Subdivision by Randolph L. Rofolski, R.L.S. Data from Racine County conditional use permits was used to locate scattered houses which have been constructed on fill above the 100-year recurrence interval flood stage.

Source: SEWRPC.



surveyor provided certain standards are met.<sup>13</sup> Furthermore, this plan element is presented as an option, subject to the preference of the individual property owner. As noted in Chapter IV, there are six structures considered by FEMA to be repetitive- or substantial-loss properties in Racine County, four of which are located within the Fox River watershed. Projects involving acquisition and demolition of properties within the one-percent-annual-probability floodplain are the highest priority for Wisconsin Emergency Management (WEM) when funding is available. Acquisition and demolition of repetitive- or substantial-loss properties should have highest priority, followed by other structures confirmed to be within the one-percent-annual-probability floodplain after field survey.

- Replace two 20-foot-wide radial gates at the Waterford Dam (implemented).
- Maintenance removal of sediment and debris from the Fox River channel at selected locations upstream of the Waterford Impoundment.
- Purchase of up to 370 acres of agricultural land that is subject to frequent flooding and impaired drainage in the Town of Waterford.
- Installation of two additional 16-foot by five-foot radial gates in the Rochester Dam (implemented).
- Maintenance dredging along about 50 acres of shallow bays and other areas in the Waterford Impoundment (partially implemented).
- Complete channel clean out operations of the Wind Lake Drainage Canal every 20 to 25 years (partially implemented).
- Continued cleanout and maintenance of the Muskego Canal (partially implemented).

The following recommendations from the 1970 Fox River watershed study which were intended to protect flood-vulnerable agricultural areas, abate agricultural damages, and improve agricultural drainage should be reevaluated to consider current conditions and contemporary, environmentally sound flood mitigation approaches. One potential alternative is presented above in discussion related to wetland restoration of flood-prone agricultural lands shown in Map 43.

- Construction of about 211,000 linear feet of dikes along the Wind Lake Canal, the Goose Lake Branch Canal, and other tributary canals. About 40 pumping stations would also be installed.
- Construction of levees and channel widening and deepening along the lower reaches of Hoosier Creek to increase hydraulic capacity of the Creek. This recommendation was designed to contain the 10-year recurrence interval flood.

In addition to the measures outlined above, the floodland management element contains several accessory measures to meet special needs within the watershed. These include: 1) the standards set forth in Chapter III relative to bridge replacement to ensure that major streets and highways remain operable during flood events; 2) adoption of boating restrictions along the Fox River upstream from the Waterford Impoundment; 3) participation in the Federal Flood Insurance Program; 4) continuation of desirable lending institution policies concerning the sale of riverine

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<sup>13</sup> *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.*

Table 62

**PRINCIPAL FEATURES AND COSTS OF THE FLOODPLAIN  
MANAGEMENT PLAN ELEMENT FOR THE FOX RIVER WATERSHED**

Component Description	Capital Cost <sup>a</sup>		Annual Operation and Maintenance Cost (thousands of dollars)	Implementation Status
	Component Details	Cost (thousands of dollars) <sup>b</sup>		
1. Preserve remaining riparian buffer areas, specifically primary environmental corridor lands along the Fox River and its major tributaries	Primary environmental corridors should be preserved in essentially natural open space uses. Corridors should be preserved by a combination of public acquisition for parkway purposes and floodplain and open space zoning	--	--	Partially implemented
2. Structure floodproofing, relocation, or removal of 435 structures <sup>c</sup>	Remove up to 337 residential structures; relocate or demolish up to 54 mobile home structures; and floodproof up to 19 agricultural buildings, 18 commercial buildings, 6 utility structures, and 1 other structure	68,243.3 <sup>d</sup>	--	Not implemented <sup>e</sup>
3. Installation of gates at Waterford Dam	Replacement of two 20-foot-wide radial gates, replacement of one actuator motor, and concrete repair to the dam structure	98.9	8.2	Implemented <sup>f</sup>
4. Installation of gates at Rochester Dam	Two 16-foot by five-foot radial gates	427.1	3.4	Implemented
5. Channel clean out in Fox River upstream from Waterford Impoundment	Remove selected sediment and debris from channel	17.5	0.1	Not implemented
6. Land acquisition	Purchase 370 acres of agricultural land in Town of Waterford	1,471.0	--	Not implemented
7. Maintenance dredging within Waterford Impoundment	Dredge along 50 acres	1,292.2	--	Partially implemented
8. Channel clean out of Wind Lake Drainage Canal	Clear 7.0 miles of Wind Lake Drainage Canal, 40.0 miles of lateral canals	1,011.4	20.2	Partially implemented
9. Channel clean out and deepening along Muskego Canal	Remove debris and deepen by three feet 0.6 mile of canal	56.1	2.8	Implemented
Total		72,617.5	34.7	--

NOTE: The management measures in this table originate from 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). The floodland management measures as they appear in this table were adapted to reflect current conditions for use in the current hazard mitigation planning program.

<sup>a</sup>Includes engineering, administration, and contingencies. Costs are shown in 2014 dollars.

<sup>b</sup>City of Burlington needs and components are recommended to be reevaluated, given the extensive recent downtown area improvements which include flood mitigation actions.

<sup>c</sup>This number reflects the structures determined to be within the one-percent-annual-probability (100-year recurrence interval) floodplain utilizing the most recent FEMA floodplains, effective May 2012, geographic information system techniques, and orthophotographs from April 2015. Field surveys of these structures would provide a more definitive assessment of their flood hazard status.

<sup>d</sup>For the purpose of this analysis, it was assumed that all residential structures located within the one-percent-annual-probability (100-year recurrence interval) floodplain would be acquired and demolished. The cost for removal of the residential structures includes an estimated average fair market property value plus \$10,000 per property for demolition expenses. Floodproofing or elevating some residential structures, if found to be feasible based on specific factors, could be more cost effective. If floodproofing or elevation is considered at a specific structure, or a group of structures, field surveys of these structures should be conducted to obtain a more definitive assessment of their flood hazard status. All other categories of buildings (agricultural, commercial, utility, governmental, and other) were assumed to be floodproofed for the purpose of this analysis.

<sup>e</sup>Structure floodproofing/removal to be carried out at discretion of property owners.

<sup>f</sup>A contractor was hired by Racine County in 2016 to replace two 20-foot-wide radial dam gates and one actuator motor on the Waterford Dam. In addition, concrete repair to the dam structure was planned. The project was expected to be completed in January 2017.

Source: SEWRPC.

Table 63

**FEATURES AND COSTS OF THE FLOODPLAIN MANAGEMENT PLAN ELEMENT  
FOR THE FOX RIVER WATERSHED THAT ARE RECOMMENDED TO BE REEVALUATED**

Component Description	Capital Cost <sup>a</sup>		Annual Operation and Maintenance Cost (thousands of dollars)	Implementation Status
	Component Details	Cost (thousands of dollars)		
1. Construction of dikes and floodwalls in City of Burlington <sup>b</sup>	a. Earth dikes (12,500 feet) <sup>b</sup>	355.6	--	
	b. Concrete floodwalls (2,100 lineal feet) <sup>b</sup>	1,534.7	--	
	c. 22 automatic drainage gates <sup>b</sup>	26.7	--	--
	d. Miscellaneous items <sup>b</sup>	941.1	--	
	Subtotal	2,858.1 <sup>b</sup>	4.1 <sup>b</sup>	Partially implemented
2. Construction of levees and channel improvements along Hoosier Creek	a. Channel improvement (49,000 feet)	596.8		
	b. Earth dikes (20,600 feet)	134.0		
	c. 66 surface water inlets	156.0	--	--
	d. Revegetation (112 acres)	168.0		
	e. Miscellaneous items	907.9		
	Subtotal	1,962.7	22.6	Not implemented
3. Construct agricultural dikes along Wind Lake Drainage Canal and tributaries	a. 211,000 lineal feet of earth dike, install 40 pumping stations	1,185.6	20.2	Not implemented
Total		6,006.4	46.9	--

<sup>a</sup>Includes engineering, administration, and contingencies. Costs are shown in 2014 dollars.

<sup>b</sup>City of Burlington needs and components are recommended to be reevaluated, given the extensive recent downtown area improvements which include flood mitigation actions.

Source: SEWRPC.

properties; 5) maintain and consider of expansion of the existing stream-gaging network in the watershed<sup>14</sup>; and 6) enforcement of floodplain regulations in the watershed.

As shown in Tables 62 and 63, the estimated capital cost of implementing the Fox River watershed portion of the Racine County floodland management plan element would be \$78,623,900<sup>15</sup> (in 2014 dollars). Tables 62 and 63 also show the current implementation status of each plan element. The capital cost of implementing those elements that remain to be implemented is about \$69,731,800.<sup>16</sup>

<sup>14</sup> Location of current and historical U.S. Geological Survey stream-gaging stations are shown on Map 21 of the SEWRPC 2015 annual report.

<sup>15</sup> This amount is the total cost in 2014 dollars if all mitigation measures were fully implemented. This includes projects that have already been fully or partially implemented. This amount also includes the cost to implement the mitigation measures presented in Table 63 which are recommended in this plan update to be reevaluated to consider current conditions and alternative contemporary and environmentally sound flood mitigation approaches.

<sup>16</sup> This amount excludes the total costs of mitigation measures that have been implemented and partially implemented and the mitigation measures presented in Table 63 which are recommended in this plan update to be reevaluated to consider current conditions and alternative contemporary and environmentally sound flood mitigation approaches. Additional costs for measures to mitigate flooding problems in the areas addressed in Table 63 should be expected.

In 1977 the west spillway of the Waterford Dam was reconstructed with the control gates that were recommended in SEWRPC's 1970 Fox River comprehensive watershed report. In 1978 the east spillway was reconstructed. Water level sensors and automated gate controls were also installed at that time. Due to operational problems, these sensors and gate controls were abandoned in 1980, with the gates now being operated manually. As discussed above, two radial gates and one actuator motor were replaced on the Waterford Dam in 2016.

The additional control gates that were recommended in SEWRPC's 1970 Fox River comprehensive watershed report have also been installed in the Rochester Dam. Some maintenance dredging has been carried out within the Waterford Impoundment, along with removal of debris from the Fox River channel. In 1993, the Muskego Canal was cleared and deepened as part of a lake rehabilitation project for Big Muskego Lake.

### ***Floodplain Management Plan for the Root River Watershed***

In 1966, SEWRPC adopted a comprehensive plan for the Root River watershed.<sup>17</sup> That plan was further amended as it affects portions of Racine County in 1990.<sup>18</sup> In preparing that plan a concerted effort was made to offer for public evaluation a full range of physically feasible alternative plan elements 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. The alternative plan elements can best be conceptualized in terms of various combinations of land use patterns and water control facilities. A number of alternatives incorporating both structural and nonstructural measures were explored in the preparation of the plan. The flood control alternatives considered include: 1) channel modification; 2) channel clearing and maintenance; 3) construction of peak flow diversion channels to Lake Michigan; 4) construction of a multi-purpose reservoir; 4) preservation of existing floodplain areas in essentially natural open uses; 5) structure floodproofing and 6) structure removal.

In addition to the Racine County portion of the Root River watershed, alternative floodplain management measures have also been evaluated that address upstream flooding problems in Milwaukee County through the Milwaukee Metropolitan Sewerage District's (MMSD) watercourse planning program. As part of the evaluation of those alternatives, including their potential impact on flooding in Racine County, flood discharges and stages were developed for the Root River main stem through Racine County.<sup>19</sup> That evaluation was designed to ensure that measures implemented in Milwaukee County do not compound problems in Racine County. Flooding problems in the Milwaukee County portion of the Root River watershed are under the Milwaukee Metropolitan Sewerage District's (MMSD) jurisdiction. Additionally, SEWRPC is currently conducting an update to floodplain mapping for the Milwaukee County Land Information Council and MMSD that includes hydrologic modeling for the Racine County portion of the Root River watershed.

FEMA is now emphasizing flood mitigation under Risk MAP; therefore, participating in the program may be an effective approach for Racine County to work with WDNR and FEMA to conduct flood mitigation planning to develop alternatives that address the concentrated flood problems in the County. The projected schedule for initiating the Risk MAP program in the Root River watershed has not yet been established. As was discussed in the previous paragraph, SEWRPC is developing a hydrologic model to compute flood flows for the Root River watershed. Flood flows from that hydrologic modeling could be coupled with hydraulic models developed under a potential Risk MAP program and applied to delineate revised floodplain boundaries and to analyze flood mitigation measures along the Root River mainstem and its tributaries in the County.

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<sup>17</sup> *SEWRPC Planning Report No. 9, A Comprehensive Plan for the Root River Watershed, July 1966.*

<sup>18</sup> *SEWRPC Community Assistance Planning Report No. 152, A Stormwater Drainage and Flood Control System Plan for the Milwaukee Metropolitan Sewerage District, December 1990.*

<sup>19</sup> *Ibid.*

### *Recent Local Actions*

The City of Racine completed a Flood Response Plan in 2003.<sup>20</sup> The plan identifies proactive remediation measures and provides guidance on coordination of City departments and resources. In 2009 the City of Racine hired a consultant to perform a Root River Flood Stage Relationship Study<sup>21</sup>. The purpose of the study was to develop a relationship between stages at the Root River USGS gage located just downstream of the Horlick Dam and flood elevations in the City. The study compared stages at the gage to river stage data collected by the City at a site about 500 feet upstream from the Spring Street Bridge and to results from a hydraulic model of this portion of the Root River.<sup>22</sup> Using model results, the study correlated stage information with flood elevations at four locations along the Root River in the City. These locations included Domanik Drive, the Lincoln Park Bike Bridge, Parkview Drive, and the intersection of McKinley Avenue and Cedar Bend Avenue. The study presented estimates of water surface elevations for a series of gage stations ranging from seven feet to 14 feet, presented estimated flood limits associated with these stages for lands adjacent to these four locations, described the flood conditions associated with each of these stages, and described actions that can be taken in response to those flood conditions.<sup>23</sup>

One home in the Village of Caledonia was substantially damaged as a result of the June 2008 flooding event. The homeowner used FEMA National Flood Insurance Program funds to demolish the damaged house and build a new house on the same parcel outside of the Root River mainstem floodplain.

Prior to 2009, the Village of Union Grove cleared, expanded, and installed riprap on the West Branch of the Root River Canal along Maurice Drive to more readily convey flood flows. In addition, in 2008 the Wisconsin Department of Transportation made storm sewer improvements along Main Street from STH 11 past 7th Avenue to reduce street flooding. The June 2009 flood event caused significant flooding in the Village as outlined in Chapter IV. The West Branch of the Root River Canal is constrained by a railroad bridge crossing just east of 67th Drive. The Village indicated that as of 2009 the Canadian Pacific Railway does not have any plans to modify the bridge crossing.

In 2009, the Town of Raymond Drainage District conducted an evaluation of the 3 Mile Road crossing over the East Branch Root River Canal. The evaluation indicated that the crossing is impassable anytime two or more inches of rain falls and this was identified as the highest priority flooding problem to be addressed by the Town. The evaluation included a floodplain impact study of raising the road and providing additional high water culverts. This study concluded that these actions would have no impact on the extent of the floodplain. Between 2009 and 2011, the Raymond Stormwater Utility District conducted three projects along the mainstem of the Root River, the Root River Canal, and the East and West Branches of the Root River Canal. In each of these projects, woody and non-woody debris were removed from streams and dead, dying, and leaning trees that were located within 30 feet of the ordinary high water mark of the streams were removed. Projects were conducted along the Root River Canal between 5 Mile Road and 8 Mile Road in 2009, the East Branch Root River Canal and the Root River Canal between 3 Mile Road and 5 Mile Road in 2010, and the mainstem of the Root River from 43rd street to the Milwaukee County line in 2011.

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<sup>20</sup> *Earth Tech, Inc.*, Flood Response Plan Spring Flood Control, August 2003.

<sup>21</sup> *Jaren Hiller, AECOM*, "Root River Flood Stager Relationship Study," Memorandum to the City of Racine, July 20, 2009.

<sup>22</sup> *The model was constructed using the U.S. Army Corps of Engineers HEC-RAS river analysis system model. This model was developed in 2002 by AECOM (formerly Earth Tech) for the Root River bike path project and was based upon a HEC-2 model developed by SEWRPC.*

<sup>23</sup> *It should be noted that the HEC-RAS model developed in the AECOM study has not been approved by the WDNR or FEMA and should not be used for any regulatory purposes, such as floodland zoning or official floodland mapping.*

In 2015, the Town of Raymond Stormwater Utility District again completed a stormwater drainage project to clear brush and improve drainage on the mainstem of the Root River Canal, the East Branch Root River Canal, and the Kilbournville Tributary. The mainstem of the Root River Canal portion of the project included an unnamed tributary and extended from County Trunk Highway (CTH) G north to the Milwaukee County line, the East Branch Root River Canal portion of the project extended from 3 Mile Road to the confluence with the mainstem of the Root River Canal, and the Kilbournville Tributary portion of the project extended from 6 ½ Mile Road north to the Milwaukee County line. Roadways in the vicinity of these projects have overtopped during heavy rainfall events.

In 2014, a consultant for Racine County completed a dam failure analysis for the Horlick dam to determine the dam's hazard rating. Through the analysis it was determined that a rating of low hazard was appropriate for the dam,<sup>24</sup> and such a rating was assigned by the WDNR. Chapter NR 333, "Dam Design and Construction," of the *Wisconsin Administrative Code* requires that a low hazard dam must safely convey the one-percent-annual probability flood event. However, hydraulic analyses completed by the consultant as part of the dam failure analysis determined that the dam spillway is not able to safely pass the peak flow during a one-percent-probability flood. Thus, the WDNR has established the requirement that within 10 years from the date of the completed study (April 2024) the spillway capacity of the dam must be increased to safely pass the peak flow during a one-percent-annual-probability flood, or the dam must be demolished and removed. As part of the Root River restoration plan,<sup>25</sup> SEWRPC examined five alternatives to bring the dam into compliance with WDNR safety standards. The alternatives examined in the plan were: 1) lower the current dam spillway crest to allow for a one-percent-annual-probability flood capacity; 2) modify the current fishway in addition to alternative 1 changes; 3) lengthen the current dam spillway and raise the abutments for one-percent-annual-probability flood capacity; 4) create a full notch of the current dam spillway; or 5) full removal of the dam. Cost estimates for the preceding alternatives are presented in Table 65. Additional analysis for evaluating each alternative including surface and groundwater quantity, water quality, natural resources, social, and cost considerations are summarized in the restoration plan.

#### *Priority Mitigation Measures*

After consideration of the technical and economic feasibility of the various alternatives, a final strategy for alleviating problems due to flooding in the Racine County portion of the Root River watershed was developed and adopted by the Root River Watershed Committee. Selected mitigation measures were subsequently adapted for current conditions for use in the hazard mitigation planning program. As shown on Map 46, the plan calls for the following measures:

- Preserve the remaining primary environmental corridor lands along the Root River and its major tributaries in essentially natural open space uses (environmental corridors within Racine County are shown on Map 6). The corridors are to be preserved by a combination of public acquisition for parkway purposes and flood-land and open space zoning (partially implemented).
- Channel clearing and maintenance on the Root River Canal, including its east and west branches. Specifically, the plan proposes channel debrushing and cleaning along about 8.3 miles of the West Branch of the

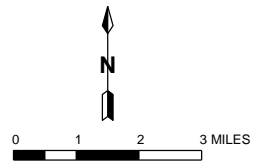
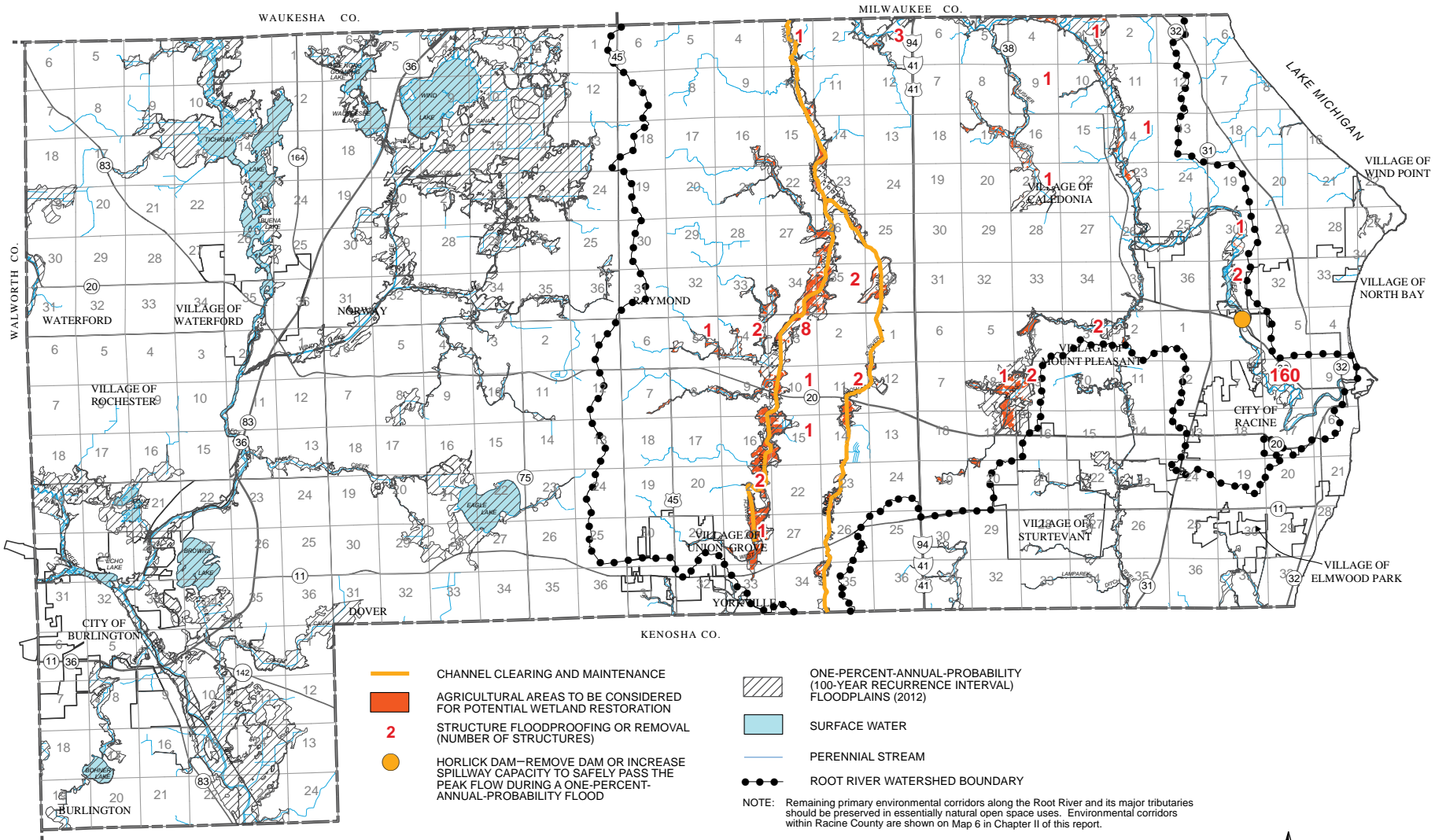
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<sup>24</sup> According to Section 333.06(1)(a), a low hazard rating would apply to a dam that has 1) no development unrelated to allowable open space use in the hydraulic shadow where the failure or mis-operation of the dam would result in probable loss of human life, 2) anticipated low economic losses due to failure of the dam (losses are principally limited to the owners property), 3) low environmental damage due to failure of the dam, 4) no significant disruption of lifeline facilities due to failure of the dam, and 5) downstream land use controls in place to restrict future development in the hydraulic shadow ("that area of land downstream from a dam that would be inundated by water upon failure of the dam during the" 1-percent-annual probability flood).

<sup>25</sup> SEWRPC Community Assistance Planning Report No. 316, A Restoration Plan for the Root River Watershed, July 2014.

Map 46

RECOMMENDED FLOODPLAIN MANAGEMENT MEASURES FOR THE ROOT RIVER WATERSHED



Source: SEWRPC.

Root River Canal from a point one-half mile downstream of the CP Rail System bridge near the Village of Union Grove to the confluence with the East Branch, along 9.6 miles of the East Branch of the Root River Canal from CTH E in Kenosha County to its confluence with the Root River Canal, and along 4.0 miles of the Root River Canal from its confluence with the East and West Branches to County Line Road in Milwaukee County. The plan does not contemplate any major channel deepening or widening, but would improve the operation of agricultural drain tiles and, to a limited extent, reduce agricultural flood damages (partially implemented).

- Structure floodproofing or removal of up to 196 structures identified using geographic information systems techniques as potentially being located in the one-percent-annual-probability floodplain. While this number of structures may include some agricultural structures, no garages or small outbuildings are included in this total. In this regard, field surveys should be made of those structures identified as being located within the one-percent-annual-probability floodplain to obtain a more definitive assessment of their flood hazard status.<sup>26</sup> Where LiDAR topographic data are available, applicants for Letters of Map Amendment (LOMA) may submit LiDAR data to FEMA in lieu of a certified elevation study by a professional engineer or land surveyor provided certain standards are met.<sup>27</sup> Furthermore, this plan element is presented as an option, subject to the preference of the individual property owner. The number of structures identified has increased substantially since the initial hazard mitigation plan as a result of revisions to the one-percent-annual-probability floodplain. As noted in Chapter IV, there are six structures considered by FEMA to be repetitive- or substantial-loss properties in Racine County, two of which are located in the Root River watershed. Projects involving acquisition and demolition of properties within the one-percent-annual-probability floodplain are the highest priority for Wisconsin Emergency Management (WEM) when funding is available. Acquisition and demolition of repetitive- or substantial-loss properties should have highest priority, followed by other structures confirmed to be within the one-percent-annual-probability floodplain after field survey.
- Take actions to meet the established WDNR requirement to either increase the spillway capacity of the Horlick dam to safely pass the peak flow during a one-percent-annual-probability flood, or demolish and remove the dam by 2024.

In addition to the measures outlined above, the floodplain management element contains several accessory measures to meet special needs within the watershed. These include: 1) application of the standards set forth in Chapter III relative to bridge replacement to ensure that major streets and highways remain operable during flood events, 2) participation in the Federal Flood Insurance Program, 3) continuation of desirable lending institution policies concerning the sale of riverine properties, 4) maintenance of the existing stream-gaging network in the watershed,<sup>28</sup> and 5) enforcement of floodplain regulations in the watershed.

As shown in Table 64, the estimated capital cost of implementing the Root River watershed portion of the Racine County floodland management plan element would be \$35,615,100 (2014 dollars).<sup>29</sup> Table 64 also shows the

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<sup>26</sup> *It is anticipated that the results of the field surveys may reduce the number of structures that are confirmed to be in the flood hazard area and the may require floodproofing.*

<sup>27</sup> *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.*

<sup>28</sup> *Location of current and historical U.S. Geological Survey stream-gaging stations are shown on Map 21 of the SEWRPC 2015 annual report.*

<sup>29</sup> *Total capital cost includes the full cost of components that have not been implemented and those that have been partially implemented.*



Table 64

**PRINCIPAL FEATURES AND COSTS OF THE FLOODPLAIN  
MANAGEMENT PLAN ELEMENT FOR THE ROOT RIVER WATERSHED**

Component Description	Capital Cost <sup>a</sup>		Annual Operation and Maintenance Cost (thousands of dollars)	Implementation Status
	Component Details	Cost (thousands of dollars)		
1. Preserve remaining riparian buffer areas, specifically primary environmental corridor lands along the Fox River and its major tributaries	Primary environmental corridors should be preserved in essentially natural open space uses. Corridors should be preserved by a combination of public acquisition for parkway purposes and floodplain and open space zoning	- -	- -	Partially implemented
2. Channel clearing and maintenance along the Root River Canal	Clear 21.9 of canal	662.2	21.8	Partially implemented
3. Structure floodproofing or removal of 196 structures <sup>b</sup>	Remove up to 170 residential structures and floodproof up to 12 agricultural buildings, 3 government structures, and 11 "other" structures	34,952.9 <sup>c</sup>	- -	Not implemented <sup>d</sup>
Total		35,615.1	21.8	

<sup>a</sup>Includes engineering, administration, and contingencies. Costs are shown in 2014 dollars.

<sup>b</sup>This number reflects the structures determined to be within the one-percent-annual-probability (100-year recurrence interval) floodplain utilizing the most recent FEMA floodplains, effective May 2012, geographic information system techniques, and orthophotographs from April 2015. Field surveys of these structures would provide a more definitive assessment of their flood hazard status.

<sup>c</sup>For the purpose of this analysis, it was assumed that all residential structures located within the one-percent-annual-probability (100-year recurrence interval) floodplain would be acquired and demolished. The cost for removal of the residential structures includes an estimated average fair market property value plus \$10,000 per property for demolition expenses. Floodproofing or elevating some residential structures, if found to be feasible based on specific factors, could be more cost effective. If floodproofing or elevation is considered at a specific structure, or a group of structures, field surveys of these structures should be conducted to obtain a more definitive assessment of their flood hazard status. All other categories of buildings (agricultural, commercial, utility, governmental, and other) were assumed to be floodproofed for the purpose of this analysis.

<sup>d</sup>Structure floodproofing/removal to be carried out at discretion of property owners.

Source: SEWRPC.

current implementation status of each plan element. In addition, the estimated capital costs of alternatives to meet the established WDNR requirement to either increase the spillway capacity of the Horlick dam to safely pass the peak flow during a one-percent-probability flood, or demolish and remove the dam range from \$370,000 to \$960,000 (2013 dollars), as shown in Table 65.

Some elements of the floodland management plan that have been implemented to date include channel clearing along the east and west branches of the Root River Canal in the early 1980s and again in 2009 through 2015. A Racine County parkway acquisition program has also been established.

***Floodland Management Plan for the Pike River Watershed***

In 1983, SEWRPC adopted a comprehensive plan for the physical development of the Pike River watershed.<sup>30</sup> That plan was further amended as it relates to Racine County in 1987, 1996, and 1997.<sup>31</sup> In the preparation of that plan,

<sup>30</sup> SEWRPC Planning Report No. 35, A Comprehensive Plan for the Pike River Watershed, June 1983.

<sup>31</sup> SEWRPC Amendment to the Pike River Watershed Plan, Town of Mt. Pleasant, June 1987; SEWRPC Amendment to the Pike River Watershed Plan, Kenosha and Racine Counties, March 1996; and Crispell-Snyder, Inc., Pike River Improvements, Mt. Pleasant Storm Water Drainage District No. 1 Project No. 89169, Chapter 30 Re-Submittal, July 7, 1997.

Table 65

**SUMMARY OF ALTERNATIVES TO INCREASE SPILLWAY CAPACITY OF HORLICK DAM—COSTS**

Alternative	Capital Cost <sup>a,b</sup> (dollars)	Annual Operation and Maintenance (dollars) <sup>c</sup>	Total Present Worth Cost (dollars)
Alternative 1—Lower Crest for 100-Year Capacity .....	\$370,000	\$2,600	\$411,000
Alternative 2—Alt 1 with Fishway.....	\$510,000	\$2,900	\$555,000
Alternative 3—Lengthen Spillway for 100-Year Capacity .....	\$960,000 <sup>d</sup>	\$2,400	\$998,000
Alternative 4—Full Notch of Dam for 100-Year Capacity .....	\$450,000	\$2,100	\$483,000
Alternative 5—Dam Removal.....	\$540,000	\$ 700	\$551,000

<sup>a</sup>Capital costs based upon year 2013 conditions. Engineering News-Record Construction Cost Index: 12,208.

<sup>b</sup>These are systems-level planning costs and the WDNR has indicated that even after the final design stage, the average dam reconstruction change order amount is 40 percent of the initial capital cost estimate, mainly due to unforeseen site conditions once construction begins.

<sup>c</sup>Based on an interest rate of 6 percent and a project life of 50 years.

<sup>d</sup>Capital cost includes \$240,000 for raising Old Mill Drive.

Source: SEWRPC.

a concerted effort was made to offer for public evaluation a full range of physically feasible alternative plan sub-elements that might satisfy one or more agreed-upon watershed development objectives. Each alternative floodland management subelement was evaluated insofar as possible in terms of technical and economic impact, financial and legal feasibility, and public acceptability, as well as with respect to satisfaction of the watershed development objectives.

In a manner similar to that used in the preparation of the plans for the Fox and Root River watersheds, a number of alternatives were explored in the preparation of the floodland management element of the Pike River watershed plan. A total of five structural floodland management measures were identified for possible application, whether individually or in various combinations, to specific floodprone reaches of the watershed: 1) storage; 2) floodwater diversion; 3) dikes and floodwalls; 4) channel modification and enclosure; and 5) bridge and culvert alteration or replacement. A total of 12 nonstructural measures were likewise identified for possible inclusion in the floodland management element of the watershed plan: 1) reservation of floodlands for recreational and related open space use; 2) floodland regulations; 3) control of land use outside of floodlands; 4) community education programs; 5) flood insurance; 6) lending institution policies; 7) realtor policies; 8) community utility policies; 9) emergency programs; 10) structure floodproofing; 11) structure removal; and 12) channel maintenance. Various combinations of structural and nonstructural management measures were evaluated for each of the most floodprone reaches in the watershed.

*Recent Local Actions*

The Village of Mt. Pleasant Stormwater Utility District is near completion of its multi-year, multi-phase project to restore the riverine environment along the Pike River in the Village limits. In addition to the goal of mitigating flooding along the River, the project will restore natural stream features, enhance aquatic habitat, improve water quality, and install a trail system providing connectivity from existing on-road trails. Construction on Phases 1 through 3 were completed from 2001 to 2006. The work from these three phases stretched from the headwaters of the Pike River to just south of Oakes Road and physically removed over 120 properties from the one-percent-annual-probability floodplain. Those property owners will no longer be required to purchase flood insurance for their homes. Phases 4 and 5 were constructed from 2007 through 2010 and occurred from 16th Street south to STH 11.

As part of this phase of the project, more than 47 acres of river corridor was donated to the Village by S.C. Johnson & Son, Inc. Within Phases 1 through 5 of the project, 206 acres of land were acquired for Pike River riparian corridor restoration. Phase 6 was completed in 2012 and included flood channel expansion, demolition of an abandoned sanitary sewer lift station, and installation of recreational trails. Final Phases 7 through 9 were completed in 2016. Approximately 35 acres of corridor land were to be acquired for these last phases of the project. In addition, Phases 1, 4, and 9 included construction of large flood storage areas to further reduce potential flooding in the Village. In total, the project has restored about 450 acres of Pike River corridor. Each phase included expansion of the flood channel to control floodwaters, plantings of wetland and prairie vegetation, and instream structures to improve fish habitat. The Utility District has received nearly \$4 million in local, State, and Federal grants for this project, and \$5 million from the U.S. Army Corps of Engineers (USACE).

In 2015, the Village of Sturtevant was awarded a Municipal Flood Control Grant from the WDNR to purchase and raze a home that has been plagued by flooding from a nearby unnamed tributary to Waxdale Creek. The Village planned to remove the building and hard surfaces on the property and turn the lot into green space. The Village also planned to apply for future grants to return the tributary stream to its more natural state.

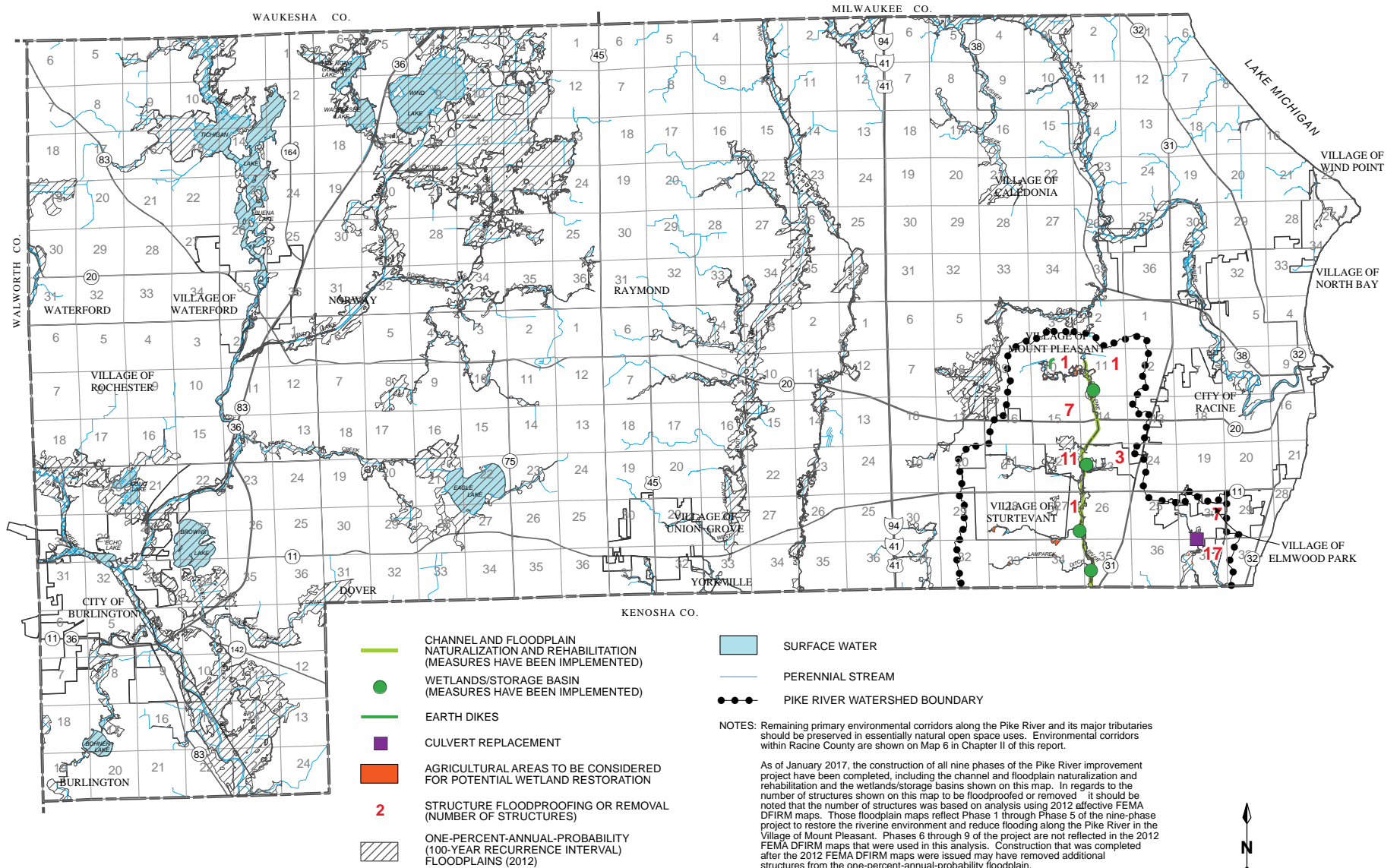
#### *Priority Mitigation Measures*

After consideration of the technical and economic feasibility of the various alternatives, a final strategy for alleviating problems due to flooding in the Racine County portion of the Pike River watershed was developed and adopted by the Pike River Watershed Committee (see Appendix A for committee member list). The watershed study was further refined in 1987, 1996, and 1997. Selected mitigation measures were subsequently adapted for current conditions for use in the current hazard mitigation planning effort. As shown on Map 47, the plan calls for the following measures:

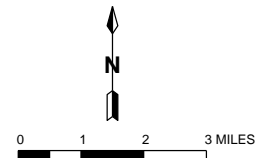
- Preserve of the remaining primary environmental corridor lands along the Pike River and its major tributaries in essentially natural open space uses (environmental corridors within Racine County are shown on Map 6). The corridors are to be preserved by a combination of public acquisition for parkway purposes and floodland and open space zoning (partially implemented).
- Complete the final phases of the Pike River improvement project. As of January 2017, the construction of all nine phases of the project have been substantially completed. Maintenance and monitoring of the project is currently underway. This project is described in more detail in the section above (implemented).
- Construct an earthen berm upstream of Old Spring Street to protect residential structures along the Bartlett Branch. The berm would be about 500 feet long, with an average height of about five feet (implemented).
- Replacement of the Chicory Road crossing of Sorenson Creek with a new clear-span bridge having a waterway opening of about 30 feet (not implemented).
- Structure floodproofing or removal of up to 48 structures--identified using geographic information systems techniques and color orthophotographs as potentially being located within the one-percent-annual-probability floodplain--that would not be removed through the structural measures noted above. This number was determined using the 2012 FEMA floodplain mapping which reflects construction of Phases 1 through 5 of the nine-phase project to restore the riverine environment and reduce flooding along the Pike River in the Village of Mount Pleasant. Phases 6 through 9 of the Pike River improvements project are not reflected in the 2012 FEMA floodplains. Construction that was completed after 2012 may remove additional structures from the one-percent-annual-probability floodplain. While the 48 structures remaining within the floodplain may include some agricultural structures, no garages or small outbuildings are included in this total. At such future time that floodproofing or removal of those structures is considered, field surveys should be made of those structures to obtain a more definitive assessment of their flood hazard status. Where LiDAR topographic data are available, applicants for Letters of Map Amendment (LOMA) may submit LiDAR data

Map 47

RECOMMENDED FLOODPLAIN MANAGEMENT MEASURES FOR THE PIKE RIVER WATERSHED



Source: SEWRPC.



to FEMA in lieu of a certified elevation study by a professional engineer or land surveyor provided certain standards are met.<sup>32</sup> Furthermore, this plan element is presented as an option, subject to the preference of the individual property owner. Projects involving acquisition and demolition of properties within the one-percent-annual-probability floodplain are the highest priority for Wisconsin Emergency Management (WEM) when funding is available. None of the six structures in Racine County considered by FEMA to be repetitive- or substantial-loss properties are located in the Pike River watershed.

In addition to the measures outlined above, the floodland management element contains several accessory measures to meet special needs within the watershed. These include: 1) the standards set forth in Chapter III relative to bridge replacement to ensure that major streets and highways remain operable during flood events; 2) participation in the Federal Flood Insurance Program; 3) continuation of desirable lending institution policies concerning the sale of riverine properties; 4) maintain the existing stream-gaging network in the watershed;<sup>33</sup> and 5) enforcement of floodplain regulations in the watershed.

As shown in Table 66, the estimated capital cost of implementing the Pike River watershed portion of the Racine County floodland management plan element would be \$29,647,700<sup>34</sup> (in 2014 dollars). Table 66 also show the current implementation status of each plan element. The capital cost for those elements that remain to be implemented is estimated at \$9,501,100.

Elements of the floodland management plan that have been implemented to date include the construction of the earthen berm along the Bartlett Branch, and construction all nine phases of the Pike River improvement project from Spring Street (CTH C) to STH 11. As of January 2017, maintenance and monitoring of the project was underway.

#### ***Floodland Management Plan for the Des Plaines River Watershed***

In 2003, SEWRPC adopted a comprehensive plan for the physical development of the Des Plaines River watershed.<sup>35</sup> In the preparation of that plan, a concerted effort was made to offer for public evaluation a full range of physically feasible alternative plan elements that might satisfy one or more agreed-upon watershed development objectives. Each alternative floodland management subelement was evaluated insofar as possible in terms of technical and economic impact, financial and legal feasibility, and public acceptability, as well as with respect to satisfaction of the watershed development objectives.

In a manner similar to that used in the preparation of the plans for the other watersheds in Racine County, a number of alternatives were explored in the preparation of the floodland management element of the Des Plaines River

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<sup>32</sup> *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.*

<sup>33</sup> *Location of current and historical U.S. Geological Survey stream-gaging stations are shown on Map 21 of the SEWRPC 2015 annual report.*

<sup>34</sup> *This amount is the total cost if all mitigation measures were fully implemented in 2014 dollars. Costs for projects that have already been fully or partially implemented and for those projects that have not been implemented are included in this total.*

<sup>35</sup> *SEWRPC Planning Report No. 44, A Comprehensive Plan for the Des Plaines River Watershed, June 2003.*

Table 66

**PRINCIPAL FEATURES AND COSTS OF THE FLOODPLAIN  
MANAGEMENT PLAN ELEMENT FOR THE PIKE RIVER WATERSHED**

Component Description	Capital Cost <sup>a</sup>		Annual Operation and Maintenance Cost (thousands of dollars)	Implementation Status
	Component Details	Cost (thousands of dollars)		
1. Preserve remaining riparian buffer areas, specifically primary environmental corridor lands along the Fox River and its major tributaries	Primary environmental corridors should be preserved in essentially natural open space uses. Corridors should be preserved by a combination of public acquisition for parkway purposes and floodplain and open space zoning	--	--	Partially implemented
2. Pike River channel enlargement and rehabilitation	Construct 5.25 miles of channel modifications and four wetland/storage basins	20,000.0 <sup>b</sup>	26.2	Implemented
3. Berm along Bartlett Branch	500-foot-long earth berm	146.6	1.2	Implemented
4. Chicory Road culvert replacement along Sorenson Creek	Install new clear-span bridge with 30-foot opening width	349.3	0.0	Not implemented
5. Structure floodproofing or removal of 48 structures <sup>c</sup>	Remove up to 42 residential structures and floodproof up to 6 commercial/industrial structures	9,151.8 <sup>d</sup>	--	Not implemented <sup>e</sup>
Total		29,647.7	27.4	--

<sup>a</sup>Includes engineering, administration, and contingencies. Costs are shown in 2014 dollars.

<sup>b</sup>About \$4 million of this total cost was paid for in a variety of grants. In addition, the U.S. Army Corps of Engineers contributed about \$5 million to the project.

<sup>c</sup>This number reflects the structures determined to be within the one-percent-annual-probability (100-year recurrence interval) floodplain utilizing the most recent FEMA floodplains, effective May 2012, geographic information system techniques, and orthophotographs from April 2015. Field surveys of these structures would provide a more definitive assessment of their flood hazard status.

<sup>d</sup>For the purpose of this analysis, it was assumed that all residential structures located within the one-percent-annual-probability (100-year recurrence interval) floodplain would be acquired and demolished. The cost for removal of the residential structures includes an estimated average fair market property value plus \$10,000 per property for demolition expenses. Floodproofing or elevating some residential structures, if found to be feasible based on specific factors, could be more cost effective. All other categories of buildings (agricultural, commercial, utility, governmental, and other) were assumed to be floodproofed for the purpose of this analysis. If floodproofing or elevation is considered at a specific structure, or a group of structures, field surveys of these structures should be conducted to obtain a more definitive assessment of their flood hazard status.

<sup>e</sup>Structure floodproofing/removal to be carried out at discretion of property owners.

Source: Village of Mt. Pleasant Utility District and SEWRPC.

watershed plan. A total of five structural floodland management measures were identified for possible application, whether individually or in various combinations, to specific floodprone reaches of the watershed: 1) storage; 2) diversion; 3) dikes and floodwalls; 4) channel modification and enclosure; and 5) bridge and culvert alteration or replacement. A total of 11 nonstructural measures were likewise identified for possible inclusion in the floodland management element of the watershed plan: 1) reservation of floodlands for recreational and related open space use; 2) floodland regulations; 3) control of land use outside of floodlands; 4) community education programs; 5) flood insurance; 6) lending institution policies; 7) community utility policies; 8) emergency programs; 9) structure floodproofing; 10) structure removal; and 11) channel maintenance. Various combinations of structural and nonstructural management measures were evaluated for each of the most floodprone reaches in the watershed.

*Priority Mitigation Measures*

After consideration of the technical and economic feasibility of the various alternatives, a preliminary strategy for alleviating problems due to flooding in the Des Plaines River watershed was developed and adopted by the Des

Plaines River Watershed Committee (see Appendix A for committee member list).<sup>36</sup> While there are no directly-flooded structures in the one-percent-probability floodplain in the Racine County portion of the watershed, the following selected mitigation measures, adapted for current conditions for use in the hazard mitigation planning program, are applicable to management of stormwater runoff and minimization of possible future flooding in the Racine County portion of the watershed, and in downstream areas in Kenosha County. The plan calls for the following measures (see Map 48):

- Preservation of the remaining primary environmental corridor lands along the Des Plaines River and its major tributaries in essentially natural open space uses (environmental corridors within Racine County are shown on Map 6). The corridors are to be preserved by a combination of public acquisition for parkway purposes and floodland and open space zoning.
- Provision of onsite detention storage facilities for planned new development. Facilities would be designed to limit peak discharges for the 50-percent (two-year recurrence interval) and one-percent-annual-probability storm events based on the following release rates: 0.04 cfs per acre of development for the two-year event, and 0.30 cfs per acre of development for the one-percent-annual probability event.
- Restoration of prairie conditions on 6.0 square miles (watershedwide) on agricultural land.
- Restoration of wetland conditions on 3.1 square miles (watershedwide) of agricultural land in the one-percent-annual-probability floodplain.

In addition to the measures outlined above, the preliminary floodland management element contains the following accessory measures to meet special needs within the Des Plaines watershed:

- Application of the standards set forth in Chapter III relative to bridge replacement to ensure that major streets and highways remain operable during flood events.
- Preparation of detailed subwatershedwide stormwater management system plans for the Village of Union Grove and the urban areas of the Village of Mt. Pleasant and the Town of Yorkville.
- Encouraging the use of floodland areas for outdoor recreation and related open space activities.
- Continued participation in the National Flood Insurance Program.
- Adoption of the one-percent-annual-probability flood profiles and floodland maps developed for planned land use conditions under the watershed plan. Also updating of Federal Flood Insurance Studies to reflect these flood profiles and maps.<sup>37</sup>
- Amendment of local floodland zoning ordinances to require the provision of compensatory floodland storage to offset the effects of the placement of fill in the floodplain.
- Purchase of Federal flood insurance by property owners in floodprone areas.

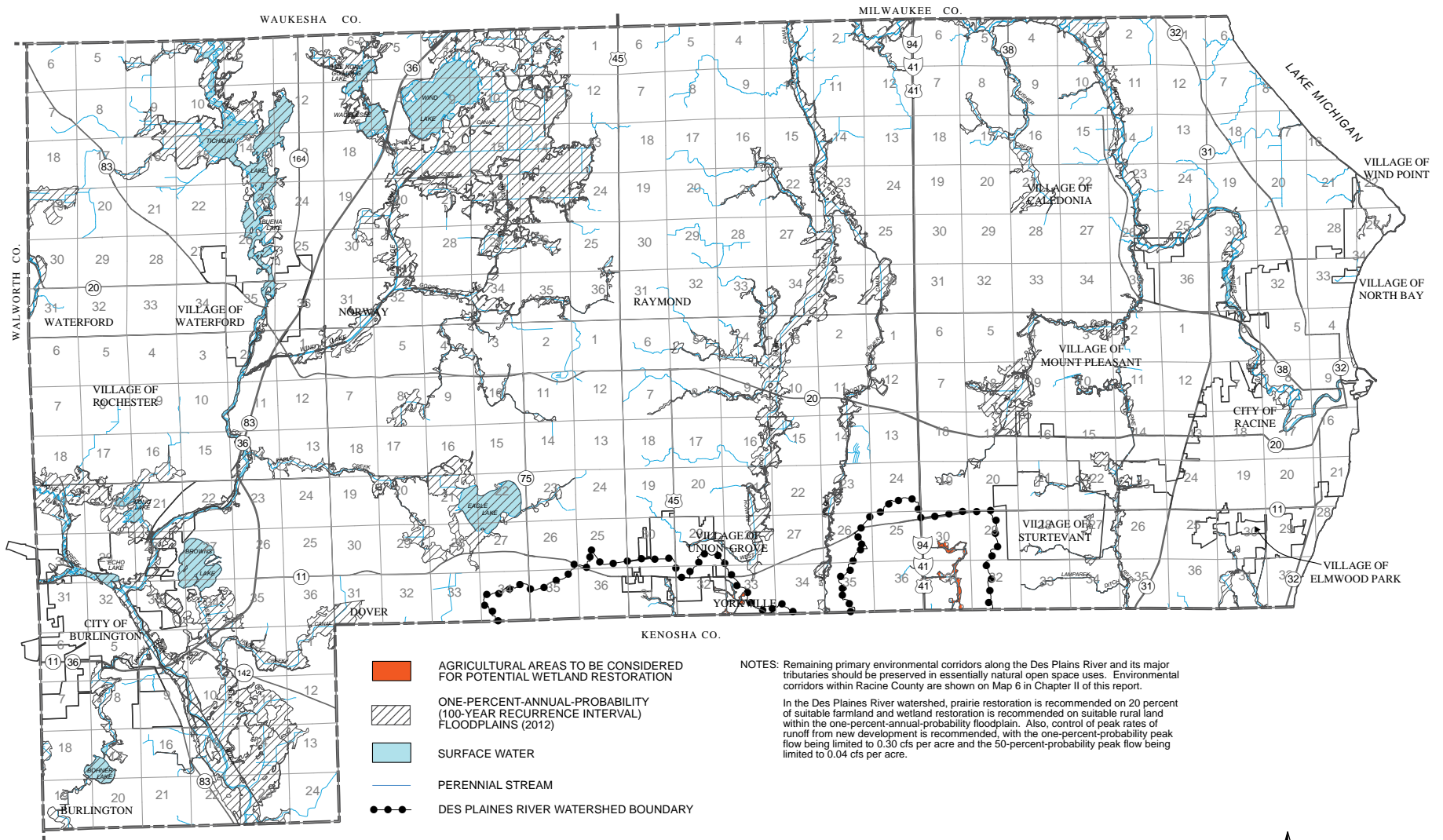
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<sup>36</sup> *Previous editions of this hazard mitigation plan used County large-scale topographic maps to identify structures that are potentially located within the one-percent-annual-probability floodplain. That analysis concluded that one residential structure was located within the one-percent-annual-probability floodplain. For this update of the hazard mitigation plan, geographic information systems techniques were used to determine that the structure believed to be a residential structure in the previous analysis was in fact a shed. Therefore, it was determined that no structures of significance are located within the floodplain the Racine County portion of the Des Plaines watershed.*

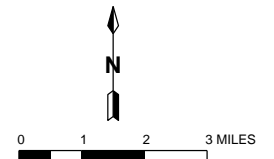
<sup>37</sup> *In May 2012, FEMA updated the Racine County portion of the digital flood information rate maps based on the floodplain delineations and flood profiles developed under the Des Plaines River watershed study.*

Map 48

RECOMMENDED FLOODPLAIN MANAGEMENT MEASURES FOR THE DES PLAINES RIVER WATERSHED



Source: SEWRPC.





- Determination by lending institutions of the floodprone status of properties prior to granting a mortgage.
- Formulation, or continuation, of governmental and agency policies such that the location, use, and size of public utilities and facilities are consistent with the floodprone status of riverine areas identified in the watershed plan.
- Consideration by local communities of the potential hydrologic impact of proposed development or redevelopment and recognition that planned development should occur according to the land use plan presented in the watershed study.
- Revision of local policies and regulations to encourage low impact source controls and stormwater management practices designed to maintain pre-development hydrologic conditions.
- Provide property owners with information regarding the extent of flood hazard areas.
- Incorporate of channel maintenance functions in the operations of responsible governmental units.
- Maintain the U.S. Geological Survey stream gage on the Des Plaines River at Russell, Illinois, and adding, establishing and maintaining a continuous recording gage on the Des Plaines River near CTH K in Kenosha County.

As shown in Table 67, the estimated capital cost of implementing the overall Des Plaines River watershed floodland management plan elements would range from \$9,379,700 to \$11,232,600 (in 2014 dollars), depending on the techniques used for prairie and wetland restoration.<sup>38</sup> This amount represents the cost of implementing those particular measures in both Racine and Kenosha Counties. The cost for Racine County is estimated to be at most \$907,125 (2014 dollars) and is largely associated with the provision of stormwater detention for new development and conversion of rural lands to wetland and prairie conditions. Table 67 also shows the current implementation status of each plan element.

### **Stormwater Management Element**

Because of the relationship between stormwater management and floodland management, stormwater management actions are an important element of the flood mitigation plan. This element of the plan includes the status of stormwater management planning and stormwater ordinances and related regulations.

#### ***Stormwater-Related Regulations, Stormwater Management Plans, and Recent Local Actions***

Chapter 283 of the Wisconsin Statutes and Chapter NR 216 of the *Wisconsin Administrative Code* require certain municipalities to obtain State stormwater discharge permits to discharge stormwater to receiving streams and watercourses from municipal storm sewer systems. The *Statutes* and implementing *Administrative Code* require municipalities to file applications for the State permits. The permit applications must demonstrate that the municipality concerned has the legal authority to control pollutant contributions to storm sewer systems from various sources. The permit application must provide stormwater management-related data, most of which would be provided by a properly prepared, technically sound, stormwater management system plan.

In 2002 the WDNR issued Chapter NR 151 of the *Wisconsin Administrative Code*, outlining 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

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<sup>38</sup> This amount is the total cost if all mitigation measures were fully implemented in 2014 dollars. Costs for projects that have already been fully or partially implemented are included in this total.

Table 67

**PRINCIPAL FEATURES, COSTS, AND BENEFITS OF THE RECOMMENDED FLOODPLAIN MANAGEMENT PLAN FOR THE DES PLAINES RIVER WATERSHED**

Component Description	Capital Cost <sup>a,b</sup>		Annual Operation and Maintenance Cost (thousands of dollars)	Implementation Status
	Component Details	Cost (thousands of dollars)		
Watershed wide				
1. Preserve remaining riparian buffer areas, specifically primary environmental corridor lands along the Fox River and its major tributaries	Primary environmental corridors should be preserved in essentially natural open space uses. Corridors should be preserved by a combination of public acquisition for parkway purposes and floodplain and open space zoning	--	--	Partially implemented
2. Provide onsite detention storage facilities for planned new development	Detention facilities, including land cost	8,323.4 <sup>c</sup>	84.8 <sup>c</sup>	Partially implemented
3. Restore prairie conditions on 6.0 square miles of agricultural land	Prairie restoration	838.3 to 2,365.1 <sup>d</sup>	1.3 to 95.3 <sup>d</sup>	Not implemented
4. Restore wetland conditions on 3.1 square miles of agricultural land in the 100-year floodplain	Wetland restoration	216.3 to 542.5 <sup>d</sup>	0.4 to 24.6 <sup>d</sup>	Not implemented
	Total	9,378.0 to 11,231.0	86.5 to 204.7	--

<sup>a</sup>A breakdown of costs between Kenosha and Racine Counties is not available. Thus, total costs for both Counties are listed. It is estimated that the capital cost range for measures in Racine County would be relatively small, ranging from \$762,000 to \$907,125.

<sup>b</sup>Includes engineering, administration, and contingencies. Costs are shown in 2014 dollars.

<sup>c</sup>Incremental cost between control of two-year and 100-year events.

<sup>d</sup>Cost reflects range from minimal wetland and prairie operation and maintenance to active management.

Source: SEWRPC.

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 stormwater discharge permit are required to have a stormwater management program which most often results in adoption of a stormwater management ordinance.

Communities with Wisconsin Pollution Discharge Elimination System (WPDES) stormwater discharge permits include Racine County, the Cities of Racine and Burlington, the Villages of Caledonia, Mt. Pleasant, Sturtevant, and Wind Point, and the Towns of Norway and Waterford. As a part of the permit application process, these communities also have adopted stormwater-related ordinances.

In 2010, the Village of Union Grove enacted an ordinance to create a stormwater utility district to oversee necessary stormwater management activities within the Village. The ordinance also created a stormwater management fee based on the amount of impervious surface area located on a property. In 2013, the Village completed two projects to improve stormwater drainage. One ditch was dredged and riprap was installed to alleviate flooding in the Fox Creek Subdivision. Another drainage ditch near Industrial Park Drive was dredged and riprap was installed to provide better stormwater drainage and alleviate flooding. In 2015, the Village redesigned and installed a new stormwater debris grate on an unnamed tributary to the West Branch Root River Canal to eliminate flooding near STH 45 and 7th Avenue. The grate can be lifted up in heavy rains if it becomes plugged by debris. The banks on the unnamed tributary were also reshaped and riprap was installed.

In 2016, the City of Burlington hired a consulting firm to complete a stormwater management plan to make the City compliant with its new status as a WPDES-permitted community. The City received a grant from the WDNR to match 57 percent of the cost of the planning process. The total cost of the plan was estimated at over \$121,800.

The remaining urban communities in the County are also encouraged to prepare stormwater management plans. In those townships 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 developed.

In 1993, Commission staff developed an agricultural drainage and urban stormwater management plan for the Racine County Farm Drainage District No. 1.<sup>39</sup> The study area for this plan encompassed a 1.33-square-mile area within the Village of Waterford and the Towns of Norway and Waterford. This plan was developed because over time the two drainage systems have become interconnected. Because of that interconnection, neither system can be viewed in isolation from each other, even though the two systems are generally intended to serve different purposes. The interconnection of the two systems has limited the effectiveness of each system because the addition to the pre-existing agricultural drainage system of stormwater runoff from urban and transportation land uses was not offset by an increase in the capacities of the agricultural drain tiles located downstream of the stormwater connections added to the system, or by a significant increase in the pumping capacity at the outlet of the system. The 1993 SEWRPC study addressed the problem of providing an integrated system which could adequately meet both the existing and probable future agricultural drainage and urban stormwater management needs of the area as projected in 1993.

In 2004, the Village of Waterford commissioned a study intended to refine those portions of the study documented in SEWRPC MR No. 79 that are within the Village.<sup>40</sup> This study was based on future land use information that was developed after the 1993 SEWRPC study. The Village study projected that a significantly higher proportion of the study area would be in urban land uses than was projected by the 1993 SEWRPC study.

In 2008, at the request of local representatives, Commission staff compared and evaluated these two studies.<sup>41</sup> This comparison and evaluation concluded that, because land use projections have evolved since the 1993 SEWRPC study was prepared and urban land uses are now expected to predominate, it is no longer appropriate to address the future drainage system in the study area as a joint agricultural/urban system that will have both significant urban and rural components under future conditions. Instead, it is more appropriate to view the future system as an urban system that should be configured to accommodate drainage from the remaining upstream agricultural areas in the northern headwaters of the study area.

The 2008 SEWRPC evaluation recommended further study to evaluate urban stormwater drainage system needs in the northern and eastern portions of the study area beyond areas of existing development in the Village of Waterford. It indicated that such an evaluation should be based on a minor stormwater management system designed for a ten-percent-annual-probability storm and a major system to function during a one-percent-annual-probability

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<sup>39</sup> *SEWRPC Memorandum Report No. 79, An Agricultural Drainage and Urban Stormwater Management Plan for Racine County Farm Drainage District No. 1, Village of Waterford and Towns of Norway and Waterford, Racine County, Wisconsin, September 1993.*

<sup>40</sup> *Crispell-Snyder, Inc., Consulting Engineers, East Side Storm Water Management Study-Village of Waterford, 2004.*

<sup>41</sup> *SEWRPC Staff Memorandum, "Comparison of 1993 SEWRPC Memorandum Report No. 79, Agricultural Drainage and Urban Stormwater Management Plan for Racine County Farm Drainage District No. 1, and 2004 Village of Waterford Report, East Side Storm Water Management Study, February 20, 2008.*

storm. Citing factors in the study area that make establishment of an adequate overland major drainage system consisting of flow in streets and drainageways difficult, the evaluation also recommended that, to enable adequate functioning during storms approaching and including the one-percent-probability storm, any future study should consider the need to 1) size some conveyance and pumping components for flows greater than those resulting from a ten-percent-probability storm, and/or 2) increase the size of some detention facilities to reduce peak flows to a greater degree. The evaluation noted that the Towns and the Racine County Drainage Board are faced with the decision of whether to upgrade the existing portions of the agricultural drainage system as recommended under the 1993 SEWRPC study to improve drainage during the interim period between the present and a future time when much of the existing rural land is anticipated to be developed in urban uses, or to not upgrade drain tiles and replace the agricultural drainage system with an urban stormwater management system in the future when urban development is proposed. Under either scenario, the evaluation recommended that the Village of Waterford begin to implement the recommendations of the 2004 study, ensuring that the facilities design considers major drainage system needs that may require additional or larger facilities. The recommendations of the 2004 study include:

- Upgrading the pumping capacity near the study area outlet through the provision of a new pump station at the site of the existing pump station,
- Upgrading storm sewer hydraulic capacity from the east side of the Waterford-Wind Lake Bicycle Trail to the new pump station,
- Improving stormwater drainage system capacity from the east side of the Bicycle Trail extending to the east, and
- Maximizing utilization of the storage capacity of the existing detention basin that is located between Foxmead Crossing and Sixth Street.

In 2013, the Village of Waterford and the Racine County Farm Drainage District No. 1 completed a stormwater drainage project to alleviate stormwater flooding in the neighborhood near Conservancy Park, fulfilling several of the recommendations described above. The project included a new lift station, installation of new storm sewers, and installation of a force main. Flooding in this neighborhood often caused damage to Conservancy Park, water in basements, and closure of a local road. The project was funded with \$1.1 million grant from the Federal Community Development Block Grant-Emergency Assistance program.

The 2008 evaluation also recommends that the Village of Waterford and the Towns of Norway and Waterford consider cooperating on an expansion of the 2004 Village study that would address existing urban drainage problems not specifically covered by the plan recommendations of either study and would also provide a framework for stormwater management in areas of future development.

Heavy rain events in June 2009 caused significant flooding in the Village of Sturtevant as outlined in Chapter IV. The most frequently flooded location in the Village is at the intersection of 90th Street and Corliss Avenue. The problem at that location is stormwater-related. The Village has completed 11 stormwater detention facilities to address NR 216 water quality regulations. The Village plans to continue to pursue detention facilities as development and land opportunities arise.

The Village of Rochester established a stormwater utility in 2012. Since its inception, the utility has completed several projects to address long neglected stormwater infrastructure within the Village. In 2012, the utility repaired several storm sewer inlets in the Fox River Prairie Subdivision to improve stormwater drainage in the neighborhood. A comprehensive drainage plan was completed in 2013 related to the future reconstruction of N. River Road. Also related to the planned N. River Road reconstruction, two ditching projects were completed to improve drainage in the area. In 2014, a series of rock check dams on Rookery Glen Drive were removed and replaced to help improve drainage in the area. In the same year, the utility designed and relocated an outlet from tile that drained the land of the former agricultural school in the Village. This project decreased flooding on Maryl Street and reduced standing

water in road ditches that often occurred in the neighborhood. The Village replaced failing culverts at June Lane and Ryan Avenue in 2014 and 2015, respectively. In 2015, 1,320 feet of road ditch was constructed along Oak Knoll Road. Prior to this project, runoff would sheet-flow over Oak Knoll Road forming dangerous sheets of ice in winter months. In 2013 and 2015 the Village cleaned sections of drainage ditches along N. River Road, Fox Knoll Drive, and Clover Lane to improve stormwater drainage in the area.

Since 2004, the Village of Sturtevant has completed four regional stormwater detention facilities that reduce flood flows to the local stormwater management system tributary to Hoods Creek in the Root River watershed and to Chicory Creek, Waxdale Creek, and the Pike River system in adjacent watersheds.

### **Public Information and Education Element**

Public information, education, and participation constitute an integral aspect of Racine County's flood mitigation and related efforts. This element includes two subelement activities to be carried out, namely public education activities and public information programming and coordination associated with detailed stormwater and floodland management plans.

#### ***Public Education Activities***

This subelement involves preparation and distribution of educational and self-help materials and provision of educational programs. With regard to this subelement, Racine County and the various municipalities will, as needed, collaborate to prepare and distribute various public informational and educational materials, including materials oriented toward homeowners and designed to help them consider and potentially undertake actions to mitigate damage caused by stormwater flooding and sanitary sewer backups. Methods available include, but are not limited to, social media, cable television, pamphlet development, individual seminars, the internet, and community speaking engagements. The Wisconsin Department of Health Services has prepared a flooding toolkit for citizens.<sup>42</sup> 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.<sup>43</sup>

In partnership with the City of Racine, Racine County has implemented the CodeRED® Emergency and Weather Notification System to deliver customized prerecorded messages directly to homes and businesses, or to persons traveling through the County via the free mobile app. This service uses a high-speed telephone calling system to a phone number in the CodeRED® database to alert users of significant incidents and events where timely notification of an affected population or geographic area is essential. The pre-recorded message may also provide instructions for action to be taken. Messages will only be sent to individuals and businesses that have registered their home, business, or cellular phone number with the service.<sup>44</sup> Racine County residents who sign up for the additional CodeRED® Weather Warning will automatically receive calls when tornado, flash flood, and severe thunderstorm warnings are issued by the National Weather Service for addresses that are in the path of the storm.

In addition, the County has the capability to issue emergency alerts to cell phones through the Wireless Emergency Alerts (WEA) system. The WEA is a partnership including local and State public safety agencies, FEMA, the

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<sup>42</sup> *The Wisconsin Flood Toolkit is available for download at <https://www.dhs.wisconsin.gov/publications/p0/p00631.pdf>*

<sup>43</sup> *The ReadyWisconsin flood informational handout is available for download at <http://readywisconsin.wi.gov/media/pdf/Flooding.pdf>*

<sup>44</sup> *County residents can register for the CodeRED® service at <https://public.coderedweb.com/cne/en-US/42B2D9DB5844>.*

Federal Communications Commission (FCC), the Department of Homeland Security (DHS) and the National Weather Service (NWS). Under the WEA system, authorized County officials can send emergency messages to mobile devices of those that may be in harm's way without the need to download an app or subscribe to a service. WEAs are broadcast from area cell towers to mobile devices only in the specific area where there is a danger. These short messages are designed to get the recipient's attention in a critical situation and will look like a text message that will show the type and time of the alert, any action that recipients should take, and the agency issuing the alert. The WEA message includes a special tone and vibration that will be repeated twice. WEA will send alerts for extreme weather warnings including flash flood, tornado, and extreme wind warnings; local emergencies requiring evacuation or immediate action; AMBER Alerts; and Presidential alerts during a national emergency.

Finally, County emergency management representatives from Southeast Wisconsin have worked with the computer science students from the University of Wisconsin-Parkside's "App Factory" to develop the Ready Badger app for wireless devices.<sup>45</sup> 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. 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.

### ***Public Participation Activities and Coordination with Other Agencies and Units of Government***

The second subelement of this program involves direct public participation and coordination with other agencies during detailed stormwater and floodland management plan development. One example of this is the active participation of local citizens and community groups in the technical advisory committees that were formed to oversee the development of the four comprehensive watershed plans referenced above. In some of the watersheds, those committees, listed in Appendix A, continue to serve to help guide the implementation and refinement of those watershed plans. In the other watersheds, the Commission would reconstitute the committees as needed. In addition, public hearings were held to allow for public input into each of the comprehensive watershed plans.

As part of the implementation of the Pike River improvements project, the Mt. Pleasant Storm Water Drainage District held a series of public information meetings updating the progress of the project. The District has also published a summary document of the project that is available to the public.

As discussed above, discovery meetings for the FEMA Risk MAP Upper Fox River watershed were held in 2012 and 2014. At the meetings, communities from around the Upper Fox River watershed, WDNR, and FEMA exchanged information regarding flooding history, development plans, flood risks, floodplain management activities, and study needs. Discussions have begun regarding a potential Risk MAP program within the Root River Watershed, including Racine County. The projected schedule for initiating the Risk MAP program in the Root River watershed has not yet been established. Local knowledge and participation from the public through community representatives in Risk MAP discovery meetings is an essential component of a successful Risk MAP program.

Toward further informing the public regarding flood mitigation, stormwater and floodland management, and related issues, this hazard mitigation plan update calls for concerned units and agencies of government, including Racine County and all cities, villages, and towns within the County, to involve members of the general public and to seek public input in the preparation and implementation of recommendations regarding such issues.

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<sup>45</sup> *The Ready Badger app can be downloaded for free in the Apple App Store and Android Google Play Store.*

## **Secondary Plan Element**

In addition to the above recommended measures, several secondary measures are included in the floodland management element. These secondary measures are described below.

### ***National Flood Insurance Program and Floodplain Map Updating Efforts***

Racine County and all cities and villages with exception of the Village of Elmwood Park, have been designated by the Federal Emergency Management Agency as having flood hazard areas and have taken the steps needed to make residents eligible to participate in the National Flood Insurance Program (NFIP). Initial Flood Insurance Studies (FISs) have been completed by FEMA for Racine County and all municipalities identified by FEMA as having flood hazards. This plan calls for the continued participation of Racine County and the municipalities in the NFIP. This plan also calls for the County or incorporated municipalities to request FEMA to revise, as necessary, the local flood insurance studies to reflect new flood hazard data when such data become available. This plan also calls for owners of property in Racine County to purchase flood insurance to provide some financial relief for losses sustained in floods that may occur in floodprone areas where no flood control measures are called for or in other floodprone areas before the implementation of any flood mitigation measures called for under the plan. As of April 2016, 339 flood insurance policies were in effect in Racine County. The average cost of a premium in Racine County was \$930 per year. Finally, as the flood control measures are implemented, this plan calls for FEMA to make the necessary revisions to the appropriate FISs. Participation in the NFIP by the communities in Racine County is summarized in Table 68.

FEMA has completed an update of the Racine County FIS as part of its Map Modernization program. The Map Modernization products include a countywide FIS and Digital Flood Insurance Rate Maps (DFIRM). The DFIRM uses an aerial photo base, and incorporates updated floodplain boundaries delineated by SEWRPC and others. The updated Racine County FIS and DFIRM became effective on May 2, 2012.

On November 13, 2012, initial FEMA Risk MAP program discovery meetings were held for the upper Fox River Watershed. This watershed encompasses portions of Kenosha, Racine, Walworth, and Waukesha Counties. Following this meeting, FEMA issued an initial discovery report.<sup>46</sup> Additional discovery meetings were held with communities in the watershed in February 2014. A final discovery report was issued to further reflect additional comments from the communities.<sup>47</sup> As part of the Risk MAP project, detailed studies are proposed for the mainstem of the Fox River and a portion of Eagle Creek in Racine County. As of October 2016, no decision has been made to fund DFIRM production for the upper Fox River watershed.

### ***Community Rating System***

The Community Rating System (CRS) is an additional program offered by FEMA as part of its 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 its residents. A high CRS ranking will offer citizens of that municipality reduced flood insurance premiums 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 moving forward. Technical assistance related to design and implementation of some activities associated with the program are available at no charge.

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<sup>46</sup> *Federal Emergency Management Agency, Discovery Report: Upper Fox River Watershed, HUC 07120006, March 26, 2013.*

<sup>47</sup> *Federal Emergency Management Agency, Discovery Report: Upper Fox River Watershed, HUC 07120006, November 5, 2014.*

Table 68

**PARTICIPATION IN THE NATIONAL FLOOD INSURANCE PROGRAM BY RACINE COUNTY JURISDICTIONS**

Civil Division	Participating in Racine County Hazard Mitigation Plan	Participating in National Flood Insurance Program	Date Initial Flood Hazard Boundary Map Identified	Date Initial Flood Insurance Rate Map (FIRM)	Current Effective Map Date	Entry Date into National Flood Insurance Program
<b>Cities</b>						
Burlington .....	Y	Y	10/05/1973	05/15/1978	05/02/2012	05/15/1978
Racine .....	Y	Y	--	06/01/1973	05/02/2012	06/01/1973
<b>Villages</b>						
Caledonia .....	Y	Y	--	04/01/1982	05/02/2012	12/05/2008
Elmwood Park .....	Y	N <sup>a</sup>	--	--	--	--
Mt. Pleasant .....	Y	Y	--	04/01/1982	05/02/2012	04/28/2008
North Bay .....	Y	N <sup>a</sup>	--	--	05/02/2012	09/06/1975
Rochester .....	Y	Y	01/09/1974	01/02/1981	05/02/2012	01/02/1981
Sturtevant .....	Y	Y	05/24/1974	06/04/1980	05/02/2012	04/08/2008
Union Grove .....	Y	Y	--	06/17/1986	05/02/2012	06/17/1986
Waterford.....	Y	Y	12/17/1973	01/02/1981	05/02/2012	01/02/1981
Wind Point .....	Y	Y	06/28/1974	09/30/1980	05/02/2012	09/30/1980
<b>Towns</b>						
Burlington .....	Y	Y	05/20/1977 <sup>b</sup>	04/01/1982 <sup>b</sup>	05/02/2012 <sup>b</sup>	04/01/1982 <sup>b</sup>
Dover.....	Y	Y	05/20/1977 <sup>b</sup>	04/01/1982 <sup>b</sup>	05/02/2012 <sup>b</sup>	04/01/1982 <sup>b</sup>
Norway .....	Y	Y	05/20/1977 <sup>b</sup>	04/01/1982 <sup>b</sup>	05/02/2012 <sup>b</sup>	04/01/1982 <sup>b</sup>
Raymond .....	Y	Y	05/20/1977 <sup>b</sup>	04/01/1982 <sup>b</sup>	05/02/2012 <sup>b</sup>	04/01/1982 <sup>b</sup>
Waterford.....	Y	Y	05/20/1977 <sup>b</sup>	04/01/1982 <sup>b</sup>	05/02/2012 <sup>b</sup>	04/01/1982 <sup>b</sup>
Yorkville.....	Y	Y	05/20/1977 <sup>b</sup>	04/01/1982 <sup>b</sup>	05/02/2012 <sup>b</sup>	04/01/1982 <sup>b</sup>
<b>County</b>						
Racine County.....	Y	Y	05/20/1977	04/01/1982	05/02/2012	04/01/1982

<sup>a</sup>There are no floodplains mapped in the Villages of Elmwood Park and North Bay.

<sup>b</sup>In Wisconsin, towns are covered under county eligibility in the National Flood Insurance Program.

Source: Federal Emergency Manage

There are currently no communities in Racine County that participate 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 would be eligible for premium discounts under Racine County’s potential 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 floodprone status of properties before mortgage transactions. 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 Federal flood insurance studies. 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 being sold in accord with rules of Wisconsin Department of Safety and Professional Services.

***Stream Channel Maintenance***

This plan calls for Racine County and local municipalities and drainage districts to work cooperatively to continue and expand programs for regular stream channel maintenance within their respective jurisdictions. These programs would include the periodic removal of sediment deposits, selected heavy vegetation, and debris from all watercourses in the County, including bridge openings and culverts, subject to obtaining any necessary local and State permits.



### ***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 procedures include the periodic repair of storm sewers, clearing of sewer obstructions, maintenance of open channel vegetation, clearing debris and sediment from open channels, maintenance 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 measures and to protect the capital investment in the facilities.

### ***Dam Safety***

The increasing age of dams escalates the need to ensure dam owners understand their responsibilities and the risk a dam can pose to surrounding properties and infrastructure. The best method of avoiding a hazard situation involving a dam is proper operation, maintenance, and inspection. The owner of any sized dam should inspect their dam on a regular basis, including during and after any high water event. The inspection should look for any changes that may indicate the need for repairs or the existence of serious deficiencies that could lead to failure of the dam.<sup>48</sup> The owners of large dams are required by law to hire an experienced professional to inspect their dams on a recurring basis depending on the hazard rating. High hazard large dams require inspection every two years, significant hazard large dams require inspection every three to four years, and low hazard large dams require inspection every ten years.

Emergency action plans are required for all new and existing dams that meet the large dam criteria or pose a threat to life and property.<sup>49</sup> These plans should address the coordination of necessary actions by the dam owner and the responsible local, State, and Federal emergency organizations and provide for timely notification, warning and evacuation in the event of an emergency at the dam. An emergency action plan must be developed in conjunction with the local community and emergency management agency and then be submitted to the WDNR Dam Safety staff for review and approval. These plans should be reviewed and updated regularly to reflect current conditions of the dam and the surrounding area.

In cases where private dams are old, unsafe, or unwanted, or where dam owners are unable to provide proper maintenance, the dam should be considered for removal. The 2015-2017 Wisconsin biennial budget provided \$500,000 to fund dam removal projects for any owner who wishes to remove their dam. The Dam Removal Grant Program provides reimbursement for 100 percent of eligible project costs up to a maximum of \$50,000 to remove a dam.<sup>50</sup>

### ***Survey of Buildings in and Near the One-Percent-Annual-Probability Floodplain***

The extent of the one-percent-annual-probability floodplain has been delineated on the Racine County large-scale topographic maps, and much of that information is reflected on the FEMA 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 regards to establishing building grades. Thus, this plan calls for Racine 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 remaining in or near the one-percent-annual-probability floodplain after

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<sup>48</sup> The WDNR has information detailing how the owner of a dam should inspect their dam. This information can be found at <http://dnr.wi.gov/topic/Dams/InspectionOwner.html>.

<sup>49</sup> Information regarding emergency action plans for dam failures, including a guide to writing an emergency action plan can be found at the WDNR website at <http://dnr.wi.gov/topic/dams/documentsEAP.html>

<sup>50</sup> Information regarding the Wisconsin Dam Removal Grant Program can be found on the WDNR website at <http://dnr.wi.gov/Aid/DamRemoval.html>

all other structural floodland management plan elements called for in this plan have been implemented, and at such time that flood mitigation activities are being considered for those buildings remaining in the 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 floodproofing or structure removal options. It should be noted that where LiDAR<sup>51</sup> topographic data are available applicants for Letters of Map Amendment (LOMA) may submit LiDAR data to FEMA in lieu of a certified elevation study by a professional engineer or land surveyor provided that certain standards are met.<sup>52</sup> This may allow for a more definitive assessment of a structure's flood hazard status to be obtained at a lower cost.

A review of the Letters of Map Change (LOMC) information on the FEMA website reveals that 208 LOMC have been revalidated for Racine County cases from 1992 to 2012. LOMC include two categories; Letters of Map Amendment (LOMA) and Letters of Map Revision (LOMR). LOMA include those cases that have completed a survey and under existing conditions are above the one-percent-annual-probability floodplain. In Racine County 120 cases have effective LOMA from 2012 to 2016. There is currently one LOMR in Racine County. This LOMR covers a portion of Spring Brook in the City of Burlington.

## **HAZARD MITIGATION PLAN COMPONENT FOR THUNDERSTORM WIND, NON-THUNDERSTORM HIGH-WIND, HAIL, AND LIGHTNING HAZARDS**

As described in Chapter IV, thunderstorm winds, non-thunderstorm high-winds, hail, and lightning are natural hazard events of significant concern to be considered in the Racine County hazard mitigation plan. This section describes alternate and selected strategies to mitigate these types of hazards. As part of the updating process, these strategies were reviewed and reevaluated by the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

### **Identification of Alternative Mitigation Strategies**

All thunderstorm related hazards and non-thunderstorm high-wind events are potentially dangerous and are the most common type of severe weather event compared to other natural hazards within Racine County as discussed in Chapter IV. About 10 percent of the thunderstorms and related hazard events that occur each year within Racine County are classified as severe. Severe thunderstorm fronts can often be tracked, which generally provides ample warning for potentially affected areas to take preventative actions. In addition, when severe thunderstorms and related hazard events occur, they generally last for short periods of time.

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 wind storms 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. During a hail storm personal safety is the first priority and persons 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.

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<sup>51</sup> *LiDAR stands for Light Imaging, Detection, and Ranging.*

<sup>52</sup> *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.*

Personal protection is paramount for lightning safety—many people incur 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 his/her personal safety and should take appropriate action when threatened by lightning.

Through review by the Racine County Hazard Mitigation Plan Local Planning Team, the following measures to reduce vulnerability to thunderstorm winds, non-thunderstorm high-winds, hail, and lightning have been identified as viable for the County hazard mitigation plan.

### ***Nonstructural***

- Review local building codes to determine if revisions are needed to improve the ability of structures to withstand greater wind velocities and impacts from hail;<sup>53</sup>
- Local fire departments should obtain and maintain equipment to help detect or mitigate lightning-related fires, such as thermal imaging devices;
- Enforce existing local ordinances requiring adequate grounding of newly constructed buildings;
- Continue the County’s participation in the National Weather Service’s (NWS) StormReady® program.<sup>54</sup> Requirements for this program include:
  - Establishing a 24-hour warning point and emergency operations center,
  - Having multiple ways to receive severe weather warnings and forecasts to alert the public,
  - Promoting the importance of public readiness through community seminars, and
  - Developing a formal hazardous weather plan, which includes training severe weather spotters and holding emergency exercises;
- Provide annual access to SKYWARN weather spotter training<sup>55</sup>;
- Ensure that mobile and manufactured housing is securely anchored; and
- Encourage agricultural producers to purchase crop insurance.

### ***Structural***

- Maintain, update, and upgrade public early warning systems and networks. Consider expanding such systems as necessary. Desirable characteristics of a robust early warning system include:

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<sup>53</sup> *The State Uniform Dwelling Code (UDC) is a statewide regulation that sets standards for fire safety, structural strength, energy conservation, erosion control, heating, plumbing and electrical systems, and general health and safety in dwellings constructed or altered after 1980. The UDC applies uniformly throughout the State, and local governments may not adopt a more or less stringent code. Consequently, should review of local ordinances reveal that a change in the building code would be a viable mitigation measure, the County and the municipalities within it would need to pursue a change in the UDC at the State level.*

<sup>54</sup> *More information on the NWS StormReady program can be found at <http://www.stormready.noaa.gov/>*

<sup>55</sup> *SKYWARN is a National Weather Service program consisting of a network of trained severe storm spotters who make reports of severe weather to their local NWS offices.*

- Employing multiple means of communication to alert people of the imminent threat of severe weather. Examples of such means of communication include providing warnings and/or information through outdoor warning systems, broadcast media, cable and satellite media, electronic mail, SMS (text) messaging, social media, reverse-911 telephony, and apps for mobile devices, and
- Being capable of reaching vulnerable segments of the population;
- Trim and maintain the health of trees near vulnerable infrastructure, such as utility lines, essential facilities and roads, as well as near homes and businesses. Communities should prepare for emerald ash borer infestation by developing a funding strategy for removal of infested ash trees. A well planned response can minimize the impact of infestation, reduce liability, and lessen the overall cost to a community. Ash trees should be removed at the first sign of infestation of the emerald ash borer;
- Promote planting windbreaks for farm crops;
- Work with municipalities and businesses to explore installation of community safe rooms and hardening projects<sup>56</sup> for community facilities, businesses, and manufacturers. Priority should be considered for those facilities that are located in slab-on-grade structures and for those projects that can be completed as part of a newly planned building or building expansion;
- Provide model mobile home park regulations to municipalities for their consideration which require that community safe rooms (storm shelters) be provided for residents of new and expanding mobile home parks. Based on community and landowner interest, pursue grant funding for installation of community safe rooms in existing mobile home parks;
- Bury and protect power and utility lines;
- Encourage the use of surge protectors on critical electronic equipment;
- Install lightning grade surge protection devices for critical electronic components used by government, public service, and public safety facilities, such as warning systems, control systems, communications, and computers; and
- Promote emergency back-up power at critical facilities.

### ***Public Informational 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. Such educational efforts should include promoting public awareness of proven lightning safety guidelines to reduce the risk of lightning hazards and the potential severity of hailstorms;
- Encourage residents to purchase NOAA All Hazards Weather Radios and register for emergency alert services such as CodeRED® and emergency preparedness and damage reporting mobile apps such as Ready Badger;
- Promote inclusion of safety strategies for severe weather events in driver education classes and materials;

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<sup>56</sup> FEMA defines “hardening” as project-specific specialized design and construction methods which are applied to one or more rooms within a building and/or to an entire building envelope to allow portions of and/or the entire structure to resist wind pressures and windborne debris impacts during an extreme wind event and are capable of providing life-safety protection to the occupants of the room or structure.

- Encourage residents to develop a Family Emergency Preparedness Plan that include the preparation of a Disaster Supply Kit (see Appendix F);
- Produce and distribute emergency preparedness information related to thunderstorm related and high-wind hazards; and

## **Current Programs**

### ***Federal and State Programs***

The National Weather Service issues severe thunderstorm warnings, watches and advisories when there is a threat of severe weather conditions. Several categories of warnings, watches, and advisories apply to hazards related to thunderstorms and non-thunderstorm high-wind events. The NWS Milwaukee/Sullivan office will issue a severe thunderstorm warning when either a spotter reports a thunderstorm producing winds that equal or exceed 58 miles per hour (mph) or hail of one inch or larger in diameter or a severe thunderstorm is detected by Doppler radar. 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 high wind warning when sustained winds of 40 mph are expected to occur for an hour or more or 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 or wind gusts of 45 mph to 57 mph or more are expected to occur. The office also issues a variety of wind related marine warnings for events in Lake Michigan.

Federal and State programs include awareness and education efforts. The National Weather Service also has an extensive public information program to educate people about the dangers of thunderstorms and related hazards and assist in preventing related deaths and injuries. WEM, in conjunction with the National Weather Service and State and local government agencies, provides both preparedness information and severe weather information to the public. 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 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.<sup>57</sup> Similarly, WEM has produced several educational resources regarding thunderstorms and related hazards including prerecorded radio and public service announcements, scripts for radio public service announcements, fliers, and educational materials for children.<sup>58</sup> In addition, numerous other organizations, including the American Red Cross, provide public safety information regarding lightning.

### ***Local Programs***

Programs within Racine County include those conducted by the Racine County Office of Emergency Management. The Racine County Office of Emergency Management has a number of brochures, booklets, and pamphlets available for the public on severe weather safety and other general emergency management-related topics. In addition, the Ready Racine County website contains factsheets listing specific information regarding what to do in the event of a tornado watch or warning as well as what residents can do before, during, and after, in the event that a severe thunderstorm was to occur in their area. The Racine County Office of Emergency Management also participates in all State sponsored severe weather awareness campaigns. In addition, a number of local emergency management and fire departments have instituted educational programs and communications on public safety.

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<sup>57</sup> *Wisconsin Department of Health Services, Wisconsin Severe Thunderstorm and Tornadoes Toolkit, Publication P01037, June 2015.*

<sup>58</sup> *These can be accessed at Wisconsin Emergency Management's ReadyWisconsin website located at: [http://ready.wi.gov/Resources/Manager\\_Resources.asp](http://ready.wi.gov/Resources/Manager_Resources.asp).*

Racine County currently relies on NOAA Weather Radio for severe thunderstorm and related hazard warnings and encourages all of the local citizens to have a weather radio. In 2002, NOAA Weather Radio installed a new transmitter at CTH KR and Wood Road in Racine County (frequency is 162.450 megahertz). This transmitter covers both Racine and Kenosha Counties. 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 non-weather emergency messages through the National Weather Service’s HAZCollect system.

In partnership with the City of Racine, Racine County has implemented the CodeRED® Emergency and Weather Notification System to deliver customized prerecorded messages directly to homes and businesses, or to persons traveling through the County via the free mobile app. This service uses a high-speed telephone calling system to call a phone number in the CodeRED® database, alerting users of significant incidents and events where timely notification of an affected population or geographic area is essential. The pre-recorded message may also provide instructions for action to be taken. Messages will only be sent to individuals and businesses that have registered their home, business, or cellular phone number with the service.<sup>59</sup> Racine County residents who sign up for the additional CodeRED® Weather Warning will automatically receive calls when tornado, flash flood, and severe thunderstorm warnings are issued by the National Weather Service for addresses that are in the path of the storm.

In addition, the County has the capability to issue emergency alerts to cell phones through the Wireless Emergency Alerts (WEA) system. The WEA is a partnership including local and state public safety agencies, FEMA, the Federal Communications Commission (FCC), the Department of Homeland Security (DHS) and the National Weather Service (NWS). With WEA, authorized County officials can send emergency messages to mobile devices of those that may be in harm’s way without the need to download an app or subscribe to a service. WEAs are broadcast from area cell towers to mobile devices only in the specific area where there is a danger. These short messages are designed to get the recipient’s attention in a critical situation and will look like a text message that will show the type and time of the alert, any action that recipients should take, and the agency issuing the alert. The WEA message will include a special tone and vibration that will be repeated twice. WEA will send alerts for extreme weather warnings, local emergencies requiring evacuation or immediate action, AMBER Alerts, and Presidential alerts during a national emergency. Although the WEA does not issue alerts for severe thunderstorms, the service will alert for tornado, flash flood, and extreme wind warnings that are often associated with severe thunderstorms.

Finally, County emergency management representatives from Southeast Wisconsin have worked with the computer science students from the University of Wisconsin-Parkside’s “App Factory” to develop the Ready Badger app for wireless devices.<sup>60</sup> 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. 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.

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<sup>59</sup> *County residents can register for the CodeRED® service at <https://public.coderedweb.com/cne/en-US/42B2D9DB5844>.*

<sup>60</sup> *The Ready Badger app can be downloaded for free in the Apple App Store and Android Google Play Store.*

As described in Chapter II, Racine County has developed a comprehensive emergency management plan 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 which complement the County plan and which also set forth procedures and actions to deal with a range of situations and events, including thunderstorms, high-wind, and hail events.

Analysis of the vulnerability of humans, infrastructure, and economic production to thunderstorm related hazard events and non-thunderstorm high-wind events demonstrates that the provision of advanced warning systems, as well as public informational and educational programming, are the most important mitigation actions to be considered. Racine County contains a total of 24 warning and communication siren systems, with 14 located within the City of Racine; three within the City of Burlington; two each within the Villages of Sturtevant, Waterford, and Union Grove; and one within the Town of Waterford. These sirens are regularly tested and maintained. New battery powered emergency sirens were installed at two sites in the City of Racine and the electronics on two sirens in the Village of Union Grove were upgraded since the last plan update.

Racine County was redesignated by the National Weather Service as a StormReady® community in 2015. This designation is valid for three years. StormReady® is a national community preparedness program that uses a grassroots approach to help communities develop plans to handle all types of severe weather. In general, a community must possess a solid communication network and provide verification of its multi-hazard emergency operations plan to qualify for this designation. Specifically, to become StormReady® a community must:

- Establish a 24-hour warning point and emergency operations center;
- Have multiple methods to receive and disseminate severe weather warnings and information for their community;
- Have various methods to monitor weather conditions locally;
- Promote the importance of public readiness; and
- Develop a formal hazardous weather action plan, including severe weather spotter training and drills.

### **Evaluation of Alternatives and Identification of Mitigation Actions**

Based upon review of the above by the Racine County Hazard Mitigation Plan Local Planning Team as part of the updating process, refinement and expansion of current ongoing programs continues to 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 be considered as areas needing outdoor warning systems. In addition, informing the public of the significance of thunderstorm watches and warnings so that they take thunderstorm warnings and related hazards seriously and know where to seek shelter in emergency situations, is an important, ongoing component 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.

Promoting the provision of adequate safe places for people to seek shelter during severe storms constitutes an additional approach to mitigating some impacts of severe storms in Racine County. Residents of mobile 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.

Similarly, severe storm events can cause economic losses especially to agricultural producers through damage to crops. Providing agricultural producers with information regarding Federal crop insurance programs and encouraging them to purchase crop insurance constitutes a means of providing them with some protection against such losses.

Finally, other feasible, nonstructural and structural mitigation actions include surge protection for sensitive electronic equipment; and other precautions that will limit possible future bodily injuries, deaths, or property damages due to severe weather events. The majority of these measures are currently in place, indicating an emphasis on informational programming and enforcement.

### **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 and/or high winds. Hence, Racine County, municipalities, and relevant businesses 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 Racine County Office of Emergency Management and coordinated local community emergency operations programs and should be continued.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation, consideration of risk (see Appendix G), and review and action by the Racine County Hazard Mitigation Plan Local Planning Team as a part of the updating process (see Appendix A), the following mitigation measures related to thunderstorm wind, non-thunderstorm high-wind, hail, and lightning events are included in the Racine County hazard mitigation plan:

- Maintain, update, and further develop the early warning and communication systems including coverage of NOAA All Hazard Weather Radios; Emergency Alert System (EAS) capabilities; and emerging technologies, such as the County's targeted Wireless Emergency Alerts (WEA) system, the CodeRED® Emergency and Weather Notification System, and the Ready Badger emergency preparedness and damage reporting app;
- Promote educational and informational programming, especially related to the early warning network, including NOAA All Hazard Weather Radio, EAS broadcasts, WEA system, the CodeRED® Emergency and Weather Notification System, and the Ready Badger app;
- Encourage residents to develop a Family Emergency Preparedness Plan including the preparation of a Disaster Supply Kit (see Appendix F);
- Encourage the provision of safe rooms for public buildings, major industrial sites, mobile home parks, and other large businesses or complexes such as shopping malls, fairgrounds, and other vulnerable public areas. Approaches to achieve this recommendation may include:
  - Working with municipalities and businesses to explore installation of community safe rooms and hardening projects for community facilities, businesses, and manufacturers,
  - Consideration by municipalities of adopting model mobile home park regulations which require that community safe rooms be provided for residents of new and expanding mobile home parks, and
  - Based on community and landowner interest, pursue grant funding for installation of community safe rooms in existing mobile home parks;
- Provide annual access to SKYWARN weather spotter training;
- Encourage agricultural producers to purchase crop insurance; and
- Continued coordination of emergency operations and response plans among governmental units and first responders.



The Local Planning Team decided to add the above listed components related to safe rooms and crop insurance to the hazard mitigation plan. Because the remaining measures are intended to be ongoing efforts, the Local Planning Team decided to retain them in the updated plan.

## **HAZARD MITIGATION PLAN COMPONENT FOR TORNADOES**

As described in Chapter IV, tornadoes are natural hazard events of moderate concern to be considered in this update of the Racine County hazard mitigation plan. This section describes alternate and selected strategies to mitigate these types of hazards. As part of the updating process, these strategies were reviewed and reevaluated by the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

### **Identification of Alternative Mitigation Strategies**

All tornadoes are potentially dangerous hazards within Racine County as discussed in Chapter IV. However, tornadoes have been shown to impact Racine County about once every two to three years and these are most likely to be an EF1 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.

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 and related hazards wherever they may occur in the County. Based upon review by the Racine County Hazard Mitigation Plan Local Planning Team as part of the updating process, the following measures to reduce vulnerability to tornadoes have been identified as viable for this update of the Racine County hazard mitigation plan.

### ***Nonstructural***

- Review local building codes to determine if revisions are needed to improve the ability of structures to withstand greater wind velocities;<sup>61</sup>
- Conduct of an inventory and inspection of facilities to ensure the quality, quantity, and accessibility of adequate tornado shelters;
- Continue the County's participation in the National Weather Service's (NWS) StormReady® program.<sup>62</sup>
- Provide annual access to SKYWARN weather spotter training;
- Organize a local tornado spotter network;
- Ensure that mobile and manufactured housing is securely anchored; and
- Establish safe and appropriate locations for temporary debris disposal sites.

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<sup>61</sup> *The State Uniform Dwelling Code (UDC) is a statewide regulation that sets standards for fire safety, structural strength, energy conservation, erosion control, heating, plumbing and electrical systems, and general health and safety in dwellings constructed or altered after 1980. The UDC applies uniformly throughout the State, and local governments may not adopt a more or less stringent code. Consequently, should review of local ordinances reveal that a change in the building code would be a viable mitigation measure, the County and the municipalities within it would need to pursue a change in the UDC at the State level.*

<sup>62</sup> *More information on the NWS StormReady program can be found at <http://www.stormready.noaa.gov/>*

## ***Structural***

- Maintain, update, and upgrade public early warning systems and networks. Consider expanding such networks as necessary. Desirable characteristics of a robust early warning system include:
  - Employing multiple means of communication to alert people of the imminent threat of severe weather. Examples of such means of communication include providing warnings and/or information through outdoor warning systems, broadcast media, cable and satellite media, electronic mail, SMS messaging, social media, apps for mobile devices, and reverse-911 telephony; and
  - Being capable of reaching vulnerable segments of the population;
- Retrofit existing or install new structures to ensure adequate shelters from tornadoes for public buildings, major industrial sites, mobile home parks, and other large businesses or complexes such as shopping malls, fairgrounds, and other vulnerable public areas;
- Work with municipalities and businesses to explore installation of community safe rooms and hardening projects<sup>63</sup> for community facilities, businesses, and manufacturers. Priority should be considered for those facilities that are located in a slab-on-grade structure and for those projects that can be completed as part of a newly planned building or building expansion;
- 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 landowner interest, pursue grant funding for installation of community safe rooms in existing mobile home parks;
- Trim and maintain the health of trees near vulnerable infrastructure, such as utility lines, essential facilities and roads, as well as near homes and businesses. Communities should prepare for emerald ash borer infestation by developing a funding strategy for removal of infested ash trees. A well planned response can minimize the impact of infestation, reduce liability, and lessen the overall cost to a community. Ash trees should be removed at the first sign of infestation of the emerald ash borer; and
- Bury and protect power and utility lines.

## ***Public Informational and Educational Programming***

- Increase public education and awareness of the potential severity of tornados;
- Encourage residents to purchase NOAA All Hazards Weather Radios and register for emergency alert services such as CodeRED® and emergency preparedness and damage reporting mobile apps such as Ready Badger;
- Promote inclusion of safety strategies for severe weather events in driver education classes and materials;
- Encourage residents to develop a Family Emergency Preparedness Plan which would include the preparation of a Disaster Supply Kit (see Appendix F); and
- Produce and distribute emergency preparedness information related to tornado hazards.

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<sup>63</sup> FEMA defines “hardening” as project-specific specialized design and construction methods which are applied to one or more rooms within a building and/or to an entire building envelope to allow portions of and/or entire structure to resist wind pressures and windborne debris impacts during an extreme wind event and are capable of providing life-safety protection to the occupants of the room or structure.

## **Current Programs**

### ***Federal and State Programs***

The National Weather Service issues warnings, watches, and advisories when there is a threat of severe weather conditions. The National Weather Service 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 educational activities. The National Weather Service has an extensive public information program to educate people about the dangers of tornadoes and related hazards and assist in preventing related deaths and injuries. WEM, in conjunction with the National Weather Service and State and local government agencies, provides both preparedness information and severe weather information to the public. 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 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.<sup>64</sup> 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.<sup>65</sup> In addition, numerous other organizations, including the American Red Cross, provide public safety information regarding tornadoes.

### ***Local Programs***

The Racine County Office of Emergency Management has a number of brochures, booklets, and pamphlets available for the public on tornado safety and other general emergency management-related topics. In addition, the Ready Racine County website contains factsheets listing specific information regarding what to do in the event of a tornado watch or warning as well as what residents can do before, during, and after, in the event that a tornado occurs in their area. A number of local emergency management and fire departments have also instituted educational programs and communications on public safety. The Racine County Office of Emergency Management participates in all State sponsored severe weather awareness campaigns.

Racine County has undertaken a tornado shelter assessment of the public and nonpublic schools within the County. As a result of the assessment, school officials will be able to develop or revise emergency procedures and plans, and initiate educational programs. The County is active in promoting mitigation through events such as safety fairs and workshops. The County has produced a coloring book to teach children how to stay safe during a natural hazard event. In addition, in 2000, the Housing Authority of Racine County in partnership with Racine County built a Safe Room in a new home. In this unique partnership, the County of Racine donated the vacant parcel to the Housing Authority of Racine County, a nonprofit organization that builds homes for certain first-time buyers. The County worked with the local technical college to conduct a survey of selected County residents to determine resident's opinions, attitude and preparedness in the event of a disaster within the County. The information gathered from the survey was used to develop public awareness campaigns as well as other hazard mitigation planning-related efforts.

Racine County currently relies on NOAA Weather Radio for tornado and related hazard warnings and encourages all local citizens to have a weather radio. In 2002, NOAA Weather Radio installed a new transmitter at CTH KR and Wood Road in Racine County (frequency is 162.450 megahertz), which covers both Racine and Kenosha Counties. In addition, tornado and related hazard warnings from NOAA Weather Radio are relayed to other media via the

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<sup>64</sup> *Wisconsin Department of Health Services, Wisconsin Severe Thunderstorm and Tornadoes Toolkit, op. cit.*

<sup>65</sup> *These can be accessed at Wisconsin Emergency Management's ReadyWisconsin website located at: [http://ready.wi.gov/Resources/Manager\\_Resources.asp](http://ready.wi.gov/Resources/Manager_Resources.asp).*

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 tones. 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.

A variety of methods are used to warn people in Racine County of emergency situations, including tornadoes. These warning systems are described in the section of this chapter related to thunderstorm wind, non-thunderstorm high-winds, hail, and lightning hazards.

As described in Chapter II, Racine County has developed a comprehensive emergency management plan 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 which complement the County plan and which also set forth procedures and actions to deal with a range of situations and events, including tornado and related hazard events.

Analysis of the vulnerability of humans, infrastructure, and economic production to tornadoes and related hazard events demonstrates that the provision of advanced warning systems; availability of adequate shelters for public buildings, major industrial sites, and other large businesses or complexes such as shopping malls; as well as public informational and educational programming are the most important mitigation actions to be considered. Racine County contains a total of 24 warning and communication siren systems, with 14 located within the City of Racine; three within the City of Burlington; two each within the Villages of Sturtevant, Waterford, and Union Grove; and one within the Town of Waterford. These sirens are regularly tested and maintained. New battery powered emergency sirens were installed at two sites in the City of Racine and the electronics on two of the sirens in the Village of Union Grove were upgraded since the last plan update.

Racine County was redesignated by the National Weather Service as a StormReady® community in 2015. This designation is valid for three years. The program is described in the previous section on hazard mitigation plan components for thunderstorm wind, non-thunderstorm high-wind high-wind, hail, and lightning hazards.

### **Evaluation of Alternatives and Identification of Mitigation Actions**

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 be considered as needing early outdoor 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 Racine County. Residents of mobile home parks, in particular, 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 tornadoes to 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, nonstructural and structural mitigation actions include incorporation of wind resistant construction methods for the protection of buildings and infrastructure; and other precautions that will limit possible future bodily injuries, deaths, or property damages due to tornado and related hazard events.

### **Multi-Jurisdictional Considerations**

Tornadoes 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, as well as destroyed buildings from high winds. Hence, Racine County, municipalities, and relevant businesses 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 coordinated emergency management planning program involving the Racine County Office of Emergency Management and coordinated local community emergency operations programs.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation, consideration of risk (see Appendix G), and review and action by the Racine County Hazard Mitigation Plan Local Planning Team (see Appendix A), the following mitigation measures related to tornado hazard events are included in the updated Racine County hazards mitigation plan:

- Maintain, update, and further develop the early warning and communication systems including coverage of NOAA All Hazard Weather Radios; Emergency Alert System (EAS) capabilities; and emerging technologies, such as the County's targeted Wireless Emergency Alerts (WEA) system, the CodeRED® Emergency and Weather Notification System, and the Ready Badger emergency preparedness and damage reporting app;
- Promote educational and informational programming, especially related to the early warning network, including NOAA All Hazard Weather Radio, EAS broadcasts, WEA system, the CodeRED® Emergency and Weather Notification System, and the Ready Badger app;
- Encourage residents to develop a Family Emergency Preparedness Plan including the preparation of a Disaster Supply Kit (see Appendix F);
- Encourage the provision of safe rooms for public buildings, major industrial sites, mobile home parks, and other large businesses or complexes such as shopping malls, fairgrounds, and other vulnerable public areas. Approaches to achieve this recommendation may include:
  - Working with municipalities and businesses to explore installation of community safe rooms and hardening projects for community facilities, businesses, and manufacturers,
  - Consideration by municipalities of adopting model mobile home park regulations which require that community safe rooms be provided for residents of new and expanding mobile home parks, and
  - Based on community and landowner interest, pursue grant funding for installation of community safe rooms in existing mobile home parks;
- Provide annual access to SKYWARN weather spotter training;
- Encourage agricultural producers to purchase crop insurance;
- Enforcement of building code ordinance requirements; and
- Continue coordination of emergency response and operations plans among governmental units and first responders.

Because these measures are intended to be ongoing efforts, the Local Planning Team decided to retain them in the updated plan.

## HAZARD MITIGATION PLAN COMPONENT FOR EXTREME TEMPERATURE

As described in Chapter IV, extreme temperatures are natural hazard events of moderate concern to be considered in the Racine County hazard mitigation plan. This section describes alternate and selected strategies to mitigate these types of hazards. As part of the updating process, these strategies were reviewed and reevaluated by the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

### Identification of Alternative Mitigation Strategies

Extreme temperature events pose a serious threat to Racine County and should be expected with each summer and winter season. 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 temperature extreme events do occur, they commonly last for extended periods of time (days or weeks) and impact entire areas larger than Racine County.

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 large urbanized areas of the County. Demographically, the elderly, debilitated, mentally ill, poor, and homeless are most vulnerable to excessive heat and cold. Fatalities are usually related to age because excessive heat is stressful 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 Racine County Hazard Mitigation Plan Local Planning Team as part of the updating process, the following measures to reduce vulnerability to extreme temperature events have been identified as viable for this update of the Racine County hazard mitigation plan.

### *Nonstructural*

- Maintain, update, and upgrade public early warning systems and networks. Consider expanding such networks as necessary. Desirable characteristics of a robust early warning system include:
  - Employing multiple means of communication to alert people of the imminent threat of extreme temperatures. Examples of such means of communication include providing warnings and/or information through outdoor warning systems, broadcast media, cable and satellite media, electronic mail, SMS messaging, social media, apps for mobile devices, and reverse-911 telephone calls; and
  - Being capable of reaching vulnerable segments of the population; and
- Organize neighborhood outreach groups who look after vulnerable groups and individuals;
- Continue to provide special arrangements for payment of heating bills;
- Designate sites to be used as public cooling/heating shelters during extreme temperature events. In addition:
  - Conduct an inventory and inspection of these facilities to ensure their quality, quantity, and accessibility for use as heating and/or cooling shelters;
  - Extend hours at these sites during extreme temperature events, and
  - Promote transportation options to assist members of highly vulnerable populations to reach these sites during extreme temperature events;
- Reschedule public events to avoid large outdoor gatherings during periods of extreme heat or cold;
- Extend public swimming pool hours during extreme heat events;
- 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; and

- Promote and expand winter weather clothing drives (coats, hats, mittens) where people can drop off unused winter clothing for distribution to vulnerable populations.

### ***Structural***

- Promote measures to reduce heat island effects in urban areas. Examples of such measures include:
  - Increase the amount of green space throughout urban areas;
  - Increase tree plantings around buildings, parking lots, and along public right-of-ways to shade surfaces that contribute to heat island formation; and
  - Encourage the use of “cool roofing” products made of highly reflective and emissive materials.

### ***Public Informational 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;
- Encourage residents to purchase NOAA All Hazards Weather Radios and register for emergency alert services such as CodeRED® and emergency preparedness and damage reporting mobile apps such as Ready Badger;
- Increase awareness of public cooling/heating shelters that are available during extreme heat and cold events. Post the locations of these shelters online, in newsletters, and on the Ready Badger app; and
- Produce and distribute emergency preparedness information related to the safe operation of generators, space heaters, fireplaces, and wood stoves.

## **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 extreme temperature conditions and associated hazards. The NWS Milwaukee/Sullivan office will issue an excessive heat warning when daytime high temperatures of 105°F or higher and night time temperatures of 75°F or higher are expected to occur over a 48-hour period or when high temperatures of 100°F or more are expected over four or more consecutive days. The office will issue a heat advisory when daytime high temperatures of 100°F or higher are expected or when daytime high temperatures are expected between 95°F and 99°F for four or more consecutive days. The NWS office will issue wind chill warnings for Racine County when wind chill values reach -35°F or colder, with wind speeds of at least four mph that are expected to occur for three hours or more. A wind chill advisory is issued when wind chill values will reach -20°F to -34°F, with wind speeds of 4 mph or more.

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 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, provides both preparedness information 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 has developed an extreme heat toolkit to provide information to local governments, health departments, and citizens in Wisconsin about preparing for and responding to extreme heat events.<sup>66</sup> Similarly, the Department has developed a winter weather toolkit to provide information about winter weather, including extreme cold.<sup>67</sup> 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.<sup>68</sup> In addition, numerous other organizations, such as the American Red Cross, provide public safety information.

### ***Local Programs***

Programs within Racine County include those conducted by the Racine County Office of Emergency Management. The Racine County Office of Emergency Management has information available for the public on extreme temperatures and other general emergency management-related topics, and also participates in all State sponsored severe weather awareness campaigns. The City of Racine Health Department and the Central Racine County Health Department maintain a list of warming centers and cooling centers available throughout the County that provide safe environments to prevent adverse effects from extreme temperatures (see Appendix H). Individuals are encouraged to contact the specific location to verify their operating hours before visiting. During extreme heat events, some locations may have extended hours.

Racine County was redesignated by the National Weather Service as a StormReady® community in 2015. This designation is valid for three years. This program, which includes actions related to extreme temperature conditions, is described in the section above on hazard mitigation plan components for thunderstorm, high-wind, hail, and lightning hazards.

A variety of methods are used to warn people in Racine County of emergency situations, including extreme temperatures. These warning systems are described in the section of this chapter related to thunderstorm wind, non-thunderstorm high-winds, hail, and lightning hazards.

As described in Chapter II, Racine County has developed a comprehensive emergency management plan 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 which complement the County plan and which also set forth procedures and actions to deal with a range of situations and events, including extreme temperature hazard events.

### **Evaluation of Alternatives and Identification of Mitigation Actions**

Based upon review of the above, the current ongoing informational and educational programs represent a major component of the planned mitigation action. Racine County should promote basic strategies to reduce injuries and fatalities; hazard awareness, and community involvement. Temperature hazards are faced by Racine County residents annually and the ability to make positive decisions concerning exposure limits will depend on safety

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<sup>66</sup> Wisconsin Department of Health Services, Wisconsin Extreme Heat Toolkit, Publication P00632, March 2014.

<sup>67</sup> Wisconsin Department of Health Services, Wisconsin Winter Weather Toolkit, Publication P00652, April 2014.

<sup>68</sup> These can be accessed at Wisconsin Emergency Management's ReadyWisconsin website located at: [http://ready.wi.gov/Resources/Manager\\_Resources.asp](http://ready.wi.gov/Resources/Manager_Resources.asp).



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; availability of adequate shelter from the heat and cold in public buildings, major industrial sites, and other large businesses or complexes such as shopping malls; and public informational and educational programming are the most important mitigation actions to be considered. Public service announcements regarding avoiding heat stress help to minimize exposure. Racine County supports measures presently implemented by the National Weather Service; national, State, and local health organizations; and the media preceding and during excessively hot 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 heating and cooling shelters within the County is also an important component to keeping these vulnerable populations safe. Community and school-based informational programs should also continue to be conducted by the County in partnership with Federal, State and local authorities.

### **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. A coordinated effort involving the Racine County Office of Emergency Management and local community emergency operations programs will be needed to identify and protect individuals vulnerable to temperature-related hazards.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation, consideration of risk (see Appendix G), and review and action by the Racine County Hazard Mitigation Plan Local Planning Team (see Appendix A), the following mitigation measures related to extreme temperature events are included in the updated hazard mitigation plan for Racine County:

- Organize neighborhood outreach groups who look after vulnerable groups and individuals;
- Designate sites to be used as public cooling/heating shelters during extreme temperature events. In addition:
  - At the request of the sites' owners, conduct inventories and inspections of these facilities to ensure their quality, quantity, and accessibility for use as heating and/or cooling shelters,
  - Encourage the sites' owners to extend hours at these sites during extreme temperature events, and
  - Promote transportation options to assist members of highly vulnerable populations to reach these sites during extreme temperature events;
- Increase awareness of public cooling/heating shelters that are available during extreme heat and cold events. Post the locations of these shelters online, in newsletters, and on the Ready Badger app;
- Continue to provide special arrangements for payment of heating bills;
- Maintain, update, and further develop the early warning and communication systems including coverage of NOAA All Hazard Weather Radios; Emergency Alert System (EAS) capabilities; and emerging technologies, such as the County's targeted Wireless Emergency Alerts (WEA) system, the CodeRED® Emergency and Weather Notification System, and the Ready Badger emergency preparedness and damage reporting app;
- Promote educational and informational programming, especially related to the early warning network, including NOAA All Hazard Weather Radio, EAS broadcasts, WEA system, the CodeRED® Emergency and Weather Notification System, and the Ready Badger app; and
- Produce and distribute emergency preparedness information related to the safe operation of generators, space heaters, fireplaces, and wood stoves.

Because these measures are intended to be ongoing efforts, the Local Planning Team decided to retain them in the updated plan.

## **HAZARD MITIGATION PLAN COMPONENT FOR LAKE MICHIGAN COASTAL HAZARDS**

As described in Chapter IV, Lake Michigan bluff recession, shoreline erosion, flooding, and shoreline protection structure damage are natural hazard events of moderate concern to be considered in the Racine County hazard mitigation plan. This section describes alternate and selected strategies to mitigate these types of hazards. As part of the updating process, these strategies were reviewed and reevaluated by the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

### **Identification of Alternative Mitigation Strategies**

As reported in Chapter IV, a number of studies and planning programs have been carried out relating to Lake Michigan coastal erosion and related hazards.<sup>69</sup> A review of those plans and materials developed under the State of Wisconsin Coastal Management Program indicates a range of alternative shoreline erosion control mitigation measures. In the review by the Racine County Hazard Mitigation Plan Local Planning Team as part of the updating process, the following measures to reduce the vulnerability to shoreline erosion and related hazards were considered as viable for incorporation into this update of the Racine County hazard mitigation plan.

#### ***Nonstructural***

- Conduct an updated assessment of the condition and effectiveness of shoreline protection structures in the County. Such an assessment of structures along Lake Michigan in Racine County was last conducted in 2005;
- Consider a study to update bluff recession rates along the Lake Michigan coast and compare these rates to past reports. Bluff recession rates as reported in the 1982 Lake Michigan coastal erosion management study are used for the delineation of non-structural setback overlay erosion risk distance and stable slope distances as set forth in Chapter 20, Division 36 and 37 of the Racine County Code. The 1982 Lake Michigan coastal erosion management study recommends that bluff recession rates be remeasured at approximately 10-year intervals, as appropriate aerial photography becomes available. An updated study of bluff recession rates could determine any correlation of these rates with fluctuating Lake Michigan water levels, and potential effects on bluff recession due to climate change;
- Continue ongoing programs to update, refine, and map shoreline erosion risk data using geographic information system mapping. Such mapping would include shoreline erosion risk areas along with property and other cadastral features mapping;

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<sup>69</sup> *J.P. Keillor and Robert DeGroot, Recent Recession of Lake Michigan Shorelines in Racine County, Wisconsin, University of Wisconsin Sea Grant College Program Advisory Services, April 1, 1978; SEWRPC Community Assistance Planning Report No. 86, A Lake Michigan Coastal Erosion Management Study for Racine County, Wisconsin, October 1982; SEWRPC Technical Report No. 36, Lake Michigan Shoreline Recession and Bluff Stability in Southeastern Wisconsin: 1995, December 1997; Short Elliot Hendrickson Inc., and Michael Baker Jr., Inc., Lake Michigan Recession Rate Study, Manitowoc, Ozaukee, and Racine Counties, Wisconsin Coastal Management Program, November 1997; The H. John Heinz III Center for Science, Economics and the Environment, Evaluation of Erosion Hazards, April 2000; and SEWRPC and Habitat Solutions, Memorandum Report No. 171, Assessment of Lake Michigan Shoreline Erosion Control Structures in Racine County, January 2008.*

- Continue working with Wisconsin Coastal Management Program (WCMP) through the Coastal Natural Hazards Work Group to review existing zoning ordinances, other regulations, and comprehensive plans to evaluate the effectiveness of existing local regulations and identify opportunities to better address coastal hazards;
- Develop, adopt, and enforce shoreland zoning ordinances incorporating bluff setback provisions for new development or redevelopment (Guidance on setback provisions is available from the Wisconsin Coastal Management Program); and
- Continue to review wastewater treatment plant outfall capacity to determine capacity at high lake levels. The Racine Utility has completed a wastewater treatment facility plan<sup>70</sup> which included a hydraulic capacity evaluation and includes recommendations for a new additional outfall to provide adequate hydraulic capacity. The new outfall was completed in 2005.

### ***Structural***

- Construct and maintain shoreline protection structures and bluff stabilization measures where urban development commitments have been made dictating the need for structures. Effective shore protection requires a combination of bluff stabilization, surface water and subsurface water control, and bluff toe protection. The following considerations should be evaluated prior to any project (Table 69 sets forth minimum criteria to use as a basis for structure design.):
  - Structural shore protection measures 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 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;<sup>71</sup> and
  - 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.<sup>72</sup>
- 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.<sup>73</sup>

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<sup>70</sup> *Rust Environment and Infrastructure, and Applied Technologies, Facilities Plan for the Racine Wastewater Utility, February 1998.*

<sup>71</sup> *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.*

<sup>72</sup> *Ibid.*

<sup>73</sup> *Requests for placing temporary emergency material should be directed to the Water Management Specialist for the landowner's area. Contact information for Water Management Specialists by county can be found at <http://dnr.wi.gov/topic/waterways/contacts.html#county>.*

Table 69

**MINIMUM CRITERIA FOR SHORE PROTECTION STRUCTURES ADAPTED FROM CRITERIA RECOMMENDED BY THE RACINE COUNTY TECHNICAL SUBCOMMITTEE ON SHORELAND DEVELOPMENT STANDARDS**

Category	Criteria Required to be Met
Support Information	<ol style="list-style-type: none"> <li>1. Determine lake bottom profiles offshore of proposed structure and 300 feet on both sides of the structure, from the structure out to a water depth of at least 12 feet</li> <li>2. Identify existing and planned septic tank systems on the property to be protected and on adjacent properties, and consider the impact of the systems on bluff stability</li> <li>3. Consider design wave height, wave direction, and the erosive impacts of wave action on the proposed structure</li> </ol>
Structural Design	<ol style="list-style-type: none"> <li>1. Size structure for design waves expected for a two-percent-annual-probability lake level, or 584.2<sup>a</sup> feet above the National Geodetic Vertical Datum (1929)<sup>b</sup></li> <li>2. Provide measures to protect the base of the structure against wave scouring</li> <li>3. Design loose rubble revetment structures with a slope not greater than one vertical on two horizontal</li> <li>4. Avoid structural damage or erosion on the landward side of the structure by preventing the overtopping of the structure by storm waves, or by providing for the positive drainage of any water which overtops the structure</li> <li>5. Provide measures to prevent excessive erosion along the flanks of the structure</li> <li>6. Provide adequate bedding materials to prevent undercutting of the structure</li> </ol>
Bluff Stabilization	<ol style="list-style-type: none"> <li>1. Regrade the bluff to a one on two and one half slope; unless detailed site-specific engineering analyses indicate that a different slope would be stable</li> <li>2. If the groundwater level is occasionally higher than the lake level and threatens bluff stability, provide subsurface drainage facilities to intercept the groundwater, if necessary</li> <li>3. If necessary, provide for interception drainage of surface water runoff to prevent surface erosion and saturation of the soils in the bluff</li> <li>4. Provide adequate vegetative cover of the bluff slope after regrading</li> </ol>

<sup>a</sup>U.S. Army Corps of Engineers Detroit District, *Revised Phase I Report on the Great Lakes Open-Coast Flood Levels*, April 1988.

<sup>b</sup>The Technical Subcommittee established the two-percent-annual-probability elevation based on Lake Michigan levels available at the time. That elevation has been superseded by the U.S. Army Corps of Engineers 1988 report.

Source: SEWRPC and the Racine County Technical Subcommittee on Shoreland Development Standards, *Recommendations of the Racine County Technical Subcommittee on Shoreland Development Standards for the Racine County Land Use Committee*, 1982.

Such a request must include descriptions of the type and amount of material that will be used, where this material will be placed, and how the material will be put into place.<sup>74</sup> A letter authorizing the placement of temporary emergency structures may then be sent by the WDNR to the landowner. If such authorization is granted, the landowner may proceed with placing the temporary measures, subject to the condition that the landowner must actively work toward planning, designing, and implementing a permanent shoreline protection solution through the State permitting process set forth in Chapter 30, “Navigable Waters, Harbors, and Navigation,” of the *Wisconsin Statutes*;

<sup>74</sup> *Wisconsin Department of Natural Resources, Factsheet for Landowners: Placing Temporary Emergency Erosion Control Structures*, May 2016.

- Relocate buildings within a high-risk area. (The Racine County coastal erosion management plan suggests this option as viable in instances where the building can be moved by conventional methods at a cost equal to, or less than, 30 percent of the value of an equivalent building located on secure ground.<sup>75</sup>); and
- 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 structures should be considered. This plan element is presented as an option, subject to the preference of the individual property owner.

### ***Public Informational and Educational Programming***

- Work with WCMP to develop, refine, and distribute guidance and education to local decision makers, permitting staff, developers, consultants, and homeowners related to coastal hazards;
- Work with WCMP 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; and
- Encourage residents to purchase NOAA All Hazards Weather Radios and register for emergency alert services such as CodeRED® and emergency preparedness and damage reporting mobile apps such as Ready Badger.

### **Current Programs**

#### ***Federal Programs***

The USACE exercises some control over lake levels through the use of water controls, such as locks and dams. However, these impacts are minimal compared to the impacts due to climatic influence.

FEMA produced a Draft Great Lakes Coastal Guidelines Update, dated March 2009, which includes new methodology to determine flood hazard zones within the FEMA Region V coastal zone. Final guidelines were issued in 2014.<sup>76</sup> Future steps include pilot studies to evaluate the new methodologies at specific Great Lakes locations followed by a prioritization of coastal mapping needs within the FEMA region for future analyses. The ultimate goal of these efforts will be a remapping of flood hazards along the Great Lakes coastal areas that would subsequently be reflected in revised Federal flood insurance studies.

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.

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<sup>75</sup> *Racine County Technical Subcommittee on Shoreline Development Standards*, Recommendations of the Racine County Technical Subcommittee Shoreland Development Standards for the Racine County Land Use Committee, 1982.

<sup>76</sup> *Federal Emergency Management Agency*, FEMA Great Lakes Coastal Guidelines, Appendix D.3 Update, *January 2014*.

The Great Lakes Coastal Flood Study (GLCFS) is a multi-year project led by FEMA to determine what physical processes would need to be included in updated FEMA coastal flood hazard mapping of the Great Lakes coastal communities. These flood maps and related information will be tools that can help communities identify high-risk areas and guide land use planning and capital investments to mitigate future losses.

In May 2016, the Village of Mount Pleasant asked the USACE to consider conducting a study for an emergency bluff stabilization project to protect public infrastructure on a 900-foot-long stretch along the Lake Michigan coast from the old fire department station near the intersection of Sheridan Road and Walter Avenue, north to Graceland Avenue. Section 14 of the Flood Control Act of 1946 authorized the USACE to construct emergency streambank and shoreline erosion protection to protect public infrastructure such as public buildings, roads, and utilities that are endangered by flood-caused bank or shoreline erosion. The USACE has agreed to study whether there is a viable project that fits the Section 14 authority and protects public property in the Village of Mount Pleasant. Suggestions from the USACE on long-term solutions to slow or stop the bluff erosion will be the product of the roughly two-year feasibility phase study. During the feasibility phase, Federal interest is determined by evaluating different alternatives, comparing costs and benefits, and identifying potential environmental affects. If a project is deemed to be viable for Section 14 funding, the study will recommend proceeding to the design and implementation phase. The first \$100,000 of the feasibility phase is provided by the Federal government and costs exceeding \$100,000 must be cost-shared 50/50 with a non-Federal project sponsor. Costs for the design and implementation phase of a project would be shared 65 percent Federal and 35 percent non-Federal. Each project is limited to a total Federal cost of \$5 million. Portions of the non-Federal costs can be in the form of lands, easements, right-of-ways, relocations, and disposal areas.

### ***State Programs***

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*.

The Wisconsin Coastal Management Program (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 formed by staff from the WDNR, University of Wisconsin-Madison's Sea Grant Institute, State Cartographer's Office, and the Wisconsin Emergency Management Program as a forum to coordinate initiatives related to coastal management in the State.

The WCMP created a web-based tool that allows users to examine photos from the late 1970s and compare them to corresponding photos from 2007 and 2008 to assess changes to the shoreline.<sup>77</sup> GIS layers for shore structures, beach protection, and bluff conditions for each time frame allow for more detailed analysis of shoreline and bluff changes.

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 Racine County in dealing with Lake Michigan shoreline management issues.

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<sup>77</sup> *The Wisconsin Shoreline Inventory and Oblique Photo Viewer can be accessed at <http://greatlakesresilience.org/maps-tools-data/data/wisconsin-shoreline-inventory-and-oblique-photo-viewer>*

### **Local Programs**

As reported in Chapter II, Racine County, the City of Racine, and the Villages of Caledonia, Mount Pleasant, and Wind Point have adopted shoreland zoning regulations which apply to the Lake Michigan shoreland area. The Racine County regulations related to Lake Michigan bluff setbacks are set forth in Chapter 20, Division 36 (structural setback overlay district) and Division 37 (nonstructural setback overlay district) of the Racine County Code. The County bluff setback regulations continue to apply to lands annexed by the City of Racine after May 7, 1982. The Villages of Caledonia and Mount Pleasant have adopted the County's bluff setback requirements by reference into the Village zoning ordinances. Although the Village of Wind Point zoning ordinance does not include specific bluff setback regulations, the Village ordinance applies a shoreland overlay zoning district within 1,000 feet of the Lake Michigan shoreline. The overlay district generally requires approval of a conditional use permit for alterations of steep slopes within the shoreland area.

The current County shoreland regulations regarding Lake Michigan setbacks for development and shore protection, which have been incorporated into Caledonia and Mount Pleasant ordinances, are sound and represent current planning recommendations. The ordinances provide for the use of shoreline protection, bluff stabilization structural measures, and bluff setbacks for development along portions of the Lake Michigan shoreline where urban shoreline development exists or is envisioned, and provides for a larger setback for development in areas where structural protection is not envisioned to be used due to limited planned urban development. County regulations adopted as part of the Caledonia and Mount Pleasant ordinances also provide for specific procedures for the design and review of shore protection measures. These shoreline regulations were developed under the guidance of a County Technical Subcommittee and are documented in a 1982 Lake Michigan coastal erosion management plan.<sup>78</sup> Village of Wind Point regulations for development of steep slopes within the shoreland overlay district require an engineer's report and review and approval of the report by the Village.

A variety of methods are used to warn people in Racine County of emergency situations, including Lake Michigan coastal hazards. These warning systems are described in the section of this chapter related to thunderstorm wind, non-thunderstorm high-winds, hail, and lightning hazards.

As also described in Chapter II, Racine County has an ongoing program of inspection and maintenance of shoreline protection structures owned by the County. In addition, the effectiveness and condition of the shoreline protection structures along the lakefront in Racine County was assessed in 2005, and the report was published in 2008.<sup>79</sup>

### **Evaluation of Alternatives and Identification of Mitigation Actions**

A review of the alternative measures noted above and the status of ongoing programs indicates that all of the measures noted above are considered to be appropriate for inclusion in the Racine County hazard mitigation plan. The measures noted have been developed, evaluated, and recommended in other studies and programs.

### **Multi-Jurisdictional Considerations**

The plan elements for Lake Michigan shoreline erosion and related problems correspond only to the City of Racine; the Villages of Caledonia, Mt. Pleasant, North Bay, and Wind Point.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation, consideration of risk (see Appendix G), and review and action by the Racine County Hazard Mitigation Plan Local Planning Team (see Appendix A), the following mitigation measures related to Lake Michigan coastal hazards are included in the updated Racine County Hazard Mitigation Plan:

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<sup>78</sup> *SEWRPC Community Assistance Planning Report No. 86*, op. cit.

<sup>79</sup> *SEWRPC Community Assistance Planning Report No. 171*, Assessment of Lake Michigan Shoreline Erosion Control Structures in Racine County, January 2008.

- Continue to enforce and review the County shoreland regulations and policies relating to setbacks for new development or redevelopment and structural shoreline erosion protection and bluff stabilization measures.
- Review of Lake Michigan shoreline municipal shoreland ordinances to assess the need for updating to be consistent with the Wisconsin Coastal Management Program guidance for development setbacks and structural shoreline erosion protection and bluff stability measures.
- Reevaluate the effectiveness of Lake Michigan shoreline protection structures in the County at a 10-year interval, building from the 2005 cooperative program involving Racine County, the Coastal Management Program, the WDNR, and the University of Wisconsin Sea Grant Institute.<sup>80</sup>
- Where possible, relocate buildings within a high-risk area. 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 structures should be considered. This plan element is presented as an option, subject to the preference of the individual property owner.
- Continue maintenance and construction of new shoreline protection structures to protect urban development in selected areas of the County and under the provisions provided for under the County Lake Michigan coastal erosion management plan.
- Continue ongoing programs to update and refine coastal hazard area data using geographic information system technology.
- Provide public informational and educational programming on shoreline erosion hazards and allowable property owner shoreline and bluff management actions.

## **HAZARD MITIGATION PLAN COMPONENT FOR WINTER STORMS**

As described in Chapter IV, winter storms are natural hazard events of moderate concern to be considered in the Racine County hazard mitigation plan. This section describes alternate and selected strategies to mitigate this type of hazard. As part of the updating process, these strategies were reviewed and reevaluated by the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, 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 for days completely shutting down businesses and government, while isolating residents in their homes. Extreme cold temperatures, often connected to winter storm events, is the number two natural hazard cause of deaths in the State. Additionally, indirect injuries and fatalities from activities associated with winter storms include heart attacks while shoveling snow, 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. In the review by the Racine County Hazard Mitigation Plan Local Planning Team as part of the updating process, the following measures to reduce vulnerability to these dangers have been identified as viable for this update of the Racine County hazard mitigation plan.

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<sup>80</sup> Ibid.



### ***Nonstructural***

- Review local building codes to determine if revisions are needed to improve the structures ability to withstand greater wind velocities and snow weight;<sup>81</sup>
- Review the energy efficiency and winter readiness of critical facilities and housing in the community; and
- Ensure that the necessary amount of snow removal, anti-icing, and deicing equipment is available and operational.

### ***Structural***

- Maintain, update, and upgrade public early warning systems and networks. Consider expanding such networks as necessary. Desirable characteristics of a robust early warning system include:
  - Employing multiple means of communication to alert people of the imminent threat of severe weather. Examples of such means of communication include providing warnings and/or information through outdoor warning systems, broadcast media, cable and satellite media, electronic mail, text messaging, social media, apps for mobile devices, and reverse-911 telephone calls; and
  - Being capable of reaching vulnerable segments of the population;
- Work with utility companies to assess and improve, as needed, electric service systems reliability;
- Consider burying utilities at critical and vulnerable junctions to avoid power loss due to downed lines;
- Trim and maintain the health of trees near vulnerable infrastructure, such as utility lines, essential facilities and roads, as well as near homes and businesses. Communities should prepare for emerald ash borer infestation by developing a funding strategy for removal of infested ash trees. A well planned response can minimize the impact of infestation, reduce liability, and lessen the overall cost to a community. Ash trees should be removed at the first sign of infestation of the emerald ash borer; and
- Promote planting windbreaks and installing snow fences to protect farm crops and highways.

### ***Public Informational and Educational Programming***

- 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, if travel cannot be avoided; and installing a back-up heating system in at least one room in the home;
- Encourage residents to purchase NOAA All Hazards Weather Radios and register for emergency alert services such as CodeRED® and emergency preparedness and damage reporting mobile apps such as Ready Badger;
- Promote inclusion of safety strategies for severe weather events in driver education classes and materials;
- Encourage residents to develop a Family Emergency Preparedness Plan including the preparation of a Disaster Supply Kit (see Appendix F);

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<sup>81</sup> *The State Uniform Dwelling Code (UDC) is a statewide regulation that sets standards for fire safety, structural strength, energy conservation, erosion control, heating, plumbing and electrical systems, and general health and safety in dwellings constructed or altered after 1980. The UDC applies uniformly throughout the State, and local governments may not adopt a more or less stringent code. Consequently, should review of local ordinances reveal that a change in the building code would be a viable mitigation measure, the County and the municipalities within it would need to pursue a change in the UDC at the State level.*

- Produce and distribute emergency preparedness information related to winter storm hazards; and
- Maintain and update shelter sites that have back-up emergency power sources.

## **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, or
- Less than one-quarter inch of freezing rain accompanied by another winter event.

NWS forecasters also have discretion to issue winter storm warnings for events that may not officially reach warning criteria, but are expected to have a significant impact on the public. 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, or
- Less than one-quarter inch of freezing rain accompanied by another winter event.

The NWS office will issue a blizzard warning under conditions of sustained winds or frequent gusts of 35 mph or more and falling or blowing snow which reduces visibility to one-quarter mile or less for three or more hours. The office will issue an ice storm warning when ice accumulations of one-quarter inch or more are expected over a period of 12 or fewer hours and a freezing rain advisory when ice accumulations of less than one-quarter inch are expected over a period of 12 or fewer hours.

Cold, dry air passing over warmer waters of Lake Michigan can produce snow squalls in downwind shoreline communities of Racine County. The NWS office will issue a lake effect snow warning when more than six inches of heavy lake effect snow squall accumulations are expected within a period of 12 hours. A lake effect snow advisory will be issued when three to six inches of lake effect snow squall accumulations are expected over a period of 12 hours or less.

The NWS bulletins are disseminated 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 programs include awareness and education activities. WEM, in conjunction with the National Weather Service, other State agencies, and local emergency management organizations, provides awareness and preparedness information to the public. This information is provided in three severe weather awareness campaigns

conducted annually, each focusing on the prevalent weather hazard at that time. 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 has developed a weather tool kit to provide information to local governments, health departments, and citizens in Wisconsin about preparing for and responding to winter storm events.<sup>82</sup> Similarly, the Wisconsin Department of Emergency Management 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.<sup>83</sup>

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 National Weather Service 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***

The Racine County Office of Emergency Management has a number of brochures, booklets, and pamphlets available for the public on winter weather safety and other general emergency management-related topics. In addition, the Ready Racine County website contains factsheets listing specific information regarding what to do in the event of a winter storm watch or warning as well as what residents can do before, during, and after a winter storm occurs in their area. The Racine County Office of Emergency Management also participates in all State sponsored severe weather awareness campaigns.

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 a safe alternative heat and power source is a consideration in protecting against winter storm hazards.

As described in Chapter II, Racine County has developed a comprehensive emergency management plan, 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 which complement the County plan and which also set forth procedures and actions to deal with a range of situations and events, including winter storm events.

Racine County was redesignated by the National Weather Service as a StormReady® community in 2015. This designation is valid for three years. The program is described in the previous section on hazard mitigation plan components for thunderstorm wind, non-thunderstorm high-wind, hail, and lightning hazards.

A variety of methods are used to warn people in Racine County of emergency situations, including winter storms. These warning systems are described in the section of this chapter related to thunderstorm wind, non-thunderstorm high-winds, hail, and lightning hazards.

### **Evaluation of Alternatives and Identification of Mitigation Actions**

Analysis of the vulnerability of humans, infrastructure, and economic production to winter storms and related hazard events demonstrates that the provision of 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,

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<sup>82</sup> *Wisconsin Department of Health Services, Wisconsin Winter Weather Toolkit, op. cit.*

<sup>83</sup> *These can be accessed at Wisconsin Emergency Management's ReadyWisconsin website located at: [http://ready.wi.gov/Resources/Manager\\_Resources.asp](http://ready.wi.gov/Resources/Manager_Resources.asp).*

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. The formation of 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 these events. Community and school based informational programs are currently being conducted by the County in partnership with Federal, State and local authorities.

### **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 slippery conditions and reduced visibility. Racine County, the local units of government and relevant businesses need to coordinate hazard mitigation activities through local government participation in countywide disaster planning and response mechanisms. Such measures are already well underway through the coordinated emergency management planning program involving the Racine County Office of Emergency Management and coordinated local community emergency operations programs.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation, consideration of risk (see Appendix G), and review and action by the Racine County Hazard Mitigation Plan Local Planning Team (see Appendix A), the following mitigation measures related to winter storm events are included in the updated hazard mitigation plan for Racine County:

- Organize neighborhood outreach groups who look after vulnerable groups and individuals;
- Identify and advertise a list of available heated shelters in the immediate area;
- Maintain, update, and further develop the early warning and communication systems including coverage of NOAA All Hazard Weather Radios; Emergency Alert System (EAS) capabilities; and emerging technologies, such as the County's targeted Wireless Emergency Alerts (WEA) system, the CodeRED® Emergency and Weather Notification System, and the Ready Badger emergency preparedness and damage reporting app;
- Promote educational and informational programming, especially related to the early warning network, including NOAA All Hazard Weather Radio, EAS broadcasts, WEA system, the CodeRED® Emergency and Weather Notification System, and the Ready Badger app;
- Encourage residents to develop a Family Emergency Preparedness Plan including the preparation of a Disaster Supply Kit (see Appendix F);
- Ongoing review and enforcement of building code ordinance requirements;
- Work with agencies, such as the American Red Cross, to establish a system to provide for short-term shelters and shelter operations during severe winter storm event situations;
- Continued coordination of emergency response plans among governmental units and first responders;
- Continue and refine State, County, and local road maintenance programs; and
- Work with utilities to assess and improve, as needed, electrical service systems reliability. Such improvements should include consideration of burying utilities at critical and vulnerable junctions to avoid power loss due to downed lines.

Because most of these measures are intended to be ongoing efforts, the Local Planning Team decided to retain them in the updated plan.

## HAZARD MITIGATION PLAN COMPONENT FOR DROUGHT

As described in Chapter IV, droughts are natural hazard events of limited concern to be considered in the Racine County hazard mitigation plan. This section describes alternate and selected strategies to mitigate this type of hazard. As part of the updating process, these strategies were reviewed and reevaluated by the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

### Identification of Alternative Mitigation Strategies

Stresses on the water resources of Racine County include: a growing population, increased competition for available water, and loss of groundwater recharge areas due to development. Severe droughts result from extended periods of limited or no rainfall, which generally provides ample warning for potentially affected areas to take preventative actions. When drought events do occur, they commonly last for extended periods of time (weeks or months) and impact a relatively large area.

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. Racine County has 115,737 acres of farmland, and 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 the individual producers and the local economy. Although nothing can prevent a drought, measures can be taken to reduce the potential loss caused by droughts wherever they may occur in the County. In review by the Racine County Hazard Mitigation Plan Local Planning Team 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 Racine County hazard mitigation plan.

### *Nonstructural*

- Encourage the development and maintenance of drought emergency plans for local utilities and local communities. Such plans should include:
  - Development of criteria for triggering drought-related actions, and
  - Specification of water use regulations to be initiated during drought conditions;
- Encourage the development of local water conservation programs.<sup>84</sup> Such programs may include provisions such as:
  - Water supply system efficiency actions including water audits, meter testing, leak detection and repair, water main maintenance and replacement, water system audits, and water production system refinement,
  - Public information and education programming, distribution of educational materials, and presentations to schools and civic groups;
  - Outdoor watering reduction measures such as the use of rain barrels or implementation of lawn and landscape plant watering restrictions when a severe drought is occurring,
  - Development and use of water conservation rate structures, and/or
  - Fixture and plumbing system retrofits;

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<sup>84</sup> For recommended levels of conservation programs based on forecast conditions in the design year 2035, see Map 126 and Table 189 from SEWRPC Planning Report No. 52, A Regional Water Supply Plan for Southeastern Wisconsin, December 2010.

- Protect areas of high and very high groundwater recharge potential from inappropriate development and promote regional activities to protect groundwater recharge areas outside of the County boundaries;<sup>85</sup>
- Identify areas with potential groundwater level problems and inspect wells in those areas for adequate depth and construction;
- Promote the use of agricultural methods that reduce evaporation and/or promote infiltration. Such methods may include planting windbreaks for farm crops, planting cover crops, use of no-till or reduced-till methods, and contour plowing;
- Encourage the use of drought-resistant landscaping practices using native plantings;
- Promote the use of green infrastructure and other stormwater management practices that facilitate aquifer recharge, such as rain gardens, permeable pavement, and soil amendments;
- Support agricultural programs that promote soil health, preserve soil moisture, and help to minimize loss of crops and topsoil during drought conditions;
- Consider farm drought management strategies that include monitoring soil moisture levels and planting crops that will tolerate low moisture levels;
- Maintain and support the University of Wisconsin-Extension Farmer to Farmer Hay, Forage, and Corn List;
- Support ordinances to prioritize or control water use during drought conditions;
- Design and plan for water supply infrastructure systems that are not vulnerable to drought events; and
- Promote enrollment of agricultural producers into Federal crop insurance programs.

### ***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;<sup>86</sup>

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<sup>85</sup> See groundwater recharge protection areas on Map 128 from SEWRPC Planning Report No. 52, A Regional Water Supply Plan for Southeastern Wisconsin, December 2010.

<sup>86</sup> See recommendations for Racine County in Table 194 from SEWRPC Planning Report No. 52, A Regional Water Supply Plan for Southeastern Wisconsin, December 2010. These recommendations were made for water utilities to meet a “reliable capacity” based on forecast water use demands in the design year 2035. For utilities utilizing groundwater as a source of supply, reliable capacity was defined as adequate capacity to supply the needed maximum daily pumpage with the largest capacity well out of service. For utilities with surface water as a source of supply, reliable capacity was defined as the capacity remaining with the most critical unit of the production process out of service. In the design of the recommended plans, facilities were then added to each water supply system to provide a reliable capacity equal to the anticipated 2035 maximum daily pumpage demand. The resulting systems have a reliable capacity that provides significant protection for the continuity of supply in the event of loss of functionality of a portion of the utility. The potential new, expanded, or upgraded facilities and programs recommended in the regional water supply plan should be implemented based upon local needs and determinations.

- Where opportunities exist, consider development of interconnections between adjacent water utilities to ensure provision of water in the event of a loss of water supply due to severe drought;<sup>87</sup> and
- Continue operation and monitoring of stream gaging stations and groundwater monitoring wells by the WDNR, U.S. Geological Survey, National Weather Service, and U.S. Army Corps of Engineers.

### ***Public Informational and Educational Programming***

- Increase public education and awareness of the potential severity of drought events;
- Produce and distribute emergency preparedness information related to droughts; and
- Encourage farmers to report crop and/or livestock losses to the appropriate officials, including the Racine County Office of Emergency Management. The Ready Badger app allows users to submit a digital damage report that will allow County emergency managers to better assess drought related damages and respond to these disasters more quickly.

### **Current Programs**

#### ***Federal and State Programs***

The continuous monitoring of hydrologic conditions is important to identify and assess drought conditions. The U.S. Geological Survey operates a stream gaging program with local cooperators throughout the State. In South-eastern Wisconsin, this program is coordinated by the WDNR and SEWRPC. The Racine Wastewater Utility is a local cooperator. The Wisconsin Geological and Natural History Survey also monitors a statewide network of groundwater elevation monitoring wells.

The National Drought Mitigation Center (NDMC), based at the University of Nebraska-Lincoln, provides assistance in the development and implementation of measures to reduce societal vulnerability to drought, stressing preparedness and risk management rather than crisis management.<sup>88</sup> Most of the NDMC's services are directed to State, Federal, regional, and tribal governments that are involved in drought and water supply planning. The NDMC's activities include maintaining an information clearinghouse and drought portal; drought monitoring, including participation in the preparation of the U.S. Drought Monitor and maintenance of the web site; drought planning and mitigation; drought policy; advising policy makers; collaborative research; K-12 outreach; workshops for Federal, State, and foreign governments and international organizations; organizing and conducting seminars, workshops, and conferences; and providing data to and answering questions for the media and the general public.

The U.S. Drought Monitor, a joint effort of the U.S. Department of Agriculture (USDA), the National Oceanic and Atmospheric Administration (NOAA), and the National Drought Mitigation Center, provides monitoring of drought conditions and forecasting of seasonal conditions throughout the United States.<sup>89</sup>

The USDA's Farm Service Agency (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

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<sup>87</sup> Any such interconnections would require the establishment of necessary agreements and approvals for activating and would need to consider and address issues related to equipment, pumping rates, and demand on water sources. In addition, some interconnections could be prohibited or subject to approvals pursuant to the Great Lakes-St. Lawrence River Basin Water Resources Compact.

<sup>88</sup> The National Drought Mitigation Center can be accessed at <http://drought.unl.edu/>.

<sup>89</sup> The U.S. Drought Monitor can be accessed at <http://droughtmonitor.unl.edu/>.

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.

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 can be extremely 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.

Federal and State programs also include awareness and education activities. 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.<sup>90</sup>

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 persons within the Great Lakes Basin applying for a diversion or a new or increased withdrawal averaging 100,000 gallons per day (gpd) or more and all persons within the State applying for withdrawals that will result in a water loss averaging more than 2,000,000 gpd. 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 persons applying for a new or increased withdrawal, diversion, or water loss approval submit a water conservation plan meeting specified requirements 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***

As described in Chapter II, Racine County has developed a comprehensive emergency management plan 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 which complement the County plan and which also set forth 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 experience the most severe impacts from drought events. Racine County, the local units of government, and relevant businesses need to coordinate hazard mitigation activities through the local government participation in countywide disaster planning and response mechanisms.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation, consideration of risk (see Appendix G), and review and action by the Racine County Hazard Mitigation Plan Local Planning Team (see Appendix A), the following mitigation measures related to drought events are included in the updated hazard mitigation plan for Racine County:

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<sup>90</sup> *Wisconsin Department of Health Services, Wisconsin Drought Toolkit, Publication P00884, August 2014.*



- Encourage the development and maintenance of drought emergency plans for local utilities and local communities;
- Encourage the development of local water conservation programs;
- Encourage multi-agency approaches to drought planning, water conservation, drought prediction and stream and groundwater monitoring;
- Promote educational and informational programming relating to water conservation;
- Support agricultural programs that promote soil health, preserve soil moisture, and help to minimize loss of crops and topsoil in the event of a drought. Such programs should promote the use of agricultural methods that reduce evaporation and/or promote infiltration;
- Evaluate and design water supply systems that are not vulnerable to drought events;
- Encourage farm operators evaluate the economics of crop insurance programs; and
- Encourage development practices that promote preservation of areas of high and very high groundwater recharge potential and promote stormwater management practices that facilitate aquifer recharge.

Because these measures are intended to be ongoing efforts, the Local Planning Team decided to retain them in the updated plan.

## **HAZARD MITIGATION PLAN COMPONENT FOR TRANSPORTATION ACCIDENTS**

As described in Chapter IV, transportation accidents are human-induced hazard events of significant concern to be considered in the Racine County hazard mitigation plan. This section describes alternate and selected strategies to mitigate these types of hazards. As part of the updating process, these strategies were reviewed and reevaluated by the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

### **Identification of Alternative Mitigation Strategies**

As discussed in Chapter IV, a significant number of injuries, deaths, and property damages are associated with crashes on the roadway transportation system in Racine County. Motor vehicle-related accidents within the County are influenced by factors such as road conditions, time of day, weather conditions, traffic conditions, and drug and alcohol use. In addition, railway accidents occasionally occur in the County. These accidents can also result in injuries, deaths, and damage to property.

#### ***Roadways***

Roadway intersections and highway segments at on- and off-ramp locations are areas that are significantly more dangerous than other areas for the automotive transportation system within Racine County. However, automobile-related accidents have and will continue to occur in a variety of areas such as parking lots and local roadways, and cause injuries and death to motor vehicle passengers as well as pedestrians and bicycle riders throughout Racine County. In review by the Racine County Hazard Mitigation Plan Local Planning Team as part of the updating process, the following measures to reduce vulnerability to motor vehicle accidents have been identified as viable for this update of the Racine County hazard mitigation plan.

#### ***Nonstructural***

- Continue to monitor and upgrade the transportation system, when necessary, to reduce accident exposure and provide for increased travel safety and personal security;<sup>91</sup>

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<sup>91</sup> *SEWRPC Planning Report No. 55, VISION 2050: A Regional Land Use and Transportation System Plan for Southeastern Wisconsin, 2017.*

- Continue to promote enforcement of laws prohibiting texting while driving;
- Continue to promote enforcement of laws requiring use of safety restraints such as seat belts and infant car seats;
- Continue to promote traffic related law enforcement including enforcement for traffic violations, weight and travel restrictions, and designated truck routes; and
- Consider expanding the use of freeway service patrols to include Racine County. These patrols consist of specially equipped vehicles designed to assist disabled motorists and assist in the clearance of incidents.

#### *Structural*

- Continue to improve the design, routing, and traffic control at problem roadway areas;
- Expand the use of emergency vehicle preemption at traffic signals;<sup>92</sup>
- Consider and implement intersection improvements such as two-or four-way stop control, roundabouts, or signalization at arterial street and highway intersections;
- Consider expanding the use of ramp closure devices to allow for rapid closure of freeway on-ramps during major traffic incidents, inclement weather, or special events;
- Consider providing bicycle accommodation through bicycle lanes, paved shoulders, widened outside travel lanes, or enhanced bicycle facilities where feasible and where the existing surface arterial street system is resurfaced and reconstructed and as new surface arterial roads are constructed;
- Continue and expand the use of closed circuit television cameras (CCTV) on heavily traveled freeways, arterial streets, and highways; and
- Continue and expand the use of advisory information measures including variable message signs (VMS) on the freeway system and appropriate arterial streets and highways.<sup>93</sup>

#### *Public Informational and Educational Programming*

- Promote driver safety hazard awareness, especially to drivers within the 15 to 24 age group;
- Promote inclusion of safety strategies for severe weather events in driver education classes and materials;
- Promote use of intelligent transportation systems (ITS) technology (see Federal and State Programs section below);
- Promote commercial operator training and skill enhancement programs;
- Promote training, planning, and preparedness for mass-casualty incidents involving public transportation;

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<sup>92</sup> *Emergency vehicle preemption allows emergency vehicles to intervene in the normal operation of traffic signals to either change the traffic signal to the green phase or to hold the green phase for the approach from which the emergency vehicle is oriented.*

<sup>93</sup> *VMS are over-road devices that display dynamic messages providing real-time information to motorists.*

- Develop trained, equipped, and prepared emergency first responders;
- Promote awareness of the influence of alcohol and drug usage on driving safety;
- Continue public education regarding the dangers of distracted driving such as texting and using mobile phones while driving;
- Provide public education on recent innovations in road design and operation, such as signal preemption and driving in roundabouts;
- Continue to provide public education on correct installation and use of child restraint devices; and
- Promote the use of personal safety equipment such as helmets for operators and passengers of motorcycles and bicycles.

### ***Railways***

As indicated in Table 51 in Chapter IV, more accidents occur at railway intersections than in other areas of the railway transportation system within Racine County. One reason for this is that trains cannot stop quickly. It can take a freight train moving at 55 miles per hour, or an eight-car passenger train moving at 79 miles per hour as much as a mile or more to stop. Despite this, railroad-related accidents have and will continue to occur in a variety of areas such as railroad yards and derailments can happen anywhere within the railroad system. In the review by the Racine County Hazard Mitigation Plan Local Planning Team as part of the updating process, the following measures to reduce vulnerability to railway-related accidents have been identified as viable for this update of the Racine County hazard mitigation plan.

#### *Nonstructural*

- Promote railroad inspections and improved designs at problem railway/roadway intersections, particularly at grade crossings, rural signs and/or signals for railroad crossings.

#### *Structural*

- Improve the design, routing, and traffic control at problem railway areas; and
- Consider adding railroad gate arms at grade crossings that do not currently have them installed.

#### *Public Informational and Educational Programming*

- Promote awareness and importance of all warning signs and signals;
- Promote awareness that some vehicles require special consideration at crossings, such as school buses, church vans, farm machinery, semi-trucks, and emergency response vehicles;
- Promote awareness of the hazards of trespassing on railroad tracks; and
- Continue emergency operation training, planning, and preparedness for mass-casualty incidents involving railroad transportation.

### ***Airports***

The risk of airplane crashes/accidents is greatest during landing and take-off operations. Therefore, the developed areas adjacent to airports and in airport approach and departure paths are most vulnerable to this hazard within Racine County. The only measures to reduce vulnerability to airport accidents considered as viable involve the proper design and maintenance of airport facilities and continuation of proper safety and security programs.

## **Current Programs**

### ***Federal and State Programs***

The Wisconsin Department of Transportation (WisDOT) is currently involved in a variety of long-range transportation planning activities for airport, bicycle, highway, pedestrian, rail, and roadway systems.<sup>94</sup> Connections 2030, which was adopted in October 2009, is a strategic plan developed by WisDOT that provides a foundation for developing more detailed year 2030 plans. The plan establishes policies to help transportation decision-makers when evaluating programs and projects. The plan is published on the WisDOT website.

In addition, planning guidance and tools are available on the WisDOT website to provide local communities with basic transportation planning-related information to help them develop the transportation element of the local community's comprehensive plan.<sup>95</sup> WisDOT programs and services also include incorporation of a broad range of diverse technologies, known collectively as intelligent transportation systems (ITS) to assist in identifying and helping to resolve transportation-related problems. ITS is comprised of a number of information technologies, including information processing, communications, control, and electronic systems integrated together into the transportation systems to improve safety and reduce costs. The WisDOT's Department of Motor Vehicles also has an extensive public information program to educate people about driver safety and awareness of hazards to help prevent accidents and related deaths and injuries. The WisDOT has also produced standards on airport construction and educational and information material for airport owners and pilots relative to several hazards.

The WisDOT's Bureau of Transportation Safety in partnership with the National Highway Traffic Safety Administration sponsors campaigns that mobilize hundreds of law enforcement agencies throughout the State to increase motorists' compliance with safety laws. The high-visibility law enforcement efforts are combined with effective media campaigns to get more motorists to buckle up, slow down, and drive sober. Examples of these campaigns include the 2016 "Click It or Ticket" campaign to increase the use of safety belts and the "Drive Sober or Get Pulled Over" campaign which sought to discourage drunk driving.

The WisDOT's 511 Wisconsin traveler information website provides up-to-date information about traffic conditions using data collected from freeway system traffic detectors.<sup>96</sup> The information provided on the website includes color-coded maps depicting the level of freeway traffic congestion, travel times and delays, locations of confirmed incidents, trucker information, winter road conditions, and views of traffic from a closed-circuit television (CCTV) camera network. In 2015, WisDOT also launched a free 511 Wisconsin smart phone application, which allows users to receive instant notifications of traffic alerts.

The Federal Aviation Administration (FAA) regulates all commercial airlines in the United States, promulgating standards and conducting compliance audits for aircraft, air crews, maintenance personnel, and airport facilities. Counties and municipalities with major airports routinely conduct exercises to test their response capabilities, particularly those of fire, emergency medical, mortuary, and law enforcement agencies.

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<sup>94</sup> For more information about Wisconsin Department of Transportation Programs and Services, see <http://wisconsin-dot.gov/> and for specific information on the State Connections 2030 transportation plan see <http://wisconsin-dot.gov/Pages/projects/multimodal/conn2030.aspx>.

<sup>95</sup> For general local planning guidance and tools, see <http://wisconsin-dot.gov/Pages/projects/data-plan/plan-res/default.aspx>. For projects specific to the southeastern portion of the State, including Racine County, see <http://wisconsin-dot.gov/Pages/projects/by-region/se/default.aspx>.

<sup>96</sup> This website can be accessed at [www.511WI.gov](http://www.511WI.gov).

### ***Local Programs***

The Southeastern Wisconsin Regional Planning Commission (SEWRPC) is designated as the official metropolitan transportation planning organization for Southeastern Wisconsin under State and Federal laws and regulations. SEWRPC has the responsibility of developing and maintaining transportation plans for the Region under these designations. The 2050 regional land use and transportation plan<sup>97</sup> was adopted by the Regional Planning Commission in July 2016. VISION 2050 recommends a long-range vision for land use and transportation in the seven-county Southeastern Wisconsin Region. It makes recommendations to local and State governments to shape and guide land use development and transportation improvement including public transit, arterial streets and highways, and bicycle and pedestrian facilities, to the year 2050.

The Racine County Traffic Safety Commission works to enhance the level of safety on public roadways in Racine County. The Commission includes the representatives from law enforcement, education, the legal professions, medicine, highway engineering, highway safety, and citizens groups. This group meets quarterly to review traffic accident data from the County and other traffic safety related matters.

Local agencies also conduct outreach related to transportation safety. For example, several local police, fire, and health departments will check child car seats for proper installation, either at special events or on an ongoing basis. In addition, the Safe Kids Coalition of Kenosha and Racine Counties, led by Wheaton Franciscan Healthcare, focuses on ways to prevent injuries to children by educating the community on topics such as motor vehicle safety, pedestrian safety, proper use of bicycle helmets, and proper installation of child car seats.

As described in Chapter II, Racine County has developed a comprehensive emergency management plan 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 which complement the County plan and which also sets forth procedures and actions to deal with a range of situations and events, including transportation accidents. As described in Chapter II, all of the fire and rescue departments in Racine County participate in the Mutual Aid Box Alarm System (MABAS) agreement.

The Racine County Local Emergency Planning Committee has developed a railroad emergency response plan<sup>98</sup> that mostly covers hazardous rail cargo emergencies. This plan documents methods and procedures designed to protect life and property in the event of a rail disaster within the County, to render aid to the municipality in which the accident occurred, and to protect the emergency scene and preserve evidence for further investigation. This plan will be further addressed in the plan component for hazardous material incidents below.

### **Evaluation of Alternatives and Identification of Mitigation Actions**

Based upon review of the above, the current ongoing programs represent the major component of the planned mitigation action with regard to transportation safety. Enforcement activities and public informational and educational programming should continue to constitute major components of the mitigation strategy for transportation accidents.

### **Multi-Jurisdictional Considerations**

Roadway transportation accidents on arterial and highway systems can potentially impact all municipalities within the County. The Villages of Caledonia and Mount Pleasant, and the Towns of Raymond and Yorkville have the additional potential impact from transportation accidents on IH 94. In addition, heavily traveled railroad lines traverse many of the County's communities. Racine County, the local units of government, and relevant businesses need

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<sup>97</sup> *SEWRPC Planning Report No. 55*, op. cit.

<sup>98</sup> *Racine County Local Emergency Planning Committee, Racine County Railroad Emergency Response Plan, October 2014.*

to coordinate hazard mitigation activities through local government participation in countywide disaster planning and response mechanisms. Such measures are already well underway through the coordinated emergency operations planning program involving the Racine County Office of Emergency Management, Racine County Sheriff's Department, local law enforcement agencies, and coordinated local community emergency operations programs.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation, consideration of risk (see Appendix G), and review and action by the Racine County Hazard Mitigation Plan Local Planning Team (see Appendix A), the following mitigation measures related to transportation accident-related hazard events are included in the updated Racine County hazards mitigation plan:

- Adopt and implement the recommendations of the VISION 2050 Regional land use and transportation system plan related to monitoring and improving the transportation system through design, routing, and traffic control at problem areas, including:
  - Expand the use of emergency vehicle preemption traffic signals;
  - Consider and implement intersection improvements such as two-or four-way stop control, roundabouts, or signalization at arterial street and highway intersections;
  - Continue and expand the use of closed circuit television cameras (CCTV) on heavily traveled freeways, highways, and arterial streets;
  - Continue and expand the use of advisory information measures including variable message signs (VMS) on the freeway system and at appropriate arterial street and highway locations;
  - Consider expanding the use of ramp closure devices to allow for rapid closure of freeway on-ramps during major traffic incidents, inclement weather, or special events;
  - Consider providing bicycle accommodations through bicycle lanes, paved shoulders, widened outside travel lanes, or enhanced bicycle facilities, where feasible when existing surface arterial streets are resurfaced and reconstructed and as new surface arterial roads are constructed;
  - Expand the use of freeway service patrols to include Racine County;
- Continue to promote educational and informational programming, especially related to driver safety, and to individual actions to protect citizens, property, and businesses;
- Continue to promote traffic-related law enforcement, including enforcement for traffic violations, weight and travel restrictions, and designated truck routes. Enforcement efforts should include efforts related to enforcement of laws regarding distracted driving and use of safety restraints;
- Continue to evaluate and refine safety components of railway and airport facilities;
- Continue to support of training, state-of-the-art equipment, planning, and preparedness of first responders as well as search and rescue teams;
- Continue to evaluate of the roadway system in the County for proper separation distances of ramps and frontage roads;
- Continue the coordination of emergency response plans among governmental units and first responders.

Because these measures are intended to be ongoing efforts, the Local Planning Team decided to retain them in the updated plan.

## **HAZARD MITIGATION PLAN COMPONENT FOR CONTAMINATION AND LOSS OF WATER SUPPLY**

As described in Chapter IV, contamination and loss of water supply are natural hazard events of concern to be considered in the Racine County hazard mitigation plan. This section describes alternate and selected strategies to mitigate these types of hazards. As part of the updating process, these strategies were reviewed and reevaluated by

the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

### **Identification of Alternative Mitigation Strategies**

Racine County is richly endowed with surface and groundwater resources as discussed in Chapter IV. However, these sources of freshwater are not unlimited and both surface and groundwater resources are subject to contamination, as well as depletion of supply. Contamination and loss of water supply events generally provide no warning, making it difficult for potentially affected areas to take preventative actions. In some cases, industries may be particularly vulnerable to loss of water supply, due to equipment and process needs. Water supply is also a necessity for municipal and volunteer fire suppression.

When contamination and loss of water supply events do occur, they may last for extended periods of time (weeks or months) and likely would impact a specific water source (well, reservoir, utility, etc.). In the review by the Racine County Hazard Mitigation Plan Local Planning Team as part of the updating process, the following measures to reduce vulnerability to groundwater contamination events and loss of water supply have been identified as viable for this update of the Racine County hazard mitigation plan.

#### ***Nonstructural***

- Continue to monitor water supply capacity and plan for future water supply demand for each public water utility;
- Promote development of a thorough drinking water supply risk and threat assessment that identifies potential vulnerabilities and targets for sabotage and terrorism attack;
- Develop and maintain an emergency operation plan for each public water supply system to specify procedures for mechanical failures, power outages, unsafe samples, and threats of terrorism;
- Utilize GIS technology and available data to identify important groundwater management areas;
- Promote measures to protect groundwater recharge areas, including promotion of regional activities to protect groundwater recharge areas outside of the County boundaries and incorporate a groundwater protection element in future land use planning activities;<sup>99</sup>
- Promote land development site design and stormwater management practices that are designed to maintain the natural hydrology and facilitate recharge of aquifers while minimizing pollutant loads that could contaminate the groundwater;<sup>100</sup>
- Develop and implement wellhead protection plans and establish setbacks from wellhead locations to minimize the potential for contamination of groundwater supplies;
- Promote proper location, installation, cleaning, monitoring, and maintenance of septic systems and other private onsite sewage disposal systems;

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<sup>99</sup> See groundwater recharge protection areas on Map 128 from SEWRPC Planning Report No. 52, A Regional Water Supply Plan for Southeastern Wisconsin, December 2010.

<sup>100</sup> Examples of potential site design and stormwater management practices which could be considered, include the use of permeable pavement; set-aside open space; infiltration basins and trenches; landscaping with drought resistant plants; landscape mulch versus turf grass; conservation subdivision design; and the integration of rain gardens, bioswales, and other groundwater recharge features into site design. Care must be taken on a site-specific basis to avoid increased potential for groundwater contamination.

- Identify failing onsite sewage disposal systems for maintenance and remediation;
- Identify leaking or failed sewer laterals for maintenance and remediation;
- Reduce the potential for groundwater contamination from agricultural fertilizers and chemicals with emphasis on groundwater-related water quality management areas;
- Manage livestock, manure, sewage sludge, and agricultural chemicals effectively in areas that are susceptible to groundwater contamination with emphasis on groundwater related water quality management areas;
- Encourage the development of local water conservation programs.<sup>101</sup>
- Encourage regular testing of private wells for contaminants including, but not limited to nitrates, total coliform bacteria, arsenic, and molybdenum;
- Expand lead testing of out-of-tap drinking water supply in homes that are suspected to have lead water service lines or lead plumbing fixtures within the home;
- Encourage local municipalities and public water supply utilities to apply for potential funding opportunities to help offset the expense for homeowners to replace lead service lines and/or consider programs to offer homeowners low interest loan options or deferred payment through property taxes for such lead service line replacements; and
- Encourage local water utilities to develop emergency drinking water supply plans. Such plans may include provisions such as:
  - Establishing response partner contacts to discuss procedures,
  - Identifying priority water customers and developing plans for restoring their service first, and Identifying potential distribution points for emergency water supply.

### ***Structural***

- Consider implementing the recommendations made in the regional water supply plan for additional water supply facilities and programs to meet forecast 2035 water use demands;<sup>102</sup>
- Where opportunities exist, consider development of interconnections between adjacent water utilities to ensure provision of water in the event of an emergency such as breakdown of utility equipment, contamination of water supply, a major fire, or a terrorist attack;<sup>103</sup>

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<sup>101</sup> *For recommended levels of conservation programs based on forecast conditions in the design year 2035, see Map 126 and Table 189 from SEWRPC Planning Report No. 52, A Regional Water Supply Plan for Southeastern Wisconsin, December 2010.*

<sup>102</sup> *See recommendations for Racine County in Table 194 from SEWRPC Planning Report No. 52, A Regional Water Supply Plan for Southeastern Wisconsin, December 2010. The potential new, expanded, or upgraded facilities and programs recommended in the regional water supply plan should be implemented based upon local needs and determinations, and any available updated water use forecasts for a particular utility.*

<sup>103</sup> *Any such interconnections would require the establishment of necessary agreements and approvals for activating and would need to consider and address issues related to equipment, pumping rates, and demand on water sources. In addition, some interconnections could be prohibited or subject to approvals pursuant to the Great Lakes-St. Lawrence River Basin Water Resources Compact.*



- Maintain and consider upgrading water disinfection capabilities, including emergency disinfection equipment;
- Maintain municipal water and sewer infrastructure at acceptable operating standards;
- Continue efforts to manage stormwater runoff more effectively;
- Locate and properly abandon old and improperly abandoned wells;
- Evaluate ability of water utility electrical equipment to accept generators. Repair or upgrade as necessary;
- Provide backup power for wells, treatment plants, and other vital water utility system components;
- Develop and implement programs to the replace publicly owned water service mains, laterals, and other infrastructure that are known to contain lead;
- Promote the replacement of privately owned portions of lead water service lines and lead plumbing fixtures within the home; and
- Promote the use of water filtration devices on drinking water sources in homes where there are known lead service lines, lead plumbing, or fixtures and where replacement of the lead service line or plumbing fixture is not currently feasible.<sup>104</sup>

### ***Public Informational and Educational Programming***

- Encourage residents to develop a Family Emergency Preparedness Plan including the preparation of a Disaster Supply Kit (see Appendix F);
- Continue educational and outreach programs related to backflow prevention;
- Train operators and plant personnel in security awareness and reporting protocols; and
- Continue and expand public education and outreach efforts regarding the effects of lead in drinking water and educate homeowners on steps to take to lessen their exposure to lead from the drinking water supply.

### **Current Programs**

#### ***Federal and State Programs***

There are various governmental and agency programs to help address and fund groundwater contamination-related issues. The U.S. Environmental Protection Agency (USEPA) administers the Superfund program. This program was designed to clean up the worst contamination sites from sources such as warehouses and landfills. There is one Superfund site in Racine County, located in the Village of Caledonia.

In 1991, the USEPA published a regulation known as the Lead and Copper Rule mandating large water utilities to begin corrosion control treatment to reduce lead and copper concentrations in the water provided to consumers. The rule has undergone various revisions since its formation. Municipal water utilities are also required to regularly test their water supply for lead and copper under Section NR 809.54(3) of the *Wisconsin Administrative Code*. Under this code, the action level is exceeded if the concentration in more than ten percent of tap water samples collected during any monitoring period is greater than 15  $\mu\text{g}/\text{l}$  for lead and 1,300  $\mu\text{g}/\text{l}$  for copper. That is, if the 90th percentile lead concentration is greater than 15  $\mu\text{g}/\text{l}$ , or the 90th percentile copper concentration is greater than 1,300  $\mu\text{g}/\text{l}$ , the utility is out of compliance with the WDNR standards. If a utility fails to meet these standards, they are required to

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<sup>104</sup> *Water filters to remove lead from drinking water should be certified by the National Science Foundation (NSF) under Standard 53 for lead removal.*

undertake additional action to control corrosion of pipes that are leading to the high lead or copper concentrations. The utility is also required to increase its monitoring program, and conduct public education and outreach regarding high lead or copper levels in the drinking water, and steps the consumer can take to protect their health.

The WDNR oversees three programs relating to groundwater contamination issues:

- The first is overseen by the Department's Bureau for Remediation and Redevelopment (RR). This bureau oversees response actions at spills, hazardous substance release sites, abandoned containers, drycleaners, brownfields (including the Site Assessment Grant program), "high priority" leaking underground storage tanks, closed wastewater and solid waste facilities, hazardous waste corrective action and generator closures, and sediment cleanup actions. It has primary responsibility for implementing and aiding cleanups under the Spill Law, the Environmental Repair Law, Federal programs (Superfund, Hazardous Waste Corrective Action, Leaking Underground Storage Tanks (LUST), Brownfields), the Land Recycling Law and State Brownfield Initiatives, the Drycleaner Environmental Response Fund, and at closed landfills. The RR program provides technical assistance, helps to clarify legal liability, provides financial assistance primarily to local governmental units and provides technical project oversight of cleanup projects.
- The second is the Well Compensation Program, which provides financial assistance through grant monies to remediate or seal contaminated private wells.
- The third is the Source Water Assessment Program which was completed in May 2003, as required by the 1996 reauthorization of the Federal Safe Drinking Water Act (SDWA). The 1996 amendments to the SDWA require states to: 1) delineate assessment area boundaries from which public water systems receive supplies of drinking water, 2) inventory significant potential sources of contamination within those boundaries, 3) determine the susceptibility of the public water systems to those potential sources of contamination, and 4) provide the assessment results to the public. In addition, Chapter NR 811 of the *Wisconsin Administrative Code* requires that wellhead protection plans be developed and submitted to the WDNR for all municipal water supply wells constructed since May 1, 1992. The WDNR has approximately delineated wellhead protection areas for all other municipal wells and is working with the communities to refine those delineations. The WDNR has also sent letters to all municipal water supply system operators recommending steps to be taken for system security purposes.

### ***Local Programs***

As part of its water supply planning program, the Southeastern Wisconsin Regional Planning Commission (SEWRPC) identified groundwater recharge areas with high and very high recharge potential and has made recommendations regarding groundwater recharge area protection.<sup>105</sup> The regional water supply plan also identified additional

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<sup>105</sup> *SEWRPC Planning Report No. 52, A Regional Water Supply Plan for Southeastern Wisconsin, December 2010; SEWRPC Technical Report No. 47, Groundwater Recharge in Southeastern Wisconsin Estimated by a GIS-Based Water-Balance Model, July 2008.*

water supply facilities and programs necessary for water utilities to meet a “reliable capacity” based on forecast water use demands in the design year 2035.<sup>106</sup>

In 2016, the U.S. Environmental Protection Agency (USEPA) made \$14.5 million in funds available to the Wisconsin Department of Natural Resources (WDNR) for dispersal to municipalities in the State to assist home owners with replacing lead service lines that bring drinking water into homes. Typically, municipalities are responsible for the portion of the water service lines from the water main to the curb stop while private property owners are responsible for the portion from the curb stop to the home. The City of Racine obtained \$500,000 from the WDNR that will be available to assist homeowner with the cost of replacing their portion of lead water service lines. The City plans to replace the public side of water service lines as planned road construction projects proceed around the City. Residents in these areas will have the opportunity to have their portion of the lead service line replaced with the costs covered up to \$2,500. The project is expected to cover the majority of the replacement cost for approximately 200 homes.

Most of the municipalities in the County that operate water utilities that use groundwater have either enacted wellhead protection ordinances, created wellhead protection or groundwater protection overlay districts as part of their zoning ordinances, or developed wellhead protection plans. While the details of these measures differ among the municipalities, they typically do some or all of the following:

- Specify minimum separation distances from wells and potential sources of contamination such as sewer mains, septic tanks, fuel storage tanks,
- Define protection zones around municipal wells, and
- Indicate land uses that are permitted, permitted on a conditional basis, and prohibited within these zones.

Section 810.15 of the *Wisconsin Administrative Code* requires that the water supplier for every municipal water system develop and implement a comprehensive cross-connection control program. Water utilities within Racine County have developed such programs. While the provisions of these programs differ from utility to utility, they may include such measures as initial and periodic inspections of industrial, commercial, and public authority buildings to detect actual and potential cross-connections; requirements that property owners install protective devices, such as backflow assemblies, where unprotected cross-connections are detected; annual testing of backflow assemblies; and public education measures.

Municipal water utilities also send out informational brochures and newsletters to their customers on water supply related issues.

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<sup>106</sup> See recommendations for Racine County in Table 194 from SEWRPC Planning Report No. 52, A Regional Water Supply Plan for Southeastern Wisconsin, December 2010. For utilities utilizing groundwater as a source of supply, reliable capacity was defined as adequate capacity to supply the needed maximum daily pumpage with the largest capacity well out of service. For utilities utilizing surface water as a source of supply, reliable capacity was defined as the capacity remaining with the most critical unit of the production process out of service. In the design of the recommended plans, facilities were then added to each water supply system to provide a reliable capacity equal to the anticipated 2035 maximum daily pumpage demand. The resulting systems then have a reliable capacity that provides significant protection for the continuity of supply in the event of loss of functionality of a portion of the utility. The potential new, expanded, or upgraded facilities and programs recommended in the regional water supply plan should be implemented based upon local needs and determinations, and any available updated water use forecasts for a particular facility.

### **Evaluation of Alternatives and Identification of Mitigation Actions**

Based upon review of the above, the current ongoing programs represent a major component of the planned mitigation action with regard to the continued provision of advanced protection and monitoring measures, as well as public informational and educational programming systems. In addition, feasible mitigation actions include development of a thorough water supply risk and threat assessment that identifies potential vulnerabilities; heightening security at water supply and treatment facilities; and development of site emergency plans, including emergency water supply source alternative plans, which may be applicable at the town, city, or village municipality levels. Other potential mitigation actions include increased monitoring measures for pathogens and chemical toxins, as well as management measures to reduce the potential for groundwater contamination from chemicals, livestock, and sewage sources to limit possible future bodily injuries and deaths due to contamination or loss of water supply. Aging water supply infrastructure can pose multiple risks including contamination and loss of delivery capacity. Maintenance and updating of water supply infrastructure should continue to be a major component of the planned mitigation measure.

### **Multi-Jurisdictional Considerations**

The contamination or loss of water supply can potentially impact all municipalities within the County. Those communities relying on individual private wells are susceptible to certain problems, such as shallow aquifer contamination or drawdown. Communities with public systems are more susceptible to security, facility malfunction, main breaks, and aging infrastructure related problems.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation, consideration of risk (see Appendix G), and review and action by the Racine County Hazard Mitigation Plan Local Planning Team (see Appendix A), the following mitigation measures related to contamination or loss of water supply are included in the hazard mitigation plan for Racine County:

- Promote educational and informational programming related to water safety issues;
- Encourage multi-agency approaches to water conservation, loss and contamination prevention and trend-monitoring;
- Prepare emergency operation and emergency drinking water supply plans for each public water supply system. The WDNR correspondence on this element, including basic security measures to be considered is attached hereto as Appendix I;
- Continued coordination of emergency response plans among governmental units and first responders;
- Prepare, update, and implement wellhead protection plans;
- Develop and implement plans to systematically replace publically owned water service lines and other public water supply infrastructure that are known to contain lead;
- Educate the public on, and promote the replacement of, privately owned portions of water service lines and other plumbing fixtures that contain lead. Pursue available funding opportunities to help offset the cost of these improvements to residents; and
- Promote the use of water filtration devices on drinking water sources in homes where there are known lead service lines, lead plumbing, or fixtures and where replacement of the lead service line or plumbing fixture is not currently feasible.<sup>107</sup>

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<sup>107</sup> *Water filters to remove lead from drinking water should be certified by the National Sanitation Foundation (NSF) under Standard 53 for lead removal.*

Because these measures are intended to be ongoing efforts, the Local Planning Team decided to retain the recommendations from the previous edition of the plan and include additional priority mitigation measures in this updated plan.

## **HAZARD MITIGATION PLAN COMPONENT FOR HAZARDOUS MATERIAL INCIDENTS**

As described in Chapter IV, hazardous material incidents are human-induced hazard events of concern to be considered in the Racine County hazard mitigation plan. This section describes alternate and selected strategies to mitigate these types of hazards. As part of the updating process, these strategies were reviewed and reevaluated by the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

### **Identification of Alternative Mitigation Strategies**

As described in Chapter II, Racine County contains a significant number of fixed facilities that store hazardous substances, as well as an extensive transportation system to move hazardous materials throughout the County. Nevertheless, there have only been a limited number of minor hazardous material incidents, all of which have been properly handled through local emergency response actions.

Hazardous materials are present in quantities of concern in business and industry, agriculture, universities, hospitals, utilities, and other facilities in Racine County. Despite extensive precautions taken to ensure careful handling during manufacture, transport, storage, use, and disposal, accidents and inadvertent releases are bound to occur. In review by the Racine County Hazard Mitigation Plan Local Planning Team as part of the updating process the following measures to reduce vulnerability to hazardous material incidents have been identified as viable for this update of the Racine County hazard mitigation plan.

#### ***Nonstructural***

- Continue participation in the Wisconsin Hazardous Materials Response System;
- Maintain current County-wide, State-designated Type II hazardous materials response team;
- Assess levels of training and refresher training for hazardous material response among first responders, including law enforcement, fire, emergency medical, and public works personnel;
- Continue to document the flow of hazardous cargo along transportation routes in the County through recurring updates to the County's commodity flow study;<sup>108</sup>
- Update the County's hazardous materials plan as needed;<sup>109</sup>
- Maintain communication and coordination between railroads operating trains containing large amounts of Bakken crude oil, Wisconsin Emergency Management, Racine County Office of Emergency Management, and local communities;<sup>110</sup>

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<sup>108</sup> *Emergency Response Specialists, LLC, Racine County Local Emergency Planning Committee Hazardous Materials Commodity Flow Study, August 2011.*

<sup>109</sup> *Racine County Office of Emergency Management, Racine County Hazardous Materials Plan, March 2017.*

<sup>110</sup> *U.S. Department of Transportation Emergency Order (Docket Number DOT-OST-2014-0067) requires that each railroad operating trains containing more than 1,000,000 gallons of crude oil, or approximately 35 tank cars, provide the State Emergency Response Commission notification regarding the expected movement of such trains through the counties in the State.*

- Update the County’s railroad emergency response plan as needed;<sup>111</sup>
- Develop local community response plans for hazardous material releases;
- Promote community and operator compliance with industry safety regulations and standards;
- Promote development of site emergency plans for schools, factories, office buildings, shopping malls, hospitals, and other appropriate sites that produce, store, or utilize hazardous materials or that are near facilities or transportation routes where hazardous materials are produced, stored, used, or transported;
- Inventory and evaluate stockpiles of materials used for responding to hazardous material incidents, such as firefighting foam; and
- Consider enacting zoning restrictions for areas adjacent to transportation routes carrying hazardous cargoes.

### ***Structural***

- Promote proper design, construction, maintenance and inspections of hazardous material storage facilities, pipelines, and other related facilities;
- Promote continued maintenance and upgrading of transportation infrastructure carrying shipments of hazardous cargo;
- Urge the railroad companies that own the tracks that traverse Racine County to consider adding safety gate systems at all at-grade railroad crossings along routes that transport crude oil;
- Urge the railroad companies that own the tracks that traverse Racine County to consider adding safety gate systems at all at-grade crossings that do not currently have them installed;
- Promote control, enforcement, and cleanup of hazardous materials, including proper disposal of chemicals; and
- Continue and consider expansion of the current household hazardous waste management program.

### ***Public Informational and Educational Programming***

- Promote public awareness of hazardous material dangers and personal protection actions for these dangers;
- Educate businesses and those utilizing hazardous materials of their responsibilities;
- Conduct public outreach and education for those who live or work near facilities or transportation corridors where hazardous materials are produced, stored, used, or transported regarding actions to take if a hazardous materials incident occurs;
- Encourage public awareness and widespread use of the “Diggers Hotline” utility damage prevention service;
- Continue to promote training, planning, and preparedness for mass-casualty incidents involving fixed facilities and transportation systems; and
- Continue to develop trained, equipped, and prepared emergency first responders. Training should be recurring, as needed.

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<sup>111</sup> *Racine County Office of Emergency Management, Racine County Railroad Emergency Response Plan, An Attachment to the Racine County Countywide Hazardous Materials Plan, October 2014.*

## **Current Programs**

### ***Federal and State Programs***

In 2014, the U.S. Department of Transportation issued an Emergency Order requiring all railroads operating trains containing more than one million gallons of Bakken crude oil, or approximately 35 tank cars, in a particular state to provide the State Emergency Response Commission (SERC) notification regarding the expected transport of such cargo through the counties of that state. The notification must include estimated volumes of Bakken crude oil being transported, frequencies of anticipated train traffic, and the route that the crude oil will be transported. The railroad operators must also provide contact information for a responsible party from the railroad and assist the SERC in sharing the information with the appropriate emergency responders in appropriate communities. In addition, the Pipeline and Hazardous Materials Safety Administration (PHMSA) and Federal Railroad Administration (FRA), in coordination with Canada, issued a rule in 2015 that mandates enhanced standards for new tank cars and a retrofitting schedule for older tank cars carrying crude oil and ethanol. The rule also requires a new braking standard for certain trains and designates new operational protocols for trains transporting large volumes of flammable liquids, including routing requirements, speed restrictions, and information for local government agencies regarding the cargo.

In accordance with The Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 and Chapter 59 of the *Wisconsin Statutes*, a Local Emergency Planning Committee (LEPC) has been established in Racine County and in other counties in Wisconsin. WEM has been charged with the duties of the State Emergency Response Commission and is the oversight organization for the EPCRA grant program, the emergency response system, and establishing training standards for the State and the LEPCs. In Wisconsin, the Federally-mandated local planning districts are counties and the LEPCs develop emergency response plans and prepare for hazardous material emergencies within their individual counties. Each LEPC is required to coordinate its planning activities with local response agencies and local industries that handle extremely hazardous substances above threshold planning quantities (TPQs), and to develop emergency response plans for the transportation of hazardous materials through their communities. Additionally, facilities are required to make emergency release notification to the National Response Center, the State EPCRA program and LEPC whenever there is a release of an “extremely hazardous substance” or other hazardous substances listed under the Comprehensive Environmental Resources and Conservation Liability Act (CERCLA).

To provide a high level of hazardous materials response capabilities to local communities, WEM contracts and manages 22 Regional Hazardous Materials Response Teams. The teams are divided into four Task Forces: Northeast Task Force, Northwest Task Force, Southeast Task Force, and the Southwest Task Force. These Task Forces are then divided into Type III, Type II, and Type I teams, all with complimentary capabilities and training requirements.

Type III teams are appropriately equipped and trained to handle all known industrial chemical hazards in liquid, aerosol, powder, and solid forms. They are not expected to be fully equipped to intervene and handle vapor or gas emergencies or incidents involving chemical, biological, radiological, nuclear, and explosive agents (CBRNE). Type II teams are equipped and trained to meet all Type III requirements and are appropriately equipped and trained to handle all unknown industrial chemical hazards in liquid, aerosol, powder, solids, and vapor or gas forms. They are generally not expected to be fully equipped to intervene and handle incidents involving CBRNE. Type I teams meet all Type III and Type II requirements and are also appropriately equipped and trained to handle and can function in all categories for all known and unknown CBRNE agents.

Racine County is part of the Southeast Task Force. This task force includes Type III teams in Fond du Lac, Sheboygan, and Washington Counties, a Type II team in Racine County, and a Type I team in Milwaukee County.

The Wisconsin Hazardous Materials Response System may be activated for an incident involving a hazardous materials spill, leak, explosion, injury, or the potential of immediate threat to life, the environment, or property. The Wisconsin Hazardous Materials Response system responds to the most serious of spills and releases requiring the highest level of skin and respiratory protective gear. This includes all chemical, biological, or radiological emergencies.

Through public educational programs, Emergency Managers in Wisconsin counties are required to make the public aware of certain hazardous materials located at local facilities. Information about these facilities in Racine County is shared with the public through the Racine County LEPC. The LEPC consists of representatives from a cross-section of individuals from throughout Racine County, including, but not limited to, elected officials, members of emergency response agencies, media representatives, community groups, and facility representatives from the community. Types of material, quantities stored, and their inherent dangers are discussed during quarterly LEPC meetings. Facilities having these hazardous materials are required to give this information to Emergency Management and to prepare written plans to respond to possible spills.

Federal and State programs also include awareness and education activities. The Wisconsin Department of Health Services has developed a chemical release tool kit to provide information to local governments, health departments, and citizens in Wisconsin about preparing for and responding to hazardous material incidents.<sup>112</sup>

### ***Local Programs***

The Racine County Office of Emergency Management and the LEPC have developed a countywide hazardous materials plan which was updated in March 2017.<sup>113</sup> The plan also contains information on protective actions such as how to reach the facility coordinator in an emergency, evacuation, and in-place sheltering. It also lists special facilities that may be located within the vulnerability zone. The Racine County Office of Emergency Management and the LEPC are also responsible for receiving and maintaining files. They maintain a countywide emergency response plan, develop and update offsite emergency response plans and the County's hazard analysis for both fixed facilities and chemicals that are transported on highways and railways.

In the event of a hazardous materials incident, Racine County is well served by a regional hazardous material response system. In 1995, the City of Racine Fire Department signed a contract with the State of Wisconsin to provide Hazardous Materials response in Southeastern Wisconsin. The firefighters that make up the Hazardous Materials Team have been trained to respond to chemical-related emergencies. The City of Racine also has specialized equipment and a state-of-the-art hazardous materials response vehicle.

A Commodity Flow Study was completed for Racine County in 2011.<sup>114</sup> The study covers transportation of hazardous material within the County on interstate, State, and local highways and streets. The study also reviews general information regarding off-site emergency response planning facilities and County hazardous materials response planning efforts. The study is intended to better prepare local responders and mutual aid departments in surrounding counties for a transportation related hazardous materials release within Racine County.

Racine County has also developed a railroad emergency response plan.<sup>115</sup> This plan was developed to serve as a resource for local emergency responders in the event of a rail emergency in the County. The plan contains a standard response guidance of rescue, medical, and firefighting operations to combat the effects of a major rail disaster. The plan also addresses responding to a railway accident involving a hazardous material release and includes response checklists and a guide to railroad car identification and to the railroad tank car marking system.

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<sup>112</sup> *Wisconsin Department of Health Services, Wisconsin Chemical Release Toolkit, Publication P00734, July 2014.*

<sup>113</sup> *Racine County Hazardous Materials Plan, op. cit.*

<sup>114</sup> *Racine County Local Emergency Planning Committee Hazardous Materials Commodity Flow Study, op. cit.*

<sup>115</sup> *Racine County Railroad Emergency Response Plan, An Attachment to the Racine County Countywide Hazardous Materials Plan, op. cit.*



A variety of methods are used to warn people in Racine County of emergency situations, including hazardous material incidents. These warning systems are described in the section of this chapter related to thunderstorm wind, non-thunderstorm high-winds, hail, and lightning hazards.

The Racine County Office of Emergency Management has a number of brochures, booklets, and pamphlets available for the public on hazardous chemical safety and other general emergency management-related topics. The Office of Emergency Management conducts a number of disaster exercises and drills including tabletop and functional exercises focused on hazardous materials release. In addition, the Racine Wastewater Utility holds multiple household hazardous waste collection dates each year where residents can drop off harmful chemicals from around their homes for safe disposal.

As described in Chapter II, Racine County has developed a comprehensive emergency management plan 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 which complement the County plan and which also sets forth procedures and actions to deal with a range of situations and events, including hazardous materials incidents.

### **Evaluation of Alternatives and Identification of Mitigation Actions**

Based upon review of the above, the current ongoing programs represent a major component of the planned mitigation action with regard to the continued compliance with safety regulation standards, continued training of first responders, enforcement of existing laws and rules, and public informational and educational programming systems. Other potential mitigation actions include expansion of the current household hazardous waste management program; development of, and continued updates to, relevant hazardous materials related plans at the County and local municipality level; and maintenance and upgrading of transportation infrastructure.

### **Multi-Jurisdictional Considerations**

Hazardous material incidents could potentially impact all municipalities within the County. Increased potential impacts for hazardous material incidents are apparent for those communities in the County that are traversed by Interstate 94 and freight railroad lines. Racine County, the local units of government, and relevant businesses need to coordinate hazard mitigation activities through the local government participation in countywide disaster planning and response mechanisms.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation, consideration of risk (see Appendix G), and review and action by the Racine County Hazard Mitigation Plan Local Planning Team (see Appendix A), the following mitigation measures related to hazardous material incidents are included in this update of the Racine County hazards mitigation plan:

- Continue participation in Wisconsin Hazardous Materials Response System;
- Continue to promote training, planning, and preparedness for first responders of mass-casualty incidents involving hazardous materials at fixed facilities and transportation systems;
- Develop local community response plans for hazardous material releases and continue coordination of these plans among governmental units, businesses, and first responders;
- Promote development of site emergency plans for schools, factories, office buildings, shopping malls, hospitals, and other appropriate sites that produce, store, or utilize hazardous materials or that are near facilities or transportation routes where hazardous materials are produced, used, stored, or transported;
- Promote proper design, construction, maintenance, and inspections of hazardous material storage facilities, pipelines, and other related facilities;
- Promote continued maintenance and upgrading of transportation infrastructure carrying shipments of hazardous cargo;

- Educate businesses and those utilizing hazardous materials of their responsibilities;
- Promote educational and informational programming related to hazardous material safety, and to individual actions to protect citizens, property, and businesses;
- Promote ongoing enforcement of Federal, State, and County regulatory standards;
- Support existing, and consider expansion of, household waste management control programs;

Because these measures are intended to be ongoing efforts, the Planning Team decided to retain them in the updated plan.

## **HAZARD MITIGATION PLAN COMPONENT FOR PUBLIC HEALTH EMERGENCIES**

As described in Chapter IV, public health emergencies involving natural and human-induced hazard events are of concern to be considered in the Racine County hazard mitigation plan. This section describes alternative and selected strategies to mitigate these types of hazards. As part of the updating process, these strategies were reviewed and reevaluated by the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

### **Identification of Alternative Mitigation Strategies**

As described in Chapter IV, a range of public health emergencies from the individual level, through multi-casualty, to mass-casualty levels can occur throughout Racine County. Within Racine County many of the reported public health emergencies were associated with communicable diseases. The severity of communicable disease outbreaks can range from small, relatively localized outbreaks to major pandemics. The 2009 outbreak of the H1N1 influenza strain is an example of a communicable disease incident that resulted in social or economic disruptions within the County. The water crisis in Flint, Michigan stemming from lead contamination in the drinking water supply is an example of a potential human-induced public health emergency. As part of the review and update of the Racine County Hazard Mitigation Plan, the Local Planning Team identified the following measures to reduce County vulnerability to public health emergencies.

#### ***Nonstructural***

- Continue maintenance of a community public health system with adequate numbers of staff and sufficient disease monitoring and surveillance capabilities to adequately protect the population from illness and disease;
- Continue to develop trained, equipped, and prepared public health responders;
- Supply all first responders and clinicians with health-related advisories or disease specific guidance documents as provided by the Wisconsin Division of Public Health and/or the Centers for Disease Control or Prevention;
- Provide technical assistance to all food and beverage service sites as it relates to health standards, including food, water, and sanitation;
- Promote development of site emergency plans for schools, factories, office buildings, shopping malls, hospitals, and other appropriate sites;
- Promote the development of site emergency plans for local units of government;
- Provide community support of clinics and school health services;
- Promote pollution control, enforcement, and cleanup, including proper disposal of chemicals and scrap materials;

- Implement preventive actions directed toward a specific medical situation. For example, preventive actions considered for mosquito-borne diseases could include: mosquito abatement measures, such as catch basin cleaning or spraying and general spraying; standing water reduction actions; and individual actions, such as covering and use of repellents;
- Develop and maintain public health emergency response plans for use in the event of a public health emergency, including plans for mass dispensing clinics;
- Develop, implement, and support preventative health services (e.g. programs to reduce opioid abuse);
- Coordinate the surveillance and investigation of communicable disease. Implement disease tracking procedures to assess numbers of persons and areas affected to determine the potential for spread of disease and minimize the effects on the community;
- Maintain inventories of resources and equipment related to public health emergency response (e.g. personal protective equipment);
- Promote childhood and adult immunization programs;
- Develop and implement plans to replace publicly owned water service lines and other infrastructure that are known to contain lead. In addition, municipalities and water utilities should promote the replacement of privately owned portions of lead water service lines and other lead plumbing fixtures and pursue available funding opportunities to help offset the cost of these necessary improvements.

### ***Structural***

- Improve ventilation techniques in areas/facilities prone to crowding, or that may involve exposure to contagion or noxious atmospheres;
- Maintain community water and sewer infrastructure at high operating standards.

### ***Public Informational and Educational Programming***

- Develop and release educational materials to instruct, direct, and coordinate actions that ensure the health, safety, and welfare of community residents;
- Promote preventative actions directed toward the protection of the public's health. For example, provide information on the proper use of repellents to reduce the public's unprotected exposure to mosquitoes and ticks;
- Promote public awareness to local health hazards (e.g. radon gas)
- Inform the public on the prevention and control of communicable diseases. For example, encourage County residents to receive immunizations against communicable diseases such as annual and novel influenza inoculations.
- Promote and educate the public on the use of water filtration devices for tap water sources that are used for drinking water in homes where there are known lead service lines, lead plumbing, or fixtures, and where replacement of the lead service line or plumbing fixtures is not currently feasible.

### **Current Programs**

#### ***Federal and State Programs***

The U.S. Department of Health and Human Services (HHS) is the Federal government's principal agency for protecting the health of all Americans and providing essential human services, especially for those who are least able to help themselves. The Department has 11 operating divisions, including eight agencies in the U.S. Public Health

Service and three human services agencies. These operating divisions administer 115 programs, covering a wide spectrum of activities. Some of these activities include:

- Medical and social science research;
- Preventing outbreak of infectious disease;
- Immunization services;
- Assuring food and drug safety;
- Medicare, which provides health insurance for elderly and disabled Americans (implementation is supported by the Racine County Human Services Department);
- Medicaid, which provides health insurance for low-income people (implementation is supported by the Racine County Human Services Department);
- Financial assistance and services for low-income families (implementation is supported by the Racine County Human Services Department);
- Improving maternal and infant health;
- Head Start (pre-school education and services (implementation is supported by the Racine County Human Services Department);
- Preventing child abuse and domestic violence (implementation is supported by the Racine County Human Services Department);
- Substance abuse treatment and prevention (implementation is supported by the Racine County Human Services Department);
- Services for older Americans, including home-delivered meals (implementation is supported by the Racine County Human Services Department);
- Comprehensive health services for Native Americans (implementation is supported by the Racine County Human Services Department); and
- Medical preparedness for emergencies.

HHS works closely with State, local and tribal governments, and many HHS-funded services are provided at the local level by State, County or tribal agencies, or through private sector grantees. In addition to the services they deliver, the HHS programs provide for equitable treatment of beneficiaries nationwide, and they enable the collection of national health and other data.

The Center for Disease Control and Prevention (CDC) is one of the operating divisions within HHS and is recognized as the lead Federal agency for protecting the health and safety of people both at home and abroad. The CDC provides credible information to enhance health decisions, and promotes health through strong partnerships. The CDC serves as the national focus for developing and applying disease prevention and control, environmental health, and health promotion and education activities designed to improve the health of the people of the United States.

The CDC's mission is to promote health and quality of life by preventing and controlling disease, injury, and disability. The CDC seeks to accomplish this mission by working with partners throughout the nation and world to monitor health, detect and investigate health problems, conduct research to enhance prevention, develop and advocate sound public health policies, implement prevention strategies, promote healthy behaviors, foster safe and healthful environments, and provide leadership and training. In addition, the CDC has developed and sustained many vital partnerships with public and private entities that improve service to the American people.

In March 2010, the Patient Protection and Affordable Care Act (ACA) was signed into law. The ACA is the most significant regulatory overhaul of the United States healthcare system since the passage of Medicare and Medicaid in 1965. The ACA includes provisions that are to take effect between 2010 and 2020. A main provision of the law, the individual mandate, requires everyone who is not covered by an employer sponsored health plan, Medicaid, Medicare, or another public insurance program, to purchase a qualified health insurance plan or pay a penalty. Under the ACA, health insurance plans can no longer limit or deny benefits to certain patients for preexisting conditions, persons under the age of 26 may be eligible to be covered under their parents health plan, lifetime limits on benefits are banned for all new health plans, and certain preventative care is covered at no cost to the patient. The CDC has reported that the percentage of people without health insurance in the United States fell from about 16 percent in 2010 to about nine percent in 2016.<sup>116</sup> Census data from Wisconsin shows that the uninsured rate in the State was 5.7 percent in 2015, down from 9.4 percent in 2010.<sup>117</sup>

The Wisconsin Department of Health Services (WDHS) works in partnership with local governments, health and human services agencies, private providers, and concerned and affected citizens to protect and promote the health and safety of the people of Wisconsin. The Division of Public Health (WDPH) provides public health services to the people of Wisconsin that address acute and chronic diseases; health promotion; environmental, occupational, family and community health; emergency medical services; and injury prevention. WDPH also collects statistics related to the health of Wisconsin residents. Through its Bureau of Communicable Diseases, WDPH promotes efforts to prevent and control communicable diseases in Wisconsin. Specific responsibilities of the Bureau include:

- Implementing surveillance, control, and prevention measures for communicable diseases;
- Maintaining a State-wide disease surveillance system;
- Providing vaccines and technical assistance to health care providers that conduct immunizations for those communicable diseases for which vaccines are available;
- Operating the Wisconsin Immunization Registry which keeps track of immunization histories for Wisconsin citizens;
- Conducting educational activities to encourage prompt and complete immunization;
- Assisting local health departments, health care providers, and citizens to prevent and control the spread of communicable diseases;
- Assisting in the early identification and intervention of communicable diseases;
- Informing the public about ways to prevent and control communicable diseases;
- Monitoring scientific advances in the field of communicable disease prevention and control research; and
- Incorporating appropriate advances into public health practice.

Other divisions of the WDHS related to public health include the Division of Care and Treatment Services (DCTS), which supports community mental health and substance abuse programs and operates seven facilities providing services for mental health and developmental disabilities; the Division of Long Term Care (DLTC), which oversees

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<sup>116</sup> *Center for Disease Control, Early Release of Selected Estimates Based on Data from the National Health Interview Survey, November 2016.*

<sup>117</sup> *United States Census Bureau, Health Insurance Coverage in the United States: 2015, September 2016.*

the provision of long-term support services for older adults and people with disabilities; and the Division of Health Care Access and Accountability (DHCAA), which administers the Medicaid and Food Share programs and provides help to medically needy and low income individuals and families.

In addition to the programs offered by the WDHS, a number of other organizations conduct programs related to public health in Wisconsin. These organizations include the Wisconsin Hospital Association, the Wisconsin Association of Local Health Departments and Boards, the Wisconsin Public Health Association, Wisconsin Medical Society, University of Wisconsin, the Medical College of Wisconsin, the Bureau of Local Public Health Practice and Emergency Management Services, the Wisconsin Laboratory of Hygiene, the Wisconsin Division of Emergency Management (WEM), the Wisconsin Primary Health Care Association, the Wisconsin Office of Rural Health, and the Children's Hospital of Wisconsin Poison Center.

### ***Local Programs***

Racine County has developed a comprehensive emergency management plan which sets forth an all-hazards action plan. Additionally, some 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, including a variety of natural and human-induced public health emergencies.

Racine County has two health departments that cover the municipalities within the County: the City of Racine Health Department (RHD) and the Central Racine County Health Department (CRCHD). In addition to serving the City of Racine, the RHD serves the Villages of Wind Point and Elmwood Park. The CRCHD serves the City of Burlington; the Villages of Caledonia, Mount Pleasant, North Bay, Rochester, Sturtevant, Union Grove, and Waterford; and the Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville. Primary functions performed by the RHD and CRCHD include conducting disease surveillance and investigations; performing public education regarding communicable diseases, disease prevention, immunization, and protection from environmental hazards; providing immunizations; and licensing and inspecting food, lodging, campgrounds, recreational water, and body art facilities within their service areas.

The CRCHD and the RHD have developed a Public Health Emergency Plan (PHEP).<sup>118</sup> The PHEP is an all-hazard response plan for public health that covers all aspects of planning and enables the health departments to respond in a collaborative and organized manner. In addition to the PHEP, the CRCHD and RHD have developed two disease specific response manuals including a pandemic influenza plan and an Ebola response plan.

The CRCHD and RHD have also developed a Mass Clinic Plan.<sup>119</sup> Mass immunizations or prophylaxis may need to be provided to County residents in the event of public health emergency. This plan serves as a guide for establishing and operating a mass clinic and defines the roles and responsibilities of the individuals that will coordinate clinic operations. The plan also defines the procedures for requesting, receiving, and utilizing the assets of the Strategic National Stockpile (SNS) program.<sup>120</sup>

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<sup>118</sup> *Central Racine County and Racine Health Departments, Public Health Emergency Plan, March 2017.*

<sup>119</sup> *Central Racine County and Racine Health Departments, Mass Clinic Plan, Appendix to the Public Health Emergency Plan, February 2017.*

<sup>120</sup> *The Center for Disease Control and Prevention's Strategic National Stockpile (SNS) is the nation's largest supply of potentially life-saving pharmaceuticals, vaccines, and other medical supplies for use in a public health emergency severe enough to cause local supplies to run out.*

### **Evaluation of Alternatives and Identification of Mitigation Actions**

Based upon review of the information contained in this document by the Racine County Hazard Mitigation Plan Local Planning Team the current ongoing programs represent the major component of the planned mitigation action with regard to the continued prevention, control, and preparedness for public health emergency incidents, and public informational and educational programming systems. In addition, development and implementation of programs aimed at reducing the exposure of lead from drinking water supplies represents an addition to planned actions to mitigate potential public health hazards.

### **Multi-Jurisdictional Considerations**

Public health emergency incidents could potentially impact all municipalities within the County. Therefore, Racine County, the local units of government, the local health departments, and relevant businesses need to coordinate hazard mitigation activities through participation in countywide disaster planning and response mechanisms.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation and consideration of risk (see Appendix G), by the Racine County Hazard Mitigation Plan Local Planning Team (see Appendix A), the following mitigation measures related to public health emergencies are included in this update of the Racine County hazards mitigation plan:

- Continue educational and informational programming related to general public health and safety issues;
- Continue maintenance of the community public health infrastructure with adequate numbers of staff and to support public health monitoring, surveillance, response, reporting, and research, and to implement prevention and control programs;
- Develop and maintain plans for medical counter measure dispensing in the event of an infectious disease emergency;
- Provide the public health work force with the knowledge and tools needed for the early detection and control of diseases and disease vectors;
- Ensure prompt implementation of prevention strategies and enhance communication of public health information about emerging diseases, their vectors, and control measures;
- Continue support of training, equipment, planning, and preparedness of emergency management and response officials;
- Continue coordination of emergency response plans among governmental units, businesses and emergency management services and promote development of site emergency plans for schools, factories, office buildings, shopping malls, hospitals, and other appropriate sites; and
- Promote strategies to prevent and/or mitigate the public's exposure to harmful environmental contaminants (e.g. develop and implement plans to systematically replace publicly owned water service lines and other infrastructure that are known to contain lead and promote the replacement of privately owned portions of lead water service lined and other lead plumbing fixtures and pursue available funding opportunities to offset the cost of these necessary improvements; and promote the use of water filtration devices on drinking water sources in homes where there are known lead service lines, lead plumbing, or fixtures and where replacement of the lead service line or plumbing fixture is not currently feasible<sup>121</sup>)

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<sup>121</sup> *Water filters to remove lead from drinking water should be certified by the National Science Foundation (NSF) under Standard 53 for lead removal.*

Because most of these measures are intended to be ongoing efforts, the Local Planning Team decided to retain some of the recommendations from the previous edition of the plan and include additional priority mitigation measures in the updated plan.

## **HAZARD MITIGATION PLAN COMPONENT FOR TERRORISM INCIDENTS**

As described in Chapter IV, terrorism involving human-induced hazard events is of limited concern to be considered in the Racine County hazard mitigation plan. This section describes alternate and selected strategies to mitigate these types of hazards. As part of the updating process, these strategies were reviewed and reevaluated by the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

### **Identification of Alternative Mitigation Strategies**

As described in Chapter IV, a range of terrorism incidents from the individual level, through multi-casualty, to mass-casualty levels have the potential to occur in Racine County. The magnitude and scope of a terrorism incident is dependent upon the technological means available to the terrorists, nature of the political issue motivating the act, and points of weakness of the terrorism target. However, there is no real precedent for such events in Racine County. In the review by the Racine County Hazard Mitigation Plan Local Planning Team as part of the updating process, the following measures to reduce vulnerability to terrorism incidents and related hazards have been identified as viable for this update of the Racine County hazard mitigation plan. It should be noted that incidents involving cyberattack are addressed separately in the section on cyberattack on local government in this chapter.

#### ***Nonstructural***

- Promote development of a thorough community risk and threat assessment that identifies potential vulnerabilities and targets for sabotage, terrorism, and/or weapons of mass destruction (WMD) attack;
- Promote and conduct preparedness activities including planning, training, and exercises for local law enforcements, fire and rescue, and other response personnel for a variety of terrorist, sabotage, and weapons of mass destructions attacks;
- Promote development of site emergency plans that address evacuation and in-place sheltering for schools; factories; office buildings; shopping malls; hospitals; critical governmental, utility, and infrastructure systems; and other appropriate sites;
- Establish and train Community Emergency Response Teams (CERT) coordinated with County and local emergency operations planning and programs;
- Promote alertness, awareness, and monitoring of organizations and activities that may threaten the community;
- Establish clear communication lines with WEM, as the means to access assistance from the Wisconsin National Guard;
- Provide legitimate channels of political and public expression;
- Encourage residents to report suspicious behavior and establish avenues of reporting (and potential rewards) for information preventing terrorist incidents and sabotage;
- Support and expand the use of Neighborhood Watch;
- Develop and promote workable population protection plans such as evacuation and in-place sheltering plans, as appropriate; and
- Promote increased security measures at water supply facilities that could include increased security patrols, and/or increased monitoring for pathogens and chemical toxins.



## ***Structural***

- Continue to restrict access to sensitive critical community facilities;
- Heighten security at public gatherings, special events, and critical community facilities and industries;
- Consider the use of concrete barriers to restrict access of vehicles for large gatherings such as fairs, farmer’s markets, and block parties; and
- Maintain, update, and upgrade public early warning systems and networks. Consider expanding such systems as necessary. Desirable characteristics of a robust early warning system include:
  - Employing multiple means of communications to alert people of the imminent threat of terrorism incident. Examples of such means include providing warnings and/or information through outdoor warning systems, broadcast media, cable and satellite media, electronic mail, SMS messaging, social media, and reverse-911 telephony, and
  - Being capable of reaching vulnerable segments of the population.

## ***Public Informational and Educational Programming***

- Promote public awareness of terrorism-related dangers and personal protection actions for these dangers;
- Continue participation and promotion of the “See Something Say Something” public awareness campaign sponsored by the U.S. Department of Homeland Security, raising awareness of indicators of terrorism and terrorism-related crime and emphasizing the importance of reporting suspicious activity to law enforcement;
- Promote greater awareness of, and provision for, mental health services in schools, workplaces, and institutional settings;
- Increase coverage and use of NOAA All Hazard Weather Radio, and encourage residents to register for available emergency alert services such as CodeRED® and emergency preparedness and damage reporting mobile apps such as Ready Badger, which can provide notification to the community during any period of emergency, including a terrorist attack; and
- Promote development and testing (i.e., tabletop exercises) of internal emergency plans and procedures by businesses and organizations.

## **Current Programs**

### ***Federal and State Programs***

At the Federal level, initiatives to combat terrorism are coordinated through the Department of Homeland Security (DHS). Since its establishment, DHS has been the lead Federal agency responsible for preparing for and responding to terrorist attacks, in addition to being the lead Federal agency for preparing for, responding to, and recovering from any accidental, man-made, or natural disasters. DHS also has a variety of anti-terrorism resources available to local governments including information, training, and funding.

The DHS has developed the Law Enforcement First Responder Training Program (LEFRTP). This classroom-based training program is designed to help State and local law enforcement officers build critical skills needed to effectively respond to mass consequence events, including criminal acts, terrorist attacks, and other large-scale emergencies. The program provides training, guidelines, and resources for first responders to use a system of command to achieve a coordinated and effective incident response.

In partnership with the FBI, the DHS has also developed a web portal known as Countering Violent Extremism and Active Shooter (CVE-AS) on the Homeland Security Information Network (HSIN). This web portal provides

videos and training resources and a document library with information covering many violent extremism topics. The web portal also provides a forum for sworn law enforcement officers (Federal, State, or local) to exchange information and outreach initiatives on related topics.

Wisconsin anti-terrorism efforts are coordinated by WEM within the Department of Military Affairs in cooperation with the Wisconsin Office of Justice Assistance and various other Federal, State, and local agencies. A Wisconsin Interagency Working Group on Terrorism, which includes numerous State agencies and advisory members from Federal agencies was initiated by the Governor in 1997. This group has been working WEM on Weapons of Mass Destruction and other terrorism-related issues.

Another important State program is the availability of the Wisconsin National Guard, which can be accessed through the Wisconsin Department of Military Affairs, Division of Emergency Management.

### ***Local Programs***

As described in Chapter II, all 17 local units of government either own or contract with fire and rescue departments. Ten of the 17 municipalities in Racine County provide for law enforcement through local police departments. In the remaining municipalities primary law enforcement is provided by the County Sheriff's Department. All of the fire and rescue departments in Racine County participate in the 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 emergency incidents and to bring in additional resources. In addition, there are four hospitals, 20 major clinics, and two health departments located within Racine County (see Appendices C and D for more details).

Programs within Racine County also include those conducted by the Racine County Office of Emergency Management. The Office of Emergency Management has developed a weapons of mass destruction plan that provides a framework for planning and responding to a terrorist threat or incident that may occur within Racine County.<sup>122</sup> The plan provides general guidance for the coordination of emergency operations and resources within the County. In addition, the Racine County Office of Emergency Management has a number of brochures, booklets, and pamphlets available for the public on preparedness for a terrorism event and other general emergency management-related topics.

Racine County has developed a comprehensive emergency management plan 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 which complement the County plan and which also sets forth procedures and actions to deal with a range of situations and events, including a variety of terrorism incidents.

A variety of methods are used to warn people in Racine County of emergency situations, including terrorism incidents. These warning systems are described in the section of this chapter related to thunderstorm wind, non-thunderstorm high-winds, hail, and lightning hazards.

### **Evaluation of Alternatives and Identification of Mitigation Actions**

Based upon review of the above, the current ongoing programs represent a major component of the planned mitigation action with regard to the continued prevention, control, and preparedness for terrorist incidents, and public informational and educational programming systems. Feasible, nonstructural and structural mitigation actions include development of a thorough community risk and threat assessment that identifies potential vulnerabilities, heightening security at special events and critical community facilities, development of site emergency plans, and development of emergency water supply source protection measures which may be applicable at the municipality level.

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<sup>122</sup> *Racine County Office of Emergency Management, Special Subject-Weapons of Mass Destruction, January 2004.*

### **Multi-Jurisdictional Considerations**

Terrorism incidents could potentially impact all municipalities within the County. These events can potentially cause multiple damages to a variety of infrastructure including transmission lines, utilities, and transportation routes, as well as other critical community facilities in the vicinity of the incident. Hence, Racine County, municipalities, and relevant businesses will need to coordinate hazard mitigation activities through the local government participation in countywide disaster planning and response mechanisms. Such measures are already well underway through the coordinated emergency operations planning program involving the Racine County Office of Emergency Management and coordinated local community emergency operations programs.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation, consideration of risk (see Appendix G), and review and action by the Racine County Hazard Mitigation Plan Local Planning Team (see Appendix A), the following mitigation measures related to terrorism incidents are included in this update of the Racine County hazards mitigation plan:

- Develop, maintain, update, and upgrade public and institution-based early warning systems and networks. Encourage the public to register for early warning services such as CodeRED® Emergency and Weather Notification System and the Ready Badger app;
- Promote and conduct preparedness activities including planning, training, and exercises for local law enforcement, fire and rescue departments, and other emergency management services for a variety of terrorist, sabotage, and weapons of mass destruction attacks;
- Promote development of site emergency plans that address evacuation and in-place sheltering for schools, factories, office buildings, shopping malls, hospitals, government buildings and infrastructure, and other appropriate sites;
- Consider the need to strengthen public health infrastructure to support surveillance, response, reporting and research, and to implement prevention and control programs from potential chemical and bio-terrorism attacks;
- Continue maintenance and consider enhanced security measures at water treatment facilities, including increased pathogen and chemical monitoring, and emergency drinking water supply source alternative planning;
- Continue coordination of emergency response plans among Federal, State, and local governmental units, businesses, and emergency management services; and
- Heighten security at public gatherings, special events, critical community facilities, utilities, and infrastructure.

Because most of these measures are intended to be ongoing efforts, the Task Force decided to retain them in the updated plan.

## **HAZARD MITIGATION PLAN COMPONENT FOR CYBERATTACK ON LOCAL GOVERNMENT**

As described in Chapter IV, cyberattack is a hazard of concern to be considered in the Racine County hazard mitigation plan. This section describes alternative and selected strategies to mitigate this hazard.

### **Identification of Alternative Mitigation Strategies**

A range of cyberattack incidents have the potential to affect local government in Racine County. Such attacks may include the disabling of information systems, theft or modification of sensitive or important information, transfer of control of an information system to an unauthorized user, or use of local government resources for unauthorized

purposes. The magnitude and scope of a cyberattack incident is also dependent upon the technological means available to the attackers, the goals and motivations of the attackers, and the points of weakness of the local government information system. The Racine County Hazard Mitigation Plan Local Planning Team identified the following measures to reduce local government vulnerability to cyberattack.

### ***Nonstructural***

- Consider hiring information technology staff if such staff is not currently employed;
- Provide cybercrime and cyberthreat training to appropriate information technology staff, law enforcement personnel, and prosecutors;
- Purchase of cyber-insurance. Such insurance may include first party coverage against losses such as data destruction, extortion, theft, hacking, and denial of service attacks; liability coverage indemnifying the local government for losses to others caused by actions such as errors and omissions, failure to safeguard data, or defamation; and other benefits such as regular audits of security, investigative expenses, and criminal reward funds;
- Education in basic cybersecurity actions for employees. This education should include training on:
  - Identifying sensitive data;
  - Prioritizing which data need more protection;
  - Prioritizing which data need more frequent backing up;
  - Policies regarding access to and use of data;
  - Recognizing suspicious files, emails, and websites;
  - Using strong passwords and changing passwords at regular intervals; and
  - Achieving a balance between operational efficiency and risk;
- Installation, maintenance, and regular updating of security software, such as firewalls and antiviruses, on computers and computer networks;
- Installation of updates for operating systems and application software on computers and computer networks as they become available;
- Disconnection from the internet of computers and networks that store highly sensitive information or that control or monitor important equipment or processes; and
- Consider developing back up or alternative public safety communications systems and first responder networks in the event of communication loss due to cyberattack.

### ***Structural***

- Installation of dedicated communication lines for monitoring and/or controlling critical equipment or processes.

### ***Public Informational and Educational Programming***

- Develop and implement a cybersecurity and data back-up educational initiative for Racine County.

### **Current Programs**

#### ***Federal and State Programs***

Several Federal agencies provide no-cost specialized cybercrime training to state and local law enforcement agencies. The Federal Bureau of Investigation's (FBI) Cyber Investigation Certification Program teaches law enforce-

ment personnel how to secure digital artifacts in crime scenes. The FBI Cyber Shield Alliance provides state and local law enforcement agency partners access, intelligence sharing, Federally sponsored training, and fellowships at the National Cyber Investigative Joint Task Force. The National Initiative for Cybersecurity Careers and Studies (NICSS) makes research and training information available through a searchable catalog that allows users to find cyber training programs based on location, preferred delivery method, specialty area, or proficiency level. The National Computer Forensics Institute offers training courses to state and local law enforcement, prosecutors, and judges through funding from the Federal government. Travel, lodging, equipment for some classes, and course fees are provided at no cost to attendees or their agencies. The Federal Law Enforcement Training Centers' Cyber Division provides introductory to advanced cybercrime training to state and local law enforcement personnel. FEMA's National Training and Education Division provides cybercrime and cybersecurity focused courses that address issues such as network assurance, digital forensics, cyber law, white collar crime, and cyber incident analysis and response. The National White Collar Crime Center (NW3C) provides support for law enforcement and regulatory agencies involved in the prevention, investigation, and prosecution of economic and high-tech crime. The NW3C offers courses in cyber investigation, forensics and cybercrime, network intrusions, mobile forensics and wireless network investigations.

The U.S. Department of Homeland Security provides educational materials on cybersecurity and reducing vulnerability to cyberattack.

WEM, through its Ready Wisconsin initiative provides educational materials on several hazards, including cyber-attack. These materials include a monthly cybersecurity newsletter, links to resources, pre-recorded radio public service announcements, and videos.

### ***Local Programs***

In June 2016, the Racine County Finance and Human Resources Committee passed a resolution authorizing an agreement for the County to purchase cyber liability and computer fraud/funds transfer insurance coverage. The insurance coverage would help protect the County against losses of County funds as well as lawsuits against the County in the event of a cyberattack that resulted in the exposure of sensitive data.

The Racine County Office of Emergency Management hosted two seminars in 2013 related to cybersecurity. The seminar objectives were to inform municipal officials on the nature and reach of cyberattacks so they can better help their communities prevent, detect, respond to, and recover from cyber incidents. They also provided community leaders and first responders with information on how cyberattacks can impact operations and emergency responses in a community.

### **Evaluation of Alternatives and Identification of Mitigation Actions**

Based upon review of the above, programs to educate and train government employees in basic cybersecurity measures including identifying sensitive data and recognizing cyber-threats represent a major component of the planned mitigation actions with regard to the continued prevention and control of, and preparedness for, cyberattack incidents. Feasible, nonstructural and structural mitigation actions include risk and threat assessment that identifies potential vulnerabilities, increasing security of servers that contain sensitive data, and protecting against monetary loss and liability with insurance.

### **Multi-Jurisdictional Considerations**

All municipalities within Racine County could potentially be impacted by cyberattacks.

### **Priority Mitigation Measures**

The mitigation actions considered most viable for cyberattacks on local government are as follows:

- Purchase of cyber insurance by local governments, including both first party and liability coverage;
- Encourage local governments to provide education in basic cybersecurity to their employees, including training on identifying sensitive data, prioritizing data which needs greater protection and/or more frequent

backing up, policies regarding data access and use, recognition of cyber-threats, proper procedures for passwords, and balancing operational efficiency and risk;

- Disconnect computers and networks from the internet that store highly sensitive information or that control or monitor important equipment or processes;
- Consider installing dedicated communication lines for monitoring and/or controlling critical equipment or processes; and
- Develop and implement a cybersecurity and data back-up initiative.

## **HAZARD MITIGATION PLAN COMPONENT FOR ACTIVE SHOOTER INCIDENTS**

As described in Chapter IV, no active shooter incidents have been reported in Racine County. However, increased occurrences of this type of event across the United States and the unpredictability of an active shooter incident make this hazard a concern to be considered in the Racine County hazard mitigation plan.

### **Identification of Alternative Mitigation Strategies**

As described in Chapter IV, a variety of community assets including educational, commercial, transportation systems, and critical community facilities have the potential to be impacted by an active shooter incident. The Racine County Hazard Mitigation Plan Local Planning Team identified the following measures to reduce the vulnerability to an active shooter.

#### ***Nonstructural***

- Promote and conduct preparedness activities including planning, training, and exercises for local law enforcement, fire, and rescue, and other response personnel for an active shooter incident in a variety of public and private locations;
- Continue and train Community Emergency Response Teams (CERT) in coordination with County and local emergency operations planning and programs;
- Promote development of site emergency action plans that address evacuation and in-place sheltering for schools, factories, office buildings, shopping malls, movie theatres, hospitals, government buildings, and other appropriate sites;
- Promote alertness, awareness, and monitoring of activities that may threaten the community;
- Establish avenues of reporting for information that could potentially prevent active shooter incidents and continue participation and promotion of the “If You See Something, Say Something” public awareness campaign sponsored by the U.S. Department of Homeland Security emphasizing the importance of reporting suspicious activity to law enforcement; and
- Promote adequate safety and security budgeting for public and non-public entities.

#### ***Structural***

- Heighten security at public gatherings, special events, schools, factories, office buildings, shopping malls, hospitals, government buildings, and other appropriate sites;
- Maintain, update, and upgrade public early warning systems and networks. Consider expanding such networks as necessary. Desirable characteristics of a robust early warning system include:

- Employing multiple means of communications to alert people of the imminent threat of an active incident. Examples of such means include providing warnings and/or information through outdoor warning systems, broadcast media, cable and satellite media, electronic mail, SMS messaging, social media, and reverse-911 telephony, and
- Being capable of reaching vulnerable segments of the population;
- Consider installation of credential-based facilities access control systems for appropriate sites;
- Consider installation of remote door-lock security systems on entryways and lobby doors of appropriate sites;
- Consider installation of deadbolt locks on doors of individual classrooms, offices, and other appropriate sites;
- Consider installation of public address loudspeaker systems in schools, office buildings, shopping malls, movie theatres, hospitals, government buildings, and other appropriate sites that allow for timely distribution of information and instructions in the event of an active shooter incident; and
- Ensure that facilities have at least two evacuation routes and post evacuation routes in conspicuous locations throughout the facility.

### ***Public Information and Educational Programming***

- Promote and conduct preparedness activities including mock active shooter incident exercises to prepare facility management and security, employees, students, and other appropriate regular occupants of the facility to effectively respond and help minimize injury and loss of life. Include local law enforcement agencies and emergency responders in these training exercises;
- Develop and promote awareness programs to educate families and communities on early warning signs of individuals who may be at risk for violence;
- Promote awareness of and promotion for mental health services in schools, workplaces, and institutional settings;
- Maintain, update, and upgrade public early warning systems and networks including use of Emergency Alert System broadcasts and Wireless Emergency Alert System warnings;
- Encourage residents to register for the CodeRED® Emergency and Weather Notification System, and the Ready Badger app;
- Develop and maintain institution-oriented warning systems, such as mass SMS messaging lists, for universities, hospitals, and similar campus-like settings that can distribute warnings and emergency instructions to those in the immediate area of an active shooter incident; and
- Promote education of the public on the best way to respond when an active shooter is in their vicinity. The U.S. Department of Homeland Security recommends the following response:
  - Evacuate-If there is an accessible escape path, attempt to evacuate the premises;
  - Hide Out-If evacuation is not possible, find a place to hide where the active shooter is less likely to find you. If possible, lock the door or blockade the door with heavy furniture.
  - Take action against the attacker-As a last resort, and only when your life is in imminent danger, attempt to disrupt or incapacitate the active shooter.

## **Current Programs**

### ***Federal and State Programs***

The U.S. Department of Justice, Bureau of Justice Assistance has partially funded an active shooter training program known as Advanced Law Enforcement Rapid Response Training (ALERRT).<sup>123</sup> This program prepares the first officers on the scene of an active shooter incident to isolate, distract, and end the threat. The training was developed by the San Marcos, Texas Police Department; the Hays County, Texas Sheriff's Department; and Texas State University. After the incident at Sandy Hook Elementary in Newtown, Connecticut, the FBI offered to work with ALERRT personnel to improve the course by providing updates and ensuring compliance with current rules and regulations. In 2013 the FBI designated the ALERRT program as the national standard in active shooter response training.

The FBI's Behavioral Analysis Unit (FBI BAU) has developed several publications related to active shooter incidents. The FBI BAU published a report in 2002 to serve as a practical guide to businesses and government in implementing proactive workplace violence prevention strategies.<sup>124</sup> The report, in part, examines pre-incident warning behaviors of attackers who have targeted places of employment. The FBI BAU has also partnered with the U.S. Department of Education and the U.S. Secret Service to publish a similar report focused on attempted and committed homicidal attacks on college campuses in the United States.<sup>125</sup>

The U.S. Department of Homeland Security (DHS) partners with a broad range of stakeholders to provide resources to help organizations and facilities plan for an active shooter incident. The DHS website offers a webinar designed for private and public sector organizations to develop emergency response plans and prepare employees or students on how to respond if confronted with an active shooter incident.<sup>126</sup> In addition, DHS has held scenario-based workshops to facilitate discussions with private sector professionals and law enforcement representatives to learn how to prepare for, and respond to, an active shooter incident. The DHS also has a number of videos, brochures, booklets, and pamphlets available regarding preparedness for an active shooter incident. This material is separated into information for the public, human resources personnel, security personnel, and law enforcement professionals.

In addition, the DHS has developed the Law Enforcement First Responder Training Program (LEFRTP). This classroom-based training program is designed to help state and local law enforcement officers build critical skills needed to effectively respond to mass consequence events including criminal acts, terrorist attacks, and other large-scale emergencies. The program provides training, guidelines, and resources for first responders to use a system of command to achieve a coordinated and effective incident response.

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<sup>123</sup> Agencies can obtain no-cost active shooter training in their area by submitting a request via the ALERRT website, <http://www.alerrt.org>. The site provides general information, requirements for hosting a training session, and registration materials.

<sup>124</sup> U.S. Department of Justice, Federal Bureau of Investigation, Workplace Violence, Issues in Response, 2002.

<sup>125</sup> U.S. Secret Service, U.S. Department of Education, and Federal Bureau of Investigation, Campus Attacks, Targeted Violence Affecting Institutions of Higher Education, April 2010

<sup>126</sup> This webinar and other active shooter incidents preparedness materials and resources can be found at the U.S. Department of Homeland Security website at <https://www.dhs.gov/active-shooter-preparedness>.



The DHS, in partnership with the Federal Bureau of Investigation (FBI), has developed a web portal known as Countering Violent Extremism and Active Shooter (CVE-AS) on the Homeland Security Information Network (HSIN).<sup>127</sup> This web portal provides training resources and a document library covering many violent extremism and active shooter topics. The web portal also provides a forum for sworn law enforcement officers (Federal, state, or local) to exchange information and outreach initiatives on related topics.

### ***Local Programs***

As described in Chapter II, all 17 local units of government either own or contract with fire and rescue departments. There are four hospitals, 20 major clinics, and two health departments located within Racine County. (see Appendices C and D for more details). Ten of the 17 municipalities in Racine County provide for law enforcement through local police departments. In the remaining municipalities primary law enforcement is provided by the County Sheriff's Department. All of the fire and rescue departments in Racine County participate in the 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 emergency incidents and to bring in additional resources.

Racine County has developed a comprehensive emergency management plan 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 which complement the County plan and which also set forth procedures and actions to deal with a range of situations and events, including armed attacks.

The Racine County Office of Emergency Management along with the Racine County Sheriff's department has been proactive in training public officials and employees how best to respond during an active shooter event. Several active shooter tabletop exercises have been held in the County. Representatives from eleven agencies joined Regency Mall officials to participate in a tabletop exercise where a realistic scenario involving a lone gunman facilitated the discussion. Discussion centered on mall policies and interactions with responding agencies, as well as policies and procedures for first responders. An active shooter tabletop exercise was also conducted at a local manufacturing facility involving management and staff of the facility.

The City of Racine Police Department has also participated in active shooter exercises. In April 2013, the Department collaborated with Wheaton Franciscan—All Saints on a full-scale exercise hosted at their Spring Street Campus. The exercise included about 50 volunteer actors, and was based on a scenario where a hospitalized inmate had overpowered his police guard, stealing his gun, and fired shots within the hospital. The SWAT Team, investigators, and hostage negotiators faced patient actors with a variety of illnesses and limitations and had to determine whether the patients could be evacuated, or whether they should be sheltered in place as they tried to locate and neutralize the suspect.

A variety of methods are used to warn people in Racine County of emergency situations, including active shooter incidents. These warning systems are described in the section of this chapter related to thunderstorm wind, non-thunderstorm high-winds, hail, and lightning hazards.

### **Evaluation of Alternatives and Identification of Mitigation Actions**

Based upon review of the above, programs aimed at preparedness and training of local law enforcement and fire department first responders represent a major component of the planned mitigation action with regard to the prevention, control, and protection of life for active shooter incidents. In addition, preparedness education and training of students, employees, and the general public regarding the best actions to take in the event of an active shooter

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<sup>127</sup> More information and access to the Countering Violent Extremism and Active Shooter web portal can be found on the U.S. Department of Homeland Security website at <https://www.dhs.gov/cveas-portal>.

incident represent an equally important component to this plan. Feasible, nonstructural and structural mitigation actions include development of site emergency plans, increasing access control to certain facilities, and installing security devices at key locations within facilities.

### **Multi-Jurisdictional Considerations**

Active shooter incidents could potentially impact all municipalities within the County. Hence, Racine County, municipalities, and relevant businesses will need to coordinate hazard mitigation activities through the local government participation in countywide planning, training, and response mechanisms.

### **Priority Mitigation Measures**

Based upon the foregoing evaluation, consideration of risk (see Appendix G), and review and action by the Racine County Hazard Mitigation Plan Local Planning Team (see Appendix A), the following mitigation measures related to active shooter incidents are included in this update of the Racine County hazards mitigation plan:

- Develop, maintain, update, and upgrade public and institution-based early warning systems and networks. Encourage the public to register for early warning services such as CodeRED® Emergency and Weather Notification System and the Ready Badger app;
- Continue development of preparedness activities including planning, training, and exercises for local law enforcement, fire and rescue, and other first response personnel for active shooter incidents in a variety of public and private locations;
- Promote development of site emergency plans that address evacuation and in-place sheltering for schools, factories, office buildings, shopping malls, movie theatres, hospitals, government buildings, and other appropriate sites;
- Conduct preparedness activities including training and mock active shooter exercises that carry out site emergency plans to effectively respond to potential active shooter incidents and help minimize injury and loss of life. Include participation of facility management and security, employees, students, and other appropriate regular occupants of the facility;
- Consider installing appropriate security devices at vulnerable facilities such as facility access control systems, remote door lock systems for public entryways, deadbolt locks on individual classrooms and offices, and public address systems.

## **HAZARD MITIGATION PLAN COMPONENTS FOR POWER OUTAGES**

As described in Chapter II, power outages are a hazard of concern to be considered in the Racine County hazard mitigation plan. This section describes selected strategies to mitigate power outages. As part of the updating process, these strategies were reviewed and reevaluated by the Racine County Hazard Mitigation Plan Local Planning Team in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

### **Identification of Alternative Mitigation Strategies**

As described in Chapter IV, long-term power outages can occur throughout Racine County. The severity of such events may range from small, relatively localized incidents to major incidents impacting a substantial portion of the County. Some outages may result in serious social and economic disruptions. The following measures to reduce vulnerability to long-term power outages have been identified as viable for the Racine County Hazard Mitigation Plan.

#### ***Nonstructural***

- Continue to review and implement programs to improve the reliability of the power supply facilities. Such measures may include implementation of maintenance and operational improvements, equipment upgrad-

ing, providing redundancy in the supply facilities where appropriate, and in some instances, burying power lines;

- Coordinate activities and communication between the power suppliers and the Racine County Emergency Management Office to keep County and municipal officials informed of prevention practices and response activities during outages;
- Establish and maintain a database of critical facilities, such as shelters, long-term care facilities, and fueling sites, that have back up power generators;
- Encourage businesses to develop a continuity of operations plan and business resumption plan to be put into place during and after a long-term power outage;<sup>128</sup> and
- Develop plans for evacuations and shelter operations in the case of a prolonged outage.

### ***Structural***

- Encourage the installation of backup power generators at critical facilities; and
- Trim and maintain the health of trees near vulnerable infrastructure, such as utility lines, essential facilities and roads, as well as near homes and businesses. Communities should prepare for emerald ash borer infestation by developing a funding strategy for removal of infested ash trees. A well planned response can minimize the impact of infestation, reduce liability, and lessen the overall cost to a community. Ash trees should be removed at the first sign of infestation of the emerald ash borer.

With regard to preparing for a power outage, We Energies recommends<sup>129</sup> creating an emergency plan that includes backup provisions for special electrical medical equipment, sump pump backup systems, telephone provisions, assembly of an emergency kit, protection of electrical equipment, and installation or provision of power generators where appropriate.

### ***Public Informational and Educational Programming***

- Conduct outreach to businesses and facilities to encourage them to develop plans for dealing with long-term power outages. Such outreach should also encourage them to be realistic about the amount and types of assistance that they can expect to receive from local government during an outage;
- Continue and refine public informational and educational programming to include information on safety during power outages and preparation for power outages. With regard to safety during outages, We Energies<sup>130</sup> offers the following recommendations:
  - Stay at least 25 feet from downed power lines or flooded areas;
  - Use flashlights rather than candles;
  - Unplug or turn off appliances to avoid overloading when power is restored;

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<sup>128</sup> A continuity of operations plan focuses on restoring an organization's essential functions at an alternate site and performing those functions for up to 30 days before returning to normal operations. A business resumption plan addresses the restoration of business processes after an emergency.

<sup>129</sup> We Energies, "Power Outage Safety Tips," [http://www.we-energies.com/outages\\_safety/reporting/outage-safety-tips.htm](http://www.we-energies.com/outages_safety/reporting/outage-safety-tips.htm), accessed July 11, 2016.

<sup>130</sup> *Ibid.*

- Do not use extension cords between homes or across yards or streets;
- Do not use outdoor grills, kerosene heaters, or camping stoves or heaters indoors;
- People whose homes are extremely hot or cold should go to a safe shelter;
- Stay clear of electric company vehicles and equipment;
- Have a supply of safe water;
- Keep refrigerated food safe or dispose of it;
- Leave a light on in your home. When crews do neighborhood spot checks, they’ll know your power is back on if a light is on; and
- Create a family plan on procedures to be used if an outage occurs.

## **Current Programs**

### ***Federal and State Programs***

WEM has produced educational resources regarding power outages including prerecorded radio public service announcements and scripts for radio public service announcements.<sup>131</sup> Other informational and educational material related to power outages and mitigative measures are available from organizations such as the American Red Cross.<sup>132</sup>

### ***Local Programs***

As previously noted, the causes of power outages are primarily weather-related and, to a lesser extent, equipment failure and other factors. The electric power supply companies—in the case of Racine County, We Energies, the primary supplier, and American Transmission Company, the owner and operator of the main transmission facilities—have programs in place to improve the reliability of the electric power delivery system. Equipment and facilities where equipment failures have a history of occurrence are given priority.

These companies also have operational procedures for resolving outage problems once they occur. The power company procedures are prioritized to first deal with any life-threatening situations, then larger outages, and then smaller secondary lines and neighborhood equipment. In some cases homes, utilities, hospitals, and business owners have installed, or have available, backup power generating sources to be used during power outages that temporarily provide for partial or full power during an outage. We Energies has prepared informational and educational materials related to power outage mitigative measures.

## **Multi-Jurisdictional Considerations**

All municipalities within Racine County could potentially be impacted by long-term power outages. Racine County, the local units of government, and relevant businesses need to coordinate hazard mitigation activities through the local government participation in countywide disaster planning and response mechanisms.

## **Priority Mitigation Measures**

In the review by the Racine County Hazard Mitigation Plan Local Planning Team as part of the updating process, the mitigative actions considered viable for power outage incidents are as follows:

- Continue to review and implement programs to improve the reliability of the power supply facilities. Consider implementing such measures as maintenance and operational improvements, equipment upgrading, providing redundancy in the supply facilities where appropriate, and, burying power lines where appropriate;

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<sup>131</sup> These can be accessed at Wisconsin Emergency Management’s ReadyWisconsin website located at: [http://ready.wi.gov/Resources/Manager\\_Resources.asp](http://ready.wi.gov/Resources/Manager_Resources.asp).

<sup>132</sup> American Red Cross, “Be Red Cross Ready: Power Outage Checklist,” 2009.

- Encourage the installation of backup power generators at public and private critical facilities;
- Coordinate activities and communication between the power suppliers and the Racine County Office of Emergency Management to keep County officials informed of prevention practices and reaction activities during outages; and
- Continue and refine public informational and educational programming to include information on safety during outages and preparation for outages. Emergency preparedness information related to the safe operation of generators, space heaters, fireplaces, and wood stoves should be included.

Because most of these measures are intended to be ongoing efforts, the Local Planning Team decided to retain them in the updated plan.

## **SUMMARY**

Based upon the foregoing evaluation of each of the natural and other hazards above, the priority mitigation measures identified to be included in the Racine County hazard mitigation plan are summarized in Table 70. Table 70 provides an evaluation of the mitigation measures identified in each hazard category based upon estimated capital costs and annual operation and maintenance, likely direct and indirect benefits of implementation, and a list of communities affected. Table 70 also indicates those mitigation measures that are related to continued compliance with the National Flood Insurance Program.

There are several potential issues inherent in the prioritization or ranking of the mitigation measures, which were considered in development of the recommended ranking of priority mitigation measures summarized below. First, the Racine County hazard vulnerabilities as shown in Appendix G are different for loss of life and injury versus property damages, which may affect prioritization of costs to be incurred. For the purposes of this plan priority or emphasis was placed upon preventing loss of life and injury.

The costs of avoidance of a particular hazard may not be quantifiable, but the cost of occurrence of the hazard often is—for example, most hazards have been quantified by insurance underwriters in the issuance of property and life insurance policies. Conversely, the benefit of any particular mitigation measure may also not be quantifiable or realized. For example, continued coordination of emergency response and operation plans among governmental units and first responders will directly enhance preparedness and protection of the communities involved; however, this action may or may not ultimately result in reduced property damage, injuries or death if the hazard does not occur. Similarly, in the case of flood mitigation, upstream actions may result in downstream benefit even if the immediate benefits at the location where the mitigation measure was applied may be less than optimal.

Another potential issue is whether the hazard ranking reflects public health concerns for which mitigation is possible. For example, the vulnerability to hazards such as extreme heat and lightning are very much a matter of personal exposure. Mitigation in the traditional sense (strengthening a structure or moving a structure away from the hazard such as in flood mitigation) is of little use for these hazards. Neither extreme heat nor lightning are emergency management issues in terms of operations. Reducing the risk of mortality from lightning or temperature extremes requires public health information and hazard awareness so that individuals take precautions to limit their exposure to the hazard. While hazard awareness and public safety information are important for any type of hazard, it is especially important for hazards such as temperature extremes, lightning, tornadoes, and severe thunderstorms.

### **Ranking of Priority Mitigation Measures**

The mitigation measures identified in each hazard category were evaluated based upon relative cost, direct benefits, and likely indirect benefits as shown in Table 70. Consideration was given to the likelihood of occurrence of each type of hazard as set forth in the hazard prioritization analysis as shown in Appendix G. Greatest priority is recommended to be given to those mitigation measures that directly or indirectly resulted in minimized loss of life or injury.

Table 70

**COST-BENEFIT ANALYSIS SUMMARY OF MEASURES INCLUDED IN THE RACINE COUNTY ALL-HAZARDS MITIGATION PLAN**

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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			
Flooding and Related Stormwater Drainage Problems	Floodplain and Environmentally Sensitive Land Preservation Element												
	• Floodplain and wetland zoning <sup>d</sup>	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	X	X	5	Racine County; Cities of Burlington and Racine; and Villages of Caledonia, Mt. Pleasant, Rochester, Sturtevant, Union Grove, Waterford, and Wind Point	
	• Environmentally sensitive area and open preservation action <sup>d</sup>	31,219.4 <sup>f</sup>	-- <sup>f</sup>	--	--	X	X	X	--	--	4	Racine County; Cities of Burlington and Racine; and Villages of Caledonia, Elmwood Park, Mt. Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford, and Wind Point	
	• Wetland Restoration of up to 6,800 acres of agricultural land to reduce flood-related agricultural and property damages	-- <sup>s</sup>	-- <sup>s</sup>	--	--	X	X	X			4	Racine County; City of Burlington; Villages of Caledonia, Mt. Pleasant, Rochester, Sturtevant, Union Grove, and Waterford; and Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville.	
	Floodland Management Plan Element Fox River Watershed												
	• Construction of dikes and floodwalls in City of Burlington <sup>g</sup>	2,858.1 <sup>g</sup>	4.1 <sup>g</sup>	--	--	X	X	X	--	--	--	City of Burlington	
	• Structure floodproofing or removal <sup>d</sup>	68,243.3 <sup>h</sup>	--	--	--	X	X	X	--	--	4	Racine County; City of Burlington; Towns of Burlington, Dover, Norway, and Waterford; and Villages of Rochester and Waterford	
	• Replacement of two 20-foot-wide radial gates and one actuator motor at Waterford Dam <sup>i</sup>	98.9	8.2	--	X	--	X	X	--	--	3, 5	Racine County and Village of Waterford	
	• Installation of gates at Rochester Dam	427.1	3.4	--	X	--	X	X	--	--	3, 4, 5	Racine County and Village of Rochester	
	• Channel clean out in Fox River upstream from Waterford Impoundment	17.5	0.1	X	--	--	X	X	--	--	4	Town of Waterford	
• Land acquisition <sup>d</sup>	1,471.0	--	--	--	X	X	X	--	--	4	Racine County and Town of Waterford		
• Maintenance dredging within Waterford Impoundment	1,292.2	--	--	--	X	X	X	--	--	4	Racine County, Town of Waterford, and Village of Waterford		
• Channel clean out of Wind Lake Drainage Canal	1,011.4	20.2	--	--	X	X	X	--	--	--	Racine County; Towns of Dover and Norway; and Village of Rochester		

Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Flooding and Related Stormwater Drainage Problems (continued)	<ul style="list-style-type: none"> <li>Channel clean out and deepening along Muskego Canal</li> </ul>	56.1	2.8	X	--	--	X	X	--	--	--	Racine County and Town of Norway
	<ul style="list-style-type: none"> <li>Construct agricultural dikes along Wind Lake Drainage Canal and tributaries<sup>f</sup></li> </ul>	1,185.6	20.2	--	--	X	X	X	--	--	--	Racine County; Towns of Dover, Norway; and Village of Rochester
	<ul style="list-style-type: none"> <li>Construction of levees and channel improvements along Hoosier Creek<sup>j</sup></li> </ul>	1,962.7	22.6	--	--	X	X	X	--	--	5	Racine County and Town of Burlington
	Root River Watershed <ul style="list-style-type: none"> <li>Channel clearing and maintenance along the Root River Canal</li> </ul>	662.2	21.8	--	X	--	X	X	--	--	4	Racine County and Towns of Raymond and Yorkville
	<ul style="list-style-type: none"> <li>Structure floodproofing or removal<sup>d</sup></li> </ul>	34,952.9 <sup>h</sup>	--	--	--	X	X	X	--	--	4	Racine County; City of Racine; Villages of Caledonia and Mt. Pleasant; and Towns of Raymond, and Yorkville
	<ul style="list-style-type: none"> <li>Increase spillway capacity or remove of Horlick Dam</li> </ul>	370.0 to 960.0 <sup>k</sup>	0.7 to 2.9	--	X	--	X	X	--	--	4, 5	Racine County and City of Racine
	Pike River Watershed <ul style="list-style-type: none"> <li>Pike River channel enlargement and rehabilitation</li> </ul>	20,000.0	26.2	--	--	X	X	X	--	--	2, 3, 4	Racine County and Village of Mt. Pleasant
	<ul style="list-style-type: none"> <li>Berm along Bartlett Branch</li> </ul>	146.6	1.2	--	X	--	X	X	--	--	3	Racine County and Village of Mt. Pleasant
	<ul style="list-style-type: none"> <li>Chicory Road culvert replacement along Sorenson Creek</li> </ul>	349.3	0.0	--	X	--	X	X	--	--	3	Racine County and Village of Mt. Pleasant
	<ul style="list-style-type: none"> <li>Structure floodproofing or removal<sup>d</sup></li> </ul>	9,151.8 <sup>h</sup>	--	--	--	X	X	X	--	--	4	Racine County, City of Racine, and Villages of Mt. Pleasant and Sturtevant
	Des Plaines River Watershed <sup>l</sup> <ul style="list-style-type: none"> <li>Provide onsite detention storage facilities for planned new development<sup>d</sup></li> </ul>	8,323.4 <sup>m</sup>	84.8 <sup>n</sup>	--	--	X	X	X	--	--	3	Racine County, Town of Yorkville, and Villages of Mt. Pleasant and Union Grove
	<ul style="list-style-type: none"> <li>Prairie restoration<sup>d</sup></li> </ul>	838.3 to 2,365.1	1.3 to 95.3	--	X	--	--	X	--	--	4	Racine County, Town of Yorkville, and Villages of Mt. Pleasant and Union Grove
	<ul style="list-style-type: none"> <li>Wetland restoration<sup>d</sup></li> </ul>	216.3 to 542.5 <sup>n</sup>	0.4 to 24.6	--	X	--	--	X	--	--	4	Racine County, Town of Yorkville, and Village of Mt. Pleasant
Stormwater Management Plan Element <ul style="list-style-type: none"> <li>Stormwater management plans<sup>d</sup></li> </ul>	-- <sup>o</sup>	-- <sup>o</sup>	X	--	--	X	X	--	--	3, 4	Racine County; Cities of Burlington and Racine; and Villages of Caledonia, Elmwood Park, Mt. Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford, and Wind Point	

Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Flooding and Related Stormwater Drainage Problems (continued)	<ul style="list-style-type: none"> <li>Stormwater-related regulations<sup>d</sup></li> </ul>	-- <sup>p</sup>	-- <sup>p</sup>	X	--	--	X	X	--	--	3, 4	Racine County; Cities of Burlington and Racine; and Villages of Caledonia, Elmwood Park, Mt. Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford, and Wind Point
	Public Information and Education Element	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	2, 3, 5	Racine County and all local jurisdictions <sup>r</sup>
	Secondary Plan Element <ul style="list-style-type: none"> <li>National Flood Insurance Program and map updating<sup>a</sup></li> </ul>	-- <sup>e</sup>	-- <sup>e</sup>	--	X	--	X	X	--	--	3	Racine County; Cities of Burlington and Racine; Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville; and Villages of Caledonia, Mt. Pleasant, Rochester, Sturtevant, Union Grove, and Waterford
	<ul style="list-style-type: none"> <li>Lending institution and real estate agent policies<sup>d</sup></li> </ul>	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	--	--	3	Racine County; Cities of Burlington and Racine; Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville; and Villages of Caledonia, Mt. Pleasant, Rochester, Sturtevant, Union Grove, and Waterford
	<ul style="list-style-type: none"> <li>Channel maintenance</li> </ul>	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	--	--	3, 4	Racine County; Cities of Burlington and Racine; Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville; and Villages of Caledonia, Mt. Pleasant, Rochester, Sturtevant, Union Grove, and Waterford
	<ul style="list-style-type: none"> <li>Stormwater management facilities maintenance<sup>a</sup></li> </ul>	-- <sup>e</sup>	-- <sup>e</sup>	--	X	--	X	X	--	--	3	Racine County; Cities of Burlington and Racine; Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville; and Villages of Caledonia, Mt. Pleasant, Rochester, Sturtevant, Union Grove, and Waterford
	<ul style="list-style-type: none"> <li>Dam inspections, emergency action plans, and removals</li> </ul>	-- <sup>s</sup>	--	X	--	--	X	--	--	--	3, 4, 5	Racine County; Cities of Burlington and Racine; Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville; and Villages of Caledonia, Mt. Pleasant, Rochester, Sturtevant, Union Grove, and Waterford
<ul style="list-style-type: none"> <li>Survey of buildings near flood hazard area<sup>d</sup></li> </ul>	820.0	--	X	--	--	X	X	--	--	1, 3	Racine County; Cities of Burlington and Racine; Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville; and Villages of Caledonia, Mt. Pleasant, Rochester, Sturtevant, Union Grove, and Waterford	



Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Thunderstorm, High-Wind, Hail, and Lightning Hazards	Maintain, update, and further develop early warning systems and networks including use of NOAA All Hazard Weather Radios, EAS broadcasts, WEA system, CodeRED® Emergency and Weather Notification System, and the Ready Badger app	-- <sup>s</sup>	-- <sup>s, t</sup>	--	X	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Promote educational and informational programming, especially related to the early warning network, and to individual actions to protect citizens, property, and businesses	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Enforce building code ordinances requirements	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	X	X	--	Racine County; Cities of Burlington and Racine; and Villages of Caledonia, Elmwood Park, Mt. Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford, and Wind Point
	Encourage provision of safe rooms	-- <sup>s</sup>	-- <sup>s</sup>	--	X	--	X	--	X	X	5	Racine County and all local jurisdictions <sup>f</sup>
	Work with municipalities and businesses to explore installation of community safe rooms and hardening projects for community facilities, businesses, and manufacturers	-- <sup>u</sup>	-- <sup>u</sup>	--	X	--	X	--	X	X	5	Racine County and all local jurisdictions <sup>f</sup>
	Consideration by municipalities of adopting mobile home park regulations which require that community safe rooms be provided for residents of new and expanding mobile home parks	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	X	X	5	Racine County and all local jurisdictions <sup>f</sup>
	Pursue grant funding for installation of safe rooms in existing mobile home parks, based on community and landowner interest	-- <sup>u</sup>	-- <sup>u</sup>	--	X	--	X	--	X	X	5	Racine County, Villages of Caledonia, Mt. Pleasant, and Waterford; Towns of Burlington, Dover, and Yorkville
	Encourage agricultural producers to purchase crop insurance	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	X	--	--	1, 3	Racine County
	Continue to conduct annual weather spotter training	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County
	Continued coordination of emergency operations and response plans among governmental units and first responders	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
Tornadoes	Maintain, update, and further develop early warning systems and networks including use of NOAA All Hazard Weather Radios, EAS broadcasts, WEA system, CodeRED® Emergency and Weather Notification System, and the Ready Badger app	-- <sup>s</sup>	-- <sup>s, t</sup>	--	X	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>

Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Tornadoes (continued)	Retrofit existing or install new structures to ensure adequate shelters from tornadoes for public buildings, major industrial sites, and other large businesses or complexes such as shopping malls, fairgrounds, mobile home parks, and other vulnerable public areas	-- <sup>v</sup>	-- <sup>v</sup>	--	X	--	X	X	X	X	5	Racine County, and all local jurisdictions <sup>f</sup>
	Work with municipalities and businesses to explore installation of community safe rooms and hardening projects for community facilities, businesses, and manufacturers	-- <sup>u</sup>	-- <sup>u</sup>	--	X	--	X	--	X	X	5	Racine County, and all local jurisdictions <sup>f</sup>
	Consideration by municipalities of adopting mobile home park regulations that require that community safe rooms be provided for residents of new and expanding mobile home parks	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	X	X	5	Racine County, and all local jurisdictions <sup>f</sup>
	Pursue grant funding for installation of safe rooms in existing mobile home parks, based on community and landowner interest	-- <sup>u</sup>	-- <sup>u</sup>	--	X	--	X	--	X	X	5	Racine County, Villages of Caledonia, Mt. Pleasant, and Waterford; Towns of Burlington, Dover, and Yorkville
	Promote educational and informational programming, especially related to the early warning network, and to individual actions to protect citizens, property, and businesses	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	5	Racine County, and all local jurisdictions <sup>f</sup>
	Enforce building code ordinances requirements	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	X	X	5	Racine County; Cities of Burlington and Racine; and Villages of Caledonia, Elmwood Park, Mt. Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford, and Wind Point
	Continue to conduct annual weather spotter training	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County
	Continue coordination of emergency response and operation plans among governmental units and first responders	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County, and all local jurisdictions <sup>f</sup>
Extreme Temperature Events	Organize neighborhood outreach groups who look after vulnerable groups and individuals	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County, and all local jurisdictions <sup>f</sup>
	Identify and advertise a list of available heating and/or cooling shelters in the immediate area	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	5	Racine County, and all local jurisdictions <sup>f</sup>
	Continue to provide special arrangements for payment of heating bills	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Utilities, Racine County and all local jurisdictions <sup>f</sup>

Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Extreme Temperature Events (continued)	Maintain, update, and further develop early warning systems and networks including use of NOAA All Hazard Weather Radios, EAS broadcasts, WEA system, CodeRED® Emergency and Weather Notification System, and the Ready Badger app	-- <sup>s</sup>	-- <sup>s, t</sup>	--	X	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Promote educational and informational programming	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
Lake Michigan Coastal Hazards	Continued enforcement of County shoreland zoning ordinance <sup>d</sup>	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	X	X	3, 5	Racine County; City of Racine; and Villages of Caledonia, Mt. Pleasant, North Bay, and Wind Point
Lake Michigan Coastal Hazards (continued)	Review Lake Michigan shoreline municipal shoreland ordinances <sup>d</sup>	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	X	X	3, 5	Racine County; City of Racine; and Villages of Caledonia, Mt. Pleasant, North Bay, and Wind Point
	Update assessment of the effectiveness of Lake Michigan shoreline protection structures in the County every 10 years	60.5	--	X	--	--	X	X	X	X	3, 5	Racine County; City of Racine; and Villages of Caledonia, Mt. Pleasant, North Bay and Wind Point
	Continued construction and maintenance of shoreline protection structures	-- <sup>u</sup>	-- <sup>u</sup>	--	X	--	X	X	--	--	3	Racine County; City of Racine; and Villages of Caledonia, Mt. Pleasant, North Bay and Wind Point
	Where possible, relocate buildings within a high-risk area. 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 structures should be considered. This plan element is presented as an option, subject to the preference of the individual property owner.	-- <sup>u</sup>	--	--	X	--	X	X	X	X	3, 5	Racine County; City of Racine; and Villages of Caledonia, Mt. Pleasant, North Bay and Wind Point
	Continue ongoing programs to update and refine coastal hazard area data using geographic information system technology <sup>d</sup>	20.6	--	X	--	--	X	--	--	--	3	Racine County; City of Racine; and Villages of Caledonia, Mt. Pleasant, North Bay and Wind Point
	Review water and wastewater treatment plant and outfall capacity and level of protection under range of Lake Michigan water levels	-- <sup>u</sup>	-- <sup>u</sup>	--	X	--	X	--	--	--	4	City of Racine
	Public informational and educational programming	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	5	Racine County; City of Racine; and Villages of Caledonia, Mt. Pleasant, North Bay and Wind Point

Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Winter Storm Events	Organize neighborhood outreach groups who look after vulnerable groups and individuals	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Identify and advertise a list of available heated shelters in the immediate area	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Maintain, update, and further develop early warning systems and networks including use of NOAA All Hazard Weather Radios, EAS broadcasts, WEA system, CodeRED® Emergency and Weather Notification System, and the Ready Badger app	-- <sup>s</sup>	-- <sup>s,t</sup>	--	X	--	X	--	--	X	5	Racine County and all local jurisdictions <sup>f</sup>
	Promote educational and informational programming	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Encourage residents to develop a Family Emergency Preparedness Plan including the preparation of a Disaster Supply Kit	--	--	X	--	--	X	--	--	--	1	Racine County and all local jurisdictions <sup>f</sup>
	Ongoing enforcement of building code ordinance requirements	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	X	X	5	Racine County; Cities of Burlington and Racine; and Villages of Caledonia, Elmwood Park, Mt. Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford, and Wind Point
	Work with agencies to establish a system for short-term sheltering	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Continued coordination of emergency response plans among governmental units and first responders	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Continue and refine State, County, and local road maintenance programs	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Work with utilities to assess and improve electrical service reliability	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
Drought Events	Encourage the development and maintenance of drought emergency plans for local utilities and communities	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	4	Racine County and all local jurisdictions <sup>f</sup>
	Encourage development of local water conservation programs	-- <sup>s</sup>	94.7 <sup>w</sup>	X	--	--	X	--	--	--	4	Cities of Racine and Burlington; Villages of Caledonia, Elmwood Park, Mt. Pleasant, North Bay, Sturtevant, Union Grove, Waterford, Wind Point; Towns of Burlington, Norway, Raymond, and Yorkville; and the Wisconsin Southern Center
	Encourage multi-agency approaches to water conservation, drought planning, and stream and ground water monitoring	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	4	Racine County and all local jurisdictions <sup>f</sup>
	Promote educational and informational programming	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	3	Racine County and all local jurisdictions <sup>f</sup>

Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Drought Events (continued)	Support agricultural programs that promote soil health, preserve soil moisture, and help to minimize loss of crops and topsoil in event of a drought. Such programs should promote the use of agricultural methods that reduce evaporation and/or promote infiltration	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	3	Racine County and all local jurisdictions <sup>f</sup>
	Evaluate and design water supply systems which are not vulnerable to drought	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	3	Racine County and all local jurisdictions <sup>f</sup>
	Encourage farm operators to evaluate economics of crop insurance	-- <sup>u</sup>	-- <sup>u</sup>	X	--	--	X	X	--	--	3	Racine County and all local jurisdictions <sup>f</sup>
	Encourage development practices that promote preservation of areas of high and very high groundwater recharge potential and promote stormwater management practices that facilitate aquifer recharge	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	X	--	--	4	Racine County and all local jurisdictions <sup>f</sup>
Transportation Accident Related Events	Adopt and implement the recommendations made in the VISION 2050 Regional land use and transportation system plan related to monitoring and improving the transportation system through design, routing, and traffic control problem areas including:											
	Expand the use of emergency vehicle preemption traffic signals	-- <sup>y</sup>	--	--	X	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>
	Consider and implement intersection improvements such as two-or four-way stop control, roundabouts, or signalization at arterial street and highway intersections	-- <sup>s</sup>	--	--	X	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>
	Continue and expand the use of closed circuit television cameras (CCTV) on heavily traveled freeways, highways, and arterial streets	-- <sup>z</sup>	-- <sup>z</sup>	--	X	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>
	Continue and expand the use of advisory information measures including variable message signs (VMS) on the freeway system and at appropriate arterial street and highway locations	-- <sup>aa</sup>	-- <sup>aa</sup>	--	X	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>
	Consider expanding the use of ramp closure gates to allow for rapid closure of freeway on-ramps during major traffic incidents, inclement weather, or special events	-- <sup>bb</sup>	-- <sup>bb</sup>	--	X	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>

Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Transportation Accident Related Events (continued)	Consider providing bicycle accommodations through bicycle lanes, paved shoulders, widened outside travel lanes, or enhanced bicycle facilities, where feasible when existing surface arterial street system is resurfaced and reconstructed and as new surface arterial roads are constructed	-- <sup>u</sup>	--	--	X	--	--	--	X	X	3	Racine County and all local jurisdictions <sup>f</sup>
	Expand the use of freeway service patrols to include Racine County	-- <sup>u</sup>	--	--	X	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>
	Continue to promote educational and informational programming, especially related to driver safety, and to individual actions to protect citizens, property, and businesses	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Continue to promote traffic-related law enforcement for traffic violations, weight and travel restrictions, designated truck routes, distracted driving, and use of safety restraints	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	X	X	5	Racine County and all local jurisdictions <sup>f</sup>
	Continue to evaluate and refine safety components of railway facilities	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	X	X	5	Cities of Burlington and Racine; Towns of Burlington, Dover, Waterford, and Yorkville; and Villages of Caledonia, Mt. Pleasant, Rochester, Sturtevant, and Union Grove
	Continue to evaluate and refine safety components of airport facilities	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	X	X	5	Cities of Burlington and Racine; Towns of Burlington, Norway, Raymond, and Yorkville; and Village of Rochester.
	Continue to support training, state-of-the-art equipment, planning, and preparedness of first responders, as well as search and rescue teams	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Continue coordination of emergency response plans among governmental units and first responders	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
Contamination or Loss of Water Supply	Promote educational and informational programming related to water safety issues	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Encourage multi-agency approaches to water conservation, loss and contamination prevention and trend-monitoring	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	4	Racine County and all local jurisdictions <sup>f</sup>
	Prepare emergency operation and emergency drinking water supply plans for each public water supply system	-- <sup>s</sup>	-- <sup>s</sup>	--	X	--	X	--	--	--	5	Cities of Racine and Burlington; Villages of Caledonia, Mt. Pleasant, Union Grove, and Waterford; and Town of Yorkville

Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Contamination or Loss of Water Supply (continued)	Continue coordination of emergency response plans among governmental units and first responders	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Prepare, update, and implement wellhead protection plans	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Develop and implement plans to systematically replace publically owned water service lines and other public water supply infrastructure that are known to contain lead	-- <sup>s, cc</sup>	-- <sup>s, cc</sup>	--	--	X	X	--	X	--	2, 5	Racine County and all local jurisdictions <sup>f, dd</sup>
	Educate the public on, and promote the replacement of, privately owned portions of water service lines and other plumbing fixtures that contain lead. Pursue available funding opportunities to help offset the cost of these improvements to residents <sup>dd</sup>	-- <sup>s, ee</sup>	-- <sup>s, ee</sup>	--	X	--	X	--	X	--	2, 5	Racine County and all local jurisdictions <sup>f, dd</sup>
	Promote the use of water filtration devices on drinking water sources in homes where there are known lead service lines, lead plumbing, or lead fixtures and where replacement of the lead service line or plumbing fixture is not currently feasible <sup>dd</sup>	-- <sup>s, x, ff</sup>	-- <sup>s, x, ff</sup>	X	--	--	X	--	X	--	2, 5	Racine County and all local jurisdictions <sup>f, dd</sup>
Hazardous Material Events	Continue participation in the Wisconsin Hazardous Materials Response System	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Continue to promote training, equipment, planning, and preparedness of first responders for mass-casualty incidents involving hazardous materials at fixed facilities and transportation systems	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>
	Develop and update local community response plans for hazardous material releases and continue coordination of these plans among governmental units, businesses, and first responders	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>
	Promote development of site emergency plans for schools, factories, office buildings, shopping malls, hospitals, and other appropriate sites that produce, store, or utilize hazardous materials or that are near fixed facilities or transportation routes where hazardous materials are produced, used, stored, or transported	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>
	Promote proper design, construction, maintenance, and inspections of hazardous material storage facilities, pipelines, and other related facilities	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>

Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Hazardous Material Events (continued)	Promote continued maintenance and upgrading of transportation infrastructure carrying shipments of hazardous cargo	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>
	Educate businesses and those utilizing hazardous materials of their responsibilities	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>
	Promote educational and informational programming related to hazardous material safety, and to individual actions to protect citizens, property, and businesses	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Promote ongoing enforcement of Federal, State, and County regulatory standards	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	X	X	X	5	Racine County and all local jurisdictions <sup>f</sup>
	Support existing or consider expansion of household waste management control programs, which should include hazardous material disposal sites for public citizens	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	X	X	4, 5	Racine County and all local jurisdictions <sup>f</sup>
Public Health Emergencies	Continue educational and informational programming related to public health and safety issues	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Continue maintenance of the community public health infrastructure with adequate numbers of staff and to support public health monitoring, surveillance, response, reporting, and research, and to implement prevention and control programs	-- <sup>s</sup>	-- <sup>s</sup>	--	X	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Develop and maintain plans for medical counter measure dispensing in the event of an infectious disease emergency	-- <sup>s</sup>	-- <sup>s</sup>	--	X	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Provide the public health work force with the knowledge and tools needed for early detection and control of diseases and disease vectors	-- <sup>s</sup>	-- <sup>s</sup>	--	X	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Ensure prompt implementation of prevention strategies and enhance communication of public health information about emerging diseases, their vectors, and control measures	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Continued coordination of emergency response plans among governmental units, businesses, and emergency management services	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>



Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
	Promote strategies to prevent and/or mitigate the public's exposure to harmful environmental contaminants (e.g. develop and implement plans to systematically replace publically owned water service lines and other public water supply infrastructure that are known to contain lead, and promote the use of water filtration devices on drinking water sources in homes where there are known lead service lines, or lead plumbing or fixtures <sup>dd</sup>	--, x, cc, ff	--, s, x, cc, ff	--	--	X	X	--	X	--	2, 5	Racine County and all local jurisdictions <sup>r, dd</sup>
Terrorism Incidents	Develop, maintain, update, and upgrade public and institution-based early warning systems and networks. Encourage the public to register for early warning services such as <i>CodeRED®</i> Emergency and Weather Notification System and the <i>Ready Badger</i> app	-- <sup>t</sup>	-- <sup>t</sup>	--	X	--	X	--	X	X	5	Racine County and all local jurisdictions <sup>r</sup>
	Promote and conduct preparedness activities including planning, training, and exercises for local law enforcement, fire and rescue departments, and other emergency management services for a variety of terrorist, sabotage, and weapons of mass destruction attacks	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>r</sup>
	Promote development of site emergency plans that address evacuation and in-place sheltering for schools, factories, office buildings, shopping malls, hospitals, government buildings and infrastructure, and other appropriate sites	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>r</sup>
	Consider the need to strengthen public health infrastructure to support surveillance, response, reporting, and research, and to implement prevention and control programs from potential chemical and bio-terrorism attacks	-- <sup>s</sup>	-- <sup>s</sup>	--	X	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>r</sup>
	Continue maintenance and consider enhanced security measures at water treatment facilities, including increased pathogen and chemical monitoring and emergency drinking water supply source alternative planning	-- <sup>s</sup>	-- <sup>s</sup>	--	X	--	X	--	X	X	5	Racine County and all local jurisdictions <sup>r</sup>

Table 70 (continued)

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Terrorism Incidents (continued)	Continue coordination of emergency response plans among Federal, State, and local governmental units, businesses, and emergency management services	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Heighten security at public gatherings, special events, critical community facilities, utilities, and infrastructure	-- <sup>s</sup>	-- <sup>s</sup>	--	X	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
Cyber Attack on Local Government	Purchase of cyber insurance by local governments, including first party coverage and liability coverage	-.99	-.99	--	X	--	X	--	--	--	3	Racine County and all local jurisdictions <sup>f</sup>
	Encourage local governments to provide education in basic cybersecurity to their employees, including training on identifying sensitive data, prioritizing data which needs greater protection and/or more frequent backing up, policies regarding data access and use, recognition of cyber-threats, proper procedures for passwords, and balancing operational efficiency and risk	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	3	Racine County and all local jurisdictions <sup>f</sup>
	Disconnect computers and networks from the internet that store highly sensitive information or that control or monitor important equipment or processes	--	--	X	--	--	X	--	--	--	3	Racine County and all local jurisdictions <sup>f</sup>
	Consider installing dedicated communication lines for monitoring and/or controlling critical equipment or processes	-- <sup>u</sup>	-- <sup>u</sup>	--	X	--	X	--	--	--	3	Racine County and all local jurisdictions <sup>f</sup>
	Develop and implement a cybersecurity and data back-up initiative	-- <sup>u</sup>	-- <sup>u</sup>	X	--	--	X	--	--	--	3	Racine County and all local jurisdictions <sup>f</sup>
Active Shooter Incidents	Develop, maintain, update, and upgrade public and institution-based early warning systems and networks. Encourage the public to register for early warning services such as <i>CodeRED</i> ® Emergency and Weather Notification System and the <i>Ready Badger</i> app	-- <sup>t</sup>	-- <sup>t</sup>	--	X	--	X	--	X	X	5	Racine County and all local jurisdictions <sup>f</sup>
	Continue development of preparedness activities including planning, training, and exercises for local law enforcement, fire and rescue departments, and other first response personnel for active shooter incidents in a variety of public and private locations	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Promote development of site emergency plans that address evacuation and in-place sheltering for schools, factories, office buildings, shopping malls, hospitals, government buildings and infrastructure, and other appropriate sites	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>

**Table 70 (continued)**

Hazard	Mitigation Measures	Estimated Cost <sup>a</sup>		Costs of Implementation <sup>b</sup>			Direct Benefits				Indirect Benefits <sup>c</sup>	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		
Active Shooter Incidents (continued)	Conduct preparedness activities including training and mock-active shooter exercises that carry out site emergency plans to effectively respond to potential active shooter incidents and help minimize injury and loss of life. Include participation of facility management and security, employees, students, and other appropriate regular occupants of the facility	-- <sup>s</sup>	-- <sup>s</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Consider installing appropriate security devices at vulnerable facilities such as facility access control systems, remote door lock systems for public entryways, deadbolt locks on individual classrooms and offices, and public address systems	-- <sup>u</sup>	-- <sup>u</sup>	--	X	--	X	--	--	--	3, 5	Racine County and all local jurisdictions <sup>f</sup>
Power Outages	Continue to review and implement programs to improve reliability of power supply facilities	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	3	Racine County and all local jurisdictions <sup>f</sup>
	Encourage backup power generation facilities	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Coordinate activities and communication regarding prevention and response to power outages	-- <sup>e</sup>	-- <sup>e</sup>	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions <sup>f</sup>
	Continue and refine public informational and educational programming. Information related to the safe operation of generators, space heaters, fireplaces, and wood stoves should be included	-- <sup>q</sup>	-- <sup>q</sup>	X	--	--	X	--	--	--	3	Racine County and all local jurisdictions <sup>f</sup>

<sup>a</sup>All cost expressed in 2014 dollars unless otherwise noted.

<sup>b</sup>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

<sup>c</sup>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

<sup>d</sup>This mitigation measure is related but not essential to continued compliance with the requirements of the National Flood Insurance Program.

<sup>e</sup>Costs covered under ongoing activity.

**Table 70 (continued)**

<sup>f</sup>Costs are included under Racine County Park and Open Space Plan Implementation. The costs are based on purchasing all land recommended for parks and open space (4,964 acres). It should be noted that the protection of these areas could also be accomplished through conservation through conservation easements, conservation subdivisions, donations, and purchase or transfer of development rights. To the extent that the costs are reduced through the use of alternative methods of land acquisition, and through the use of available State and Federal funds for acquisition, the costs to the County and local governments could be significantly reduced.

<sup>g</sup>Flood mitigation measures and project costs to be reviewed and refined to reflect ongoing City of Burlington downtown redevelopment program.

<sup>h</sup>Structure floodproofing or removal to be evaluated on a site-by-site basis and to be carried out at the discretion of property owners. Field surveys should be conducted for structures proposed to be floodproofed or removed to obtain a more definitive assessment of their flood hazard status. For the purpose of this analysis, it was assumed that all residential structures located within the one-percent-annual-probability (100-year recurrence interval) floodplain would be acquired and demolished. The cost for removal of the residential structures includes an estimated average fair market property value plus \$10,000 per property for demolition expenses. Floodproofing or elevating some residential structures, if found to be feasible based on specific circumstances, could be more cost effective. All other categories of buildings (agricultural, commercial, utility, governmental, and other) were assumed to be floodproofed for the purpose of this analysis.

<sup>i</sup>A contractor was hired by Racine County in 2016 to replace two 20-foot-wide radial dam gates and one actuator motor on the Waterford Dam. In addition, concrete repair to the dam structure was conducted. The project was completed in January 2017.

<sup>j</sup>Flood mitigation measures should be reviewed to reflect RiskMAP findings and current flood mitigation best management practices.

<sup>k</sup>Capital costs for these alternatives are based upon year 2013 conditions. These are systems-level planning costs and the WDNR has indicated that even after the final design stage, the average dam reconstruction change order amount is 40 percent of the initial capital cost estimate, mainly due to unforeseen site conditions once construction begins.

<sup>l</sup>A breakdown of costs between Kenosha and Racine Counties is not available. Thus, total costs for both Counties are listed. It is estimated that the capital cost range for measures in Racine County would be relatively small, ranging from \$762,000 to \$907,000.

<sup>m</sup>Incremental cost between control of two-year and 100-year events.

<sup>n</sup>Cost reflects range from minimal wetland and prairie operation and maintenance to active management.

<sup>o</sup>Costs to be determined by each community based upon logical subwatershed area. Estimated cost is from \$1,318,355 to \$1,608,635 countywide.

<sup>p</sup>Cost of ordinance development is covered under ongoing programs. Cost of implementation is not determined.

<sup>q</sup>Portion of costs included in ongoing program and construction project implementation programs. Additional cost of all of the hazard mitigation and public informational and educational programs is estimated to be \$21,800 per year.

<sup>r</sup>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, Public Inland Lake Protection and Rehabilitation Districts and Agricultural Drainage Districts.

<sup>s</sup>Costs to be determined. Partially covered under ongoing programs.

<sup>t</sup>Costs include an estimated annual subscription fee of \$12,000 for the CodeRED® targeted alert notification service.

<sup>u</sup>Costs are site-specific and survey is needed for countywide estimate.

<sup>v</sup>To be conducted as part of next needed facility planning program.

<sup>w</sup>Costs shown are the estimated annual costs of water supply conservation programs for existing water utilities in the County as reported in SEWRPC PR No. 52, A Regional Water Supply Plan for Southeastern Wisconsin, December 2010.

<sup>x</sup>Private property costs to be expended as needs arise.

<sup>y</sup>Estimated cost for installation of emergency vehicle preemption at one four-way intersection is about \$8,200.

<sup>z</sup>Estimated equipment and installation cost for one closed circuit television system ranges from \$50,000 to \$65,000. Average annual operation and maintenance for a single unit is approximately \$1,500.

<sup>aa</sup>Estimated equipment and installation cost for one variable message sign (VMS) ranges from \$35,000 to \$75,000 at an arterial highway location, from \$80,000 to \$90,000 for a ground-mount system at a freeway location, and from \$180,000 to \$200,000 for an overhead system at a freeway location. Average annual operation and maintenance for a single VMS unit is approximately \$2,200.

<sup>bb</sup>Estimated equipment and installation cost for one ramp closure gate ranges from \$10,000 to \$15,000. Note that this cost is per gate and on or two gates are typically installed at one freeway entrance ramp. Average annual operation and maintenance for a single ramp closure gate is estimated to be \$400.

<sup>cc</sup>Estimated cost for replacement of a utility-owned portion of a water supply service line is about \$6,000. The cost is dependent on the length of the pipe, among other factors.

<sup>dd</sup>Homes constructed prior to 1951 are more likely to have lead water supply service lines.

<sup>ee</sup>Estimated cost for replacement of a typical privately owned portion of a water supply service line is typically between \$3,500 and \$7,000. The cost is dependent on the length of the pipe, among other factors.

<sup>ff</sup>Cost of a NSF certified lead removal filter can vary widely. Typical costs range from about \$20 to \$130 for pour-through pitcher style filters; about \$20 to \$200 for faucet-mounted systems; and about \$80 to \$500 for counter-top systems. The recommended filter change cycle varies from one product to the next.

<sup>gg</sup>Costs are specific for each jurisdiction being insured. In 2016 Racine County purchased an insurance policy for cyber liability coverage with a \$3,000,000 limit, \$25,000 retention, and \$29,729 annual premium. Racine County also purchased additional cyber crime coverage at an additional premium of approximately \$7,000.

Source: SEWRPC.

### ***Estimated Cost of Implementation***

Where possible, Table 70 includes a summary of the estimated capital cost and average annual operation and maintenance cost for each mitigation measure. There are many mitigation measures, especially for hazards other than flooding and related stormwater drainage problems, 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 (see Table 70). 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.

### ***Direct and Indirect Benefits***

The benefits from implementation of a mitigation measure can be classified as direct, or measurable, and as indirect, or intangible. Direct benefits were defined in terms of enhanced preparedness/protection of individuals or communities, reduced property damage, reduced injuries and reduced mortalities. Although the exact numbers or amounts of such direct benefits are often not known, these would be a direct result of implementation of a particular mitigation measure. In contrast, indirect benefits represent a range 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 associated benefits for economic productivity

Similar to cost analysis, direct monetary benefits are difficult to assess for most mitigation measures. For example, while constructing of a safe room at a mobile home park may save lives during a severe thunderstorm or tornado event, it is difficult to allocate a monetary benefit to avoiding injury or loss of life. Likewise, although it can be assumed that the restoration of farmland that often floods back to its historical wetland state will have the likely

Table 71

**ESTIMATED FLOOD DAMAGES AVOIDED WITH THE ACQUISITION  
AND DEMOLITION OR FLOODPROOFING OF STRUCTURES WITHIN  
THE ONE-PERCENT-ANNUAL-PROBABILITY (100-YEAR) FLOODPLAIN: 2015**

Annual Probability of Flood Occurrence	Estimated Structural Flood Damages Avoided <sup>a</sup>		
	Fox River Watershed	Root River Watershed	Pike River Watershed
1 Percent	\$10,114,276	\$4,306,730	\$1,236,140
2 Percent	7,831,370	1,689,050	708,590
10 Percent	4,047,840	308,500	349,950
Estimated Annual Average Flood Damages Avoided	\$2,498,980	\$304,860	\$224,540

<sup>a</sup>Estimated structural damages avoided are based upon the reduction in flood damages within the Racine County portion of the watersheds in the event of a 1-, 2-, and 10-percent-annual-probability flood event. The damage estimates were developed by SEWRPC staff based upon assessed 2015 structure values, estimated content value, and depth of flooding data.

Source: SEWRPC.

benefit of the reduction in crop losses, crop insurance indemnity payouts, crop insurance premiums, and the potential to decrease downstream flood damages, more rigorous modelling would be required to estimate these monetary benefits. Conversely, SEWRPC staff has analyzed the estimated flood damages that would be sustained to structures within the one-percent-annual-probability (100-year) floodplain in the event of a ten-, two-, and one-percent-annual-probability flood.<sup>133</sup> Estimated benefits from implementation of the recommendation related to acquisition and demolition, or floodproofing of these structures, are estimated as the annual structural flood damages avoided, as shown in table 71.

Direct and indirect benefits are summarized in Table 70. The greatest indirect benefit should be allocated to those mitigation measures that may ultimately result in minimized loss of life or injury.

***Communities/Jurisdictions Affected***

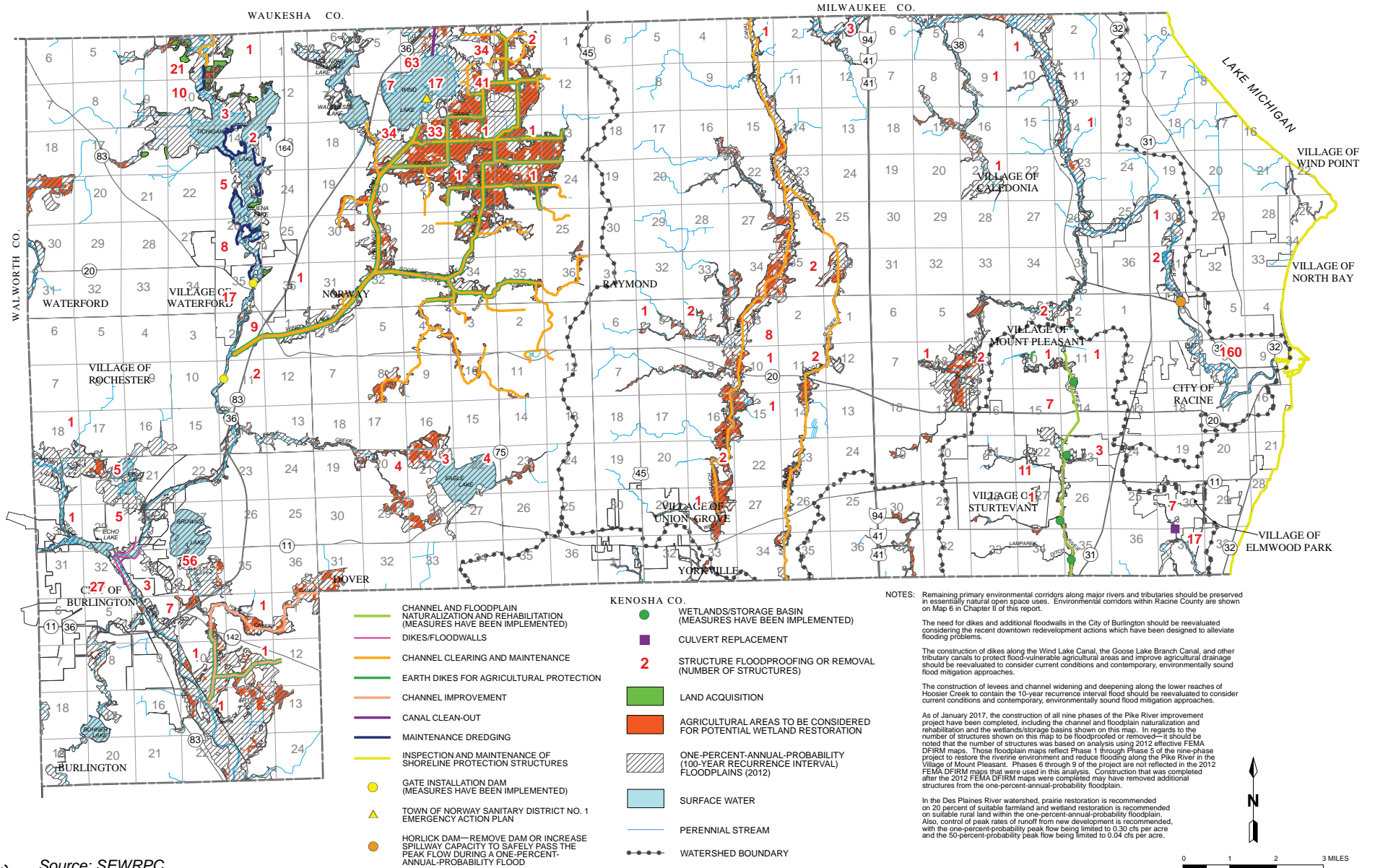
Table 70 also indicates a list of the communities affected for each hazard and corresponding priority mitigation measure. Map 49 corresponds with Table 70 and shows the map based priority mitigation actions for Racine County and the corresponding cities, towns, and villages.

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<sup>133</sup> Flood damage estimates were developed by SEWRPC staff based upon assessed structure values, estimated content value, and depth of flooding data.

# Map 49

## SUMMARY OF FLOOD MITIGATION MEASURES INCLUDED IN RACINE COUNTY ALL-HAZARDS MITIGATION PLAN: 2016



Source: SEWRPC.

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## Chapter VI

# PLAN ADOPTION, IMPLEMENTATION, MAINTENANCE, AND REVISION

The updated hazard mitigation plan described in this report is designed to attain, to the maximum extent practicable, the goals and objectives set forth in Chapter III of this report. In a practical sense, however, the plan is not complete until the steps to translate the plan into action policies and programs have been specified. This chapter presents the plan implementation strategies envisioned and includes provisions and information on plan adoption, maintenance, and revision.

### PLAN REFINEMENT, REVIEW, AND ADOPTION

As described in Chapter I, the all-hazard mitigation planning program was initiated by Racine County in 2001. The plan update set forth in this report was begun in 2015, and 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. During 2002, the Federal Emergency Management Agency (FEMA) published new rules for hazard mitigation planning and the hazard mitigation grant program in response to the Disaster Mitigation Act of 2000. These rules address State and local mitigation planning and are important for the Racine County hazard mitigation program in three ways:

- The Wisconsin Department of Military Affairs, Division of Emergency Management (WEM), is directly involved in a partnership role for all-hazard mitigation planning. WEM is responsible for preparing and periodically updating a State all-hazard mitigation plan; providing technical assistance and guidance for local all-hazards planning; and administering the Pre-Disaster Mitigation Program for FEMA.
- The rules outline State and local mitigation planning guidelines for accessing hazard mitigation program grant funds. According to the rules, for disasters declared after November 1, 2004, local government must have a FEMA-approved mitigation plan in order 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 an all-hazards mitigation plan to remain eligible to receive grants from specific mitigation funds. Communities can formally adopt the County plan, or, alternatively, create and adopt their own plan.

- The rules and related guidance provide more specifics and detail on the hazard mitigation plan content than did the previous rules.

The Racine County hazard mitigation plan and this plan update have been structured to meet the 2002 guidance. The work on the initial plan was also coordinated with a Wisconsin Division of Emergency Management statewide task force on hazard mitigation planning.

The Racine County all-hazards mitigation plan was prepared under the guidance of the Racine County Hazard Mitigation Task Force comprised of representatives of all of the communities within the County, as well as County businesses and agency representatives. That Task Force met four times during the plan preparation period for the initial plan to provide input on the types of hazards to be considered, the appropriate mitigation strategies, and to review the draft report chapters with the report chapters then being refined to reflect the comments and recommendations of the Task Force. The Task Force was reconvened for the first updating effort and 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 with the report chapters then being refined to reflect the comments and recommendations of the Task Force. For this, the third edition of the Racine County all-hazards mitigation plan, the Task Force was renamed as the Racine County Hazard Mitigation Plan Local Planning Team. The Local Planning Team met four times during the plan preparation period to provide input on the types of hazards to be considered, the appropriate mitigation strategies, and to review the draft report chapters. The report chapters were refined to reflect the comments and recommendations of the Local Planning Team (see Appendix A).

Following completion of the initial plan in draft form, a public informational meeting was held to review the plan with local officials, businesses and industry, and citizens. Following plan finalization, the plan was presented for consideration and adoption to the Racine County Economic Development and Land Use Committee and the County Board. A copy of the report was also sent to each of the local units of government requesting adoption of the plan and advising them of the need for such action in order to retain future eligibility for mitigation funding for the FEMA Hazard Mitigation Grant and the Pre-Disaster Mitigation Program administered by the WEM. In addition, County and SEWRPC staffs were available to meet with communities on an individual basis to review the plan and consider adoption and implementation steps. A status report on plan adoption by the County and local units of government is maintained by the Racine County Office of Emergency Management.

With some additions, similar local adoption procedures were followed for the first update of this plan. As draft chapters of the updated plan were completed, copies were placed in downloadable form on SEWRPC's website. A comments page was available on the SEWRPC website on which members of the public could ask questions and submit comments upon the draft plan update. When the plan was completed in draft form, a public informational meeting was held to review the plan with local officials, businesses and industry, and citizens. Following finalization of the updated plan, the plan update was presented for consideration and adoption to the Racine County Economic Development and Land Use Committee and the County Board. A copy of the report was also sent to each of the local units of government requesting adoption of the updated plan and advising them of the need for such action in order to retain future eligibility for mitigation funding for the FEMA Hazard Mitigation Grant and the Pre-Disaster Mitigation Program administered by the WEM.

For this third edition of the Racine County all-hazards mitigation plan, draft chapters of the updated plan were again placed in downloadable form on SEWRPC's website. Similarly to previous planning efforts, a comments page was available on the SEWRPC website on which members of the public could ask questions and submit comments regarding the draft plan update. During the planning period, no comments were received through this webpage. The local adoption procedures for this third edition of the Racine County all-hazards mitigation plan were also similar to those followed for the first update. The main difference was that two public informational meetings were held during the updating period to review the plan with local officials, business and industry, and citizens. One of these meetings was held following completion of the risk analysis and covered the material documented in Chapters I through IV. The second public meeting was held after completion of the plan in draft form and covered the entire

plan update. No comments were received from the public at either public meeting. As part of consideration and adoption of the plan by the County Board, the plan was presented to the full County Board and adopted on November 7, 2017.

## **PLAN IMPLEMENTATION STRATEGIES**

An important first step in implementation of this third edition all-hazards mitigation plan for Racine County is the formal adoption of the plan update by Racine County; the Cities of Racine and Burlington; the Villages of Caledonia, Elmwood Park, Mount Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford, Wind Point; and the Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville. Upon the formal adoption, the updated plan becomes an important guide to the making of hazard mitigation and related management decisions for the County and 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 planning, 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 Racine County 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; nongovernmental organizations; 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 implementation status, priority, designated management agencies, and an implementation timetable is included in Table 72. In addition, corresponding mitigation measures are also summarized on Map 49 in Chapter V of this report.

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 land use, stormwater management, stream and river protection, land and water conservation, and comprehensive planning, where appropriate. As an example of this, the analyses and recommendations of the initial Racine County hazard mitigation plan were reviewed and considered as part of the development of the comprehensive plan for Racine County.<sup>1</sup>

## **HAZARD MITIGATION FUNDING SOURCES**

Financing of the construction, operation, and maintenance of hazard mitigation measures may be accomplished through a number of means, including: the establishment of a stormwater utility; tax-incremental-financing (TIF) districts; local property taxes; reserve funds; general obligation bonds; private-developer contributions, including fees paid to be applied toward construction of regional stormwater management facilities in lieu of providing onsite facilities; non-profit grants; State grants or loans; and certain Federal and State programs.

The identification of potential funding sources, including sources other than solely local-level sources, is an integral part of the implementation of a successful mitigation plan. The following description of funding sources includes those that appear to be potentially applicable for the County and local units of government as of 2016. However,

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<sup>1</sup> *SEWRPC Community Assistance Planning Report No. 301, A Multi-Jurisdictional Comprehensive Plan for Racine County: 2035, November 2009.*

Table 72

RACINE COUNTY ALL-HAZARDS MITIGATION PLAN SUMMARY AND IMPLEMENTATION STRATEGIES

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Flooding and Related Stormwater Drainage Problems	<u>Floodplain and Environmentally Sensitive Land Preservation Element</u> <ul style="list-style-type: none"> <li>Floodplain and wetland zoning</li> <li>Environmentally sensitive area and open preservation action</li> <li>Wetland Restoration of up to 6,800 acres of agricultural land to reduce flood-related agricultural and property damages</li> </ul>	Implemented	High	In place and ongoing	RCDPWDS, Municipal Planning Departments and Commissions	1, 2, 4, 11, 18, 23, 50, 51, 58, 60, 61, 62, 66, 69, 70, 80, 84
	<u>Floodland Management Plan Element</u> Fox River Watershed <ul style="list-style-type: none"> <li>Structure floodproofing or removal</li> <li>Replacement of two 20-foot-wide radial gates and one actuator motor at Waterford Dam</li> <li>Installation of gates at Rochester Dam</li> <li>Channel clean out in Fox River upstream from Waterford Impoundment</li> <li>Land acquisition</li> <li>Maintenance dredging within Waterford Impoundment</li> <li>Channel clean out of Wind Lake Drainage Canal</li> <li>Channel clean out and deepening along Muskego Canal</li> </ul>	Not Implemented	High	As funding and opportunities become available	Private Property Owners, RCOEM, RCDPWDS, Wisconsin Emergency Management	1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 32, 38, 39, 41, 46, 47, 48, 54, 58, 59, 60, 62, 63, 66, 67, 69, 70, 72, 73, 74, 81, 82, 84
		Partially Implemented	High	Largely in place and ongoing, expand as funding and opportunities become available	RCDPWDS, Municipal Planning Departments and Commissions, Municipal Parks Departments, Municipal Common Councils/Village Boards, WDNR, Wisconsin Coastal Management Program, Seno K/RLT Conservancy	1, 2, 3, 4, 7, 8, 9, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 39, 41, 46, 47, 53, 58, 59, 60, 61, 62, 63, 66, 67, 69, 70, 72, 73, 74, 78, 79, 80, 81, 82, 84
		Not Implemented	Medium	As funding and opportunities become available	RCDPWDS, Municipal Planning Departments and Commissions, Municipal Parks Departments, Municipal Common Councils/Village Boards, Seno K/RLT Conservancy, WDNR	2, 4, 11, 12, 14, 15, 17, 18, 19, 20, 21, 22, 23, 24, 25, 39, 41, 46, 47, 53, 54, 58, 59, 60, 61, 62, 63, 66, 67, 69, 70, 71, 72, 74, 78, 79, 80, 81, 82, 84, 85
		Not Implemented	High	As funding and opportunities become available	Private Property Owners, RCOEM, RCDPWDS, Wisconsin Emergency Management	
		Implemented	--	Implemented	RCDPWDS	
		Implemented	--	Implemented	RCDPWDS	
		Not Implemented	Medium	As needed	Southeastern Wisconsin Fox River Commission, Waterford Waterway Management District, RCDPWDS, WDNR	
		Not Implemented	Medium	As funding and opportunities become available	RCDPWDS, Southeastern Wisconsin Fox River Commission, Waterford Waterway Management District, WDNR, Seno K/RLT Conservancy	
		Partially Implemented	Medium	As funding and opportunities become available	Private Lake Property Owners, Southeastern Wisconsin Fox River Commission, Waterford Waterway Management District, WDNR	
		Not Implemented	Medium	As needed	Racine County Drainage Board	
		Implemented	--	Implemented	--	

**Table 72 (continued)**

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Flooding and Related Stormwater Drainage Problems (continued)	Fox River Watershed (continued) Measures recommended to be reevaluated considering current conditions and contemporary, environmentally sound flood mitigation approaches: <ul style="list-style-type: none"> <li>Construction of dikes and floodwalls in City of Burlington</li> <li>Construct agricultural dikes along Wind Lake Drainage Canal and tributaries</li> <li>Construction of levees and channel improvements along Hoosier Creek</li> </ul>	Mostly Implemented	Medium	Largely in place; additional measures to be reevaluated	City of Burlington Public Works Department	See previous page
		Not Implemented	Medium	Measures to be reevaluated to consider current conditions and contemporary, environmentally sound flood mitigation approaches	Racine County Drainage Board, RCDPWDS, Municipal Public Works/Engineering Departments, Municipal Planning Departments, WDNR	
		Not Implemented	Medium	Measures to be reevaluated to consider current conditions and contemporary, environmentally sound flood mitigation approaches	Racine County Drainage Board, RCDPWDS, Kenosha County, Municipal Public Works/Engineering Departments, Municipal Planning Departments, WDNR	
	Root River Watershed <ul style="list-style-type: none"> <li>Channel clearing and maintenance along the Root River Canal</li> <li>Structure floodproofing or removal</li> <li>Increase spillway capacity or removal of Horlick Dam</li> </ul>	Partially Implemented	Medium	Ongoing	Racine County Drainage Board	1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 24, 32, 41, 48, 54, 58, 59, 62, 66, 69, 72, 73, 78, 79, 80, 83, 85
		Not Implemented	High	As funding and opportunities become available	Private property owners, RCOEM, RCDPWDS, Wisconsin Emergency Management	
		Not Implemented	High	Must be completed by April 2024	Racine County Board, RCDPWDS, WDNR	
	Pike River Watershed <ul style="list-style-type: none"> <li>Pike River channel enlargement and rehabilitation</li> <li>Berm along Bartlett Branch</li> <li>Chicory Road culvert replacement along Sorenson Creek</li> <li>Structure floodproofing or removal</li> </ul>	Implemented	--	Implemented	Village of Mount Pleasant Stormwater Drainage Utility	1, 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 24, 32, 41, 47, 48, 54, 58, 62, 66, 67, 72, 78, 79, 80, 81, 82, 83, 84
		Implemented	--	Completed	--	
		Not Implemented	Medium	To be determined	Village of Mount Pleasant Stormwater Drainage Utility	
		Not Implemented	High	As funding and opportunities become available	Private property owners, RCOEM, RCDPWDS, Wisconsin Emergency Management	

Table 72 (continued)

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Flooding and Related Stormwater Drainage Problems (continued)	Des Plaines River Watershed	Partially Implemented	High	Ongoing	Private Property Owners, RCDPWDS, Municipal Public Works/Engineering Departments	1, 2, 3, 4, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 24, 25, 38, 39, 41, 46, 47, 54, 58, 60, 62, 63, 66, 67, 69, 70, 73, 74, 81, 82, 83, 84
	<ul style="list-style-type: none"> <li>Provide onsite detention storage facilities for planned new development</li> <li>Prairie restoration</li> </ul>	Not Implemented	Medium	As funding and opportunities become available	Private Property Owners, RCDPWDS, Municipal Planning Departments, Seno K/RLT Conservancy, WDNR	
	<ul style="list-style-type: none"> <li>Wetland restoration</li> </ul>	Not Implemented	Medium	As funding and opportunities become available	Private Property Owners, RCDPWDS, Municipal Planning Departments, Seno K/RLT Conservancy, WDNR	
	<u>Stormwater Management Plan Element</u>	Partially Implemented	High	Ongoing	Municipal Stormwater Utility Districts, Municipal Public Works/Engineering Departments, RCDPWDS	4, 11, 12, 15, 39, 41, 48, 58, 62, 66, 73
	<ul style="list-style-type: none"> <li>Stormwater-related regulations</li> </ul>	Partially Implemented	High	Ongoing	Municipal Stormwater Utility Districts, Municipal Public Works/Engineering Departments, Municipal Planning Departments RCDPWDS	
	<u>Public Information and Education Element</u>	Partially Implemented	High	Ongoing	RCOEM, RCDPWDS, MSWUD, Municipal Planning Departments, Municipal Engineering Departments, Root-Pike WIN, Wisconsin Emergency Management, UW-Extension	4, 40, 41, 49, 58, 59, 66, 73
	<u>Secondary Plan Element</u>	Partially Implemented	High	Ongoing, RiskMAP updating efforts underway in Fox River Watershed	FEMA, RCDPWDS, RCOEM, Municipal Planning Departments	4, 9, 10, 11, 12, 13, 14, 15, 16, 22, 32, 39, 41, 54, 58, 62, 66, 73, 74, 78, 79, 80
	<ul style="list-style-type: none"> <li>National Flood Insurance Program and map updating</li> </ul>	Partially Implemented	High	Ongoing	Lending Institutions and Real Estate Brokers	
	<ul style="list-style-type: none"> <li>Lending institution and real estate agent policies</li> <li>Channel maintenance</li> </ul>	Partially Implemented	High	Ongoing	Racine County Drainage Board, Southeastern Wisconsin Fox River Commission, Waterford Waterway Management District, RCDPWDS, Municipal Public Works Departments	
	<ul style="list-style-type: none"> <li>Stormwater management facilities maintenance</li> <li>Dam inspections, emergency action plans, and removals</li> </ul>	Partially Implemented	High	Ongoing	Municipal Stormwater Utility Districts, Municipal Public Works/Engineering Departments, RCDPWDS	
	<ul style="list-style-type: none"> <li>Survey of buildings near flood hazard area</li> </ul>	Not Implemented	High	As needed	Public and Private Dam Owners, WDNR	
Thunderstorm, High-Wind, Hail, and Lightning Hazards	Maintain, update, and further develop early warning systems and networks including use of National Oceanic and Atmospheric Administration All Hazard Weather Radios, EAS broadcasts, WEA system, CodeRED® Emergency and Weather Notification System, and the Ready Badger app	Partially Implemented	High	Ongoing	RCOEM, RCDPWDS, Municipal Public Works Departments, Municipal Police Departments, Racine County Sheriff's Department, NOAA	1, 4, 32, 40, 48, 49, 58, 87, 88, 89

**Table 72 (continued)**

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Thunderstorm, High-Wind, Hail, and Lightning Hazards (continued)	Promote educational and informational programming, especially related to the early warning network, and to individual actions to protect citizens, property, and businesses	Partially Implemented	High	Ongoing	RCOEM, UW-Extension	See previous page
	Enforce building code ordinances requirements	Partially Implemented	High	Ongoing	Wisconsin Department of Safety and Public Services, Municipal Engineering Departments, RCDPWDS	
	Encourage provision of safe rooms	Partially Implemented	High	Ongoing	RCOEM	
	Work with municipalities and businesses to explore installation of community safe rooms and hardening projects for community facilities, businesses, and manufacturers	Not Implemented	High	As needed	RCOEM	
	Consider municipal adoption of mobile home park regulations that require that community safe rooms be provided for residents of new and expanding mobile home parks	Not Implemented	Medium	Ongoing	RCDPWDS, Municipal Common Counsels, Village Boards, Town Boards	
	Pursue grant funding for installation of safe rooms in existing mobile home parks, based on community and landowner interest	Partially Implemented	High	Ongoing	RCOEM, Mobile Home Park Owners	
	Encourage agricultural producers to purchase crop insurance	Partially Implemented	Medium	Ongoing	USDA Farm Service Agency, RCDPWDS, RCOEM	
	Continue to conduct annual weather spotter training	Implemented	Low	Ongoing	RCOEM	
	Continued coordination of emergency operations and response plans among governmental units and first responders	Partially Implemented	High	Ongoing	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Departments	
Tornadoes	Maintain, update, and further develop early warning systems and networks including use of National Oceanic and Atmospheric Administration All Hazard Weather Radios, EAS broadcasts, WEA system, CodeRED® Emergency and Weather Notification System, and the Ready Badger app	Partially Implemented	High	Ongoing	RCOEM, RCDPWDS, Municipal Public Works Departments, Municipal Police Departments, Racine County Sheriff's Department, NOAA	1, 4, 32, 48, 49, 58, 87, 88, 89
	Retrofit existing or install new structures to ensure adequate shelters from tornadoes for public buildings, major industrial sites, and other large businesses or complexes such as shopping malls, fairgrounds, mobile home parks, and other vulnerable public areas	Partially Implemented	High	As needed	Property Owners	

Table 72 (continued)

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Tornadoes (continued)	Work with municipalities and businesses to explore installation of community safe rooms and hardening projects for community facilities, businesses, and manufacturers	Partially Implemented	Medium	Ongoing	RCOEM	See previous page
	Consider municipal adoption of mobile home park regulations that require that community safe rooms be provided for residents of new and expanding mobile home parks	Not Implemented	Medium	To be determined	RCDPWDS, Municipal Common Councils and Village Boards	
	Pursue grant funding for installation of safe rooms in existing mobile home parks, based on community and landowner interest	Not Implemented	High	Ongoing	RCOEM, Mobile Home Park Owners	
	Promote educational and informational programming, especially related to the early warning network, and to individual actions to protect citizens, property, and businesses	Partially Implemented	High	Ongoing	RCOEM, UW-Extension	
	Enforce building code ordinances requirements	Partially Implemented	High	Ongoing	Wisconsin Department of Safety and Professional Services, Municipal Engineering Departments, RCDPWDS	
	Continue to conduct annual weather spotter training	Implemented	Low	Ongoing	RCOEM	
	Continue coordination of emergency response and operation plans among governmental units and first responders	Partially Implemented	High	Ongoing	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Departments	
Extreme Temperature Events	Organize neighborhood outreach groups who look after vulnerable groups and individuals	Partially Implemented	High	Ongoing	RCOEM, City of Racine Health Department, Central Racine County Health Department, American Red Cross Southeastern Wisconsin Chapter, Racine County Human Services Department	40, 49, 55, 58
	Identify and advertise a list of available heating and/or cooling shelters in the immediate area	Implemented	High	Ongoing	RCOEM, City of Racine Health Department, Central Racine County Health Department, UW-Extension	
	Continue to provide special arrangements for payment of heating bills	Implemented	High	Ongoing	WE Energies	
	Maintain, update, and further develop early warning systems and networks including use of National Oceanic and Atmospheric Administration All Hazard Weather Radios, EAS broadcasts, WEA system, CodeRED® Emergency and Weather Notification System, and the Ready Badger app	Partially Implemented	High	Ongoing	RCOEM, RCDPWDS, Municipal Public Works Departments, Municipal Police Departments, Racine County Sheriff's Department, NOAA	
	Promote educational and informational programming	Partially Implemented	High	Ongoing	RCOEM, City of Racine Health Department, Central Racine County Health Department, UW-Extension	



Table 72 (continued)

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Lake Michigan Coastal Hazards	Continued enforcement of County shoreland zoning ordinance	Partially Implemented	High	Ongoing	RCDPWDS, Municipal Planning Departments	1, 3, 4, 7, 8, 13, 32, 48, 49, 50, 53, 58, 63, 70, 78
	Review Lake Michigan shoreline municipal shoreland ordinances	Partially Implemented	Medium	To be determined	RCDPWDS, Municipal Planning Departments	
	Update assessment of the effectiveness of Lake Michigan shoreline protection structures in the County every 10 years	Out of Date	High	Every 10 years; last update 2005	RCDPWDS, Municipal Planning Departments, Municipal Engineering Departments, Wisconsin Coastal Management Program, UW Sea Grant Institute	
	Continued construction and maintenance of shoreline protection structures	Partially Implemented	High	As needed	Private Landowners, RCDPWDS, Municipal Engineering Departments, UW Sea Grant Institute, WDNR	
	Where possible, relocate buildings within a high-risk area. 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 structures should be considered. This plan element is presented as an option, subject to the preference of the individual property owner.	Not Implemented	High	As needed	Municipal Common Councils and Village Boards, Municipal Engineering Departments, RCDPWDS, RCOEM, Wisconsin Emergency Management, FEMA, U.S. Army Corps of Engineers	
	Continue ongoing programs to update and refine coastal hazard area data using geographic information system technology	Partially Implemented	Medium	Ongoing	RCDPWDS, Municipal Engineering Departments, Wisconsin Coastal Management Program, UW Sea Grant Institute, SEWRPC	
	Review water and wastewater treatment plant and outfall capacity and level of protection under range of Lake Michigan water levels	Partially Implemented	Medium	Ongoing	City of Racine Water and Wastewater Utility	
	Public informational and educational programming	Partially Implemented	High	Ongoing	RCDPWDS, Municipal Planning Departments, Wisconsin Coastal Management Program, UW Sea Grant Institute, SEWRPC	
Winter Storm Events	Organize neighborhood outreach groups who look after vulnerable groups and individuals	Partially Implemented	High	Ongoing	RCOEM, American Red Cross Southeastern Wisconsin Chapter, Racine County Human Services Department	32, 49, 55, 58, 87, 88, 89
	Identify and advertise a list of available heated shelters in the immediate area	Partially Implemented	High	Ongoing	RCOEM, City of Racine Health Department, Central Racine County Health Department, UW-Extension	
	Maintain, update, and further develop early warning systems and networks including use of National Oceanic and Atmospheric Administration All Hazard Weather Radios, EAS broadcasts, WEA system, CodeRED® Emergency and Weather Notification System, and the Ready Badger app	Partially Implemented	High	Ongoing	RCOEM, RCDPWDS, Municipal Public Works Departments, Municipal Police Departments, Racine County Sheriff's Department, NOAA	

Table 72 (continued)

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Winter Storm Events (continued)	Promote educational and informational programming	Partially Implemented	Medium	Ongoing	RCOEM, UW-Extension	See previous page
	Encourage residents to develop a Family Emergency Preparedness Plan including the preparation of a Disaster Supply Kit	Partially Implemented	Medium	Ongoing	RCOEM	
	Ongoing enforcement of building code ordinance requirements	Partially Implemented	High	Ongoing	WDSPTS, Municipal Engineering Departments, RCDPWDS	
	Work with agencies to establish a system for short-term sheltering	Partially Implemented	Medium	Ongoing	RCOEM, American Red Cross Southeastern Wisconsin Chapter	
	Continued coordination of emergency response plans among governmental units and first responders	Partially Implemented	High	Ongoing	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Departments	
	Continue and refine State, County, and local road maintenance programs	Partially Implemented	High	Ongoing	RCDPWDS, Municipal Public Works Departments, WisDOT	
	Work with utilities to assess and improve electrical service reliability	Partially Implemented	Medium	Ongoing	RCOEM, WE Energies	
Drought Events	Encourage the development and maintenance of drought emergency plans for local utilities and communities	Partially Implemented	High	Ongoing	Water Supply Utilities, Municipal Planning Departments	17, 18, 22, 24, 25, 49, 52, 53, 54, 58
	Encourage development of local water conservation programs	Partially Implemented	Medium	2022	Water Supply Utilities, Municipal Planning Departments	
	Encourage multi-agency approaches to water conservation, drought planning, and stream and ground water monitoring	Partially Implemented	Medium	Ongoing	Water Supply Utilities, USDA Farm Service Agency, WDNR, USGS	
	Promote educational and informational programming	Partially Implemented	High	Ongoing	Water Supply Utilities, RCOEM, WDATCP, UW-Extension	
	Support agricultural programs that promote soil health, preserve soil moisture, and help to minimize loss of crops and topsoil in event of a drought. Such programs should promote the use of agricultural methods that reduce evaporation and/or promote infiltration	Partially Implemented	High	Ongoing	Agricultural Producers, RCDPWDS, WDATCP	
	Evaluate and design water supply systems which are not vulnerable to drought	Partially Implemented	High	Ongoing	Water Supply Utilities, Agricultural Producers, RCDPWDS, WDATCP	
	Encourage farm operators to evaluate economics of crop insurance	Partially Implemented	Medium	Ongoing	USDA Farm Service Agency, UW-Extension, RCDPWDS, RCOEM	
	Encourage development practices that promote preservation of areas of high and very high groundwater recharge potential and promote stormwater management practices that facilitate aquifer recharge	Partially Implemented	High	Incorporated into Regional Land Use Plan, Ongoing	RCDPWDS, Municipal Planning Departments	

Table 72 (continued)

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Transportation Accident Related Events	Adopt and implement the recommendations made in the VISION 2050 Regional land use and transportation system plan related to monitoring and improving the transportation system through design, routing, and traffic control problem areas including:				Racine County Board, Municipal Common Councils, Village Boards	5, 6, 32, 39, 42, 49, 58, 75, 76, 77, 86
	Expand the use of emergency vehicle preemption traffic signals	Partially Implemented	Medium	As needed	RCDPWDS, Racine County Sheriff's Department, Municipal Public Works Departments, Municipal Police Departments, Municipal Fire and EMS Departments, WisDOT	
	Consider and implement intersection improvements such as two-or four-way stop control, roundabouts, or signalization at arterial street and highway intersections	Partially Implemented	Medium	As needed	RCDPWDS, Municipal Public Works Departments, WisDOT	
	Continue and expand the use of closed circuit television cameras (CCTV) on heavily traveled freeways, highways, and arterial streets	Partially Implemented	Low	As needed	RCDPWDS, Municipal Public Works Departments, WisDOT	
	Continue and expand the use of advisory information measures including variable message signs (VMS) on the freeway system and at appropriate arterial street and highway locations	Partially Implemented	Low	As needed	RCDPWDS, Municipal Public Works Departments, WisDOT	
	Consider expanding the use of ramp closure gates to allow for rapid closure of freeway on-ramps during major traffic incidents, inclement weather, or special events	Partially Implemented	Low	As needed	RCDPWDS, Racine County Sheriff's Department, WisDOT	
	Consider providing bicycle accommodations through bicycle lanes, paved shoulders, widened outside travel lanes, or enhanced bicycle facilities, where feasible when existing surface arterial street system is resurfaced and reconstructed and as new surface arterial roads are constructed	Partially Implemented	Low	As new surface arterial roads are resurfaced, reconstructed or as new roads are constructed	RCDPWDS, Municipal Public Works Departments, WisDOT	
	Expand the use of freeway service patrols to include Racine County	Not Implemented	Medium	As needed	WisDOT, Racine County Sheriff's Department	
	Continue to promote educational and informational programming, especially related to driver safety, and to individual actions to protect citizens, property, and businesses	Partially Implemented	High	Ongoing	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Departments, UW-Extension	
	Continue to promote traffic-related law enforcement for traffic violations, weight and travel restrictions, designated truck routes, distracted driving, and use of safety restraints	Implemented	High	Ongoing	Racine County Sheriff's Department, Municipal Police Departments, Wisconsin State Patrol	

Table 72 (continued)

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Transportation Accident Related Events (continued)	Continue to evaluate and refine safety components of railway facilities	Partially Implemented	Medium	Ongoing	Federal Railroad Administration, National Transportation Safety Bureau, WisDOT	See previous page
	Continue to evaluate and refine safety components of airport facilities	Partially Implemented	Medium	Ongoing	Federal Aviation Administration, National Transportation Safety Bureau	
	Continue to support training, state-of-the-art equipment, planning, and preparedness of first responders, as well as search and rescue teams	Partially Implemented	High	Ongoing	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Departments	
	Continue coordination of emergency response plans among governmental units and first responders	Partially Implemented	High	Ongoing	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Departments	
Contamination or Loss of Water Supply	Promote educational and informational programming related to water safety issues	Partially Implemented	High	Ongoing	Water Supply Utilities, City of Racine Health Department, Central Racine County Health Department, RCOEM, UW-Extension	5, 16, 32, 33, 49, 50, 53, 54, 55, 56, 57, 58, 64, 68, 80, 87
	Encourage multi-agency approaches to water conservation, loss and contamination prevention and trend-monitoring	Partially Implemented	Medium	Ongoing	Water Supply Utilities, RCDPWDS, Municipal Planning Departments, WDNR, UW-Extension	
	Prepare emergency operation and emergency drinking water supply plans for each public water supply system	Partially Implemented	High	2022	Water Supply Utilities	
	Continue coordination of emergency response plans among governmental units and first responders	Partially Implemented	High	Ongoing	Water Supply Utilities, RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Departments	
	Prepare, update, and implement wellhead protection plans	Partially Implemented	Medium	As needed	Water Supply Utilities, RCDPWDS, Municipal Planning Departments	
	Develop and implement plans to systematically replace publically owned water service lines and other public water supply infrastructure that are known to contain lead	Not Implemented	High	Develop plans by 2022	Water Supply Utilities, Municipal Public Works Departments	
	Educate the public on, and promote the replacement of, privately owned portions of water service lines and other plumbing fixtures that contain lead. Pursue available funding opportunities to help offset the cost of these improvements to residents	Partially Implemented	High	Ongoing	Water Supply Utilities, City of Racine Health Department, Central Racine County Health Department, UW-Extension	
	Promote the use of water filtration devices on drinking water sources in homes where there are known lead service lines, lead plumbing, or lead fixtures and where replacement of the lead service line or plumbing fixture is not currently feasible	Partially Implemented	High	Ongoing	Water Supply Utilities, City of Racine Health Department, Central Racine County Health Department, Municipal Public Works Departments, UW-Extension	

Table 72 (continued)

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Hazardous Material Events	Continue participation in the Wisconsin Hazardous Materials Response System	Implemented	High	Ongoing	Municipal Fire Departments and Emergency Medical Service	5, 6, 26, 27, 30, 42, 43, 44, 45, 49, 56, 58, 65, 87
	Continue to promote training, equipment, planning, and preparedness of first responders for mass-casualty incidents involving hazardous materials at fixed facilities and transportation systems	Partially Implemented	High	Ongoing	RCOEM, Racine County Local Emergency Planning Committee, Racine County Sheriff's Department, Municipal Fire and EMS Departments, Municipal Police Departments	
	Develop and update local community response plans for hazardous material releases and continue coordination of these plans among governmental units, businesses, and first responders	Partially Implemented	High	2022	RCOEM, Racine County Local Emergency Planning Committee, Racine County Sheriff's Department, Municipal Fire and EMS Departments, Municipal Police Departments	
	Promote development of site emergency plans for schools, factories, office buildings, shopping malls, hospitals, and other appropriate sites that produce, store, or utilize hazardous materials or that are near fixed facilities or transportation routes where hazardous materials are produced, used, stored, or transported	Partially Implemented	High	Ongoing	RCOEM; Racine County Local Emergency Planning Committee, School Districts, Business Owners	
	Promote proper design, construction, maintenance, and inspections of hazardous material storage facilities, pipelines, and other related facilities	Partially Implemented	High	Ongoing	Pipeline and Hazardous Materials Safety Administration, RCOEM, Public Service Commission of Wisconsin Pipeline Safety Program	
	Promote continued maintenance and upgrading of transportation infrastructure carrying shipments of hazardous cargo	Partially Implemented	High	Ongoing	WisDOT, RCDPWDS, Municipal Public Works/Road Departments, Federal Railroad Administration	
	Educate businesses and those utilizing hazardous materials of their responsibilities	Partially Implemented	Medium	Ongoing	RCOEM, WDNR, Wisconsin Emergency Management, UW-Extension	
	Promote educational and informational programming related to hazardous material safety, and to individual actions to protect citizens, property, and businesses	Partially Implemented	High	Ongoing	RCOEM, WDNR, Wisconsin Emergency Management, UW-Extension	
	Promote ongoing enforcement of Federal, State, and County regulatory standards	Partially Implemented	High	Ongoing	Pipeline and Hazardous Materials Safety Administration, WDNR, RCDPWDS, Public Service Commission of Wisconsin	
	Support existing or consider expansion of household waste management control programs, which should include hazardous material disposal sites for public citizens	Partially Implemented	Medium	Ongoing	City of Racine Water and Wastewater Utility, WDNR, City of Racine Health Department, Central Racine County Health Department, Municipal Public Works Departments, Root-Pike WIN	
Public Health Emergencies	Continue educational and informational programming related to public health and safety issues	Partially Implemented	High	Ongoing	Wisconsin Division of Public Health, City of Racine Health Department, Central Racine County Health Department, Local Health Care Providers, RCOEM, Water Utility Districts, UW-Extension	5, 6, 33, 40, 42, 44, 45, 49, 55, 56, 57, 58, 64, 68

Table 72 (continued)

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Public Health Emergencies (continued)	Continue maintenance of the community public health infrastructure with adequate numbers of staff and to support public health monitoring, surveillance, response, reporting, and research, and to implement prevention and control programs	Partially Implemented	High	Ongoing	Wisconsin Division of Public Health, City of Racine Health Department, Central Racine County Health Department, Local Health Care Providers	See previous page
	Develop and maintain plans for medical counter measure dispensing in the event of an infectious disease emergency	Partially Implemented	High	2022	Wisconsin Division of Public Health, City of Racine Health Department, Central Racine County Health Department, Local Health Care Providers	
	Provide the public health work force with the knowledge and tools needed for early detection and control of diseases and disease vectors	Partially Implemented	Medium	Ongoing	Wisconsin Division of Public Health, City of Racine Health Department, Central Racine County Health Department, Local Health Care Providers	
	Ensure prompt implementation of prevention strategies and enhance communication of public health information about emerging diseases, their vectors, and control measures	Partially Implemented	Medium	Ongoing	Wisconsin Division of Public Health, City of Racine Health Department, Central Racine County Health Department	
	Continued coordination of emergency response plans among governmental units, businesses, and emergency management services	Partially Implemented	High	Ongoing	Wisconsin Division of Public Health, RCOEM, City of Racine Health Department, Central Racine County Health Department, Local Health Care Providers, Wisconsin Emergency Management	
	Develop and implement plans to systematically replace publically owned water service lines and other public water supply infrastructure that are known to contain lead	Not Implemented	High	Develop plans by 2022	Water Supply Utilities, Municipal Public Works Departments	
	Promote the use of water filtration devices on drinking water sources in homes where there are known lead service lines, lead plumbing, or lead fixtures and where replacement of the lead service line or plumbing fixture is not currently feasible	Partially Implemented	High	Ongoing	Water Supply Utilities, City of Racine Health Department, Central Racine County Health Department, Municipal Public Works Departments	
Terrorism Incidents	Develop, maintain, update, and upgrade public and institution-based early warning systems and networks. Encourage the public to register for early warning services such as CodeRED® Emergency and Weather Notification System and the Ready Badger app	Partially Implemented	High	Ongoing	RCOEM, RCDPWDS, Municipal Public Works Departments, Municipal Police Departments, Racine County Sheriff's Department	5, 6, 28, 29, 30, 31, 35, 36, 37, 42, 43, 44, 45, 49, 56, 57, 58
	Promote and conduct preparedness activities including planning, training, and exercises for local law enforcement, fire and rescue departments, and other emergency management services for a variety of terrorist, sabotage, and weapons of mass destruction attacks	Partially Implemented	Medium	Ongoing	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Services, Racine County Local Emergency Planning Committee	

**Table 72 (continued)**

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Terrorism Incidents (continued)	Promote development of site emergency plans that address evacuation and in-place sheltering for schools, factories, office buildings, shopping malls, hospitals, government buildings and infrastructure, and other appropriate sites	Partially Implemented	Medium	2022	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Services, Racine County Local Emergency Planning Committee, School Districts, Hospital Administration, Shopping Mall Administration, Office Building Administration	See previous page
	Consider the need to strengthen public infrastructure to support surveillance, response, reporting, and research, and to implement prevention and control programs from potential chemical and bio-terrorism attacks	Partially Implemented	Medium	Ongoing	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Services, Racine County Local Emergency Planning Committee, Wisconsin Division of Public Health	
	Continue maintenance and consider enhanced security measures at water treatment facilities, including increased pathogen and chemical monitoring and emergency drinking water supply source alternative planning	Partially Implemented	Medium	Ongoing	Water Supply Utilities	
	Continue coordination of emergency response plans among Federal, State, and local governmental units, businesses, and emergency management services	Partially Implemented	High	Ongoing	RCOEM, Wisconsin Emergency Management, Racine County Local Emergency Planning Committee, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Departments	
	Heighten security at public gatherings, special events, critical community facilities, utilities, and infrastructure	Partially Implemented	High	Ongoing	Racine County Sheriff's Department, Municipal Police Departments	
Active Shooter Incidents	Develop, maintain, update, and upgrade public and institution-based early warning systems and networks. Encourage the public to register for early warning services such as CodeRED® Emergency and Weather Notification System and the Ready Badger app	Partially Implemented	High	Ongoing	RCOEM, RCDPWDS, Municipal Public Works Departments, Municipal Police Departments, Racine County Sheriff's Department	5, 6, 28, 29, 30, 31, 35, 36, 37, 42, 49, 58
	Continue development of preparedness activities including planning, training, and exercises for local law enforcement, fire and rescue departments, and other first response personnel for active shooter incidents in a variety of public and private locations	Partially Implemented	High	Ongoing	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Services, Racine County Local Emergency Planning Committee	
	Promote development of site emergency plans that address evacuation and in-place sheltering for schools, factories, office buildings, shopping malls, hospitals, government buildings and infrastructure, and other appropriate sites	Partially Implemented	High	2022	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Services, Racine County Local Emergency Planning Committee, School Districts, Hospital Administration, Shopping Mall Administration, Office Building Administration	

**Table 72 (continued)**

Hazard	Mitigation Measures	Status	Priority	Implementation Timetable	Designated Management Agency (see notes for abbreviations)	Potential Funding Programs (see Appendix J)
Active Shooter Incidents (continued)	Conduct preparedness activities including training and mock-active shooter exercises that carry out site emergency plans to effectively respond to potential active shooter incidents and help minimize injury and loss of life. Include participation of facility management and security, employees, students, and other appropriate regular occupants of the facility	Partially Implemented	Medium	Ongoing	RCOEM, Racine County Sheriff's Department, Municipal Police Departments, Municipal Fire and EMS Services, Racine County Local Emergency Planning Committee, School Districts, Hospital Administration, Shopping Mall Administration, Office Building Administration	See previous page
	Consider installing appropriate security devices at vulnerable facilities such as facility access control systems, remote door lock systems for public entryways, deadbolt locks on individual classrooms and offices, and public address systems	Partially Implemented	Medium	Ongoing	School Districts, Hospital Administration, Shopping Mall Administration, Office Building Administration	
Cyber Attack on Local Government	Purchase of cyber insurance by local governments, including first party coverage and liability coverage	Partially Implemented	High	Ongoing	Racine County Board, Municipal Common Council's, Village Boards, Town Boards, School Districts	5, 6, 28, 29, 30, 34, 49
	Encourage local governments to provide education in basic cybersecurity to their employees, including training on identifying sensitive data, prioritizing data which needs greater protection and/or more frequent backing up, policies regarding data access and use, recognition of cyber-threats, proper procedures for passwords, and balancing operational efficiency and risk	Partially Implemented	High	2022	County and Municipal Information Technology Departments	
	Disconnect computers and networks from the internet that store highly sensitive information or that control or monitor important equipment or processes	Partially Implemented	High	2022	County and Municipal Information Technology Departments	
	Consider installing dedicated communication lines for monitoring and/or controlling critical equipment or processes	Partially Implemented	Medium	2022	WE Energies, Water Supply Utilities, Public Works Departments, Municipal Police Departments, Municipal Fire and EMS Departments	
	Develop and implement a cybersecurity and data back-up initiative	Not Implemented	Medium	2022	County and Municipal Information Technology Departments	
Power Outages	Continue to review and implement programs to improve reliability of power supply facilities	Partially Implemented	High	Ongoing	WE Energies, American Transmission Company, Public Service Commission of Wisconsin	49, 58, 87, 88, 89
	Encourage backup power generation facilities	Partially Implemented	Medium	Ongoing	RCOEM, Wisconsin Emergency Management	
	Coordinate activities and communication regarding prevention and response to power outages	Partially Implemented	Medium	Ongoing	WE Energies, American Transmission Company, Public Service Commission of Wisconsin, RCOEM, Wisconsin Emergency Management	
	Continue and refine public informational and educational programming. Information related to the safe operation of generators, space heaters, fireplaces, and wood stoves should be included	Partially Implemented	Medium	Ongoing	RCOEM, WE Energies, UW-Extension	

NOTE: The following abbreviations are used for designated management agencies:

- |         |   |   |        |   |   |
|---------|---|---|--------|---|---|
| FEMA    | = | Federal Emergency Management Agency                               | USGS   | = | U.S. Geological Survey  |
| NOAA    | = | National Oceanic and Atmospheric Administration                   | WDATCP | = | Wisconsin Department of Agriculture, Trade, and Consumer Protection |
| RCDPWDS | = | Racine County Department of Public Works and Development Services | WDNR   | = | Wisconsin Department of Natural Resources                           |
| RCOEM   | = | Racine County Office of Emergency Management                      | WDSPS  | = | Wisconsin Department of Safety and Professional Services            |
| SEWRPC  | = | Southeastern Wisconsin Regional Planning Commission               | WisDOT | = | Wisconsin Department of Transportation                              |
| USDA    | = | U.S. Department of Agriculture                                    |        |   |   |

Source: SEWRPC.



because funding programs and opportunities are constantly changing, the involved County and local units of government staffs 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 sources for implementing the hazard mitigation plan recommended in this report (see also Appendices J and K).

### **Federal Emergency Management Agency Programs**

The Federal Emergency Management Agency (FEMA) funds several programs that in the State of Wisconsin are administered through WEM. These programs include the Hazard Mitigation Grant Program, the Flood Mitigation Assistance Program, the Pre-Disaster Mitigation Program, and the Public Assistance Program. These programs are described below.<sup>2</sup> Examples of types of projects that can be eligible for funding under the Hazard Mitigation Grant Program, the Flood Mitigation Assistance Program, and the Pre-Disaster Mitigation Program are given in Table 73. For all three FEMA programs, the projects must be cost-effective (benefits outweigh the costs), environmentally sound, address a repetitive problem, and be a long-term solution.

#### ***Hazard Mitigation Grant Program***

The Hazard Mitigation Grant Program (HMGP) can provide up to 75 percent of the costs attendant to certain natural hazard mitigation programs. In the case of flood mitigation, projects can include the floodproofing or acquisition and relocation of floodprone properties, the elevation of structures in compliance with National Flood Insurance Program (NFIP) standards, and other flood control measures, including structural projects, where identified as cost-effective. To be eligible for flood mitigation related activities with FEMA funding, structures must be insured under the NFIP. Acquisition and demolition of structures in landslide or bluff recession areas where the risk of catastrophic failure of the slope is imminent and/or an immediate threat is also eligible for HMGP funding. Under the HMGP, the balance of the costs are shared by the State of Wisconsin (12.5 percent) and the grantee (12.5 percent). Communities in Wisconsin can apply through the State for HMGP funds only after a Presidential disaster declaration is issued. The amount that a state is awarded is based upon the size of the declared disaster. Communities applying for HMGP funds do not have to be in the declared disaster area, however, communities within the disaster area receive priority for project funding. HMGP funds must be applied for 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. Although State and local units of government are eligible applicants, HMGP funds can be used on private property for eligible projects. The State, as HMGP grantee, is responsible for identifying and prioritizing projects. The following have been adopted as the State's priorities for HMGP funds:

1. Acquisition and demolition of floodplain properties determined to be substantially damaged per a community's floodplain zoning ordinance;
2. Acquisition and demolition of repetitive loss and severe repetitive loss structures;
3. Acquisition and demolition of damaged floodplain properties;
4. Acquisition and demolition of floodplain properties;
5. Acquisition and demolition of flood damaged properties not in the floodplain;

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<sup>2</sup> *Additional information on eligibility requirements and eligible projects under the Hazard Mitigation Grant Program, the Flood Mitigation Assistance Program, and the Pre-Disaster Mitigation Program can be found in Federal Emergency Management Agency, Hazard Mitigation Assistance Guidance: Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program, February 27, 2015.*

Table 73

**ELIGIBLE ACTIVITIES UNDER FEDERAL HAZARD MITIGATION GRANT PROGRAMS**

Eligible Activity	Hazard Mitigation Grant Program	Flood Mitigation Assistance Program	Pre-Disaster Mitigation Program
Mitigation Projects	Y	Y	Y
Property Acquisition and Structure Demolition	Y	Y	Y
Property Acquisition and Structure Relocation	Y	Y	Y
Structure Elevation	Y	Y	Y
Mitigation Reconstruction	Y	Y	Y
Dry Floodproofing of Historic Residential Structures	Y	Y	Y
Dry Floodproofing of Non-residential Structures	Y	Y	Y
Generators	Y	--	Y
Localized Flood Risk Reduction Projects	Y	Y	Y
Non-localized Flood Risk Reduction Projects	Y	--	Y
Structural Retrofitting of Existing Buildings and Facilities	Y	Y	Y
Non-structural Retrofitting of Existing Buildings and Facilities	Y	Y	Y
Safe Room Construction	Y	--	Y
Wind Retrofit for One- and Two Family Residences	Y	--	Y
Infrastructure Retrofit	Y	Y	Y
Soil Stabilization	Y	Y	Y
Wildfire Mitigation	Y	--	Y
Post-Disaster Code Enforcement	Y	--	--
Advanced Assistance	Y	--	--
5 Percent Initiative Projects	Y	--	--
Miscellaneous/Other <sup>a</sup>	Y	Y	Y
Hazard Mitigation Planning	Y	Y	Y
Planning Related Activities	Y	--	--
Technical Assistance	--	Y	--
Management Cost	Y	Y	Y

<sup>a</sup>Miscellaneous/Other indicates that any proposed action will be evaluated on its own merit against program requirements. Eligible projects may be approved provided funding is available.

Source: Federal Emergency Management Agency.

6. Elevating, floodproofing, or retrofitting flood damaged structures not in the floodplain; and
7. Other hazard reduction projects (such as community or residential safe rooms, detention basins, storm sewer improvements, protection of utilities, drainage)

Communities applying for HMGP program funding must have a current hazard mitigation plan (or have adopted the County’s hazard mitigation plan) that has been formally approved by FEMA at the time the grant is awarded and funds are obligated.

### ***Flood Mitigation Assistance Program***

The Flood Mitigation Assistance (FMA) program can potentially provide up to 75 percent of the costs attendant to the acquisition, relocation, elevation, and floodproofing of structures in compliance with NFIP standards. Properties included in a project subapplication 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. Mitigation of repetitive-loss properties is given a high priority under this program. Properties that meet FEMA's definition for Repetitive Loss (RL) are 90 percent federally funded and Severe Repetitive Loss (SRL) properties are 100 percent federally funded under this program.<sup>3</sup> Increased cost of compliance (ICC) coverage under the NFIP may provide a funding source for bringing noncompliant structures into compliance after a flood loss. Communities applying for FMA program funding must have a current hazard mitigation plan (or have adopted the County's current hazard mitigation plan) that has been formally approved by FEMA at the time of application deadline. The hazard mitigation plan must also be current at the time the grant is awarded and funds are obligated.

### ***Pre-Disaster Mitigation Program***

FEMA's Pre-Disaster Mitigation Program (PDM) can potentially provide up to 75 percent of the costs attendant to pre-disaster natural hazard mitigation planning and the implementation of cost-effective mitigation projects prior to a disaster event. Funding these plans and projects reduces overall risks to the population and structures, while also reducing reliance on funding from actual disaster declarations. This is a national competitive program that is dependent on Congressional appropriations. The amount and timing of funding appropriations varies from year to year. Examples of eligible projects include property acquisition; structure removal or relocations; structure elevation; safe room construction; dry floodproofing of nonresidential structures and historic residential structures; minor localized flood reduction projects; soil stabilization; and construction or modification of groins, jetties, and breakwaters. Communities applying for PDM program funding must have a current hazard mitigation plan (or have adopted the County's current hazard mitigation plan) that has been formally approved by FEMA at the time of application deadline. The hazard mitigation plan must also be current at the time the grant is awarded and funds are obligated.

### ***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 repair of 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 program may pay for cost-effective hazard mitigation measures for facilities damaged by the incident. In addition, funding from the PA program may be combined with funding from the HMGP, FMA, and/or PDM programs to implement mitigation measures on the same facility; however, funding from these programs cannot be combined to pay for the same work.

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<sup>3</sup> *Repetitive Loss (RL) properties have had two or more flood insurance claims of at least \$1,000 each within a rolling ten-year period since 1978. Severe Repetitive Loss (SRL) properties are defined as National Flood Insurance Program-insured residential properties that either have had four or more claims over \$5,000 (including building and contents) each, the cumulative amount of such claims payments exceeding \$20,000, or at least two claims with a cumulative amount exceeding the value of the building.*

### **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. Several of these programs are described below (also see Appendices J and K).

#### ***Conservation Reserve Program***

The Conservation Reserve Program (CRP) is a voluntary program for agricultural landowners that provides annual rental payments and up to 50 percent cost-share assistance to establish long-term, resource-conserving covers on eligible farmland. The CRP goal is to reduce soil erosion, protect the nation's ability to produce food, reduce sedimentation in streams and lakes, improve water quality, establish wildlife habitat, and enhance forest and wetland resources. Implementation of the program can also have hazard mitigation benefits, including reduction of crop losses and property damages due to flooding. Through the program, farmers are encouraged to convert highly erodible cropland or other environmentally sensitive areas to vegetative cover such as prairie-compatible, noninvasive forage mix, wildlife plantings, trees, filter strips, or riparian buffers. The rental payment that the land owner receives is based on the agricultural rental value of the land.

#### ***Conservation Reserve Enhancement Program***

The Conservation Reserve Enhancement Program (CREP) is an offshoot of the CRP that targets exclusively removing high-priority environmentally sensitive riparian areas from crop or pasture production. CREP pays landowners to install riparian buffers, grassed waterways, filter strips along waterways, or to return continually flooded agricultural fields to restored wetlands. The program provides cost share assistance from both Federal and State funding for project costs. The farmer is also compensated with an annual rental payment. The CREP program enrolls up to 100,000 acres within the State. In drought years, haying may be allowed on CREP land to offset the overall loss of production on farmlands. The program helps reduce environmental damage and improve water quality while reducing crop and property losses from flooding. Participation in this program is voluntary and the contract period is typically ten to 15 years.

#### ***Farmable Wetlands Program***

The Farmable Wetlands Program (FWP) is also run through the CRP program and is designed to restore previously farmed wetlands to improve both vegetation and water flow. Landowners must agree to restore the wetlands, establish plant cover, and not use the enrolled land for commercial purposes. The program aims to improve surface and groundwater quality, prevent soil erosion, reduce downstream flood damage, and provide habitat for wildlife. FWP contracts last between ten and 15 years. The maximum size of enrollment is 40 acres.

### **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 Appendices J and K).

### **U.S. Department of Housing and Urban Development Community Development Block Grant Program**

Community Development Block Grant (CDBG) programs, funded by the U.S. Department of Housing and Urban Development (HUD), are administered by the Wisconsin Department of Administration (see Appendices J and K).

The Community Development Block Grant Emergency Assistance Program (CDBG-EAP) is a special program that the Wisconsin Department of Administration, Division of Energy, Housing, and Community Resources activates to assist local units of government that have recently experienced a natural or manmade disaster. The program provides funds to address housing needs which occur as a direct result of natural or man-made disasters, with preference given to those households with incomes at or below 80 percent of the county median household income. A

local unit of government that has recently experienced a natural or man-made disaster may apply for assistance in addressing housing problems caused by the disaster. Generally, cities, towns, and villages with populations less than 50,000, and counties with populations less than 200,000 are eligible to apply. The program also makes funds available for the repair of public infrastructure affected by natural disaster. Eligible activities dependent upon the nature of the disaster may include: repair of damage to the dwelling unit, acquisition and demolition of dwellings unable to be repaired, costs for new housing units to replace those lost in the disaster, and repairs to publically-owned utility systems, streets, and sidewalks. The CDBG-EAP has provided the local match on many hazard mitigation assistance projects around the State. These funds are especially instrumental in non-declared events, as they may be the only source of funding for recovery or mitigation activities after an event. A local unit of government interested in applying for CDBG-EAP funds must do so within 90 days of the disaster event.

The Community Development Block Grant for Public Facilities Program is a versatile financing tool for general-purpose local units of government in need of funds to undertake needed infrastructure and public building projects. This program is designed to enhance the vitality of a community by undertaking public investment that contributes to its overall community and economic development. Eligible applicants are local units of government that are not HUD entitlement communities.<sup>4</sup> Projects must meet one of the three national objectives for the program, which are: 1) the project principally benefits low and moderate income persons; 2) the project eliminates slum and blight; and 3) the proposed activity meets an urgent local need, typically a catastrophic event. Eligible activities include utilities and streets, fire stations and emergency vehicles, community/senior centers and shelters, tornado shelters or shelter retrofits, and municipal telecommunications. Grant funds are available on a continual basis. The maximum grant for any single applicant is \$500,000 and applicants can receive only one grant per 12-month period.

#### **U.S. Small Business Administration Programs**

The U.S. Small Business Administration (SBA) provides disaster loans to homeowners and businesses to repair or replace property damaged in a declared disaster. SBA loans are granted only for uninsured losses. Loans may be used to meet required building codes, such as the NFIP requirements. SBA may also provide loans for relocation out of special flood hazard areas when such relocations are required by local officials. While SBA's enabling legislation generally prohibits the agency from making disaster loans for voluntary relocations, there are exceptions that can be made, including relocations of homeowners, renters, and business owners out of special flood hazard areas when the community is participating in a buyout program. These loans would be limited to the amount necessary to repair or replace the damage at the disaster site. SBA loans may also be used to refinance existing mortgages. Up to 20 percent of the disaster loan can be used for mitigation measures.

#### **U.S. Army Corps of Engineers**

The U.S. Army Corps of Engineers (USACE) programs are potential sources of funding for implementing the recommendations of this plan related to floodland management and Lake Michigan coastal hazards. In order to be eligible for funding, the plan components must meet specific Corps economic feasibility and other criteria. The programs which 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);

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<sup>4</sup> HUD entitlement communities include principal cities of Metropolitan Statistical Areas, other metropolitan cities with populations of at least 50,000, and urban counties with populations of at least 200,000 (excluding the population of entitlement cities). The City of Racine is the only entitlement community in Racine County.

projects designed to control storm water runoff rates, volumes, and discharge quality from nonpoint sources within existing urban development. Eligible project sponsors can be reimbursed up to 50 percent to construct BMPs. A project must be located in an urban area to be eligible for BMP cost sharing. Eligible activities include: Construction of structural urban BMPs such as detention basins, wet basins, infiltration trenches, infiltration basins, or wetland basins; engineering design and construction services for BMP installation; land acquisition and easement purchase; storm sewers; and streambank and shoreland stabilization projects. Projects are selected for funding based on a competitive process.

### ***Municipal Dam Grant Program***

The 2015-2017 biennial budget provides approximately \$3.5 million to fund eligible engineering and construction costs associated with the maintenance, repair, modification, or abandonment and removal of municipally owned dams. The program will cover 50 percent of the first \$400,000 of eligible project costs and 25 percent of the next \$800,000 of dam repair, reconstruction, or modification project costs. The program will cover 100 percent of the first \$400,000 for dam abandonment and removal projects. Cities, towns, villages, counties, tribes, and public inland lake protection and rehabilitation districts may apply for funds through this program.

### ***Dam Removal Grant Program***

The 2015-2017 Biennial Budget provides approximately \$500,000 to fund dam removal projects for any owner who wishes to remove their dam. This program provides reimbursement for 100 percent of eligible costs up to a maximum of \$50,000 to remove a dam. Counties, cities, villages, towns, tribes, public inland lake protection and rehabilitation districts, and private dam owners may apply for grant funds through this program.

### ***Urban Forestry Grant Program***

This program funds projects that improve a community's capacity to manage its trees. Counties, cities, villages, towns, and nonprofit organizations may apply for this program. These grants fall into three categories: regular grants, startup grants, and catastrophic storm grants. Regular grants are competitive cost-share grants up to \$25,000 to support innovative projects that will develop sustainable urban and community forestry programs. Startup grants are cost-share grants up to \$5,000 available to communities that want to start or restart an urban forestry program. Catastrophic storm grants fund tree repair, removal, or replacement within urban areas following a catastrophic storm event for which the governor has declared a State of Emergency.

### **Wisconsin Department of Transportation**

The Wisconsin Department of Transportation (WisDOT) has numerous programs that provide financial assistance to local government and other public and private entities to make a variety of improvements to local roads, highways, bridges, airports, harbors, rail, bike, and pedestrian facilities.

### ***Bureau of Transportation Safety Grants***

WisDOT Bureau of Transportation Safety provides traffic safety grants to organizations and partners that provide services that minimize the number of traffic fatalities and injuries each year. Partners include health centers, law enforcement, fire departments, emergency medical services, and other agencies. One such program provides funding for health care centers and departments to purchase child passenger safety seats to distribute to families who are unable to afford them.

### ***Highway Safety Improvement Program***

The Highway Safety Improvement Program (HSIP) provides funding for highway safety projects at sites that have a high crash history. The objective of the program is to develop and implement stand-alone safety projects designed to reduce the number and severity of crashes on all streets and highways (both State and local). The emphasis for this program is on low-cost measures that can be implemented quickly to increase road safety. The program is typically 90 percent federally funded and requires a 10 percent match of State and/or local funds.

## **Wisconsin Coastal Management Program**

The Wisconsin Coastal Management Program administers an annual competitive grants program available for the 15 Wisconsin coastal counties. Under the category Coastal Resource and Community Planning, funds are available for projects that support natural hazard planning and development of ordinances.

## **Other Potential Funding Sources**

A variety of other potential funding sources exists which may provide funds for implementation of elements of the recommended hazard mitigation plan. These are listed in Appendices J and K.

## **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**

#### ***Annual Review***

Toward ensuring successful monitoring of the hazard mitigation plan for Racine County, the County intends that the Racine County Hazard Mitigation Local Planning Team meet at least annually to review the plan and the status of its implementation. At the meeting the Racine County Office of Emergency Management will give a status report detailing the progress of various mitigation projects, difficulties encountered, and the coordination efforts identified in the plan. These meetings will provide the opportunity to develop and recommend any necessary revisions and updates of the plan to the County Economic Development and Land Use Planning Committee and the County Board, as well as to the local units of government involved. The revisions would be proposed, considered, and adopted as formal amendments to the hazard mitigation plan. This review process will be coordinated and conducted by the Racine County Office of Emergency Management, 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 Local Planning Team, in its review process, will periodically examine and evaluate 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 altered; 3) the degree and extent of progress made in implementing previously identified hazard mitigation actions; 4) whether the plan elements and priorities should remain unchanged or need modification; 5) whether any new plan elements are needed; and 6) whether applicable funding programs and levels have changed. As an integral part of its review process, the County Office of Emergency Management, with the review and guidance of the Hazard Mitigation Local Planning Team will submit an annual written report to the County Economic Development and Land Use Planning Committee and the County Board, setting forth the status of plan implementation efforts, detailing plan implementation actions taken over the past year, prioritizing mitigation goals and activities for the next year, and setting forth any recommended revisions to the plan. It is also recommended that the County Office of Emergency Management oversee the development and maintenance of a tracking and archiving system for all future detailed hazard mitigation studies undertaken by and/or for the County or the local units of government concerned. Such studies should be evaluated using policies established either by the Local Planning Team or the County Board.

The meetings of the Local Planning Team will continue to be recorded in summary notes and posted for public review. Any salient decisions should be recorded in the County Office of Emergency Management files and, where appropriate, on the County web site and in relevant press releases, among others. Meetings of the Racine County Hazard Mitigation Local Planning Team are considered public meetings under Wisconsin Law and are open to all interested parties.

County Office of Emergency Management 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 persons and local planning team 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 natural hazard awareness and preparedness at a high level.

The County Office of Emergency Management shall 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.

#### ***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 flood and other hazard event experiences, circumstances, and consequences. In this regard, the post-disaster review effort will be coordinated with the emergency operations program administered by the County Office of Emergency Management in partnership with the local units of government. The experiences of the emergency operations may indicate a need for refined mitigation actions which would then be incorporated into the plan. Any plan updating found to be needed will be incorporated into the annual plan update noted above.

#### **Reevaluation Strategy**

The components of the hazard mitigation plan developed under County- and local-level planning efforts will be reevaluated and updated at a minimum of five-year intervals, considering the degree to which the actions recommended under such efforts have been implemented and incorporating any changes in the available hazard mitigation strategy state-of-the-art management methods and procedures. The plan components should be revised as necessary to reflect changing conditions and needs in accord with the plan review-revision procedures recommended above. Reevaluation, updating, and revision of this plan should be initiated by the County Office of Emergency Management approximately 24 months prior to expiration of this updated plan. The County Office of Emergency Management will also be responsible for initiating meetings of the Local Planning Team and the County Board as needed.

When an updated draft of the plan is completed, it will be submitted to the State Hazard Mitigation Officer at the Wisconsin Division of Emergency Management for review. Following any revisions suggested by the State Hazard Mitigation Officer, the draft updated plan will be submitted to FEMA for approval. Once FEMA has found that the updated plan is approvable upon adoption, the Racine County Office of Emergency Management will submit it to the Racine County Board for adoption. Following adoption of the updated plan by County Board, the Racine County Office of Emergency Management will request that the governing bodies of the incorporated municipalities within the County adopt the updated plan.<sup>5</sup>

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<sup>5</sup> *The review, approval, and adoption process described in this paragraph follows the practices currently used by the Wisconsin Division of Emergency Management and FEMA. Should such practices change, it is recommended that the County follow the process recommended by the Wisconsin Division of Emergency Management.*



**Appendix A**

**RACINE COUNTY HAZARD MITIGATION LOCAL  
PLANNING TEAM AGENDAS AND MEETING SUMMARY  
NOTES, INFORMATION ON PUBLIC MEETING,  
PERTINENT COMMITTEE MEMBERSHIP LISTS, AND  
OPORTUNITY FOR REVIEW OF PLAN AND COMMENT**

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Figure A-1

## INVITATION TO JOIN THE RACINE COUNTY HAZARD MITIGATION LOCAL PLANNING TEAM

Owens, Aaron W.

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**From:** Maack, David <David.Maack@goRacine.org>  
**Sent:** Friday, May 15, 2015 11:00 AM  
**To:** cwalters@burlington-wi.gov; dbaumeister@townofburlington.com; kwahlen@mtpleasantwi.gov; Logan Martin; rewald@waterfordwi.org; thomaskramer@wi.rr.com; TOC Tom Christensen; Tom Friedel; townofraymond@core.com; townwtfrd@tds.net; villageadmin@sturtevant-wi.gov; Wind Point; astreif@townofburlington.com; barb.mcnulty@vil.ep.wi.us; Caledonia Village Clerk; Christensen, Wendy M.; cityclerk@burlington-wi.gov; corlovsky@waterfordwi.org; dhalbach@burlington-wi.gov; Dover Clerk; Janice.Johnson-Martin@cityofracine.org; jill@uniongrove.net; Michael@townofyorkville.com; North Bay; Patcampbell262@wi.rr.com; Racine City Clerk; rladewig@waterfordwi.org; Rochester, Village of; Sentahall@wi.rr.com; Skohlhagen@mtpleasantwi.gov; sstearns@mtpleasantwi.gov; Sturtevant Village Clerk; tammy.ruggaber@vil.ep.wi.us; tnorway@wi.rr.com; TOC Kari Torilsen; bbradley@caledoniawi.com; Delagrave, Jonathan; ejchart@tds.net; ellis.steiner@vil.ep.wi.us; Hansen, Peter L.; jgarski@mtpleasantwi.gov; john.dickert@cityofracine.org; maimone@uniongrove.net; pih1148@aol.com; pjacobson1@wi.rr.com; rmiller@burlington-wi.gov; sjansen3@wi.rr.com; thincz@wi.rr.com; troanhouse@waterfordwi.org; Vnbpresident@gmail.com  
**Cc:** Anderson, Julie; Owens, Aaron W.; Kletti, Laura L.  
**Subject:** Hazard Mitigation Plan Update  
**Importance:** High

**NOTE:** In order to be eligible for Hazard Mitigation grants, each municipality is required to have a Hazard Mitigation Plan. Each municipality in Racine County adopted the County's Plan five years ago. We are now required to update that plan. If your municipality intends to adopt the update, it is important that you participate in the planning process.

County Executive Jonathan Delagrave invites you to participate on the Hazard Mitigation Planning Team.

Racine County's Public Works & Development Services Department and the Office of Emergency Management will be convening a Hazard Mitigation Local Planning Team to update the Racine County Hazard Mitigation Plan. Keeping this plan up to date is very critical for municipalities within Racine County to maintain eligibility for hazard mitigation grants.

FEMA requires that each municipality in the County be represented on this team. We also seek a cross-section of community interests, including law enforcement, fire and rescue, public health, public works, engineering, elected and appointed officials, and representatives from both the private sector and non-profits.

Our first meeting will be held on Tuesday, June 2<sup>nd</sup> from 9:00 AM-11:00 AM at the **iMET Center (formerly CATI)**, 2320 Renaissance Blvd, Sturtevant, WI 53177. At this meeting we will present a brief overview of hazard mitigation and the hazard mitigation plan updating process as well as an overview of the first update to the Racine County Hazard Mitigation Plan which was completed in 2010. We will also be conducting a short hazard and vulnerability assessment exercise to begin to update our identification of local risk areas.

This first meeting is very crucial to our planning process. To confirm your attendance, please contact the Office of Emergency Management at 262.636.3513 or by email at [RCEmergencyManagement@goracine.org](mailto:RCEmergencyManagement@goracine.org).

David L. Maack, CEM, CPM, WCEM | Coordinator  
Racine County Office of Emergency Management  
Office: 262.636.3515 | Fax: 262.636.3505  
E-mail: [david.maack@goRacine.org](mailto:david.maack@goRacine.org)  
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Website: [www.readyracineco.com](http://www.readyracineco.com)  
Facebook: [www.facebook.com/readyracineco](http://www.facebook.com/readyracineco)

\*Building a Disaster Resistant Community-Making Disaster Resistance a Way of Life\*

Figure A-2

**MEMBERS OF THE RACINE COUNTY  
HAZARD MITIGATION LOCAL PLANNING TEAM**

David Maack, Co-Chair	Coordinator, Racine County Office of Emergency Management
Julie Anderson, Co-Chair	Director, Racine County Department of Public Works and Development Services
Aaron Owens, Secretary	Planner, Southeastern Wisconsin Regional Planning Commission
Mark Anderson	Lieutenant, City of Burlington Police Department
Christopher Bennet	Trustee, Village of Rochester
Brandon Bledsoe	Management Intern, Village of Wind Point
Dottie Bowersox	Public Health Administrator, Racine Health Department
Joseph Boxhorn	Senior Planner, Southeastern Wisconsin Regional Planning Commission
Jyl Brunner	Administrative Captain, Racine Youthful Offender Correctional Facility
Jeff Busch	Building Superintendent, Town of Dover
Pat Campbell	Clerk, Town of Norway
Tom Christensen	Administrator, Village of Caledonia
Jeff Collen	Chief Executive Officer, YMCA of Racine
Aaron Collins	Director of Plant Operations and Maintenance, Wheaton Franciscan Healthcare
James F. Day	Assistant Chief, S.C. Johnson & Son Fire Brigade
Jonathan Delagrave	County Executive, Racine County
Tom Ditscheit	Chief, Town of Waterford Police Department
Jeff Dolezal	Director of Public Works, Village of Waterford
Mark Dubiel	Emergency Management Coordinator, Cree, Inc.
Brian Freitag	Manager of Environmental and Facility Services, In-Sink-Erator
Silviano E. Garcia	Public Health Specialist, Central Racine County Health Department
Michael Hawes	Village Administrator, Village of Wind Point
Nicholas Hempel	Division Chief, City of Racine Fire Department
Ken Hinz	Supervisor, Town of Waterford Public Works Department
Perry Howard	Fire Chief, City of Burlington Fire Department
Jody Howell	Supervisor, Racine County Communication Center
Jake Isaacson	Supervisor, Town of Dover Roads Department
Jon Keiser	Battalion Chief, South Shore Fire Department
Laura L. Kletti	Chief Environmental Engineer, Southeastern Wisconsin Regional Planning Commission
Jill Kopp	Clerk-Treasurer, Village of Union Grove
Tom Kramer	Administrator, Town of Norway
Heidi Lange	Manager, Marketing, Communications & Public Relations, Wheaton Franciscan Healthcare
Chris Litzau	President, Great Lakes Community Conservation Corps
Jennifer Loizzo	Registered Sanitarian, Central Racine County Health Department
Paul Madden	Battalion Chief, City of Racine Fire Department
Michael McKinney	Clerk/Treasurer, Town of Yorkville
Luke Miller	Trustee, Franksville United Methodist Church
Moirra Moon	Administrative Assistant, Racine County Office of Emergency Management
Jane Nikolai	Treasurer, Racine County
Mark Osmundsen	Director of Public Works, Village of Union Grove
Nakeisha Payne	Senior Public Involvement & Outreach Specialist, Southeastern Wisconsin Regional Planning Commission
Cody Pearce	Public Health Educator, City of Racine
Dick Roeder	Chief, Caledonia Fire Department
Kyle Roeder	Disaster Program Manager, American Red Cross of Southeast Wisconsin
Ben Schliesman	Southeast Region Director, Wisconsin Emergency Management
Jeff Seitz	Village Engineer, Village of Sturtevant Department of Public Works
John P. Serketich	Assistant Corporation Counsel, Racine County
Robert Stedman	Chief, South Shore Fire Department
Anthony Trevino	Security Manager, Cree, Inc.
Skip Twardosz	Emergency Management Director, Town of Burlington
Dan Warren	Captain, Village of Caledonia Police Department
Stacey Webber	Business Manager, Accu-Temp Heat Treating
James Weidner	Captain, Racine County Sheriff Department
Chuck Weitzel	Lieutenant, City of Racine Police Department
David Wohlgemuth	Lieutenant, City of Racine Police Department
Craig Workman	Director of Public Works, City of Burlington
Mark Yehlen	Commissioner of Public Works, City of Racine

**Figure A-3**

**ACTIVITIES OF THE RACINE COUNTY  
HAZARD MITIGATION LOCAL PLANNING TEAM**

Racine County Office of Emergency Management  
Southeastern Wisconsin Regional Planning Commission

**Notice of Meeting and Agenda**

**RACINE COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM**

DATE: June 2, 2015

TIME: 9:00 to 11:00 a.m.

PLACE: iMET Center (formerly CATI)  
2320 Renaissance Blvd  
Sturtevant, Wisconsin

AGENDA:

1. Welcome
2. Introductions
3. Overview of hazard mitigation plan updating process: Joseph E. Boxhorn, SEWRPC Senior Planner
4. Background on the second update to the Racine County Hazard Mitigation Plan: Aaron W. Owens, SEWRPC Planner
  - a. Initial 2001/2004 plan
  - b. 2009/2010 updated plan
  - c. Main components to be reviewed and revised
  - d. Schedule for the plan update (Attachment 1)
  - e. Local Planning Team role
5. Review hazard mitigation goals as revised by the first plan update (Attachment 2): Aaron Owens
6. Hazard and vulnerability assessment exercise (Attachment 3): Aaron Owens
7. Adjourn

Aaron W. Owens  
Secretary

Enclosures

CAPR-266 3RD ED MEETING NOTICE JUNE 2015 (00226040).DOC  
500-1113  
AWO/pk  
05/27/2015

# SUMMARY NOTES OF THE JUNE 2, 2015 MEETING OF THE RACINE COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM

## INTRODUCTION

The June 2, 2015 meeting of the Racine County Hazard Mitigation Plan Local Planning Team was convened at the Racine County Center at 9:00 a.m. The meeting was called to order by David Maack, Coordinator of the Racine County Office 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

David Maack, Chair .....Coordinator, Racine County Office of Emergency Management  
Aaron Owens, Secretary .....Planner, Southeastern Wisconsin Regional Planning Commission  
Julie Anderson..... Director, Racine County Department of Public Works and  
Development Services  
Mark Anderson..... Lieutenant, City of Burlington Police Department  
Christopher Bennet ..... Trustee, Village of Rochester  
Brandon Bledsoe ..... Management Intern, Village of Wind Point  
Dottie Bowersox ..... Public Health Administrator, Racine Health Department  
Joseph Boxhorn..... Senior Planner, Southeastern Wisconsin Regional Planning Commission  
Jyl Brunner..... Administrative Captain, Racine Youthful Offender Correctional Facility  
Jeff Busch ..... Building Superintendent, Town of Dover  
Pat Campbell.....Clerk, Town of Norway  
Tom Christensen .....Administrator, Village of Caledonia  
Jeff Collen ..... Chief Executive Officer, YMCA of Racine  
Aaron Collins ..... Director of Plant Operations and Maintenance, Wheaton Franciscan  
Healthcare  
James F. Day .....Assistant Chief, S.C. Johnson & Son Fire Brigade  
Jonathan Delagrave..... County Executive, Racine County  
Tom Ditscheit.....Chief, Town of Waterford Police Department  
Jeff Dolezal ..... Director of Public Works, Village of Waterford  
Mark Dubiel..... Emergency Management Coordinator, Cree, Inc.  
Brian Freitag .....Manager of Environmental and Facility Services, In-Sink-Erator  
Silviano E. Garcia ..... Public Health Specialist, Central Racine County Health Department  
Michael Hawes..... Village Administrator, Village of Wind Point  
Nicholas Hempel..... Division Chief, City of Racine Fire Department  
Ken Hinz ..... Supervisor, Town of Waterford Public Works Department  
Perry Howard.....Fire Chief, City of Burlington Fire Department  
Jody Howell ..... Supervisor, Racine County Communication Center  
Jake Isaacson..... Supervisor, Town of Dover Roads Department  
Jon Keiser..... Battalion Chief, South Shore Fire Department  
Laura L. Kletti..... Chief Environmental Engineer, Southeastern Wisconsin Regional  
Planning Commission  
Jill Kopp..... Clerk-Treasurer, Village of Union Grove  
Tom Kramer ..... Administrator, Town of Norway  
Heidi Lange..... Manager, Marketing, Communications & Public Relations, Wheaton  
Franciscan Healthcare

Chris Litzau..... President, Great Lakes Community Conservation Corps  
 Jennifer Loizzo..... Registered Sanitarian, Central Racine County Health Department  
 Paul Madden .....Battalion Chief, City of Racine Fire Department  
 Michael McKinney .....Clerk/Treasurer, Town of Yorkville  
 Luke Miller ..... Trustee, Franksville United Methodist Church  
 Moira Moon ..... Administrative Assistant, Racine County Office of Emergency  
 Management  
 Jane Nikolai ..... Treasurer, Racine County  
 Mark Osmundsen..... Director of Public Works, Village of Union Grove  
 Nakeisha Payne..... Senior Public Involvement & Outreach Specialist, Southeastern  
 Wisconsin Regional Planning Commission  
 Cody Pearce ..... Public Health Educator, City of Racine  
 Dick Roeder ..... Chief, Caledonia Fire Department  
 Kyle Roeder ..... Disaster Program Manager, American Red Cross of Southeast Wisconsin  
 Ben Schliesman..... Southeast Region Director, Wisconsin Emergency Management  
 Jeff Seitz..... Village Engineer, Village of Sturtevant Department of Public Works  
 John P. Serketich ..... Assistant Corporation Counsel, Racine County  
 Robert Stedman..... Chief, South Shore Fire Department  
 Anthony Trevino ..... Security Manager, Cree, Inc.  
 Skip Twardosz..... Emergency Management Director, Town of Burlington  
 Dan Warren ..... Captain, Village of Caledonia Police Department  
 Stacey Webber..... Business Manager, Accu-Temp Heat Treating  
 James Weidner ..... Captain, Racine County Sheriff Department  
 Chuck Weitzel..... Lieutenant, City of Racine Police Department  
 David Wohlgemuth ..... Lieutenant, City of Racine Police Department  
 Craig Workman ..... Director of Public Works, City of Burlington  
 Mark Yehlen..... Commissioner of Public Works, City of Racine

Mr. Maack welcomed all attendees to the meeting and thanked them for their participation. He noted that the first Racine County hazard mitigation plan was completed ten years ago and that the plan was updated in 2010. He further explained that the plan is required to be updated every five years, and that this meeting marked the beginning of the second update to the original plan. Mr. Maack emphasized that input from the Local Planning Team will be invaluable throughout the process and that the plan is very important to ensure communities maintain eligibility for funding for potential mitigation projects.

Mr. Maack introduced Julie Anderson, Director, Racine County Department of Public Works and Development Services. Ms. Anderson welcomed everyone to the plan updating process and reiterated the importance of keeping the County’s hazard mitigation plan up to date. She discussed the flooding that the County experienced in 2008 and 2009 and explained how the hazard mitigation plan allowed the County to access State and Federal aid to rehabilitate homes damaged by the floods. She noted that the County has had a great partnership with the Southeastern Wisconsin Regional Planning Commission (SEWRPC) throughout the initial planning process and the update to the plan. Ms. Anderson said that in addition to assisting Racine County with its plan update, SEWRPC is currently working with two other counties on their hazard mitigation plans as well.

Ms. Anderson introduced Jonathan Delagrave, Racine County Executive. Mr. Delagrave welcomed everyone and commended the good mix of government, non-profit, and business interests coming together for this important process. Mr. Delagrave discussed notable hazard events that had occurred within the County, and indicated that most were related to weather and particularly flooding hazards. He explained that the County was eligible and received FEMA assistance to help make communities whole again after these events. He said that in addition to keeping the County eligible for aid, the hazard mitigation plan identifies policies and actions to reduce the risk of costly damages and loss of life within the County.



## **OVERVIEW OF HAZARD MITIGATION AND HAZARD MITIGATION PLAN UPDATING PROCESS**

Mr. Maack introduced Joseph Boxhorn, Senior Planner, SEWRPC. Mr. Boxhorn presented an overview of hazard mitigation and the hazard mitigation plan updating process.

[Secretary's Note: A copy of Mr. Boxhorn's presentation is attached herein as Exhibit A.]

## **BACKGROUND ON THE SECOND UPDATE OF THE RACINE COUNTY HAZARD MITIGATION PLAN**

Mr. Boxhorn introduced Aaron Owens, Planner, SEWRPC who then presented background information on the initial hazard mitigation plan and the first update to the plan. He explained that the initial planning process began in 2001 and the first edition plan was published in 2004. Study began in 2009 for the first update of the plan, which was coordinated with the development of the County's comprehensive plan that was ongoing at the time. The first update to the hazard mitigation plan was published in 2010. Mr. Owens stated that all municipalities, as well as many additional non-governmental partners, participated in some fashion in both the initial planning effort as well as the update to the plan. Mr. Owens also outlined the main plan components to be reviewed and revised, presented a work schedule for the plan update, and explained the role of the Local Planning Team in the plan development process. He stated that a project webpage has been created on the SEWRPC website and indicated that draft chapters of the plan report, meeting materials, and summary notes from planning team meetings will be available on this page. He added that a comment screen is also available on this webpage through which planning team members and members of the public may submit questions or comments on the draft plan.

[Secretary's Note: Mr. Owens' presentation is attached herein as Exhibit A. A copy of the proposed work schedule for the plan update is attached herein as Exhibit B.]

## **REVIEW OF HAZARD MITIGATION GOALS FROM FIRST PLAN UPDATE**

Mr. Owens presented a brief overview of the goals that were established for the initial Racine County hazard mitigation planning program and revised during the first update of the plan. He explained that each goal had several objectives and standards associated with them and asked the Team to review the goals and to begin to think about any changes and/or additions that may be necessary. He noted that there will be opportunities to revise goals as needed as the planning process continues.

[Secretary's Note: A copy of the hazard mitigation goals is attached herein as Exhibit C.]

Mr. Maack asked if these goals are similar to the goals of other communities conducting hazard mitigation planning. Mr. Boxhorn responded that most of the hazard mitigation plans that he has worked on have very similar goals. He indicated that Kenosha County has one additional goal related to communications interoperability amongst first responders. Mr. Maack also asked if communicable diseases would fall under the goal of "Unpredictable Hazards". Mr. Owens responded that the "Unpredictable Hazards" goal was intended to cover a broad range of hazards which are unpredictable and not geographically specific which would include communicable diseases. If the planning team feels that there should be a separate goal pertaining to communicable disease or any other hazard, there will be an opportunity to add or revise goals as the process proceeds.

## **HAZARD AND VULNERABILITY ASSESSMENT EXERCISE**

Mr. Owens 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 D.]

Mr. Owens explained that the tool assesses the potential that a specific hazard 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. Mr. Owens asked the members of the Local Planning Team to complete the hazard and vulnerability assessment tool. He noted that the results of this exercise would be used to help determine which hazards are addressed by the hazard mitigation plan update.

In response to a request from Mr. Maack, Mr. Boxhorn guided the Team through the assessment tool using the first listed hazard, riverine flooding, as an example.

Jennifer Loizzo, registered sanitarian, Central Racine County Health Department, asked if the assessment should be completed utilizing their experience from the entity that they are representing or through their perception of the entire County. Mr. Owens responded that ideally they would complete the exercise through their observations of the entire County. He added that if the members felt uncomfortable assessing the entire County, utilizing their experience from only their entity would be sufficient and asked that they note the entity they are representing on the top of the assessment tool.

## **ADJOURNMENT**

There being no further business, the meeting was adjourned by unanimous consent at 10:30 a.m.

CAPR-266-3 SUMMARY NOTES RACINE CTY HMP LPT MTG JUNE 2, 2015 (00226216).DOC  
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06/15/2015, 06/16/2015, 10/12/2015

## Exhibit A

### HAZARD MITIGATION PLANNING

June 2, 2015

Aaron Owens, Planner  
Southeastern Wisconsin Regional Planning Commission  
Joseph Boxhorn, Ph.D., Senior Planner  
Southeastern Wisconsin Regional Planning Commission  
Katie Sommers, CFM, State Hazard Mitigation Officer  
Wisconsin Division of Emergency Management  
Roxanne Gray, Mitigation Section Supervisor  
Wisconsin Division of Emergency Management




### What is Mitigation?

- “Mitigation is any sustained action taken to eliminate or reduce the long-term risk to human life and property from natural and technological hazards” – FEMA definition
- Constructive actions to reduce damages prior to the next disaster




### What is Mitigation?

- Mitigation is not
  - Emergency response
  - Crisis management
  - Disaster preparation and recovery
- Mitigation focuses on reducing the impacts of disasters when they occur




### Mitigation Breaks the Disaster Cycle



### Why Do We Mitigate?

- Disasters cost society too much
- State and federal aid insufficient
- Can prevent future damages
- Less impact and speed response and recovery process
- Mitigation happens at the local level




### Why Do We Mitigate?

#### Nationwide Trends

- \$80 Billion 2004-2011 (GAO) responding to disasters
- \$6 Billion per year in flood damages
- Costs continue to rise
- People continue to build and live in high-risk areas




## Why Do We Mitigate?



### In Wisconsin

- \$3 billion in disaster-related damages last 3 decades
- 12 Federal Disaster Declarations in the 90's compared to 6 in the 80's
- 2000, 2001, two in 2002, 2004, 2007, 2008, two in 2010, 2011, 2012, 2013
- 2 snow emergencies (2000 and 2008)

## Value of Mitigation



In 2005, the National Institute of Building Sciences found that for every \$1 spent on mitigation, \$4 are saved in avoided future damages

## Examples of Mitigation Measures (mostly related to flooding)



## Acquisition/Demolition



Communities acquire land, demolish structures, and keep the land in open space.

Images from Darlington, WI

## Elevation



Elevation raises a structure out of the floodplain. Wisconsin has specific regulations to follow with elevation projects. See DNR for more information.

Images from Soldiers Grove, WI

## Floodwall



Floodwalls can prevent water from inundating structures that cannot be elevated, relocated, or demolished.

Image from Darlington, WI

## Community Safe Room



Community safe rooms built to FEMA-361 standards can withstand winds up to 250 MPH.

Image from Town of Dunn, WI

## Stormwater Detention



Detention ponds can store stormwater runoff, decreasing flash flooding in urban areas.

Image from MMSD Stormwater Detention Project (Wauwatosa, WI)

## Stormwater Management



Stream restoration allows watersheds to better manage flooding.

Image from Thiensville, WI

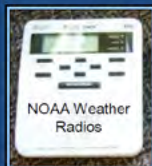
## River Warning Systems



River warning systems installed on conservation dams to warn county officials about expected dam breaching.

Images from Vernon County

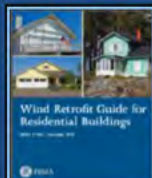
## Other Projects



NOAA Weather Radios



Mobile Home Tie-Downs



Wind Retrofit Guide for Residential Buildings



Proper Landscaping

- Raise appliances and utilities
- Install back-flow valves
- Retrofit for wind resistance
- Education and public awareness
- Insurance (flood and sewer backup)
- Land use planning

## Benefits of Mitigation

- Enhance recreation and tourism
  - Parks
  - Trails
- Increase community pride and quality of life
- Save tax dollars



Darlington, WI



Chaseburg, WI



## Hazard Mitigation Planning

## Disaster Mitigation Act of 2000

- Established a national disaster mitigation program
- Communities must have an approved hazard mitigation plan to be eligible to receive Federal funds through:
  - Hazard Mitigation Grant Program (HMGP)
  - Pre-disaster Mitigation Program (PDM)
  - Flood Mitigation Assistance Program (FMA)
- Plans must be reviewed and updated every five years

## Disaster Mitigation Act of 2000

Vision of the Disaster Mitigation Act of 2000

- Communities will have all hazards mitigation plans that identify and prioritize cost-effective mitigation measures that can be implemented prior to a disaster or quickly after a disaster
- Having a plan would speed up the recovery process

## Plan Components

1. Documentation of the planning process
2. Description of study area
3. Analysis of hazard conditions
4. Hazard mitigation goals and objectives
5. Hazard mitigation strategies
6. Plan adoption, implementation, and maintenance

## Plan Components

### 1. Documentation of the Planning Process

- Chapter 1 and Appendix A
- Incorporated municipalities must participate in plan development and adopt the plan in order to be covered
  - County adoption covers the towns
- Public and adjacent communities must be given an opportunity to comment during the drafting stage

## Plan Components

### 2. Description of Study Area – Chapter 2

- |  |                                      |
|--|--------------------------------------|
| • Demographic  | • Land use                           |
| • Surface waters   | • Flood hazard areas                 |
| • Transportation   | • Utility systems                    |
| • Public facilities <ul style="list-style-type: none"> <li>– Police facilities</li> <li>– Fire facilities</li> <li>– EMS facilities</li> </ul> | • Critical community facilities      |
| • Related regulations and programs   | • Hazardous material use and storage |
|  | • Emergency operation planning       |

## Plan Components

### 3. Analysis of Hazard Conditions-Chapter 3

- Vulnerability and risk analysis for each covered hazard
  - Historical and recent incidents
  - Vulnerabilities and community impacts
    - Human lives, property damages, crop damages
  - Potential for future changes in hazard conditions
  - Multijurisdictional aspects

## Plan Components

### 4. Hazard Mitigation Goals-Chapter 4

- Express what the plan is trying to achieve
- Ties the plan to other active plans
  - e.g. The County comprehensive plan
- Fairly general

## Plan Components

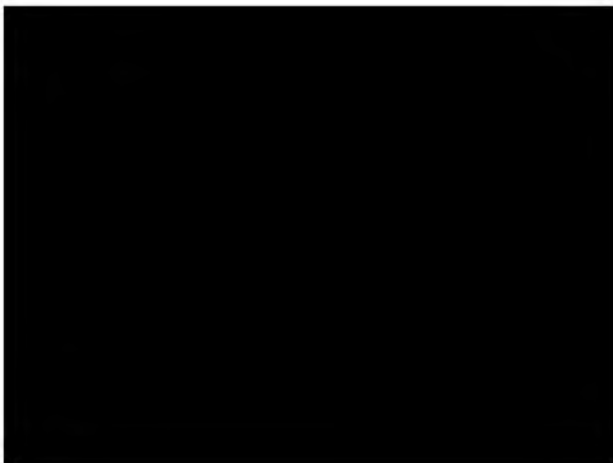
### 5. Hazard Mitigation Strategies-Chapter 5

- Develop a range of actions and projects to reduce the impacts of each hazard
  - Structural, nonstructural, educational
- Prioritize actions for implementation
- Identify responsible parties
- Examine costs and benefits
- Consider multi-jurisdictional aspects

## Plan Components

### 6. Plan Adoption, Implementation, and Maintenance-Chapter 6

- County and incorporated municipalities must formally adopt the plan
  - Towns are covered by County adoption
- Detail available funding and technical assistance
- Monitoring of plan implementation
- Incorporation of the plan into existing planning mechanisms



Background on 2nd Plan Update

## Initial Racine County HMP

- Study conducted 2004-2005
- Report published 2005



## Initial Racine County HMP

### Local government partners:

- City of Kenosha
- Village of Genoa City
- Village of Paddock Lake
- Village of Pleasant Prairie
- Village of Silver Lake
- Village of Twin Lakes
- Town of Brighton
- Town of Bristol
- Town of Paris
- Town of Randall
- Town of Salem
- Town of Somers
- Town of Wheatland

## Initial Kenosha County HMP

### Additional Partners

- Kenosha County Executive's Office
- Kenosha County Board
- Kenosha County Departments
- State Representative Kerkman, 66<sup>th</sup> District
- Sheriff's, Police, and Fire Departments
- Public Works Departments
- UW-Parkside, Carthage College, and UW-Extension
- Kenosha Area Business Alliance
- Kenosha Area Chamber of Commerce
- Wisconsin Division of Emergency Management
- American Red Cross
- We Energies
- ChemReport, Inc.

## First Plan Update

- Study conducted 2009/2010
- Coordinated with development of the County comprehensive plan
- Reviewed and revised
  - Goals
  - Vulnerability and risk analysis
  - Mitigation strategies
- Report published 2010

## First Update: Participating Jurisdictions

- Kenosha County
- City of Kenosha
- Village of Bristol
- Village of Paddock Lake
- Village of Pleasant Prairie
- Village of Silver Lake
- Village of Twin Lakes
- Town of Brighton
- Town of Paris
- Town of Randall
- Town of Salem
- Town of Somers
- Town of Wheatland

## First Plan Update

### Additional Partners

- Kenosha County Board
- Kenosha County Departments
- Sheriff's, Police, and Fire Departments
- Public Works Departments
- UW-Parkside, Carthage College, and UW-Extension
- Kenosha Unified School District
- Wisconsin Division of Emergency Management
- American Red Cross
- We Energies
- ChemReport, Inc.



## Plan Components to Review and Revise

- Review implementation activities
- Update inventories of natural and built features
- Review and reevaluate identification of hazards
- Update and reevaluate risk analysis
- Review and revise mitigation goals
- Review and revise mitigation strategies
- Update plan implementation and maintenance
  - Update potential funding sources

## Tentative Schedule

Task	Estimated Completion Date
Update Planning Team Membership	April 1, 2015
Survey Designated Management Agencies Regarding Status of Implementation of Original Plan	June 30, 2015
Kickoff Planning Team Meeting	Late April 2015
Public Participation	January 2015 through July 2016
Develop Updated Community Profiles	June 15, 2015
Planning Team Meeting (Review Chapters 1 and 2)	Early August 2015
Identify and Describe Hazards	August 31, 2015
Review of Established Goals and Objectives	September 30, 2015
Update Risk and Vulnerability Assessments	October 30, 2015
Planning Team Meeting (Review Chapters 3 and 4)	Late January 2016
First Public Meeting	Mid February 2016
Development of Updated Mitigation Actions	April 30, 2016
Development of Updated Plan Maintenance Process	May 31, 2016
Apply to Wisconsin Emergency Management for Extension of Grant Deadline (Original Period of Performance Deadline is September 1, 2016)	June 15, 2016
Planning Team Meeting (Review Chapters 5 and 6)	Early June 2016
Second Public Meeting	Mid July 2016
Submit Draft Plan Update to Wisconsin Division of Emergency Management for Review	August 31, 2016
Review Plan Based on State Review	October 31, 2016
Submit Final Plan Update to the Federal Emergency Management Agency for Approval Pending Adoption	November 15, 2016
Formal Adoption	February 15, 2017

## Key Dates (all tentative)

- Local Planning Team Meetings
  - August 2015, January 2016, June 2016
- Public Meetings
  - February 2016, July 2016
- Submit for Review
  - August 2016
- County Adoption
  - February 2017

## Local Planning Team Role

- Weigh in on hazard identification
- Review the plan chapters
- Help us get needed information
  - Recent and historical problems with hazards → Location, occurrence, damages
  - Recent projects, planned and contemplated projects, recent hazard-related outreach
  - Inventory data

## Project Web Site

<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>

- Copy of the 2010 plan update
- Agendas and other meeting materials
- Summary notes from meetings
- Presentations
- Draft chapters as they are completed
- Comment screen
- Other ways to send a comment



### Hazard Mitigation Goals

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 which 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.

### Hazard Mitigation Goals

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

### Hazard Mitigation Goals

5. The development of a stormwater and floodland 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.
6. 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.

### Hazard Mitigation Goals

7. 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 that are unpredictable and not geographically specific in nature.
8. 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.

**Exhibit B**

**PROPOSED WORK SCHEDULE FOR UPDATING THE  
RACINE COUNTY HAZARD MITIGATION PLAN**

<b>Task</b>	<b>Estimated Completion Date</b>
Update Planning Team Membership	April 1, 2015
Survey Designated Management Agencies Regarding Status of Implementation of Original Plan	June 30, 2015
Kickoff Planning Team Meeting	Early June
Public Participation	January 2015 through July 2016
Develop Updated Community Profiles	June 15, 2015
Planning Team Meeting (Review Chapters 1 and 2)	Late August 2015
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Revise Plan Based on State Review	October 31, 2016
Submit Final Plan Update to the Federal Emergency Management Agency for Approval Pending Adoption	November 15, 2016
Formal Adoption	February 15, 2017
Anticipated Period of Performance Deadline	March 1, 2017

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5/21/2015, 05/26/2015

## Exhibit C

### GOALS FOR RACINE COUNTY ALL HAZARD MITIGATION PLAN

The following goals have been established for the Racine County hazard mitigation planning program.<sup>1</sup> The goals have been established 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 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.
2. **Natural Resources:** A spatial distribution of the various land uses which maintains biodiversity and which 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 which, 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 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.
6. **Lake Michigan Coastal Erosion:** The identification of high erosion risk Lake Michigan shoreline areas and the development of a coastal erosion management program which 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 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.

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<sup>1</sup> SEWRPC Community Assistance Planning Report No. 266, 2nd Edition, Racine County Hazard Mitigation Plan Update: 2011-2015, July 2010.

Racine County Office of Emergency Management  
Southeastern Wisconsin Regional Planning Commission

**Notice of Meeting and Agenda**

**RACINE COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM**

DATE: October 27, 2015

TIME: 9:00 to 12:00 noon

PLACE: Ives Grove Office Complex Auditorium  
14200 Washington Avenue  
Sturtevant, Wisconsin

AGENDA:

1. Welcome
2. Introductions
3. Consideration of Summary Notes of June 2, 2015, Local Planning Team Meeting (a copy of the draft summary notes will be available for download from the SEWRPC website at:  
<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>)
4. Consideration of Chapter I, "Introduction and Background," of SEWRPC Community Assistance Planning Report No. 266 (3rd edition), *Racine County Hazard Mitigation Plan Update: 2016-2020* (a copy of the draft chapter will be available for download from the SEWRPC website at:  
<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>)
5. Consideration of Chapter II, "Basic Study Area Inventory and Analysis," of SEWRPC Community Assistance Planning Report No. 266 (3rd edition), *Racine County Hazard Mitigation Plan Update: 2016-2020* (a copy of the draft chapter will be available for download from the SEWRPC website at:  
<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>)
6. Review of results from hazard and vulnerability assessment exercise (a copy of the review will be available for download from the SEWRPC website at:  
<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>)
7. Discussion of hazards to be addressed by the Racine County Hazard Mitigation Plan Update
8. Adjourn

Aaron W. Owens  
Secretary

Exhibit D

HAZARD AND VULNERABILITY ASSESSMENT TOOL  
 RACINE COUNTY HAZARD MITIGATION PLAN UPDATE

EVENT	SEVERITY * (MAGNITUDE - MITIGATION)					RISK
	PROBABILITY	HUMAN IMPACT	PROPERTY IMPACT	BUSINESS AND AGENCY IMPACT	PREPAREDNESS	
	<i>Likelihood This Will Occur</i>	<i>Possibility of Death or Injury</i>	<i>Physical Losses and Damages</i>	<i>Interruption of Services</i>	<i>Preplanning</i>	
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. Thunderstorm						0%
A6. High straight-line wind						0%
A7. Lightning						0%
A8. Hail						0%
A9. Heavy snow storm						0%
A10. Blizzard						0%
A11. Ice storm						0%
A12. Extreme cold						0%
A13. Extreme heat						0%
A14. Drought						0%
A15. Fog						0%
A16. Dust storm						0%
A17. Lake Michigan Erosion						
A18. Earthquake						
B1. Contamination or loss of water supply system						0%
B2. Loss of sewerage system						0%
B3. Loss of telecommunication						0%
B4. Electrical system outage						0%
B5. Computer system incident/cyber attack						0%
C1. Hazardous materials railroad incidents						0%
C2. Hazardous materials roadway incidents						0%
C3. Hazardous materials pipeline incidents						0%
C4. Hazardous materials fixed facility incidents (industries, bulk fuel storage sites, grain elevators, agricultural chemical storage, and explosives, including fireworks storage)						0%
D1. Railroad transportation accidents						0%
D2. Roadway transportation accidents						0%
D3. Aviation accidents						0%
E1. Correctional center incidents						0%
E2. Civil unrest						0%
E3. Terrorism incidents (bomb threats, hostage situations, biological incidents)						0%
E4. Workplace violence						0%
E5. School violence						0%
F1. Communicable disease outbreak or epidemic						0%
F2. Large-scale food contamination						0%
G1. Wildfire						0%
G2. Large structure fires						0%
G3. Explosions						0%
G4. Mass casualty incidents						0%
G5. Building collapse or cave-in						0%
H1. Dam failure						0%
H2. Landslide						0%
H3. Land subsidence						0%
Other Event (write in)						
Other Event (write in)						
<b>AVERAGE SCORE</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0%</b>

\*Threat increases with percentage.

Source: Kaiser Permanente and SEWRPC.

<b>RISK = PROBABILITY * SEVERITY</b>		
0.00	0.00	0.00

# SUMMARY NOTES OF THE OCTOBER 27, 2015 MEETING OF THE RACINE COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM

## INTRODUCTION

The October 27, 2015 meeting of the Racine County Hazard Mitigation Plan Local Planning Team was convened at the Ives Grove Office Complex at 9:02 a.m. The meeting was called to order by Julie Anderson, Director of the Racine County Department of Public Works and Development Services. Attendance was taken by circulating a sign-in sheet.

In attendance at the meeting were the following individuals:

### Local Planning Team Members

Julie Anderson, Co-Chair ..... Director, Racine County Department of Public Works and Development Services

David Maack, Co-Chair .....Coordinator, Racine County Office of Emergency Management

Aaron Owens, Secretary .....Planner, Southeastern Wisconsin Regional Planning Commission

Christopher Bennett ..... Trustee, Village of Rochester

Joseph Boxhorn..... Senior Planner, Southeastern Wisconsin Regional Planning Commission

Pat Campbell.....Clerk, Town of Norway

James F. Day .....Assistant Chief, S.C. Johnson & Son Fire Brigade

Jeff Dolezal ..... Director of Public Works, Village of Waterford

Silviano E. Garcia ..... Public Health Specialist, Central Racine County Health Department

Ken Hinz ..... Supervisor, Town of Waterford Public Works Department

Jody Howell ..... Supervisor, Racine County Communication Center

Jake Isaacson..... Supervisor, Town of Dover Roads Department

Laura L. Kletti..... Chief Environmental Engineer, Southeastern Wisconsin Regional Planning Commission

Heidi Lange..... Manager, Marketing, Communications & Public Relations, Wheaton Franciscan Healthcare

Chris Litzau..... President, Great Lakes Community Conservation Corps

Jennifer Loizzo..... Registered Sanitarian, Central Racine County Health Department

Cody Pearce ..... Public Health Educator, City of Racine

Richard Roeder ..... Chief, Caledonia Fire Department

John P. Serketich .....Assistant Corporation Counsel, Racine County

Skip Twardosz..... Emergency Management Director, Town of Burlington

Ms. Anderson welcomed all attendees to the meeting and thanked them for their continued participation. She explained that updating the plan every five years enables the County and its municipalities to remain eligible for certain mitigation grant opportunities. At the request of Ms. Anderson, the team members introduced themselves.

Ms. Anderson introduced David Maack, Coordinator of the Racine County Office of Emergency Management. Mr. Maack reminded the planning team that it was imperative that every municipality participate in the development of the plan update, as is required by FEMA. Mr. Maack further explained that after FEMA has reviewed and approved the plan update, the County will ask the municipalities to formally adopt the plan by resolution. He explained that this formal adoption is also a requirement of FEMA in order for municipalities to maintain eligibility for funding for potential mitigation projects.

## **CONSIDERATION OF THE SUMMARY NOTES OF THE JUNE 2, 2015 LOCAL PLANNING TEAM MEETING**

Ms. Anderson introduced Aaron Owens, Planner, Southeastern Wisconsin Regional Planning Commission (SEWRPC). Mr. Owens reviewed the summary notes from the June 2, 2015 meeting of the Local Planning Team. Mr. Owens noted that the slides from the presentations given at the meeting, a tentative work schedule, and a copy of the hazard vulnerability assessment tool were attached to the summary notes. There were no questions or comments from the planning team and the summary notes from the June 2, 2015 Local Planning Team Meeting were approved on a motion by Ms. Anderson, seconded by Mr. Serketich, and carried by consensus.

## **CONSIDERATION OF CHAPTER I, “INTRODUCTION AND BACKGROUND,” OF SEWRPC COMMUNITY ASSISTANCE PLANNING REPORT NO. 266 (3RD EDITION), *RACINE COUNTY HAZARD MITIGATION PLAN UPDATE: 2016-2020***

Mr. Owens noted that the handouts included the draft chapter text, followed by the tables and the maps. He pointed out that the yellow highlighting indicates a change or addition from the text in the 2nd Edition of the report and that the highlighting will be removed after final FEMA review. Mr. Owens indicated that copies of the maps from Chapters I and II would be displayed on the projection screen as they come up in the review of the chapters.

[Secretary’s Note: Mr. Owens’ presentation is attached hereto as Exhibit A]

Mr. Owens reviewed preliminary draft Chapter I of the plan report. He stated that Table I-2 documents how each jurisdiction within the County has participated in the development of the plan update. He noted that there are several ways for communities to participate including attending meetings, reviewing the report, and providing data to Commission staff and that Table I-2 would be updated as the plan proceeds.

In reference to outreach activities related to emergency preparedness and hazard mitigation, Ms. Anderson said the Sheriff’s office uses text messaging to targeted areas with specific dangers to give updates and instructions to residents. She cited a recent case in which a fugitive was on the loose where this tool was used to notify residents to be on the lookout. She said many agencies are turning to this method to alert residents for a number of different hazards and she expects this method to continue to expand.

[Secretary’s Note: The following paragraph was added after the first paragraph on page 7 of draft Chapter I. The last sentence in the first paragraph was removed and added to this new paragraph:

“In addition, the Racine County Sheriff’s Department has the ability to send out text message alerts to residents in a selected area informing them of a hazard. Also, Racine County has a contract with the Root-Pike Watershed Initiative Network to conduct the educational and outreach programs required as a condition of their municipal storm sewer system discharge permit.”]

Mr. Maack added that the City of Racine currently has a contract with Nixle, a company that offers a paid GPS-driven notification service that disseminates information to wireless devices in an assigned geographical area. Users of wireless devices do not have to sign up for the service and will automatically receive the alert, however the alerts can be disabled by the user. Mr. Maack indicated that the County Executive’s proposed 2016 budget for Racine County includes funding for this service to be used countywide. He said if the budget is passed, the County will be able to select specific geographical areas to receive alerts for emergencies such as tornadoes and floods. Mr. Maack also said he is currently working with UW–Parkside on an application called “Ready Badger” which, when completed, will allow the County to send out emergency alerts to subscribers to the application.

[Secretary’s Note: The following was added as an outreach activity for the City of Racine in Table I-3:



“Contract with Nixle to send out geographically specific emergency alerts to wireless devices”]

Ms. Loizzo indicated that the Central Racine County Health Department maintains a Facebook page and Twitter account for community outreach.

[Secretary’s Note: The Central Racine County Health Department contracts with the City of Burlington; the Villages of Caledonia, Mt. Pleasant, North Bay, Rochester, Sturtevant, Union Grove, Waterford; and the Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville to provide public health services and outreach. Table I-3 was updated to reflect this outreach. In addition, the first paragraph on page 8 was revised to read as follows (Text in bold is included here, and in similar subsequent Secretary’s Notes, to indicate language changed or added to the text. Text will not be bold in the report.):

“In addition, several municipalities contract with **organizations to provide outreach and other services to the public on specific issues. The City of Racine, Villages of Caledonia, Mt. Pleasant, Sturtevant, and Wind Point contract** with the Root-Pike Watershed Initiative Network to conduct the education and outreach programs required as a condition of their municipal separate storm sewer system discharge permits. **Like-wise, the Central Racine County Health Department (CRCHD) contracts with many communities in Racine County to provide public health services. A large focus of the CRCHD’s mission is to provide outreach to the public to improve health through health promotion, disease prevention, and protection from health and environmental hazards. In addition to health educational programs, the CRCHD provides public outreach through a biannual newsletter, brochures, fact sheets, and reports which are available for download on their website. The CRCHD is also active on Facebook and Twitter.”]**

In reference to the discussion of implementation activities on pages 8 through 10, Mr. Owens explained that FEMA wants documentation of completed projects that are intended to implement the recommendations of the hazard mitigation plan. Mr. Owens acknowledged that there are likely other activities and projects that are not included in Table I-4 and described in the text. He explained that he included activities that he was able to find through newsletters, newspaper articles, and information provided by a few municipalities. He asked the team members to provide information on any other projects related to hazard mitigation that have been completed, are in the process of being completed, or are in the planning phase.

In regards to implementation activities, Mr. Bennett indicated that the Village of Rochester established a stormwater utility district in 2012 which has completed a handful of projects related to flood mitigation.

[Secretary’s Note: Following the meeting of the Local Planning Team, Mr. Bennet provided additional information regarding projects related to hazard mitigation that have been completed by the stormwater utility in the Village of Rochester. The projects were added to Table I-4. In addition, the following paragraph was added after the first paragraph on page 9:

“The Village of Rochester Stormwater Utility was established in 2012. Since its inception, the utility has completed several projects to address long neglected stormwater infrastructure within the Village. In 2012 the utility repaired several storm sewer inlets in the Fox River Prairie Subdivision to improve stormwater drainage in the neighborhood. A comprehensive drainage plan was completed in 2013 related to the future reconstruction of N. River Road. Also related to the planned N. River Road reconstruction, two ditching projects were completed to improve drainage in the area. In 2014 a series of rock check dams on Rookery Glen Drive were removed and replaced to help improve

drainage in the area. In the same year, the utility designed and relocated a drain tile outlet that drained land of the former agricultural school. This project decreased flooding on Maryl Street and reduced standing water in road ditches that often occurred in the neighborhood. The Village replaced failing culverts at June Lane and Ryan Avenue in 2014 and 2015, respectively. In 2015, 1,320 feet of road ditch was constructed along Oak Knoll Road. Prior to this project, runoff would flow over Oak Knoll Road forming dangerous sheets of ice in winter months. In 2013 and 2015 the Village cleaned sections of drainage ditches along N. River Road, Fox Knoll Drive, and Clover Lane to improve stormwater drainage in the area.”]

There were no further questions or comments from the Planning Team regarding Chapter I “Introduction and Background.” The draft Chapter was approved, as amended, on a motion by Mr. Serketich, seconded by Mr. Bennett, and carried by consensus.

**CONSIDERATION OF CHAPTER II, “BASIC STUDY AREA INVENTORY AND ANALYSIS,” OF SEWRPC COMMUNITY ASSISTANCE PLANNING REPORT NO. 266 (3RD EDITION), *RACINE COUNTY HAZARD MITIGATION PLAN UPDATE: 2016-2020***

Mr. Owens reviewed preliminary draft Chapter II of the plan report, describing the characteristics of the study area. In reference to Mr. Owens’ description of anticipated household and population data, as represented by the intermediate growth projection from SEWRPC’s 2035 land use plan, Ms. Anderson noted that SEWRPC’s projections have been very accurate. Mr. Boxhorn stated that Commission staff is now working on VISION 2050, which will update the 2035 land use and transportation plans. He informed the planning team that the fourth round of public workshops are ongoing and that one of the workshops is upcoming for Racine County. He encouraged planning team members to take a brochure regarding the workshop.

[Secretary’s Note: Additional information on the VISION 2050 planning effort can be found on its website at: <http://vision2050sewis.org/Vision2050>]

In reference to mobile homes identified on Map II-3 and Table II-9, Ms. Loizzo said that the mobile home park labeled as number eight, located in the Village of Mt. Pleasant, was disassembled about four years ago. Ms. Anderson confirmed that this mobile home park, which she identified as Jensen’s Mobile Home Park, no longer exists. Chief Roeder also commented that he was not aware of any mobile homes located within the Village of Caledonia. He asked Mr. Owens to look into mobile home number nine on Map II-3 and Table II-9. Mr. Owens explained that the information for mobile home parks came from the Wisconsin Department of Safety and Professional Services and that individual mobile homes were mapped based on SEWRPC’s 2010 land use data. He said that he would look into these two mobile home sites that are in question.

[Secretary’s Note: Mobile home park number 8, formerly known as Jensen’s Mobile Home Park, as well as the single mobile home number 9 were removed from Map II-3 and Table II-9. The last paragraph on page 4 was revised to read as follows:

“Mobile homes are a type of structure that can be particularly vulnerable to some hazards such as high winds. Map II-3 shows the locations of mobile home parks and individual mobile homes in Racine County. In 2010 there were **666** mobile homes located in the County. Most of these were located in **seven** mobile home parks. In addition, there were **three** sites in the County that contained one mobile home each. Mobile home parks and small groupings are listed in Table II-9.”]

In reference to discussion regarding high hazard dams, Ms. Anderson stated that the Waterford dam had been downgraded from high hazard to significant hazard. Mr. Owens acknowledged that a dam failure analysis was run on the Waterford Dam and the results indicated that the hazard rating of the dam could be lowered to a significant hazard.

However, he explained that downstream communities have yet to adopt the hydraulic shadow that was developed as part of the dam failure analysis. Mr. Boxhorn added that he had discussed this issue with Nathan Zoch, the WDNR dam safety engineer for Racine County, and Mr. Zoch indicated that the hydraulic shadow has not yet been adopted by affected downstream communities, and therefore the hazard rating of the dam is officially still high hazard. Mr. Bennett, Trustee from the Village of Rochester indicated that he had no knowledge of this hydraulic shadow issue, but that he would look into the matter. Ms. Anderson asked Mr. Owens to look into this issue further and indicated that this plan update should reflect the findings of the dam failure analysis which find that the hazard rating should be lowered to significant. Mr. Owens agreed and said he would look further into the issue. Mr. Dolezal, Director of the Department of Public Works for the Village of Waterford also said he would look into the status of the dam.

[Secretary's Note: Subsequent to the meeting Mr. Owens followed up with Mr. Zoch, WDNR Water Management Engineer, to clarify what needed to be done for the hazard rating of Waterford dam to be lowered. Via electronic mail, Mr. Zoch indicated that the Department had ordinance approval letters for both the Village of Rochester and the Village of Waterford, adopting the hydraulic shadow from the dam failure analysis. He explained that for the Department to change the hazard rating, the owner of the dam, in this case Racine County, needs to send a letter to the Department requesting the change. He recommended that the County verify that no development has been constructed downstream in the hydraulic shadow that may affect the rating. He said once the request is received from the dam owner, the Department can assign the new hazard rating.]

Regarding the study on shoreline erosion and bluff stability conditions which was conducted in 1995, Ms. Loizzo noted that Dr. Julie Kinzelman, Laboratory Director with the City of Racine Health Department, has been performing data collection on Racine County beaches and suggested that she may have more recent data related to beach erosion. Mr. Pearce, also with the City of Racine Health Department said that he would check to see if Dr. Kinzelman has been collecting data related to beach erosion.

[Secretary's Note: Following the meeting Mr. Pearce indicated via electronic mail that he had spoken to Dr. Kinzelman about shoreline erosion and bluff stability data in Racine County. She said all of the work she has done along Lake Michigan beaches has been related to water quality and coastal rehabilitation related to water quality. She indicated that she has not collected any shoreline erosion or bluff stability data and she was not aware of any more recent data.]

In reference to discussion on the railroad system within Racine County, Mr. Maack asked if the mile markers that he provided via electronic mail were included on Map II-11. Mr. Owens indicated that he had shown the printed map of mile markers to Ethan Johnson, Senior Planner in the SEWRPC Transportation Planning Division. Mr. Johnson indicated that the Wisconsin Department of Transportation (WisDOT) keeps an inventory of railroad crossings and that the mile marker map provided by Mr. Maack appears to match each point within the WisDOT shapefile representing railroad crossings. Mr. Owens asked if Mr. Maack could provide a shapefile of the mile markers so that he could compare them with the WisDOT database. Mr. Owens indicated that he would add them to Map II-11 if they were different. Mr. Maack said he would attempt to get a shapefile of the mile marker points for Mr. Owens.

Regarding Map II-16 which shows electrical transmission lines, natural gas pipelines, and petroleum pipelines in the County, Mr. Dolezal commented that a high pressure natural gas pipeline was missing. He said that the 20- inch diameter WE Energies natural gas pipeline goes through the Village of Waterford along STH 20 and runs to a substation in the Village of Rochester. Mr. Hinz also noted that the map was missing two 24-inch diameter natural gas pipelines and one 36-inch diameter natural gas pipeline that run through the Towns of Waterford and Norway.

[Secretary's Note: Subsequent to the meeting of the Local Planning Team, Mr. Owens contacted Marilyn Weiss with the Wisconsin Public Service Commission (PSC). Ms. Weiss indicated that the PSC only has information related to interstate transmission pipelines for natural gas. She said the PSC does not have regulatory authority over or the ability to locate

distribution natural gas pipelines. She further indicated the natural gas pipelines shown on Map II-16 are accurate with PSC records for interstate transmission pipelines. To be clearer as to the natural gas pipelines that are mapped on Map II-16, the title of the map was revised to read “ELECTRICAL TRANSMISSION LINES, NATURAL GAS **INTERSTATE TRANSMISSION PIPELINES**, AND PETROLEUM PIPELINES IN RACINE COUNTY. In addition, the following addition was made to the legend of Map II-16: “Natural Gas **Interstate Transmission** Pipeline”.]

Mr. Day noted that S.C. Johnson & Son, Inc. owns and operates two wind turbines at their Waxdale facility in Mt. Pleasant. Mr. Day also indicated the company operates a landfill gas pipeline from Kestrel Hawk Park Landfill to their Waxdale facility.

[Secretary’s Note: The fourth full paragraph on page 13 was revised to read as follows:

“Racine County is provided with electric power service by We Energies. Electric power service is available on demand throughout the County. As of early in 2001, an independent company, American Transmission Company, owned, maintained, and operated the major transmission facilities located in portions of the State of Wisconsin, including Racine County. The general locations of the major electrical transmission facilities, owned by American Transmission Company and including transmission lines and substations, are shown on Map II-16. There are no **major** electric power generation facilities located within the County, **however small private renewable energy generation facilities are becoming more common. S.C. Johnson & Son, Inc. owns and operates two wind turbines at their Waxdale facility in Mt. Pleasant. In addition, the company employs two cogeneration systems at the facility which use methane gas from nearby Kestrel Hawk Landfill to generate a large portion of the facility’s electrical energy.**”]

In relation to discussion on Table II-14 regarding working status of fire departments, emergency medical services providers, and police departments, there were several additions and changes. Mr. Twardosz mentioned that there is an automatic aid agreement between the City and Town of Burlington. He indicated that he would send an explanation of the agreement via electronic mail after the meeting. Subsequent to the meeting Mr. Bennett also provided information regarding a mutual aid agreement between the Villages of Rochester and Waterford, and the Tichigan Volunteer Fire Department.

[Secretary’s Note: The following notes were added to Table II-14 to describe automatic mutual aid agreements between several communities for fire services:

“The Union Grove-Yorkville Fire and Rescue Department and Kansasville Fire and Rescue have an automatic mutual aid agreement for structure fires. Any time a structure fire is reported in the Village of Union Grove, the Town of Dover, or the Town of Yorkville, both fire departments automatically get called to assist.

The City and Town of Burlington fire departments have an informal mutual aid agreement. The City of Burlington Fire Department will send a ladder truck to any structure fire in the Town of Burlington. The Town of Burlington Fire Department will send an engine truck to any structure fire or fire with trapped victims in the City of Burlington.

The Village of Rochester, Village of Waterford, and Tichigan fire departments maintain an automatic aid agreement. If there is a structure fire or fire alarm in any of these jurisdictions, all three departments are automatically dispatched. If the call is in the Village of Rochester, the Town of Burlington is also dispatched.”]

Mr. Dolezal said as of January 1, 2016, the Village of Waterford will no longer contract with the Racine County Sheriff's Department, but will contract with the Town of Waterford Police Department for law enforcement services.

[Secretary's Note: The following footnote was added to Table II-14:

“<sup>d</sup>As of January 1, 2016, the Village of Waterford no longer contracts with the Racine County Sheriff's Department for law enforcement. Law enforcement services are provided by the Town of Waterford Police Department.”]

Regarding documentation of law enforcement departments in Table II-14, Mr. Isaacson said that the Town of Dover no longer had a constable or a Police Chief. He said the Town contracts with the Racine County Sheriff's Department for law enforcement. He indicated that the Town does have a water patrol with nine part time officers. Mr. Campbell said the Town of Norway has a water patrol and Mr. Twardosz added that the Town of Burlington also has a water patrol.

[Secretary's Note: Table II-14 was updated to reflect the above comments.]

Mr. Litzau noted that there was a new community oriented policing house in Mt. Pleasant that should be added to Map II-21 and Appendix Table C-1. He also indicated that Jacato Drive was recently changed to Anthony Lane, and therefore the name of the City of Racine community oriented police house named after the old street should be changed to “Anthony Lane Community Oriented Police House.”

[Secretary's Note: Map II-21 and Appendix Table C-1 were updated to reflect these changes.]

Mr. Maack said that in 2014 Racine County launched a new system for law enforcement mutual aid called Suburban Mutual Assistance Response Team (SMART). He suggested that some discussion of this new program be included in the law enforcement section in Chapter II.

[Secretary's Note: The following paragraph was added after the third full paragraph on page 15:

“In 2014 Racine County joined the Suburban Mutual Assistance Response Team (SMART). The agreement was made in recognition that situations may occur which are beyond the ability of a local law enforcement agency to deal with effectively in terms of personnel, equipment, and available resources Under this system Racine County agencies have cooperative agreements with agencies in Milwaukee, Waukesha, Jefferson, and Walworth Counties that allows for mutual aid during a significant emergency or disaster. Within one hour, a community that is a member of SMART can have up to 65 law enforcement officers respond to the community to help where needed.”]

In regard to discussion in Chapter II on fire suppression services and law enforcement, Mr. Roeder suggested adding some discussion on specialized response teams within the County.

[Secretary's Note: The following section was added after the paragraph referenced above to be added on page 15:

#### **“Specialized Response Teams**

Some fire departments and law enforcement agencies in the County participate in several specialized response teams. The Racine County Water Rescue Response Team consists of members of public safety agencies throughout Racine County. 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. The Racine County Sheriff's Office Water Patrol operates water safety patrol on Lake Michigan and inland lakes and rivers throughout the County to assist boaters with accidents, engine failures, rescue, as well as enforcement activities. The Racine County Sheriff's Office also leads a Community Emergency Response Team (CERT) that can provide assistance to communities before, during, and after disasters. The Racine County Sheriff's Office and the City of Racine Police Department each have their own Special Weapons and Tactics (SWAT) and crisis negotiators type-teams. The SWAT teams are comprised of personnel specially trained in serving high risk search warrants, fugitive apprehension, and resolving barricaded subject and hostage situations. Both SWAT teams are also equipped with an armored personnel carrier. In addition, the Racine Police Department operates a Crowd Control Team.

The City of Racine Fire Department represents the State as the southeast region's Hazardous Materials Response Team and operates a fully equipped hazmat trailer. In addition, the City of Racine Fire Department's specialized operations include a Local Technical Rescue Team which involves collapse, confined space, trench, and high/low angle rescues; water rescue divers and boat including side scan sonar; Tactical Emergency Medical Technicians; an Active Shooter Rescue Task Force; and a Regional Command Post. The South Shore Fire Department is equipped with a Mass Casualty Incident Trailer to deliver supplies to an incident where the normal personnel and equipment would be overwhelmed by the number and severity of casualties.”]

Mr. Owens reviewed the section in Chapter II related to critical facilities. In regards to discussion of government administration buildings inventoried in Appendix Table D-3, Mr. Maack indicated that the County's child support and human services department are located within the same facility and should only be listed once on Appendix Table D-3 as the Dennis Kornwolf Racine County Service Center. He also requested that the Racine County Law Enforcement Center is added to Appendix Table D-3.

[Secretary's Note: Appendix Table D-3 was revised to reflect the changes suggested above.]

In discussion of Appendix Table D-4 related to hospitals and major clinics, Mr. Owens said that due to the large number of hospitals and health clinics, he only included those facilities that may be necessary for the preservation of life during and after an emergency such as those providing urgent care, dialysis services, and blood donation centers. Ms. Loizzo suggested that a more inclusive inventory of clinics would be helpful should there be a pandemic and recommended that Appendix Table D-4 be expanded. Mr. Maack agreed and suggested that clinics that provide laboratory, radiology, and other diagnostic services be included on the inventory. Ms. Lange indicated that she would get a list of pertinent Wheaton Franciscan medical clinics. Mr. Owens said that he would update the inventory to be inclusive of those providing diagnostic services.

[Secretary's Note: Following the meeting of the Local Planning Team, Ms. Lange provided additional Wheaton Franciscan clinics that perform laboratory work. Appendix Table D-4 and Map II-25 were revised to include major clinics that offer laboratory, radiology, and other diagnostic services.]

Mr. Maack indicated DaVita Harbor View Dialysis Center has moved to a new location on Washington Avenue.

[Secretary's Note: DaVita Harbor View Dialysis Center is now located at 3113 Washington Avenue, Racine, WI 53405. Appendix Table D-4 and Map II-25 have been revised to reflect this address change.]

Regarding discussion related to hazardous materials storage facilities, Mr. Maack said that some planning facilities are also reporting facilities. He noted that the number of facilities cited in the text on page 16 was probably double counting facilities, and suggested removing the number.

[Secretary's Note: The first sentence in the third paragraph on page 16 was revised to read as follows:

“The facilities which are noted above as storing or producing hazardous materials are located throughout Racine County.”]

Mr. Owens asked whether there were any additional corrections or comments to Chapter II. None were offered. The draft Chapter was approved, subject to discussed revisions, on a motion by Ms. Anderson, seconded by Mr. Maack, and carried by consensus. Mr. Owens reminded the Local Planning Team that they could submit additional comments to him via the project website or electronic mail.

## **REVIEW OF RESULTS FROM HAZARD AND VULNERABILITY EXERCISE**

Mr. Owens reviewed the results of the hazard and vulnerability assessment tool (HVA) which the Local Planning Team completed at its June 2, 2015 meeting. He briefly explained how the data were analyzed. He noted that nine of the top ten highest-ranked hazards identified by the tool were related to severe storms or winter weather. He added that other notable hazards ranked high by the Local Planning Team were related to various types of hazardous material incidents. He noted that the table and text that summarized the results of the HVA were attached to the handouts and are also posted on the project website. He said that the table and further discussion of the HVA will be included in Chapter IV of the plan report.

## **DISCUSSION OF HAZARDS TO BE ADDRESSED BY THE RACINE COUNTY HAZARD MITIGATION PLAN UPDATE**

Mr. Owens stated that as part of the updating process for the hazard mitigation plan, the Local Planning Team will need to review the set of hazards that the current plan addresses. He asked the group to think about whether current circumstances are such that there is no longer a need for the plan to profile some currently profiled hazards, and conversely, whether there are additional hazards that the plan should address. He indicated that the results of the HVA tool is one factor to consider in addition to the County's historical experience with hazards.

Mr. Owens presented annual damage estimates from hazard events updated in 2014 dollars. He noted that these numbers will need to be updated for the third edition of the plan. He stated that on an average annual basis automobile accidents are responsible for the highest amount of damages and account for over \$65 million of property damages per year in Racine County. He noted that flooding is responsible for at least \$2.5 million of damages per year and several types of weather events including thunderstorms, tornadoes, lightning, and drought all account for over \$100 thousand of damages per year each. Mr. Owens also presented data on fatalities and injuries caused by certain hazards within Racine County. He stated that on an average annual basis automobile accidents have the highest impact on human life and account for about 2,400 injuries and deaths per year in the County. He said that there are over 1,500 cases of sexually transmitted diseases and communicable diseases in the County per year. He added that temperature extremes and railway accidents cause over five deaths and injuries per year and that all other hazards for which he could find data caused less than one death or injury per year.

Mr. Owens presented a list of natural hazards and technological hazards that are currently profiled in the plan. He indicated that FEMA requires that natural hazards be profiled in the plan. He added that FEMA does not require technological hazards to be evaluated, but that Counties are free to profile them if they choose. Mr. Owens proposed that this plan update address the same set of hazards that were addressed in the previous plan update and asked the

Local Planning Team if there were other hazards they would like to consider either adding to the plan or removing from the plan.

Mr. Maack suggested that cyber-attacks are becoming more common and asked if the plan could address them as a hazard. Mr. Bennett recommended that active shooter incidents should also be profiled in the plan update. Mr. Maack suggested that an option may be to combine both cyber-attacks and active shooter incidents under the terrorism profile. It was the consensus of the Local Planning Team that both hazards be profiled in the plan update separately.

Mr. Maack asked if communicable diseases such as pandemic flu and Ebola would be profiled in the plan update. Mr. Owens indicated that public health emergencies were profiled in the current version of the plan and indicated that both of these diseases would fall within that section. Mr. Maack also asked that the rail transport through the County of oil from the Bakken fields in North Dakota be addressed within the profile of hazardous materials incidents. Mr. Owens acknowledged that this hazard will be addressed in discussion of rail transport of hazardous materials.

Ms. Anderson stated the plan update should profile dam failure. She indicated that Racine County owned six dams and that decisions will need to be made in the near future as to whether to fix, modify, replace, or remove some of these dams. She noted that profiling dam failure as a hazard may help guide some of these decisions. Mr. Boxhorn suggested that dam failure could be discussed within the assessment of flooding and associated stormwater drainage problems. Ms. Anderson agreed that would be appropriate.

Mr. Litzau asked if bluff erosion should be profiled in the plan report. Ms. Anderson noted that Racine County has good ordinances in place regarding new development along Lake Michigan bluffs in the County. She added there are a couple of instances of lost shoreline in Mt. Pleasant, but it wasn't a significant problem. Mr. Boxhorn pointed out that Lake Michigan coastal hazards are profiled in the current edition of the plan. It was the consensus of the Local Planning Team that this hazard should continue to be assessed in the plan update.

Mr. Boxhorn mentioned that other counties that he is working with on hazard mitigation had decided to not profile earthquakes. He indicated that while earthquakes do occur in the area, there are no documented cases of damages or injuries resulting from these incidents. There was discussion among the Local Planning Team regarding earthquakes and it was the consensus of the group to remove earthquakes from the vulnerability assessment.

### **COMMENTS ON DRAFT CHAPTERS I AND II BY MR. SKIP TWARDOSZ, EMERGENCY MANAGEMENT DIRECTOR, TOWN OF BURLINGTON, FOLLOWING THE OCTOBER 27, 2015 MEETING OF THE LOCAL PLANNING TEAM**

Following the meeting of the Local Planning Team, Mr. Twardosz provided additional comments on draft Chapters I and II via electronic mail. He indicated that the Town of Burlington implemented two mitigation projects in 2010 related to road flooding on Wheatland Road and Hoosier Creek Road.

[Secretary's Note: Two projects were added for the Town of Burlington on Table I-4 and the following paragraph was added after the fourth paragraph on page 9 of draft Chapter I:

“In 2010, the Town of Burlington completed two projects to raise sections of Wheatland Road and Hoosier Creek Road. An approximately 500-foot-long section of Wheatland Road was raised about three feet in elevation to alleviate flooding that occurred when Hoosier Creek overtopped the road. An approximately 1,650-foot-long section of Hoosier Creek Road was raised about four feet in elevation to alleviate flooding from both Hoosier Creek and the Fox River.”]



## **COMMENTS ON DRAFT CHAPTERS I AND II BY CHIEF DICK ROEDER, VILLAGE OF CALEDONIA FIRE DEPARTMENT, FOLLOWING THE OCTOBER 27, 2015 MEETING OF THE LOCAL PLANNING TEAM**

Following the meeting of the Local Planning Team, Mr. Roeder provided additional comments on draft Chapters I and II via electronic mail. In regard to outreach activities discussed on page 7 and Table I-3, Mr. Roeder indicated that the Village of Caledonia Fire Department has a Facebook page, offers a yearly open house, and conducts a yearly fire safety school program. He also indicated the Police and Fire Department put on a Safety Day each year.

[Secretary's Note: Table I-3 was revised to include the outreach activities discussed above in the Village of Caledonia.]

In regard to discussion of historic sites on page 17 and Table II-16, Mr. Roeder indicated that the Caledonia Historical Society has a small collection of historic buildings at Linwood Park in the Village of Caledonia.

[Secretary's Note: Historic sites and districts discussed in Chapter II of this plan update are listed on the National Register of Historic Places. These sites have significance in regards to hazard mitigation because FEMA has the responsibility to ensure that any FEMA funded mitigation project that may affect these sites are in compliance with laws related to historic preservation. The historic buildings that Mr. Roeder discussed above are not listed on the National Register of Historic Places and therefore will not be listed on Table II-16 or Map II-28. However, because these sites have an important recreational, educational, and cultural value, the following sentence was added to the end of the first paragraph on page 17 of draft Chapter II:

“In addition, the Caledonia Historical Society also maintains several historic buildings in Linwood Park in the Village of Caledonia which are not listed on the National Register of Historic Places.”]

Mr. Roeder indicated there will be changes for two public schools in the Racine Unified School District coming in 2016. Construction of an addition to the Gifford Elementary School building is underway. When finished, the school will offer kindergarten through eighth grade. Additionally, construction is underway on a new building that will house Olympia Brown Elementary School.

[Secretary's Note: The following footnote was added to Gifford Elementary in Appendix Table D-1:

“<sup>e</sup>Construction of an addition to Gifford Elementary School began in August 2015. The addition is scheduled to be completed by the beginning of the 2016 school year. Gifford School will then offer kindergarten through eighth grade.”

The following footnote was added to Olympia Brown Elementary School in Appendix Table D-1:

“<sup>h</sup>Construction of a new building that will house Olympia Brown Elementary School began in August 2015. The new building is scheduled to be completed by the beginning of the 2016 school year. The new location for Olympia Brown Elementary School will be 2115 5 ½ Mile Road, Caledonia, WI 53402.”

All subsequent footnotes in Appendix Table D-1 have been re-lettered.]

Lastly, Mr. Roeder indicated that construction is underway for Siena on the Lake, a new community based residential facility that will be located in the Village of Caledonia. The new facility is scheduled to open in 2016.

[Secretary's Note: The Siena on the Lake facility was added to Appendix Table D-6 and Map II-26.]

## **NEXT MEETING OF THE LOCAL PLANNING TEAM**

Mr. Owens reminded the Team that they can submit any additional questions or comments that they may have regarding Chapters I and II to him either through the project website or electronic mail. He indicated that at the next Local Planning Team meeting they will review the chapters on goals and analysis of hazard conditions. He stated that this meeting will be scheduled once Chapters III and IV are updated. He added the updated Chapters and other meeting materials would be posted on the project website. Mr. Boxhorn noted that following the next Team meeting, a meeting will be scheduled to present the first four chapters to the public and get public input.

## **ADJOURNMENT**

There being no further business, the meeting was adjourned by unanimous consent at 11:15 a.m.

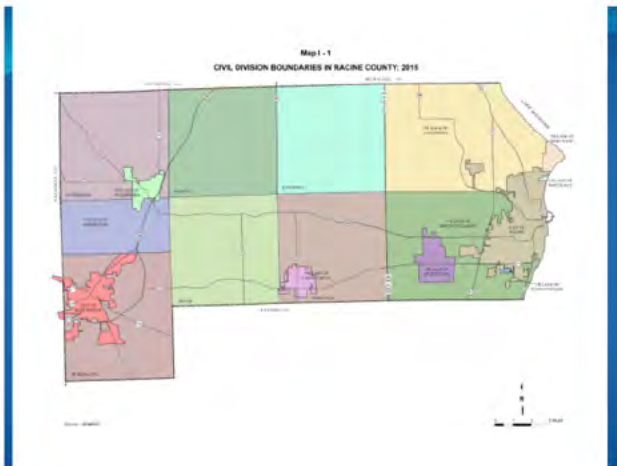
CAPR-266-3 SUMMARY NOTES RACINE CTY HMP LPT MTG OCT 27, 2015 (00228677).DOC  
500-1113  
MGH/LLK/AWO  
02/26/1610/28/2015, 11/19/2016, 2/23/2016

Exhibit A: Owens Presentation (#232246)



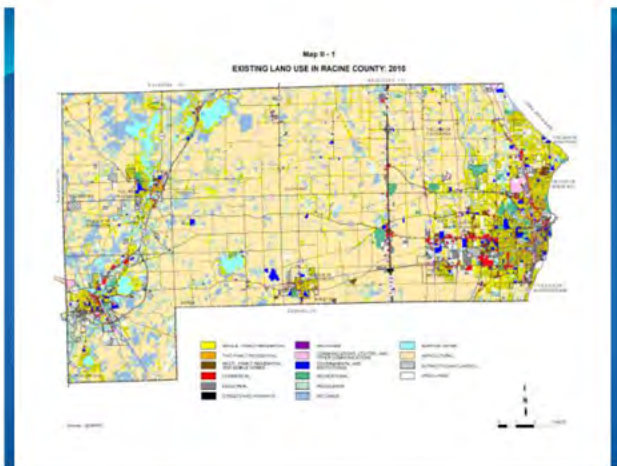
# Chapter I

## Introduction and Background

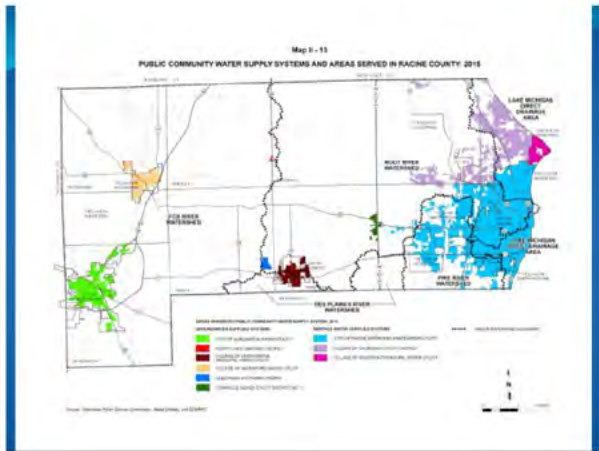
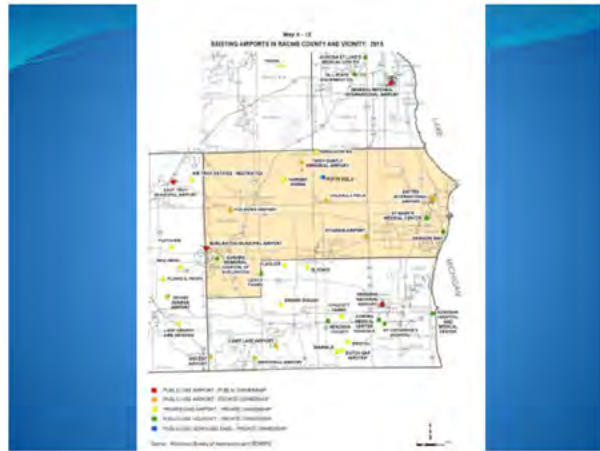
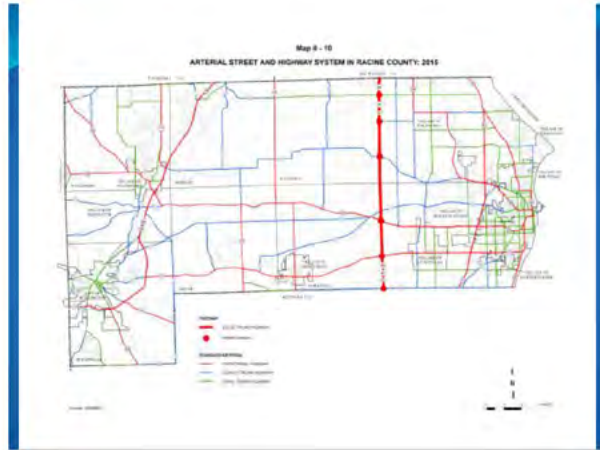


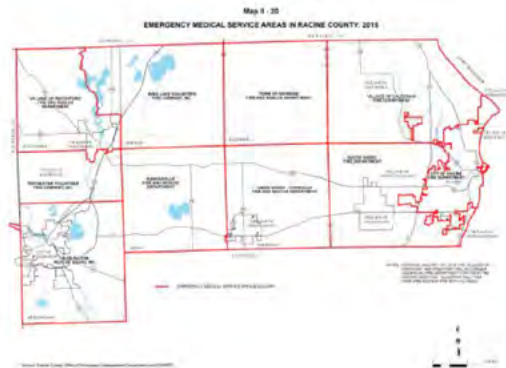
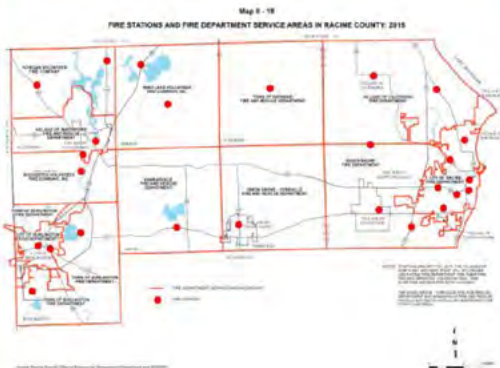
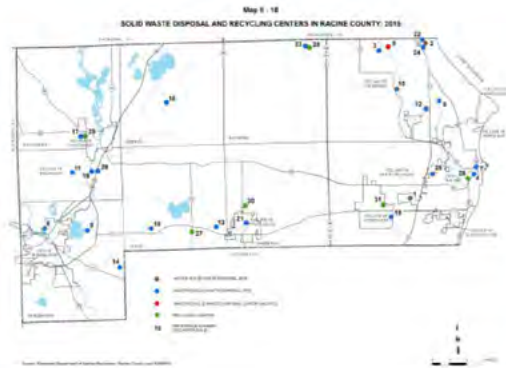
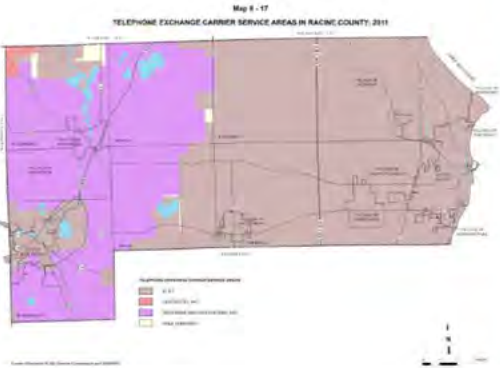
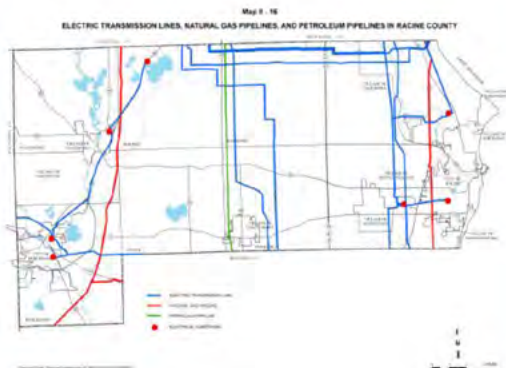
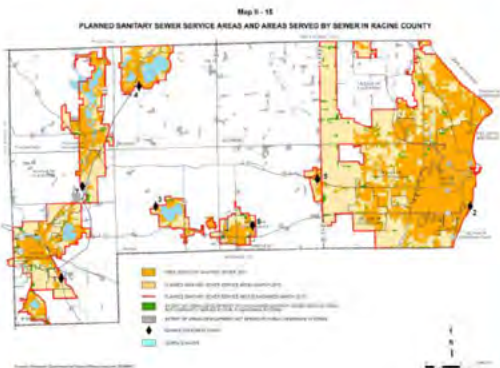
# Chapter II

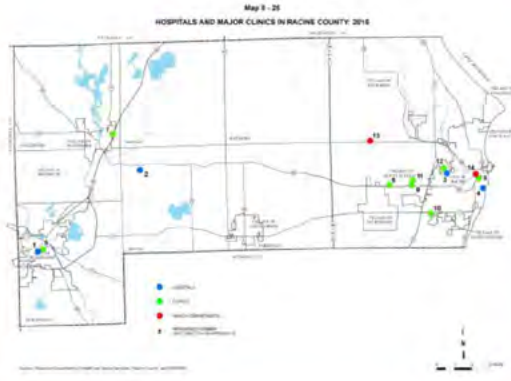
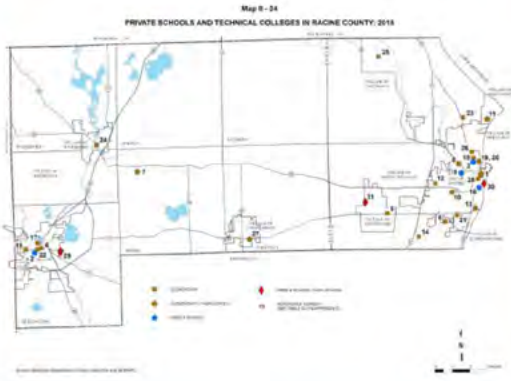
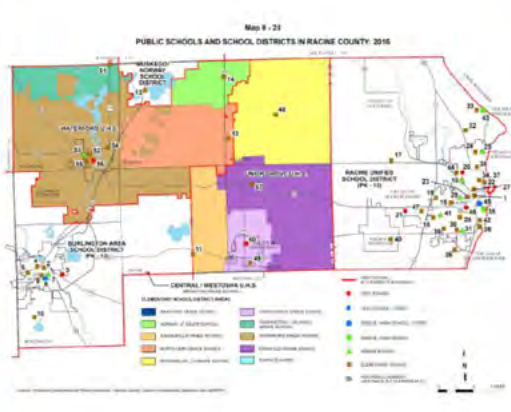
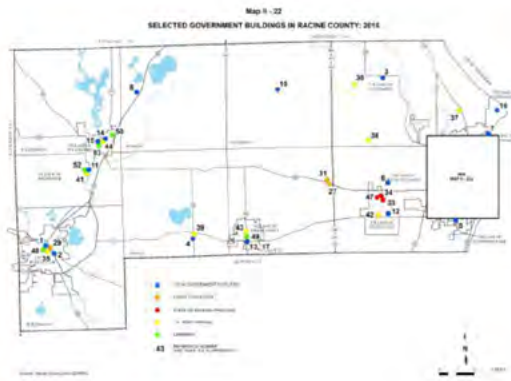
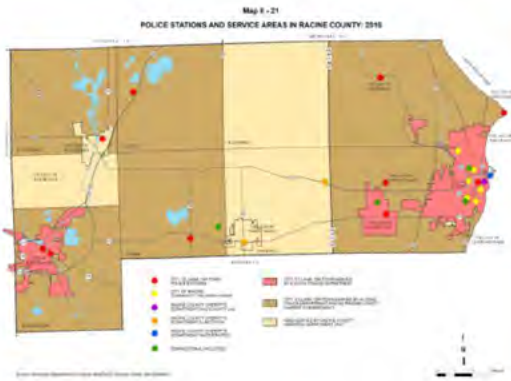
## Basic Study Area Inventory and Analysis

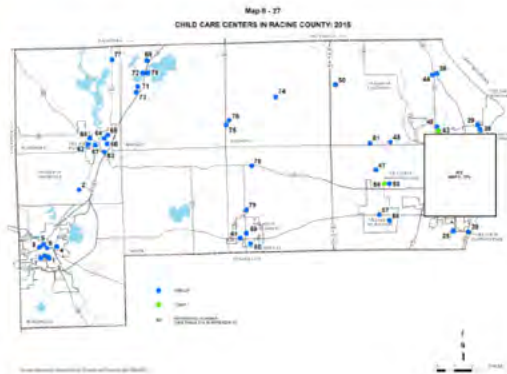
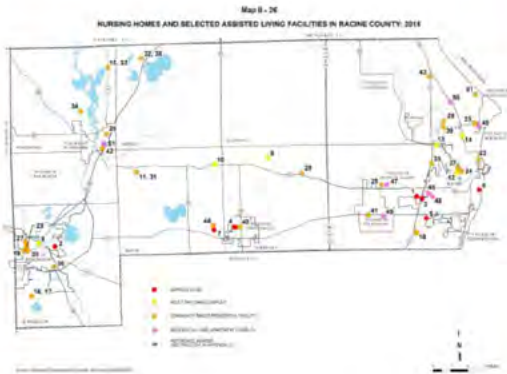












### Hazard and Vulnerability Assessment Tool

### Hazard and Vulnerability Assessment Tool

1. Risk assessment based determined by  

$$\text{Risk} = 100 \times \frac{(\text{probability} \times (\text{Human Impact} + \text{Property Impact} + \text{Business Impact} + \text{Preparedness}))}{(4 \times 3)}$$
2. Percent risk (0 to 100 percent)
3. Relative measure → Higher indicates greater perceived risk
4. Interquartile range is the range of the middle half of responses
5. Smaller interquartile range indicates greater agreement among team members → used to break ties

### HVA Results – Top 10 Perceived Risks





## HVA Results – Top 10 Perceived Risks



6. Ice Storm



7. Roadway Transportation Accidents



8. Lightning



9. Riverine Flooding



10. Large Structure Fire

## HVA Results – Other Notable Risks



Flooding-related

11. Stormwater Flooding



Hazardous Material Incidents

13. Roadways

14. Railroads

15. Fixed Facilities



Thunderstorm-related

12. High Straight-Line Winds



16. Hail

## HVA Results – Bottom Ten Perceived Risks

- |                                    |                                   |
|------------------------------------|-----------------------------------|
| 36. Large-scale food contamination | 41. Earthquake                    |
| 37. Drought                        | 42. Correctional center incidents |
| 38. Dam failure                    | 43. Land subsidence               |
| 39. Lake Flooding                  | 44. Landslide                     |
| 40. Wildfire                       | 45. Dust storm                    |

## Hazard Identification

- FEMA requires the plan to address natural hazards
  - Examples:
    - Tornadoes, Winter Storms, Flooding, Thunderstorms, Drought
- The plan can also address human-induced or technological hazards
  - Examples
    - Hazardous Material Incidents, Transportation Accidents

## Annual Damages

Hazard	Years	Incidents per Year	Annual Property Damages	Annual Crop Damages	Total Annual Damages
Automobile Accidents	13	4,170.15	\$65,753,600	\$0	\$65,753,600
Flood	18	2.17	\$439,800	\$2,106,875	\$2,546,675
Thunderstorms/Wind	47	3.42	\$472,945	\$51,370	\$524,315
Tornadoes	51	0.39	\$454,110	\$283	\$454,393
Lightning	13	2.23	\$115,247	\$0	\$115,247
Drought	25	0.44	\$0	\$233,193	\$233,193
Pipeline Hazmat	25	0.16	\$4,002	\$0	\$4,002
Hail	44	1.48	\$4,773	\$0	\$4,773
Temperature Extremes	13	2.85	\$2,532	\$0	\$2,532
Winter Storms	14	2.64	--	--	--

*Note: All damages are in 2014 dollars*

## Fatality and Injury Totals

Hazard	Years	Incidents	Fatalities	Injuries	Total
Automobile Accidents	13	54,214	248	30,954	31,202
Sexually-Transmitted Diseases	8	10,159	0	10,159	10,159
Communicable Diseases	8	2,641	0	2,641	2,641
Temperature Extremes	13	37	29	71	100
Railway Accidents	15	72	8	60	68
Thunderstorms/Wind	47	161	6	28	34
Lightning	13	29	1	8	9
Tornadoes	51	20	0	7	7
Aviation Accidents	13	22	5	1	6
Pipeline Hazmat Accidents	25	4	0	1	1
Winter Storms	14	37	0	1	1

## Annual Fatalities and Injuries

Hazard	Years	Incidents per Year	Fatalities per Year	Injuries per year	Annual Total
Automobile Accidents	13	4,170.15	19.07	2,381.07	2,400.14
Sexually-Transmitted Diseases	8	1,269.88	0.00	1,269.88	1,269.88
Communicable Diseases	8	330.13	0.00	330.13	330.13
Railway Accidents	15	4.80	0.53	4.00	4.53
Temperature Extremes	13	2.85	2.23	5.46	7.69
Thunderstorm/Wind	47	3.42	0.13	0.60	0.73
Tornadoes	51	0.39	0.00	0.14	0.14
Aviation Accidents	13	1.69	0.38	0.08	0.46
Pipeline Hazmat	25	0.16	0.00	0.04	0.04
Lightning	13	2.23	0.08	0.62	0.70
Winter Storms	14	2.64	0.00	0.07	0.07

## Hazards Currently Profiled in the Plan

### Natural Hazards

1. Flooding
2. Thunderstorms, Wind, Hail, Lightning
3. Tornadoes
4. Temperature Extremes
6. Winter Storms
7. Coastal Erosion
8. Drought
9. Earthquakes

## Hazards Currently Profiled in the Plan

### Technological Hazards

12. Transportation Accidents (roadway, railway, airport)
13. Contamination or Loss of Water Supply
14. Hazardous Materials Incidents (fixed facility, roadway, railway)
15. Emergency Medical Incidents
16. Terrorism Incidents
17. Power Outage Incident

## Hazards NOT Profiled by the Plan

### Natural Hazards

1. Dam Failure
2. Fog
3. Wildfire
4. Dust Storms
5. Land Slide
6. Land Subsidence

## Hazards NOT Profiled by the Plan

### Technological Hazards

7. Large Structure Fire
8. Cyber Attack
9. Mass Casualty Incident
10. Civil Unrest
11. Workplace Violence
12. Building Collapse
13. Loss of Telecommunication System
14. School Violence
15. Loss of Sewerage System
16. Large-Scale Food Contamination
17. Correctional Center Incident

## Project Web Site

- <http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>
  - Agendas and other meeting materials
  - Summary notes from meetings
  - Presentations
  - Draft chapters as they are completed
  - Comment screen
  - Other ways to send a comment
- Email to [aowens@sewrpc.org](mailto:aowens@sewrpc.org)

Racine County Office of Emergency Management  
Southeastern Wisconsin Regional Planning Commission

**Notice of Meeting and Agenda**

**RACINE COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM**

DATE: Monday, June 20, 2016

TIME: 9:00 to 12:00 noon

PLACE: Ives Grove Office Complex Auditorium  
14200 Washington Avenue  
Sturtevant, Wisconsin

AGENDA:

1. Welcome
2. Introductions
3. Consideration of Summary Notes of October 27, 2015, Local Planning Team Meeting (a copy of the draft summary notes is available for download from the SEWRPC website at:  
<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>)
4. Consideration of Chapter III, "Hazard Mitigation Goals," of SEWRPC Community Assistance Planning Report No. 266 (3rd edition), *Racine County Hazard Mitigation Plan Update: 2016-2020* (a copy of the draft chapter is available for download from the SEWRPC website at:  
<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>)
5. Consideration of Chapter IV, "Analysis of Hazard Conditions," of SEWRPC Community Assistance Planning Report No. 266 (3rd edition), *Racine County Hazard Mitigation Plan Update: 2016-2020* (a copy of the draft chapter is available for download from the SEWRPC website at:  
<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>)
6. Discussion of upcoming public meeting
7. Adjourn

Aaron W. Owens  
Secretary

Enclosures

CAPR-266 3<sup>RD</sup> ED MEETING NOTICE JUNE 20 2016 (00232222)  
500-1113  
AWO  
05/25/16

# SUMMARY NOTES OF THE JUNE 20, 2016 MEETING OF THE RACINE COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM

## INTRODUCTION

The June 20, 2016 meeting of the Racine County Hazard Mitigation Plan Local Planning Team (LPT) was convened at the Ives Grove Office Complex at 9:06 a.m. The meeting was called to order by Julie Anderson, Director of the Racine County Department of Public Works and Development Services. Attendance was taken by circulating a sign-in sheet.

In attendance at the meeting were the following individuals:

### Local Planning Team Members

Julie Anderson, Co-Chair ..... Director, Racine County Department of Public Works and Development Services  
David Maack, Co-Chair .....Coordinator, Racine County Office of Emergency Management  
Aaron Owens, Secretary .....Planner, Southeastern Wisconsin Regional Planning Commission  
Christopher Bennett ..... Trustee, Village of Rochester  
Joseph Boxhorn..... Senior Planner, Southeastern Wisconsin Regional Planning Commission  
Dottie Bowersox ..... Public Health Administrator, City of Racine Health Department  
James F. Day .....Assistant Chief, S.C. Johnson & Son Fire Brigade  
Jeff Dolezal .....Director of Public Works, Village of Waterford  
Silviano E. Garcia ..... Public Health Specialist, Central Racine County Health Department  
Jerry Garski..... Village President, Village of Mount Pleasant  
Karin Hollister ..... Senior Engineer, Southeastern Wisconsin Regional Planning Commission  
Jody Howell ..... Supervisor, Racine County Communication Center  
Jake Isaacson..... Supervisor, Town of Dover Roads Department  
Tom Kramer ..... Administrator, Town of Norway  
Jonathan Lisowski.....Lieutenant, Caledonia Police Department  
Chris Litzau..... President, Great Lakes Community Conservation Corps  
Jennifer Loizzo.....Registered Sanitarian, Central Racine County Health Department and City of Racine Health Department  
Paul Madden .....Battalion Chief, Racine Fire Department  
Nakeisha Payne.....Public Involvement and Outreach Specialist, Southeastern Wisconsin Regional Planning Commission  
Richard Roeder ..... Chief, Caledonia Fire Department  
John P. Serketich .....Assistant Corporation Counsel, Racine County  
James Weidner ..... Captain, Racine County Sheriff's Office  
Brian Zmudzinski..... Lieutenant, Burlington Police Department

Ms. Anderson welcomed all attendees to the meeting and thanked them for their continued participation. She highlighted the importance of the hazard mitigation planning process before turning discussion over to David Maack, Coordinator of the Racine County Office of Emergency Management.

Mr. Maack thanked the members of the planning team for their attendance and participation in the hazard mitigation plan updating process. He reminded the planning team that participation in, and adoption of, an updated

County-wide hazard mitigation plan is required for municipalities to maintain eligibility for funding for potential mitigation projects. Mr. Maack also emphasized the importance of identifying mitigation projects during this planning process that communities would like to work on so that they are able to apply for funding when grants become available.

## **CONSIDERATION OF THE SUMMARY NOTES OF THE OCTOBER 27, 2015 LOCAL PLANNING TEAM MEETING**

Mr. Maack introduced Aaron Owens, Planner, Southeastern Wisconsin Regional Planning Commission (SEWRPC). Mr. Owens reviewed the summary notes from the October 27, 2015 meeting of the Local Planning Team. Mr. Owens noted that the slides from the presentations given at the meeting were attached to the summary notes. Regarding discussion in the summary notes about the hazard rating of the Waterford Dam, Mr. Owens asked Ms. Anderson to update the LPT on the situation from the County's perspective. Ms. Anderson indicated that the County has not yet sent the letter requesting the hazard rating of the dam to be reclassified to significant-hazard. She noted that Nathan Zoch, who was the WDNR Dam Safety Engineer for Racine County, is no longer with the WDNR. Ms. Anderson further indicated that she will discuss this issue with the County engineer and will follow up with the WDNR shortly to request the change to the hazard rating of the Waterford Dam. Mr. Owens indicated that it is documented in the preliminary draft Chapter II of the report that the County is working with the WDNR to lower the dam hazard rating. He said that once the change to the hazard rating is accepted by the WDNR, the necessary revisions will be made to the Hazard Mitigation Plan Update.

Mr. Owens indicated that several changes regarding working status and mutual aid service agreements for law enforcement, fire departments, and emergency medical services are documented in the summary notes. He also noted that discussion was added to Chapter II regarding specialized response teams within the County. Mr. Owens asked the LPT to review these changes to be sure they are accurate.

[Secretary's Note: Following the meeting of the Local Planning Team, Mr. Maack forwarded an email he received from Rebecca Ewald, Village Administrator for the Village of Waterford, and Rick Mueller, Fire Chief of the Waterford Fire and Rescue Department, which indicated the service boundaries for the Department were not accurately reflected on Maps II-19 and II-20. Chief Mueller provided a map with the correct service area.

Updated versions of Map II-19 and Map II-20 are attached hereto as Exhibit A.]

No further questions or comments were offered on the October 27, 2015 summary notes. Mr. Owens indicated that the LPT members could send him any comments or corrections to the summary notes by electronic mail or through the comments screen on the project webpage. He stated that if he receives no further comments by July 1, 2016, he will consider the summary notes to present an accurate reflection of what transpired at the October 27, 2015 meeting.

## **CONSIDERATION OF CHAPTER III, "HAZARD MITIGATION GOALS AND OBJECTIVES," OF SEWRPC COMMUNITY ASSISTANCE PLANNING REPORT NO. 266 (3RD EDITION), RACINE COUNTY HAZARD MITIGATION PLAN UPDATE: 2017-2021**

Mr. Owens noted that the handout included the text for draft Chapter III, followed by one table. Mr. Owens stated that material in the draft Chapter that is either new or revised has been highlighted yellow in the text and tables. He noted that this was done to assist review of the Chapter and indicated that the highlighting will be removed prior to publication of the final report.

[Secretary's Note: Mr. Owens' presentation is attached hereto as Exhibit B.]

Mr. Owens indicated that with the exception of a few updated references, draft Chapter III of the report was mostly unchanged from the previous edition. He explained that the Chapter sets forth goals and objectives for use in the consideration of alternative hazard mitigation strategies and for the selection of recommended hazard mitigation actions. He further explained that the goals are framed by goals that were previously established in other plans for Racine County such as watershed plans, park and open space plans, and land use plans. Mr. Owens gave a brief review of the seven goals outlined in the Chapter and indicated that the goals and associated objectives are documented in Table III-1. Mr. Boxhorn added that the Federal Emergency Management Agency (FEMA) wants to see an integration of hazard mitigation planning with other planning efforts. He indicated that the goals presented in Chapter III tie in with the goals and objectives of other planning efforts within the County and are complementary to those planning efforts.

There were no further questions or comments from the Planning Team regarding Chapter III “Hazard Mitigation Goals and Objectives.” The draft Chapter was approved on a motion by Mr. Maack and, seconded by Mr. Weidner, and carried by consensus.

### **CONSIDERATION OF CHAPTER IV, “ANALYSIS OF HAZARD CONDITIONS,” OF SEWRPC COMMUNITY ASSISTANCE PLANNING REPORT NO. 266 (3RD EDITION), *RACINE COUNTY HAZARD MITIGATION PLAN UPDATE: 2017-2021***

Mr. Owens reviewed preliminary draft Chapter IV of the report, describing the hazard conditions of the study area. He indicated that the Chapter documents how the hazards addressed in the report were identified, it briefly describes how the risks and vulnerabilities associated with these hazards were assessed, and it presents a profile of each hazard addressed by the plan. He noted that, with some variation among hazards, the profiles follow a similar format which includes a definition and description of the hazard, a discussion of notable historic and recent events in which the hazard affected Racine County, an assessment of the vulnerabilities and potential community impacts related to the hazard, discussion of potential future changes in impacts from the hazard, and discussion of any differences among communities within the County in the risks they face from the hazard.

Mr. Owens reviewed the section of the draft Chapter on hazard identification. He noted that this section incorporates the results and summary of the hazard and vulnerability assessment tool that the LPT completed at the June 2, 2015 meeting. No comments or questions were offered on this section.

Mr. Owens reviewed the section of the Chapter regarding vulnerability assessment analysis methods and procedures. He stated that this section includes a new subsection describing climate trends since 1950 and climate projections that are anticipated to occur between now and the middle of the 21st century. He noted that this information will be used as a basis of discussion of how climate change may affect the impacts of a particular hazard. Mr. Maack added that FEMA now requires that state hazard mitigation plans address climate change and may require this of local plans at some time in the future.

Mr. Owens reviewed the section on past hazard experiences within the County. He noted that all damage totals had been updated to 2014 dollars using the Consumer Price Index (CPI) from the U.S. Department of Labor, Bureau of Labor Statistics. He stated that previous editions of the report include data on deaths, injuries, property damage, and crop damages that were reported, in some cases, based on a larger geographic area than Racine County. He explained that some of the databases that provide this information have since been refined to include data specific to Racine County. Damages, injuries, and deaths reported in this 3rd edition of the report are specific to Racine County when possible, and may be lower than the figures reported in previous editions of the report. No comments or questions were offered on this section.

Mr. Owens reviewed the section regarding ranking of hazards. He noted that the LPT decided to include cyber-attack on local governments and active shooter incidents as new hazards to be considered by this 3rd edition of the

report. He explained that the section includes brief descriptions of a number of hazards that the LPT considered for inclusion in the plan, either during the initial development of the plan or the first update, but ultimately decided to omit. Ms. Anderson raised concern with Table IV-8, which lists hazards to be considered by the report and ranks the risk of occurrence, warning time, damage to property, threat to life safety, duration of impact, and size of area affected. Ms. Anderson felt that some of the rankings regarding Lake Michigan coastal hazards were too low considering recent developments in the Villages of Mount Pleasant and Caledonia. She noted that there had been significant changes in coastal erosion in the County since the previous plan update. Ms. Anderson stated that the coastal erosion hazard could have long term impacts and the plan should address the heightened importance of mitigating the impacts from this hazard. She further noted that if funding becomes available in the future, it would be helpful to emphasize the vulnerability and impact that communities within the County face due to coastal erosion. Mr. Owens indicated that the section pertaining to coastal hazards was completed prior to knowing the severity of the bluff recession in Mount Pleasant and Caledonia, and acknowledged that Table IV-8, as well as other portions of the coastal hazards section will need to be updated and expanded in light of the current situation along the Lake Michigan coast.

Regarding the ranking of hazards in Table IV-8, Mr. Weidner asked if FEMA had any threshold for the low, medium, and high rankings for the hazard such as damage amounts or population affected. Mr. Owens indicated that the ratings were largely subjective and there were no metrics set by FEMA for specific rankings.

Mr. Maack suggested raising the risk of occurrence of coastal hazards in Table IV-8 from “Low” to “Medium”. Mr. Garski also suggested changing the potential damage to property from “Medium” to “High”. He explained that one resident in the Lake Park neighborhood in the Village of Mount Pleasant had his house torn down due to the bluff recession and added that an additional 10 to 12 property owners are at risk of losing their homes if additional bluff erosion occurs. The LPT agreed that both entries in Table IV-8 should be revised.

[Secretary’s Note: In Table IV-8, the entry for coastal hazards pertaining to risk of occurrence has been revised to read “Medium”, and the entry regarding to potential damage to property to read “High.”]

Mr. Owens reviewed the section of the Chapter regarding flooding and associated stormwater drainage problems. He stated that Ms. Hollister of SEWRPC staff performed a parcel-based analysis to estimate the impacts of a one-percent-annual-probability flood in the County. He explained that this analysis used geographic information systems (GIS) to identify structures in the floodplain. He indicated that damages resulting from flooding were estimated based upon the 2015 assessed values of the structures, flood elevations from past flood studies, and topographic mapping. Mr. Boxhorn added that this analysis was only a rough estimate as to whether a structure is within the one-percent-annual-probability floodplain and that a more detailed survey of each structure would be needed to confirm a structure is impacted by the floodplain.

Mr. Owens noted that analysis showed there had been a decrease of about 100 structures in the one-percent-annual-probability floodplain when compared to the previous edition of the report. He explained that this decrease is largely due to the Pike River improvements project that greatly increased flood storage and stormwater holding capacity and lead to contracted floodplain boundaries when new flood flows and stages were developed. Mr. Owens said that the project also restored aquatic and terrestrial habitats and developed a recreational trail through the newly restored corridor.

Mr. Owens indicated that the GIS analysis identified four critical facilities that were at least partially within the one-percent-annual-probability floodplain in the County, including a private high school, an adult daycare center, the Racine County Sheriff’s Water Patrol office, and the City of Burlington Police Department. Ms. Loizzo stated that the adult daycare center mentioned may no longer be operational. Mr. Serketich added that he thought the property may be for sale.

[Secretary’s Note: Lincoln Lutheran Adult Daycare Center in Racine and Lincoln Lutheran Chestnut Club in Burlington were closed in March 2015. The third sentence in the fourth full paragraph

on page 32 of Chapter IV was revised to read (text in bold is included here, and in similar subsequent Secretary's Notes, to indicate language changed or added onto the text. Text will not be bold in the report):

“**Three** of these facilities—a private high school, the Racine County Sheriff's Department Water Patrol Office, and the City of Burlington Police Department—are located within the flood hazard area.”

In addition, Lincoln Lutheran Adult Day Care Center and Chestnut Club were removed from Appendix Table D-6 and Maps II-26, IV-4, and IV-4a.]

In reference to discussion on page 33 about buildings identified as mass care facility sites, Mr. Maack indicated that the list of facilities is not available from the County Office of Emergency Management, but rather from the Southeast Wisconsin Chapter of the American Red Cross.

[Secretary's Note: The sixth sentence in the first partial paragraph on page 33 of Chapter IV was revised to read as follows:

“A listing of those facilities is available **from the Southeast Wisconsin Chapter of the American Red Cross.**”]

Related to the section on flooding hazards, Ms. Anderson mentioned that under the Lake Michigan water diversion to the City of Waukesha, return flows are required to go to the Root River through Racine County on the way back to the Lake. She indicated that under normal operating conditions, the Fox River would receive less treated wastewater outflows from Waukesha because the treated outflow would go to the Root River instead. She noted that any necessary overflows from the Waukesha water treatment plant would go to the Fox River. Ms. Anderson indicated that the amount of treated water planned to be returned to the Root River would not affect the existing flooding hazard within Racine County. Mr. Boxhorn agreed, stating that the negotiated 8.2 million gallons per day (12.7 cfs) return flow into the Root River is a minor fraction of the flood flow and would not significantly raise flood levels along the Root River.

Mr. Owens reviewed the section on thunderstorm winds, non-thunderstorm high-winds, hail, and lightning. He pointed out that the main change in this section from previous editions of the report was that the high wind events that are not associated with thunderstorms were moved into a separate category of non-thunderstorm high-winds. He explained that this was done because significant non-thunderstorm high-wind events have the potential to impact the County in different ways than thunderstorm winds. He added that these events are also reported separately from thunderstorm events within the National Climatic Data Center (NCDC) storm events database.

Mr. Owens reviewed the section on tornadoes. Regarding a description of the location of a recent tornado event, Ms. Anderson noted that Highway 41 was now a U.S. Highway, not a State Highway, as was reported in the description. There was some uncertainty amongst the LPT as to the correct designation of this highway. Mr. Owens stated that the road is more widely known as S. 27th Street locally, and suggested using that road name in the reference.

[Secretary's Note: The second sentence in the first bullet point on page 49 was revised to read as follows:

“This supercell spawned a tornado near **the intersection of S. 27th Street** and STH 100 in the City of Franklin in Milwaukee County.”]

Mr. Owens reviewed the section on Lake Michigan coastal hazards. He again noted that the majority of the assessment for this hazard was written before the severity of the bluff erosion in Mount Pleasant and Caledonia was reported. He stated that he anticipated there would need to be some additional descriptions of the current situation along the coast in the County, as well as some revisions made to the section. Mr. Owens asked that the lakeshore



communities provide him with any data regarding their experiences with coastal hazards and any projects or planned projects they may have to address the problem. Specifically, he requested damage estimates, number of buildings at risk, known public infrastructure at risk, and photos of the areas affected.

[Secretary's Note: No additional data pertaining to damage estimates was provided by lakeshore communities.]

At the request of Mr. Owens, Mr. Garski gave an update regarding the ongoing bluff erosion situation in Mount Pleasant. Mr. Garski indicated that the weather had been cooperating recently with a lack of strong storms and easterly winds which has slowed the wave action erosion. He noted, however, that there was a 15-foot section of bluff on one property that could fail at any time. He stated that several professors from the University of Wisconsin are installing a temporary monitoring system to detect movements in the affected slopes.

Mr. Garski suggested that the bullet points on page 62 addressing the types of Lake Michigan coastal hazards potentially affecting Racine County should address the vulnerability of roads and other public infrastructure.

[Secretary's Note: The bullet points in the second paragraph under the vulnerability assessment for Lake Michigan Coastal Hazards section on page 62 reference the types of Lake Michigan coastal hazards which potentially affect Racine County. The physical assets that may be affected are not meant to be included in these bullet points. The concern above will be addressed in the paragraph following the bullet points on page 62. The paragraph on page 62 following the bullet points was revised to read as follows:

“The focus of **this** vulnerability assessment is on the first type of hazard noted above, erosion of bluffs, beaches, and nearshore areas as that phenomenon is a documented hazard in Racine County where bluff recession rates exceeding 10 feet per year have been reported.<sup>50</sup> **Bluff recession has destroyed, damaged, or jeopardized the integrity of private property such as homes, garages, sheds, and trees as well as public property and infrastructure such as parklands, roads, and utilities.**

The second hazard, flooding from high Lake levels, is being considered, along with flooding in other areas of the County. As shown on Maps IV-2 and IV-3, there are no structures identified in the floodplain associated with Lake Michigan. Those floodplain areas are delineated on the County large-scale topographic maps.

With regard to the third hazard, storm wave damage, there are assets in the County, primarily in the City of Racine, that are protected by sheet piling, breakwaters, and revetments. 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 County continues to routinely monitor and maintain the structures as needed.”]

Mr. Owens asked if the discussion regarding the bluff erosion in the Lake Park neighborhood of Mount Pleasant accurately describes the current conditions. Mr. Garski indicated that the conditions were accurate as of the date of the LPT meeting. Ms. Anderson added that there was a public meeting on June 7, 2016 regarding the bluff erosion issues occurring in the County that drew nearly 200 residents. She noted that in addition to the concern of property owners with homes at risk, there were property owners who were not under direct threat of losing their home that expressed concern regarding the property values in the area.

Mr. Owens indicated that he was unable to find specific details regarding bluff erosion occurring in the Village of Caledonia. He asked the LPT if anyone had specific information for bluff erosion in this area. Mr. Roeder stated that a project was underway to stabilize and reinforce the shoreline on a private property on Waters Edge Road. He

indicated that he did not have details on the project. Ms. Anderson said that she had toured a property on Novak Road where a home is built into the bluff. She stated that erosion had undercut the bluff and the back deck of the home was at risk of falling into the Lake. She added that there is concern for the resident's safety, as he is elderly.

[Secretary's Note: The first full paragraph on page 66 was revised to read as follows:

“Lake Michigan water levels are 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 and 2014 has led to less evapotranspiration, contributing to rising Lake levels. Beginning in 2015, residents in the Lake Park neighborhood of the Village of Mount Pleasant, whose homes reside on a bluff overlooking Lake Michigan, have experienced significant erosion and bluff recession issues. The erosion has been caused by a combination of wave action reaching up to the bottom of the bluff and groundwater seepage from the top of the bluff. Some property owners have reported losing 40 feet or more of land due to the erosion. One home on Sheridan Road needed to be removed in April 2016, while another 10 to 12 homes are threatened by the receding bluff. **In addition, several homes in the Village of Caledonia were also at risk due to Lake Michigan bluff erosion. As of June 2016, a project was underway to stabilize and reinforce the shoreline on a private property on Waters Edge Road. On Novak Road erosion had undercut the bluff where a home resides and the home's deck was at risk of falling into the Lake.**

In May 2016 the Racine County Executive issued a declaration of emergency to better position the County to receive State and Federal assistance as well as to make personnel and resources available to assist affected residents. **Several public meetings were hosted in the Village of Mount Pleasant in the summer of 2016 that included local, County, State, and Federal officials. The meetings provided information for property owners on temporary actions they can take to stabilize the bluff while more permanent solutions are explored. Long term solutions to stabilize bluffs could cost property owners tens of thousands of dollars, or more.”**

In light of recent bluff failures in the County, revisions were also made to the section of the coastal hazards profile related to potential future changes in hazard conditions.

[Secretary's Note: The first paragraph under the “Potential Changes in Coastal Hazard Conditions” on page 68 was revised to read as follows:

“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 coastal 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 Racine 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 provides for a larger setback for development in areas where structural protection is not envisioned to be used due to limited planned urban development.**

**As discussed in the sections above, Lake Michigan water levels have risen more than three feet since January 2013, causing some residents in the Villages of Caledonia and Mount Pleasant 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 fluctuate but are currently higher than the long-term average. 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 V.”]**

Mr. Owens reviewed the section on winter storm events. Mr. Maack stated that many injuries and deaths occur indirectly from winter storm event, for example from traffic accidents. He noted that Table IV-24, which lists the winter storm events that have occurred in the County from 1994 through 2014 as well as deaths and injuries that are directly associated with each event, does not account for injuries and deaths that are indirectly related to these events. Mr. Owens indicated that data regarding indirect deaths related to each specific winter storm event is not reported by the NCDC. He indicated that he would add a note to Table IV-24 clarifying that the table only represents data directly related to winter storm events, and that property damage, injuries, and deaths that are indirectly related to these events occur frequently.

[Secretary’s Note: The following note was added to Table IV-24:

“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 occur frequently but are not included in this table.”]

During discussion regarding an active shooter incident at a Sikh temple in the City of Oak Creek, Ms. Anderson indicated that the Officer cited in the text of Chapter IV as being shot nine times was actually shot 17 times.

[Secretary’s Note: The third sentence in the first bullet point on page 127 was revised to read as follows:

“The gunman exited the building and confronted a responding police officer, shooting him 17 times.”

In addition, Ms. Anderson noted that there has been a very proactive effort by the Racine County Sheriff’s Department to train public officials and employees regarding active shooter situations. This outreach has included information on how to better secure buildings and how to triage during an active shooter incident. Mr. Owens noted that Chapter V of the report would review recent Federal, State, and local programs for each profiled hazard and indicated that he would include the discussed outreach in that section.

There were no further questions or comments from the Planning Team regarding Chapter IV “Analysis of Hazard Conditions.” The draft Chapter was approved unanimously by the Local Planning Team pursuant to changes and additions that were discussed during the meeting.

## **NEXT MEETING OF THE LOCAL PLANNING TEAM**

Mr. Owens indicated that there would be a public meeting to present preliminary draft Chapters I through IV to the public and to get public input on the report. He noted that a date for the public meeting was yet to be determined but indicated that the Planning Team members will be notified when a date is determined and are welcome to attend. Mr. Owens reminded the LPT that they can submit any additional questions or comments that they may have regarding the report to him either through the project website or electronic mail. He indicated that at the next Local

Planning Team meeting they will review the final two chapters which are related to hazard mitigation strategies and plan adoption and implementation. He added the updated chapters and other meeting materials would be posted on the project website.

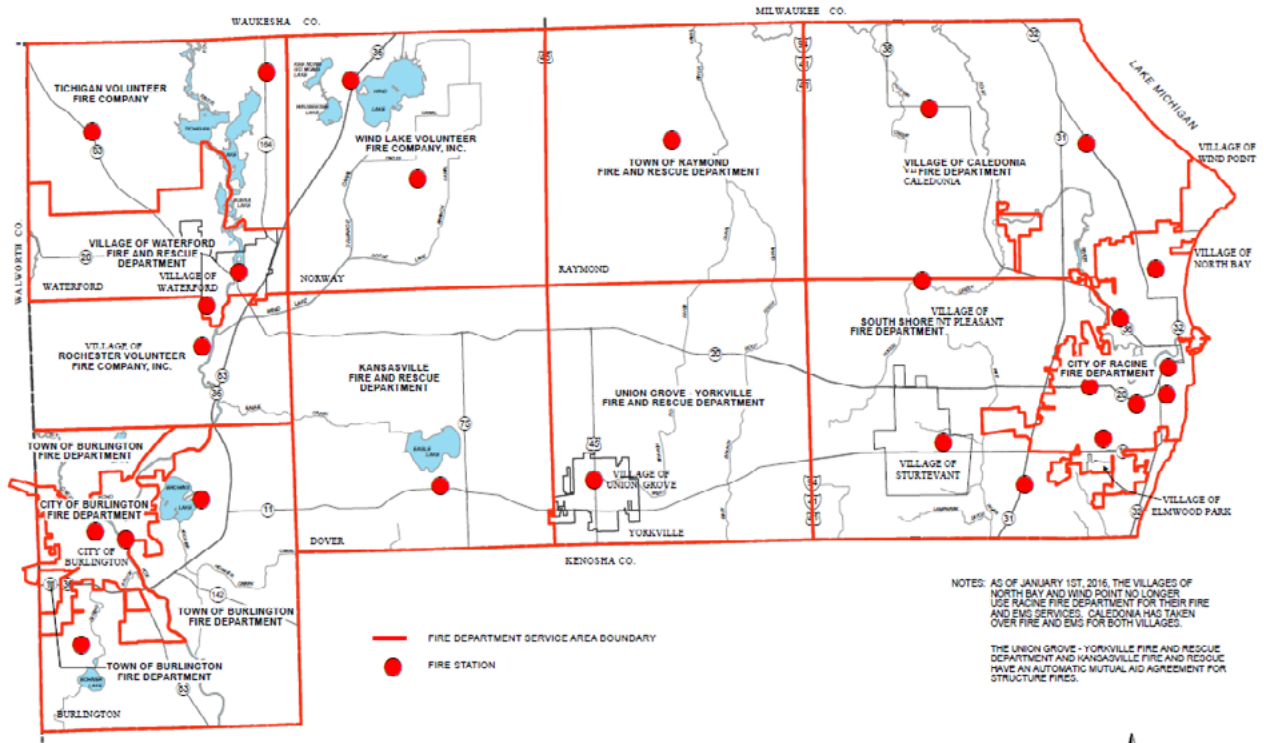
## **ADJOURNMENT**

There being no further business, the meeting was adjourned by unanimous consent at 11:27 a.m.

EXHIBIT A

Map II - 19

FIRE STATIONS AND FIRE DEPARTMENT SERVICE AREAS IN RACINE COUNTY: 2015

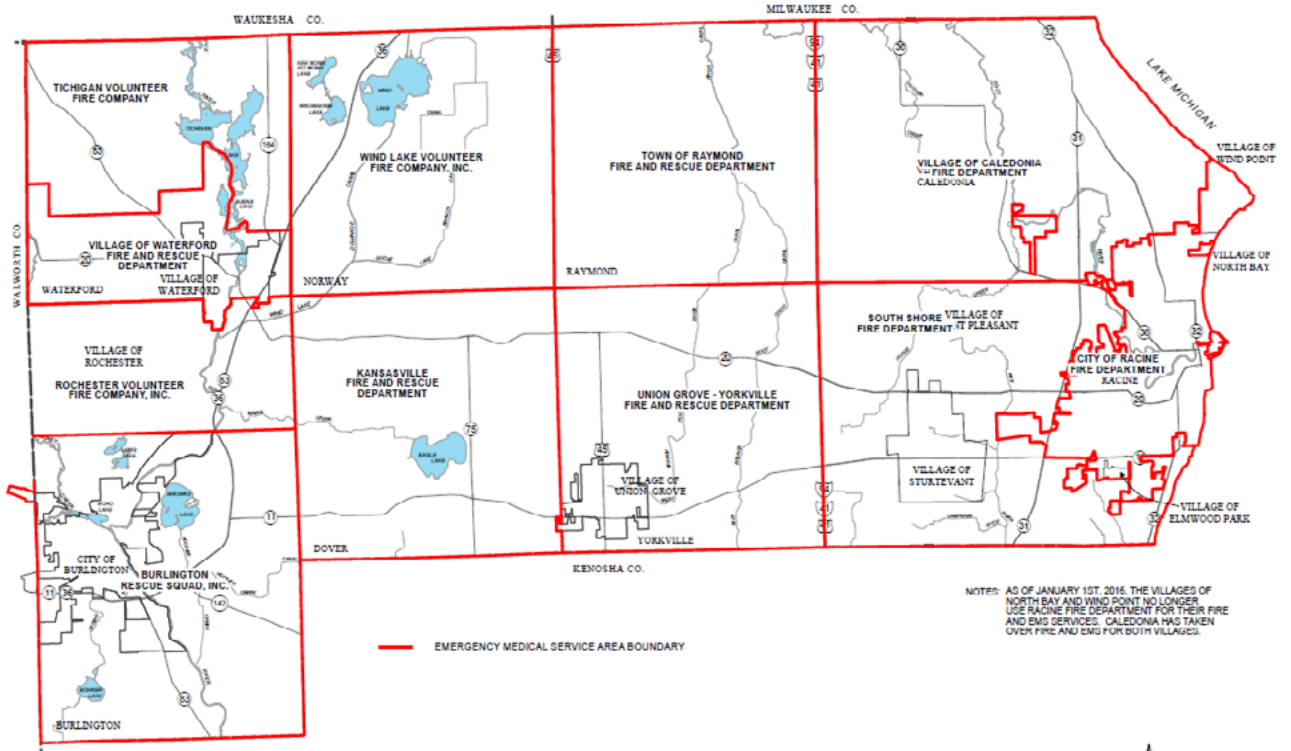


NOTES: AS OF JANUARY 1ST, 2016, THE VILLAGES OF NORTH BAY AND WIND POINT NO LONGER USE RACINE FIRE DEPARTMENT FOR THEIR FIRE AND EMS SERVICES. CALEDONIA HAS TAKEN OVER FIRE AND EMS FOR BOTH VILLAGES.  
THE UNION GROVE - YORKVILLE FIRE AND RESCUE DEPARTMENT AND KANSASVILLE FIRE AND RESCUE HAVE AN AUTOMATIC MUTUAL AID AGREEMENT FOR STRUCTURE FIRES.

Source: Racine County Office of Emergency Management Department and SEWRPC.

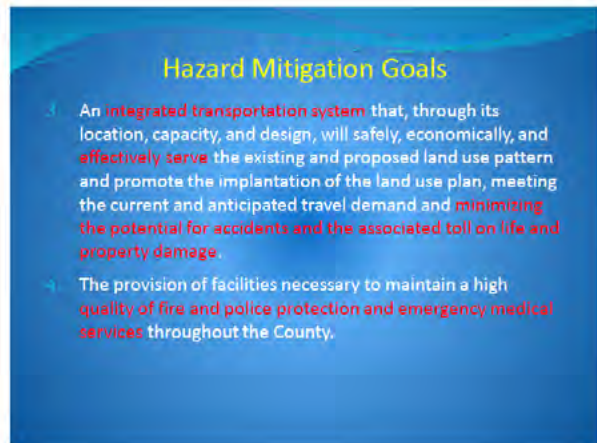
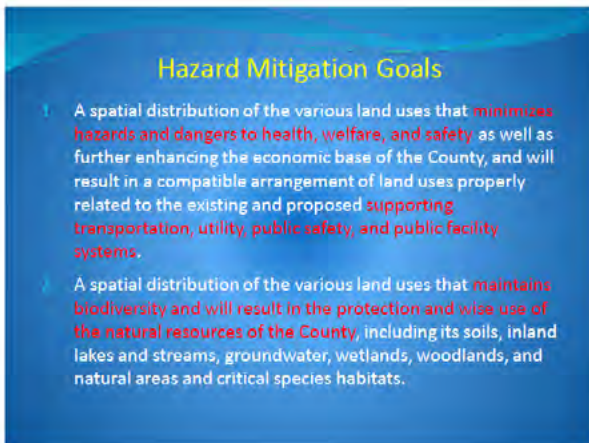
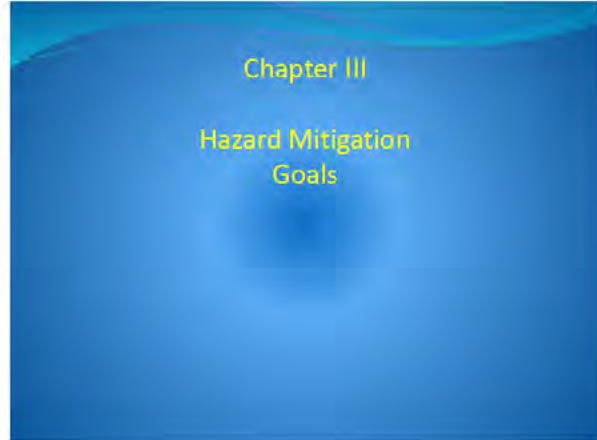
Map II - 20

EMERGENCY MEDICAL SERVICE AREAS IN RACINE COUNTY: 2015



Source: Racine County Office of Emergency Management Department and SEWRPC.

Exhibit A

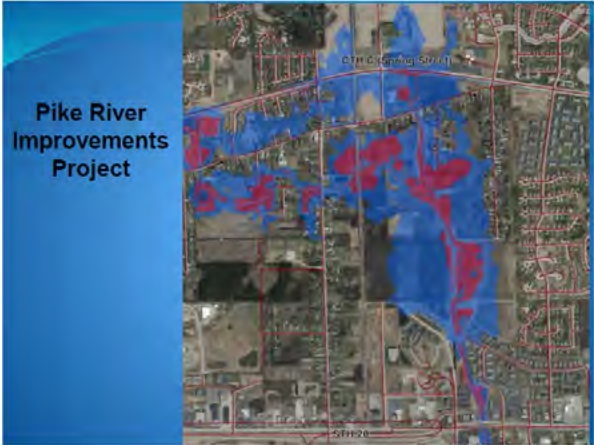
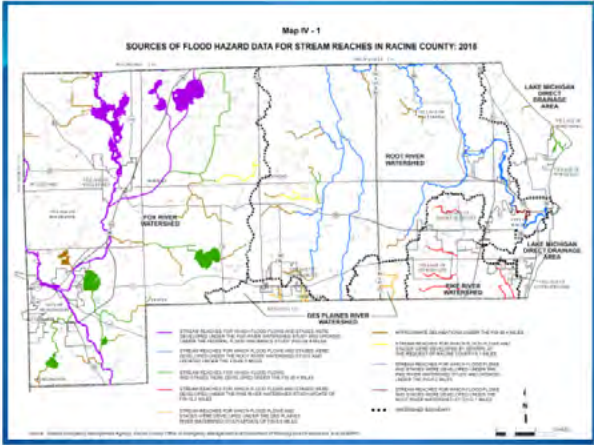


# Chapter IV

## Analysis of Hazard Conditions

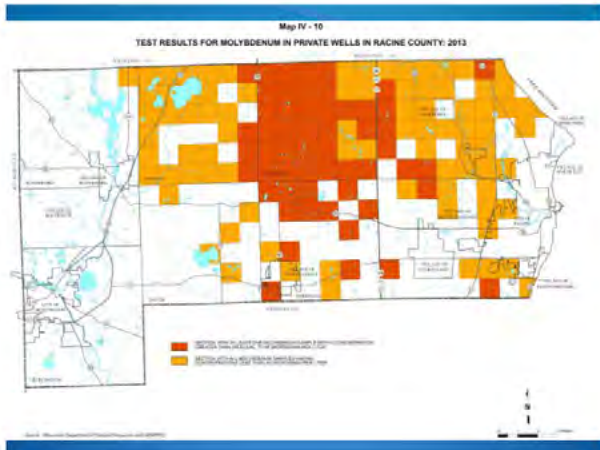
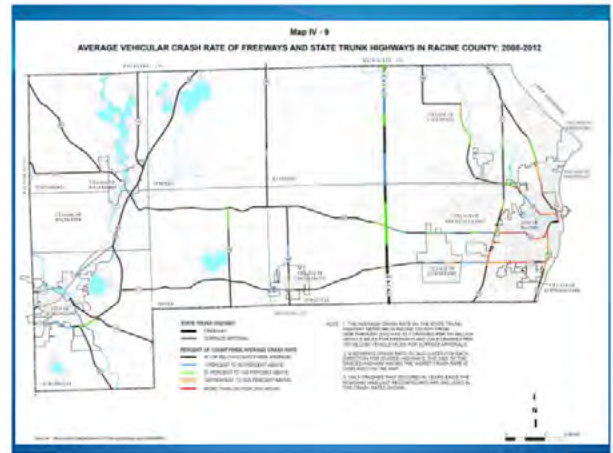
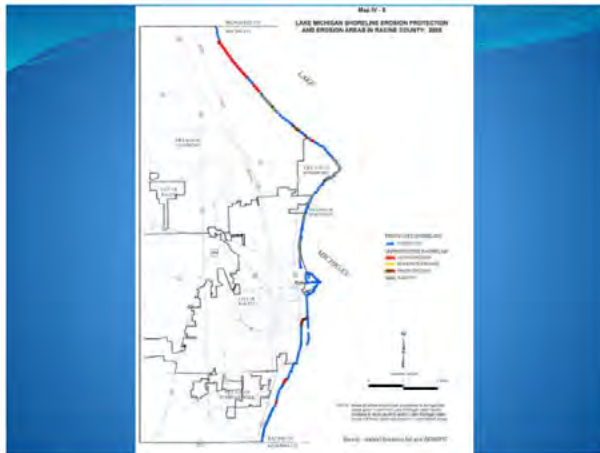
- ### Chapter IV Overview
- Documents the identification of the hazards that the plan addresses
    - This includes brief descriptions of hazards that are not addressed but were considered for inclusion during the initial plan or one of the updates
  - Describes how risks and vulnerabilities were assessed
  - Gives a profile of each hazard addressed by the plan

- ### Hazard Profiles
- Most profiles follow a similar format
    - Definition and description of the hazard
    - Description of notable historical events that affected the County
    - Description of some notable recent events that affected the County
    - Assessment of vulnerabilities to the hazard and community impacts from the hazard
    - Description of potential future changes in impacts
    - Discussion of any differences among communities in risks









## Public Meeting on Hazard Mitigation Plan

- Date to be announced soon
- Review progress on the plan update to date
- Seek public input
  - Problem areas relative to hazards
  - Potential mitigation measures and projects
  - Comments on draft plan

## Project Web Site

- <http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>
  - Agendas and other meeting materials
  - Summary notes from meetings
  - Presentations
  - Draft chapters as they are completed
  - Comment screen
  - Other ways to send a comment
- Email to [aowens@sewrpc.org](mailto:aowens@sewrpc.org)

Racine County Office of Emergency Management  
Southeastern Wisconsin Regional Planning Commission

**Notice of Meeting and Agenda**

**RACINE COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM**

DATE: April 26, 2017  
TIME: 3:30 until 5:00 p.m.  
PLACE: Mount Pleasant Village Hall Community Room  
8811 Campus Drive  
Mount Pleasant, Wisconsin

AGENDA:

1. Welcome
2. Introductions
3. Consideration of Summary Notes for the June 20, 2016 Local Planning Team Meeting [**NOTE: All meeting materials are available for download from the SEWRPC website at: <http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>**  
**Scroll down to the “Racine County Hazard Mitigation Plan Update” section and click on desired file under the “Local Planning Team Meeting Materials: April 26, 2017” heading]**
4. Consideration of Chapter V, “Hazard Mitigation Strategies,” of SEWRPC Community Assistance Planning Report No. 266 (3rd edition), *Racine County Hazard Mitigation Plan Update: 2017-2021* (a copy of the draft chapter is available for download from the SEWRPC website at: <http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>)
5. Consideration of Chapter VI, “Plan Adoption, Implementation, Maintenance, and Revision,” of SEWRPC Community Assistance Planning Report No. 266 (3rd edition), *Racine County Hazard Mitigation Plan Update: 2017-2021* (a copy of the draft chapter is available for download from the SEWRPC website at: <http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>)
6. Discussion regarding notification of adjacent communities.
7. Review of plan approval and adoption process.
8. Discussion of upcoming public meeting.

Aaron W. Owens  
Secretary

CAPR-266 3RD ED MEETING NOTICE APRIL 26 2017 (00236945)  
500-1113  
AWO  
4/11/2017

# SUMMARY NOTES OF THE APRIL 26, 2017 MEETING OF THE RACINE COUNTY HAZARD MITIGATION PLAN LOCAL PLANNING TEAM

## INTRODUCTION

The April 26, 2017 meeting of the Racine County Hazard Mitigation Plan Local Planning Team (LPT) was convened at the Mount Pleasant Village Hall Community Room at 3:37 p.m. The meeting was called to order by David Maack, Coordinator of the Racine County Office 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

Julie Anderson, Co-Chair..... Director, Racine County Department of Public Works and Development Services  
David Maack, Co-Chair .....Coordinator, Racine County Office of Emergency Management  
Aaron Owens, Secretary .....Planner, Southeastern Wisconsin Regional Planning Commission  
Dan Adams..... Captain, Racine County Sheriff’s Office  
Megan Beauchaine..... Research Analyst, Southeastern Wisconsin Regional Planning Commission  
Joseph Boxhorn..... Senior Planner, Southeastern Wisconsin Regional Planning Commission  
David Degroot..... President, Village of Mount Pleasant  
Richard Roeder ..... Chief, Caledonia Fire Department  
John P. Serketich ..... Assistant Corporation Counsel, Racine County  
Brian Smith ..... Captain, Mount Pleasant Police Department  
Robert Stedman..... Fire Chief, Caledonia Fire Department  
Sandi Swan..... Deputy Clerk Treasurer, Village of Rochester  
Skip Twardosz..... Director of Emergency Management, Town of Burlington  
Dan Warren ..... Chief, Caledonia Police Department  
James Weidner ..... Captain, Racine County Sheriff’s Office  
Charles Weitzel ..... Member, Local Emergency Planning Committee  
David Wohlgenuth ..... Lieutenant, City of Racine Police Department

Mr. Maack welcomed all attendees to the meeting and thanked them for their continued participation. He explained that this plan is required for communities to remain eligible for hazard mitigation grant funding. Mr. Maack provided an example of a home near the Pike River in the Village of Mount Pleasant that was bought out using hazard mitigation grant funds following a flooding event. He indicated that the buyout of the property was possible because the County had a hazard mitigation plan that was approved by FEMA. Ms. Anderson added that the plan helped get additional funding for the County’s recovery following the 2008 flooding. Mr. Mack continued that the mitigation plan covers many other types of projects and mentioned that this plan update profiles two new hazard events: active shooter incidents and cyberattack on local governments. Mr. Maack noted that following FEMA’s approval of the plan, adoption by the County will be obtained through the County Board’s Land Use Committee. Mr. Maack further noted that FEMA requires all cities and villages within the County to participate in the planning process and each must adopt the plan to be eligible for hazard mitigation funding.

## CONSIDERATION OF THE SUMMARY NOTES OF THE JUNE 20, 2016 LOCAL PLANNING TEAM MEETING

Mr. Maack turned the meeting over to Mr. Owens. Mr. Owens thanked the members of the planning team for their time and effort in updating Racine County’s hazard mitigation plan. Mr. Owens briefly reviewed the summary notes from the June 20, 2016 meeting of the Local Planning Team. He noted that his presentation from that meeting was

attached to the summary notes as Exhibit B. He further noted that the summary notes serve as documentation of edits made to the draft Chapters of the report.

Mr. Owens stated that he received an email from Fire Chief Rick Mueller of the Waterford Fire and Rescue Department. In the email, Chief Mueller indicated that the service boundaries for the Village of Waterford Fire and EMS, as shown in draft Maps II-19 and II-20 were not accurate. Chief Mueller included in the email an image with the correct service boundaries for the department. Mr. Owens said that the revised boundaries for the Waterford Fire and Rescue Department were added to Maps II-19 and II-20 and were attached to the summary notes as Exhibit A.

Mr. Owens explained that there were several parts of the Lake Michigan coastal hazard section in Chapter IV of the report where discussion was added. Text was added regarding several homes in Caledonia that were at risk due to bluff erosion. There was also an added sentence regarding public informational meetings that were held in the County in June 2016 where local, State, and Federal officials provided information on temporary actions that could be taken to stabilize bluffs in the Villages of Mount Pleasant and Caledonia. In addition, further discussion related to the potential impacts of future fluctuations in Lake Michigan water levels associated with climate change projections was added to the Chapter.

Mr. Owens asked if there were any questions or comments. None were offered. Ms. Anderson motioned to approve the summary notes for the June 20, 2016 LPT meeting. Mr. Wohlgenuth seconded the motion, and the summary notes were approved.

**CONSIDERATION OF CHAPTER V, “HAZARD MITIGATION STRATEGIES,”  
OF SEWRPC COMMUNITY ASSISTANCE PLANNING REPORT  
NO. 266 (3RD EDITION), RACINE COUNTY HAZARD MITIGATION PLAN  
UPDATE: 2017-2021**

Mr. Owens stated that the handout for the meeting included the text for draft Chapter V, followed by the tables and maps associated with the Chapter. Mr. Owens said material in the draft Chapter that is either new or revised has been highlighted yellow. This was done to assist in the review of the Chapter. He noted that the highlighting will be removed prior to publication of the final report.

[Secretary’s Note: Mr. Owens’ presentation is attached hereto as Exhibit A.]

Mr. Owens explained that Chapter V presents and evaluates alternative mitigation approaches for each hazard. There is also a review of current Federal, State, and local programs that deal with each hazard. The alternative measures for each hazard are then whittled down to recommended priority mitigation measures. Mr. Owens indicated that he would not go through each hazard in detail but he would briefly go through analysis of strategies for each hazard and point out the significant additions and changes from the previous edition of the report.

Mr. Owens presented a new element related to wetland restoration that was added to the flood mitigation strategies in Chapter V. This element recommended the consideration of restoring wetlands on agricultural land that is within the FEMA one-percent-annual-probability floodplain and is also considered by the Wisconsin Department of Natural Resources (WDNR) to be potentially restorable wetlands (PRW). Mr. Owens indicated that these areas were shown on Map V-3 and totaled approximately 6,800 acres throughout the County. Mr. Owens indicated that this measure was aimed primarily at reducing crop losses due to flooding, which have totaled over \$38.5 million dollars in the County since 1950. He also noted that restoration of wetland functions to these lands may also help to reduce flood flows and thus potentially reduce structure flooding in downstream areas. He stressed that this alternative should be implemented as a voluntary program, considered at the discretion of individual property owners. Mr. Boxhorn asked how much full implementation of the mitigation measure would reduce crop losses. Mr. Owens indicated that if all of the agricultural land shown on Map V-3 were taken out of production, crop losses may be reduced by over 60 percent based on reported losses. Mr. Owens stressed that it is not expected that all areas shown

on Map V-3 would be restored to wetlands. The alternative simply recommends that when opportunities present themselves on a particular tract of land, wetland restoration should be considered.

Regarding the mitigation measures presented in Chapter V related to flooding in the Root River watershed, Mr. Owens pointed out a new measure added for this update related to the Horlick dam in the City of Racine. He explained that in 2014 the WDNR had determined through a consultant's hydraulic analysis of the dam that it is unable to safely pass the peak flow during a one-percent-annual-probability flood. Thus, the WDNR has established a requirement to either increase the spillway capacity of the dam to safely pass the peak flow of a 100-year flood, or remove the dam altogether. The WDNR placed a deadline of April 2024 for these required actions to be completed. Mr. Owens noted that five alternatives to meet this requirement were studied as part of the Root River watershed restoration plan completed by SEWRPC in 2014. These alternatives are included in this plan update in Table V-4. Mr. Owens noted that the dam is owned by Racine County and asked Ms. Anderson if she was aware of further planning that the County has conducted regarding the dam. Ms. Anderson responded that the Root River Council held a public informational meeting in December 2016 relating to the dam alternatives. She indicated that environmental groups have supported the full removal of the dam. She explained that the County is continuing to evaluate all options and that no final decision has been made as to the direction the County will take to meet the WDNR requirement for the dam. Ms. Anderson further indicated that WisDOT is also watching the situation closely, as they need to rebuild the STH 38 bridge that transects the Root River just downstream of the Horlick dam. The decision related to the Horlick dam's future could impact the design and construction of the new STH 38 bridge.

Mr. Owens highlighted new or revised segments of the floodland management plan elements for the Fox, Pike, and Des Plaines watersheds. No questions or comments regarding those sections were offered from the members of the LPT.

Related to the public education activities of the flood mitigation section, Mr. Owens noted the new discussion that was added to explain a variety of methods that are used to warn people in Racine County of emergency situations. He indicated that three emerging warning methods are described in detail in this section (including CodeRed Emergency and Weather Notification System, the Wireless Emergency Alerts system, and the Ready Badger app). He further indicated that these warning methods are referenced for many of the hazards throughout Chapter V. Mr. Owens explained that the Ready Badger app was developed by computer science students from the University of Wisconsin-Parkside with the guidance emergency managers throughout southeastern Wisconsin. He noted that one of the main assets of this app was the ability of the public to report damages caused by hazards to the proper authorities. Mr. Owens asked if anyone from the LPT had an update as to the status of the Ready Badger app's production. Mr. Twardosz explained that the app is currently available to download for free and should be fully operational shortly.

Mr. Owens highlighted new and revised segments of the hazard mitigation strategies sections in Chapter V for thunderstorms, tornadoes, and extreme temperatures. There were no questions or comments regarding these sections.

Mr. Owens noted that there has been severe bluff erosion in Racine County in the past year, particularly in the Villages of Mount Pleasant and Caledonia. Due to these recent events, there were several segments of the Lake Michigan coastal hazards section of Chapter V that contained additional discussion. Mr. Owens said that text was added regarding a request made by the Village of Mount Pleasant to the U.S. Army Corp of Engineers (USACE) to study whether there is a viable project that fits their Section 14 authority to help the Village with a long-term solution to slow or stop the bluff erosion. Mr. Degroot asked where the USACE was in their process. Ms. Anderson responded that the USACE was still studying whether they would be able to help and indicated that if they are able to help it would be a long term project. She also noted that there is uncertainty currently if there will be Federal funding for programs that fund such projects.

Mr. Owens pointed out several alternative mitigation measures that were added to the Lake Michigan coastal erosion section. These alternatives included updating of a study that estimates bluff erosion rates, consideration of acquisitions and demolitions of structures where bluff erosion had progressed to the point where the risk of failure

of the slope was imminent within five years, and an update to a 2005 SEWRPC study that evaluated the condition and effectiveness of shoreline protection along the coast of the entire County. Mr. Owens also noted that projects to acquire and demolish homes at risk due to bluff failure would be potentially eligible for funding through the Hazard Mitigation Grant Program and the Pre-Disaster Mitigation Program. There were no further questions or comments regarding Lake Michigan coastal hazards.

Mr. Owens highlighted new and revised segments of the hazard mitigation strategies sections in Chapter V for winter storm events, drought events, transportation accidents, and contamination or loss of water supply. There were no questions or comments regarding these sections.

Mr. Owens pointed out several new alternative mitigation strategies that were added for hazardous materials incidents. Ms. Anderson raised some concern with the alternative measure related to adding safety gate systems at all at-grade crossings along routes that transport crude oil. She explained that the railroad companies control the installation of all safety gates at rail crossings, and it is often difficult to persuade them to take action. She added that the County and municipalities can make requests of the railroad companies, but in the end they don't have the authority to mandate them to install the safety gates. Mr. Maack suggested that the wording of the alternative could be revised to make it clear that the railroad companies are the responsible party for installation of safety gates.

[Secretary's Note: The third and fourth bullet point under "Structural" on page 97 of Chapter V were revised to read (text in bold is included here, and in similar subsequent Secretary's Notes, to indicate language changed or added onto the text. Text will not be bold in the report):

**"Urge the railroad companies that own the tracks that traverse Racine County to consider adding safety gate systems at all at-grade railroad crossings along routes that transport crude oil;**

**Urge the railroad companies that own the tracks that traverse Racine County to consider adding railroad gate systems at all at-grade crossings that do not currently have them installed."**]

Mr. Maack indicated that the Racine County hazardous materials plan was updated in 2017 and this date should be reflected in the text regarding local programs for hazardous materials incidents.

[Secretary's Note: The first sentence of the third paragraph on page 100 was revised to read:

**"The Racine County Office of Emergency Management and the LEPC have developed a countywide hazardous materials plan which was updated in March 2017."**]

Mr. Owens highlighted new and revised segments of the hazard mitigation strategies sections in Chapter V for public health emergencies, terrorism incidents, and long-term power outages. There were no questions or comments regarding these sections.

Mr. Owens indicated that the LPT decided to add two new hazards to be profiled in this update to the plan: cyber-attack on local government and active shooter incidents. He reviewed the main alternative mitigation strategies for both hazards; reviewed the current programs at the Federal, State, and local governments that aim to mitigate damages from these hazards; and reviewed the priority mitigation measures for both hazards. There were no comments or questions regarding the mitigation strategies of these new hazards.

Mr. Owens reviewed the summary section of Chapter V. He explained that the section includes discussion of the ranking of prioritization of hazards. He noted the ranking of hazards was conducted both in terms of property and crop damages, and death and injury instances. He also indicated that the section discusses the costs and benefits of

mitigation measures, which are summarized in Table V-9. He noted that costs were only able to be developed for certain mitigation measures.

There were no further questions or comments from the Planning Team regarding Chapter V “Hazard Mitigation Strategies.” Mr. Maack’s motion to approve Chapter V was seconded by Mr. Serketich. The Chapter was approved unanimously by the Local Planning Team pursuant to changes and additions that were discussed during the meeting.

Subsequent to the April 26, 2017 Local Planning Team (LPT) meeting, Mr. Owens received an email correspondence from Silviano Garcia. The email indicated that Mr. Gracia and Ms. Jennifer Loizzo, from the Central Racine County Health Department (also members of the LPT) had reviewed the hazard mitigation plan component for public health emergencies in Chapter V. Mr. Garcia indicated that their revisions and additions to the section were attached to the email. The section on public health emergencies in Chapter V was revised, as appropriate, to reflect the Central Racine County Health Department review.

**CONSIDERATION OF CHAPTER VI, “PLAN ADOPTION, IMPLEMENTATION, MAINTENANCE, AND REVISION,” OF SEWRPC COMMUNITY ASSISTANCE PLANNING REPORT NO. 266 (3RD EDITION), RACINE COUNTY HAZARD MITIGATION PLAN UPDATE: 2017-2021**

Mr. Owens explained that the process for refining the plan, reviewing of the plan, and adoption of the plan update are included at the beginning of Chapter VI. Plan implementation strategies are summarized in Table VI-1, which provides, for each mitigation measure, the status of implementation, implementation priority, a general timetable, the suggested agency to manage the implementation of the measure, and potential funding programs. Mr. Owens also pointed out that the text in the Chapter provided descriptions of some of the main hazard mitigation funding sources and programs. He added that a comprehensive list and description of potential funding programs can be found in Appendix J and contact information for these programs are presented in Appendix K. He noted that these funding programs are constantly changing, especially with changing Federal administrations. Appendix J represents the most current programs that were available in March 2017.

There were no questions or comments from the Planning Team regarding Chapter VI “Plan Adoption, Implementation, Maintenance, and Revision.” Ms. Anderson’s motion to approve Chapter VI was seconded by Mr. Maack with no opposition. The Chapter was approved by the Local Planning Team.

**REMAINING WORK TO BE COMPLETED FOR THE PLAN UPDATE**

Mr. Owens indicated that there would be a public meeting held following the Local Planning Team meeting to present the preliminary draft of the plan update to the public and to get public input on the draft report. He explained that following the public meeting, comments and edits from both the LPT meeting and the public meeting will be incorporated into the draft chapters. He also indicated that several appendices also needed to be completed or refined. He reminded the LPT that all meeting materials including presentations, summary notes for all of the LPT meetings, and draft chapters are available for download on the SEWRPC website. Finally, he noted that there is also a comments page available on the website and also provided his email for additional comments or revisions that might come up. He asked the LPT to have any additional revisions or comments to him by May 8, 2017.

Mr. Owens explained that after all edits were incorporated from the LPT and public meetings, the plan would be sent to Wisconsin Emergency Management (WEM) for review. He indicated that the draft plan update would be revised based on the WEM review. The revised draft plan update would then be sent to FEMA for their final review. Pursuant to their review, FEMA will give a finding that the plan is approvable upon adoption by Racine County and the incorporated local municipalities. Mr. Owens noted that the towns are covered by the County’s adoption, but that they have adopted on their own in the past as well. He further explained that there is no eligibility for funding



through the Hazard Mitigation Grant Program (HGMP), the Pre-Disaster Mitigation Program (PDM), or the Flood Mitigation Program unless the plan is adopted by the County and incorporated municipalities.

Mr. Owens once again thanked the LPT members for their contributions of time and knowledge to the planning process. He specifically thanked David Maack and Julie Anderson from Racine County for their direction and assistance. He further thanked staff from SEWRPC for their assistance in developing the plan update including Joe Boxhorn, Laura Herrick, Karin Hollister, Tim Gorsegner, and Megan Beauchaine.

**COMMENTSONDRAFTPLANFROMMS.BARBARAMCNULTY,TREASURER,VILLAGE OF ELMWOOD PARK, AND MS. CONNIE MELLEM, MUNICIPAL CLERK, VILLAGE OF NORTH BAY FOLLOWING THE APRIL 26, 2016 MEETING OF THE LOCAL PLANNING TEAM**

Following the meeting, Mr. Maack sent an email to the municipalities that had not yet participated in the updating process for the Racine County hazard mitigation plan. The email explained that it was a required by FEMA that incorporated municipalities participate in the hazard mitigation planning process if they would like to remain eligible for hazard mitigation funding. Mr. Maack's email stated that the best way for these communities to participate at this point in the planning process is to review that draft plan and forward any comments or revisions to Mr. Owens for inclusion into the draft plan update. The email was sent to the Villages of Elmwood Park and North Bay.

Ms. Barbara McNulty, the Village Clerk/Treasurer for the Village of Elmwood Park responded to Mr. Maack's email and indicated that she had reviewed the draft plan update. Ms. McNulty attached revisions for the draft plan to her email.

[Secretary's Note: The email correspondence between Mr. Maack, Ms. McNulty, and Mr. Owens is attached hereto as Exhibit B. The email correspondence contained an attachment with photocopies of the pages with revisions pertaining to the Village of Elmwood Park. All revisions that were provided by Ms. McNulty were incorporated into the draft plan.]

Ms. Connie Mellem, the Municipal Clerk for the Village of North Bay responded to Mr. Maack's email and indicated that she had reviewed the draft plan update. Ms. Mellem's email included revisions for the draft plan.

[Secretary's Note: The email correspondence between Ms. Mellem and Mr. Owens is attached hereto as Exhibit C. All revisions that were provided by Ms. Mellem were incorporated into the draft plan.]

**ADJOURNMENT**

There being no further business, the meeting was adjourned by unanimous consent at 4:56 p.m.

CAPR-266-3 SUMMARY NOTES RACINE CTY HMP LPT MTG APRIL 26, 2017 (00237210).DOC  
500-1113  
LLH/AWO  
5/1/2017, 5/18/17

Exhibit A

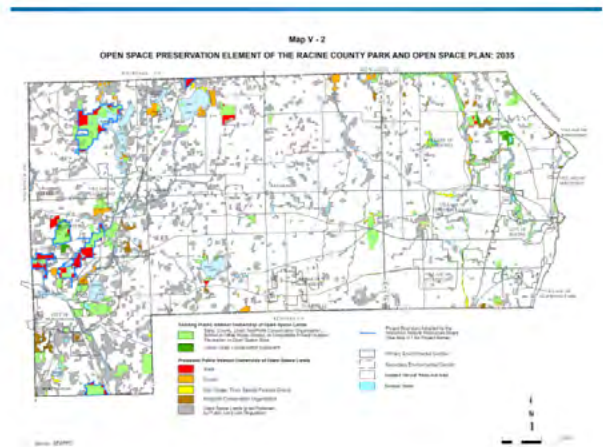
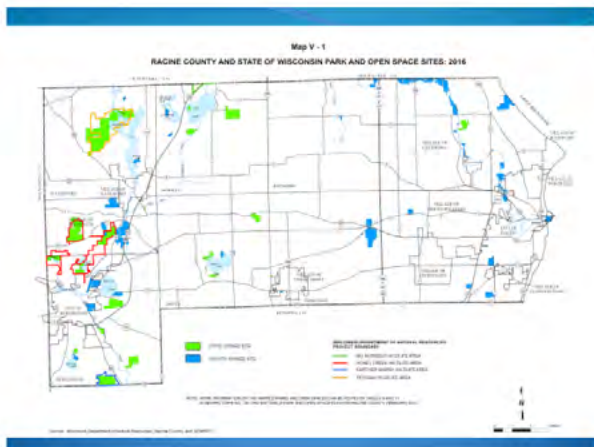


### Chapter V Overview

- Presents and evaluates alternative approaches to mitigating each hazard
- Identifies and recommends priority mitigation measures for each hazard
- Flooding section is organized by watershed
- Sections for all hazards other than flooding follow a standard format
- Summary section looks at costs and benefits and prioritizes hazards

### Hazard Sections

- Most profiles follow a similar format
  - Identification of alternative mitigation strategies
    - Nonstructural, structural, public information and education
  - Review of current programs
    - Federal, State, and Local
  - Evaluation of alternatives and identification of mitigation actions
  - Multijurisdictional considerations
  - Priority mitigation measures





## Average Annual Damages

**Table G-2**  
**PRIORITY RANKING OF NATURAL AND OTHER HAZARDS AFFECTING RACINE COUNTY BASED UPON PROPERTY AND CROP DAMAGE**

Hazard	Estimated Annual Damages	Priority Ranking	Number of Properties at Risk	Estimated Annual Damages	Priority Ranking	Number of Properties at Risk
1. Floodplain	\$1,000,000	1	100,000	\$1,000,000	1	100,000
2. Wind	\$500,000	2	50,000	\$500,000	2	50,000
3. Tornado	\$200,000	3	20,000	\$200,000	3	20,000
4. Thunderstorm High Winds	\$100,000	4	10,000	\$100,000	4	10,000
5. Drought	\$50,000	5	5,000	\$50,000	5	5,000
6. Agricultural Insect/Plant Disease	\$20,000	6	2,000	\$20,000	6	2,000
7. Tornado	\$10,000	7	1,000	\$10,000	7	1,000
8. Other Hazards	\$5,000	8	500	\$5,000	8	500
9. Land Management/Control Erosion	\$2,000	9	200	\$2,000	9	200
10. Contamination in Lake Michigan Basin	\$1,000	10	100	\$1,000	10	100
11. Power Outage/Blackout	\$500	11	50	\$500	11	50
12. Chemical Spill/Leak	\$200	12	20	\$200	12	20
13. Severe Winter	\$100	13	10	\$100	13	10
14. Air Quality/Smog	\$50	14	5	\$50	14	5
15. Public Health/Contamination	\$25	15	2	\$25	15	2

**Notes:** The above table is based on the best available data for the Racine County area. The data is based on the best available data for the Racine County area. The data is based on the best available data for the Racine County area. The data is based on the best available data for the Racine County area.

**Table V-8**  
**COST-BENEFIT ANALYSIS SUMMARY OF MEASURES INCLUDED IN THE RACINE COUNTY ALL-HAZARDS MITIGATION PLAN**

Measure	Estimated Annual Damages	Priority Ranking	Number of Properties at Risk	Estimated Annual Damages	Priority Ranking	Number of Properties at Risk
1. Floodplain	\$1,000,000	1	100,000	\$1,000,000	1	100,000
2. Wind	\$500,000	2	50,000	\$500,000	2	50,000
3. Tornado	\$200,000	3	20,000	\$200,000	3	20,000
4. Thunderstorm High Winds	\$100,000	4	10,000	\$100,000	4	10,000
5. Drought	\$50,000	5	5,000	\$50,000	5	5,000
6. Agricultural Insect/Plant Disease	\$20,000	6	2,000	\$20,000	6	2,000
7. Tornado	\$10,000	7	1,000	\$10,000	7	1,000
8. Other Hazards	\$5,000	8	500	\$5,000	8	500
9. Land Management/Control Erosion	\$2,000	9	200	\$2,000	9	200
10. Contamination in Lake Michigan Basin	\$1,000	10	100	\$1,000	10	100
11. Power Outage/Blackout	\$500	11	50	\$500	11	50
12. Chemical Spill/Leak	\$200	12	20	\$200	12	20
13. Severe Winter	\$100	13	10	\$100	13	10
14. Air Quality/Smog	\$50	14	5	\$50	14	5
15. Public Health/Contamination	\$25	15	2	\$25	15	2

## Chapter VI Overview

### Plan Adoption, Implementation, Maintenance, and Revision

- Plan refinement, review, and adoption
- Plan implementation strategies
- Funding sources
- Plan monitoring and reevaluation strategies
  - Annual review
  - Post-disaster review

**Table V-1**  
**RACINE COUNTY ALL-HAZARDS MITIGATION PLAN SUMMARY AND IMPLEMENTATION STRATEGIES**

Measure	Estimated Annual Damages	Priority Ranking	Number of Properties at Risk	Estimated Annual Damages	Priority Ranking	Number of Properties at Risk
1. Floodplain	\$1,000,000	1	100,000	\$1,000,000	1	100,000
2. Wind	\$500,000	2	50,000	\$500,000	2	50,000
3. Tornado	\$200,000	3	20,000	\$200,000	3	20,000
4. Thunderstorm High Winds	\$100,000	4	10,000	\$100,000	4	10,000
5. Drought	\$50,000	5	5,000	\$50,000	5	5,000
6. Agricultural Insect/Plant Disease	\$20,000	6	2,000	\$20,000	6	2,000
7. Tornado	\$10,000	7	1,000	\$10,000	7	1,000
8. Other Hazards	\$5,000	8	500	\$5,000	8	500
9. Land Management/Control Erosion	\$2,000	9	200	\$2,000	9	200
10. Contamination in Lake Michigan Basin	\$1,000	10	100	\$1,000	10	100
11. Power Outage/Blackout	\$500	11	50	\$500	11	50
12. Chemical Spill/Leak	\$200	12	20	\$200	12	20
13. Severe Winter	\$100	13	10	\$100	13	10
14. Air Quality/Smog	\$50	14	5	\$50	14	5
15. Public Health/Contamination	\$25	15	2	\$25	15	2

SEWRPC Community Assistance Planning Report No. 266-ED  
**RACINE COUNTY HAZARD MITIGATION PLAN UPDATE, 2016-2020**

**Appendix J**  
**POTENTIAL FUNDING PROGRAMS TO IMPLEMENT PLAN RECOMMENDATIONS**

**FUNDING PROGRAM DESCRIPTIONS**

Program Name	Agency/Source	Eligible	Priority	Notes
1. Floodplain	Floodplain Management Agency (FEMA)	Yes	High	Priority funding for floodplain management projects.
2. Wind	State of Wisconsin	Yes	Medium	Funding for wind mitigation projects.
3. Tornado	State of Wisconsin	Yes	Medium	Funding for tornado mitigation projects.
4. Thunderstorm High Winds	State of Wisconsin	Yes	Medium	Funding for thunderstorm high wind mitigation projects.
5. Drought	State of Wisconsin	Yes	Medium	Funding for drought mitigation projects.
6. Agricultural Insect/Plant Disease	State of Wisconsin	Yes	Medium	Funding for agricultural insect/plant disease mitigation projects.
7. Tornado	State of Wisconsin	Yes	Medium	Funding for tornado mitigation projects.
8. Other Hazards	State of Wisconsin	Yes	Medium	Funding for other hazard mitigation projects.
9. Land Management/Control Erosion	State of Wisconsin	Yes	Medium	Funding for land management/control erosion mitigation projects.
10. Contamination in Lake Michigan Basin	State of Wisconsin	Yes	Medium	Funding for contamination in Lake Michigan Basin mitigation projects.
11. Power Outage/Blackout	State of Wisconsin	Yes	Medium	Funding for power outage/blackout mitigation projects.
12. Chemical Spill/Leak	State of Wisconsin	Yes	Medium	Funding for chemical spill/leak mitigation projects.
13. Severe Winter	State of Wisconsin	Yes	Medium	Funding for severe winter mitigation projects.
14. Air Quality/Smog	State of Wisconsin	Yes	Medium	Funding for air quality/smog mitigation projects.
15. Public Health/Contamination	State of Wisconsin	Yes	Medium	Funding for public health/contamination mitigation projects.

**RACINE COUNTY HAZARD MITIGATION PLAN UPDATE, 2016-2020**

**Appendix K**  
**FUNDING PROGRAMS CONTACT INFORMATION**

Agency/Source	Program Name	Address	Phone Number	Website/Email
FEMA	Floodplain Management Agency (FEMA)	Federal Emergency Management Agency Region 7 200 South Clark Street, 10th Floor Chicago, IL 60606	(773) 436-3000	<a href="http://www.fema.gov">www.fema.gov</a>
WIS	State of Wisconsin	Wisconsin Department of Transportation 1200 Lincoln Drive Madison, WI 53707	(608) 649-2400	<a href="http://www.wisconsin.gov">www.wisconsin.gov</a>
USACE	Small Flood Damage Reduction Program (SFDROP)	U.S. Army Corps of Engineers 221 E. Linn St., Suite 1320 Chicago, IL 60604	(773) 248-6300	<a href="http://www.usace.army.mil">www.usace.army.mil</a>
USACE	Emergency Bank Protection Program (EBPP)	U.S. Army Corps of Engineers 477 Morgan Avenue, Room 617 Detroit, MI 48226	(313) 224-7900	<a href="http://www.usace.army.mil">www.usace.army.mil</a>
USDA	Flood Mitigation Assessment Grant Program (FMAGP)	Department of Agriculture Natural Resources Conservation Service 1400 Independence Avenue SW Washington, DC 20250	(202) 720-3413	<a href="http://www.nrcs.usda.gov">www.nrcs.usda.gov</a>
USDA	State and Tribal Coastal Storm Protection Program (STCSP)	U.S. Department of Agriculture Rural Water Service Water and Environmental Programs Room 4400-G, Stop 1546 1402 Independence Avenue SW Washington, DC 20250	(202) 696-2870	<a href="http://www.nrcs.usda.gov">www.nrcs.usda.gov</a>

## Remaining Effort on Plan Update

- Public Meeting
- Review by the Wisconsin Division of Emergency Management
  - Any necessary revisions
- Review by the Federal Emergency Management Agency
  - Any necessary revisions
- Formal adoption by the Racine County Board
  - Covers the Towns
- Formal adoption by the governing bodies of the incorporated municipalities of the County

## Project Web Site

- <http://www.sewrpc.org/HMP>
- Agendas and other meeting materials
- Draft chapters as they are completed
- Comment screen
- Summary notes from meetings
- Other ways to send a comment
- Presentations

Also Can Email Comments to [aowens@sewrpc.org](mailto:aowens@sewrpc.org)

Please Send Comments By May 8, 2017

## Exhibit B

### Owens, Aaron W.

---

**From:** Village Treasurer <Treasurer@vil.ep.wi.us>  
**Sent:** Thursday, May 11, 2017 10:49 AM  
**To:** Owens, Aaron W.  
**Cc:** Kathy Wells  
**Subject:** Re: Hazard Mitigation Plan Review  
**Attachments:** Changes Hazard Mitigation.pdf

Good Morning Aaron,

I have attached copies of the pages that require changes for the Village of Elmwood Park. Please call with any questions.

Thank you for your assistance.

Barbara McNulty  
Treasurer  
Village of Elmwood Park  
(262)498-9789 (Cell)

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**From:** Owens, Aaron W. <AOWENS@SEWRPC.org>  
**Sent:** Friday, May 5, 2017 9:59 AM  
**To:** Village Treasurer  
**Cc:** 'Maack, David'; Kathy Wells  
**Subject:** RE: Hazard Mitigation Plan Review

Hello Barbara,

We are hoping to have the draft plan update to Wisconsin Emergency Management (WEM) by May 12. For the Village of Elmwood Park to remain eligible to be covered by the County's plan, and thus eligible for hazard mitigation funding, we simply need someone from the Village to review the draft plan located in the link that David Maack provided in the email below. In the interest of time for you, I would recommend starting by reviewing of the tables from each chapter. Most of the important info discussed in the text is also presented in the tables. Tables are located at the back of each chapter of the plan.

Your example of the new fire and EMS contract status with the Village of Mt. Pleasant is exactly the types of revisions that we have been seeking from communities. Please make a list of any necessary revisions or comments, with the page number that they appear in in the preliminary draft plan (or if it is easier, make a copy of the page with your revisions written on the page). I think the easiest method at this point would be to email the list of your revisions (or scanned pages with revisions written on them) to me. We will then make any necessary revisions to the draft plan before we send it off to WEM for review.

This will allow the Village to remain eligible under the plan update, assuming the Village also adopts the plan after it is approved by FEMA (likely towards the end of summer).

Feel free to give me a call if you have any questions.

#### *Aaron Owens*

Planner  
Southeastern Wisconsin Regional Planning Commission  
P.O. Box 1607  
W239 N1812 Rockwood Drive  
Waukesha, WI 53187-1607  
Phone: (262) 953-4293  
Fax: (262) 547-1103  
E-mail: [aowens@sewrpc.org](mailto:aowens@sewrpc.org)  
Web site: [www.sewrpc.org](http://www.sewrpc.org)

**From:** Maack, David [mailto:David.Maack@racinecounty.com]  
**Sent:** Friday, May 05, 2017 8:21 AM  
**To:** Village Treasurer <Treasurer@vil.ep.wi.us>  
**Cc:** RS Kathy Wells Vil of Elmwood Prk <Kathy.Wells@vil.ep.wi.us>; Owens, Aaron W. <AOWENS@SEWRPC.org>  
**Subject:** RE: Hazard Mitigation Plan Review

We had our last meeting last week. I am cc'ing Aaron from SEWRPC. He can work with you on any changes affecting the Village.

David L. Maack, CEM, CPM, WCEM I Coordinator  
Racine County Office of Emergency Management  
Office: 262.636.3515 | Fax: 262.636.3505  
E-mail: [david.maack@racinecounty.com](mailto:david.maack@racinecounty.com)  
Website: [www.racinecounty.com/government/ready-racine-county](http://www.racinecounty.com/government/ready-racine-county)  
Facebook: [www.facebook.com/readyracineco](http://www.facebook.com/readyracineco)  
"Building a Disaster Resistant Community-Making Disaster Resistance a Way of Life"

**From:** Village Treasurer [mailto:Treasurer@vil.ep.wi.us]  
**Sent:** Thursday, May 04, 2017 5:47 PM  
**To:** Maack, David <David.Maack@racinecounty.com>  
**Cc:** RS Kathy Wells Vil of Elmwood Prk <Kathy.Wells@vil.ep.wi.us>  
**Subject:** Re: Hazard Mitigation Plan Review

David,

I am the new clerk/treasurer for the Village of Elmwood Park. I would like to know if you have a schedule for meeting on the Hazard Mitigation Plan. There are updated names and service providers for the Village since the Plan update was completed. For instance, the village now has contracted with the Village of Mount Pleasant for fire and emergency services.

Please let me what we need to do to be more pro-active in the mitigation plan.

Sincerely,

Barbara McNulty  
Treasurer  
Village of Elmwood Park  
(262)498-9789 (Cell)

---

**From:** Maack, David <[David.Maack@racinecounty.com](mailto:David.Maack@racinecounty.com)>

**Sent:** Wednesday, May 3, 2017 2:27 PM

**To:** Kathy Wells; Village Treasurer

**Subject:** Hazard Mitigation Plan Review

Over the past year and a half, we have been reviewing and updating the Racine County Hazard Mitigation Plan. It is imperative, if municipalities would desire to be eligible for Hazard Mitigation Funds, that they participate in this planning process. To date, we have not had representation from the Village of Elmwood Park. If you would like to maintain eligibility for future funds, you must do two things:

1. Review and comment on the plan
2. Adopt the plan

You may review and comment by clicking on the following link:

<http://www.sewrpc.org/HMP>

**Scroll down to the heading titled "Preliminary Draft Chapters" under the "Racine County Hazard Mitigation Plan Update" section.**

**The preliminary draft of the report is titled "CAPR-266—Racine County Hazard Mitigation Plan Update: 2017-2021 (PRELIMINARY DRAFT)"**

Please let me know if you have any questions. Thank you for your consideration.

David L. Maack, CEM, CPM, WCEM | Coordinator  
Racine County Office of Emergency Management  
Office: 262.636.3515 | Fax: 262.636.3505  
E-mail: [david.maack@racinecounty.com](mailto:david.maack@racinecounty.com)  
Website: [www.racinecounty.com/government/ready-racine-county](http://www.racinecounty.com/government/ready-racine-county)  
Facebook: [www.facebook.com/readyracineco](https://www.facebook.com/readyracineco)  
"Building a Disaster Resistant Community-Making Disaster Resistance a Way of Life"



Table I-3

OUTREACH ACTIVITIES BY LOCAL COMMUNITIES IN RACINE COUNTY RELATED TO HAZARD MITIGATION: 2009-2014

Community	Activity
Racine County	<p>County Website                      Office of Emergency Management webpages                      Ready Racine County Facebook page                      Ready Racine quarterly newsletter                      Contract with Root-Pike WIN for stormwater education and outreach</p>
City of Burlington	<p>Quarterly newsletter                      City website                      Email and text message information notices                      City Facebook page                      City Twitter account                      City Fire Department Facebook page                      City Police Department Facebook page                      Contract with Central Racine County Health Department for public health services and outreach</p>
City of Racine	<p>City website                      Email newsletter                      City Twitter account                      City Police Department Twitter account                      Health Department Facebook and Twitter page                      Contract with Nixle to send out geographically specific emergency alerts to wireless devices                      Contract with Root-Pike WIN for stormwater education and outreach</p>
Village of Caledonia	<p>Village website                      Village Police Department Facebook page                      Village Fire Department Facebook page                      Village Fire Department open house                      Village Fire Department yearly fire safety school program                      Village Police and Fire Department Safety Day                      Contract with Root-Pike WIN for stormwater education and outreach                      Contract with Central Racine County Health Department for public health services and outreach</p>
Village of Elmwood Park	<p>Village website                      Village Facebook page                      Village Twitter account <i>delete Add email information notices</i></p>
Village of Mount Pleasant	<p>Village website                      Village Facebook page                      Village Twitter account                      Village Police Department Facebook page                      Contract with Root-Pike WIN for stormwater education and outreach                      Contract with Central Racine County Health Department for public health services and outreach</p>
Village of North Bay	<p>Village website                      Contract with Central Racine County Health Department for public health services and outreach</p>
Village of Rochester	<p>Quarterly newsletter                      Compiling list of special needs residents who would need special assistance in the event of a disaster                      Visits by public works staff to homes at risk of flooding in the event of upstream dam failure to inform and advise residents                      Email and text message information notices                      Village Facebook page                      Contract with Central Racine County Health Department for public health services and outreach</p>
Village of Sturtevant	<p>Quarterly newsletter                      Village website                      Village Police Department Facebook page                      Contract with Root-Pike WIN for stormwater education and outreach                      Contract with Central Racine County Health Department for public health services and outreach</p>

Table II-14

WORKING STATUS OF FIRE DEPARTMENTS, EMERGENCY MEDICAL SERVICE PROVIDERS, AND LAW ENFORCEMENT DEPARTMENTS SERVING RACINE COUNTY: 2015

Fire/Rescue Department	Working Status of Fire Suppression Department	Emergency Medical Service Arrangement	Working Status of Law Enforcement Department
City of Burlington	Full-time and part-time volunteers (City Fire Department <sup>a</sup> )	Volunteer (Burlington Rescue Squad, Inc. <sup>b</sup> )	Full-time (City Police Department)
City of Racine	Full-time (City Fire Department <sup>a</sup> )	Full-time (City Fire Department <sup>a</sup> )	Full-time (City Police Department)
Village of Caledonia	Full-time (Village Fire Department <sup>a</sup> )	Full-time (Village Fire Department)	Full-time (Village Police Department)
Village of Elmwood Park	Contract with City of Racine <i>South Shore</i>	Contract with City of Racine <i>South Shore</i>	Contract with County Sheriff Department with local constable
Village of Mt. Pleasant	Full-time (South Shore Fire Department <sup>a</sup> )	Full-time (South Shore Fire Department <sup>a</sup> )	Full-time (Village Police Department)
Village of North Bay	Contract with City of Racine <sup>b</sup>	Contract with City of Racine <sup>b</sup>	Contract with Village of Wind Point Police, Village also has a local constable
Village of Rochester	Volunteer (Rochester Volunteer Fire and Rescue Company, Inc. <sup>c, 1</sup> )	Volunteer (Rochester Volunteer Fire and Rescue Company, Inc. <sup>c</sup> )	Contract with County Sheriff Department
Village of Sturtevant	Full-time and part-time (South Shore Fire Department <sup>a</sup> )	Full-time and part-time (South Shore Fire Department <sup>a</sup> )	Full-time (Village Police Department)
Village of Union Grove	Volunteer (Union Grove-Yorkville Fire and Rescue Department <sup>a, d</sup> )	Volunteer (Union Grove-Yorkville Fire and Rescue Department <sup>a, d</sup> )	Contract with County Sheriff Department
Village of Waterford	Full-time command staff and volunteers (Village of Waterford Fire and Rescue Department <sup>a</sup> )	Full-time command staff and volunteers (Village of Waterford Fire and Rescue Department <sup>a</sup> )	Contract with County Sheriff Department <sup>d</sup>
Village of Wind Point	Contract with City of Racine <sup>b</sup>	Contract with City of Racine <sup>b</sup>	Part-time (Village Police Department)
Town of Burlington	Volunteer (Town Fire Department <sup>a</sup> )	Volunteer (Burlington Rescue Squad, Inc. <sup>c</sup> )	Full-time (Town Police Department), <b>Town Water Patrol</b>
Town of Dover	Volunteer (Kansasville Fire and Rescue <sup>a</sup> )	Volunteer (Kansasville Fire and Rescue <sup>a</sup> ) and Full-time <sup>e</sup>	Contract with County Sheriff, Town Water Patrol
Town of Norway	Volunteer (Wind Lake Volunteer Fire Company, Inc. <sup>c</sup> )	Volunteer (Wind Lake Volunteer Fire Company, Inc. <sup>c</sup> )	Part-time (Town Police Department), <b>Town Water Patrol</b>
Town of Raymond	Volunteer (Town Fire and Rescue Department <sup>a</sup> )	Volunteer (Town Fire and Rescue Department <sup>a</sup> )	Contract with County Sheriff Department
Town of Waterford	Volunteer (contracts with Village of Waterford Fire and Rescue Department <sup>a</sup> and Tichigan Volunteer Fire Department <sup>c</sup> )	Volunteer (contracts with Village of Waterford Fire and Rescue Department <sup>a</sup> and Wind Lake Volunteer Fire Company, Inc. <sup>c</sup> )	Full-time (Town Police Department)
Town of Yorkville	Volunteer (Union Grove-Yorkville Fire and Rescue Department <sup>a</sup> )	Volunteer (Union Grove-Yorkville Fire and Rescue Department <sup>a</sup> )	County Sheriff Department with local constable

NOTES: The Union Grove-Yorkville Fire and Rescue Department and Kansasville Fire and Rescue have an automatic mutual aid agreement for structure fires. Any time a structure fire is reported in the Village of Union Grove, the Town of Dover, or the Town of Yorkville, both fire departments are automatically called to assist.

The City and Town of Burlington Fire Departments have an informal mutual aid agreement. The City of Burlington Fire Department will send a ladder truck to any structure fire in the Town of Burlington. The Town of Burlington Fire Department will send an engine truck to any structure fire or fire with trapped victims in the City of Burlington.

The Village of Rochester, Village of Waterford, and Tichigan Fire Departments maintain an automatic aid agreement. If there is a structure fire or fire alarm in any of these jurisdictions, all three Departments are automatically dispatched. If the call is in the Village of Rochester, the Town of Burlington is also dispatched.

<sup>a</sup>Public departments.

<sup>b</sup>As of January 1, 2016, the Villages of North Bay and Wind Point no longer use the Racine Fire Department for their fire and EMS service. Caledonia has taken over fire and EMS services for those two communities.

<sup>c</sup>Private, nonprofit company.

<sup>d</sup>As of January 1, 2016, the Village of Waterford no longer contracts with the Racine County Sheriff's Department for law enforcement. Law enforcement services are provided by the Town of Waterford Police Department.

<sup>e</sup>The Kansasville Fire Department provides an ambulance and has volunteer emergency medical technicians (EMTs). In addition, the Town of Dover contracts with Medix Ambulance Services, a private, for-profit company, to provide advanced certified EMTs to staff the fire department's rescue squad.

Source: Racine County Office of Emergency Management, local municipalities, and SEWRPC.



*ADD: AS of January 1, 2016 V.E.P. NO longer contracts w/ Racine F.D. for fire + ems services*

Table D-3

SELECTED GOVERNMENT ADMINISTRATION BUILDINGS: 2015

Name	Community	Address	Contact Name	Telephone Number	Fax Number
City, Village, or Town Halls					
	City of Burlington	300 N. Pine Street	Dihann Halbach	(262) 342-1171	(262) 763-3474
	Town of Burlington	32288 Bushnell Road	Adelheid Streif	(262) 763-3070	(262) 763-2118
	Village of Caledonia	6922 Nicholson Road	Kari Torkilsen	(262) 835-6415	(262) 835-2388
	Town of Dover	4110 S. Beaumont Avenue	Camille Gerou	(262) 878-2200	(262) 878-2595
Hall	Village of Elmwood Park	3131 Taylor Avenue	Tommy Ruggaber	(262) 554-7818	--
all	Village of Mt. Pleasant	8811 Campus Drive	Stephanie Kohlhagen	(262) 664-7800	(262) 664-7801
	Village of North Bay	3615 Hennepin Place	Alix Sanchez	(262) 639-2334	--
	Town of Norway	6419 Heg Park Road	Patricia Campbell	(262) 895-6335	(262) 895-6601
	City of Racine	730 Washington Avenue	Janice Johnson-Martin	(262) 636-9171	(262) 636-9548
	Town of Raymond	2255 76th Street	Linda Terry	(262) 835-4426	(262) 835-4449
	Village of Rochester	300 W. Spring Street	Betty J. Novy	(262) 534-2431	(262) 534-4084
	Village of Sturtevant	2801 89th Street	Mary Cole	(262) 886-7201	(262) 886-7205
all	Village of Union Grove	925 15th Avenue	Jill Kopp	(262) 878-1818	(262) 878-3782
	Town of Waterford	415 N. Milwaukee	Tina Mayer	(262) 534-2350	(262) 534-6606
	Village of Waterford	123 N. River Street	Carrie Orlovsky	(262) 534-3980	(262) 534-5373
	Village of Wind Point	215 E. Four Mile Road	Michael Hawes	(262) 639-3524	(262) 639-5727
	Town of Yorkville	925 15th Avenue	Michael Mckinney	(262) 878-2123	(262) 878-1680
Other Local Government Facilities					
nity Center	City of Racine	2221 Douglas Avenue	Jason Mars	(262) 636-9221	--
al Court	City of Racine	800 Center Street	--	(262) 636-9263	--
unity Center	City of Racine	601 21st Street	Lesia Hill-Driver	(262) 636-9235	--
Jr. Community Center	City of Racine	1134 Martin Luther King Jr. Drive	James Wilson	(262) 636-9237	--
	City of Racine	5 5th Street	--	(262) 636-9229	--
ity Center	City of Racine	2200 Blaine Avenue	Jeanne Brenner	(262) 636-9226	--
	City of Racine	72 7th Street	--	(262) 636-9169	--
ty Center	City of Racine	2301 12th Street	Jeanne Brenner	(262) 636-9414	--

PRELIMINARY DRAFT

Barbara McNulty

523

## Law Enforcement

Seven of the 17 municipalities in Racine County provide for law enforcement through full-time police departments. In the remaining municipalities, law enforcement is provided through a combination of part time police departments and/or contracting the services of the County Sheriff's Department to provide primary law enforcement. In addition, the Village of Waterford has a limited police presence and the Villages of Elmwood Park and North Bay and the Towns of Dover and Yorkville provide limited law enforcement through part-time town constables. The location of each local law enforcement station in Racine County is shown on Map II-21. That map also shows the location of the State of Wisconsin Department of Corrections, correctional facilities and County detention centers in the County.

no constable ←

In 2014 Racine County joined the Suburban Mutual Assistance Response Team (SMART). The agreement was made in recognition that situations may occur which are beyond the ability of a local law enforcement agency to deal with effectively in terms of personnel, equipment, and available resources. Under this system Racine County agencies have cooperative agreements with agencies in Jefferson, Milwaukee, Walworth, and Waukesha Counties that allows for mutual aid during a significant emergency or disaster. Within one hour, a community that is a member of SMART can have up to 65 law enforcement officers respond to the community to help where needed.

## Specialized Response Teams

Some fire departments and law enforcement agencies in the County participate in several specialized response teams. The Racine County Water Rescue Response Team consists of members of public safety agencies throughout Racine County. 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. The Racine County Sheriff's Office Water Patrol operates water safety patrols on Lake Michigan and inland lakes and rivers throughout the County to assist boaters with accidents, engine failures, rescue, and to provide enforcement activities. The Racine County Sheriff's Office also leads a Community Emergency Response Team (CERT) that can provide assistance to communities before, during, and after disasters. The Racine County Sheriff's Office and the City of Racine Police Department each have their own Special Weapons and Tactics (SWAT) and crisis negotiators teams. The SWAT teams are comprised of personnel specially trained in serving high risk search warrants, fugitive apprehension, and resolving barricaded subject and hostage situations. Both SWAT teams are also equipped with an armored personnel carrier. In addition, the Racine Police Department operates a Crowd Control Team.

The City of Racine Fire Department is one of five representatives of the Southeast Wisconsin Hazardous Materials Task Force. The department is a Type II Hazardous Materials Response Team and operates a fully

## Exhibit C

**Owens, Aaron W.**

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**From:** Vnb Clerk <vnbclerk@gmail.com>  
**Sent:** Wednesday, May 17, 2017 3:06 PM  
**To:** Owens, Aaron W.  
**Subject:** Re: Racine County Hazard Mitigation Plan

Mr. Owens:

Thank you for responding so quickly.

I do have a further question. Since you will be updating Table II-4 on Page 61, will doing that change the "Notes" on Map II-19, Page 85 and Map II-20, Page 86?

I will try to locate information regarding the bluff stabilization before Friday.

Thank you for the information regarding FEMA updates.

**Connie Mellem**  
Municipal Clerk  
Village of North Bay  
3615 Hennepin Place  
Racine, WI 53402  
262-639-2334  
Website: <https://northbay-wi.us>

On Wed, May 17, 2017 at 2:20 PM, Owens, Aaron W. <[AOWENS@sewrpc.org](mailto:AOWENS@sewrpc.org)> wrote:

Ms. Mellum,

Thank you for your review and comments!

I will revise the draft plan to reflect your edits where appropriate. Also, I have included some short answers to some of your questions (see red text below).

After the plan is reviewed by FEMA and deemed "approvable upon adoption" the Village will be contacted to pursue adoption from the Village Board.

Keep in mind the plan will need updating again in 5 years. It would be great to have you or another representative from the Village on our Local Planning Team at that time.

Thanks again and let me know if you have any other questions.

*Aaron OWENS*, Planner

Southeastern Wisconsin Regional Planning Commission  
P.O. Box 1607

W239 N1812 Rockwood Drive

Waukesha, WI 53187-1607

Phone: [\(262\) 953-4293](tel:(262)953-4293)

Fax: [\(262\) 547-1103](tel:(262)547-1103)

E-mail: [aowens@sewrpc.org](mailto:aowens@sewrpc.org)

Web site: [www.sewrpc.org](http://www.sewrpc.org)

**From:** Vnb Clerk [<mailto:vnbclerk@gmail.com>]  
**Sent:** Wednesday, May 17, 2017 12:21 PM  
**To:** Owens, Aaron W. <[AOWENS@SEWRPC.org](mailto:AOWENS@SEWRPC.org)>  
**Subject:** Racine County Hazard Mitigation Plan

Good Morning Mr. Owens:

I have reviewed the draft plan that you forwarded, and I pose the following questions/information to you:

On Table I-2, Page 16, would North Bay be acknowledged under Provision of Data, now that you have a response and questions? **Yes, because you have now reviewed the draft plan and provided us data/info we will check off North Bay for the "provision of data" and "review of report" column of Table I-2.**

On Table I-3, Page 17, the Village of North Bay emails a Quarterly Newsletter to its residents, and sends email information notices. **Will add to Table I-3**

On Table II-4, Page 61, will the North Bay section be updated to show Caledonia Fire Department for Fire Suppression and Emergency Medical, or will that remain as the Footnote "b"? **Yes, the Caledonia Fire and EMS will be listed as serving the Village of North Bay. I have removed footnote b.**

On Map II-5, Page 71, it is difficult for me to determine if North Bay is in the Primary Environmental Corridor because of its small size. I do know that our ordinance considers North Bay to be in a Residential Conservation Overlay District. **There are no Primary Environmental Corridors in North Bay.**

On Map II-8, Page 74, I see that it is dated 1995. For what it is worth, I seem to recall that there were subsequent stabilization projects, including one in 1998 and another in the last five years. This map reflects a specific study that was completed in 1995. If you have any details on stabilization projects we could include note that stabilization projects have occurred in the Village.

On Map II-9, Page 75, and on Map IV-8, Page 300, I am not familiar enough with the term "protected" to determine that the designation for North Bay is correct. This map is showing data from a specific study that was completed in 2005 for the County. As one of the priority mitigation measures regarding Lake Michigan coastal hazards, we are recommending that the County has this study updated to reflect today's conditions (i.e. higher Lake levels).

On Page 175 and Table IV-23, there is note of special consideration for continual surveillance of coastal conditions. While our Board has been pro-active on this, I will be sure to note this reference to them.

On Table V-7, Page 447, communities participating in the National Flood Insurance Program are listed. It indicates that North Bay is not a participant. Note that on Table II-7, Page 64, North Bay is not required to adopt

Floodland zoning or Shoreland/Wetland Zoning, as it has no floodplain and no shoreland wetlands. Also noted on Page 141 is that flood hazard areas have not been identified for North Bay. My question then is whether North Bay needs to be a participant in order to be a part of the Hazard Mitigation plan? This is a good point. In Table V-7 I will add footnote "a" stating "There are no floodlands mapped in the Villages of Elmwood Park and North Bay" this will indicate why the Village is not a participant in the NFIP. The Village does not need to participate in the NFIP in order to be a part of the Hazard Mitigation plan.

One thing to note regarding floodplains...FEMA is in the process of delineating "V" zones, or "wave run-up" zones for coastal communities along Lake Michigan. They should have draft maps for review by the communities in late summer/fall of this year. North Bay may not be affected as much by this new FEMA mapping because of the bluffs in the area, but I wanted you to be aware of the project. If you would like to make sure you receive updates regarding this FEMA project you could contact Julie Anderson (Director of Racine Co Dept of Public Works and Development Services). She would be able to make sure you get on whatever mailing lists there are for updates on the project.

I believe that the statistics that you quote for North Bay on Pages 48 (acreage), 52 (equalized value) and 57 (1.4 square miles) are correct. However, I have not had the opportunity to research those yet.

It is evident that a great deal of time and effort has gone into preparing this report. It is very well done.

Please let me know if you have any other questions or concerns.

Sincerely,

**Connie Mellem**  
Municipal Clerk  
Village of North Bay  
3615 Hennepin Place  
Racine, WI 53402

[262-639-2334](tel:262-639-2334)

**Figure A-4**

**PUBLIC INFORMATIONAL MEETINGS HELD FOR  
THE RACINE COUNTY HAZARD MITIGATION PLAN UPDATE**





### Agenda for Meeting

- Discuss purpose of plan
- Review the work completed to date
- Answer any questions on the plan and process
- Seek information
  - Problem areas related to hazards
  - Potential mitigation measures and projects
- Take comments on plan



### What is Hazard Mitigation?

- “Mitigation is any sustained action taken to eliminate or reduce the long-term risk to human life and property from natural and technological hazards” —FEMA
- Actions to reduce the damages that result when disasters occur




### What is Hazard Mitigation?

- Mitigation is not:
  - Emergency response
  - Crisis management
  - Disaster recovery
- Mitigation focuses on reducing the impacts from hazard events before they occur

### Why Do We Mitigate Hazards?




- Disasters are costly
- State and Federal assistance are insufficient
- We can prevent future damages
- Lesser impacts mean a quicker response and recovery process
- Can do this locally

### Racine County Hazard Mitigation Plan

- Includes all of the municipalities in the County
- Sets forth strategies for mitigating impacts of several natural and technological hazards
- Establishes eligibility for hazard mitigation funding from the Federal Emergency Management Agency (FEMA)
  - FEMA requires that local hazard mitigation plans be updated and revised every five years

**PUBLIC INFORMATION MEETING SCHEDULED  
ON HAZARD MITIGATION PLAN UPDATE  
FOR RACINE COUNTY**

Citizens are invited to a public information meeting related to the mitigation of impacts from natural and human-induced hazards in Racine County, Wisconsin. This session will provide an opportunity to learn more about, and to comment on, the County's hazard mitigation plan which will be documented in the Southeastern Wisconsin Regional Planning Commission (SEWRPC) Community Assistance Planning Report No. 266, 3rd Edition, *Racine County Hazard Mitigation Plan Update: 2016-2020*. The plan includes recommendations related to reducing damages from hazards such as flooding and related stormwater drainage problems; weather-related hazards such as tornadoes, winter storms, and severe thunderstorms; hazardous material incidents; and public health emergencies in Racine County and the municipalities within Racine County. This plan constitutes an update of the initial hazard mitigation plan which was adopted by the County in 2005, updated in 2010, and was completed in order for the County and the cities and villages within the County to maintain eligibility for hazard mitigation funding through the Federal Emergency Management Agency. Copies of the draft report chapters completed to date are now available for review on the SEWRPC web site at:

<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>

The plan is being prepared by SEWRPC, in cooperation with the Racine County Office of Emergency Management and the County Department of Public Works and Development Services. Preparation of the plan has been guided by a Hazard Mitigation Local Planning Team consisting of elected and appointed officials from the County and the cities, villages, and towns in the County; agency and business representatives; and citizens from throughout the County knowledgeable in hazard mitigation matters.

**The meeting will be held from 6:00-7:30 p.m. on Thursday, August 25, 2016 at the Racine County Ives Grove Office Complex Auditorium, 14200 Washington Avenue, Sturtevant.**

The session will begin with a presentation by the Commission staff at 6:00 p.m. This will be followed by a meeting in "open house" format from 6:30-7:30 p.m., which will provide an opportunity to meet one-on-one or in small groups with the Commission and County staffs to receive information, ask questions, and provide written comment.

Persons with special needs are asked to contact Racine County Department of Public Works and Development Services at 262-886-8440 a minimum of 72 hours in advance of the public session date so that appropriate arrangements can be made. Affected may be site access and/or mobility, materials review or interpretation, or active participation, including the submission of comments.

In addition to providing comments at the public meeting, written comments may also be submitted by U.S. mail or through a comment screen on the Commission's website. This comment screen may be found at:

<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning/Racine-County-Comment-Form.htm>

To ask questions, or to submit written comments on the Hazard Mitigation Plan Update, please contact:

**Southeastern Wisconsin Regional Planning Commission  
Aaron W. Owens, Planner  
W239 N1812 Rockwood Drive  
P.O. Box 1607  
Waukesha, Wisconsin 53187-1607  
Phone: 262-547-6721 Fax: 262-547-1103  
E-mail: aowens@sewrpc.org**

## Racine County Hazard Mitigation Plan

- Initial plan developed 2003-2004
  - Report published 2004
- First update conducted 2009-2010
  - Coordinated with development of the County comprehensive plan
  - Report published 2010
- Current update conducted 2015-2016
  - Anticipate that the report will be published early 2017



## Racine County Hazard Mitigation Plan

- Plan development and updating is overseen by a Local Planning Team
  - Team includes elected officials, appointed officials, department and agency representatives, business representatives, knowledgeable citizens
  - Law enforcement, fire, and EMS departments; public works and engineering departments, planning departments, conservation departments, health department, private sector firms, nonprofit agencies, and educational institutions
- Staff include Racine County Office of Emergency Management, Racine County Public Works and Development Services, and SEWRPC

## Plan Components to Review and Revise

- Review implementation activities
- Update inventories of natural and built features
- Review and reevaluate identification of hazards posing risks to the County
- Update and reevaluate risk and vulnerability analysis
- Review and revise hazard mitigation goals
- Review and revise hazard mitigation strategies
- Update plan adoption, implementation, and maintenance strategies
  - Update inventory of potential funding sources

## Natural Hazards Profiled in the Plan

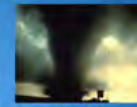
(Required by FEMA)



Flooding



Thunderstorms  
High Wind/Hail/Lightning



Tornado



Lake Michigan Coastal Hazards



Extreme Temperatures



Drought



Winter Storms

## Technological Hazards Profiled in the Plan

(Optional under FEMA rules)



Transportation  
Accidents



Contamination/Loss  
of Water Supply



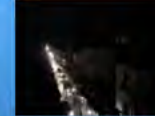
Hazardous  
Material Incidents



Public Health  
Emergency



Terrorism



Long-term  
Power Outages

## Technological Hazards Profiled in the Plan

(Optional under FEMA rules)

NEWLY ADDED FOR THIS PLAN UPDATE:



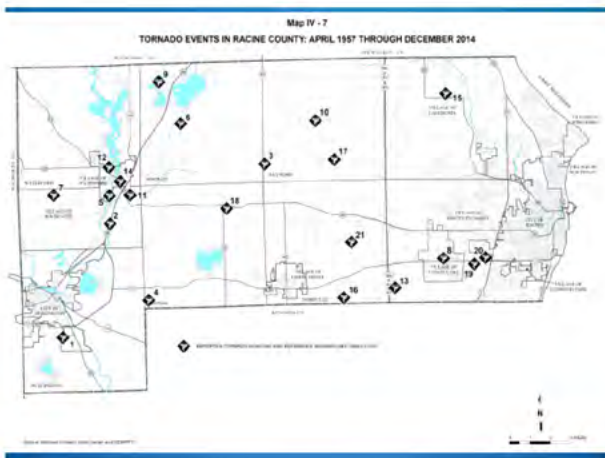
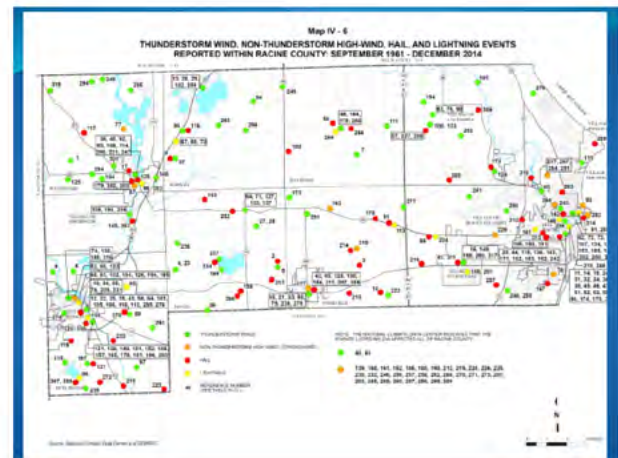
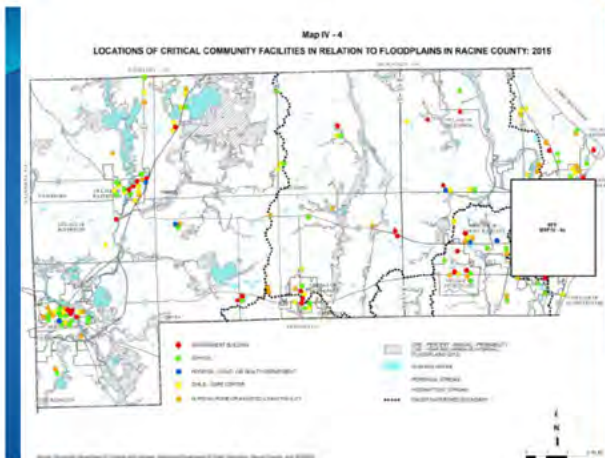
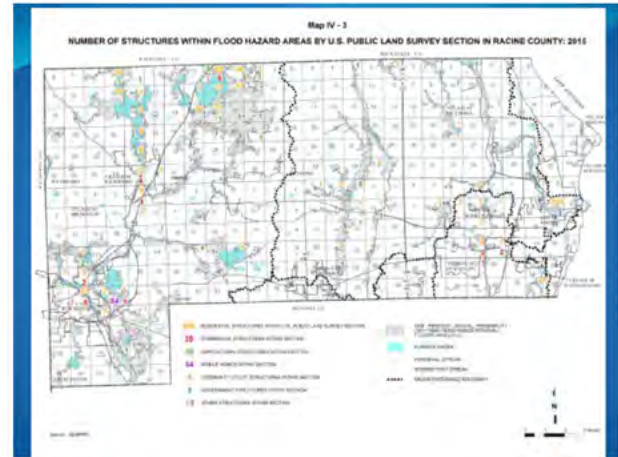
Active Shooter  
Incidents



Cyber-attack on  
Local Government

## Risk Analysis—Hazard Profiles

- Most profiles follow a similar format
  - Definition and description of the hazard
  - Description of notable historical events that affected the County
  - Description of some notable recent events that affected the County
    - Mapped events such as thunderstorms, tornados, number of structures in the floodplain, vehicle crash rates, etc.



## Risk Analysis—Hazard Profiles Continued...

- Assessment of vulnerabilities to the hazard and community impacts from the hazard
- Description of potential future changes in impacts
  - Climate Change
- Discussion of any differences among communities in risks

## Average Annual Damages

Hazard	Years	Incidents per Year	Annual Property Damages (\$)	Annual Crop Damages (\$)	Total Annual Damages (\$)
Automobile Accidents	15	3,878	60,648,428	0	60,648,428
Flood	34	1.6	296,302	726,686	1,022,988
Tornadoes	51	0.4	583,970	284	583,970
Railway Accidents	40	4.7	193,649	0	193,649
Thunderstorm wind/Hail/ Lightning	56	4.8	140,173	20,576	160,749
Drought	35	0.5	0	150,811	150,811
Non-Thunderstorm High-Wind	56	1.0	23,629	1,945	25,574
Transportation Hazmat	44	3.3	5,172	0	5,172
Temperature Extremes	33	1.6	154	3,371	3,525
Pipeline Hazmat	46	0.2	2,715	0	2,715

Note: All damages are expressed in 2014 dollars.

## Average Annual Fatalities and Injuries

Hazard	Years	Incidents per Year	Fatalities per Year	Injuries per year	Annual Total
Automobile Accidents	15	3,878	17.3	2,090.5	2,107.8
Communicable Diseases	9	1,552	0.0	1,552	1,552
Sexually-transmitted Diseases	9	1,232	0.0	1,232	1,232
Railway Accidents	40	4.6	0.4	1.5	1.9
Thunderstorm wind/Hail/Lightning	56	4.8	0.01	0.3	0.31
Transportation Hazmat Accidents	44	3.3	0.02	0.2	0.22
Non-Thunderstorm High-Wind	56	1.0	0.01	0.2	0.21
Tornadoes	51	0.4	0.0	0.2	0.2
Temperature Extremes	33	1.6	0.1	0.1	0.2
Pipeline Hazmat Accidents	46	0.2	0.0	0.04	0.04

## Hazard Mitigation Goals

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, and public facility systems.
2. 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, and natural areas and critical species habitats.

## Hazard Mitigation Goals

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

## Hazard Mitigation Goals

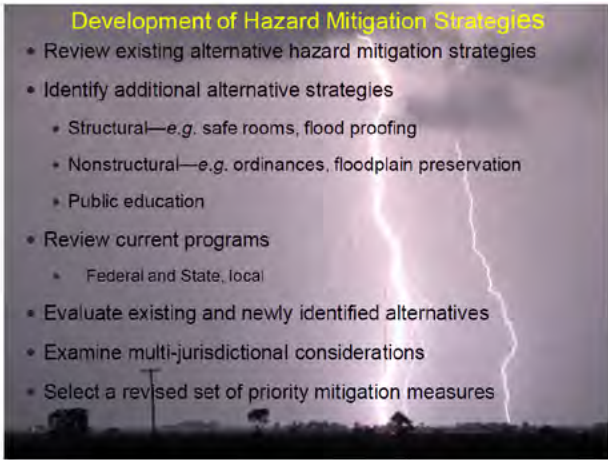
5. The development of a stormwater and floodplain management system that reduces the exposure of people to drainage- and flooding-related inconvenience and to health and safety hazards and that reduces the exposure of real and personal property to damage through inundation resulting from flooding and inadequate stormwater drainage.
6. The identification of high erosion risk lake Michigan shoreline areas and the development of a coastal erosion control program which reduces the exposure of people and real property to shoreline erosion and bluff recession.
7. 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 that are unpredictable and not geographically specific in nature.

## Remaining Work

- Review and update recommended hazard mitigation measures
- Review and update plan adoption, implementation, and maintenance measures

### Development of Hazard Mitigation Strategies

- Review existing alternative hazard mitigation strategies
- Identify additional alternative strategies
  - Structural—e.g. safe rooms, flood proofing
  - Nonstructural—e.g. ordinances, floodplain preservation
  - Public education
- Review current programs
  - Federal and State, local
- Evaluate existing and newly identified alternatives
- Examine multi-jurisdictional considerations
- Select a revised set of priority mitigation measures



### Current Plan's Flood Mitigation Strategies

- Floodland and wetland zoning and zoning review
- Preservation of open space and sensitive areas
- Purchase, demolition, and removal or flood proofing of up to 436 structures
- Channel cleaning, maintenance, or rehabilitation for selected streams
- Stormwater management planning and regulation
- Stormwater management facility maintenance
- Restoration of prairies and wetlands
- Survey of buildings near flood hazard areas



National Flood Insurance Program map updating

### Current Plan's Mitigation Strategies for Weather-related Hazards

- Maintain early warning systems
  - NOAA Weather Radio, EAS broadcasting
- Public information and education
- Identify and advertise shelters
- Review and enforcement of building code requirements
- Continued coordination of local government emergency operations and response plan



### Current Plan's Mitigation Strategies for Human-induced Hazards

- Public information and education
  - Driver safety, hazardous materials, public health, power outages
- Continued coordination of emergency response
  - Governmental units, emergency responders
- Continued support of training, equipping, planning, and preparedness for emergency responders



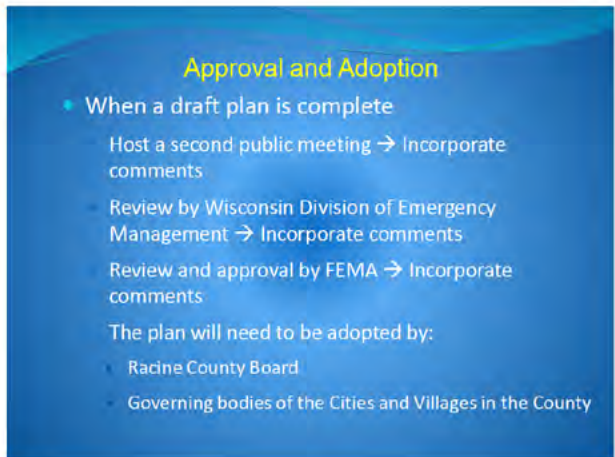
### Implementation Strategies

- Update estimates of mitigation measure costs
- Summarize benefits of implementing mitigation measures
- Designate lead management agencies
- Update current implementation status
- Identify potential sources of funding and technical assistance



### Approval and Adoption

- When a draft plan is complete
  - Host a second public meeting → Incorporate comments
  - Review by Wisconsin Division of Emergency Management → Incorporate comments
  - Review and approval by FEMA → Incorporate comments
- The plan will need to be adopted by:
  - Racine County Board
  - Governing bodies of the Cities and Villages in the County



## Project Web Site

- <http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>
  - Agendas and other meeting materials
  - Summary notes from meetings
  - Presentations
  - Draft chapters as they are completed
  - Comment screen
  - Other ways to send a comment
- Email to [aowens@sewrpc.org](mailto:aowens@sewrpc.org)



**Agenda for Meeting**

- Discuss purpose of plan update
- Review the updated plan
- Answer questions on the plan update
- Take comments on plan update

**Plan Documentation:**

SEWRPC Community Assistance  
Planning Report No. 266 (3<sup>rd</sup> Edition),  
*Racine County Hazard Mitigation Plan  
Update: 2017-2021*

**Participating Jurisdictions:**  
(as of 4/25/2017)

- Racine County
- City of Burlington
- City of Racine
- Village of Caledonia
- Village of Elmwood Park
- Village of Mt. Pleasant
- Village of North Bay
- Village of Rochester
- Village of Sturtevant
- Village of Union Grove
- Village of Waterford
- Village of Wind Point
- Town of Burlington
- Town of Dover
- Town of Norway
- Town of Raymond
- Town of Waterford
- Town of Yorkville

**What is Hazard Mitigation?**

- “Mitigation is any sustained action taken to eliminate or reduce the long-term risk to human life and property from natural and technological hazards”—FEMA
- Actions to reduce the damages that result when disasters occur

**What is Hazard Mitigation?**

- Mitigation is not:
  - Emergency response
  - Crisis management
  - Disaster recovery
- Mitigation focuses on reducing the impacts from hazard events before they occur



**PUBLIC INFORMATION MEETING SCHEDULED  
ON HAZARD MITIGATION PLAN UPDATE  
FOR RACINE COUNTY**

Citizens are invited to a public information meeting related to the mitigation of impacts from natural and human-induced hazards in Racine County, Wisconsin. This session will provide an opportunity to learn more about, and to comment on, the County's hazard mitigation plan which will be documented in the Southeastern Wisconsin Regional Planning Commission (SEWRPC) Community Assistance Planning Report No. 266, 3rd Edition, *Racine County Hazard Mitigation Plan Update: 2017-2021*. The plan includes recommendations related to reducing damages from hazards such as flooding and related stormwater drainage problems; weather-related hazards such as tornadoes, winter storms, and severe thunderstorms; hazardous material incidents; and public health emergencies in Racine County and the municipalities within Racine County. This plan constitutes an update of the initial hazard mitigation plan which was adopted by the County in 2005, updated in 2010, and was completed in order for the County and the cities and villages within the County to maintain eligibility for hazard mitigation funding through the Federal Emergency Management Agency. Copies of the draft report chapters completed to date are now available for review on the SEWRPC web site under the heading "Racine County Hazard Mitigation Plan Update":

<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning.htm>

The plan is being prepared by SEWRPC, in cooperation with the Racine County Office of Emergency Management and the County Department of Public Works and Development Services. Preparation of the plan has been guided by a Hazard Mitigation Local Planning Team consisting of elected and appointed officials from the County and the cities, villages, and towns in the County; agency and business representatives; and citizens from throughout the County knowledgeable in hazard mitigation matters.

**The meeting will be held from 5:00-6:00 p.m. on Wednesday, April 26, 2017 at the Mount Pleasant Village Hall Community Room, 8811 Campus Drive, Mount Pleasant, Wisconsin**

The session will begin with a presentation by the Commission staff at 5:00 p.m. This will be followed by a meeting in "open house" format from 5:30-6:00 p.m., which will provide an opportunity to meet one-on-one or in small groups with the Commission and County staffs to receive information, ask questions, and provide written comment.

Persons with special needs are asked to contact Racine County Department of Public Works and Development Services at 262-886-8440 a minimum of 72 hours in advance of the public session date so that appropriate arrangements can be made. Affected may be site access and/or mobility, materials review or interpretation, or active participation, including the submission of comments.

In addition to providing comments at the public meeting, written comments may also be submitted by U.S. mail or through a comment screen on the Commission's website. This comment screen may be found at:

<http://www.sewrpc.org/SEWRPC/communityassistance/Hazard-Mitigation-Planning/Racine-County-Comment-Form.htm>

To ask questions, or to submit written comments on the Hazard Mitigation Plan Update, please contact:

**Southeastern Wisconsin Regional Planning Commission  
Aaron W. Owens, Planner  
W239 N1812 Rockwood Drive  
P.O. Box 1607  
Waukesha, Wisconsin 53187-1607  
Phone: 262-547-6721 Fax: 262-547-1103**

## Why Do We Mitigate Hazards?



- Disasters are costly
- State and Federal assistance are insufficient
- We can prevent future damages
- Lesser impacts mean a quicker response and recovery process
- Can do this locally

## Racine County Hazard Mitigation Plan

- Includes all of the municipalities in the County
- Sets forth strategies for mitigating impacts of several natural and technological hazards
- Establishes eligibility for hazard mitigation funding from the Federal Emergency Management Agency (FEMA)
  - FEMA requires that local hazard mitigation plans be updated and revised every five years

## Racine County Hazard Mitigation Planning Program--History

- Initial plan developed 2003-2004
  - Report published 2004
- First update conducted 2009-2010
  - Coordinated with development of the County comprehensive plan
  - Report published 2010
- Current update conducted 2015-2016
  - Anticipate that the report will be published early 2017

## Racine County Hazard Mitigation Plan

- Plan development and updating is overseen by a Local Planning Team
  - Team includes elected officials, appointed officials, department and agency representatives, business representatives, knowledgeable citizens
  - Law enforcement, fire, and EMS departments; public works and engineering departments, planning departments, conservation departments, health department, private sector firms, nonprofit agencies, and educational institutions
- Staff include Racine County Office of Emergency Management, Racine County Public Works and Development Services, and SEWRPC

## Plan Components to Review and Revise

(Described in Chapter I)

- Review implementation activities
- Update inventories of natural and built features
- Review and reevaluate identification of hazards
- Update and reevaluate risk analysis
- Review and revise mitigation goals
- Review and revise mitigation strategies
- Update plan implementation and maintenance
  - Update potential funding sources

## Inventory Data

(Chapter II)

- Demographic characteristics
- Existing and planned land use
- Surface water and Lake Michigan Shoreline
  - One-percent-annual-probability floodplains
- Transportation and utility systems
- Critical community facilities
- Existing programs and regulations



## Hazard Mitigation Goals

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

## Hazard Mitigation Goals

5. 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.
6. The identification of **high erosion risk Lake Michigan shoreline areas** and the development of a **coastal erosion control program** which reduces the exposure of people and real property to shoreline erosion and bluff recession.
7. 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 that are unpredictable and not geographically specific in nature.

## Hazard Identification

(Chapter IV)

- Local Planning Team input
  - Hazard and Vulnerability Assessment tool
- Past hazard experience
  - Frequency of occurrence
  - Property and crop damages
  - Fatalities and injuries

## Natural Hazards Profiled in the Plan

(Required by FEMA)



Flooding



Thunderstorms  
High Wind/Hail/Lightning



Tornado



Lake Michigan Coastal Hazards



Extreme Temperatures



Drought



Winter Storms

## Technological Hazards Profiled in the Plan

(Optional under FEMA rules)



Transportation  
Accidents



Contamination/Loss  
of Water Supply



Hazardous  
Material Incidents



Public Health  
Emergency



Terrorism



Power Outages

## Technological Hazards Profiled in the Plan

(Optional under FEMA rules)

NEWLY ADDED FOR THIS PLAN UPDATE:



Active Shooter  
Incidents



Cyber-attack on  
Local Government

## Risk Analysis—Hazard Profiles Chapter IV

- Most profiles follow a similar format
  - Definition and description of the hazard
  - Description of notable historical events that affected the County
  - Description of some notable recent events that affected the County
    - Mapped events such as thunderstorms, tornados, number of structures in the floodplain, vehicle crash rates, etc.

## Risk Analysis—Hazard Profiles Continued...

- Assessment of vulnerabilities to the hazard and community impacts from the hazard
- Description of potential future changes in impacts
  - Climate Change
- Discussion of any differences among communities in risks

## Average Annual Damages

Table G-2  
PRIORITY RANKING OF NATURAL AND OTHER HAZARDS AFFECTING RACINE COUNTY BASED UPON PROPERTY AND CROP DAMAGE

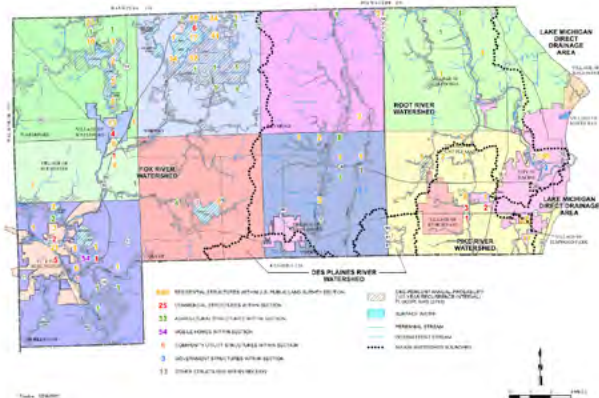
Order of Priority Ranking	Hazard and Other Hazards	Number of Hazard Incidents per Year (2000-2010)	Total Property Damage per Year (2000-2010)	Total Crop Damage per Year (2000-2010)	Number of Properties with Total Damage per Year (2000-2010)	Priority Ranking, Worst to Best
1	Thunderstorm Hazards	10,000	\$1,000,000,000	\$100,000,000	100,000	1
2	Floods	100	\$100,000,000	\$10,000,000	1,000	2
3	Tornadoes	10	\$10,000,000	\$1,000,000	100	3
4	Transportation Hazards	100	\$10,000,000	\$1,000,000	1,000	4
5	Severe Winter Weather	100	\$10,000,000	\$1,000,000	1,000	5
6	Transportation Hazards	100	\$10,000,000	\$1,000,000	1,000	6
7	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	7
8	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	8
9	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	9
10	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	10
11	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	11
12	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	12
13	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	13
14	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	14
15	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	15
16	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	16
17	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	17
18	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	18
19	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	19
20	Public Health Emergencies	10	\$10,000,000	\$1,000,000	100	20

## Average Annual Fatalities and Injuries

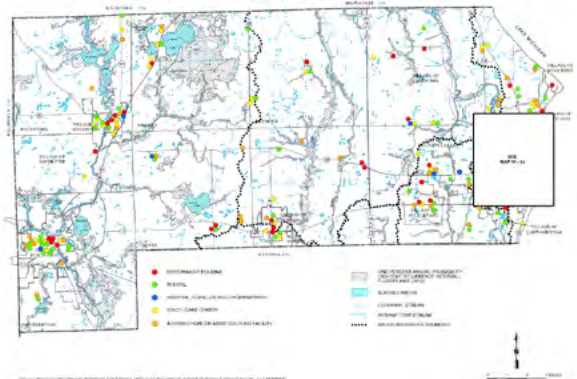
Table G-1  
PRIORITY RANKING OF NATURAL AND OTHER HAZARDS AFFECTING RACINE COUNTY BASED UPON MORTALITY AND INJURY

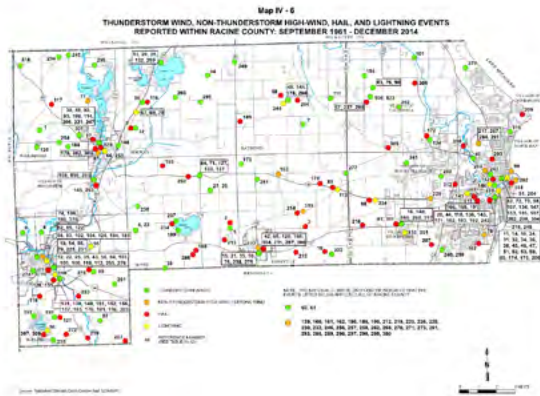
Order of Priority Ranking	Hazard and Other Hazards	Number of Hazard Incidents per Year (2000-2010)	Number of Fatalities per Year (2000-2010)	Number of Injuries per Year (2000-2010)	Priority Ranking, Worst to Best
1	Thunderstorm Hazards	10,000	100	1,000	1
2	Floods	100	1	10	2
3	Tornadoes	10	1	10	3
4	Transportation Hazards	100	1	10	4
5	Severe Winter Weather	100	1	10	5
6	Transportation Hazards	100	1	10	6
7	Public Health Emergencies	10	1	10	7
8	Public Health Emergencies	10	1	10	8
9	Public Health Emergencies	10	1	10	9
10	Public Health Emergencies	10	1	10	10
11	Public Health Emergencies	10	1	10	11
12	Public Health Emergencies	10	1	10	12
13	Public Health Emergencies	10	1	10	13
14	Public Health Emergencies	10	1	10	14
15	Public Health Emergencies	10	1	10	15
16	Public Health Emergencies	10	1	10	16
17	Public Health Emergencies	10	1	10	17
18	Public Health Emergencies	10	1	10	18
19	Public Health Emergencies	10	1	10	19
20	Public Health Emergencies	10	1	10	20

Map IV - 2  
NUMBER OF STRUCTURES WITHIN FLOOD HAZARD AREAS BY CIVIL DIVISION IN RACINE COUNTY: 2015



Map IV - 4  
LOCATIONS OF CRITICAL COMMUNITY FACILITIES IN RELATION TO FLOODPLAINS IN RACINE COUNTY: 2015





### Development of Hazard Mitigation Strategies (Chapter V)

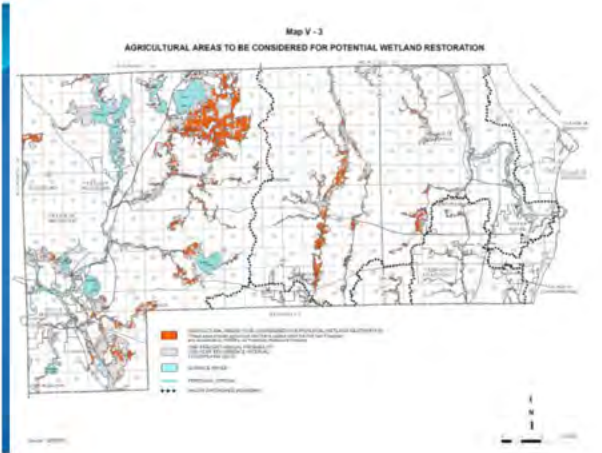
- Identified alternative strategies
  - Nonstructural, structural, public information and education
- Reviewed current programs
  - Federal and State, local
- Evaluation of alternatives and identification of mitigation actions
- Identified multi-jurisdictional considerations
- Select and set forth a revised set of priority mitigation measures

### Plan's Flood Mitigation Strategies Chapter V

- Floodland and wetland zoning and zoning review
- Preservation of open space and sensitive areas
- Purchase, demolition, and removal or flood proofing of up to 684 structures
- Channel cleaning, maintenance, or rehabilitation for selected streams
- Stormwater management planning and regulation
- Stormwater management facility maintenance
- Restoration of prairies and wetlands
- Survey of buildings near flood hazard areas




National Flood Insurance Program map updating



### Mitigation Strategies for Weather-related Hazards (Chapter V)

- Maintain early warning systems
  - NOAA Weather Radio, EAS broadcasting, CodeRED, Ready Badge App
- Public information and education
- Identify and advertise shelters (storm shelters, heating/cooling centers)
- Installation of community storm shelters at mobile home parks
- Review and enforcement of building code requirements
- Continued coordination of local government emergency operations and response plan

### Priority Mitigation Strategies for Human-induced Hazards (Chapter V)

- Public information and education
  - Driver safety, hazardous materials, public health, power outages
- Continued coordination of emergency response
  - Governmental units, emergency responders
- Continued support of training, equipping, planning and preparedness for emergency responders
- Hazard event drills and preparation



## Plan Implementation (Chapter VI)

- Updated estimates of mitigation measure costs
- Summarized benefits of implementing mitigation measures
- Designated lead management agencies
- Updated current implementation status
- Identified potential sources of funding



## Approval and Adoption

- When a draft plan is complete
  - Incorporate comments
  - Review by Wisconsin Division of Emergency Management → Incorporate comments
  - Review and approval by FEMA → Incorporate comments
  - The plan will need to be adopted by:
    - Racine County Board
    - Governing bodies of the Cities and Villages in the County

## Project Web Site

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- Agendas and other meeting materials
- Summary notes from meetings
- Presentations
- Draft chapters as they are completed
- Comment screen
- Other ways to send a comment

Also Can Email Comments to [aowens@sewrpc.org](mailto:aowens@sewrpc.org)

Please Send Comments By May 12, 2017

**Figure A-5**

**RELEVANT REGIONAL AND LOCAL ADVISORY COMMITTEES: 2017**

**ADVISORY COMMITTEE ON  
REGIONAL TRANSPORTATION SYSTEM PLANNING**

Brian Dranzik, Chair	Commissioner, Southeastern Wisconsin Regional Planning Commission Director of Transportation, Milwaukee County Department of Transportation
Fred Abadi	Director of Public Works, City of Waukesha
Clement Abongwa	Director of Highways/Highway Commissioner, Kenosha County
Julie A. Anderson	Director of Public Works and Development Services, Racine County
Mitch Batuzich	Community Planner, Federal Highway Administration, U.S. Department of Transportation
Shelly Billingsley	Director of Public Works/City Engineer, City of Kenosha
Daniel Boehm	Managing Director, Milwaukee County Transit System
Scott Brandmeier	Director of Public Works/Village Engineer, Village of Fox Point
Donna Brown-Martin	Director, Bureau of Planning and Economic Development, Division of Transportation Investment Management, Wisconsin Department of Transportation
Allison M. Bussler	Director of Public Works, Waukesha County
La Keisha Butler	Legislative Liaison Director, City of Milwaukee
David Cox	Village Administrator, Village of Hartland
Peter Daniels	Interim City Engineer/Director of Public Works, City of West Allis
John Edgren	Director of Public Works/Highway Commissioner, Ozaukee County
Gary Evans	Highway Engineering Division Manager, Waukesha County Department of Public Works
Gail Good	Director, Air Management Program, Wisconsin Department of Natural Resources
Thomas M. Grisa	Director, Department of Public Works, City of Brookfield
Steven R. Houte	Village Engineer, Village of Mt. Pleasant
Ghassan A Korban	Commissioner of Public Works, City of Milwaukee
Nik Kovac	Alderman, City of Milwaukee
Joseph Liebau, Jr.	Secretary's Director, Southeast Region Wisconsin Department of Natural Resources
Max Marechal	City Engineer, City of West Bend
Michael Mayo, Sr.	7th District Supervisor, Milwaukee County
Eric, A. Nitschke, P.E.	Director of Central Services, Walworth County Public Works Department
Jeffrey S. Polenske	City Engineer, City of Milwaukee
Scott M. Schmidt	Highway Commissioner, Washington County
Sheri Schmit	Deputy Director, Southeast Region, Wisconsin Department of Transportation
David Simpson	Director of Public Works, City of Wauwatosa
Andrea Weddle-Henning	Transportation Engineering Manager, Department of Transportation, Milwaukee County
William Wheeler	Community Planner, Federal Transit Administration-Region 5, U.S. Department of Transportation
Dennis Yaccarino	Senior Budget and Policy Manager, Budget and Management Division, Department of Administration, City of Milwaukee
Mark H. Yehlen	Commissioner of Public Works, City of Racine

**Liaison to Environmental Justice Task Force**

Willie Wade	Vice President, Employ Milwaukee
-------------	----------------------------------

**County Liaison**

Brian Field	Highway Commissioner, Dodge County
Brian Udovich	Highway Operations Manager, Jefferson County Highway Department



**RACINE COUNTY  
JURISDICTIONAL HIGHWAY PLANNING COMMITTEE**

Julie Anderson, Chair..... Director of Public Works and Development Services, Racine County  
Kevin J. Muhs, Secretary .....Deputy Director, Southeastern Wisconsin Regional Planning Commission  
Michael Aimone..... President, Village of Union Grove  
Mitch Batuzich..... Community Planner, Federal Highway Administration, U.S. Department of Transportation  
Anthony Bunkelman ..... Acting Village Engineer, Village of Caledonia  
Ed Chart ..... President, Village of Rochester  
Rebecca Ewald..... Administrator, Village of Waterford  
Peter L. Hansen..... Chairperson, Town of Yorkville  
Tom Hincz..... Chairman, Town of Waterford  
Steven D. Jansen ..... President, Village of Sturtevant  
Gary Kastenson..... Chairman, Town of Raymond  
Thomas R. Kramer..... Administrator/Treasurer, Town of Norway  
Thomas Lembcke..... Chairman, Town of Dover  
Roger Mellem ..... President, Village of North Bay  
Robert Miller..... Mayor, City of Burlington  
Nathan Plunkett..... Project Engineer, Highways Engineering Division,  
Public Works and Development Services Department, Racine County  
David Prott..... Superintendent of Highway Division,  
Public Works and Development Services Department, Racine County  
Ralph Rice.....Chairperson, Town of Burlington  
Matthew Sadowski..... Assistant Director/Principal Planner, City of Racine  
Susan Sanabria..... Village Trustee, Village of Wind Point  
William D. Sasse..... Director of Engineering, Village of Mount Pleasant  
Ellis Steiner..... President/Village Trustee, Village of Elmwood Park  
Brett Wallace..... Director, Southeast Region, Wisconsin Department of Transportation  
Mark H. Yehlen..... Commissioner of Public Works, City of Racine



**TECHNICAL AND CITIZEN ADVISORY COMMITTEE ON  
COASTAL MANAGEMENT IN SOUTHEASTERN WISCONSIN**

Dr. Norman P. Lasca ..... Professor (Emeritus), Department of Geological Sciences  
University of Wisconsin-Milwaukee

Dr. Thomas M. Slawski, Secretary ..... Chief Biologist, Southeastern Wisconsin Regional Planning Commission

Melissa Bohse ..... Village Manager, Village of Fox Point

Stevan M. Keith ..... Sustainability and Environmental Engineer,  
Milwaukee County Department of Transportation and Public Works

Ghassan A Korban..... Commissioner of Public Works, City of Milwaukee

Mary Jo Lange ..... Director of Public Works/City Engineer, City of Cudahy

Tamara Mayzik ..... Administrative Coordinator, City of South Milwaukee

Thomas Mlada ..... Mayor, City of Port Washington

Joseph Liebau, Jr. .... Secretary's Director, Southeast Region Wisconsin Department of Natural Resources

Chad Sampson ..... County Conservationist, Racine County

Kevin L. Shafer ..... Executive Director, Milwaukee Metropolitan Sewerage District

Paul Vornholt..... Operations and Trade Director, Port of Milwaukee

## REGIONAL WATER SUPPLY PLANNING ADVISORY COMMITTEE

Dr. Kurt W. Bauer, Chair.....Executive Director Emeritus, Southeastern Wisconsin Regional Planning Commission  
Michael G. Hahn, Secretary..... Executive Director, Southeastern Wisconsin Regional Planning Commission  
Julie A. Anderson .....Director of Public Works and Development Services, Racine County  
Kenneth R. Bradbury .....Hydrogeologist/Professor, Wisconsin Geological and Natural History Survey  
Andy M. Buehler .....Director of Planning and Development, Kenosha County  
Thomas J. Bunker .....Representative, Water and Wastewater Utility, City of Racine  
Douglas S. Cherkauer .....Professor of Hydrogeology Emeritus, University of Wisconsin-Milwaukee  
Michael P. Cotter..... Director, Walworth County Land Use and Resource Management Department  
Charles A. Czarkowski.... Water Supply Specialist, Wisconsin Department of Natural Resources, Southeast Region  
Brian Dranzik..... Commissioner, Southeastern Wisconsin Regional Planning Commission;  
Director of Transportation, Milwaukee County Department of Transportation  
Daniel S. Duchniak .....General Manager, Waukesha Water Utility, City of Waukesha  
Charles P. Dunning.....Hydrologist, U.S. Geological Survey  
Franklyn A. Ericson ..... Director, Worldwide Safety, Health, Environment and Quality Operations,  
S.C. Johnson & Son, Inc.  
David Ewig ..... Water Utility Superintendent, City of Port Washington  
Thomas M. Grisa .....Director, Department of Public Works, City of Brookfield  
Jeffrey A. Helmuth..... Hydrogeologist Program Coordinator,  
Wisconsin Department of Natural Resources, Madison  
John Hemauer ..... Water Utility Manager, City of West Bend  
Kristine S. Hillmer ..... Executive Director, Metropolitan Builders Association of Greater Milwaukee  
Andrew A. Holschbach .....Director, Ozaukee County Land and Water Management Department  
Matt Janecke ..... Administrator/Clerk, Town of Lisbon  
Eric J. Kiefer..... Manager, North Shore Water Utility  
Jennifer Gonda..... Superintendent, Milwaukee Water Works, City of Milwaukee  
Mark Lurvey .....Agricultural Business Operator, Lurvey Turf Nursery  
Michael P. Rau ..... President, City Water, LLC  
Jay Shambeau..... Administrator, Planning and Parks Department, Washington County  
Dale Shaver..... Director, Waukesha County Department of Parks and Land Use  
Edward St. Peter..... General Manager, Water Utility, City of Kenosha  
Michael J. Sullivan..... General Manager, Water and Sewer Utility, City of Oak Creek  
James Surfus ..... Senior Environmental Engineer, MillerCoors, LLC  
Daniel S. Winkler.....Director of Public Works and Utilities, City of Lake Geneva

**TECHNICAL ADVISORY COMMITTEE FOR THE PROTECTION  
AND MANAGEMENT OF NATURAL AREAS IN SOUTHEASTERN WISCONSIN**

- Dr. Susan E. Lewis, Chair .....Professor of Biology, Carroll University,  
Director, Greene Field Station,  
Member, State of Wisconsin Natural Areas Preservation Council
- Dr. Thomas S. Slawski, Secretary ..... Chief Biologist, Southeastern Wisconsin Regional Planning Commission
- Fay U. Amerson .....Urban Conservation Specialist, Walworth County
- Dr. Philip J. Arnholt .....Professor of Science, Biology Department, Concordia University
- Dr. Owen Boyle ..... Regional Ecologist, Wisconsin Department of Natural Resources
- Gerald H. Emmerich, Jr ..... Member, Board of Directors, Land Trust of Walworth County
- Shawn Graff ..... Executive Director, The Ozaukee Washington Land Trust, Inc.
- Duane Grimm..... Waukesha County Park System Manager
- Andrew A. Holschbach .....Director, Ozaukee County Land and Water Management Department
- Signe L. Holtz ..... Director, Bureau of Endangered Resources, Wisconsin Department of Natural Resources
- B. Martinus Johnson ..... Wildlife Manager, Wisconsin Department of Natural Resources
- Marlin P. Johnson..... Associate Professor Emeritus, Department of Biological Sciences,  
University of Wisconsin-Waukesha Center;  
Vice President, Waukesha County Land Conservancy
- Mary J. Lichter..... Parks Director, Kenosha County Parks
- James P. Morrissey..... Land/Facilities Supervisor, Wisconsin Department of Natural Resources,  
Southeast Region
- Jamie Ludovic..... Administrator, Planning and Parks Department, Washington County
- Dr. Patricia Nagai.....Horticulture Educator, UW Extension Service, Racine County
- Kevin L. Shafer..... Executive Director, Milwaukee Metropolitan Sewerage District
- Dr. Stephen L. Solheim..... Associate Professor, Department of Biological Sciences,  
University of Wisconsin-Whitewater
- Scott Thompson .....Director of Freshwater Conservation, Wisconsin Chapter, The Nature Conservancy
- Marc White .....Director of Research, Stewardship, and Adult Education, Riveredge Nature Center
- Dr. Joy J. Wolf.....Associate Professor, Department of Geography, University of Wisconsin-Parkside

**WESTERN RACINE COUNTY SEWERAGE DISTRICT**

Gill Bakke, Chairman  
Vincent G. Klemko, Vice Chairman  
Lynn C. Tamblyn, Secretary/Treasurer  
Chris Bennet  
Frank Czuta  
Jeff Bratz  
Ellie Mack

**RACINE COUNTY BOARD OF DRAINAGE COMMISSIONERS**

Alvin R. Wilks, Chairman  
Alan Jaspersen, Secretary/Treasurer  
Gregory H. Foat  
John Vyvyan  
Russell Weiss  
Matthew Woodrow

## ADVISORY COMMITTEE ON REGIONAL LAND USE PLANNING

Julie A. Anderson, Chair ..... Director of Public Works and Development Services, Racine County  
Jennifer Andrews ..... Director of Community Development, City of Waukesha  
Robert J. Bauman ..... Alderman, City of Milwaukee  
Andy M. Buehler ..... Director of Planning and Development, Kenosha County  
Harlan Clinkenbeard ..... City Planner, City of Pewaukee  
Michael P. Cotter ..... Director, Walworth County Land Use and Resource Management Department  
Brian Dranzik ..... Commissioner, Southeastern Wisconsin Regional Planning Commission;  
Director of Transportation, Milwaukee County Department of Transportation  
Henry Elling ..... Administrator, Village of Summit  
Paulette Enders ..... Director of Development, City of Wauwatosa  
Daniel F. Ertl ..... Director of Community Development, City of Brookfield  
Jason Fruth ..... Planning and Zoning Manager, Waukesha County  
Kristi Johnson ..... Community Development Manager, City of Greenfield  
Vanessa Koster ..... Planning Manager, City of Milwaukee Department of City Development  
Jeffrey B. Labahn ..... Director, City of Kenosha Department of Community Development and Inspections  
Joseph Liebau, Jr. .... Secretary's Director, Southeast Region Wisconsin Department of Natural Resources  
Patricia T. Najera ..... City Plan Commissioner, City of Milwaukee  
Mark Piotrowicz ..... City Planner/Operations Manager, City of West Bend  
Brandi Richter ..... District Conservationist, Kenosha-Milwaukee-Racine-Walworth-Waukesha  
Counties, U.S. Natural Resources Conservation Service  
Matthew Sadowski ..... Assistant Director/Principal Planner, City of Racine  
Karen Sands ..... Director of Planning, Research, and Sustainability,  
Milwaukee Metropolitan Sewerage District  
Steven J. Schaer ..... Manager of Planning and Zoning, City of West Allis  
Sheri Schmit ..... Deputy Director, Southeast Region, Wisconsin Department of Transportation  
Douglas Seymour ..... Director of Community Development, City of Oak Creek  
Debra Sielski ..... Deputy Planning and Parks Administrator,  
Manager of Planning Division, Washington County  
Andrew T. Struck ..... Director, Planning and Parks Department, Ozaukee County  
Todd Stuebe ..... Director of Community Development, City of Glendale  
Randy L. Tetzlaff ..... Director of Planning and Development, City of Port Washington  
Teig Whaley-Smith ..... Director, Department of Administrative Services, Milwaukee County

**RACINE COUNTY LOCAL EMERGENCY PLANNING COMMITTEE**

Lt. Daniel Adams, .....Racine County Sheriff’s Office  
Christopher Bach ..... American Red Cross  
L. Noelle Brigham .....SC Johnson  
David Czerwinski..... Wheaton Franciscan  
Marcia Fernholz ..... Racine Health Department  
Thomas Karkow..... WRJN  
Marla Lamparek..... Aire Liquide  
David Maack..... Racine County Emergency Management  
Chief Sean Marschke ..... Sturtevant Police Department  
Robert N Miller..... Racine County Board  
Ted Rademacher..... Goodwill Industries  
Lt. Chuck Weitzel ..... Racine Police Department  
Lt. David Wolgemuth..... Racine Police Department



## **RACINE COUNTY TRAFFIC SAFETY COMMISSION**

David Maack, Chairman .....Coordinator, Racine County Emergency Management  
Julie Anderson.....Racine County Public Works & Development Services Director  
Matt Barlar ..... State Trooper, Wisconsin State Patrol  
John Barnes ..... Retired Caledonia Police Department  
Allison Blackwood..... WisDOT, DTSD  
Joe Davis, Sr..... Bureau of Transportation Safety Regional Program Manager  
Chief Tom Ditscheit .....Town of Waterford Police Department  
Erin Donaldson ..... Safe Kids Coordinator  
Tom Knitter ..... TRIAD  
Sgt. Tim Koetter ..... Racine Police Department  
Capt. Thomas Lamke .....Racine County Highway Safety Coordinator  
Lt. Gary Larsen .....Caledonia Police Department  
Chief Sean Marschke ..... Sturtevant Police Department  
Michael Payne..... Racine County Medical Examiner  
Pat Starcken ..... Racine Unified School District Transportation  
Sgt. David Stroupe ..... Mount Pleasant Police Department  
Michael White..... Racine County District Attorney's Office

Figure A-6

## WEBSITE FOR COMMENTS AND REVISIONS TO DRAFT RACINE COUNTY HAZARD MITIGATION PLAN UPDATE

Community Assistance

SEWRPC > Community Assistance > Racine County Comment Form

Email Print

### Comprehensive Plans and Plan Implementation

### Model Ordinances and Guides

### Hazard Mitigation Planning

- Kenosha County Comment Form
- Milwaukee County Comment Form
- Racine County Comment Form
- Washington County Comment Form

### Economic Development

### EMS Data Request

### Business Park Inventories and Absorption Studies

### Advisory Services

### Review Services

### Local Park and Open Space Planning

### Surveying and Mapping Recommendations

### County Surveyor Services

## Racine County Comment Form

Use the box below to submit any comments you may have about the Racine County Hazard Mitigation Plan Update. A record of public comments will be assembled and provided to the Local Planning Team for deliberations in preparing the final report.

Please provide the following information prior to submitting your request:

First Name:

Last Name:

Email Address:

Organization:

Mailing Address:

City:

State:

Zip:

\* Denotes a required field

Press the "Submit" button when finished.

Click [here](#) to return to the Hazard Mitigation Planning Page

100%

**Figure A-7**

**CORRESPONDENCE RELATED TO PERIOD OF PERFORMANCE TIME EXTENSION  
FOR THE RACINE COUNTY HAZARD MITIGATION PLAN UPDATE**



**STATE OF WISCONSIN**  
*DEPARTMENT OF MILITARY AFFAIRS*  
**DIVISION OF EMERGENCY MANAGEMENT**

Brian M. Satula  
Administrator

Scott Walker  
Governor

June 14, 2016

Mr. Andrew Velasquez, Regional Administrator  
Federal Emergency Management Agency  
536 S. Clark Street, 6<sup>th</sup> Floor  
Chicago, IL 60605

Dear Mr. Velasquez:

**SUBJECT:** EMC-2015-PC-0001  
FFY14 Pre-Disaster Mitigation Program

The State is requesting a one-year time extension to the performance period for the following subrecipients to complete the development of all-hazards mitigation plans:

PDMC-PL-05-WI-2014-004	Burnett County
PDMC-PL-05-WI-2014-003	Douglas County
PDMC-PL-05-WI-2014-009	Green County
PDMC-PL-05-WI-2014-001	Kenosha County
PDMC-PL-05-WI-2014-008	Marathon County
PDMC-PL-05-WI-2014-006	Oneida County
PDMC-PL-05-WI-2014-007	Racine County
PDMC-PL-05-WI-2014-010	Rock County
PDMC-PL-05-WI-2014-005	Shawano County
PDMC-PL-05-WI-2014-002	Washington County
PDMC-MC-05-WI-2014-011	WEM State Management Costs

The State was awarded \$484,379.75 in federal funds for ten planning grants and State Management Costs. The performance period is April 21, 2014 to September 30, 2016. The State is requesting a one-year extension until September 30, 2017. The attached Extension Request Checklist details the status of the subawards. The activities for the subawards listed above will be completed within the extended period of performance without modifications to the original Statement of Work approved by FEMA.

If you have any questions or need additional information, please contact Katie Sommers, State Hazard Mitigation Officer, at (608) 242-3222.

2400 Wright St. PO Box 7865 Madison, WI 53707-7865 24 Hour Emergency Hotline 1-800-943-0003

Mr. Velasquez  
June 14, 2016  
Page 2

Sincerely,

Brian M. Satula  
Administrator

Enclosure

## EXTENSION REQUEST CHECKLIST

Information identified in this checklist should be provided along with an official request letter from the grantee. Grantees may provide the information by completing this checklist or by providing the same information in another format.

1. GRANT/AWARD #: **EMC-2015-PC-0001** 2. PROGRAM: Choose an item. 3. STATE: **Wisconsin**

4. GRANTEE: **Wisconsin Emergency Management** 5. DATE: **6/14/2016**

6. AWARD AMOUNT: **\$484,379.75** 7. FUNDS DRAWN TO DATE: **\$137,398.08**

8. REMAINING FUNDS AVAILABLE: **\$346,981.67**

9. EXTENSION REQUEST INCLUDES: Additional Costs  Project Amendment  Budget Amendment  Facilitates Closeout   
(Check all that apply.)

10. ORIGINAL PERFORMANCE PERIOD: START DATE: **4/21/2014** END DATE: **9/30/2016**

11. Are quarterly financial reports and all progress reports current for this award and for all FEMA awards? YES  NO

12. If approved, will this be the first extension to the period of performance for this award? YES  NO

If this is not the first extension, please provide: 1) the date approved, 2) main purpose and 3) date extended to, for each extension that has been granted for this award:

EXTENSION #1: Click here to enter text.

EXTENSION #2: Click here to enter text.

13. How much additional time is being requested? **12 Months**

14. If approved, does the grantee expect to complete all remaining work within the extended performance period? YES  NO

If not, please explain: Click here to enter text.

### WORK COMPLETED & ON TRACK FOR COMPLETION

15. List any projects that are either already completed at this time, or will be completed by the end of the current performance period (prior to an extension requested in this form). For each project list project name/number, work status and expected completion date:

Click here to enter text.

### WORK/PROJECTS REQUESTED FOR EXTENSION

16. List all projects that will not be completed unless this extension request is granted. For each project list the project name/number, remaining funds, and the expected completion date.

**Burnett County/PDMC-PL-05-WI-2014-004, \$33,250.00, 3/31/2017**

**Douglas County/PDMC-PL-05-WI-2014-003, \$9,668.80, 3/31/2017**

**Green County/PDMC-PL-05-WI-2014-009, \$23,600.00, 5/31/2017**

**Kenosha County/PDMC-PL-05-WI-2014-001, \$40,000.00, 9/1/2017**

**Marathon County/PDMC-PL-05-WI-2014-008, \$12,500.00, 3/31/2017**

**Oneida County/PDMC-PL-05-WI-2014-006, \$10,000.00, 3/31/2017**

**Racine County/PDMC-PL-05-WI-2014-007, \$32,500.00, 9/1/2017**

**Rock County/PDMC-PL-05-WI-2014-010, \$24,953.35, 3/31/2017**

**Shawano County/PDMC-PL-05-WI-2014-005, \$43,500.00, 3/31/2017**

**Washington County/PDMC-PL-05-WI-2014-002, \$80,300.00, 9/1/2017**

**Wisconsin Emergency Management: State Management Costs/ PDMC-MC-05-WI-2014-011, \$36,709.52, 9/30/2017.**

## EXTENSION REQUEST CHECKLIST

Information identified in this checklist should be provided along with an official request letter from the grantee.

Grantees may provide the information by completing this checklist or by providing the same information in another format.

17. Reasons for delays – this must include details of the legal, policy, or operational challenges that prevent the final outlay of awarded funds by the applicable deadline. Refer to each project identified in item #16 of this checklist, as necessary.

**Prior to 2013, PDM awards had 36 month periods of performance (PoPs). The regulations in 2013 changed the PoP for PDM awards to 24 months. The 2014 PDM awards were given a 29-month and nine-day PoP, but subawards were not approved until approximately seven and nine months into the PoP, leaving effectively only 22- and 20-month PoPs. Several of the subawards were actually approved with PoPs extending between 20 and 24 months. That is simply not long enough in most cases to obtain substantial stakeholder input and complete an entire planning process. Additionally, the subapplicants had truncated their realistic PoPs of 24-36 months to meet the unreasonably short PoPs newly enacted in the 2013 HMA Unified Guidance. In 2015, the PDM PoP was extended in the regulations back to 36 months, supporting the fact that 24 months is not long enough.**

### Plan for Completion

18. Provide a plan for completion of projects from item #16 that includes milestones and timeframes for achieving each milestone along with the position/person responsible for implementing the plan for completion.

**See attached time extension requests and revised schedules for each subaward.**

### 19. Certification

The letter that accompanies this request must contain a statement certifying that the activity/activities will be completed within the extended period of performance without modifications to the original Statement of Work approved by FEMA.

**WISCONSIN DIVISION OF EMERGENCY MANAGEMENT  
PRE-DISASTER MITIGATION PROGRAM  
Subgrantee's Request for a Time Extension**

**SUBGRANT NAME** RACINE COUNTY HAZARD MITIGATION PLAN UPDATE

**Contact Name:** David Maack

**Contact Number** (262) 636-3515

1. Grant award amount: \$40,000  
Grant amount expended to date: \$24,000  
Grant amount remaining: \$16,000
2. Are you incurring a cost underrun? If yes, estimate how much?  
No.
3. Are you incurring a cost overrun? If yes, estimate how much?  
No.
4. Are you completing the plan in-house or have you hired a contractor? If hired a contractor, who have you hired?  
The plan update is being completed by the Southeastern Wisconsin Regional Planning Commission (SEWRPC)
5. Provide a detailed description of work completed to date and work in progress. This includes:
  - Number of meetings held  
Two Local Planning Team Meetings have been held and a third meeting is scheduled for June 20, 2016. Our first public meeting will be held shortly thereafter.
  - How the public has been involved  
A public meeting will be held after the June 20, 2016 Local Planning Team Meeting. A press release will be issued notifying the public of the meeting. At the public meeting, the current status of the planning process will be presented. Large aerial photograph maps will be available at the meeting for the public to mark with areas of known hazard conditions and potential hazard mitigation projects. Draft Chapters I through IV, as well as Local Planning Team meeting presentations and summary notes have been posted on the SEWRPC website. A comments page is available on the website for the public to submit questions and comments regarding the plan update.  
  
Following completion and Local Planning Team review of draft Chapter V—"Hazard Mitigation Strategies" and draft Chapter VI—"Plan Adoption, Implementation, Maintenance, and Revision", a second public meeting will be held to present the draft hazard mitigation plan.
- Status of the different sections of the plan:  
Drafts of four chapters of the plan update have been completed.
  - Planning process

Draft Chapter I—“Introduction and Background” has been completed and reviewed by the Local Planning Team (LPT). Comments and edits from the LPT have been incorporated into the Chapter. The Chapter includes an overview of the study area, relationship of hazard mitigation planning to emergency operations planning, scope and purpose of the plan, plan maintenance and implementation activities since the previous update, outreach activities since the previous update, and plan development review and adoption process. Chapter I also documents involvement of participating communities in the planning process.

➤ **Study area inventory and analysis**

Draft Chapter II—“Basic Study Area Inventory and Analysis” has been reviewed by the Local Planning Team. Comments and edits from the LPT have been incorporated into the Chapter. The Chapter includes demographic and economic characteristics of the County, existing and planned 2035 land use inventories, discussion on surface water resources, Lake Michigan shoreline and bluff conditions, transportation system inventories, utility system inventories, public safety facilities and services, critical community facility inventories, hazardous material storage and use inventories, historic site inventory, and regulations and programs related to hazard mitigation.

➤ **Hazard identification and profiling**

A draft of Chapter IV—“Analysis of Hazard Conditions” has been completed and will be reviewed by the Local Planning Team at the June 20, 2016 meeting. This chapter includes hazard identification, past hazard experience in the County, summary and ranking of hazards, vulnerability assessment analysis methods and procedures, and a vulnerability assessment for each of the hazards identified by the Local Planning Team.

➤ **Risk and vulnerability assessment**

Risk and vulnerability assessments were included in Chapter IV (see above).

➤ **Development of mitigation goals and strategy**

A draft of Chapter III—“Hazard Mitigation Goals” has been completed and will be reviewed by the Local Planning Team at the June 20, 2016 meeting.

➤ **Development of mitigation actions**

Mitigation actions are currently being developed and will be documented in Chapter V—“Hazard Mitigation Strategies”.

➤ **Plan Maintenance Process**

Plan adoption and maintenance is currently being developed and will be documented in Chapter VI—“Plan Adoption, Implementation, Maintenance, and Revision.”

6. Provide a detailed schedule for completing the plan. Include when sections of the plan will be completed, when the plan will be submitted for review, and when expect final adoption.  
See “Attachment 1” for a revised schedule.

To Be Completed by WEM:

1. Have quarterly reports been submitted and on time? Yes \_\_\_ No \_\_\_
2. Extension Approved: \_\_\_ Disapproved: \_\_\_



Attachment 1

**PROPOSED WORK SCHEDULE WITH TIME EXTENSION  
FOR UPDATING THE RACINE COUNTY HAZARD MITIGATION PLAN**

<b>Task</b>	<b>Estimated Completion Date</b>
Update Planning Team Membership	Completed April 2015
Kickoff Planning Team Meeting	Completed June 2, 2015
Develop Updated Community Profiles	Completed October 2015
Planning Team Meeting (Review Chapters 1 and 2)	Completed October 27, 2015
Identify and Describe Hazards	Completed December 2015
Review of Established Goals and Objectives	Completed May 2016
Update Risk and Vulnerability Assessments	Completed May 2016
<b>Planning Team Meeting (Review Chapters 3 and 4)</b>	<b>June 20, 2016</b>
<b>First Public Meeting</b>	<b>July 2016</b>
<b>Development of Updated Mitigation Actions</b>	<b>December 31, 2016</b>
<b>Development of Updated Plan Maintenance Process</b>	<b>December 31, 2016</b>
<b>Planning Team Meeting (Review Chapters 5 and 6)</b>	<b>January 2017</b>
<b>Second Public Meeting</b>	<b>February 2017</b>
<b>Submit Draft Plan Update to Wisconsin Division of Emergency Management for Review</b>	<b>March 2017</b>
<b>Revise Plan Based on State Review</b>	<b>May 2017</b>
<b>Submit Final Plan Update to the Federal Emergency Management Agency for Approval Pending Adoption</b>	<b>July 2017</b>
<b>Anticipated Period of Performance Deadline</b>	<b>September 1, 2017</b>
<b>Formal Adoption</b>	<b>September 2017</b>

00226042-3.DOC  
AWO/LLK  
6/6/2016

**Owens, Aaron W.**

---

**From:** Maack, David <David.Maack@racinecounty.com>  
**Sent:** Thursday, July 14, 2016 12:19 PM  
**To:** Owens, Aaron W.; Anderson, Julie  
**Subject:** FW: Time Extension Approval: PDM 2014  
**Attachments:** PDM 2014 Time Extension Approval FEMA.pdf; PDM 2014 Time Extension Award Package FEMA.doc

---

**From:** Sommers, Katie - DMA [mailto:Katie.Sommers@wisconsin.gov]  
**Sent:** Thursday, July 14, 2016 11:34 AM  
**To:** Burnett County - DMA; Rannenberg, Steve; Green County - DMA; Kenosha County - DMA; Marathon County - DMA; Oneida County - DMA; Maack, David; Shena Kohler (Shena.Kohler@co.rock.wi.us); Shawano County - DMA; Washington County - DMA  
**Cc:** Gray, Roxanne - DMA  
**Subject:** Time Extension Approval: PDM 2014

Good morning!

A one-year time extension was approved by FEMA for all Wisconsin PDM 2014 subawards. **The end of the Period of Performance is now September 30, 2017.** Please plan accordingly as it is highly unlikely that FEMA will approve another time extension except under extreme extenuating circumstances.

Please share this information with appropriate associates and consultants and contact me with any questions.

Thank you,

**Katie Sommers, CFM**  
State Hazard Mitigation Officer  
Wisconsin Emergency Management  
P.O. Box 7865  
Madison, WI 53707-7865  
Office: (608) 242-3222  
Cell: (608) 516-0312



**FEMA**

Mr. Brian M. Satula, Administrator  
Wisconsin Emergency Management  
2400 Wright Street, P.O. Box 7865  
Madison, Wisconsin 53707-7865

**JUL 12 2016**

Re: Fiscal year 2014 Pre-Disaster Mitigation agreement EMC-2015-PC-0001

Dear Mr. Satula:


Federal Emergency Management Agency (FEMA) Region V has reviewed your request dated June 14, 2016, to extend by 12 months the performance period for your fiscal year 2014 Pre-Disaster Mitigation agreement EMC-2015-PC-0001. Your request has been approved.

<b>Sub-Grantee</b>	<b>Application Type</b>	<b>Period of Performance</b>
Rock County	Planning (local)	4/21/2014 – 9/30/2017
Kenosha County	Planning (local)	4/21/2014 – 9/30/2017
Burnett County	Planning (local)	4/21/2014 – 9/30/2017
Douglas County	Planning (local)	4/21/2014 – 9/30/2017
Shawano County	Planning (local)	4/21/2014 – 9/30/2017
Green County	Planning (local)	4/21/2014 – 9/30/2017
Washington County	Planning (local)	4/21/2014 – 9/30/2017
Oneida County	Planning (local)	4/21/2014 – 9/30/2017
Racine County	Planning (local)	4/21/2014 – 9/30/2017
Marathon County	Planning (local)	4/21/2014 – 9/30/2017
Wisconsin Emergency Management	State Management Costs	4/21/2014 – 9/30/2017

Amendment A-2 and the articles of agreement pertaining to this grant are enclosed. This extension is being granted to enable the completion and closeout of mitigation planning work that is underway. All other terms and conditions of the agreement remain unchanged. After the performance period ends, the state is not authorized to incur new obligations and will have 90 days to liquidate valid obligations and submit final reports.

If you have any questions please contact Assistance Officer Cheryl Baldwin at 312-408-5507.

Sincerely,

  
Andrew Velasquez III  
Regional Administrator

Enclosures



**FEMA**

# ARTICLES OF AGREEMENT

**DEPARTMENT OF HOMELAND SECURITY**

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

**PRE-DISASTER MITIGATION (PDM) COMPETITIVE GRANT AGREEMENT ARTICLES  
CFDA #97.047**

**GRANTEE: STATE OF WISCONSIN, WISCONSIN EMERGENCY MANAGEMENT**

**AGREEMENT NUMBER: EMC-2015-PC-0001**

**AMENDMENT NUMBER: 2**

**DESIGNATED AGENCY: WISCONSIN EMERGENCY MANAGEMENT**

**Amendment 1 extends the period of performances for the following:**

- Rock County, Planning 4/21/2014 ~ 9/30/2017
- Kenosha County, Planning 4/21/2014 ~ 9/30/2017
- Burnett County, Planning 4/21/2014 ~ 9/30/2017
- Douglas County, Planning 4/21/2014 ~ 9/30/2017
- Shawano County, Planning 4/21/2014 ~ 9/30/2017
- Green County, Planning 4/21/2014 ~ 9/30/2017
- Washington County, Planning 4/21/2014 ~ 9/30/2017
- Oneida County, Planning 4/21/2014 ~ 9/30/2017
- Racine County, Planning 4/21/2014 ~ 9/30/2017
- Marathon County, Planning 4/21/2014 ~ 9/30/2017
- Wisconsin Emergency Management State management Cost 4/21/2014 ~ 9/30/2017

**ALL OTHER TERMS AND CONDITIONS REMAIN UNCHANGED**

**Figure A-8**

**INVITATION TO SURROUNDING COMMUNITIES FOR REVIEW AND COMMENT  
ON THE DRAFT RACINE COUNTY HAZARD MITIGATION PLAN UPDATE**

**Owens, Aaron W.**

---

**From:** Maack, David <David.Maack@racinecounty.com>  
**Sent:** Monday, May 15, 2017 11:53 AM  
**To:** barry.mitchell@milwaukeecountywi.gov; Carl Stenbol; Cheryl McCrary;  
christine.westrich@milwaukeecountywi.gov; Maack, David; Donna Haugom  
(donnah@jeffersoncountywi.gov); genene.hibbler@milwaukeecountywi.gov;  
Horace.Staples@kenoshacounty.org; Kathy; KWilliam@co.walworth.wi.us; Mary; Oza  
County - DMA; Rob.Schmid; Schliesman, Ben - DMA; sfronk@milwaukee.gov; Skip  
Twardosz (twodoors42@gmail.com); Walworth; Zahn, Mary - DMA  
**Cc:** Owens, Aaron W.; Anderson, Julie  
**Subject:** Racine County Hazard Mitigation Plan  
**Importance:** High

Over the past year and a half, we have been reviewing and updating the Racine County Hazard Mitigation Plan. As a of that process, we are required to provide neighboring communities with the opportunity to be involved in the plan process. You may review and comment by clicking on the following link:

<http://www.sewrpc.org/HMP>

**Scroll down to the heading titled "Preliminary Draft Chapters" under the "Racine County Hazard Mitigation Plan Update" section.**

**The preliminary draft of the report is titled "CAPR-266—Racine County Hazard Mitigation Plan Update: 2017-2021 (PRELIMINARY DRAFT)"**

Please let me know if you have any questions. Thank you for your consideration.

David L. Maack, CEM, CPM, WCEM I Coordinator  
Racine County Office of Emergency Management  
Office: 262.636.3515 | Fax: 262.636.3505  
E-mail: [david.maack@racinecounty.com](mailto:david.maack@racinecounty.com)  
Website: [www.racinecounty.com/government/ready-racine-county](http://www.racinecounty.com/government/ready-racine-county)  
Facebook: [www.facebook.com/readyracineco](http://www.facebook.com/readyracineco)

"Building a Disaster Resistant Community-Making Disaster Resistance a Way of Life"

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## Appendix B

# SOLID WASTE DISPOSAL SITES IN RACINE COUNTY: 2015

**Table B**

Identification Number <sup>a</sup>	Municipality	Location by U.S. Public Land Survey	Operator
Active Landfills			
1	City of Racine	T3N, R22E, Section 23, SE, NE	Kestrel Hawk Park
2	Village of Caledonia	T4N, R22E, Section 1, N	Wisconsin Electric Power Company
Inactive Landfills			
3	Village of Caledonia	T4N, R22E, Section 3, NW, SW	Caledonia Corporation
4	City of Racine	T3N, R23E, Section 9, SE, SW	Cape and Sons Construction
5	Town of Burlington	T3N, R19E, Section 27, NE, SE	Cedar Park Landfill
6	City of Burlington	T3N, R19E, Section 29, NE, SE	City of Burlington
7	City of Racine	T3N, R23E, Section 9, SW, NE	City of Racine
8	Village of Caledonia	T4N, R23E, Section 19, NW, SE	Hillside Sand and Gravel
9	Village of Caledonia	T4N, R22E, Section 3, NE, SE	Hunt's Disposal Landfill
10	Town of Dover	T3N, R20E, Section 29, NW, SE	N/A
11	Village of Rochester	T3N, R19E, Section 10, NW, SW	Racine County Highway Department
12	Village of Caledonia	T4N, R22E, Section 25, NE, NE	Racine Steel Casting 4 Mile Road Landfill
13	Town of Dover	T3N, R20E, Section 25, SE, SW	Center for the Developmentally Disabled
14	Town of Burlington	T2N, R19E, Section 1, SE, SE	Town of Burlington
15	Village of Caledonia	T4N, R22E, Section 25, SE, NW	Village of Caledonia
16	Town of Norway	T4N, R20E, Section 21, SW, NE	Town of Norway
17	Town of Waterford	T4N, R19E, Section 34, SE, NE	Town of Waterford
18	Village of Mt. Pleasant	T3N, R22E, Section 27, SW, NE	Village of Mt. Pleasant
19	Village of Rochester	T3N, R19E, Section 11, SE, NW	Village of Rochester
20	Village of Rochester	T3N, R21E, Section 11, NW, SE	Village of Rochester
21	Town of Yorkville	T3N, R21E, Section 29, SW, NW	Village of Union Grove
22	Village of Caledonia	T4N, R23E, Section 6, SW, NW	Wang Fly Ash Berms
23	Town of Raymond	T4N, R21E, Section 2, SE, NE	Waste Management of Wisconsin Reclamation, Inc.
24	Village of Caledonia	T4N, R22E, Section 12, NE, NE	Wisconsin Electric Power Company Ash Disposal Landfill
25	City of Racine	T3N, R23E, Section 7, SW, SW	Racine City Graceland Dump
Recycling Centers			
26	City of Racine	T3N, R23E, Section 16, NW, NW	City of Racine Pearl Street Facility
27	Town of Dover	T3N, R20E, Section 27, SE, SE	Dover Town Hall
28	Town of Raymond	T4N, R21E, Section 10, SE, NE	Town of Raymond
29	Town of Waterford	T4N, R19E, Section 34, SE, NE	Town of Waterford
30	Town of Yorkville	T3N, R21E, Section 12, NW, SW	Town of Yorkville
31	Village of Sturtevant	T3N, R22E, Section 22, NW, SW	Village of Sturtevant

NOTE: The inventory data on this table is subject to periodic change due to the nature of the facilities. For the most recent data, the Wisconsin Department of Natural Resources should be contacted.

<sup>a</sup>See Map 19 in Chapter II of this report.

Source: Wisconsin Department of Natural Resources and SEWRPC.

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**Appendix C**

**POLICE STATIONS, COUNTY SHERIFF OFFICES,  
AND FIRE STATIONS IN RACINE COUNTY: 2015**

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**Table C-1**

**POLICE STATIONS, COUNTY SHERIFF OFFICES OR SUBSTATIONS, AND CORRECTIONAL FACILITIES**

Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
City of Burlington Police	City of Burlington	224 E. Jefferson Street, Burlington, WI 53105	Chief Mark Anderson	(262) 342-1000	(262) 763-5158
Racine City Police Main Station	City of Racine	730 Center Street, Racine, WI 53403	Chief Arthel Howell	(262) 635-7700	(262) 636-9332
Racine City Police, Anthony Lane Community Oriented Policing House	City of Racine	2437 Anthony Lane, Racine, WI 53404	Officer Aaron Henry	(262) 619-2511	--
Racine City Police, Robert Quantanilla Community Oriented Policing House	City of Racine	1140 Geneva Street, Racine, WI 53404	Officer Justin Koepnick	(262) 635-7928	--
Racine City Police, Sixteenth Street Community Oriented Policing House	City of Racine	1900 16 <sup>th</sup> Street, Racine, WI 53403	Officer Bryant Petersen	(262) 619-3512	--
Racine City Police, Thelma Orr Community Oriented Policing House	City of Racine	1146 Villa Street, Racine, WI 53403	Officer Robert Ortiz	(262) 635-2880	--
Racine City Police, West Sixth Street Community Oriented Policing House	City of Racine	1522 W. 6th Street, Racine, WI 53404	Officer Rick Prince	(262) 635-7863	--
Racine City Police, William Wadewitz Community Oriented Policing House	City of Racine	1750 Mead Street, Racine, WI, 53403	Officer James Pettis	(262) 635-7862	--
Racine Correctional Institution	Village of Sturtevant	2019 Wisconsin Street, Sturtevant, WI 53177	Warden, Paul S. Kemper	(262) 886-3214	(262) 886-3514
Racine County Jail	City of Racine	717 Wisconsin Avenue, Racine, WI 53403	Sheriff Christopher Schmaling	(262) 636-3929	(262) 636-3470
Racine County Juvenile Detention	City of Racine	1717 Taylor Avenue, Racine, WI 53403	Superintendent Gina Anderson	(262) 638-6729	(262) 638-6366
Racine County Sheriff's Department Main Station	City of Racine	717 Wisconsin Avenue, Racine, WI 53403	Sheriff Christopher Schmaling	(262) 636-3822	(262) 637-5279
Racine County Sheriff's Department Office	Village of Union Grove	925 15th Avenue, Union Grove, WI 53182	--	-- <sup>a</sup>	--
Racine County Sheriff's Department Patrol Station	Town of Yorkville	14116 Washington Avenue, Sturtevant, WI 53177	--	(262) 886-9465	--
Racine County Sheriff's Department Water Patrol	City of Racine	2 Christopher Columbus Causeway, Racine, WI 53403	--	(262) 636-3297	
Racine Youthful Offender Correctional Facility	City of Racine	1501 Albert Street	Warden, Pamela J. Wallace	(262) 638-1999	(262) 638-1777
Robert Ellsworth Correctional Facility	Town of Yorkville	21425-A Spring Street, Union Grove, WI 53182	Superintendent Michelle Hoffman	(262) 878-6000	(262) 878-6015
Town of Burlington Police	Town of Burlington	32288 Bushnell Road, Burlington, WI 53105	Chief Michael P. Sevick	(262) 763-7539	(262) 763-7540
Town of Dover Police	Town of Dover	4110 Beaumont Avenue, Kansasville, WI 53139	Chief Andrew D. Mammen	(262) 878-2200	--
Town of Norway Police	Town of Norway	6419 Heg Park Road, Wind Lake, WI 53185	Chief John Hanrahan	(262) 895-2195	(262) 895-3651
Town of Waterford Police	Waterford Town	415 N. Milwaukee Street, Waterford, WI 53185	Chief Tom Ditscheit	(262) 534-2119	(262) 534-7789
Village of Caledonia Police	Village of Caledonia	6900 Nicholson Road, Caledonia, WI 53108	Chief E. Toby Schey	(262) 835-4423	(262) 835-4799
Village of Mt. Pleasant Police	Village of Mt. Pleasant	8811 Campus Drive, Mount Pleasant, WI 53406	Chief Tim Zarzecki	(262) 884-0454	--
Village of Mt. Pleasant Community Oriented Policing House	Village of Mt. Pleasant	2237 Mead Street Mount Pleasant, WI 53403	Officer Nicole Schiro	--	--
Village of Sturtevant Police	Village of Sturtevant	2801 89th Street, Sturtevant, WI 53177	Chief Sean M. Marschke	(262) 886-7208	(262) 886-7212
Village of Wind Point	Village of Wind Point	4725 Lighthouse Drive, Wind Point, WI 53402	Chief David Rossman	(262) 639-3022	--

<sup>a</sup>Calls to Sheriff's Department routed to this office.

Source: Racine County Office of Emergency Management and SEWRPC.

**Table C-2**  
**FIRE STATIONS**

Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
Burlington Fire Station	City of Burlington	165 W. Washington Street, Burlington, WI 53105	Chief Perry Howard	(262) 763-7842	(262) 767-8602
Caledonia/South Shore Station No. 10 <sup>a</sup>	Village of Caledonia	9433 Northwestern Avenue, Mt. Pleasant, WI	Chief Richard Roeder/ Chief Robert Stedman	(262) 884-1182/ (262) 884-1182	(262) 884-3571/ --
Caledonia Fire Station No. 11	Village of Caledonia	6900 Nicholson Road, Caledonia, WI 53126	Chief Richard Roeder	(262) 835-2050	(262) 834-4192
Caledonia Fire Station No. 12	Village of Caledonia	6040 Douglas Avenue, Caledonia, WI 53402	Chief Richard Roeder	(262) 639-9090	--
Kansasville Fire Department	Town of Dover	23730 Durand Avenue, Kansasville, WI 53139	Chief Scott Remer	(262) 878-3811	(262) 878-7560
Racine Fire Station No. 1	City of Racine	810 8th Street, Racine, WI 53403	Chief Steve Hansen	(262) 635-7900	(262) 635-7864
Racine Fire Station No. 2	City of Racine	2430 Northwestern Avenue, Racine, WI 53404	Chief Steve Hansen	(262) 635-7852	--
Racine Fire Station No. 3	City of Racine	1107 Lombard Avenue, Racine, WI 53402	Chief Steve Hansen	(262) 635-7858	--
Racine Fire Station No. 4	City of Racine	3821 Washington Avenue, Racine, WI 53405	Chief Steve Hansen	(262) 635-7857	--
Racine Fire Station No. 5	City of Racine	2430 Blaine Avenue, Racine, WI 53405	Chief Steve Hansen	(262) 635-7859	--
Racine Fire Station No. 6	City of Racine	2101 16th Street, Racine, WI 53403	Chief Steve Hansen	(262) 635-7856	--
Raymond Fire Station	Town of Raymond	2255 76th Street, Franksville, WI 53126	Chief Alan Babe	(262) 835-1687	(262) 835-1694
Rochester Fire Station	Village of Rochester	31020 Academy Road, Rochester, WI 53105	Chief Walter Henning	(262) 534-3444	(262) 642-5910
SC Johnson Fire Brigade	City of Racine	1525 Howe Street, Racine, WI 53403	Chief Robert Mayer	(262) 260-3372	(262) 260-4554
South Shore Fire Station No. 8	Village of Mt. Pleasant	3900 Old Green Bay Road, Mt. Pleasant, WI 53406	Chief Robert Stedman	(262)-995-1200	(262)-995-1208
South Shore Fire Station No. 9	Village of Sturtevant	2801 89th Street, Sturtevant, WI 53177	Chief Robert Stedman	(262) 554-3041	--
Tichigan Fire Station No. 1	Tichigan	8205 Big Bend Road, Waterford, WI 53185	Chief David Wagner	(262) 662-3570	(262) 662-4589
Tichigan Fire Station No. 2	Tichigan	6838 Caldwell Road, Waterford, WI 53185	Chief David Wagner	--	--
Town of Burlington Fire Station No. 1	Town of Burlington	32288 Bushnell Road, Burlington, WI 53105	Ed Umnus	(262) 763-3070	(262) 539-3075
Town of Burlington Fire Station No. 2	Town of Burlington	7211 McHenry Street, Burlington, WI 53105	Ed Umnus	--	--
Town of Burlington Fire Station No. 3	Town of Burlington	30130 Meadow Drive, Burlington, WI 53105	Ed Umnus	--	--
Union Grove-Yorkville Fire Department	Village of Union Grove and Town of Yorkville	700 Main Street, Union Grove, WI 53182	Chief Thomas Czerniak	(262) 878-4181	(262) 878-4177
Waterford Safety Building	Village of Waterford	122 N. Second Street, Waterford, WI 53185	Chief Richard Mueller	(262) 534-3911	(262) 534-9580
Waterford West Side Fire Station	Village of Waterford	818 Mohr Avenue, Waterford, WI 53185	Chief Richard Mueller	(262) 514-7019	(262) 534-5930
Wind Lake Fire Station No. 1	Wind Lake	7857 S. Loomis Road, Wind Lake, WI 53185	Chief Rob Robins	(262) 895-7533	(262) 895-6601
Wind Lake Fire Station No. 2	Wind Lake	5517 East Wind Lake Road, Wind Lake, WI 53182	Chief Rob Robins	--	--

Source: Racine County Office of Emergency Management and SEWRPC.

**Appendix D**

**CRITICAL COMMUNITY FACILITIES  
IN RACINE COUNTY**

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**Table D-1**  
**PUBLIC SCHOOLS: 2015**

Identification Number <sup>a</sup>	Facility Name	School District	Community	Address	Telephone Number	Fax Number
1	21st Century Preparatory School <sup>b</sup>	--	City of Racine	1220 Mound Avenue	(262) 598-0026	(262) 598-0031
2	4K Community School <sup>c</sup>	Burlington Area School District	City of Burlington	100 N. Kane Street	(262) 763-0210	(262) 763-0215
3	Burlington High School	Burlington Area School District	City of Burlington	400 McCanna Parkway	(262) 763-0200	(262)-763-0216
4	Cooper Elementary School	Burlington Area School District	City of Burlington	249 Conkey Street	(262) 763-0180	--
5	Dr. Edward G. Dyer Elementary School	Burlington Area School District	City of Burlington	201 S. Kendrick Avenue	(262) 763-0220	(262) 767-5583
6	Lyons Center Elementary School <sup>d</sup>	Burlington Area School District	City of Burlington	1622 Mill Street	(262) 763-5380	(262) 763-5382
7	Nettie E. Karcher Middle School	Burlington Area School District	City of Burlington	225 Robert Street	(262) 763-0190	(262) 767-5580
8	Southern Lakes Consortium Alternative High School	Burlington Area School District	City of Burlington	209 Wainwright Avenue	(262) 767-2626	(262) 767-2628
9	Waller Elementary School	Burlington Area School District	City of Burlington	195 Gardner Avenue	(262) 763-0185	(262) 763-0187
10	Winkler Elementary School	Burlington Area School District	Town of Burlington	34150 Fulton Street	(262) 539-2726	(262) 539-2217
11	Kansasville Elementary School	Dover #1 School District	Town of Dover	4101 S. Beaumont Avenue	(262) 878-3773	(262) 878-1231
12	Lakeview Elementary School	Muskego Norway School District	Town of Norway	23633 Fries Lane	(262) 971-1850	(262) 895-7631
13	North Cape Elementary School	North Cape School	Town of Raymond	11926 Hwy. K	(262) 835-4069	(262) 835-2311
14	Drought Elementary School	Norway J7 School District	Town of Norway	21016 Seven Mile Road	(414) 425-6020	(414) 425-6038
15	Fratt Elementary	Racine Unified School District	City of Racine	3501 Kinzie Avenue	(262) 664-8150	(262) 664-8160
16	Giese Elementary	Racine Unified School District	City of Racine	5120 Byrd Avenue	(262) 664-8250	(262) 664-8270
17	Gifford Elementary <sup>e</sup>	Racine Unified School District	Village of Caledonia	8332 Northwestern Avenue	(262) 619-4550	(262) 886-7956
18	Gilmore Middle School	Racine Unified School District	City of Racine	2330 Northwestern Avenue	(262) 619-4260	(262) 635-5687
19	Goodland Elementary School	Racine Unified School District	City of Racine	4800 Graceland Boulevard	(262) 664-6850	(262) 664-6870
20	Horlick High School	Racine Unified School District	City of Racine	2119 Rapids Drive	(262) 619-4300	(262) 619-5723
21	J.I. Case High School	Racine Unified School District	Village of Mt. Pleasant	7345 Washington Avenue	(262) 619-4200	(262) 886-7942
22	Janes Elementary School <sup>f</sup>	Racine Unified School District	City of Racine	1425 N. Wisconsin Avenue	(262) 664-6550	(262) 664-6553
23	Jefferson Lighthouse Elementary <sup>g</sup>	Racine Unified School District	City of Racine	1722 W. Sixth Street	(262) 664-6900	(262) 664-6910
24	Jerstad Agerholm Elementary	Racine Unified School District	City of Racine	3535 LaSalle Street	(262) 664-6050	(262) 664-6054
25	Jerstad Agerholm Middle School	Racine Unified School District	City of Racine	3601 LaSalle Street	(262) 664-6075	(262) 664-6120
26	Jones Elementary	Racine Unified School District	City of Racine	3300 Chickory Road	(262) 664-8050	(262) 664-8060
27	Julian Thomas Elementary School	Racine Unified School District	City of Racine	930 Martin Luther King Drive	(262) 664-8400	(262) 664-8444
28	Knapp School	Racine Unified School District	City of Racine	2701 17th Street	(262) 664-8000	(262) 664-8010
29	McKinley Middle School	Racine Unified School District	City of Racine	2326 Mohr Avenue	(262) 664-6150	(262) 664-6196
30	Mitchell Elementary School	Racine Unified School District	City of Racine	2713 Drexel Avenue	(262) 664-6350	(262) 664-6375
31	Mitchell Middle School	Racine Unified School District	City of Racine	2701 Drexel Avenue	(262) 664-6400	(262) 635-5787
32	North Park Elementary School	Racine Unified School District	Village of Caledonia	4748 Elizabeth Street	(262) 664-6450	(262) 664-6455
33	Olympia Brown Elementary School <sup>h</sup>	Racine Unified School District	Village of Caledonia	5915 Erie Street	(262) 664-6650	(262) 664-6680
34	P-COC Elementary School	Racine Unified School District	City of Racine	914 Saint Patrick Street	(262) 631-7122	--

Table D-1 (continued)

Identification Number <sup>a</sup>	Facility Name	School District	Community	Address	Telephone Number	Fax Number
35	Racine Civil Leaders Academy <sup>b</sup>	Racine Unified School District	City of Racine	1325 Park Avenue	(262) 664-8500	(262) 631-7121
36	Racine Early Education Center	Racine Unified School District	City of Racine	2015 Franklin Street	(262)-664-8200	(262) 664-8225
37	Red Apple Elementary School <sup>g</sup>	Racine Unified School District	City of Racine	914 St. Patrick Street	(262) 619-4500	(262) 619-5874
38	Roosevelt Elementary School	Racine Unified School District	City of Racine	915 Romayne Avenue	(262) 664-8300	(262) 664-8310
39	S.C. Johnson Elementary School	Racine Unified School District	City of Racine	2420 Kentucky Street	(262) 664-6950	(262) 664-6960
40	Schulte Elementary School	Racine Unified School District	Village of Sturtevant	8515 Westminster Drive	(262) 644-6300	(262) 644-6310
41	Starbuck Middle School	Racine Unified School District	City of Racine	1516 Ohio Street	(262) 664-6500	(262) 664-6510
42	Stephen Bull Fine Arts Elementary School <sup>g</sup>	Racine Unified School District	City of Racine	815 De Koven Avenue	(262) 664-6800	(262) 664-6810
43	The R.E.A.L. School <sup>b</sup>	Racine Unified School District	Village of Caledonia	5915 Erie Street	(262) 631-7067	(262) 631-7097
44	Wadewitz Elementary School	Racine Unified School District	City of Racine	2700 Yout Street	(262) 664-6000	(262) 664-6005
45	Walden III Middle and High School	Racine Unified School District	City of Racine	1012 Center Street	(262) 664-6255	(262)664-6255
46	Washington Park High School	Racine Unified School District	City of Racine	1901 12th Street	(262) 619-4400	(262) 635-5823
47	West Ridge Elementary	Racine Unified School District	Village of Mt. Pleasant	1347 S. Emmertsen Road	(262) 664-6200	(262) 664-6225
48	Raymond Elementary	Raymond #14 School District	Town of Raymond	2659 S. 76th Street	(262) 835-2929	(262) 835-2087
49	Union Grove High School	Union Grove J1School District	Village of Union Grove	3433 S. Colony Avenue	(262) 878-2434	(262) 878-4056
50	Union Grove Elementary School	Union Grove UHS School District	Village of Union Grove	1745 Milldrum Street	(262) 878-2015	(262) 878-3133
51	Washington-Caldwell Elementary School	Washington-Caldwell School District	Town of Waterford	8937 Big Bend Road	(262) 662-3466	(262) 662-9888
52	Evergreen Elementary School	Washington-Caldwell School District	Village of Waterford	817 West Main Street	(262) 534-8210	(262) 534-8211
53	Fox River Middle School	Waterford Graded School District	Village of Waterford	921 W. Main Street	(262) 514-8240	(262) 514-8241
54	Trailside Elementary School	Waterford Graded School District	Village of Waterford	615 N. Milwaukee Avenue	(262) 514-8220	(262) 514-8221
55	Woodfield Elementary School	Waterford Graded School District	Village of Waterford	905 Barnes Drive	(262) 514-8230	(262) 514-8231
56	Waterford Union High School	Waterford Graded School District	Village of Waterford	100 Field Drive	(262) 534-3189	(262) 534-4971
57	Yorkville School	Yorkville J2 School District	Town of Yorkville	18621 Washington Avenue	(262) 878-3759	(262) 878-3794

<sup>a</sup>Identification number on Map 24

<sup>b</sup>Charter School.

<sup>c</sup>4K Community School is kindergarten only

<sup>d</sup>Lyons Center Elementary School is part of the Burlington Area School District but is located in Walworth County. The school does not appear on Map 24.

<sup>e</sup>Construction of an addition to Gifford Elementary School began in August 2015. The addition is scheduled to be completed by the beginning of the 2016 school year. Gifford School will then offer grades kindergarten through eighth grade.

<sup>f</sup>Year-round school.

<sup>g</sup>Magnet School.

<sup>h</sup>Construction of a new building that will house Olympia Brown Elementary School began in August 2015. The new building is scheduled to be completed by the beginning of the 2016 school year. The new location for Olympia Brown Elementary School will be 2115 5 ½ Mile Road, Caledonia, WI 53402.

Source: Wisconsin Department of Public Instruction and SEWRPC.



Table D-2

## PRIVATE SCHOOLS AND TECHNICAL COLLEGES: 2015

Identification Number <sup>a</sup>	Facility Name	Community	Address	Telephone Number	Fax Number
1	Academy of Racine	City of Racine	401 Wisconsin Avenue #102	(262) 635-0614	--
2	Catholic Central High School	City of Burlington	148 McHenry Street	(262) 763-1510	(262) 763-1509
3	CERT School	City of Racine	1437 Marquette Street	(262) 880-4811	--
4	Children's House Montessori School	City of Burlington	125 E. State Street	(847) 650-1303	--
5	Concordia Lutheran School	Village of Sturtevant	8500 Durand Avenue	(262) 884-0991	(262) 833-0322
6	EverGreen Academy	City of Racine	3554 Taylor Avenue	(262) 456 1079	(262) 456-1384
7	Hillside School	Town of Dover	1701 Sharp Road	(262) 534-7257	(262) 534-7257
8	John Paul II Academy	City of Racine	2023 Northwestern Avenue	(262)-637-2012	(262) 637-5130
9	Lutheran High School	City of Racine	251 Luedtke Avenue	(262) 637-6538	(262) 637-6601
10	Our Lady of Grace Academy	City of Racine	1435 Grove Avenue	(262) 636-8040	(262) 636-8045
11	Prairie School	Village of Wind Point	4050 Lighthouse Drive	(262) 752-2500	(262) 752-2517
12	Racine Christian School	City of Racine	912 Virginia Street	(262) 634-0961	(262) 634-7467
13	Racine Montessori School	City of Racine	2317 Howe Street	(262) 637-7892	--
14	Renaissance School	City of Racine	6150 Taylor Avenue	(262) 354-5126	--
15	Small World Montessori School	City of Racine	1008 High Street	(262)-632-6797	--
16	St. Catherine High School	City of Racine	1200 Park Avenue	(262) 632-2785	(262) 632-5144
17	St. Charles Borromeo Catholic School	City of Burlington	449 Conkey Street	(262) 763-2848	(262) 763-3818
18	St. John's Lutheran School	City of Burlington	198 Westridge Avenue	(262) 763-2377	--
19	St. John's Lutheran School	City of Racine	510 Kewaunee Street	(262) 633-2758	(262) 637-7089
20	St. Joseph Grade School	City of Racine	1525 Erie Street	(262) 633-2403	(262) 633-4423
21	St. Lucy's Grade School	City of Racine	3035 Drexel Avenue	(262) 554-1801	(262) 554-7618
22	St. Mary's Grade School	City of Burlington	225 W. State Street	(262) 763-1515	(262) 763-1508
23	St. Rita School	Village of Caledonia	4433 Douglas Avenue	(262) 639-3333	(262) 639-3346
24	St. Thomas Aquinas Grade School	Village of Waterford	302 S. Second Street	(262) 534-2265	(262) 534-5549
25	Trinity Lutheran Evangelical Church and School	Village of Caledonia	7900 Nicholson Road	(262) 835-4326	(262) 835-0707
26	Trinity Lutheran School	City of Racine	2055 Geneva Street	(262) 632-1766	(262) 632-3838
27	Union Grove Christian	Village of Union Grove	417 15th Avenue	(262) 878-1265	(262) 878-2085
28	Wisconsin Lutheran School	City of Racine	734 Villa Street	(262) 456-2770	(262) 633-2770
29	Gateway Technical College, Burlington Center	City of Burlington	496 McCanna Parkway	(262) 767-5200	(262) 767-5201
30	Gateway Technical College, Racine Campus	City of Racine	1001 S. Main Street	(262) 619-6200	(262) 619-6201
31	Gateway Technical College, CATI	Village of Sturtevant	2320 Renaissance Boulevard	(262) 898-7500	(262) 898-7501

<sup>a</sup>Identification number on Map 25.

Source: Wisconsin Department of Public Instruction and SEWRPC.

Table D-3

## SELECTED GOVERNMENT ADMINISTRATION BUILDINGS: 2015

Identification Number <sup>a</sup>	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
City, Village, or Town Halls						
1	Burlington City Hall	City of Burlington	300 N. Pine Street	Dihann Halbach	(262) 342-1171	(262) 763-3474
2	Burlington Town Hall	Town of Burlington	32288 Bushnell Road	Adelheid Streif	(262) 763-3070	(262) 763-2118
3	Caledonia Village Hall	Village of Caledonia	6922 Nicholson Road	Kari Torkilsen	(262) 835-6415	(262) 835-2388
4	Dover Town Hall	Town of Dover	4110 S. Beaumont Avenue	Camille Gerou	(262) 878-2200	(262) 878-2595
5	Elmwood Park Village Hall	Village of Elmwood Park	3131 Taylor Avenue	Barbara McNulty	(262) 554-7818	--
6	Mt. Pleasant Village Hall	Village of Mt. Pleasant	8811 Campus Drive	Stephanie Kohlhagen	(262) 664-7800	(262) 664-7801
7	North Bay Village Hall	Village of North Bay	3615 Hennepin Place	Alix Sanchez	(262) 639-2334	--
8	Norway Town Hall	Town of Norway	6419 Heg Park Road	Patricia Campbell	(262) 895-6335	(262) 895-6601
9	Racine City Hall	City of Racine	730 Washington Avenue	Janice Johnson-Martin	(262) 636-9171	(262) 636-9548
10	Raymond Town Hall	Town of Raymond	2255 76th Street	Linda Terry	(262) 835-4426	(262) 835-4449
11	Rochester Village Hall	Village of Rochester	300 W. Spring Street	Betty J. Novy	(262) 534-2431	(262) 534-4084
12	Sturtevant Village Hall	Village of Sturtevant	2801 89th Street	Mary Cole	(262) 886-7201	(262) 886-7205
13	Union Grove Village Hall	Village of Union Grove	925 15th Avenue	Jill Kopp	(262) 878-1818	(262) 878-3782
14	Waterford Town Hall	Town of Waterford	415 N. Milwaukee	Tina Mayer	(262) 534-2350	(262) 534-6606
15	Waterford Village Hall	Village of Waterford	123 N. River Street	Carrie Orlovsky	(262) 534-3980	(262) 534-5373
16	Wind Point Village Hall	Village of Wind Point	215 E. Four Mile Road	Michael Hawes	(262) 639-3524	(262) 639-5727
17	Yorkville Town Hall	Town of Yorkville	925 15th Avenue	Michael Mckinney	(262) 878-2123	(262) 878-1680
Other Local Government Facilities						
18	Cesar Chavez Community Center	City of Racine	2221 Douglas Avenue	Jason Mars	(262) 636-9221	--
19	City of Racine Municipal Court	City of Racine	800 Center Street	--	(262) 636-9263	--
20	Dr. John Bryant Community Center	City of Racine	601 21st Street	Lesia Hill-Driver	(262) 636-9235	--
21	Dr. Martin Luther King Jr. Community Center	City of Racine	1134 Martin Luther King Jr. Drive	James Wilson	(262) 636-9237	--
22	Festival Park	City of Racine	5 5th Street	--	(262) 636-9229	--
23	Humble Park Community Center	City of Racine	2200 Blaine Avenue	Jeanne Brenner	(262) 636-9226	--
24	Memorial Hall	City of Racine	72 7th Street	--	(262) 636-9169	--
25	Tyler Domer Community Center	City of Racine	2301 12 <sup>th</sup> Street	Jeanne Brenner	(262) 636-9414	
County						
26	Dennis Kornwolf Racine County Service Center	City of Racine	1717 Taylor Avenue	--	(262) 636-3268	(262) 636-7663
27	Racine County Convention and Visitors Bureau	Town of Yorkville	14015 Washington Avenue	Dave Blank	1-800-272-2463	--
28	Racine County Court House	City of Racine	730 Wisconsin Avenue	Wendy Christensen	(262) 636-3121	--
29	Racine County Human Services Center - Burlington	City of Burlington	209 N. Main Street	--	(262) 767-2900	(262) 767-2949

**Table D-3 (continued)**

Identification Number <sup>a</sup>	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
County (continued)						
30	Racine County Law Enforcement Center	City of Racine	717 Wisconsin Avenue	--	(262) 638-3822	(262) 637-5279
31	Ives Grove Office Complex and Public Works Facility	Town of Yorkville	14200 Washington Avenue	--	(262) 886-8440	--
State						
32	Racine Youthful Offender Correctional Facility, Wisconsin Department of Corrections	City of Racine	1501 Albert Street	Pamela Wallace	(262) 638-1999	(262) 638-1777
33	Sturtevant Transitional Facility, Wisconsin Department of Corrections	Village of Sturtevant	9351 Rayne Road	Lisa Avila	(262) 884-2410	(262) 886-6069
34	Wisconsin Department of Natural Resources Service Center	Village of Sturtevant	9531 Rayne Road	--	(262) 884-2300	(262) 884-2306
Federal—U.S. Post Offices						
35	Burlington Post Office	City of Burlington	100 S. Pine Street	Alan Krysiak	(262) 763 6300	(262) 763-2268
36	Caledonia Post Office	Village of Caledonia	11510 County Road G.	Judy Grove	(262) 835-1774	--
37	Four Mile Station Post Office	Village of Caledonia	2635 Four Mile Road	--	(262) 681-7866	(262) 681-9732
38	Franksville Post Office	Village of Caledonia	3319 Roberts Street	John Pucely	(262) 886-3664	(262) 886-1184
39	Kansasville Post Office	Town of Dover	3825 S. Beaumont Avenue	Charles Vines	(262) 878-1032	--
40	Racine Post Office	City of Racine	603 S. Main Street	Ronald A. Farnsworth	(262) 632-1921	(262) 632-0454
41	Rochester Post Office	Village of Rochester	208 W. Main Street	Michele L. Gronke	(262) 534-6100	--
42	Sturtevant Post Office	Village of Sturtevant	2849 Wisconsin Street	Mary B. Olsen	(262) 886-4104	(262) 886-3948
43	Union Grove Post Office	Village of Union Grove	830 Main Street	Wayne C. Litza	(262) 878-1100	(262) 878-0201
44	Waterford Post Office	Village of Waterford	218 N. Milwaukee Street	Richard H. Gramza	(262) 534-3255	(262) 534-3091
45	West Racine Post Office	City of Racine	1300 Perry Avenue	--	(262) 632-1008	(262) 632-3014
Federal—Other Facilities						
46	Social Security Administration	City of Racine	4020 Durand Avenue	--	(262) 554-4089	--
47	U.S. Army Corps of Engineers	Village of Sturtevant	1855 Wisconsin Avenue	--	(262) 884-3011	--
Public Libraries						
48	Burlington Public Library	City of Burlington	166 E. Jefferson Street	Gayle Palk	(262) 342-1130	--
49	Graham Public Library	Village of Union Grove	1215 Main Street	--	(262) 878-2910	--
50	Lakeshores Libraries Main Office	Village of Waterford	752 Cornerstone Crossing	Steve Ohs	(262) 514-4500	(262) 514-4544
51	Racine Public Library	City of Racine	75 7th Street	Jessica MacPhail	(262) 636-9217	--
52	Rochester Public Library	Village of Rochester	208 W. Spring Street	--	(262)-534-3533	(262)-534-3531
53	Waterford Library	Village of Waterford	101 N. River Street	Pam Belden	(262) 534-3988	(262) 534-9624

<sup>a</sup>Identification number on Map 23.

Source: Racine County Office of Emergency Management and SEWRPC.

Table D-4

## HOSPITALS AND MAJOR CLINICS

Identification Number <sup>a</sup>	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
1	Aurora Health Care—Memorial Hospital of Burlington	City of Burlington	252 McHenry Street	--	(262) 767-6000	(262) 767-6711
2	Lakeview Specialty Hospital and Rehab	Town of Dover	1701 Sharp Road	Sheri Capurso	(262) 534-7297	(262) 955-7433
3	Wheaton Franciscan Healthcare—All Saints Spring Street Campus (Formerly St. Mary's Hospital)	City of Racine	3801 Spring Street	--	(262) 687-4011	--
4	Wheaton Franciscan—All Saints Wisconsin Avenue Campus (Formerly St. Luke's Hospital)	City of Racine	1320 Wisconsin Avenue	--	(262) 687-4011	--
5	Aurora Health Center, Burlington	City of Burlington	248 McHenry Street	--	(262) 767-8000	(262) 767-8183
6	Aurora Health Center, Burlington	City of Burlington	116 Dodge Street	--	(262) 767-8000	(262) 767-4343
7	Aurora Health Center, Caledonia	Village of Caledonia	5333 Douglas Avenue	--	(262) 752-2100	(262) 752-2122
8	Aurora Health Center, Mt. Pleasant	Village of Mt. Pleasant	8348 Washington Avenue	--	(262) 884-4000	(262) 884-4177
9	Aurora Health Center, Mt. Pleasant	Village of Mt. Pleasant	8400 Washington Avenue	--	(262) 321-3000	(262) 321-3011
10	Aurora Health Center, Mt. Pleasant	Village of Mt. Pleasant	1151 Warwick Way	--	(262) 886-7360	(262) 886-7361
11	Aurora Health Center, Waterford	Village of Waterford	818 Forrest Lane	--	(262) 514-3700	(262) 514-3865
12	DaVita Harbor View Dialysis	City of Racine	3113 Washington Avenue	--	800-424-6589	(262) 637-1441
13	DaVita Willow Creek Dialysis	Village of Mt. Pleasant	1139 Warwick Way	--	800-424-6589	(262) 884-2802
14	Fresenius Medical Care Midwest Racine Dialysis	Village of Mt. Pleasant	5409 Durand Avenue	--	(262) 598-8727	--
15	Blood Center of Wisconsin—Racine Donor Center	Village of Mt. Pleasant	1120 S. Sunnyslope Road	--	877-232-4376	--
16	Wheaton Franciscan Healthcare—All Saints Walk-In Care	City of Racine	3807 Spring Street	--	(262) 687-8150	--
17	Wheaton Franciscan Healthcare—Emergency Care Center	City of Racine	3803 Spring Street	--	(262) 687-4201	--
18	Wheaton Franciscan Medical Group	Village of Caledonia	2408 Four Mile Road	--	(262) 687-5995	--
19	Wheaton Franciscan Medical Group	City of Racine	One Main Street	--	(262) 687-6100	--
20	Wheaton Franciscan Healthcare—St. Luke's Health Pavillion	City of Racine	3821 Spring Street	--	(262) 687-4011	--
21	Wheaton Franciscan Healthcare—Atrium Medical Offices	City of Racine	3811 Spring Street	--	(262) 687-4011	--
22	Wheaton Franciscan Medical Group	Village of Mt. Pleasant	4328 Old Green Bay Road	--	(262) 687-7606	--
23	Wheaton Franciscan Medical Group	Village of Sturtevant	10340 W. Washington Ave	--	(262) 687-7500	--
24	Wheaton Franciscan Medical Group	Village of Union Grove	1120 Main Street	--	(262) 878-4424	--
25	Central Racine County Health Department <sup>b</sup>	Village of Caledonia	10005 Northwestern Avenue	Margaret Gesner	(262) 898-4460	(262) 898-4490
26	Racine Health Department <sup>c</sup>	City of Racine	730 Washington Avenue	Dottie-Kay Bowersox	(262) 636-9201	(262) 636-9564

<sup>a</sup>Identification number on Map 26.

<sup>b</sup>The Central Racine County Health Department serves the City of Burlington; the Villages of Caledonia, Mt. Pleasant, North Bay, Rochester, Sturtevant, Union Grove, and Waterford; and the Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville.

<sup>c</sup>The City of Racine Health Department serves the City of Racine, and the Villages of Elmwood Park and Wind Point.

Source: Racine County Office of Emergency Management and SEWRPC.

Table D-5

## CHILD CARE CENTERS WITH A CAPACITY OF 20 OR MORE CHILDREN: 2015

Identification Number <sup>a</sup>	Facility Name	Community	Address	Class <sup>b</sup>	Capacity
1	Acelero Learning – Burlington	City of Burlington	209 Wainwright Avenue	Group	37
2	Holy Family Childcare Center	City of Burlington	31144 Hunters Trail	Group	40
3	In His Arms Early Childhood Center	City of Burlington	417 S. Kane Street	Group	50
4	Noah's Ark Preschool	City of Burlington	126 Chapel Terrace	Group	36
5	Plymouth Children's Center Burlington 1	City of Burlington	124 W. Washington Street	Group	50
6	Plymouth Children's Center Burlington 2	City of Burlington	148 E. State Street	Group	50
7	Plymouth Children's Center Burlington 3	City of Burlington	195 Gardner Avenue	Group	32
8	Plymouth Children's Center Burlington 4	City of Burlington	249 Conkey Street	Group	32
9	Acelero Learning – Grand Avenue	City of Racine	1032 Grand Avenue	Group	222
10	Acelero Learning – Green Street	City of Racine	1923 Green Street	Group	160
11	Acelero Learning at NGN	City of Racine	1220 Mound Avenue	Group	132
12	Almost Home Academy II	City of Racine	1401 N. Main Street	Group	91
13	Atonement Lutheran Child Care	City of Racine	2915 Wright Avenue	Group	50
14	Busy Bee's Child Care Center LLC	City of Racine	1143 College Avenue	Group	50
15	Care Bear Childcare Center	City of Racine	1300 Douglas Avenue	Group	42
16	Child Harbor Learning Center	City of Racine	703 Washington Avenue	Group	87
17	Child Universe Day Care Center	City of Racine	1015 Washington Avenue	Group	98
18	Children's Place Child Development Center	City of Racine	2707 Rapids Drive	Group	50
19	Christ Church Cc/Sunshine Mountain Preschool	City of Racine	5109 Washington Avenue	Group	100
20	Dreamland Childcare Center LLC	City of Racine	3034 Kentucky Street	Group	30
21	EV United Methodist Mothers Day Out	City of Racine	212 11th Street	Group	89
22	Holo Child Care Center	City of Racine	2000 Dekoven Avenue	Group	32
23	Happy Faces Daycare	City of Racine	3417 Douglas Avenue	Group	50
24	Heavens Heros Learning Academy LLC	City of Racine	2510 Douglas Avenue	Group	52
25	Kids Klub Dr. Jones	City of Racine	3300 Chicory Road	Group	27
26	Kids Klub Fine Arts	City of Racine	815 Dekoven Avenue	Group	30
27	Kids Klub Jefferson Lighthouse	City of Racine	1722 W. 6 <sup>th</sup> Street	Group	50
28	Kids Klub Red Apple	City of Racine	914 Saint Patrick Street	Group	25
29	Kindercare Learning Ctrs-3 Mile Road	City of Racine	700 3 Mile Road	Group	134
30	LA Pre Enterprise DBA Z-Cite Childcare	City of Racine	2711 19 <sup>th</sup> Street	Group	51
31	Little Champions Learning Center II	City of Racine	3015 Pritchard Drive	Group	35
32	Little Saints Child Care Center	City of Racine	4021 Spring Street	Group	184
33	Lov N Care Children's Academy	City of Racine	2000A Lathrop Avenue	Group	76
34	Mauer Home School LLC	City of Racine	3921 Olive Street	Group	49
35	Moe's Learning Academy LLC	City of Racine	2052 Douglas Avenue	Group	41
36	North Side Preschool	City of Racine	3825 Erie Street	Group	20
37	One Step Ahead Children Center LLC	City of Racine	1630 Douglas Avenue	Group	110
38	Prince Of Peace Preschool/Day Care	City of Racine	4340 Six Mile Road	Group	35
39	Racine Co Opportunity Center Sheridan	City of Racine	4214 Sheridan Road	Group	80
40	Racine Cooperative Preschool	City of Racine	2500 N Green Bay Road	Group	21
41	REE Center 4K Fun Zone	City of Racine	2015 Franklin Street	Group	36
42	SC Johnson Child Care Learning Center	City of Racine	3901 STH 31	Group	480
43	SC Johnson Summer Day Camp	City of Racine	3901 STH 31	Camp	185
44	Serendipity Preschool & Child Care	City of Racine	4811 Six Mile Road	Group	85

**Table D-5 (continued)**

Identification Number <sup>a</sup>	Facility Name	Community	Address	Class <sup>b</sup>	Capacity
45	Small World Montessori School	City of Racine	1008 High Street	Group	56
46	St Edward's Child Development Center	City of Racine	1430 Grove Avenue	Group	98
47	TLC Childcare Center	City of Racine	9605 Spring Street	Group	160
48	TLC School Age Program Gifford	Village of Caledonia	8332 Northwestern Avenue	Group	120
49	Y's Kids Wadewitz	City of Racine	2700 Yout Street	Group	50
50	Discovery Stage Preschool and Childcare	Village of Caledonia	13125 County Road G	Group	110
51	Little Champs Academy	Village of Caledonia	10127 Northwestern Avenue	Group	80
52	Living Hope Academy	Village of Mount Pleasant	1619 Newman Road	Group	27
53	Living Hope Kids Kamp	Village of Mount Pleasant	1619 Newman Road	Camp	40
54	RCC Day Camp	Village of Mount Pleasant	2801 Northwestern Avenue	Camp	20
55	Sealed Air Child Development Center	Village of Mount Pleasant	8501 N. Campus Drive	Group	94
56	YMCA Kids Camp	Village of Mount Pleasant	8501 N. Campus Drive	Camp	124
57	Kids Town USA CCC, Inc.	Village of Sturtevant	9500 Durand Avenue	Group	50
58	Y's Kids Schulte School	Village of Sturtevant	8515 Westminster Drive	Group	48
59	Bright & Beautiful Christian Child Care Center	Village of Union Grove	906 12th Avenue	Group	70
60	Bright & Beautiful Kids Club Program	Village of Union Grove	1745 Milldrum Avenue	Group	68
61	Total Learning Child Care, Inc.	Village of Union Grove	1408 15th Avenue	Group	30
62	Homestead Day Care, LCC-Woodfield Elementary	Village of Waterford	905 Barnes Drove	Group	40
63	Homestead Day Care, LLC II	Village of Waterford	29200-B Evergreen Drive	Group	34
64	It's All About Kids Child Care Center	Village of Waterford	237 N. Milwaukee Street	Group	38
65	It's All About Kids @ Trailside Elementary	Village of Waterford	615 N. Milwaukee Street	Group	44
66	Rainbow Preschool St Peters Lutheran Church	Village of Waterford	145 S. 6th Street	Group	30
67	Today's Child Learning Center, Inc.	Village of Waterford	214 S. Water Street	Group	25
68	Today's Child Learning Center, Inc.	Village of Waterford	817 W. Main Street	Group	50
69	Discovery Days Childcare II, Inc	Town of Norway	8035 S. Racine Avenue	Group	66
70	Lakeview Elementary School SACC	Town of Norway	26335 Fries Lane, Wind Lake	Group	56
71	Little V.I.P. Child Care	Town of Norway	6710 S. Loomis Road, Wind Lake	Group	55
72	Lots For Tots Early Educational Center	Town of Norway	7345 S. Loomis Road, Wind Lake	Group	48
73	Mustard Seed Preschool	Town of Norway	6321 Heg Park Road, Wind Lake	Group	48
74	Kidz Connection B and A School Program, LLC	Town of Raymond	2659 76 <sup>th</sup> Street	Group	35
75	Your Place to Grow Childcare	Town of Raymond	3862 N. Raynor Avenue	Group	29
76	Your Place to Grow II	Town of Raymond	11926 Countyt Hwy K	Group	20
77	Homestead Day Care, LLC	Town of Waterford	8221 Big Bend Road	Group	20
78	Kidz Connection B and A School Program, LLC	Town of Yorkville	18621 Washington Avenue	Group	40
79	My Little School House ECC	Town of Yorkville	19120 Spring Street	Group	50

<sup>a</sup>Identification number corresponds to digital file data for Map 28.

<sup>b</sup>Licensing rules create separate requirements for three categories of licensed child care. Group child care centers serve nine or more children. Family child care centers serve four to eight children. Camps include whole-day or part-day camps and activity programs offered by traditional camps, colleges, and sports programs. Some camp activity programs are intended for young children as theme-focused day care, while others constitute non-residential options for older campers pursuing special interests. The table above only lists child care centers with 20 or more children capacity; therefore, no family child care centers are listed.

Source: Wisconsin Department of Children and Families and SEWRPC.

Table D-6

## NURSING HOMES, ADULT DAY CARE CENTERS, AND ASSISTED LIVING FACILITIES: 2015

Identification Number <sup>a</sup>	Facility Name	Community	Address	Contact Name	Telephone Number
Nursing Homes					
1	Becker Shoop Center	Village of Mt. Pleasant	6101 16th Street	Dawn Minesal	(262) 637-7486
2	Burlington Rehabilitation and Care Center	City of Burlington	677 E. State Street	Abraham Dahan	(262) 763-9531
3	Lincoln Village Convalescent Center	City of Racine	1700 C.A. Becker Drive	Laurel Gerber	(262) 637-9751
4	Oak Ridge Care Center, Inc.	Village of Union Grove	1400 8th Avenue	Bonnie Christensen	(262) 878-2788
5	Ridgewood Health Care Center	City of Racine	3205 Wood Road	Liam Doherty	(262) 554-6440
6	Wheaton Franciscan Healthcare—Lakeshore Manor	City of Racine	1320 Wisconsin Avenue	Debra Ehler	(262) 687-2241
7	Wisconsin Veterans Home—Boland Hall	Town of Dover	21425 E. String Street	Reid Aaron	(262) 878-6702
Adult Day Care Complexes					
8	Abundant Blessings Day Services, LLC	Town of Yorkville	2308 Raymond Avenue	Renee Sparks	(262) 930-5176
10	Dolphin Manor Day Care	Town of Dover	21404 Washington Avenue	Melinda Dolphin	(262) 750-4062
11	Lakeview Neurorehab Center, Inc	Town of Dover	1701 Sharp Road	Robert Williams	(262) 973-9700
13	New Heights Family Adult Day Care Center	City of Racine	2836 Crossridge Drive	Laquisha Cokley	(262) 220-6334
14	The Manna House Adult Day Care Center	City of Racine	3417 Douglas Avenue	Beatrice Johnson	(262) 902-3338
Community-Based Residential Facilities					
15	Applewood Cottage	Town of Waterford	7711 Big Bend Road	James Schilling	(262) 210-6189
16	Arbor View Communities	Town of Burlington	34201 Arbor Lane	Jan Caflich	(262) 539-2728
17	Arbor View Memory Care	Town of Burlington	34111 Arbor Lane	Jan Caflich	(262) 539-2730
18	Artisian Racine	Village of Mt. Pleasant	6109 Braun Road	Beth Vukobrat	(262) 554-6765
19	Calebria House	Village of Burlington	155 Beth Court	Rick Wasmund	(262) 767-7300
20	Eagle House	Town of Yorkville	807 53rd Drive	Angela Anderson	(262) 835-8370
21	Elizabeth Residence Caledonia	Village of Caledonia	5737 Erie Street	Richard Coury	(262) 639-6015
22	Genesis Chatham House	City of Racine	1636 Chatham Street	Pauline Ortloff	(262) 637-2679
23	Genesis Crossroads	City of Racine	4107-09 St. Clair Street	Pauline Ortloff	(262) 833-0001
24	Genesis Spring Place Manor	City of Racine	1725-27 Spring Place	Pauline Ortloff	(262) 833-0001
25	Harmony of Racine	Village of Mt. Pleasant	8600 Corporate Drive	Anna Zapata	(262) 884-8097
26	Hil Fox Mead Group Home	Village of Waterford	516 Fox Mead Crossing	Kelley Clark	(262) 514-3500
27	Hil Hillside	City of Burlington	373 Church Street	Anna Zapata	(262) 569-5515

Table D-6 (continued)

Identification Number <sup>a</sup>	Facility Name	Community	Address	Contact Name	Telephone Number
Community-Based Residential Facilities (continued)					
28	Hil Kendric Home	City of Burlington	265 N. Kendrick Avenue	Kelley Clark	(262) 767-7411
29	Hil Kennedy Home	Village of Caledonia	4305-07 Kennedy Drive	Kelley Clark	(262) 456-4279
30	Hil Wanda Frogg Villa/Meadowhaven	Village of Burlington	524 Summit Avenue	Kelley Clark	(262) 767-0239
31	Lakeview Rehabilitation Center	Town of Dover	1701 Sharp Road	Steve Pietroske	(262) 534-7297
32	Long Lake House	Town of Norway	8208 Racine Avenue, Wind Lake	Paula Heyer	(262) 895-3052
33	Maplewood Cottage	Town of Waterford	7711 Big Bend Road	James Schilling	(262) 210-6189
34	Neurorestorative Wisconsin	Town of Waterford	5310 Buena Park Road	Ann Meeks	(262) 534-4864
35	New Vision Home LLC II	Village of Mt. Pleasant	1449 N. Green Bay Road	David Bedford	(262) 633-9920
36	Pine Brook Pointe	City of Burlington	1001 S. Pine Street	Mary Pearce	(262) 767-1516
37	Prospect Heights Community Living Center	City of Racine	2015 Prospect Street	Randal Marvin	(262) 898-1029
38	Rolling Meadows	Town of Norway	8212 Racine Avenue	Paula Heyer	(262) 895-3052
39	St. Monica's Senior Living, Inc.	Village of Caledonia	3920 N. Green Bay Road	Loretta Baxter	(262) 639-5050
39a	Siena on the Lake <sup>b</sup>	Village of Caledonia	5635 Erie Street	--	(262) 898-9100
40	Timber Oaks	Village of Union Grove	1390 8th Avenue	Sherman Koeberl	(262) 878-4899
41	Tree of Life	Village of Sturtevant	10101 Durand Avenue	Lucero Ayala	(262) 886-2007
42	Waterford Memory Care	Village of Waterford	301 S. 6 <sup>th</sup> Street	Meghan Giese	(262) 534-4800
43	Willowgreen Home	Village of Caledonia	4719 Kingdom Court	Crystal Miller	(262) 681-7201
44	Wisconsin Veterans Home—Fairchild	Town of Dover	21425-D E. Spring Street	Reid Aaron	(262) 878-6752
Residential Care Apartment Complexes					
45	Bay Pointe at the Atrium	City of Racine	3950 N. Main Street	Joann Adame	(262) 639-1100
46	Elizabeth Gardens	City of Racine	5111 Wright Avenue	Richard Coury	(262) 352-9044
47	Harmony Commons Racine	Village of Mt. Pleasant	8500 Corporate Drive	Anna Zapata	(262) 833-0810
48	Home Harbor	City of Racine	1600 Ohio Street	Suzanne Gitz	(262) 619-0000
49	Killarney Kourt	Village of Sturtevant	8800 Shannon Lane	Ethan Bickle	(262) 321-0802
50	Parkview Gardens	Village of Caledonia	5321 Douglas Avenue	Colleen Endsley	(262) 898-4000
51	Waterford Senior Living	Village of Waterford	301 S. 6th Street	Meghan Giese	(262) 534-4800

NOTE: Adult family homes (which serve fewer than five persons) as defined by the Wisconsin Department of Health and Family Services are not included.

<sup>a</sup>Identification number on Map 27.

<sup>b</sup>Construction is underway and the facility is expected to be operating in 2016.

Source: Wisconsin Department of Health Services and SEWRPC.



## Appendix E

# PLANS WITH OPEN SPACE ELEMENTS CONSISTENT WITH REGIONAL PLAN RECOMMENDATIONS: RACINE COUNTY

Comprehensive Plans		
Community	Plans Prepared by	Date
Racine County <sup>a</sup>	SEWRPC	November 2009

Land Use Plans		
Community	Plans Prepared by	Date
Village of Caledonia	Planning and Design Institute (PDI)	August 2006
Village of Mt. Pleasant	Village of Mt. Pleasant and GAI with assistance from SEWRPC	December 2015 <sup>b</sup>
Village of Rochester <sup>c</sup>	Town and Village of Rochester with assistance from SEWRPC	March 2007
Village of Union Grove/Town of Yorkville	SEWRPC	December 2003
Town of Burlington	Town of Burlington	2008
Town of Dover	SEWRPC	August 1999
Town of Norway	Racine County/SEWRPC	June 2009
Town of Raymond	Ruekert-Mielke	May 2005
Town of Waterford	SEWRPC	September 2001

Park and Open Space Plans		
Community	Plans Prepared by	Date
Racine County	SEWRPC	February 2013
City of Burlington	SAA Design Group	2015
City of Racine	SEWRPC	December 2011
Village of Caledonia	Village of Caledonia	2007
Village of Mt. Pleasant	SEWRPC	April 2015
Village of Union Grove	SEWRPC	July 2003
Village of Waterford	Village of Waterford	April 2014
Town of Norway	Michael V. Raap, Cullinane Design	January 1990
Town of Waterford	SEWRPC	January 1990
Town of Raymond	Racine County	January 1979

<sup>a</sup>Multi-jurisdictional covering all of Racine County.

<sup>b</sup>This is an amendment to the original adopted plan in January 2003.

<sup>c</sup>The Town of Rochester and the Village of Rochester were consolidated as the Village of Rochester in December 2008.

Source: SEWRPC.

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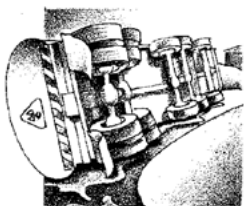
**Appendix F**

**FAMILY DISASTER SUPPLY KIT GUIDENCE**

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# Your Family Disaster Supplies Kit

**D**isasters happen anytime and anywhere. And when disaster strikes, you may not have much time to respond.

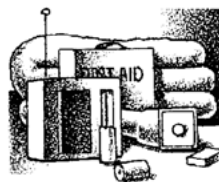


A highway spill of hazardous material could mean instant evacuation.

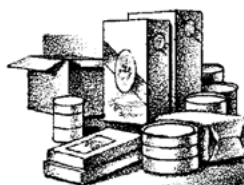


A winter storm could confine your family at home. An earthquake, flood, tornado or any other disaster could cut off basic services—gas, water, electricity and telephones—for days.

After a disaster, local officials and relief workers will be on the scene, but they cannot reach everyone immediately. You could get help in hours, or it may take days. Would your family be prepared to cope with the emergency until help arrives?



Your family will cope best by preparing for disaster *before* it strikes. One way to prepare is by assembling a Disaster Supplies Kit. Once disaster hits, you won't have time to shop or search for supplies. But if you've gathered supplies in advance, your family can endure an evacuation or home confinement.



## To prepare your kit

- Review the checklist in this brochure.
- Gather the supplies that are listed. You may need them if your family is confined at home.
- Place the supplies you'd most likely need for an evacuation in an easy-to-carry container. These supplies are listed with an asterisk (\*).

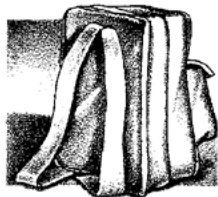


## SUPPLIES

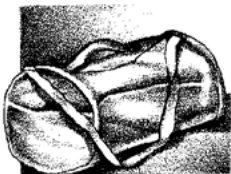
**T**here are six basics you should stock in your home: water, food, first aid supplies, clothing and bedding, tools and emergency supplies and special items. Keep the items that you would most likely need during an evacuation in an easy-to-carry container—suggested items are marked with an asterisk (\*). Possible containers include



a large, covered trash container,



camping backpack,



or a duffle bag.

## Water

Store water in plastic containers such as soft drink bottles. Avoid using containers that will decompose or break, such as milk cartons or glass bottles. A normally active person needs to drink at least two quarts of water each day. Hot environments and intense physical activity can double that amount. Children, nursing mothers and ill people will need more.

- Store one gallon of water per person per day (two quarts for drinking, two quarts for food preparation/sanitation)\*
- Keep at least a three-day supply of water for each person in your household.

## Food

Store at least a three-day supply of non-perishable food. Select foods that require no refrigeration, preparation or cooking and little or no water. If you must heat food, pack a can of sterno. Select food items that are compact and lightweight.

\*Include a selection of the following foods in your Disaster Supplies Kit:

- Ready-to-eat canned meats, fruits and vegetables
- Canned juices, milk, soup (if powdered, store extra water)
- Staples — sugar, salt, pepper
- High energy foods — peanut butter, jelly, crackers, granola bars, trail mix
- Vitamins
- Foods for infants, elderly persons or persons on special diets
- Comfort/stress foods — cookies, hard candy, sweetened cereals, lollipops, instant coffee, tea bags

## First Aid Kit

Assemble a first aid kit for your home and one for each car. A first aid kit\* should include:

- Sterile adhesive bandages in assorted sizes
  - 2-inch sterile gauze pads (4-6)
  - 4-inch sterile gauze pads (4-6)
  - Hypoallergenic adhesive tape
  - Triangular bandages (3)
  - 2-inch sterile roller bandages (3 rolls)
  - 3-inch sterile roller bandages (3 rolls)
  - Scissors
  - Tweezers
  - Needle
  - Moistened towelettes
  - Antiseptic
  - Thermometer
  - Tongue blades (2)
  - Tube of petroleum jelly or other lubricant
  - Assorted sizes of safety pins
  - Cleansing agent/soap
  - Latex gloves (2 pair)
  - Sunscreen
- Non-prescription drugs
- Aspirin or nonaspirin pain reliever
  - Anti-diarrhea medication
  - Antacid (for stomach upset)
  - Syrup of Ipecac (use to induce vomiting if advised by the Poison Control Center)
  - Laxative
  - Activated charcoal (use if advised by the Poison Control Center)

Contact your local American Red Cross chapter to obtain a basic first aid manual.

## Tools and Supplies

- |   |  |
|---|--|
| <input type="checkbox"/> Mess kits, or paper cups, plates and plastic utensils* | <input type="checkbox"/> Needles, thread   |
| <input type="checkbox"/> Emergency preparedness manual*                         | <input type="checkbox"/> Medicine dropper  |
| <input type="checkbox"/> Battery operated radio and extra batteries*            | <input type="checkbox"/> Shut-off wrench, to turn off household gas and water      |
| <input type="checkbox"/> Flashlight and extra batteries*                        | <input type="checkbox"/> Whistle   |
| <input type="checkbox"/> Cash or traveler's checks, change*                     | <input type="checkbox"/> Plastic sheeting  |
| <input type="checkbox"/> Non-electric can opener, utility knife*                | <input type="checkbox"/> Map of the area (for locating shelters)                   |
| <input type="checkbox"/> Fire extinguisher: small canister, ABC type            |  |
| <input type="checkbox"/> Tube tent  | Sanitation   |
| <input type="checkbox"/> Pliers   | <input type="checkbox"/> Toilet paper, towelettes*                                 |
| <input type="checkbox"/> Tape   | <input type="checkbox"/> Soap, liquid detergent*                                   |
| <input type="checkbox"/> Compass  | <input type="checkbox"/> Feminine supplies*  |
| <input type="checkbox"/> Matches in a waterproof container                      | <input type="checkbox"/> Personal hygiene items*                                   |
| <input type="checkbox"/> Aluminum foil  | <input type="checkbox"/> Plastic garbage bags, ties (for personal sanitation uses) |
| <input type="checkbox"/> Plastic storage containers                             | <input type="checkbox"/> Plastic bucket with tight lid                             |
| <input type="checkbox"/> Signal flare   | <input type="checkbox"/> Disinfectant  |
| <input type="checkbox"/> Paper, pencil  | <input type="checkbox"/> Household chlorine bleach                                 |

## Clothing and Bedding

\*Include at least one complete change of clothing and footwear per person.

- |  |  |
|--|--|
| <input type="checkbox"/> Sturdy shoes or work boots* | <input type="checkbox"/> Hat and gloves    |
| <input type="checkbox"/> Rain gear*                  | <input type="checkbox"/> Thermal underwear |
| <input type="checkbox"/> Blankets or sleeping bags*  | <input type="checkbox"/> Sunglasses        |

## Special Items

Remember family members with special needs, such as infants and elderly or disabled persons.

For Baby\*

- Formula
- Diapers
- Bottles
- Powdered milk
- Medications

For Adults\*

- Heart and high blood pressure medication
- Insulin
- Prescription drugs
- Denture needs
- Contact lenses and supplies
- Extra eye glasses

- Entertainment** - games and books
- Important Family Documents**  
Keep these records in a waterproof, portable container.
  - Will, insurance policies, contracts, deeds, stocks and bonds
  - Passports, social security cards, immunization records
  - Bank account numbers
  - Credit card account numbers and companies
  - Inventory of valuable household goods, important telephone numbers
  - Family records (birth, marriage, death certificates)

## SUGGESTIONS AND REMINDERS

- Store your kit in a convenient place known to all family members. Keep a smaller version of the Disaster Supplies Kit in the trunk of your car.



- Keep items in air tight plastic bags.
- Change your stored water supply every six months so it stays fresh.
- Rotate your stored food every six months.
- Re-think your kit and family needs at least once a year. Replace batteries, update clothes, etc.
- Ask your physician or pharmacist about storing prescription medications.



To get started...

Contact your local emergency management or civil defense office and your local American Red Cross chapter.

- Find out which disasters are most likely to happen in your community.
- Ask how you would be warned
- Find out how to prepare for each.

Meet with your family.

- Discuss the types of disasters that could occur.
- Explain how to prepare and respond.
- Discuss what to do if advised to evacuate.
- Practice what you have discussed.

Plan how your family will stay in contact if separated by disaster.

- Pick two meeting places:
  - 1) a location a safe distance from your home in case of fire.
  - 2) a place outside your neighborhood in case you can't return home.
- Choose an **out-of-state** friend as a "check-in-contact" for everyone to call.

Complete these steps.

- Post emergency telephone numbers by every phone.
- Show responsible family members how and when to shut off water, gas and electricity at main switches.

- Install a smoke detector on each level of your home, especially near bedrooms; test monthly and change the batteries two times each year.
- Contact your local fire department to learn about home fire hazards.
- Learn first aid and CPR. Contact your local American Red Cross chapter for information and training

Meet with your neighbors.

Plan how the neighborhood could work together after a disaster. Know your neighbor's skills (medical, technical). Consider how you could help neighbors who have special needs, such as elderly or disabled persons. Make plans for child care in case parents can't get home.

Remember to practice and maintain your plan.



The Federal Emergency Management Agency's Community and Family Preparedness Program and the American Red Cross Community Disaster Education Program are nationwide efforts to help people prepare for disasters of all types. For more information, please contact your local emergency management office and American Red Cross chapter. This brochure and other preparedness materials are available by calling FEMA at 1-800-480-2520, or writing: FEMA, P.O. Box 2012, Jessup, MD 20794-2012. Publications are also available on the World Wide Web at:

FEMA's Web site: <http://www.fema.gov>

American Red Cross Web site: <http://www.redcross.org>

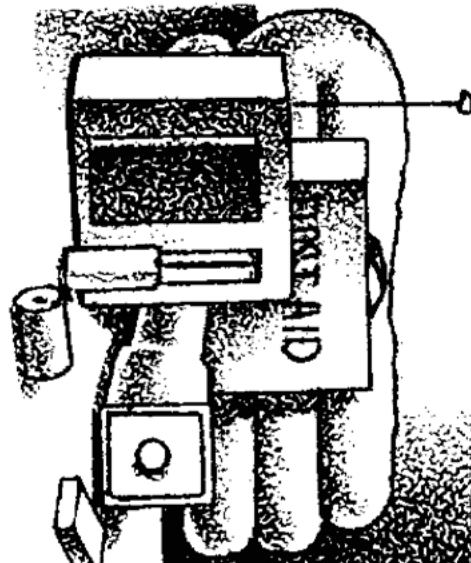
Local sponsorship provided by:

Empty box for local sponsorship information.

FEMA L- 189  
ARC 4463

EARTHQUAKE • TORNADO • WINTER STORM • FIRE

Federal Emergency  
Management Agency



YOUR  
Family Disaster Supplies Kit

HURRICANE • FLASH FLOOD • HAZARDOUS MATERIALS SPILL



## Appendix G

# HAZARD RISK ANALYSIS AND PRIORITIZATION: 2014

### NATURAL AND OTHER HAZARD RISK ANALYSIS

The major natural and other hazards that have been identified as potentially affecting Racine County have been ranked by risk to assist in developing a mitigation plan. Additional description of natural and other hazards as well as the vulnerability assessment of Racine County to these hazards have been identified and summarized in Chapter IV 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 and analyses set forth in Chapter IV. Specifically, this prioritization is based upon the protection of human life and health and protection from property and crop damages throughout the County. Therefore, the major indicators of hazard severity used to rank the natural and other hazards to Racine County are based upon the deaths and injuries versus economic losses resulting from such hazards and summarized in Tables G-1 and G-2, respectively.

As identified in the vulnerability assessment of natural and other hazards to Racine County in Chapter IV, 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 and transportation-related hazards and 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. This does 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 IV, that many disaster events are compound in nature and not the result of a single event, such as increased coastal erosion and 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 to understand the relative potential level of risk each hazard poses to Racine County on an annual basis (see Tables G-1 and G-2).

#### **Ranking Severity of Natural Hazards**

##### ***Death and Injury***

Using the data from the various sources summarized in the vulnerability assessment of Chapter IV, the priority natural and man-made hazards identified in Table 31 were ranked with respect to their severity in terms of the sum of the number of annual death and injuries caused. For those hazards that caused the same amount of injuries and deaths per year, the hazard with the higher number of occurrences per year was given higher ranking. Those hazards for which no deaths or injuries have been recorded, or for which no data was available, the priority ranking was determined based on data of known occurrences outside of Racine County, as well as logical assumptions.

Eight of the 15 identified hazards are associated with mortality and injury, as shown in Table G-1. These hazards in order of ranking include: public health emergencies, transportation accidents, thunderstorm and high wind related hazards, hazardous material incidents, temperature extremes, tornadoes, winter storms, and flooding. The remaining hazards have never been recorded to be associated with human mortality or injury within Racine County based on known data.

Public health emergencies pose the greatest risk to human life and injury compared to any other hazard in Racine County. As summarized in the vulnerability and community impact assessment in Chapter IV, public health related incidents represent a broad category of events. The frequencies and durations of individual disease outbreaks are difficult to predict, due to differences among disease agents in their infectivity, virulence, and mode of transmission.

Transportation-related accidents represent the second most costly hazard in terms of injuries and lost lives. Transportation-related accidents are not expected to change significantly in the future due to their dependence upon a number of factors that include the type of vehicle, density of traffic, type of roadway, type of driver, road conditions, weather conditions, and safety equipment. There were several segments on IH 94 that exceeded the Racine County freeway system average crash rate of 33.7 crashes per 100 million vehicle-miles, as shown on Map 38. The greatest exceedance of the average Racine County crash rate occurred on STH's 11, 20, 32, and 38 within the City of Racine.

Thunderstorm wind, non-thunderstorm high-wind, hail, and lightning, as a group, pose the third highest risk of injury or death in Racine County. The vulnerability and community impact assessment indicates that the entire County is equally at risk from these hazards, as shown on Map 35 in Chapter IV of this report. These events are highly unpredictable in terms of exactly where they may occur and how powerful they might be.

Hazardous material incidents, temperature extremes, and tornadoes are ranked fourth, fifth, and sixth highest risk for injury and death, respectfully. These hazards each cause one injury or death about once every five years in Racine County and are separated in rank by the average number of incidents per year. Hazardous material incidents occur, on average, 3.6 times per year in the County through releases from fixed facilities or pipelines, or during transportation of such materials. Temperature extremes, which occur on average 2.7 times per year in the County, are hazards that primarily affect high risk communities including the very young, the very old, persons with mental and physical illness, and the homeless. Tornadoes occur less than once every two years in Racine County, however when they do occur they pose a significant risk to public health and safety. Tornado events are highly unpredictable in terms of where they may occur and how powerful they might be.

Winter storms and flooding events were the seventh and eighth most dangerous hazards, respectively, in terms of injuries and deaths in Racine County. Each hazard causes about one injury or death every ten years in the County. Winter storms occur in the County about 6.3 times per year on average compared to 1.6 occurrences of flooding events each year. Both of these hazards have relatively advanced warnings, giving people a chance to prepare and typically avoid injury.

The remaining seven hazards have not been documented as causing mortality or injury in Racine County based upon available data. These include natural hazards—Lake Michigan coastal erosion and drought—and human induced hazards—terrorism and active shooter incidents, power outages, and cyber-attacks on local governments. Also included in this group is contamination or loss of water supply, which can be caused by both natural and human induced actions. It is important to note that while no injuries or loss of life from these hazards have occurred in Racine County, a future occurrence could substantially increase the rank of any of these hazards.

### ***Property and Crop Damages***

Another way to assess the vulnerability of Racine County to natural and other hazards is to examine the property and crop damages experienced. Again, using the data from the various sources summarized in the vulnerability assessment of Chapter IV, natural and man-made hazards in Racine County were ranked with respect to their severity in terms of the annual sum of the property and crop damage caused. For those hazards which no property or crop

damages have been recorded, or for which no data was available, priority ranking was determined based on data of known occurrences outside of Racine County, as well as logical assumptions.

Estimates of property and/or crop damages were available for eight of the 15 priority hazards. Natural hazards associated with severe weather comprised six of the eight hazards with reported property damage in Racine County. The most costly hazards in order of appearance based upon total annual property and crop damages include: transportation accidents; flooding; tornadoes; thunderstorm and high-wind related hazards; drought; hazardous material incidents; temperature extremes; and winter storms.

Among the hazards with reported property and crop damages, transportation-related accidents were identified as resulting in the greatest amount of damage to property in Racine County. Traffic accidents cause over \$61.1 million in property damages in the County each year. As summarized in the vulnerability and community impact assessment in Chapter IV, transportation-related accidents are not expected to change significantly in the future due to their dependence upon a number of factors that include the type of vehicle, density of traffic, type of roadway, type of driver, road conditions, weather conditions, and safety conditions.

Flooding events represent the second most damaging hazard identified for Racine County. As shown on Maps 31 and 32 in Chapter IV of this report, flooding hazard risks are mostly associated with the major river and lake systems within the County which include water bodies located in the Fox River, Root River, Pike River, and Des Plaines River watersheds. The impact assessment further indicates that due to economic importance and extent of agricultural acreage in Racine County, flooding is the most costly hazard in terms of potential crop damage. In addition to flooding associated with the major river and lake systems, poor drainage in agricultural areas that were historically wetland and marshland cause large annual crop losses in some regions of the County. An average of over \$1.5 million in crop losses were reported in the County each year.

Tornadoes were identified as the third most damaging hazard affecting Racine County. Tornadoes occur less than once every two years in Racine County, however when they do occur they can cause significant property damage. Tornado events are highly unpredictable in terms of where they may occur and how powerful they might be. Tornadoes caused an annual average of \$513,490 in property and crop damages. Distribution of tornado events are scattered across the entire County, as shown on Map IV-7 in Chapter IV of this report.

Severe thunderstorm wind, non-thunderstorm high-wind events, hail, and lightning, as a group, were ranked as the fourth most costly hazards in the County. While the property damage caused by a single severe tornado may be greater than that caused by a single severe thunderstorm or high wind related event, these events occur about 26 times more often than tornadoes do in Racine County. The vulnerability and community impact assessment indicates that the entire County is at risk from thunderstorm and high wind related hazards as shown on Map 35 in Chapter IV of this report. These events caused an annual average of \$417,751 in property and crop damages.

Drought ranked as the fifth most costly hazard in Racine County in terms damage associated with crop losses. An annual average of \$298,214 in crop losses due to drought were reported in the County.

Hazardous material incidents, as a group, are the sixth most costly hazard in Racine County in terms of property and crop damages. Given that many of these incidents are transportation-related, areas around major interstates, highways, and railways may be at more risk from this hazard.

Temperature extremes and winter storms round out the top eight most damaging hazards in Racine County according to reported losses. These hazards cause an average of \$5,847 and \$1,766 of annual reported property damage, respectively,

Based upon known data, three of the remaining seven hazards shown in Table G-2—cyber-attack on local government, terrorism incidents, and active shooter incidents—have not been recorded to have occurred in Racine County.

Incidences of the four other remaining hazards—Lake Michigan coastal erosion, contamination or loss of water supply, power outages, and public health emergencies—have been reported; however sufficient data regarding property damages caused by these hazards were not available to allow calculation of the average annual damages. Given the current Lake Michigan bluff recession taking place in the Villages of Caledonia and Mount Pleasant, as described in Chapter IV of this report, the priority ranking for the hazard of Lake Michigan coastal erosion as represented in Table G-2 may be too low. Despite the lack of damage estimates associated with the ongoing bluff recession in these areas, it is the determination of the Local Planning Team that it would be warranted to increase the priority ranking of the hazard of Lake Michigan coastal erosion for the hazard mitigation plan.

The priority rankings based upon mortalities, injuries, and property and crop damage in this update are similar to those presented in the first update of the Racine County hazard mitigation plan. While the rank order of most of the hazards has changed, the ranks of most hazards are within two positions of their ranking in the first plan update. Most of these changes in ranking reflect the way damages, injuries, and deaths are were reported for this update. For economic losses resulting from damages to crops, the data from the National Climatic Data Center (NCDC) was supplemented for this plan update with records of crop insurance indemnities from the U.S. Department of Agriculture Risk Management Agency. It should be noted, the NCDC relies on damages reported by county, state, and federal emergency management officials, local law enforcement officials, volunteer weather spotters, National Weather Service damage surveys, newspaper articles, the insurance industry, and the general public. Often property damage and crop damage due to weather events will go unreported. Thus, property damages and crop damages discussed above clearly represent an underestimate of actual damages that have occurred in weather events. In addition, previous editions of this report include deaths, injuries, property damage, and crop damage estimates that were reported, in some cases, based upon a larger geographic area than Racine County itself. The NCDC storm events database has since been refined to include data specific to Racine County for weather events. Therefore, deaths, injuries, and damages due to weather events reported in this 3rd Edition are specific to Racine County and may be lower than previous editions of this report.

## **RANKING SUMMARY**

Hazard severity can be assessed and ranked in a variety of ways. As shown in the analysis above, the severity of a particular hazard can differ significantly depending the impacts that are being ranked. 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 for inclusion in the Racine County Hazard Mitigation Plan 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 preventive 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—mapping, building codes, zoning laws, insurance, elevation or acquisition of floodprone structures or lands, 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 disasters in Wisconsin are probably the hazards that will cause future disasters. However, the types of natural and man-made hazards that result in fatalities remain a public health and safety concern, which is why these hazards were incorporated by the Racine County Hazard Mitigation Local Planning Team into the updated hazard mitigation plan and implementation strategies, as summarized in Chapter V of this report.

**Table G-1**

**PRIORITY RANKING OF NATURAL AND OTHER HAZARDS AFFECTING RACINE COUNTY BASED UPON MORTALITY AND INJURY**

Order Based on Local Planning Team Perception <sup>a</sup>	Natural and Other Hazards	Period of Record	Number of Hazard Incidents per Year (average)	Number of Mortalities per Year (average)	Number of Injuries per Year (average)	Sum of Average Mortality and Injury Incidences per Year	Priority Ranking Based on Analysis
31	Public Health Emergencies	2005-2013	1,552.3 <sup>b</sup>	1,394.9 <sup>c</sup>	1,552.3 <sup>b</sup>	2,947.2	1
7	Transportation Accidents	1999-2013 <sup>d</sup>	3,891.1	18.2	2,094.4	2,112.6	2
5	Thunderstorms/High Wind	1990-2014	10.6	0.1	26.0	26.1	3
13	Hazardous Material Incidents	1971-2014 <sup>e</sup>	3.6	0.0	1.0	0.2	4
4	Temperature Extremes	1995-2014	2.7	0.1	0.1	0.2	5
2	Tornadoes	1957-2014	0.4	0.0	0.2	0.2	6
1	Winter Storms	1996-2014	6.3	0.1	0.1	0.1	7
9	Flooding	1990-2014	1.6	0.1	0.0	0.1	8
34	Contamination or Loss of Water Supply	- <sup>f</sup>	- <sup>f</sup>	- <sup>f</sup>	- <sup>f</sup>	- <sup>f</sup>	9
32	Lake Michigan Coastal Erosion	1975-1995	1-2 (feet of erosion per year) <sup>g</sup>	0.0	0.0	0.0	10
37	Drought	2002-2014	0.4	0.0	0.0	0.0	11
27	Terrorism Incident	2000-2014	0.0	0.0	0.0	0.0	12
25	Active Shooter Incident	1966-2014	0.0	0.0	0.0	0.0	13
18	Power Outage Incidents	2010-2015	9.3	- <sup>f</sup>	- <sup>f</sup>	- <sup>f</sup>	14
20	Cyber Attack on Local Government	- <sup>h</sup>	- <sup>h</sup>	0.0	0.0	0.0	15

NOTE: The solid horizontal line within the table separates hazards for which injuries and mortalities were documented and hazards for which no injuries or mortalities occurred (or for which no data was available).

<sup>a</sup>These numbers indicate the ranked order of the hazards assigned by the Racine County Hazard Mitigation Plan Local Planning Team through responses given in the Hazard and Vulnerability Assessment Tool (HVA). Where hazards listed in the HVA have been consolidated for analysis and planning purposes, the order is based upon the highest rank given in the HVA. There were 45 separate hazards that were ranked. For more details see Hazard Identification section and Table 26 in Chapter IV in this report.

<sup>b</sup>Based upon cases of selected communicable diseases reported in Racine County from 2005 through 2013.

<sup>c</sup>Based upon the total number of mortalities reported due to selected causes in Racine County from 2005 through 2013, as reported in Table IV-35 (deaths due to accidents were not included).

<sup>d</sup>Data reflect automobile accidents from years 1999 through 2013 and railroad accidents from years 1975 through 2014.

<sup>e</sup>Data reflect pipeline-related incidents from years 1976 through 2014 and transportation-related incidents from years 1971 through 2014.

<sup>f</sup>Incidents have been reported, however no data is available to calculate annual averages.

<sup>g</sup>A SEWRPC study completed in 1997 found erosion rates ranging from zero to nine feet per year. A similar study by the Wisconsin Coastal Management Program covering areas in Racine, Ozaukee, and Manitowoc Counties, found erosion rates ranging from zero to 5.5 feet per year for Racine County. Recently areas of Racine County, specifically the Villages of Mount Pleasant and Caledonia, have experienced much greater bluff recession rates. In 2016, property owners in the Lake Park neighborhood in Mount Pleasant lost more than 40 feet of bluff.

<sup>h</sup>No data available.

Source: National Climatic Data Center; U.S. Department of Transportation, Office of Pipeline Safety; Wisconsin Department of Transportation; Kenosha County Division of Emergency Management; and SEWRPC.

Table G-2

## PRIORITY RANKING OF NATURAL AND OTHER HAZARDS AFFECTING RACINE COUNTY BASED UPON PROPERTY AND CROP DAMAGE

Order Based on Local Planning Team Prioritization <sup>a</sup>	Natural and Other Hazards	Period of Record	Number of Hazard Incidents per Year (average)	Total Property Damage per Year (dollars) <sup>b</sup>	Total Crop Damage per Year (dollars) <sup>b</sup>	Sum of Property and Crop Damage per Year (dollars) <sup>b</sup>	Priority Ranking Based on Analysis
7	Transportation Accidents	1999-2013 <sup>c</sup>	3,891.1	61,164,825	0	61,164,825	1
9	Flooding	1990-2014	1.6	334,446	1,533,736	1,868,182	2
2	Tornadoes	1957-2014	0.4	513,240	250	513,490	3
5	Thunderstorms/High Wind	1990-2014	10.6	367,488	50,263	417,751	4
37	Drought	2002-2014	0.4	0	298,214	298,214	5
13	Hazardous Material Incidents	1971-2014 <sup>d</sup>	3.6	8,196	0	8,196	6
4	Temperature Extremes	1995-2014	2.7	285	5,562	5,847	7
1	Winter Storms	1996-2014	6.3	1,322	444	1,766	8
32	Lake Michigan Coastal Erosion	1975-1995	1-2 (feet of erosion per year) <sup>e</sup>	-- <sup>f</sup>	-- <sup>f</sup>	-- <sup>f</sup>	9 <sup>g</sup>
34	Contamination or Loss of Water Supply	--	-- <sup>h</sup>	-- <sup>h</sup>	-- <sup>h</sup>	-- <sup>h</sup>	10
18	Power Outage Incidents	2010-2015	9.3	-- <sup>f</sup>	-- <sup>f</sup>	-- <sup>f</sup>	11
20	Cyber Attack on Local Government	--	-- <sup>h</sup>	-- <sup>h</sup>	0	--	12
27	Terrorism Incident	2000-2014	0.0	0	0	0	13
25	Active Shooter Incident	1966-2014	0.0	0	0	0	14
31	Public Health Emergencies	2005-2013	1,552.3 <sup>i</sup>	0	0	0	15

NOTE: The solid horizontal line within the table separates hazards for which property and crop damages were documented and hazards for which no property or crop damages had occurred (or for which no data was available).

<sup>a</sup>These numbers indicate the ranked order of the hazards assigned by the Racine County Hazard Mitigation Plan Local Planning Team through responses given in the Hazard and Vulnerability Assessment Tool (HVA). Where hazards listed in the HVA have been consolidated for analysis and planning purposes, the order is based upon the highest rank given in the HVA. There were 45 separate hazards that were ranked. For more details see Hazard Identification section and Table 26 in Chapter IV in this report.

<sup>b</sup>Dollar values were adjusted to year 2014 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.

<sup>c</sup>Data reflect automobile accidents from years 1999 through 2013 and railroad accidents from years 1975 through 2014.

<sup>d</sup>Data reflect pipeline-related incidents from years 1976 through 2014 and transportation-related incidents from years 1971 through 2014.

<sup>e</sup>A SEWRPC study completed in 1997 found erosion rates ranging from zero to nine feet per year. A similar study by the Wisconsin Coastal Management Program covering areas in Racine, Ozaukee, and Manitowoc Counties, found erosion rates ranging from zero to 5.5 feet per year for Racine County. Recently areas of Racine County, specifically the Villages of Mount Pleasant and Caledonia, have experienced much greater bluff recession rates. In 2016, property owners in the Lake Park neighborhood in Mount Pleasant lost more than 40 feet of bluff.

<sup>f</sup>Incidents have been reported, however no data is available to calculate annual averages.

<sup>g</sup>Given the current situation regarding Lake Michigan bluff recession in the Villages of Caledonia and Mount Pleasant, as described in Chapter IV of this report, the priority ranking of this hazard as shown in this table may be too low.

<sup>h</sup>No data available.

<sup>i</sup>Based upon cases of selected communicable diseases reported in Racine County from 2005 through 2013.

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

## Appendix H

# EXTREME TEMPERATURE HEATING AND COOLING SITES IN RACINE COUNTY: 2015

Site Name	Address	Hours	Phone Number
Community Centers			
Cesar Chavez Community Center	2221 Douglas Avenue, Racine	Hours Vary	262-636-9454
Dr. John Bryant Community Center	601 21st Street, Racine	Hours Vary	262-636-9236
Dr. Martin Luther King Jr. Community Center	1134 Dr. MLK Jr. Drive, Racine	Monday – Friday 8 am to 6 pm	262-636-9445
Humble Park Community Center	2200 Blaine Avenue, Racine	Hours Vary	262-636-9226
Tyler-Domer Community Center	2301 12 <sup>th</sup> Street, Racine	Hours Vary	262-636-9415
Burlington Senior Center	201 N. Main Street, Burlington	Hours Vary	262-767-9880
Union Grove Village Hall Community Room	925 15th Avenue, Union Grove	Hours Vary	262-878-1818
Public Libraries			
Racine Public Library	75 7th Street, Racine	Monday – Thursday 9 am to 8 pm Friday – Saturday 11 am to 4 pm	262-636-9241
Burlington Public Library	166 E. Jefferson Street, Burlington	Monday – Thursday 9 am to 9 pm Friday – Saturday 9 am to 5:30 pm	262-763-7623
Rochester Public Library	208 W. Spring Street, Rochester	Monday – Thursday 9:30 am to 7:30 pm Saturday 9:30 am to 3 pm Sunday 1 pm to 4 pm	262-534-3533
Graham Public Library	1215 Main Street, Union Grove	Monday – Thursday 9 am to 8 pm Friday 9 am to 5 pm Saturday 9 am to 3 pm	262-878-2910
Waterford Public Library	101 N. River Street, Waterford	Monday – Thursday 9 am to 8 pm Friday 9 am to 5 pm Saturday (Winter) 9 am to 3 pm Saturday (Summer) 9 am to 1 pm	262-534-3988
Shopping Centers			
Regency Mall	5538 Durand Avenue, Racine	Monday – Friday 10 am to 9 pm Saturday 10 am to 8 pm Sunday 11 am to 6 pm	262-554-7903
Target	5300 Durand Avenue, Racine	Monday – Saturday 8 am to 10 pm Sunday 8 am to 9 pm	262-445-6998
Walmart – Sturtevant	3049 S. Oakes Road, Sturtevant	24 Hours	262-598-8487
Walmart – Burlington	1901 Milwaukee Avenue, Burlington	24 Hours	262-767-9520
Medical Centers			
Wheaton Franciscan All Saints	3801 Spring Street, Racine	24 Hours	262-687-4011
Aurora Memorial Hospital	252 McHenry Street, Burlington	24 Hours	262-767-6000
Municipal Buildings			
Norway Town Hall	6419 Heg Park Road, Wind Lake	Monday – Friday 8 am to 5 pm	262-895-6335

**Appendix H (continued)**

Site Name	Address	Hours	Phone Number
<b>Municipal Buildings</b>			
Norway Town Hall	6419 Heg Park Road, Wind Lake	Monday – Friday 8 am to 5 pm	262-895-6335
<b>Community Shelters</b>			
Homeless Assistance Leadership Organization (HALO)	2000 DeKoven Avenue, Unit 1, Racine	24 Hours Must have a Racine County ID and eviction notice or proof of homelessness	262-637-9559
Safe Haven of Racine	1030 Washington Avenue, Racine	24 Hours; Available for minors age 10-17 only	262-637-9559
Salvation Army	1901 Washington Avenue	9 am to 4 pm	262-632-3147
<b>Other Community Locations</b>			
Marcus Renaissance Theater	10411 Washington Avenue, Sturtevant	- -	262-886-2900
Plaza Theatre	448 Milwaukee Avenue, Burlington	- -	262-763-6789

**NOTE:** Individuals should contact the location to verify their operating hours before visiting. During extreme temperature events, some locations may have extended hours. Certain locations may only allow paying customers.

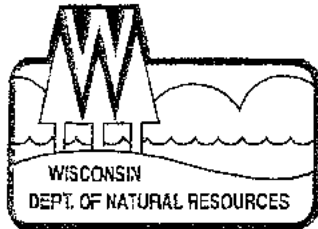
**Source:** *City of Racine Health Department and Central Racine County Health Department.*



**Appendix I**

**WISCONSIN DEPARTMENT OF NATURAL  
RESOURCES CORRESPONDENCE REGARDING  
STANDARD EMERGENCY OPERATION PLAN  
FOR WATER SUPPLY FACILITIES**

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State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Scott McCallum, Governor  
Darrell Bazzell, Secretary

101 S. Webster St.  
Box 7921  
Madison, Wisconsin 53707-7921  
Telephone 608-266-2621  
FAX 608-267-3579  
TTY 608-267-6897

October 8, 2001

Subject: Water System Security

Dear Water System Owner:

The events of September 11, 2001 will likely have profound affects on all our lives over the coming months and years. One effect that is already noticeable in the transportation industry is heightened security. The water supply industry, like the transportation industry, serves hundreds of millions of people every day. Therefore, as primary protectors of public health, we must be mindful of our responsibility to protect our customers and citizens against the potential of contaminated drinking water.

Toward that end, the Department would like to share with you some of our suggestions which may help keep your water system secure from external contamination, both intentional and accidental. Please keep in mind that the majority of these suggestions are either required by current State regulations or have been long recognized as sound operational security practices. We strongly urge you to implement as many of these suggestions as you find applicable and practicable in your individual situations.

The Department requests that every community water system perform a security analysis for their facilities. A standard emergency operation plan should be in place in event of mechanical failures, power outages, unsafe samples and threats or acts of terrorism.

Consider these basic security measures:

1. Cover all openings into reservoirs, treatment system vents and inlets with heavy hardware cloth, welded rods or other metal louvers resistant to removal. Code has always required these to be covered with fine mesh screen to exclude vermin. Now, these should also be designed to prevent intentional access. Frequent, regular inspections should be done of all vents in areas accessible to the public.
2. Lock all pumphouses, reservoirs, booster stations and other remote facilities.
3. Restrict public access, especially by vehicles, to reservoir and pump house service roads. Be mindful of the possibility of large vehicles that could contain explosives and the proximity they can access. This can be accomplished with substantial locked gates, staggered concrete barriers, grading moats or by parking a large vehicle (snow plow, garbage truck).
4. Prohibit parking/stopping on public roadways adjacent to reservoirs, pump stations, treatment facilities within proximity where vehicle bomb explosions could impact facilities.

5. Request increased routine police patrols in sensitive areas and strict parking enforcement.
6. Operators should visit all facilities daily and maintain a log.
7. Install security lighting, motion detectors and TV cameras.
8. Maintain effective disinfection capability. Chlorine, ozone and UV can be effective in destroying many biological agents. Acquire emergency disinfection equipment now if not already chlorinating.
9. Maintain a free chlorine residual at the ends of the distribution system of at least 0.2ppm. A free chlorine residual of 0.5 ppm could reasonably inactivate most biological agents likely to be used by terrorists.
10. Maintain chemical additives (fluoride, alum, lime) etc. under secure conditions that discourage tampering. Assure that containers delivered by suppliers are intact, secure and quality checked as feasible. Use only reliable sources and known contractors.
11. Develop a list of alternate, emergency water sources within the community such as industrial, commercial and private wells. Update inspection and testing programs for these wells pursuant to NR811.10. Develop plans with neighboring communities for mutual assistance to provide emergency water.
12. Train operators and plant personnel in security awareness. To prevent sabotage, think how would you attack your system? Then take measures to discourage or prevent such schemes from being effective.
13. Restrict access to water main maps and plans of all facilities. Seek legal counsel on open records requests to obtain facility plans. Contact consultants, contractors and regulators who have plans in their possession and require guarantees that access to their copies be secured. Access to water distribution maps is most sensitive.
14. Consider the reliability and security status of current and former personnel.
15. Post the chain of action for reporting threats or acts of terrorism: Call local law enforcement first. Local law enforcement authorities would in turn contact Wisconsin Emergency Management and the Federal Bureau of Investigation if it is determined that tampering has actually occurred at your water system. Second, call your local health department, the local health department will in turn call the Division of Health and Family Services Emergency Hotline at 1-608-258-0099. Have a plan for rapid public notification in place and practice it.
16. Join a security network such as Infragard, and/or contact American Waterworks Association to become part of their security information system by e-mailing: [security@awwa.org](mailto:security@awwa.org). Consider hiring a professional consulting firm such as Sandia National Labs to develop a security plan. Visit the following websites on water system security: [www.infragard.net](http://www.infragard.net) , [www.wi-infragard.com](http://www.wi-infragard.com) , [www.awwa.org](http://www.awwa.org) , [www.awwa.org/waterweek/wwlast.htm](http://www.awwa.org/waterweek/wwlast.htm) , [www.amwa.net/isac/](http://www.amwa.net/isac/)

In addition to the preceding suggestions, the Department has been actively reviewing and revising our own emergency management plans and we have taken the initial steps to try to obtain additional formal training for our staff. We intend to highlight security as an issue in upcoming sanitary surveys and water system inspections and you can expect continued emphasis from our staff regarding water system emergency plans. Please remember that while the tragic events of September 11 may be the impetus for some of this emphasis, system security and emergency planning are essential for many types of natural

catastrophes. The tornado damage in the Village of Siren this year, comes to mind. Finally, please rest assured that as we get additional information and are able to offer it to you, we will do so.

While we have not yet established a formal organizational conduit for information requests, please direct any questions you might have regarding security or emergency planning to our Regional Drinking Water Experts through your assigned regional drinking water specialist or engineer. If information is needed beyond the expertise of our Regional Staff and Experts, they will forward requests to central office staff for answers or advice.

Thank you for doing your part to protect Wisconsin's drinking water.

Sincerely,

Jill D. Jonas, Director  
Bureau of Drinking Water & Groundwater

cc: Regional DG Experts  
Regional Water Leaders  
Barb Zellmer, AD/5  
Susan Sylvester, AD/5  
Bill Sonzogni, SLH  
Lynda Knobloch, DHFS, Division of Health  
Dave Sheard, PSC

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## Appendix J

# POTENTIAL FUNDING PROGRAMS TO IMPLEMENT PLAN RECOMMENDATIONS

### FUNDING PROGRAM DESCRIPTIONS

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
1	U.S. Federal Emergency Management Agency (FEMA)	Hazard Mitigation Grant Program	State agencies and participating National Flood Insurance Program (NFIP) communities, private nonprofit organizations	<ol style="list-style-type: none"> <li>1. Acquisition and relocation or demolition of structures in flood hazard areas</li> <li>2. Floodproofing</li> <li>3. Construction or modification of dikes, levees, floodwalls, seawalls, groins, jetties, breakwaters, and stabilized sand dunes</li> <li>4. Bluff and Soil stabilization</li> <li>5. Minor structural projects</li> <li>6. Flood control projects for critical facilities</li> <li>7. Management costs</li> <li>8. Informational activities</li> <li>9. Plan preparation</li> <li>10. Technical assistance</li> <li>11. Safe room construction</li> </ol>	75 percent Federal cost-share assistance; 12.5 percent State match and 12.5 percent local match required <sup>a</sup>	Within 60 days of a Presidential disaster declaration
2	FEMA	Flood Mitigation Assistance Program	State agencies and participating NFIP communities	<ol style="list-style-type: none"> <li>1. Elevation, relocation, or demolition of insured structures</li> <li>2. Acquisition</li> <li>3. Dry floodproofing</li> <li>4. Minor structural projects</li> <li>5. Beach nourishment activities</li> </ol>	Funding is appropriated by Congress annually; 75 percent Federal cost-share assistance; 25 percent local match required; two types of grants: Planning grant and project grant <sup>b</sup>	Varies
3	FEMA	Public Assistance Program	State agencies and local communities	<ol style="list-style-type: none"> <li>1. Rebuilding infrastructure damaged during a flood</li> <li>2. Building infrastructure for portions of a community that are to be relocated outside of floodplains</li> <li>3. Limited assistance with structural elevation and relocation</li> </ol>	75 percent Federal cost-share assistance; the State determines the local match	Within 30 days of a Presidential disaster declaration

## Appendix J (continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
4	FEMA	Pre-Disaster Mitigation Program	States and local communities	<ol style="list-style-type: none"> <li>1. Acquisition and relocation or demolition of structures in flood hazard areas</li> <li>2. Floodproofing</li> <li>3. Construction or modification of dikes, levees, floodwalls, seawalls, groins, jetties, breakwaters, and stabilized sand dunes</li> <li>4. Soil stabilization</li> <li>5. Minor structural projects</li> <li>6. Flood control projects for critical facilities</li> <li>7. Management costs</li> <li>8. Informational activities</li> <li>9. Plan preparation</li> <li>10. Technical assistance</li> <li>11. Safe room construction</li> </ol>	Grants are funded annually by Congressional appropriations; 75 percent Federal cost-share assistance; 25 percent State or local match is required;	Varies
5	FEMA	Homeland Security Preparedness Technical Assistance Program	State and local government	<ol style="list-style-type: none"> <li>1. Implementation of National Infrastructure Protection Plan</li> <li>2. Strengthening chemical, biological, radiological, nuclear, and explosive detection, response, and decontamination capability</li> </ol>	No statutory matching requirements. Amounts awarded vary based on the scope of the project	Varies
6	FEMA	National Training and Education Division	State and local first responders	<ol style="list-style-type: none"> <li>1. Provides preparedness training and exercise support to first responders in the event of a weapons of mass destruction event</li> <li>2. Provides assistance for local units of government to obtain terrorism readiness equipment</li> </ol>	Provides over 150 training courses for first responders	Varies
7	National Oceanic and Atmospheric Administration (NOAA)	Coastal and Estuarine Land Conservation Program	Public agencies	<ol style="list-style-type: none"> <li>1. Protect, restore, and enhance Great Lakes coastal wetlands</li> <li>2. Protect restore, and enhance coastal and riparian habitats in the Great Lakes basin</li> </ol>	50 percent Federal cost-share not to exceed \$1,500,000; requires 50 percent non-federal match	October 10
8	NOAA	Coastal Ecosystem Resilience Grant Program	States, local, and tribal governments, higher education institutions, nonprofit and for-profit organizations	Strengthen the resilience of coastal ecosystems and decrease the vulnerability of communities to extreme weather	Federal share of two-thirds of project costs, one-third non-Federal match required; typical grant is between \$250,000 and \$750,000	August 16



**Appendix J (continued)**

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
9	U.S. Army Corps of Engineers (USACE)	Clearing and Snagging for Flood Control Program	State and local units of government	<ol style="list-style-type: none"> <li>1. Removal of obstructions that restrict flood flows of navigable waters</li> <li>2. Projects must be designed and constructed by the Corps</li> </ol>	Project studies are in most cases at Federal expense; 65 percent Federal cost-share assistance is provided for project implementation and cannot exceed \$500,000; a local match of 35 percent is required	None
10	USACE	Emergency Bank Protection Program	Local communities	<ol style="list-style-type: none"> <li>1. Bank protection of highways, highway bridges, essential public works, churches, hospitals, schools, and other nonprofit public services from flood induced erosion</li> </ol>	Federal share cannot exceed \$1,500,000 for a given project; cost-share program with local match of 35 percent for design and construction required	Continuous
11	USACE	Flood Hazard Mitigation and Aquatic Ecosystem Restoration Program	Local governments	<ol style="list-style-type: none"> <li>1. Flood hazard mitigation to include relocation of threatened structures</li> <li>2. Riverine ecosystem restoration such as conservation or restoration of natural floodwater storage areas</li> <li>3. Planning activities to determine responses to future flood situations</li> <li>4. Project areas must be in a floodplain</li> </ol>	50 percent for studies and 65 percent for project implementation of Federal cost-share assistance; 35 to 50 percent local match is required	- -
12	USACE	Flood Damage Reduction Program	State and local units of government	<ol style="list-style-type: none"> <li>1. Projects designed to reduce the impact of flood events</li> <li>2. Projects must be designed and constructed by the Corps</li> </ol>	50 to 65 percent Federal cost-share assistance above \$100,000 and cannot exceed \$10,000,000; 35 to 50 percent local match is required	None
13	USACE	Hurricane and Storm Damage Reduction Program	State agencies and local units of government	<ol style="list-style-type: none"> <li>1. Beach nourishment</li> <li>2. Floodproofing</li> <li>3. Other structural and nonstructural storm damage reduction projects</li> </ol>	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	Varies
14	USACE	Water Resources Development and Flood Control Acts	Local governments	<ol style="list-style-type: none"> <li>1. Water resources planning assistance</li> <li>2. Emergency streambank and shoreline protection</li> </ol>	50 percent for studies and 65 percent for project implementation of Federal cost-share assistance; 35 to 50 percent local match is required	None

## Appendix J (continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
15	U.S. Department of Agriculture (USDA)	Watershed Protection and Flood Prevention Program	State and local units of government	<ol style="list-style-type: none"> <li>1. Watershed protection</li> <li>2. Flood prevention measures</li> <li>3. Projects are intended to be larger scale</li> <li>4. Watersheds can be no larger than 250,000 acres</li> </ol>	Up to 100 percent Federal cost share assistance for flood control prevention; typical project range is \$3.5 to \$5.0 million in Federal financial assistance	Ongoing
16	USDA	Water and Waste Disposal Loan & Grant Program	Local units of government, nonprofit organizations, associations, and districts	<p>Funds may be used to finance the acquisition, construction, or improvement of:</p> <ol style="list-style-type: none"> <li>1. Drinking water sourcing, treatment, storage, and distribution;</li> <li>2. Sewage collection, transmission, treatment, and disposal;</li> <li>3. Stormwater collection, transmission, and disposal</li> </ol>	Long-term, low-interest loans. If funds are available, grants may be combined with a loan if necessary to keep user costs reasonable	Determined by State USDA office
17	U.S. Department of Agriculture, Farm Services Agency (FSA)	Conservation Reserve Program	Individual agricultural landowners in a 10- or 15-year contract	<ol style="list-style-type: none"> <li>1. Riparian buffers</li> <li>2. Trees</li> <li>3. Windbreaks</li> <li>4. Grassed waterways</li> </ol>	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	Annually or ongoing <sup>c</sup>
18	USDA FSA	Conservation Reserve Enhancement Program	Individual agricultural landowners in a 10- or 15-year contract	<ol style="list-style-type: none"> <li>1. Filter strips</li> <li>2. Riparian buffers</li> <li>3. Grassed waterways</li> <li>4. Permanent grasses (only in specially designated grassland project areas)</li> <li>5. Wetland development and restoration</li> </ol>	<p>Upfront Payments:</p> <p>\$100 per acre Federal one-time signing incentive payment</p> <p>One-time State payment of 1.5 times the annual rental rate for 15-year agreements and 12 times the annual rental rate for perpetual conservation easements</p> <p>Practice Payments:</p> <p>50 percent Federal, 20 percent State cost share assistance for installation costs plus one-time federal signing incentive payment of 40 percent of practice installment costs</p> <p>Annual Rental Payments:</p> <p>Federal rental rates determined by soil type, county, and whether land was cropland or pasture</p> <p>Additional annual Federal incentive payment of 35- to 60 percent the annual rental rate, depending on practice installed</p>	Ongoing

**Appendix J (continued)**

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
19	USDA FSA	Farmable Wetlands Program	Individual agricultural landowners in a 10- or 15-year contract	1. Restore currently farmed wetland	<p>Upfront Payments:</p> <p>\$100 per acre Federal one-time signing incentive payment</p> <p>Practice Payments:</p> <p>Up to 50 percent Federal cost share assistance for installation costs plus one-time federal signing incentive payment of 40 percent of practice installment costs</p> <p>Annual Rental Payments:</p> <p>Rental rate is based on the weighted average dryland cash rent</p>	Variable
20	U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)	Agricultural Conservation Easement Program-Wetlands Reserve Easements	Local governments, individual landowners	<ol style="list-style-type: none"> <li>1. Purchase agricultural land easements that protect the conservation values of eligible land</li> <li>2. Wetland protection, restoration, and enhancement</li> </ol>	<p>Permanent Easements:</p> <p>NRCS pays 100 percent of easement value and 75 to 100 percent of restoration cost</p> <p>30-year Easement:</p> <p>NRCS pays 50 to 75 percent of easement value and 50- to 75 percent of restoration cost</p>	Variable
21	NRCS	Conservation Stewardship Program	Individual landowners in a five-year contract	<ol style="list-style-type: none"> <li>1. Filter strips</li> <li>2. Riparian buffers</li> <li>3. Wildlife corridors</li> <li>4. Stream habitat improvement</li> </ol>	<p>Payments for maintaining and/or enhancing natural resources not to exceed \$40,000 per year or \$200,000 over a five-year period</p>	Annually
22	NRCS	Emergency Conservation Program	Individual landowners	<ol style="list-style-type: none"> <li>1. Regrading and shaping farmland</li> <li>2. Restoring conservation structures</li> <li>3. Redistribution of eroded soil</li> <li>4. Debris removal</li> <li>5. Projects must be in response to natural disaster</li> </ol>	<p>Up to 64 percent Federal cost-share assistance; the remaining percentage is the landowner's responsibility</p>	After a designated State or Presidential disaster declaration

## Appendix J (continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
23	NRCS	Emergency Watershed Protection Program	Individual landowners provided they have a local sponsor such as a local unit of government	<ol style="list-style-type: none"> <li>1. Sale of agricultural floodprone lands to NRCS for floodplain easements</li> <li>2. Land must have a history of repeated flooding (at least twice in the past 10 years)</li> <li>3. Landowner retains most of the rights as before the sale</li> <li>4. NRCS has authority to restore the floodplain function and value</li> </ol>	The USDA pays the landowner one of three options: a geographic rate, a value based on the assessment of the land in agricultural production, or an offer made by the landowner; 75 percent Federal cost-share assistance for construction costs; 25 percent local match is required	Variable
24	NRCS	Environmental Quality Incentives Program	Individual landowners in a three-year contract	<ol style="list-style-type: none"> <li>1. Animal waste management practices</li> <li>2. Soil erosion and sediment control practices</li> <li>3. Nutrient management</li> <li>4. Groundwater protection</li> <li>5. Habitat improvement</li> </ol>	Up to 75 percent Federal cost-share assistance; 25 percent local match is required	Annually <sup>d</sup>
25	NRCS	Regional Conservation Partnership Program	State, local, and tribal governments, higher education institutions, water districts, nonprofit and for-profit organizations	Locally driven, public-private partnerships that improve water quality, combat drought, enhance soil health, support wildlife habitat, and protect agricultural viability	Projects across the country will receive \$225 million in fiscal year 2017	April 21
26	U.S. Department of Health and Human Services, National Institute of Health (USHHS NIH)	National Institute of Environmental Health Sciences (NIEHS) HAZMAT Disaster Training Program	Public and private nonprofit organizations involved in responding to hazardous materials incidents	<p>Provides training to:</p> <ol style="list-style-type: none"> <li>1. Augment prevention and preparedness in a variety of high-risk settings</li> <li>2. Enhance safety and health training of hazardous materials workers, emergency responders, and skilled support personnel</li> <li>3. Ensure responders are aware of site-specific hazards and mitigation techniques prior to and during response activities</li> </ol>	No statutory matching requirements	Contact NIEHS headquarters for deadline
27	USHHS NIH	National Institute of Environmental Health Sciences (NIEHS) Hazardous Waste Worker Health and Safety Training	Public and private nonprofit organizations involved in hazardous waste clean up	<ol style="list-style-type: none"> <li>1. Development institutional competency to provide training and education to hazardous waste workers</li> <li>2. Development of model health and safety training programs regarding hazardous materials</li> <li>3. Training and education in emergency response to a hazardous waste incident</li> </ol>	No statutory matching requirements. Grants generally range from \$24,000 to \$3.4 million	Contact NIEHS headquarters for deadline

**Appendix J (continued)**

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
28	U.S. Department of Homeland Security (DHS)	Program to Prepare Communities for Complex Coordinated Terrorist Attacks	States, local governments, Federally recognized tribal governments	<ol style="list-style-type: none"> <li>1. Identifying capability gaps related to preparing for, preventing, and responding to a complex coordinated terrorist attack</li> <li>2. Development and/or updating plans, annexes, and processes to address the identified gaps</li> <li>3. Training personnel and the whole community to implement the plans and processes and build needed capacities</li> <li>4. Conducting exercises to validate capabilities</li> </ol>	Up to \$2.5 million	February 10
29	DHS	Homeland Security Grant Program	State governments	Planning, organization, equipment purchase, training, exercises, and management	\$1.03 billion provided for projects and programs nationally	April
30	DHS	Homeland Security National Training Program – Continuing Training Grants	States, local governments, tribal governments, public and private higher education institutions, nonprofits	Focus areas are cybersecurity, hazardous materials, economic recovery, and rural preparedness	\$11.5 million provided for projects nationally	August
31	DHS	Countering Violent Extremism Grants	States, local governments, tribal governments, school districts, higher education institutions, nonprofits	<ol style="list-style-type: none"> <li>1. Developing resilience</li> <li>2. Training and engaging with community members</li> <li>3. Managing intervention activities</li> <li>4. Building capacity of community-level nonprofit organizations</li> </ol>	\$10 million provided for projects nationally	September
32	U.S. Department of Housing and Urban Development (USHUD)	Community Development Block Grant Emergency Assistance Program	Local governments	<ol style="list-style-type: none"> <li>1. Relocation and demolition</li> <li>2. Housing Grants to fund the rehabilitation of housing to meet current building codes</li> <li>3. Construction of public facilities and improvements</li> </ol>	75 to 100 percent Federal cost-share assistance; 0 to 25 percent local match may be required	After a Presidential disaster declaration
33	USHUD	Healthy Homes Production Grant Program	State, tribal, and local governments	<ol style="list-style-type: none"> <li>1. Identify and remediate priority (significant) housing-related health and safety hazards in privately-owned, low income rental or owner occupied housing</li> <li>2. Projects that comprehensively address multiple residential health and safety issues</li> </ol>	Up to \$2,000,000 Federal assistance; Minimum 10 percent match required	June

## Appendix J (continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
34	U.S. Department of Justice, Office of Justice Programs	Economic, Cyber, and High-Tech National Training and Technical Assistance Program	Nonprofit and for-profit organizations and higher education institutions	Provides training and technical assistance to State, local, and tribal law enforcement officials; intelligence analysts; prosecutors; and other crime fighting entities on preventing, investigating, and responding to economic, cyber, and high tech crimes	\$6 million in assistance for programs nationwide	None
35	U.S. Department of Justice, Community Oriented Policing Services (DOJ COPS)	COPS Hiring Program Grants	State, local, and tribal law enforcement agencies	Provides funding to hire and re-hire entry level career law enforcement officers	Up to \$137 million available annually nationwide  Number of officer positions an agency can apply for is equal to 5 percent of the agency's actual sworn force strength  75 percent of the entry-level salary and fringe benefits of each newly hired full-time officer, up to \$125,000 per officer	--
36	DOJ COPS	Community Policing Development Program	All public governmental agencies, nonprofit and for-profit organizations, higher education institutions, community groups, faith-based organizations	Advance the practice of community policing through training and technical assistance, development of innovative community policing strategies, applied research, guidebooks, and best practices	Up to \$8 million available for projects or programs nationally	None
37	U.S. Department of Justice, Federal Bureau of Investigation (FBI)	Law Enforcement Assistance-FBI Field Police Training and Advanced Training Programs	All authorized municipal, county, local, and State criminal justice personnel	Specialized instruction in such areas as police community relations, hostage negotiation, computer fraud, cyber-attack, etc.	Training	None
38	U.S. Geological Survey (USGS)	Upper Mississippi River System Long Term Resource Monitoring Program	State and local units of government, nonprofit organizations, and interstate and intrastate agencies	<ol style="list-style-type: none"> <li>1. Monitoring resources</li> <li>2. Developing alternative management measures</li> <li>3. Managing information with respect to those resources</li> </ol>	Federal cost-share program with no local match required; average financial assistance has been \$250,000 per project	None
39	U.S. Department of Transportation (USDOT)	Transportation Enhancement Program	State and local units of government	<ol style="list-style-type: none"> <li>1. Wetland preservation and restoration</li> <li>2. Stormwater treatment systems to address runoff from roads and highways</li> <li>3. Reduce vehicle-caused wildlife mortality while maintaining habitat connectivity</li> <li>4. Pedestrian and bicycle infrastructure and safety programs</li> </ol>	80 percent Federal cost-share assistance; 20 percent local match is required	--

**Appendix J (continued)**

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
40	USEPA	Environmental Education Grants Program	Local or State education agencies, colleges, and nonprofit organizations, State environmental agencies, and noncommercial education broadcasting agencies	<ol style="list-style-type: none"> <li>1. Improving environmental education teaching skills</li> <li>2. Educating teachers, students, or the public about human health problems</li> <li>3. Building capacity for environmental education programs</li> <li>4. Education communities</li> <li>5. Educating the public through print, broadcast, or other media</li> </ol>	\$3.4 million available nationally <sup>2</sup> ; locally, grants are for \$5,000; \$5,000 to \$25,000; and up to \$125,000, up to 75 percent of the project cost, a 25 percent match is required	Mid-November
41	USEPA	Targeted Watershed Grants	Watershed organizations nominated by State Governors or Tribal leaders	<ol style="list-style-type: none"> <li>1. Watershed-based projects to protect water resources</li> <li>2. Training and technical assistance to local partnerships</li> </ol>	75 percent maximum Federal cost-share assistance. Minimum 25 percent non-Federal match	November
42	U.S. Fire Administration	Assistance to Firefighters Grant Program	Counties; city, village, township fire departments, and nonaffiliated EMS organizations	<ol style="list-style-type: none"> <li>1. Firefighter and EMT training</li> <li>2. Firefighting and EMS equipment</li> <li>3. Firefighter personal protective equipment</li> </ol>	80 percent Federal cost-share assistance for communities with population greater than 50,000; 90 percent for communities with population less than 50,000 but greater than 20,000; 95 percent for communities with population less than 20,000	See program guidance
43	U.S. Fire Administration	Fire Prevention and Safety Grants (FP&S)	County, city, village, and township fire departments	<ol style="list-style-type: none"> <li>1. Public education</li> <li>2. Arson prevention</li> <li>3. Prevention-related training</li> <li>4. Fire prevention activities</li> <li>5. Risk Assessments</li> </ol>	Cost-share matching fund requirements dependent upon size of population served by the Fire Department	See program guidance
44	U.S. Fire Administration	National Fire Academy	Persons with substantial involvement in fire prevention and control, emergency medical services, fire-related emergency management activities, or allied professions	Provides tuition-free training in firefighting, prevention, emergency medical services, and related areas	Provides tuition-free training in firefighting, prevention, emergency medical services, and related areas	June 15 for fall semester, December 15 for spring semester
45	U.S. Fire Administration	National Fire Academy Training Assistance Student Stipend Reimbursement Program	Members of fire departments or sponsoring department	Provides travel stipends for students attending National Fire Academy courses	Travel reimbursement	Rolling
46	U.S. Fish and Wildlife Service (FWS)	North American Wetlands Conservation Fund	State and public agencies	<ol style="list-style-type: none"> <li>1. Property acquisition for the protection of wetlands that migratory birds, fish, and wildlife are dependent on</li> <li>2. Wetland restoration and protection projects</li> <li>3. Habitat restoration projects</li> </ol>	50 percent Federal cost-share assistance; 50 percent local match is required	February/July

## Appendix J (continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
47	FWS	Partners for Fish and Wildlife Habitat Restoration Program	Private landowners for a 10-year 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	Continuous
48	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	After a Presidential disaster declaration
49	University of Wisconsin Cooperative Extension	Extension Disaster Education Network	Local communities	Provides Community education and public information programs promoting hazard awareness and mitigation concepts	Education and Information provided through the University of Wisconsin System	- -
50	Wisconsin Department of Administration	Wisconsin Coastal Management	State and local units of government, nonprofit organizations, and tribal agencies	Enhancement and restoration of coastal resources within the State's coastal zone	Approximately \$1,300,000 is available to all counties adjacent to Lakes Superior and Michigan	November
51	Wisconsin Department of Administration Division of Intergovernmental Relations	Comprehensive Planning Grant	Cities, villages, towns, and counties	Helps communities adopt land use plans that address issues of both urban sprawl and transportation infrastructure	Assists with the costs of developing a comprehensive plan for eligible applicants, local match may be required	Variable
52	Wisconsin Department of Agriculture, Trade and Consumer Protection (WDATCP)	Farmland Preservation Program	Individual landowners for a period of 10 years	1. 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	None
53	WDATCP	Land and Water Resource Management Program	Individual landowners	1. Grassed waterways 2. Manure storage systems 3. Grade stabilization structure 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 the State	December 31
54	WDATCP	Soil and Water Resource Management Program	Individual landowners	1. Wetland restoration 2. Filter strip, riparian buffer 3. Subsurface drainage 4. Well abandonment	Program funds 70 percent of the cost of conservation project	Variable



**Appendix J (continued)**

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
55	Wisconsin Department of Health Services	Special Needs Technical Assistance	Local Communities	Technical assistance to determine if an actual or potential human service and/or population threat is present	Provide technical assistance and support	--
56	Wisconsin Department of Health Services	Chemical Contamination Technical Assistance	Local Communities	Technical assistance can determine if an actual or potential public health threat is present and if hazard mitigation is warranted or desirable	Provide technical assistance and support	--
57	Wisconsin Department of Health Services	Communicable or Infectious Diseases Technical Assistance	Local Communities	Technical assistance to determine if an actual or potential human threat is present	Provide technical assistance and support	--
58	Wisconsin Department of Military Affairs Division of Emergency Management	Hazards Mitigation Section	State and local units of government	<ol style="list-style-type: none"> <li>1. Mitigation Planning</li> <li>2. Technical Assistance</li> <li>3. Mitigation Projects</li> </ol>	75 percent Federal cost-share assistance; 25 percent local match	--
59	Wisconsin Department of Natural Resources (WDNR)	Lake Planning Grant Program, Chapter NR 190 of the <i>Wisconsin Administrative Code</i>	Local units of government, lake districts, town sanitary districts, qualified school districts, qualified lake associations, and qualified nonprofit conservation organizations	<ol style="list-style-type: none"> <li>1. Gathering and analyzing water quality information</li> <li>2. Land use planning within lake watersheds</li> <li>3. Gathering and compiling demographic information pertinent to individual lakes</li> <li>4. Developing lake management plans</li> </ol>	Up to 67 percent State cost-share assistance, not to exceed \$8,000 for small-scale projects or \$25,000 for large-scale projects; 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	December 10
60	WDNR	Lake Protection Grant Program, Chapter NR 191 of the <i>Wisconsin Administrative Code</i>	Local units of government, lake districts, town sanitary districts, qualified school districts, qualified lake associations, and qualified nonprofit conservation organizations	<ol style="list-style-type: none"> <li>1. Gathering and analyzing water quality information</li> <li>2. Land use planning within lake watersheds</li> <li>3. Gathering and compiling demographic information pertinent to individual lakes</li> <li>4. Developing lake management plans</li> </ol>	75 percent State cost-share which cannot exceed \$200,000 for land acquisition or lake management plan implementation or \$100,000 for wetland and shoreline habitat restoration; 25 percent local match is required	February 1
61	WDNR	Lake Classification and Local Ordinance Development Grants, Section NR 191.30 of the <i>Wisconsin Administrative Code</i>	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	December 10

## Appendix J (continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
62	WDNR	Municipal Flood Control Grants Chapter NR 199 of the <i>Wisconsin Administrative Code</i>	Cities, villages, towns, metropolitan sewerage districts	<ol style="list-style-type: none"> <li>1. Acquisition and removal of structures</li> <li>2. Flood proofing and elevation of structures</li> <li>3. Riparian restoration projects</li> <li>4. Acquisition of vacant land or purchase of easements</li> <li>5. Construction of stormwater and groundwater facilities related to flood control and riparian restoration projects</li> <li>6. Flood mapping</li> </ol>	70 percent State cost-share assistance; 30 percent local match	March 15 of even-numbered years
63	WDNR	Land and Water Conservation Fund Program	Counties, cities, villages, towns, school districts	<ol style="list-style-type: none"> <li>1. Land acquisition or development that will provide opportunities for outdoor recreation</li> <li>2. Property with frontage on rivers, streams, lakes, estuaries, and reservoirs that will provide water-based outdoor recreation</li> <li>3. Property that provides special recreation opportunities, such as floodplains, wetland, and areas adjacent to scenic highways</li> </ol>	50 percent State cost-share assistance; 50 percent local match is required	May 1
64	WDNR	Private Lead Service Line Replacement Funding Program	City of Racine and private homeowners	Funding to replacing lead service lines on private property for projects that result in full lead service line replacement (publically owned and privately owned portion)	WDNR will provide \$500,000 to the City of Racine in 2017 for private lead service line replacement	Variable
65	WDNR	Remediation and Redevelopment Spills and Releases program	Responsible party	Provide technical assistance and support within the agency and to those outside the agency	Provide technical assistance and support	Department will take emergency action to remove or contain a spill at the expense of the responsible party
66	WDNR	River Protection Grant Program, Chapter NR 195 of the <i>Wisconsin Administrative Code</i>	Local units of government, lake districts, town sanitary districts, qualified school districts, qualified lake associations, and qualified nonprofit conservation organizations	<ol style="list-style-type: none"> <li>1. River restoration projects</li> <li>2. Educational projects</li> <li>3. Activities associated with river management plan development</li> <li>4. Land acquisition</li> <li>5. Ordinance development</li> <li>6. Installation of practices to control nonpoint source pollution</li> </ol>	75 percent State cost-share assistance; 25 percent local match is required; Grant not to exceed \$50,000	February 1

**Appendix J (continued)**

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
67	WDNR	Land/Easement Acquisition for River Management Section NR 195.13 of the <i>Wisconsin Administrative Code</i>	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	February 1
68	WDNR	Safe Drinking Water Loan Program	Local government	Provides subsidized interest rate loans to municipalities seeking to fund projects to build, upgrade, or replace water supply infrastructure to protect public health	Loans at subsidized interest rates	October 31
69	WDNR	Stewardship Grant Program, Chapter NR 47 of the <i>Wisconsin Administrative Code</i>	Local government and nonprofit conservation organizations	<ol style="list-style-type: none"> <li>1. Streambank protection projects</li> <li>2. Land acquisition of stream corridors for water quality improvement</li> </ol>	50 percent State cost-share assistance; 50 percent local match is required	May 1
70	WDNR	Stewardship Grant Program, Urban Green Space Program	Local units of government , lake protection and rehabilitation districts, and nonprofit conservation organizations	<ol style="list-style-type: none"> <li>1. Land acquisition for greenway space in urban areas, protection of scenic or ecological features, and wildlife habitat improvement</li> </ol>	50 percent State cost-sharing assistance; 50 percent local match is required	May 1
71	WDNR	Targeted Runoff Management Grants, Chapter 120 of the <i>Wisconsin Administrative Code</i> ; in the future, specific rural nonpoint source abatement measures will be funded under proposed Chapter NR 151 of the <i>Wisconsin Administrative Code</i>	Counties, cities, villages, regional planning commissions, tribal governments, and special purpose lake, sewerage, and sanitary districts	<ol style="list-style-type: none"> <li>1. Complying with nonpoint source performance standards</li> <li>2. Improving 303(d) waters</li> <li>3. Protecting outstanding water resources</li> <li>4. Compliance with a notice of discharge for an animal feeding operation</li> <li>5. Addressing a water quality concern of national or statewide importance, such as the Upper Mississippi River concerns</li> </ol>	70 percent State cost-share assistance; 30 percent local match is required. Large scale agricultural projects receive typical grants of \$500,000 to \$1 million small scale rural and urban projects cannot exceed \$150,000	April 15
72	WDNR	Urban Rivers Grant Program	Local units of government and nonprofit conservation organizations	<ol style="list-style-type: none"> <li>1. Land acquisition to preserve open areas in urban environments adjacent to streams and rivers</li> </ol>	50 percent State cost-share assistance; 50 percent local match is required	May 1
73	WDNR	Urban Nonpoint Source and Stormwater Grants Program. Funding is through Chapter NR 155 of the <i>Wisconsin Administrative Code</i>	Counties, cities, villages, regional planning commissions, tribal governments, and special purpose lake, sewerage, and sanitary districts	<ol style="list-style-type: none"> <li>1. Planning</li> <li>2. Educational and information activities</li> <li>3. Ordinance development and enforcement</li> <li>4. Training</li> <li>5. Storm water detention ponds</li> <li>6. Streambank and shoreline stabilization</li> </ol>	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	April 15

## Appendix J (continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
74	WDNR	Wisconsin Forest Landowner Grant Program	Individual landowners <sup>e</sup>	<ol style="list-style-type: none"> <li>1. Stream buffers</li> <li>2. Streambank stabilization</li> <li>3. Wetland Restoration</li> </ol>	Up to 50 percent cost-share for the preparation of management plans and implementation of designated practices, maximum cost-share of \$10,000 per year	Ongoing
75	Wisconsin Department of Transportation (WisDOT)	Transportation Alternatives Program	Local governments, regional transportation authorities, transit agencies, natural resource or public land agencies, school districts, tribal governments	<ol style="list-style-type: none"> <li>1. On- and off-road facilities for pedestrians and bicyclists</li> <li>2. Infrastructure-related projects and systems that will provide safe routes for non-drivers</li> <li>3. Community improvement projects</li> <li>4. Environmental mitigation activities</li> </ol>	80 percent State match; minimum of \$300,000 for infrastructure projects, minimum of \$50,000 for non-infrastructure projects. No maximum, but grants exceeding \$1,000,000 are unlikely	January 29
76	WisDOT	Freight Railroad Infrastructure Improvement Program	Counties, municipalities, railroads, transit commissions	<p>Projects that:</p> <ol style="list-style-type: none"> <li>1. Rehabilitate a rail line segment</li> <li>2. Improve transportation efficiency</li> <li>3. Promote safety</li> </ol>	Loans not to exceed \$3,000,000	Ongoing
77	WisDOT	Highway Safety Improvement Program	Local governments	<ol style="list-style-type: none"> <li>1. Intersection safety improvements</li> <li>2. Installing guardrails, signs, pavement markings</li> <li>3. Corridor signal upgrades</li> <li>4. Warning devices or elimination of hazards at rail crossings</li> </ol>	90 percent Federal reimbursement; 10 percent match required, State pay match on projects on State trunk highways, local government pays match on local streets and highways	August 15, February 15
78	Great Lakes Protection Fund	Great Lakes Protection Fund	State and local units of government, nonprofit organizations and individuals	<ol style="list-style-type: none"> <li>1. To improve the health of the Great Lakes</li> <li>2. To promote the interdependence of healthy ecological and economic systems</li> <li>3. To support innovative, creative, and venturesome ideas</li> </ol>	Finance the total cost of accepted projects	Continuous applications process
79	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	Varies by Program

**Appendix J (continued)**

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
80	Joyce Foundation	Joyce Foundation Grant program	State and local units of government, nonprofit organizations and individuals	<ol style="list-style-type: none"> <li>To improve the health of the Great Lakes</li> <li>To promote the interdependence of healthy ecological and economic systems</li> <li>To support innovative, creative, and venturesome ideas</li> <li>Developing improved regulatory approaches</li> <li>Better understanding of the supply of and demand for Great Lake</li> <li>Creating transportation alternatives to reduce over reliance on automobiles</li> </ol>	Finance the total cost of accepted projects	Grant proposals are considered at meetings of the Foundation's Board of Directors in April, July, and December
81	National Fish and Wildlife Foundation (NFWF)	Wal-Mart Stores, Inc. Acres for America	State and local units of government, nonprofit conservation organizations	<ol style="list-style-type: none"> <li>Acquisition or permanent easement for conservation of habitat</li> </ol>	\$2.5 million available annually; minimum 50 percent local match required, higher local match preferred	Preproposals due May 19 Full proposals due July 28
82	NFWF	Five-Star Restoration Program	State agencies, local governments, tribal governments, educational institutions, and 501(c) nonprofit organizations	<ol style="list-style-type: none"> <li>Wetland restoration projects</li> <li>Riparian restoration projects</li> <li>Projects must be part of a larger watershed project</li> <li>Projects must have at least five contributing parties</li> </ol>	\$225,000 available nationally annually; project awards range from \$20,000 to \$50,000, average award \$30,000; minimum 50 percent local match required, higher local match preferred	January 31
83	NFWF	Sustain Our Great Lakes Community Grant Program	State agencies, local governments, tribal governments, educational institutions, and 501(c) nonprofit organizations	<ol style="list-style-type: none"> <li>Restoring aquatic connectivity through means such as dam removal and bridge and culvert replacement</li> <li>Stream restoration, enhancement, and protection projects</li> <li>Coastal wetland restoration, enhancement, and protection projects</li> <li>Installation of green infrastructure</li> <li>Projects must be in Great Lakes watershed</li> </ol>	Grant awards range from \$50,000 to \$1,150,000. No match is required; however, the ratio of matching funds offered is considered during review with grants that meet or exceed a one-to-one match ratio being more competitive	February 21
84	Seno K/RLT Conservancy	Stewardship Grant Program, Urban Green Space Program	Land trusts, local units of government, and nonprofit organizations	<ol style="list-style-type: none"> <li>Land acquisition for greenway space in urban areas, protection of scenic or ecological features, and wildlife habitat improvement</li> </ol>	Funding on a project basis	Continuous

## Appendix J (continued)

Reference Number	Administrator of Grant Program	Name of Funding Program	Eligibility	Types of Projects and Funding Eligibility Criteria	Assistance Provided	Application Deadline
85	Southeastern Wisconsin Watersheds Trust (Sweet Water)	Mini-Grant Program	Available for nonprofit organizations and community groups. Projects must be located in the Kinnickinnic, Menomonee, Milwaukee, Root, and Oak Creek watersheds	Supports local, grassroots efforts that employ green infrastructure practices and other water quality-related activities	Grants of \$1,000 to \$5,000 are distributed annually	RFP issued in fall; grants are reviewed, judged, and awarded for execution the following spring and summer
86	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	<ol style="list-style-type: none"> <li>1. Auto and Road safety</li> <li>2. Teen driver education</li> <li>3. Home safety and fire prevention</li> <li>4. Disaster preparedness and recovery</li> </ol>	Grants of \$5,000 or more	October 30
87	Wisconsin Public Service Commission (WPSC)	Telecommunications, Water, Gas and Electric Divisions	Local Communities	Incorporate disaster resistance into Regulation development, land use practices and environmental impacts of public utilities	General Utility Assistance	--
88	WDNR	Regular Urban Forestry Grants	Counties, cities, villages, towns, and nonprofit organizations	Funding to support new, innovative projects that will develop sustainable urban and community forestry programs	Competitive cost-share grants up to \$25,000	--
89	WDNR	Urban Forestry – Catastrophic Storm Grants	Counties, cities, villages, towns, and nonprofit organizations	Fund tree repair, removal, replacement within urban areas following a catastrophic storm for which the governor has declared a State of Emergency	Funding on a project basis	--

NOTE: Table was updated in 2016 as a part of the plan update process.

<sup>a</sup>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.

<sup>b</sup>Municipalities must have a flood mitigation plan to be eligible for a project grant.

<sup>c</sup>Two types of sign-up are available for CRP: continuous CRP, which has no timeline and is used for small sensitive tracts of land and regular CRP, which has an annual sign up application period and is used for large tracts of land.

<sup>d</sup>EQIP in southeastern Wisconsin provides minimal funding.

<sup>e</sup>Applicants must have a Forest Stewardship Plan prepared by a forester in place on their land or be applying to have one prepared.

Source: SEWRPC.



## Appendix K (continued)

Administrator of Grant Program	Name of Grant Program	Address	Phone Number	Internet Web Address
USDA, Natural Resources Conservation Service (NRCS)	Agricultural Conservation Easement Program (ACEP)  Emergency Watershed Protection Program  Emergency Conservation Program  Conservation Stewardship Program  Environmental Quality Incentives Program  Regional Conservation Partnership Program	NRCS Union Grove Service Center 1012 Vine Street Union Grove, WI 53182	(262) 878-1243	<a href="https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep/">https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/easements/acep/</a>  <a href="https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/">https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/landscape/ewpp/</a>  <a href="https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/csp/">https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/csp/</a>  <a href="https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/">https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/financial/eqip/</a>  <a href="https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/farmbill/rcpp">https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/farmbill/rcpp</a>
U.S. Department of Health and Human Services, National Institute of Environmental Health Sciences	HAZMAT Disaster Preparedness Training Program  Hazardous Waste Worker Health and Safety Training	National Institute of Environmental Health Sciences Worker Education and Training Program 111 T.W. Alexander Drive Research Triangle Park, NC 27709	(919) 541-3345	<a href="https://www.niehs.nih.gov/careers/hazmat/about_wetp/hdpt/index.cfm">https://www.niehs.nih.gov/careers/hazmat/about_wetp/hdpt/index.cfm</a>
U.S. Department of Homeland Security (DHS)	Homeland Security Grant Program  Program to Prepare Communities for Complex Coordinated Terrorist Attacks  Countering Violent Extremism Grants  Homeland Security National Training Program – Continuing Training Grants	Federal Emergency Management Agency Office of Counterterrorism and Security Preparedness 500 C Street S.W. Washington, D.C. 20472	(202) 646-2500	<a href="https://www.dhs.gov/cve/resources/cve-grants/Homeland-Security-Grant-Program-HSGP">https://www.dhs.gov/cve/resources/cve-grants/Homeland-Security-Grant-Program-HSGP</a>  <a href="https://www.fema.gov/media-library/assets/documents/127506">https://www.fema.gov/media-library/assets/documents/127506</a>  <a href="https://www.dhs.gov/cve/resources/cve-grants/countering-violent-extremism-grants">https://www.dhs.gov/cve/resources/cve-grants/countering-violent-extremism-grants</a>  <a href="https://www.dhs.gov/cve/resources/cve-grants/National-Training-Program-HSNTP-Continuing-Training-Grants-CTG">https://www.dhs.gov/cve/resources/cve-grants/National-Training-Program-HSNTP-Continuing-Training-Grants-CTG</a>
U.S. Department of Housing and Urban Development (HUD)	Community Development Block Grant Program	U.S. Department of Housing and Urban Development Office of Community Planning and Development Office of Block Grant Assistance State and Small Cities Division, Room 7184 451 7th Street, SW Washington, DC 20410	(202) 708-1112	<a href="https://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs">https://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs</a>



**Appendix K (continued)**

Administrator of Grant Program	Name of Grant Program	Address	Phone Number	Internet Web Address
HUD	Healthy Homes Production Grant Program	U.S. Department of Housing and Urban Development Room 8236 451 7th Street, SW Washington, DC 20410	(202) 402-5769	<a href="https://portal.hud.gov/hudportal/HUD?src=/program_offices/healthy_homes/hhi/hhd">https://portal.hud.gov/hudportal/HUD?src=/program_offices/healthy_homes/hhi/hhd</a>
U.S. Department of Justice, Office of Justice Programs	Economic, Cyber, and High-Tech National Training and Technical Assistance Program	U.S. Department of Justice, Office of Justice Programs 810 7th Street NW Washington, DC 20531	(202) 616-6500	--
U.S. Department of Justice, Office of Community Oriented Policing Services	Community Policing Development Program  COPS Hiring Program Grants	U.S. Department of Justice Office of Community Oriented Policing Services 145 North Street NE Washington, DC 20530	(800) 421-6770	<a href="https://cops.usdoj.gov/Default.asp?Item=65">https://cops.usdoj.gov/Default.asp?Item=65</a>
U.S. Department of Justice, Federal Bureau of Investigation (FBI)	Law Enforcement Assistance-FBI Field Police Training and Advance Training Programs	Federal Bureau of Investigation, Milwaukee Office 3600 S. Lake Shore Drive St. Francis, Wisconsin 53235	(414) 276-4684	<a href="https://www.fbi.gov/contact-us/field-offices/milwaukee">https://www.fbi.gov/contact-us/field-offices/milwaukee</a>
U. S. Environmental Protection Agency (USEPA)	Environmental Education Grants Program	Megan Gavin U.S. EPA Region 5 77 West Jackson Boulevard Mail Code AT-18J Chicago, IL 60604	(312) 353-2000	<a href="https://www.epa.gov/education/environmental-education-ee-grants">https://www.epa.gov/education/environmental-education-ee-grants</a>
USEPA	Targeted Watershed Grants	Paul Thomas U.S. EPA Region 5 77 West Jackson Boulevard Mail Code AT-18J Chicago, IL 60604	(312) 886-7742	--
U.S. Fire Administration	Assistance to Firefighters Grant Program Fire Prevention and Safety Grants Staffing for Adequate Fire and Emergency Response Grants National Fire Academy	U.S. Fire Administration 16825 South Seton Avenue Emmitsburg, MD 21727  Federal Emergency Management Agency Region V 536 South Clark Street, 6th Floor Chicago, IL 60605	(301) 447-1000	<a href="https://www.usfa.fema.gov/">https://www.usfa.fema.gov/</a>  <a href="https://www.fema.gov/assistance-firefighters-grant-program-info">https://www.fema.gov/assistance-firefighters-grant-program-info</a>
U.S. Fish and Wildlife Service (FWS)	North American Wetlands Conservation Fund	U. S. Fish and Wildlife Service Division of Bird Habitat Conservation 5275 Leesburg Pike Falls Church, VA 22041-3803	(703)-358-1784	<a href="http://www.fws.gov/birdhabitat/Grants/NAWCA/">www.fws.gov/birdhabitat/Grants/NAWCA/</a>

## Appendix K (continued)

Administrator of Grant Program	Name of Grant Program	Address	Phone Number	Internet Web Address
FWS	Partners for Fish and Wildlife Habitat Restoration Program	U. S. Fish and Wildlife Service Branch of Habitat Restoration 5275 Leesburg Pike Falls Church, VA 22041-3803	(703)-358-2332	<a href="http://www.fws.gov/partners/">www.fws.gov/partners/</a>
U.S. Small Business Administration	Disaster Loan Program	U.S. Small Business Administration 409 3rd St, SW Washington DC 20416	(800) 659-2955	<a href="https://www.sba.gov/loans-grants/see-what-sba-offers/sba-loan-programs/disaster-loans">https://www.sba.gov/loans-grants/see-what-sba-offers/sba-loan-programs/disaster-loans</a>
Wisconsin Emergency Management	Hazard Mitigation Section	Wisconsin Emergency Management 2400 Wright Street P.O. Box 7865 Madison, WI 53707-7865	(608) 242-3232	<a href="http://www.emergencymanagement.wi.gov/">http://www.emergencymanagement.wi.gov/</a>
Wisconsin Department of Natural Resources (WDNR)	Municipal Flood Control Grants	Jeff Soellner Wisconsin Department of Natural Resources- CF/2 P.O. Box 7921 Madison, WI 53707-7921	(608) 267-7152	<a href="http://dnr.wi.gov/Aid/MunFloodControl.html">http://dnr.wi.gov/Aid/MunFloodControl.html</a>
WDNR	Lake Planning Grant Program  Lake Protection Grant Program  Lake Classification Grant Program	Wisconsin Department of Natural Resources Lake Coordinator-Southeast Region 141 NW Barstow Street, Room 180 Waukesha, WI 53188	(262) 574-2130	<a href="http://dnr.wi.gov/Aid/SurfaceWater.html">http://dnr.wi.gov/Aid/SurfaceWater.html</a>
WDNR	Forest Fire Protection Grant	Jennifer Feyerherm Wisconsin Department of Natural Resources- CF/2 P.O. Box 7921 Madison, WI 53707-7921	(608) 266-1967	<a href="http://dnr.wi.gov/Aid/ForestFireProtection.html">http://dnr.wi.gov/Aid/ForestFireProtection.html</a>
WDNR	Land and Water Conservation Fund	Jennifer Gihring Wisconsin Department of Natural Resources- CF/2 P.O. Box 7921 Madison, WI 53707-7921	(608) 264-6138	<a href="http://dnr.wi.gov/Aid/fedLWCF.html">http://dnr.wi.gov/Aid/fedLWCF.html</a>  <a href="http://dnr.wi.gov/Aid/LWCF.html">http://dnr.wi.gov/Aid/LWCF.html</a>
WDNR	Remediation and Redevelopment Program	Wisconsin Department of Natural Resources 2300 N. Dr. Martin Luther King Jr. Drive Milwaukee, WI 53212	(414) 263-8557	<a href="http://dnr.wi.gov/topic/brownfields/rrprogram.html">http://dnr.wi.gov/topic/brownfields/rrprogram.html</a>
WDNR	River Management Grant Program	Craig Helker Wisconsin Department of Natural Resources 9531 Rayne Rd., Ste. 4, Sturtevant, WI 53177	(262) 884-2357	<a href="http://dnr.wi.gov/Aid/SurfaceWater.html">http://dnr.wi.gov/Aid/SurfaceWater.html</a>
WDNR	Stewardship Grant Program  Urban Rivers Grant Program	Jim Ritchie Wisconsin Department of Natural Resources 2300 N. Dr. Martin Luther King Jr. Drive P.O. Box 12436 Milwaukee, WI 53212	(414) 263-8610	<a href="http://dnr.wi.gov/topic/Stewardship/">http://dnr.wi.gov/topic/Stewardship/</a>



## Appendix K (continued)

Administrator of Grant Program	Name of Grant Program	Address	Phone Number	Internet Web Address
Seno K/RLT Conservancy	Urban Green Space Program Stewardship Grant Program	Seno K/RLT Conservancy 3606 Dyer Lake Road Burlington, WI 53105	(262) 539-3222	<a href="http://www.senokrlt.org/">http://www.senokrlt.org/</a>
Great Lakes Protection Fund	Great Lakes Protection Fund Grants Program	Great Lakes Protection Fund 1560 Sherman Avenue, Suite 1370 Evanston, IL 60201	(847) 425-8150	<a href="http://www.glpf.org">http://www.glpf.org</a>
Joyce Foundation	Joyce Foundation Grant Program	The Joyce Foundation 321 North Clark Street Suite 1500 Chicago, Illinois 60654	(312) 782-2464	<a href="http://www.joycefdn.org">http://www.joycefdn.org</a>
National Fish and Wildlife Foundation (NFWF)	Five Star Restoration Program Wal-Mart Stores, Inc. Acres for America Program Sustain Our Great Lakes Program	National Fish and Wildlife Foundation 1133 15th Street, NW, Suite 1100 Washington, DC 20005	(202) 857-0166	<a href="http://www.nfwf.org/fivestar/Pages/home.aspx">http://www.nfwf.org/fivestar/Pages/home.aspx</a> <a href="http://www.nfwf.org/acresforamerica/Pages/home.aspx">http://www.nfwf.org/acresforamerica/Pages/home.aspx</a> <a href="http://www.nfwf.org/greatlakes/Pages/home.aspx">http://www.nfwf.org/greatlakes/Pages/home.aspx</a>
Wisconsin Department of Transportation (WisDOT)	Transportation Alternatives Program Highway Safety Improvement Program	Robert Schmidt Wisconsin Department of Transportation 141 NW Barstow Street P.O. Box 798 Waukesha, WI 53187-0798	(262) 548-8789	<a href="http://wisconsindot.gov/Pages/doing-bus/local-gov/astnce-pgms/aid/tap.aspx">http://wisconsindot.gov/Pages/doing-bus/local-gov/astnce-pgms/aid/tap.aspx</a> <a href="http://wisconsindot.gov/Pages/doing-bus/local-gov/astnce-pgms/highway/hsip.aspx">http://wisconsindot.gov/Pages/doing-bus/local-gov/astnce-pgms/highway/hsip.aspx</a>
WisDOT	Freight Railroad Infrastructure Improvement Program	Rich Kedzior Railroads and Harbors Section Wisconsin Department of Transportation 4802 Sheboygan Avenue Madison WI 53705	(608) 266-7094	<a href="http://wisconsindot.gov/Pages/doing-bus/local-gov/astnce-pgms/aid/friip.aspx">http://wisconsindot.gov/Pages/doing-bus/local-gov/astnce-pgms/aid/friip.aspx</a>
Southeastern Wisconsin Watersheds Trust (Sweet Water)	Watersheds Mini-Grant Program	Southeastern Wisconsin Watersheds Trust 600 E. Greenfield Avenue Milwaukee, WI 53204	(414) 382-1766	<a href="http://www.swwtwater.org/mini-grants/">http://www.swwtwater.org/mini-grants/</a>
State Farm Companies Foundation	State Farm Good Neighbor Citizenship Company Grants	State Farm Insurance One State Farm Plaza Bloomington, IL 61710	--	<a href="https://www.statefarm.com/about-us/community/education-programs/grants-scholarships/company-grants">https://www.statefarm.com/about-us/community/education-programs/grants-scholarships/company-grants</a>

NOTE: Table was updated in 2016 as a part of the plan update process.

<sup>a</sup>A complete listing of U.S. government assistance programs can be found at the Catalog of Federal Domestic Assistance web site: [www.cfd.gov](http://www.cfd.gov).

Source: SEWRPC.

**Appendix L**

**ADOPTING RESOLUTION**

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OFFICE OF THE RACINE COUNTY CLERK

Wendy M. Christensen

730 Wisconsin Avenue, Racine, Wisconsin 53403

E-mail [Wendy.Christensen@racinecountv.com](mailto:Wendy.Christensen@racinecountv.com)

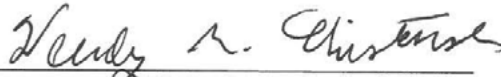
Phone 262-636-3121

Fax 262-636-3491

November 2017

TO WHOM IT MAY CONCERN:

I, Wendy M. Christensen, County Clerk in and for the County of Racine, State of Wisconsin, do hereby certify that the attached is a true and correct copy of a Resolution adopted by the Racine County Board of Supervisors on November 7, 2017.



Wendy M. Christensen  
Racine County Clerk

County Seal

NOV 14 2017

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3

1 RESOLUTION NO. 2017-55

October 26, 2017

2  
3 RESOLUTION BY THE RACINE COUNTY ECONOMIC DEVELOPMENT AND LAND USE  
4 PLANNING COMMITTEE RECOMMENDING ADOPTION OF THE RACINE COUNTY  
5 HAZARD MITIGATION PLAN UPDATE: 2017-2021  
6

7 To the Honorable Members of the Racine County Board of Supervisors:

8  
9 WHEREAS, in December 2000, the Southeastern Wisconsin Regional Planning  
10 Commission (SEWRPC) and the Racine County Office of Emergency Management and  
11 Department of Planning and Development agreed to cooperatively prepare an all hazards  
12 mitigation plan for Racine County;  
13

14 WHEREAS, the initial Racine County Hazard Mitigation Plan was adopted by the  
15 County and approved in 2004 and was subsequently adopted by the municipalities within  
16 the County;  
17

18 WHEREAS, the mitigation planning requirements of 44 Code of Federal  
19 Regulations, Section 201.6(d) [44 CFR 201.6(d)] call for local hazard mitigation plans to be  
20 reviewed; updated to reflect changes in development, progress in local mitigation plan  
21 efforts, and changes in priorities; and re-approved every five years for local jurisdictions to  
22 be able to receive hazard mitigation funding;  
23

24 WHEREAS, the Racine County Hazardous Mitigation Plan Update was guided by a  
25 Hazard Mitigation Task Force consisting of elected and appointed officials from the County  
26 and municipalities in the County; agency and business representatives; and citizens from  
27 throughout the County knowledgeable in hazard mitigation matters.  
28

29 WHEREAS, the plan was designed to be consistent with the guidelines of the  
30 Wisconsin Department of Military Affairs, Division of Emergency Management, and the  
31 Federal Emergency Management Agency (FEMA); and with the requirements and  
32 procedures defined in the Disaster Mitigation Act of 2000.  
33

34 WHEREAS, the County has duly noticed a public information meeting on the Hazard  
35 Mitigation Plan Update and a public information meeting was held on Wednesday, April  
36 26, 2017.  
37

38 NOW, THEREFORE, BE IT RESOLVED, that the Racine County Economic  
39 Development and Land Use Planning Committee hereby approves the hazard mitigation  
40 plan embodied in *SEWRPC Community Assistance Planning Report No. 266 (3rd Edition)*,  
41 *Racine County Hazard Mitigation Plan Update: 2017-2021*.  
42

43 BE IT FURTHER RESOLVED by the Racine County Board of Supervisors that the  
44 Racine County Clerk is directed to transmit copies of this resolution to the Southeastern  
45 Wisconsin Regional Planning Commission (SEWRPC), to the Racine County Office of  
46 Emergency Management and the Racine County Public Works and Development Services  
47 Department and to all municipal clerks within seven (7) days after this resolution is  
48 adopted.

4 Respectfully submitted,

5  
6 1st Reading 10-26-17

7  
8 2nd Reading 11-7-17


9  
10 BOARD ACTION

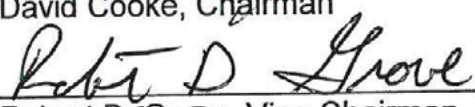
11 Adopted yes  
12 For \_\_\_\_\_  
13 Against \_\_\_\_\_  
14 Absent \_\_\_\_\_

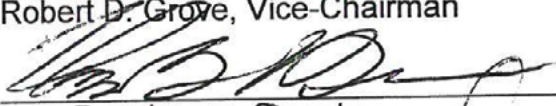
15  
16 VOTE REQUIRED: Majority

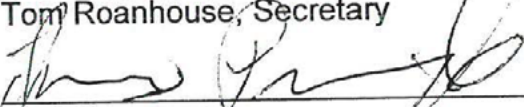
17  
18 Prepared by:  
19 Public Works & Development  
20 Services Department

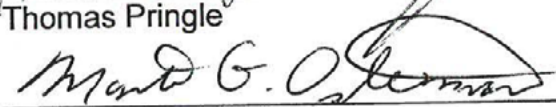
ECONOMIC DEVELOPMENT & LAND USE  
PLANNING COMMITTEE

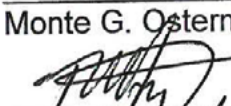
  
\_\_\_\_\_  
David Cooke, Chairman

  
\_\_\_\_\_  
Robert D. Grove, Vice-Chairman

  
\_\_\_\_\_  
Tom Roanhouse, Secretary

  
\_\_\_\_\_  
Thomas Pringle

  
\_\_\_\_\_  
Monte G. Osterman

  
\_\_\_\_\_  
Tom Hincz

  
\_\_\_\_\_  
Mark Gleason

21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33 The foregoing legislation adopted by the County Board of Supervisors of Racine  
34 County, Wisconsin, is hereby:

35  
36 Approved: \_\_\_\_\_

37 Vetoed: \_\_\_\_\_

38  
39 Date: \_\_\_\_\_

40  
41 \_\_\_\_\_  
42 Jonathan Delagrave, County Executive

43  
44  
45 FISCAL NOTE - NOT APPLICABLE  
46  
47

**MEMBERS OF THE RACINE COUNTY  
HAZARD MITIGATION LOCAL PLANNING TEAM**

David Maack, Co-Chair .....Coordinator, Racine County Office of Emergency Management  
 Julie Anderson, Co-Chair .....Director, Racine County Department of Public Works and Development Services  
 Aaron Owens, Secretary .....Planner, Southeastern Wisconsin Regional Planning Commission  
 Mark Anderson .....Lieutenant, City of Burlington Police Department  
 Christopher Bennet .....Trustee, Village of Rochester  
 Brandon Bledsoe .....Management Intern, Village of Wind Point  
 Dottie Bowersox .....Public Health Administrator, Racine Health Department  
 Joseph Boxhorn .....Senior Planner, Southeastern Wisconsin Regional Planning Commission  
 Jyl Brunner .....Administrative Captain, Racine Youthful Offender Correctional Facility  
 Jeff Busch .....Building Superintendent, Town of Dover  
 Pat Campbell .....Clerk, Town of Norway  
 Tom Christensen .....Administrator, Village of Caledonia  
 Jeff Collen .....Chief Executive Officer, YMCA of Racine  
 Aaron Collins .....Director of Plant Operations and Maintenance, Wheaton Franciscan Healthcare  
 James F. Day .....Assistant Chief, S.C. Johnson & Son Fire Brigade  
 Jonathan Delagrave .....County Executive, Racine County  
 Tom Ditscheit .....Chief, Town of Waterford Police Department  
 Jeff Dolezal .....Director of Public Works, Village of Waterford  
 Mark Dubiel .....Emergency Management Coordinator, Cree, Inc.  
 Brian Freitag .....Manager of Environmental and Facility Services, In-Sink-Erator  
 Silvano E. Garcia .....Public Health Specialist, Central Racine County Health Department  
 Michael Hawes .....Village Administrator, Village of Wind Point  
 Nicholas Hempel .....Division Chief, City of Racine Fire Department  
 Ken Hinz .....Supervisor, Town of Waterford Public Works Department  
 Perry Howard .....Fire Chief, City of Burlington Fire Department  
 Jody Howell .....Supervisor, Racine County Communication Center  
 Jake Isaacson .....Supervisor, Town of Dover Roads Department  
 Jon Keiser .....Battalion Chief, South Shore Fire Department  
 Laura L. Kletti .....Chief Environmental Engineer, Southeastern Wisconsin Regional Planning Commission  
 Jill Kopp .....Clerk-Treasurer, Village of Union Grove  
 Tom Kramer .....Administrator, Town of Norway  
 Heidi Lange .....Manager, Marketing, Communications & Public Relations, Wheaton Franciscan Healthcare  
 Chris Litzau .....President, Great Lakes Community Conservation Corps  
 Jennifer Loizzo .....Registered Sanitarian, Central Racine County Health Department  
 Paul Madden .....Battalion Chief, City of Racine Fire Department  
 Michael McKinney .....Clerk/Treasurer, Town of Yorkville  
 Luke Miller .....Trustee, Franksville United Methodist Church  
 Moira Moon .....Administrative Assistant, Racine County Office of Emergency Management  
 Jane Nikolai .....Treasurer, Racine County  
 Mark Osmundsen .....Director of Public Works, Village of Union Grove  
 Nakeisha Payne .....Senior Public Involvement & Outreach Specialist, Southeastern Wisconsin Regional Planning Commission  
 Cody Pearce .....Public Health Educator, City of Racine  
 Dick Roeder .....Chief, Caledonia Fire Department  
 Kyle Roeder .....Disaster Program Manager, American Red Cross of Southeast Wisconsin  
 Ben Schliesman .....Southeast Region Director, Wisconsin Emergency Management  
 Jeff Seitz .....Village Engineer, Village of Sturtevant Department of Public Works  
 John P. Serketich .....Assistant Corporation Counsel, Racine County  
 Robert Stedman .....Chief, South Shore Fire Department  
 Anthony Trevino .....Security Manager, Cree, Inc.  
 Skip Twardosz .....Emergency Management Director, Town of Burlington  
 Dan Warren .....Captain, Village of Caledonia Police Department  
 Stacey Webber .....Business Manager, Accu-Temp Heat Treating  
 James Weidner .....Captain, Racine County Sheriff Department  
 Chuck Weitzel .....Lieutenant, City of Racine Police Department  
 David Wohlgemuth .....Lieutenant, City of Racine Police Department  
 Craig Workman .....Director of Public Works, City of Burlington  
 Mark Yehlen .....Commissioner of Public Works, City of Racine