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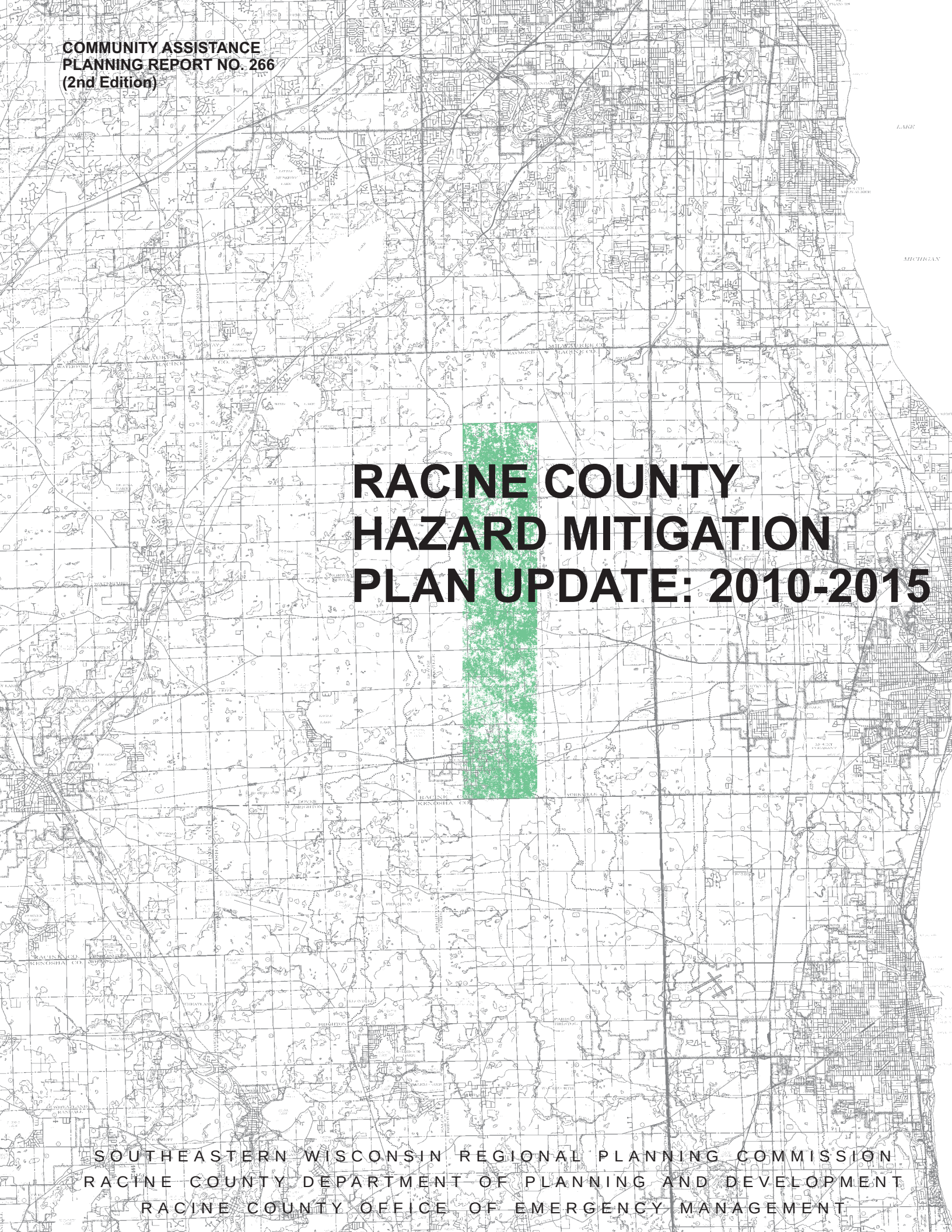

RACINE COUNTY HAZARD MITIGATION PLAN UPDATE: 2010-2015

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RACINE COUNTY OFFICE OF EMERGENCY MANAGEMENT

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RACINE COUNTY HAZARD MITIGATION PLAN UPDATE

RACINE COUNTY

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David L. Maack..... Director Racine County Emergency Management

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Ronald J. Printz, PE .....Principal Engineer

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RACINE COUNTY HAZARD MITIGATION PLAN UPDATE: 2010-2015

Prepared by the

Southeastern Wisconsin Regional Planning Commission
Racine County Department of Planning and Development
Racine County Office of Emergency Management

In Cooperation with

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

July 2010

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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, 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 is 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

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 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 is comprised of elected and appointed officials; agency and business representatives; and citizens from throughout the County knowledgeable in hazard mitigation matters.

In assembling the Racine County Hazard Mitigation Plan Task Force, the County Planning and Development Department and Office of Emergency Management sought representatives from a cross-section of community interests. The chief elected official of each municipality in the County was invited to participate. In addition, invitations were sent by e-mail to over 330 people, including 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. Finally, the County issued a news release announcing the formation of the Task Force and inviting participation.

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. Tables 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 initial plan was issued in 2004.

For more complete details on the level of participation of local citizens and community groups in the technical advisory committees, the public involvement process, and summary notes for each Task Force meeting, see Appendix A.

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

Table 1

JURISDICTIONS PARTICIPATING IN THE RACINE COUNTY ALL HAZARDS MITIGATION PLAN UPDATE: 2009

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

[a]*During November 2005, the Town of Caledonia incorporated as a village. The former Town had participated in the initial Racine County hazard mitigation plan. The Village's participation, thus, constitutes a continuation of participation.*

[b]*During December 2008, the Town of Rochester and the Village of Rochester were consolidated as the Village of Rochester. Both jurisdictions had participated in the initial Racine County hazard mitigation plan. Thus, the Village's participation constitutes a continuation of participation.*

Source: SEWRPC.

Racine County covers about 340 square miles and contains two cities, nine villages, and six towns as shown on Map 1.[2] 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

[2]*During September 2003, the Town of Mt. Pleasant was incorporated as a Village. During November 2005, the Town of Caledonia was incorporated as a Village. During December 2008, the Town of Rochester and the Village of Rochester were consolidated as the Village of Rochester.*

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[a]	Review of Report
	March 30, 2009	June 17, 2009	November 4, 2009		
Cities					
Burlington	- -	- -	X	X	X
Racine	X	X	X	X	X
Villages					
Caledonia	X	X	X	- -	X
Elmwood Park	- -	X	- -	X	X
Mt. Pleasant	X	X	X	X	X
North Bay	- -	- -	- -	X	- -
Rochester	- -	X	X	X	X
Sturtevant	X	X	X	X	X
Union Grove	X	X	- -	X	X
Waterford	X	- -	- -	X	- -
Wind Point	- -	X	X	X	X
Towns					
Burlington	X	X	X	X	X
Dover	X	X	- -	X	X
Norway	X	X	X	X	X
Raymond	X	X	X	- -	X
Waterford	X	X	X	X	X
Yorkville	- -	X	X	- -	X
County					
Racine County	X	X	X	X	X

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

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

Source: SEWRPC.

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 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

Table 3

OUTREACH ACTIVITIES BY LOCAL COMMUNITIES IN RACINE COUNTY RELATED TO HAZARD MITIGATION: 2004-2008

Community	Activity
City of Burlington	Quarterly newsletter City website
City of Racine	City website
Village of Elmwood Park	Monthly newsletter Village website
Village of Mount Pleasant	Quarterly newsletter Village website
Village of Rochester	Quarterly newsletter Compiling list of special needs residents who would need special assistance in the event 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
Village of Sturtevant	Quarterly newsletter Village website
Village of Union Grove	Quarterly newsletter Village website
Village of Waterford	Quarterly newsletter Village website Press releases
Village of Wind Point	Monthly newsletter Village Website
Town of Norway	Quarterly newsletter

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

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 is 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*[3] on local conditions and hazards likely to occur or be experienced within Racine

[3]*Wisconsin Emergency Management,* State Hazard Mitigation Plan of Wisconsin, *December 2008.*

Table 4

HAZARD MITIGATION ACTIVITIES IN RACINE COUNTY: 2004-2009

Community	Project	Funding Source	Beginning Date	Completion Date
City of Racine	Root River flood correlation study	City	March 2009	July 2009
	New outfall for wastewater treatment plant	- -	- -	2005
	Elimination of use of chlorine gas for wastewater disinfection	City	2005	2005
Village of Caledonia	House relocation	Owner's flood insurance	- -	2008
Village of Mount Pleasant	Pike River channel restoration	FEMA, WDNR	- -	Ongoing
Village of North Bay	Lake Michigan shoreline restoration project	Village	- -	May 2009
	Hennepin Place bridge rehabilitation	Village, FEMA	August 2008	August 2008
	Bridge rehabilitation	Village	November 2008	November 2008
Village of Rochester	Ditch cleaning along Oak Knoll Road	Village	2008	2008
	Updating of Village drainage map	Village	2008	Ongoing
Village of Sturtevant	Creation of Nature Preserve along Chicory Creek	- -	- -	2007
Village of Union Grove	Clearing and rip-rapping of Root River Canal near Maurice Road	Village	- -	- -
	Storm sewer improvement along Main Street	WisDOT	2008	2008
Village of Waterford	Fox River bank stabilization	Southeastern Wisconsin Fox River Commission	April 2008	August 2008
Town of Waterford	Store Street project	Town	September 2008	September 2008
	Raising of Wheatland Road	Town		August 2009

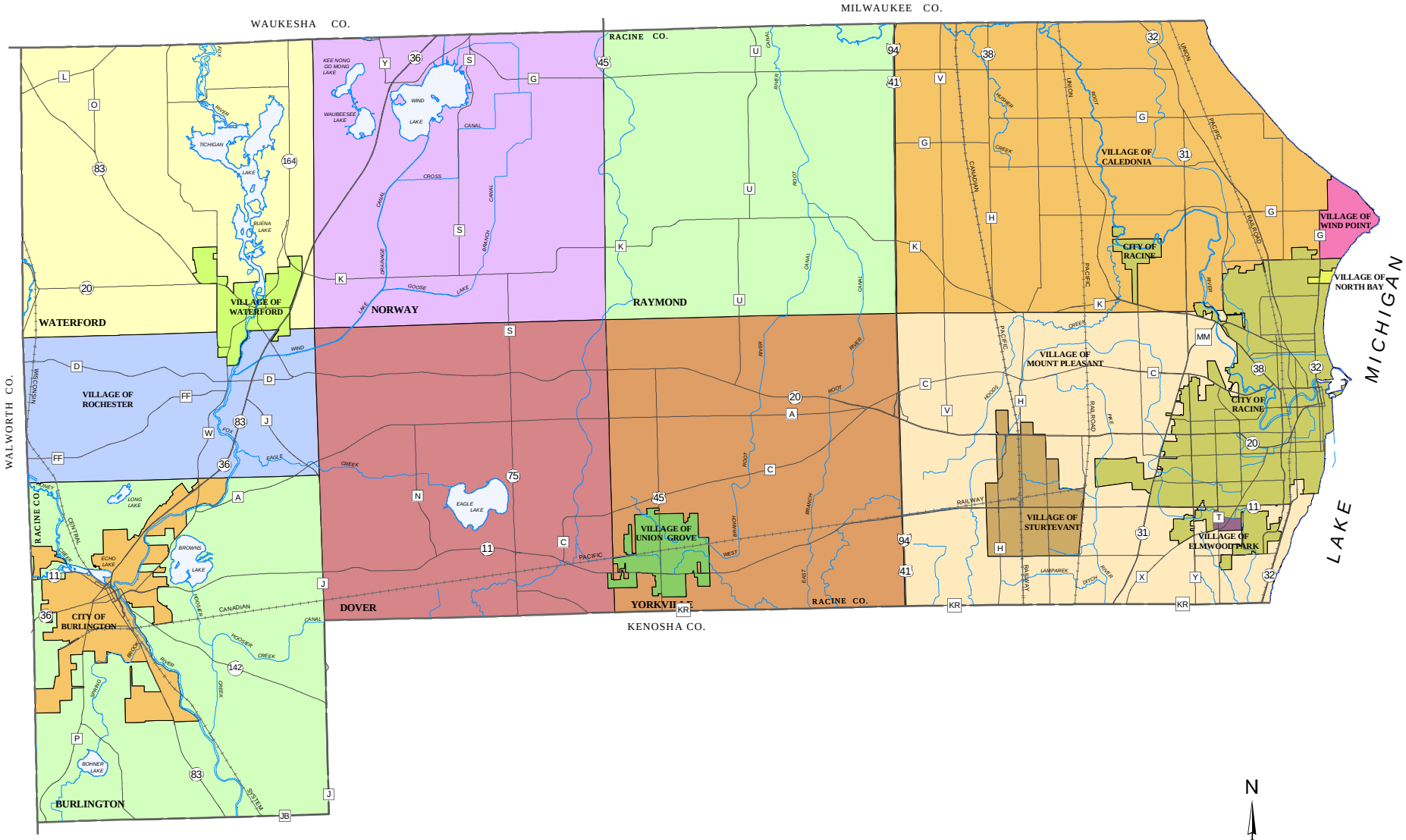
Source: Racine County Office of Emergency Management, Local Municipalities, and SEWRPC.

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

Map 1

CIVIL DIVISION BOUNDARIES IN RACINE COUNTY: 2009



Source: SEWRPC.

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 and updated in 2009 and 2010 through a collective effort of a number of agencies, organizations, and business representatives under the guidance of the Racine County Hazard Mitigation Plan Task Force, which was created by 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 that Task Force is documented in Appendix A of this report. In addition to formation and active participation of the Task Force, the plan development and updating process 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 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;[4]
- 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.

[4]*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 awareness, tornado awareness, hazardous materials awareness, heat awareness, pandemic influenza, and family preparedness. Specific activities include publication of monthly preparedness newsletters, presentations to schools and community groups, safety and preparedness seminars, 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 pages on Racine County's website.

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 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 awareness, tornado awareness, hazardous materials awareness, heat awareness, pandemic influenza, and family preparedness.

Implementation Activities

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

In 2005, the City of Racine completed a new outfall for its wastewater treatment plant. The City Water and Wastewater Utility completed a wastewater treatment plant upgrade in 2005 that eliminated the use of chlorine gas as a disinfectant. This allowed the utility to remove several one-ton chlorine gas cylinders from its facility, eliminating a potential hazard on the south side of the City. In 2009, the City conducted a flood stage correlation study for the Root River to improve the City's response to flooding, to improve the coordination of activities by the City Department of Public Works before and during flood events, and to improve service to residents.

One home in the Village of Caledonia was substantially damaged as a result of the June 2008 flooding event. As of late 2009, the homeowner was in the process of using 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 floodplain.

As of 2009, the Village of Mt. Pleasant Stormwater Utility District has completed Phases 1 through 4A of the Pike River channel restoration project. Detailed design and construction of the remaining 2.5 miles are in progress and expect to be completed over the next six to eight years. As part of this project, the Village purchased and demolished two homes along Willow Road which had been substantially damaged in the August 2007 floods.

As a result of the June 2008 flooding, the Village of North Bay undertook two bridge rehabilitation projects and a shoreline restoration project.

The Village of Rochester has conducted some ditch cleaning along Oak Knoll Road to improve drainage and protect the road embankment. In addition, it has begun updating its 100-year-old drainage map in order to identify all agricultural drainage tiles.

Since 2004 the Village of Sturtevant has completed four regional stormwater detention facilities that provide local sewer and ditch relief. These new facilities help relieve flood flows for Hoods Creek, Chicory Creek, Waxdale Creek, and the Pike River.

The Village of Union Grove recently cleared, expanded, and riprapped 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 in order to reduce street flooding.

In 2008, the Village of Waterford implemented a streambank stabilization project along the Fox River to reduce the threat of erosion, ensure the integrity of the Waterford Dam, and to protect nearby buildings and infrastructure.

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 Drainage District indicated that the crossing is impassable anytime two or more inches of rain falls and that this is the District's most pressing flooding location. The evaluation included a study of the floodplain impacts of raising the road and providing additional high water culverts. This study concluded that these actions would have no impact on the floodplain.

In 2008, the Town of Waterford regraded a portion of Store Street to divert water from adjacent homes. In 2009, the Town of Waterford raised the roadway along a four-mile section of Wheatland Road in the southern section of the Town to reduce flood impacts.

PLAN DEVELOPMENT REVIEW PROCESS AND ADOPTION

As previously noted, this 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 (see Appendix A).

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 will be 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 will be made available to meet with communities on an individual basis to review the plan 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 alternative plans 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 1 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. Two changes in civil divisions in Racine County have occurred since the adoption of the initial hazard mitigation plan. During November 2005, the Town of Caledonia was incorporated as a Village. During December 2008, the Town of Rochester and the Village of Rochester were consolidated. 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. Population growth in Racine County from 1850 to 2006 is graphically summarized by Figure 1. 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

Table 5

AREAL EXTENT OF CIVIL DIVISIONS IN RACINE COUNTY: 2008

Civil Division	Area (square miles)
Cities	
Burlington[a]	7.4
Racine	15.7
Villages	
Caledonia[b]	45.6
Elmwood Park	0.2
Mt. Pleasant[c]	33.9
North Bay	0.1
Rochester[d]	17.7
Sturtevant	4.2
Union Grove	2.5
Waterford	2.5
Wind Point	1.3
Towns	
Burlington	34.5
Dover	36.2
Norway	35.7
Raymond	35.7
Waterford	33.7
Yorkville	33.8
Total	340.7

[a]*Does not include 0.1 square mile in Walworth County.*

[b]*During November 2005, the Town of Caledonia was incorporated as a village.*

[c]*During September 2003, the Town of Mt. Pleasant was incorporated as a village.*

[d]*During December 2008, the Town of Rochester and the Village of Rochester were consolidated as the Village of Rochester.*

Source: SEWRPC.

increased by only 1 percent, while the population increased by about 8 percent, from 175,000 to 188,800 persons between 1990 and 2000. The County's estimated population in 2006 was 194,580. This represents an increase of about 3 percent between 2000 and 2006.

The City of Racine is the most populous community in the County, with an estimated 80,300 residents, or about 41 percent of the County's population, in 2006. The next most populous communities are the Village of Mt. Pleasant, with an estimated 25,400 residents, and the Village of Caledonia, with an estimated 24,800 residents, each about 13 percent of the County's population; and the City of Burlington, with 15,500 residents, or about 8 percent of the County's population. Based upon the 2000 census data, several communities in Racine County experienced a relative population increase of more than 20 percent from 1990 to 2000. These communities include the Villages of Sturtevant and Waterford, and the Towns of Norway, Rochester, and Waterford. Between 2000 and 2006 the Villages of Mt. Pleasant, Sturtevant, and Waterford and the former Town of Rochester all are estimated to have experienced a relative population increase of 10 percent or more.

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 2006. The rate of increase in the number of households has exceeded the rate of population increase. Between 1970 and 2006, the number of households increased by about 53 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 growth. It should be noted, however, that a substantial number of Racine County employed residents—31,100 of the 93,400 workers in 2007, or about 33 percent—worked outside the County, and 3,300 workers, or 4 percent, worked outside the State.

As indicated in Table 8, employment growth was significant in the County between 1970 and 2007, with an increase in the number of jobs from 64,500 to 93,400, or an increase of 45 percent.

Table 6

HISTORICAL RESIDENT POPULATION LEVELS IN RACINE COUNTY: 1850-2006

Year	Population	Change from Preceding Census	
		Absolute	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
2006[a]	194,580	5,749	3.0

[a] *Estimated.*

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

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 2008 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 2000 are set forth on Map 2 and in Table 10. Urban land uses occupied about 78.7 square miles, or about 23 percent of the County in 2000. 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 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 34.2 square miles, or about 44 percent of the urban land uses and about 10 percent of the total area of the County.

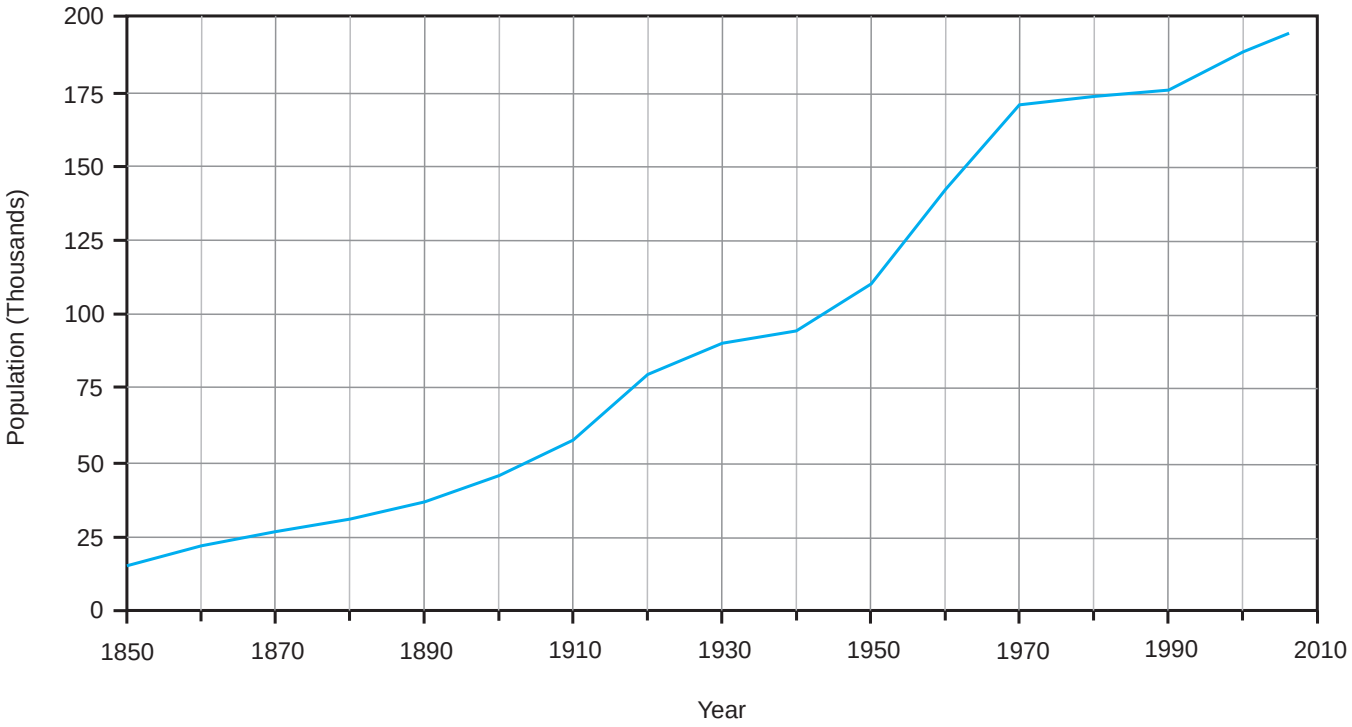
Land uses categorized as transportation, communication, and utilities constituted the second largest urban land use category in 2000, encompassing about 20.9 square miles, or about 27 percent of the area of all urban land and about 6 percent of the total area of the County. Major arterial highways serving the County include IH 94/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.

Map 3 shows lands in agricultural uses in Racine County in 2000. According to the National Agricultural Statistics Service, in 2007, there were 652 farms in the County.[1] The average farm size was about 185 acres, although it is important to note that the size of about half of the farms in the County was 45 acres or less. The estimated value of land and farm buildings associated with these farms was about $576 million, in 2008 dollars. Common crops grown in the County include corn for grain and silage, soybeans, winter wheat, hay, vegetables, and some specialty crops such as sod. Common livestock raised in the County include dairy and beef cattle, hogs, and poultry.

[1] *U.S. Department of Agriculture National Agricultural Statistics Service,* 2007 Census of Agriculture: Wisconsin State and County Data, *February 2009.*

Figure 1

HISTORICAL POPULATION LEVELS IN RACINE COUNTY: 1850-2006



NOTE: 2006 population is estimated.

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

Lands in agricultural land uses are inventoried by municipality and class of agricultural land use in Table 11. In 2000, about 125,000 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 11,000 acres in agricultural land uses. In addition, two villages, the Villages of Rochester and Sturtevant, had over 1,000 acres in agricultural land uses. Cultivated lands comprised the largest category of agricultural land uses, accounting for over 107,000 acres, or about 86 percent of agricultural lands in the County. Pasture and unused lands accounted for about 11,200 acres, or about 9 percent of the County's agricultural lands. Special agricultural uses and farm buildings accounted for about 3,800 acres and 2,100 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 2000.

Map 3 also shows the agricultural lands that are within the one-percent-annual-probability floodplain in Racine County in 2000. About 12,100 acres of agricultural land, or slightly less than 10 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 2000 there were 702 mobile homes located in the County. Most of these were located in eight mobile home parks. In addition, there were five sites in the County that contained one to four mobile homes each. Mobile home parks and small groupings are listed in Table 13.

Table 7

NUMBER OF HOUSEHOLDS IN RACINE COUNTY: CENSUS YEARS 1970-2006

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
2006[a]	75,960	5,141	7.3

[a]*Estimated.*

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

Table 8

NUMBER OF JOBS IN RACINE COUNTY: CENSUS YEARS 1970-2007

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
2007	93,426	-4,474	-4.6

Source: U.S. Bureau of Economic Analysis, U.S. Bureau of the Census, and 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 service areas, which are shown in orange 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 service areas, the largest of which is the Wind Lake area, in the Town of Norway.

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 6.

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.

Table 9

EQUALIZED VALUE OF PROPERTY IN RACINE COUNTY BY COMMUNITY: 2008

Community	2008 Equalized Value	Percent Change from 2001
Cities		
Burlington	$ 721,546,600	26
Racine	3,886,255,050	42
Subtotal	$ 4,607,801,650	39
Villages		
Caledonia	$ 2,313,197,300	70
Elmwood Park	44,822,100	40
Mt. Pleasant	2,793,812,200	74
North Bay	39,499,000	56
Rochester[a]	353,895,700	72
Sturtevant	347,551,900	32
Union Grove	317,691,400	63
Waterford	441,741,900	96
Wind Point	289,435,400	53
Subtotal	$ 6,941,646,900	69
Towns		
Burlington	$ 732,796,200	73
Dover	369,950,600	76
Norway	901,288,700	82
Raymond	474,789,200	74
Waterford	793,105,800	87
Yorkville	506,225,300	84
Subtotal	$ 3,778,155,800	80
Total	$15,327,604,350	61

[a]*During December 2008, the Town of Rochester and the Village of Rochester were consolidated. The equalized value given reflects equalized values of $85,592,500 and $268,303,200 for the Village and Town, respectively.*

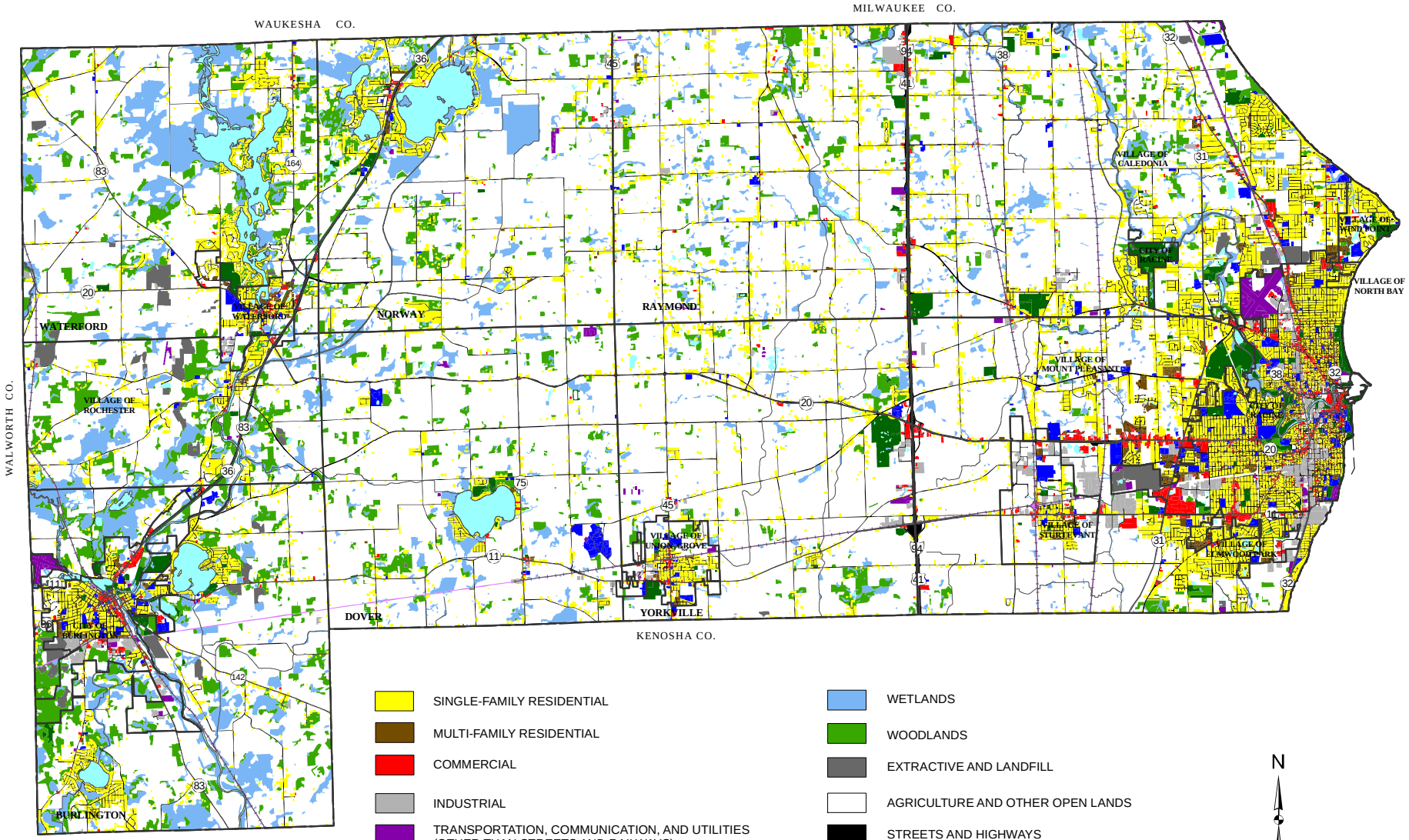
Source: Wisconsin Department of Revenue.

Floodlands are the wide, gently sloping areas contiguous to, and usually lying on both sides of, a stream channel. For planning and regulatory purposes, floodlands 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 is a 1 percent chance of this event being reached or exceeded in severity in any given year. Floodland 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. Floodland 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.

Floodlands identified by Racine County, the Southeastern Wisconsin Regional Planning Commission (SEWRPC), and the Federal Emergency Management Agency (FEMA) are shown on Map 6. Approximately 34.7 square miles, 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 4.9 square miles of approximately-delineated floodplains. The area of one-percent-annual-probability floodplain in each community is given in Table 14. In addition, 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. It is expected that restoration activities from the headwaters to State Highway 11 will be completed during 2009. A consideration in flood hazard mitigation is the potential for increased flooding due to

Map 2

EXISTING LAND USE IN RACINE COUNTY: 2000



Source: SEWRPC.

Table 10

LAND USES IN RACINE COUNTY: 2000

Land Use Category[a]	Square Miles	Percent of Subtotal	Percent of County
Urban			
Single-Family Residential	34.2	43.5	10.0
Multi-Family Residential[b]	2.4	3.1	0.7
Commercial	3.0	3.8	0.9
Industrial	3.8	4.8	1.1
Transportation, Communications, and Utilities	20.9	26.5	6.1
Governmental and Institutional	3.6	4.5	1.0
Recreational	4.7	6.0	1.4
Unused Urban	6.1	7.7	1.8
Subtotal	78.7	100.0	23.1
Nonurban			
Agricultural	195.6	74.6	57.4
Woodlands	19.8	7.6	5.8
Wetlands	24.8	9.5	7.3
Surface Water	8.1	3.1	2.4
Landfill and Extractive	2.5	1.0	0.7
Other Open Lands	11.2	4.3	3.3
Subtotal	262.0	100.0	76.9
Total	340.7	- -	100.0

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

[b]*Includes two-family residential.*

Source: SEWRPC.

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 shown on Map 7. As shown on this map, of the 19 dams identified, one has been assigned a high hazard rating by the WDNR, indicating the potential for loss of human life as well as economic loss, environmental damage, or disruption of lifeline facilities during failure or misoperation of the dam. Another five dams have been assigned significant hazard ratings indicating the potential for economic loss, environmental damage, or disruption of lifeline facilities.

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 2010 FEMA digital flood insurance rate maps for Racine County and is available as a digital file layer for the Racine County cadastral mapping system which covers the entire County.

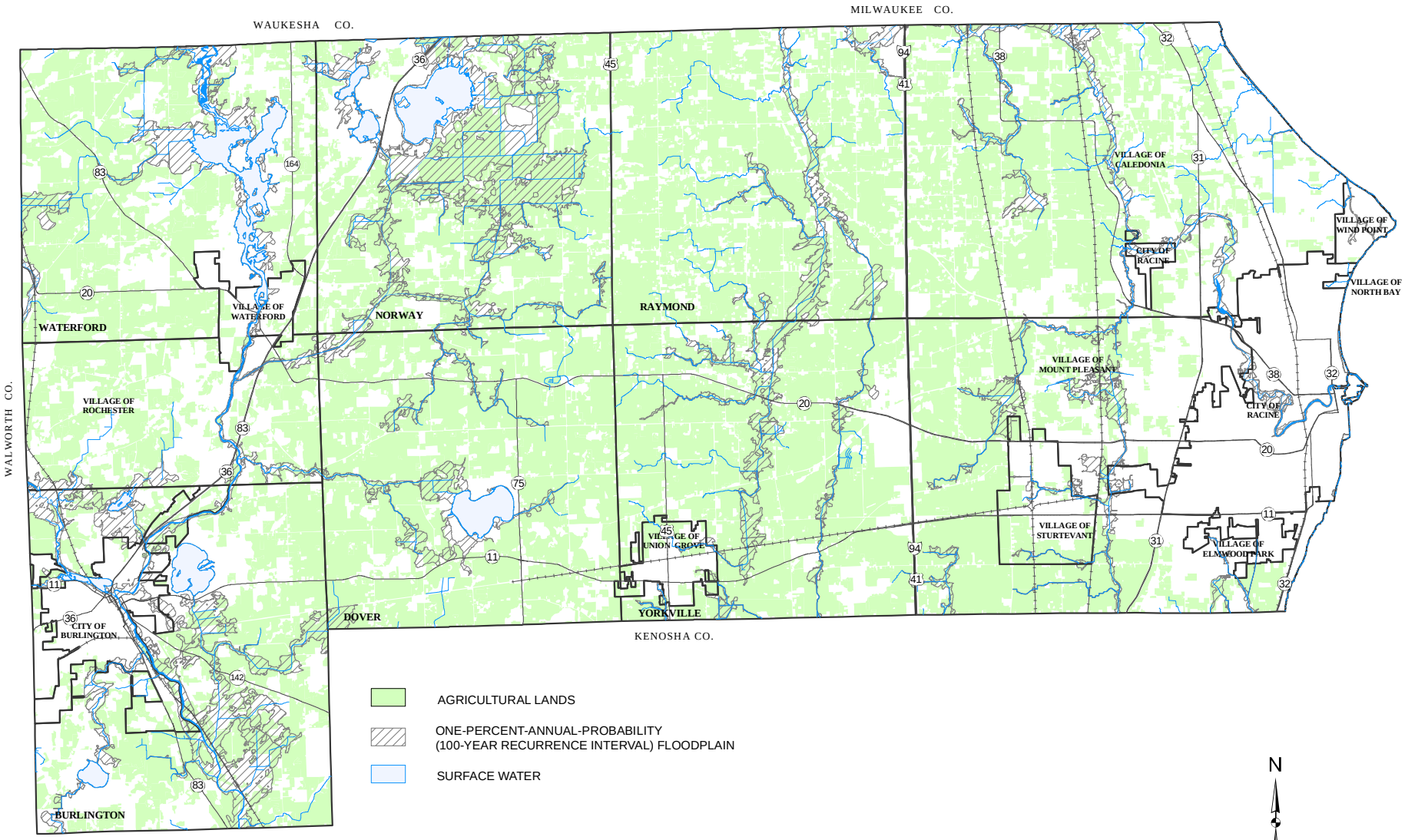
LAKE MICHIGAN SHORELINE EROSION HAZARD AREAS

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

Map 3

AGRICULTURAL LANDS IN RACINE COUNTY: 2000



Source: SEWRPC.

Table 11

AGRICULTURAL LANDS IN RACINE COUNTY: 2000

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)
Cities							
Burlington	651.7	130.9	0.0	2.3	0.0	11.1	795.5
Racine	16.2	8.8	0.0	0.0	0.0	0.0	25.0
Villages							
Caledonia	13,917.0	1,352.0	34.9	127.5	67.8	227.3	15,726.5
Elmwood Park	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mt. Pleasant	11,180.7	513.2	0.0	59.9	135.7	152.9	12,042.4
North Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rochester	4,472.0	1,101.0	10.3	63.2	0.0	109.6	5,756.1
Sturtevant	985.1	97.0	0.0	41.5	0.0	7.2	1,130.8
Union Grove	470.8	82.6	0.0	0.0	0.0	8.8	562.2
Waterford	275.2	71.2	0.0	0.0	0.0	5.1	351.5
Wind Point	10.8	0.0	0.0	0.0	0.0	0.0	10.8
Towns							
Burlington	8,848.2	1,783.0	18.3	1.2	423.0	182.4	11,256.1
Dover	16,072.6	922.0	0.0	16.5	206.3	283.8	17,501.2
Norway	10,236.2	947.0	0.0	7.1	2,864.4	212.5	14,267.2
Raymond	15,133.1	1,215.7	0.0	146.0	60.3	320.6	16,875.7
Waterford	10,131.4	1,687.8	55.5	14.5	0.5	236.4	12,126.1
Yorkville	14,974.9	1,264.4	0.0	72.9	38.3	346.2	16,696.2
Total	107,374.9	11,176.6	119.0	552.6	3,796.3	2,103.9	125,123.3

Source: SEWRPC.

Table 12

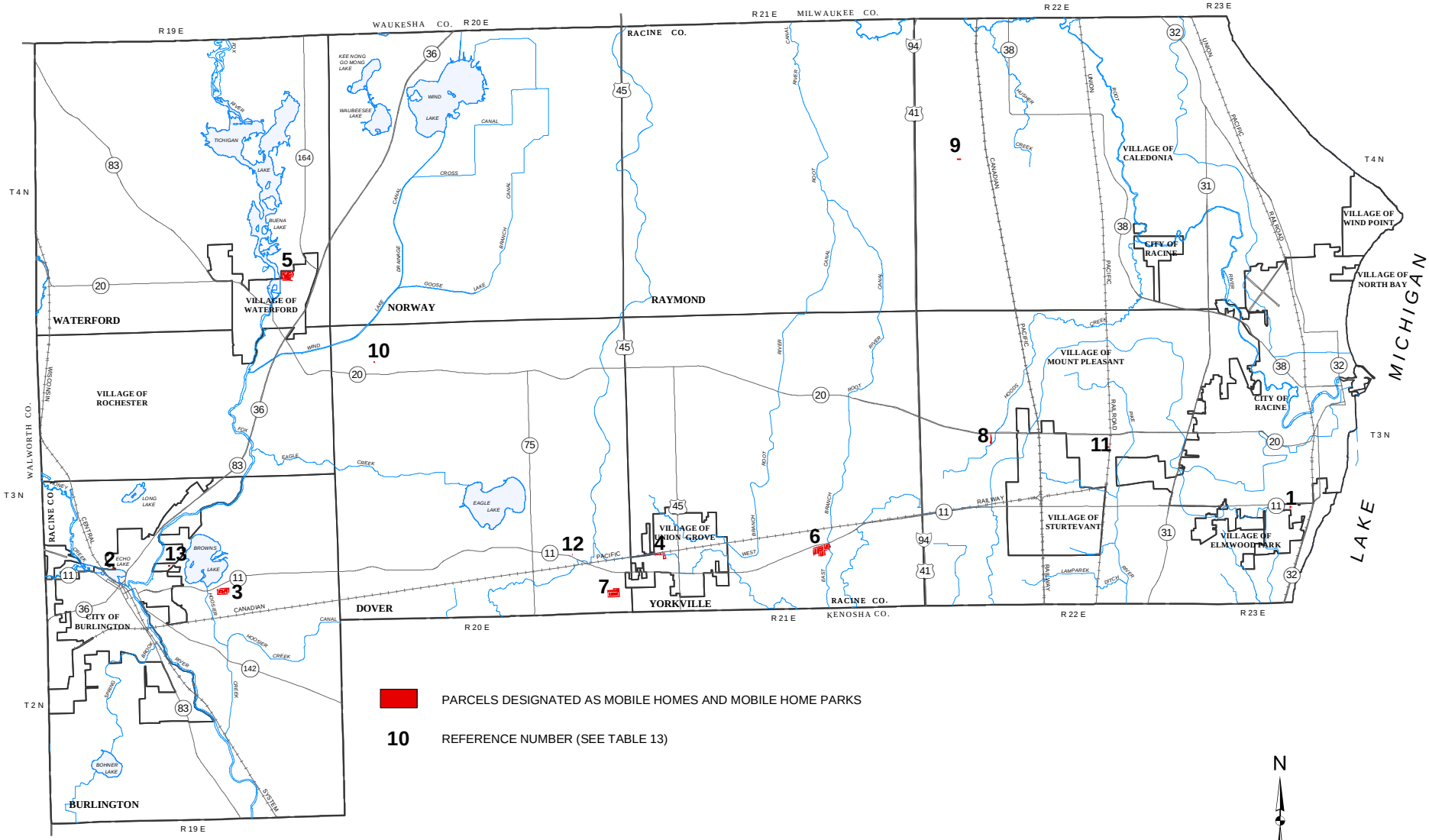
AGRICULTURAL LANDS WITHIN THE ONE-PERCENT-ANNUAL-PROBABILITY FLOODPLAIN IN RACINE COUNTY: 2000

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)
Cities							
Burlington	110.1	16.2	0.0	0.0	0.0	11.1	126.3
Racine	2.5	0.0	0.0	0.0	0.0	0.0	2.5
Villages							
Caledonia	355.5	53.2	18.5	1.2	0.0	1.7	430.1
Elmwood Park	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mt. Pleasant	823.6	165.8	0.0	0.0	1.1	1.5	993.4
North Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rochester	86.3	35.9	9.0	0.0	0.0	0.5	137.7
Sturtevant	41.3	11.2	0.0	0.0	0.0	0.0	30.8
Union Grove	21.1	4.0	0.0	0.0	0.0	0.8	25.9
Waterford	2.3	6.4	0.0	0.0	0.0	0.0	8.7
Wind Point	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towns							
Burlington	1,567.0	303.7	5.3	0.0	8.7	5.7	1,891.4
Dover	974.4	33.6	0.0	6.3	43.0	2.7	1,054.7
Norway	1,971.5	113.7	0.0	0.0	2,467.7	9.8	4,564.7
Raymond	912.2	71.0	0.0	30.5	0.3	1.0	1,015.0
Waterford	353.5	79.5	8.9	0.0	0.0	0.1	442.0
Yorkville	1,148.2	133.4	0.0	0.0	36.8	20.8	1,339.2
Total	8,369.5	1,027.6	42.7	34.2	2,559.6	44.6	12,078.2

Source: SEWRPC.

Map 4

MOBILE HOMES AND MOBILE HOME PARKS IN RACINE COUNTY: 2000



Source: SEWRPC.

Table 13

MOBILE HOME PARKS AND MOBILE HOMES IN RACINE COUNTY: 2000

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	21	Village of Mt. Pleasant
2	Echo Lake Mobile Home Court	0.8	8	Town of Burlington
3	Brown's Lake Mobile Home Court	18.4	105	Town of Burlington
4	Garden Grove Mobile Home Park	6.3	85	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	131	Town of Dover
8	Jensen's Mobile Home Village	4.0	23	Village of Mt. Pleasant
Single-Family or Small Groupings				
9	- -	1.9	2	Village of Caledonia
10	- -	0.5	1	Town of Dover
11	- -	0.9	1	Village of Mt. Pleasant
12	- -	0.3	4	Town of Dover
13	- -	0.5	1	Town of Burlington

Source: SEWRPC.

bluff stability conditions in Southeastern Wisconsin were surveyed in 1977[2] and 1997,[3] and in Racine County in 1978[4] and 1982.[5] Such conditions can change over time since they are related, in part, 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 April 2009, water levels in Lake Michigan were about 0.6 foot below average levels and about three feet below the high levels which occurred in 1986. While these relatively 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, given the cyclic nature of water levels in the Great Lakes, a return to higher lake levels may occur in the future.

---

[2]*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.*

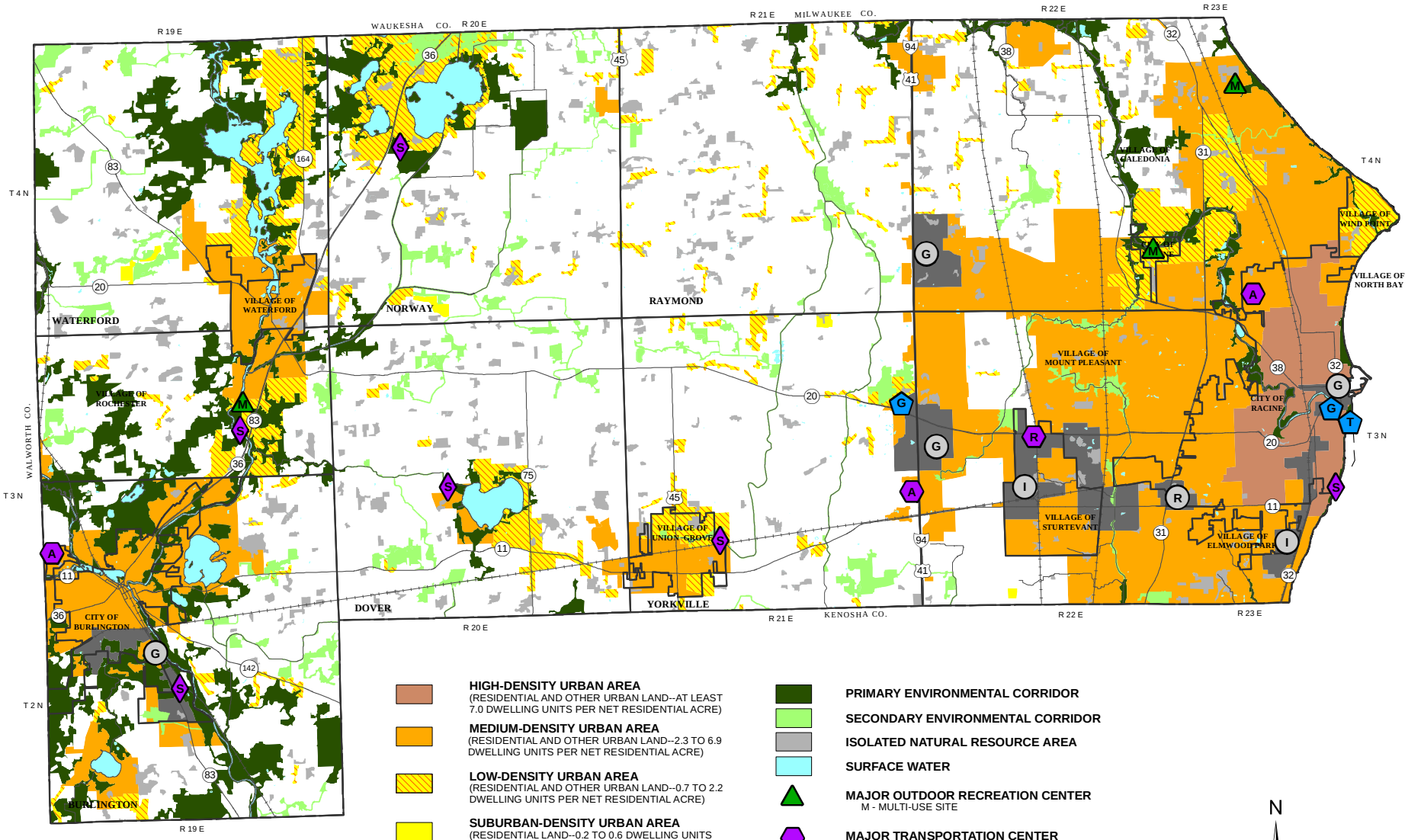
[3]*SEWRPC Technical Report No. 36,* Lake Michigan Shoreline Recession And Bluff Stability in Southeastern Wisconsin: 1995*, December 1997.*

[4]*J.P. Keillor and R. DeGroot,* Recent Recession of Lake Michigan Shorelines in Racine County, Wisconsin, *University of Wisconsin Sea Grant Program, 1978.*

[5]*SEWRPC Community Assistance Planning Report No. 86,* A Lake Michigan Coastal Erosion Management Study for Racine County, Wisconsin, *October 1982.*

Map 5

RACINE COUNTY LAND USE PLAN: 2035



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)

SUBURBAN-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

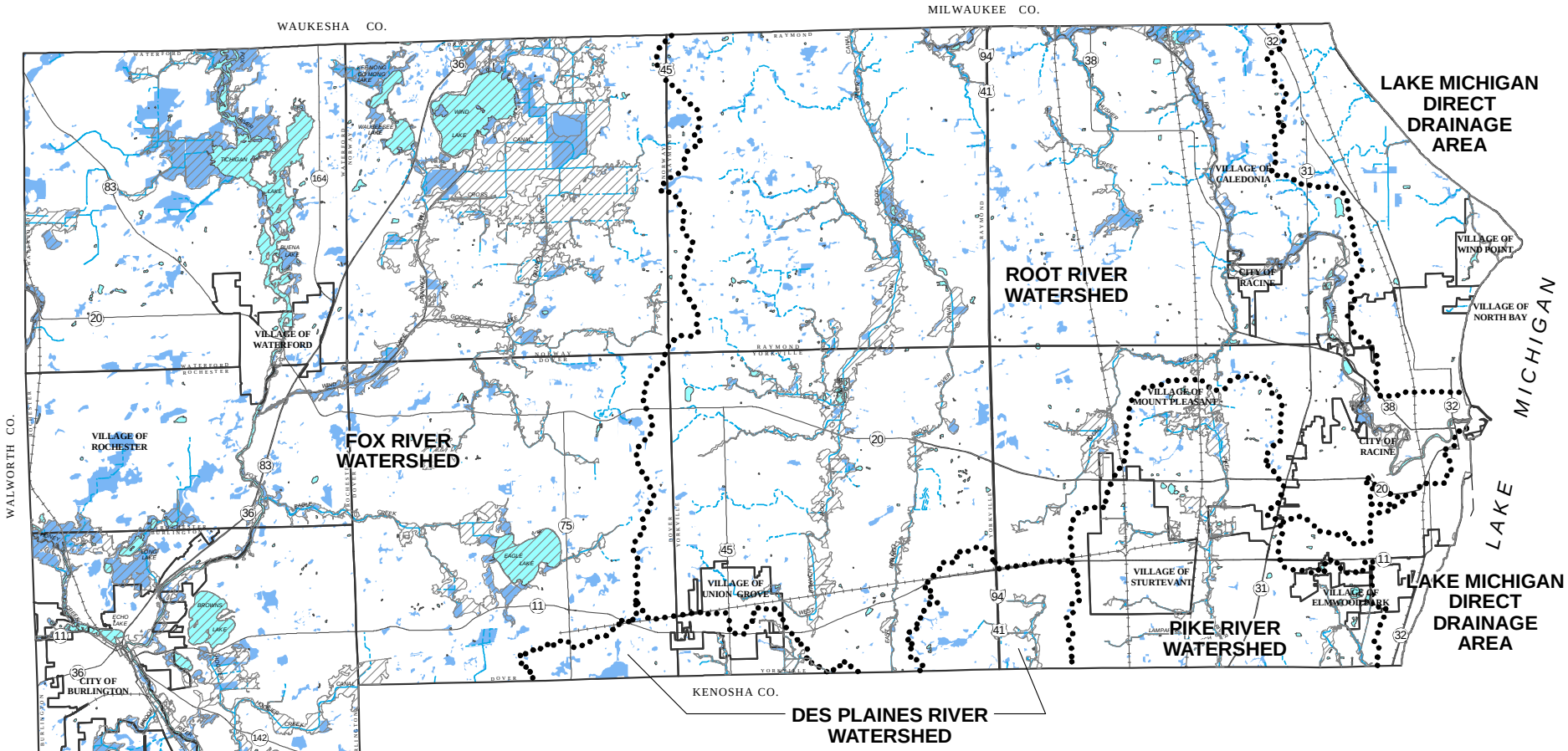
N

GRAPHIC SCALE
0 1 2 3 4 Miles

Source: SEWRPC.

Map 6

SURFACE WATERS, WETLANDS, AND FLOODPLAINS IN RACINE COUNTY: 2008



NOTE: Restoration efforts along the Pike River and its tributaries in the Village of Mount Pleasant are ongoing and are expected to result in changes to the associated floodplain. It is expected that restoration activities from the headwaters to State Highway 11 will be completed during 2009.

Source: Federal Emergency Management Agency and SEWRPC.

Table 14

AREAL EXTENT OF ONE-PERCENT-ANNUAL-PROBABILITY FLOODPLAIN BY CIVIL DIVISION IN RACINE COUNTY: 2006

Civil Division	Area (square miles)
Cities	
Burlington	0.9
Racine	0.5
Villages	
Caledonia	2.2
Elmwood Park	0.0
Mt. Pleasant	2.4
North Bay	<0.1
Rochester	1.0
Sturtevant	0.1
Union Grove	0.1
Waterford	0.1
Wind Point	0.1
Towns	
Burlington	6.7
Dover	2.4
Norway	10.1
Raymond	2.6
Waterford	2.9
Yorkville	2.6
Total	34.7

Source: SEWRPC.

The 1997 Lake Michigan coastal erosion 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 8. These reaches were selected so as 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 current 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.

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 8. 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.

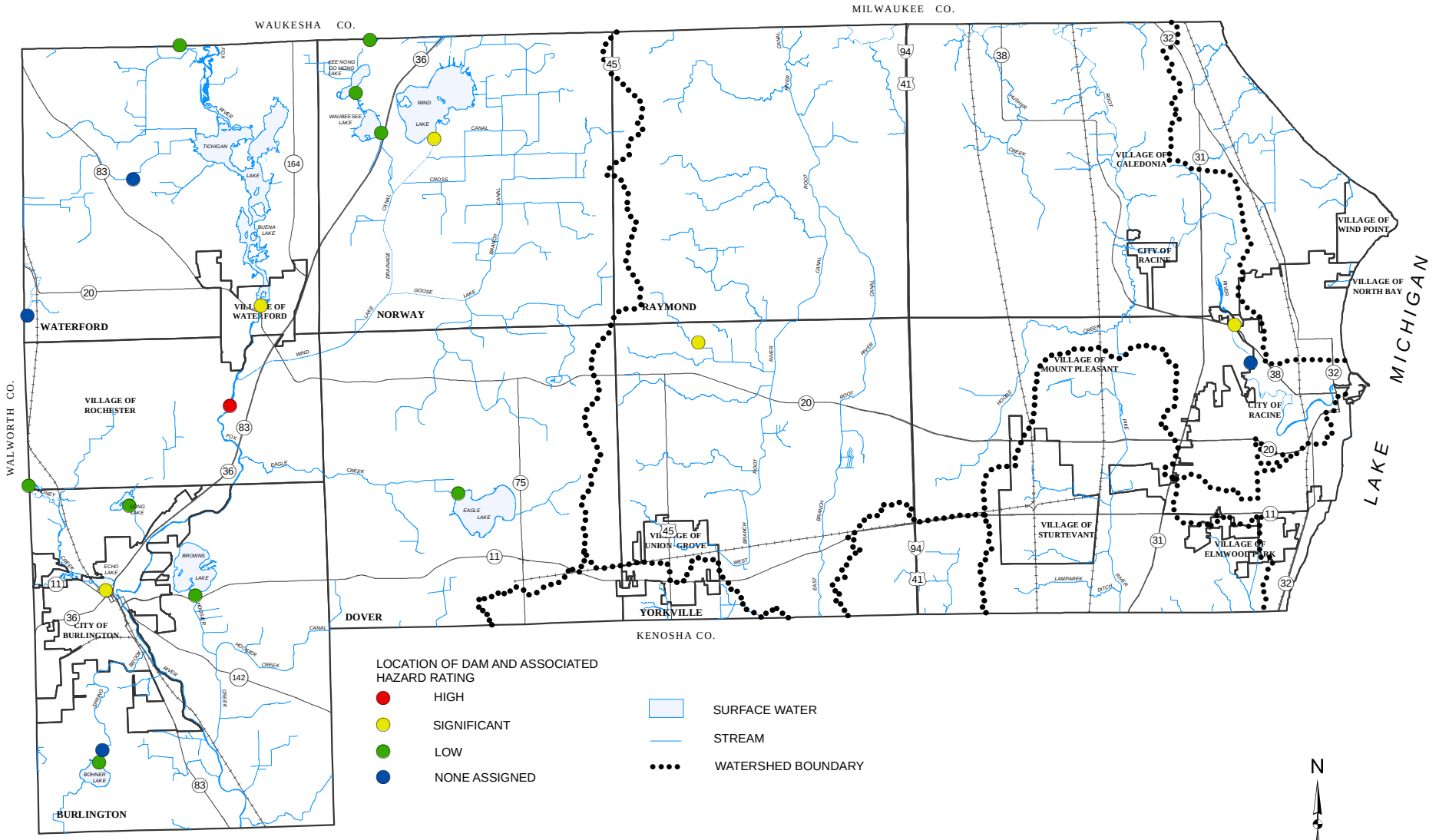
Increases in offshore depths can cause increased shore erosion problems. At the seven sites in Racine County where offshore bathymetry was measured in 1995 and compared to 1977 data, four showed decreases in depth, while the others showed little change. The sites with the greatest decrease in offshore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

A 1997 study[6] 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.

[6]*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.*

Map 7

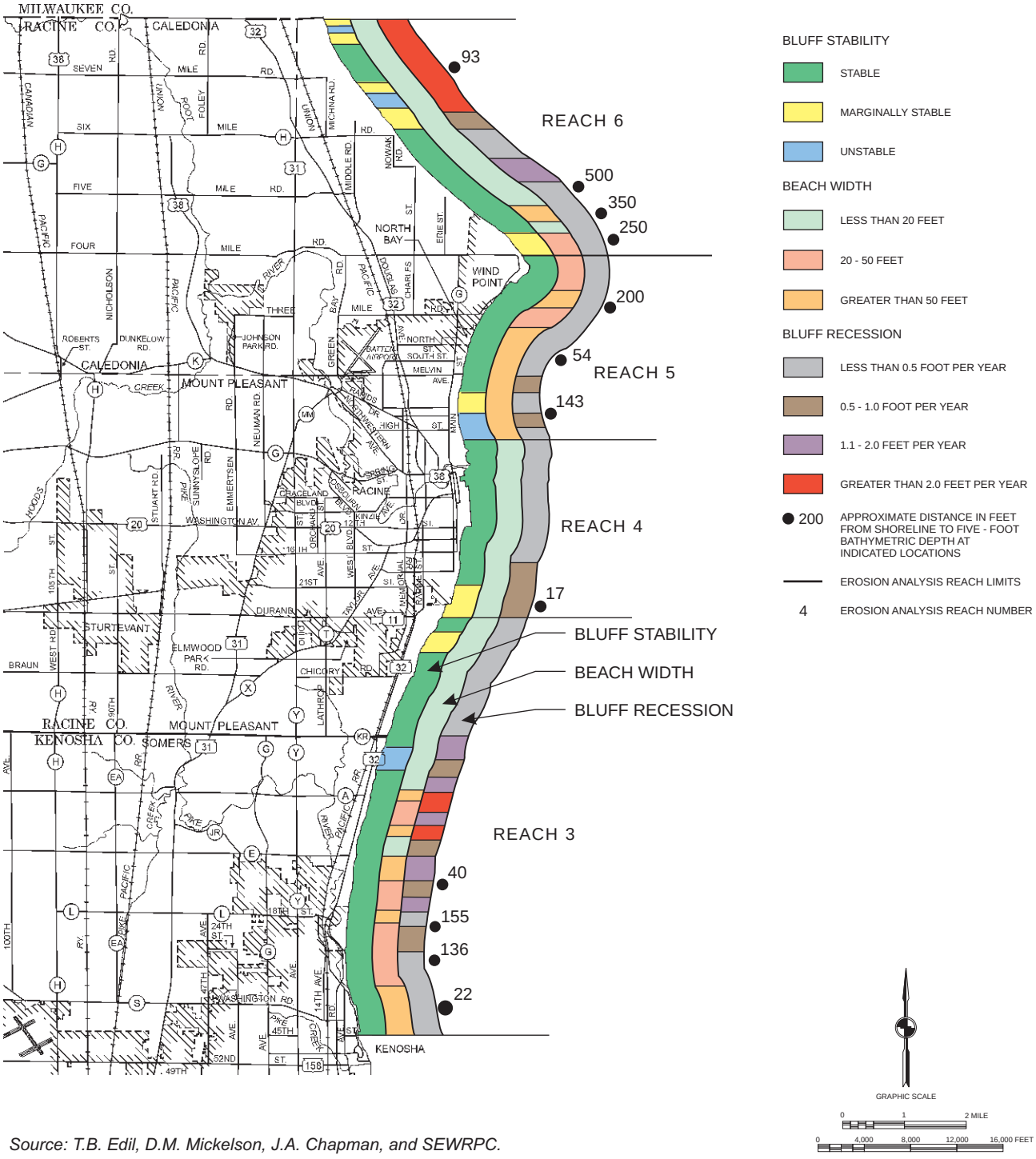
DAMS LOCATED WITHIN RACINE COUNTY: 2009



Source: Wisconsin Department of Natural Resources and SEWRPC.

Map 8

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.

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

Shoreline erosion conditions are important considerations in planning for the protection and sound development and redevelopment of lands located along Lake Michigan. These conditions can change over time because they are related to changes in climate, water level, the geometry of the near shore areas, the extent and condition of shore protection measures, the type and extent of vegetation, and the type of land uses in shoreline areas. 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.[7] The findings for shoreline protection and nonprotection areas are depicted in Map 9. 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, the effectiveness of the structures will decrease.

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

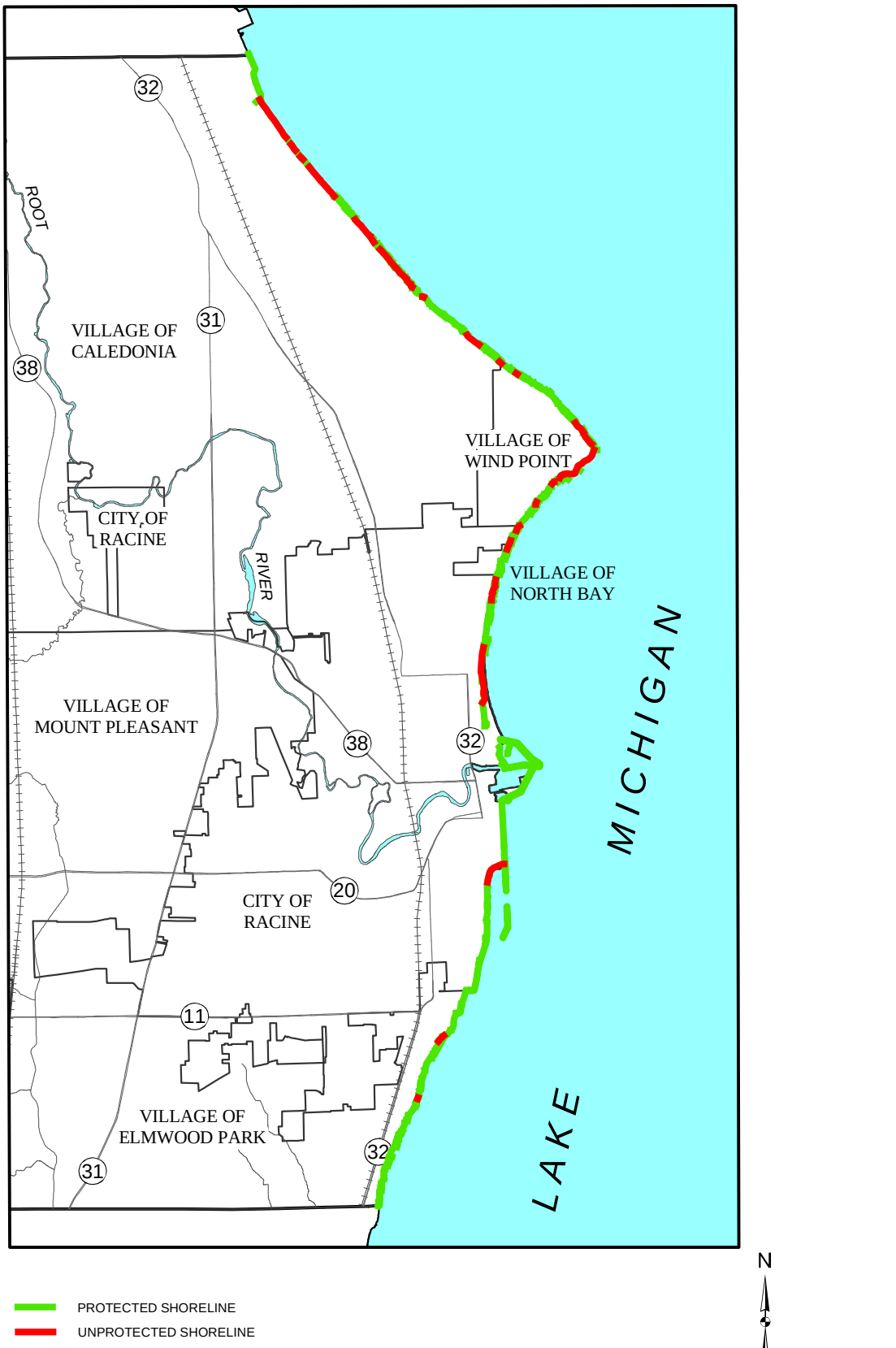
The arterial street and highway system serving Racine County is shown on Map 10. As shown on Map 10, the existing arterial network in the eastern portion of the County is relatively densely spaced, arterials occurring at about one-mile intervals in both the north-south and east-west directions. IH 94 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.

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 15, 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

[7] *SEWRPC Memorandum Report No. 171,* Assessment of Lake Michigan Shoreline Erosion Control Structures in Racine County, *January 2008.*

Map 9

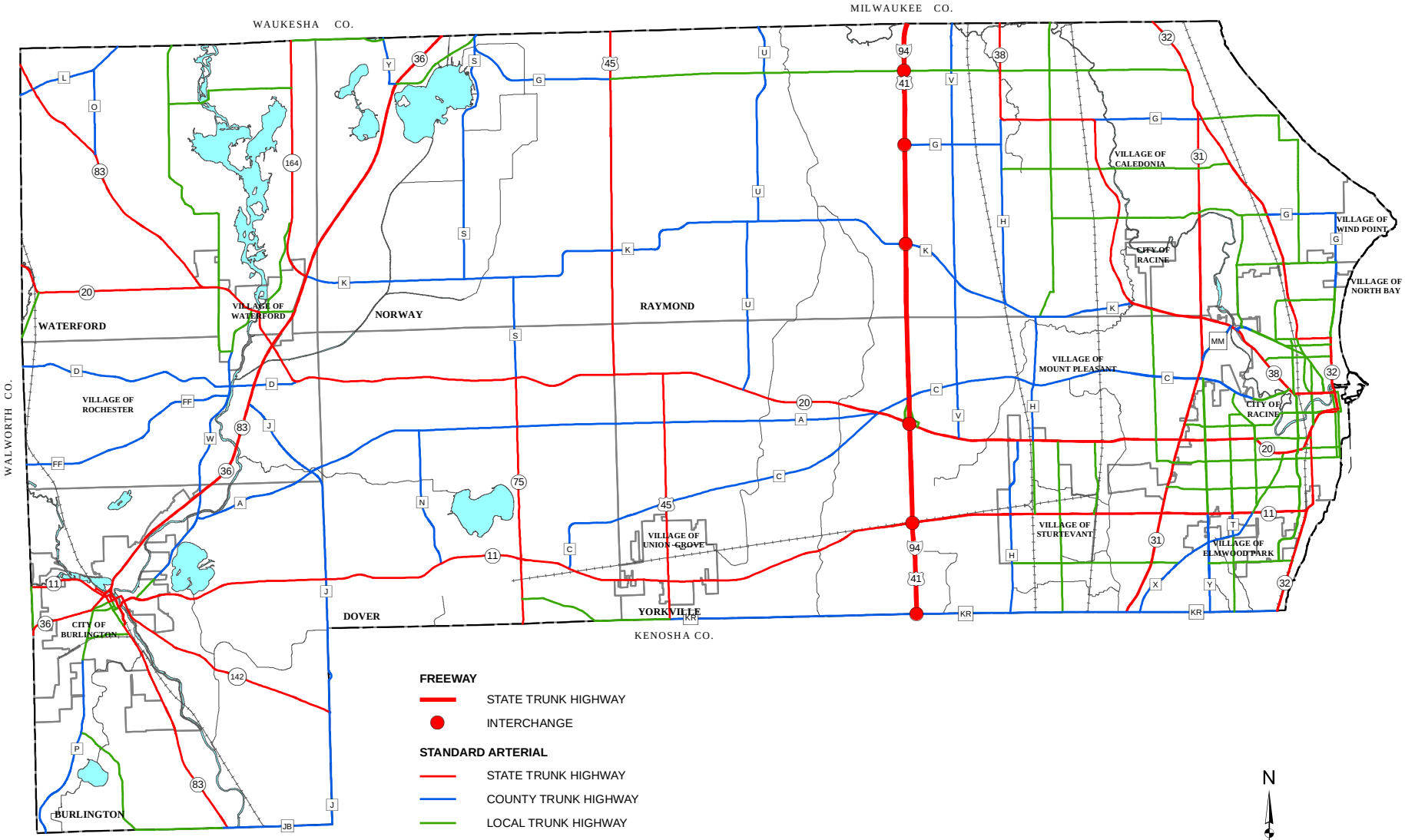
LAKE MICHIGAN SHORELINE/EROSION PROTECTION IN RACINE COUNTY: 2005



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

Map 10

ARTERIAL STREET AND HIGHWAY SYSTEM IN RACINE COUNTY: 2005



Source: SEWRPC.

Table 15

ESTIMATED FREEWAY AND SURFACE ARTERIAL FACILITY DESIGN CAPACITY AND ATTENDANT LEVEL OF CONGESTION[a]

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 by 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

[a]*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.

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 15, 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 a route 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.[8] 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.

Railway Facilities

As of the end of 2006, railway freight service was being provided within Racine County by three railway companies operating active mainline railway lines. As shown on Map 11, 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 CP 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 CP 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.

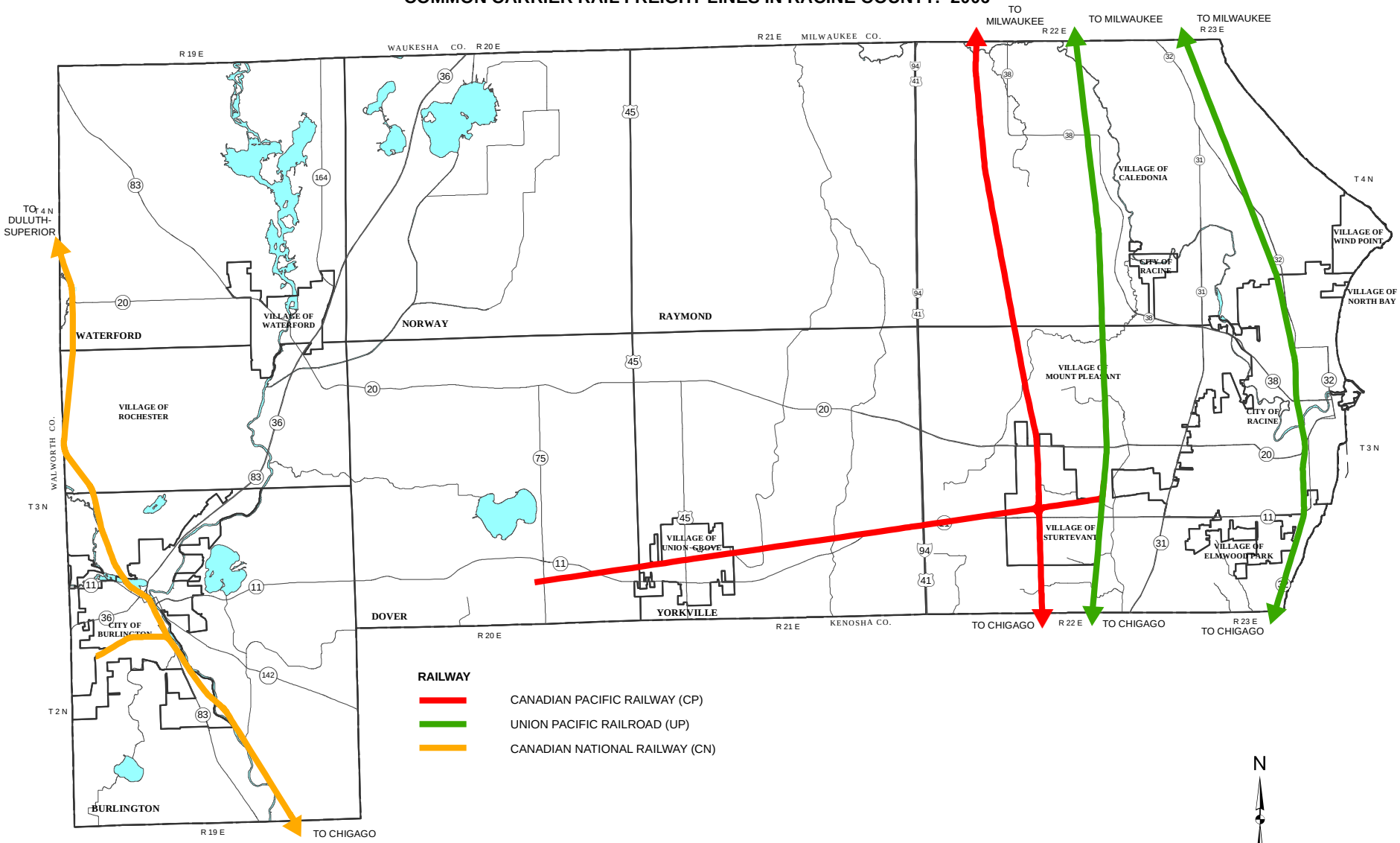
Airports

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 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 2007, there were about of 200 aircraft based in Racine County, a level which has been relatively constant over the past 10 years. The public-use airports in the County are shown on Map 12. 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 12.

[8] *A route extending to serve the University of Wisconsin-Parkside was discontinued in 2007.*

Map 11

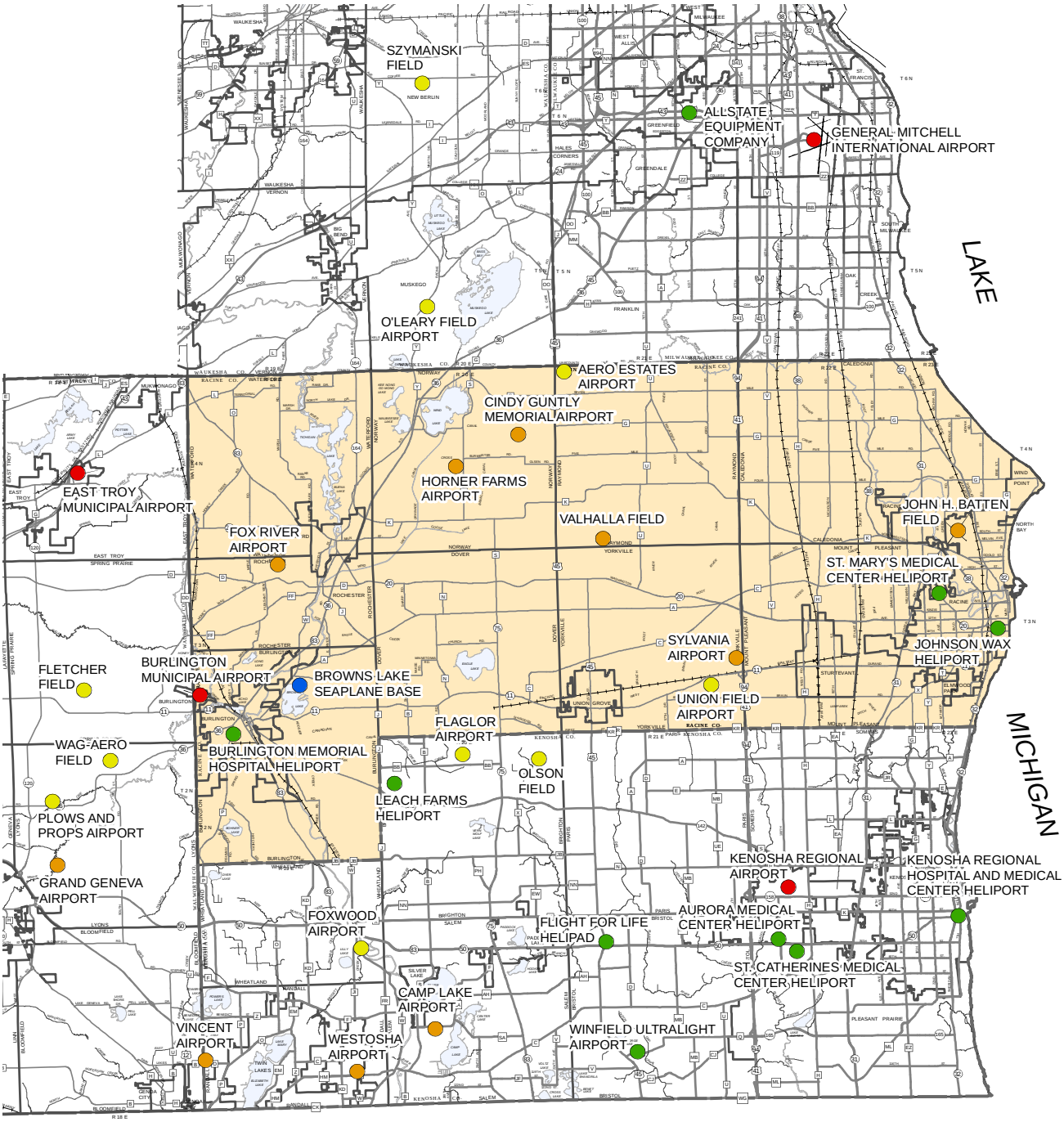
COMMON CARRIER RAIL FREIGHT LINES IN RACINE COUNTY: 2006



Source: Wisconsin Department of Transportation and SEWRPC.

Map 12

EXISTING AIRPORTS IN RACINE COUNTY AND VICINITY: 2005



- PUBLIC-USE AIRPORT-PUBLIC OWNERSHIP
- PUBLIC-USE AIRPORT-PRIVATE OWNERSHIP
- PRIVATE-USE AIRPORT-PRIVATE OWNERSHIP
- PRIVATE-USE HELIPORT-PRIVATE OWNERSHIP
- PUBLIC-USE SEAPLANE BASE-PRIVATE OWNERSHIP

N

GRAPHIC SCALE

0 1 2 3 4 Miles

Source: Wisconsin Bureau of Aeronautics and SEWRPC.

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 2005, over 80 percent of the County utilized private systems relying on groundwater as a water supply source for domestic, commercial, and agricultural use. The remaining areas of the County have access to public water supply systems. The areas served by public community water supply systems are shown on Map 13. 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. As of 2005, about 1,600 County residents were served by private residential community water systems. These systems are listed in Table 16 and their service areas are shown on Map 14. The uses of groundwater, as well as surface water, are summarized in Table 17. As shown in Table 17, just under 23 million gallons per day (mgd) of Lake Michigan-derived surface water and about 3.5 mgd of groundwater supply are used by public water utility systems in the County. Considering all water uses, including industrial, commercial, agricultural, and private water supply, approximately 27 mgd of surface water and 13 mgd of groundwater are used. The City of Racine operates a water treatment plant utilizing Lake Michigan as a source of supply. That plant provides the source of supply for all the areas noted to be served by a surface water supply on Map 14, except for the portions of Caledonia which are served by a supply from the City of Oak Creek. The remaining areas in the County served by public water supplies rely on groundwater pumping and treatment systems as a source of supply.

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 planned sewer service areas within the County are shown on Map 15.

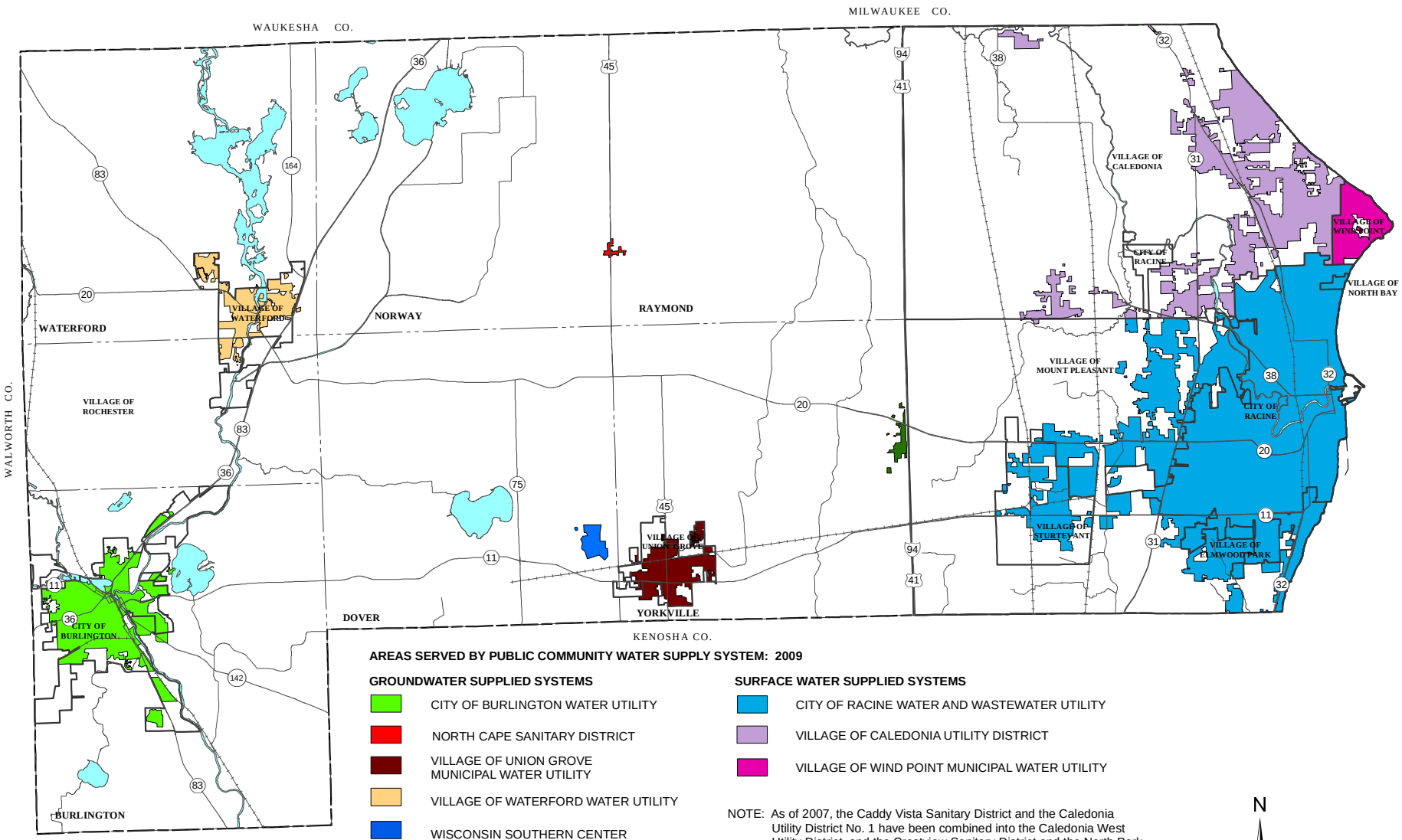
Private Utilities

Racine County is provided with electric power service by We Energies. Electric power service is available on demand throughout the County. There are no electric power generation facilities located within 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 16.

Natural gas distribution service is provided for the entire County by We Energies-Gas Operations. In Racine County the main gas supply is 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. Natural gas service is available on demand throughout Racine County.

Map 13

PUBLIC COMMUNITY WATER SUPPLY SYSTEMS AND AREAS SERVED IN RACINE COUNTY: 2009



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

Table 16

PRIVATE RESIDENTIAL COMMUNITY WATER SYSTEMS IN RACINE COUNTY: 2005

Number on Map 14	Civil Division	System Name	Population Served[a]
1	Village of Mt. Pleasant	Cozy Acres Subdivision	120
2		Jensen's Mobile Home Village	40
3		Pavillion Apartments	N/A
4		Spring Green	89
5	Village of Rochester	Riverside Apartments	33
6	Town of Burlington	Browns Lake Mobile Home Court	225
7		Island View Condominiums	25
8		Lakeview Landing Condos	26
9	Town of Dover	Eagle Lake Manor	300
10		Hickory Haven	303
11		Regency Club Condominiums	74
12	Town of Yorkville	Harvest View Estates	400
Total	- -	- -	1,635

NOTE: N/A indicates data not available.

[a]*Per Wisconsin Department of Natural Resources files.*

Source: Wisconsin Department of Natural Resources and SEWRPC.

Telephone service within Racine County is provided through a number of telephone companies. The service areas of the various operators are shown on Map 17. In general, telephone service is available on demand throughout the County. There is also an extensive system of cellular telecommunication facilities in Racine County. These facilities are also shown on Map 17.

Solid Waste Disposal

Landfilling and recycling are the primary methods of managing solid wastes generated in Racine County. As of 2008, 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 18 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 Town of Caledonia, is classified as a Superfund site and has been classified as remediated. The location of the solid waste disposal sites in Racine County are shown on Map 18. Appendix B lists the owner and activity status of these sites.

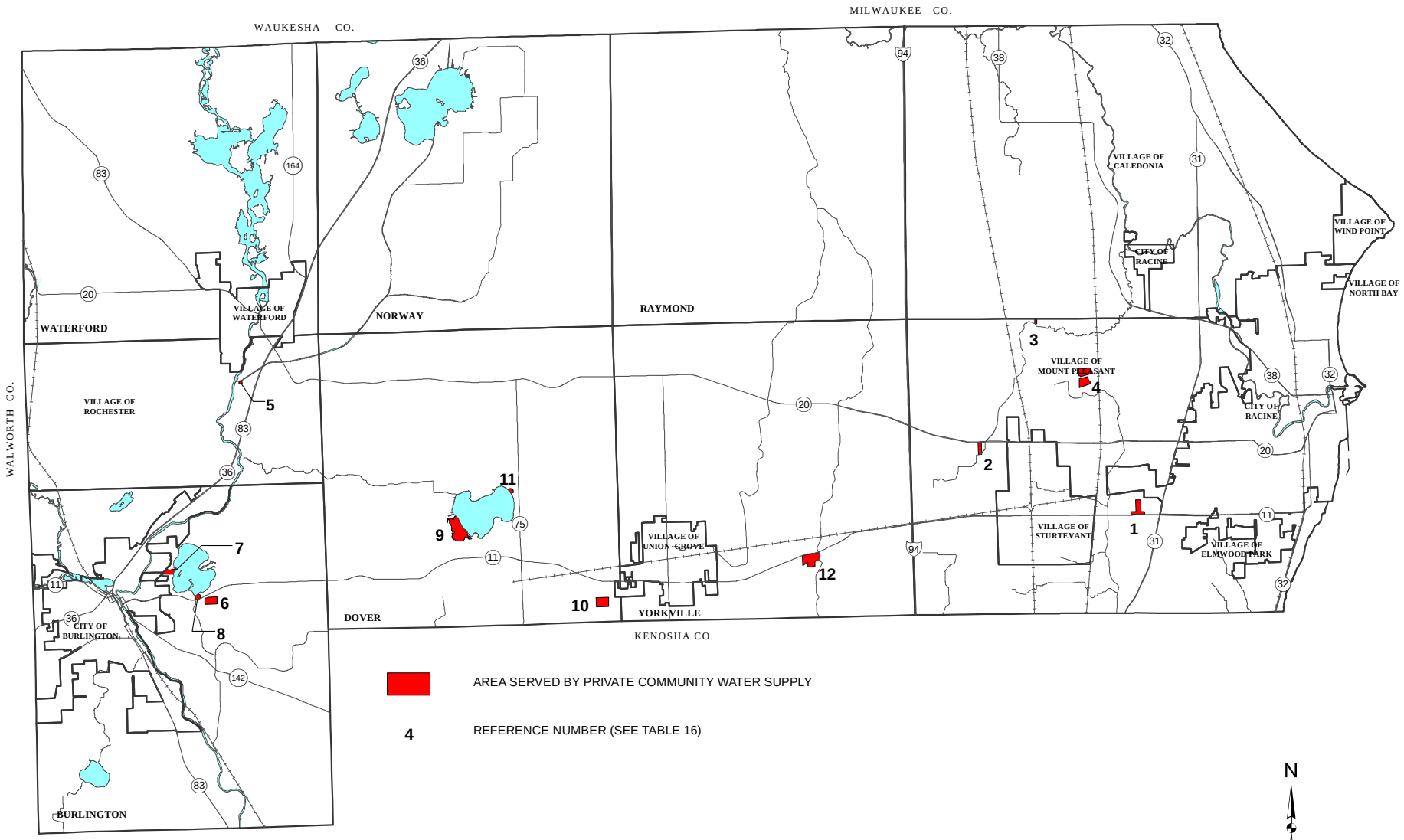
Map 18 also shows the locations of recycling service centers in Racine County. As of 2007 there five recycling centers in the County.

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, police stations, sheriff offices, and correctional facilities in Racine County are shown on Maps 19 through 21. 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.

Map 14

PRIVATE RESIDENTIAL COMMUNITY WATER SYSTEMS IN RACINE COUNTY: 2005



Source: Wisconsin Department of Natural Resources and SEWRPC.

Table 17

ESTIMATED USE OF WATER IN RACINE COUNTY IN 2005 IN MILLION GALLONS PER DAY

Usage Category	Water Source	
	Surface Water (Lake Michigan)	Groundwater
Public[a]	22.78	3.51
Industrial	2.90	0.90
Commercial	- -	0.09
Irrigation	0.31	5.03
Agricultural	0.02	0.21
Aquaculture	1.00	0.20
Domestic	- -	3.53
Total	27.01	13.47

[a]*Includes water delivered to residents, industry, and commerce within the served area.*

Source: U.S. Geological Survey and SEWRPC.

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 19. Table 18 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.

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. In the case of all jurisdictions, rescue service is provided by a publicly sponsored fire or fire and rescue department. The emergency medical service areas in Racine County are shown on Map 20.

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.

Law Enforcement

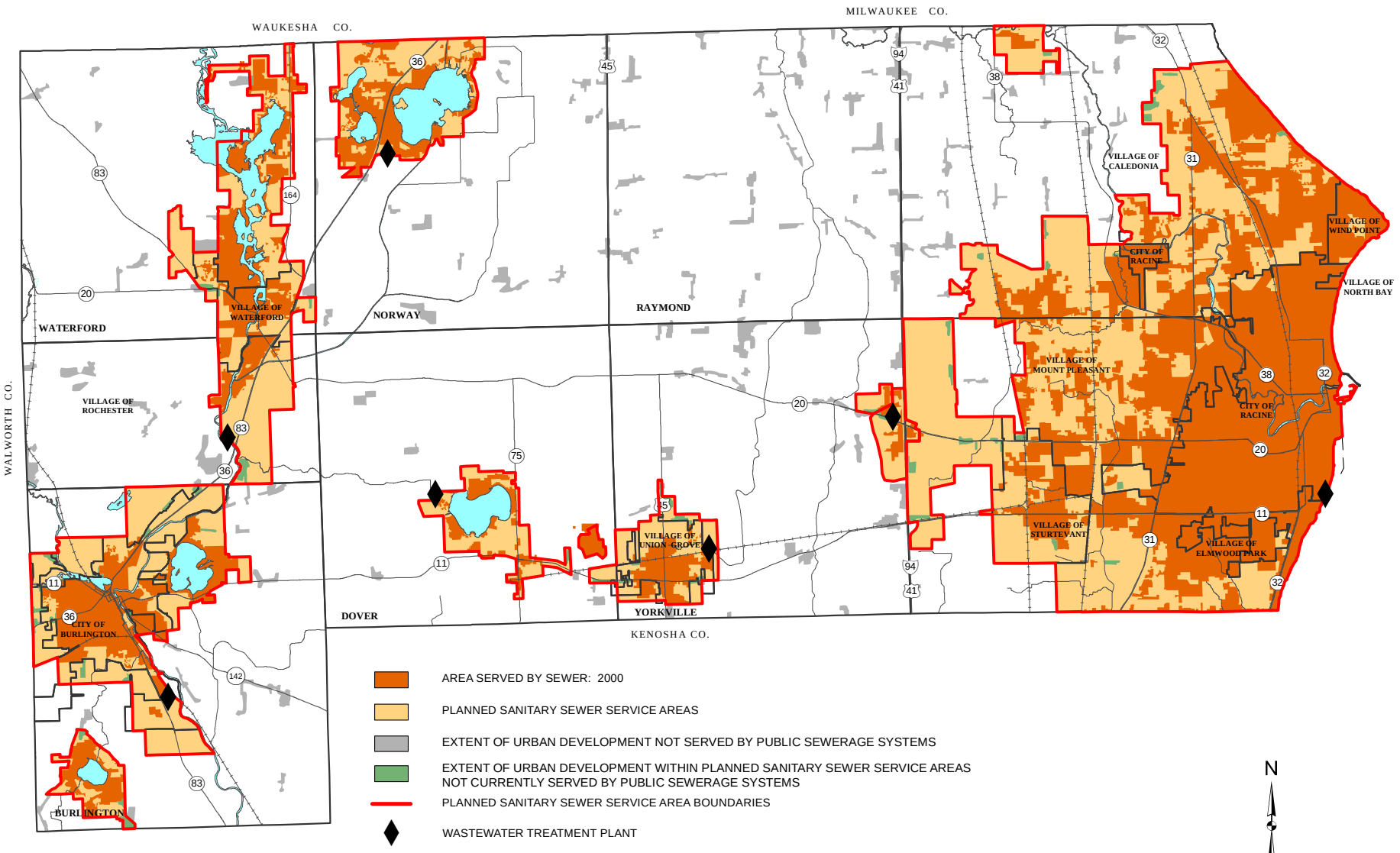
Nine of the 17 municipalities in Racine County provide for law enforcement through full-time police departments. In the remaining municipalities primary law enforcement is through the County Sheriff's Department. In addition, the Village of Waterford has a limited police presence and the Villages of 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 21. That map also shows the location of the State of Wisconsin Department of Corrections, correctional facilities and County detention centers in the County.

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

Map 15

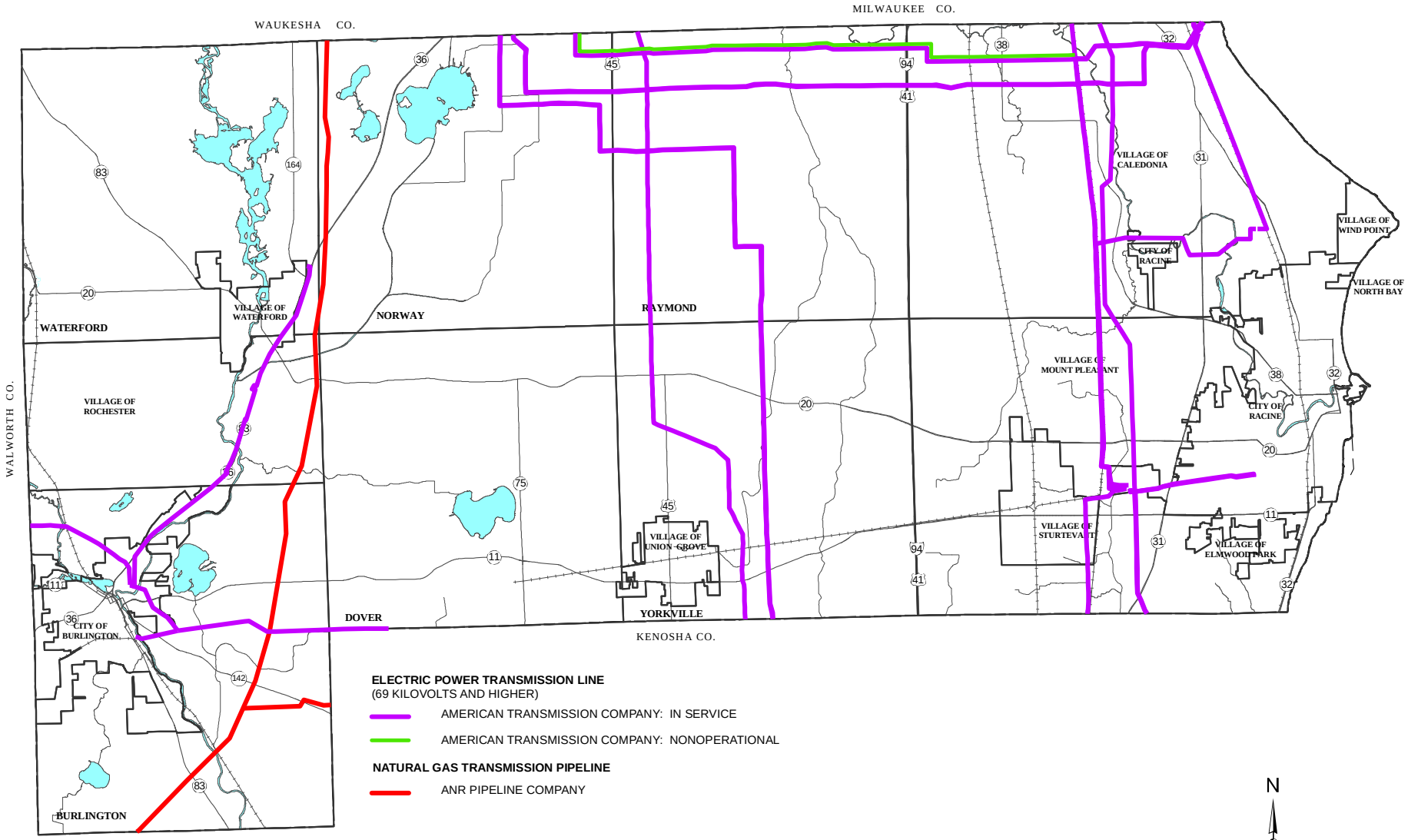
PLANNED SANITARY SEWER SERVICE AREAS AND AREAS SERVED BY SEWER IN THE RACINE COUNTY PLANNING AREA



Source: Wisconsin Department of Natural Resources and SEWRPC.

Map 16

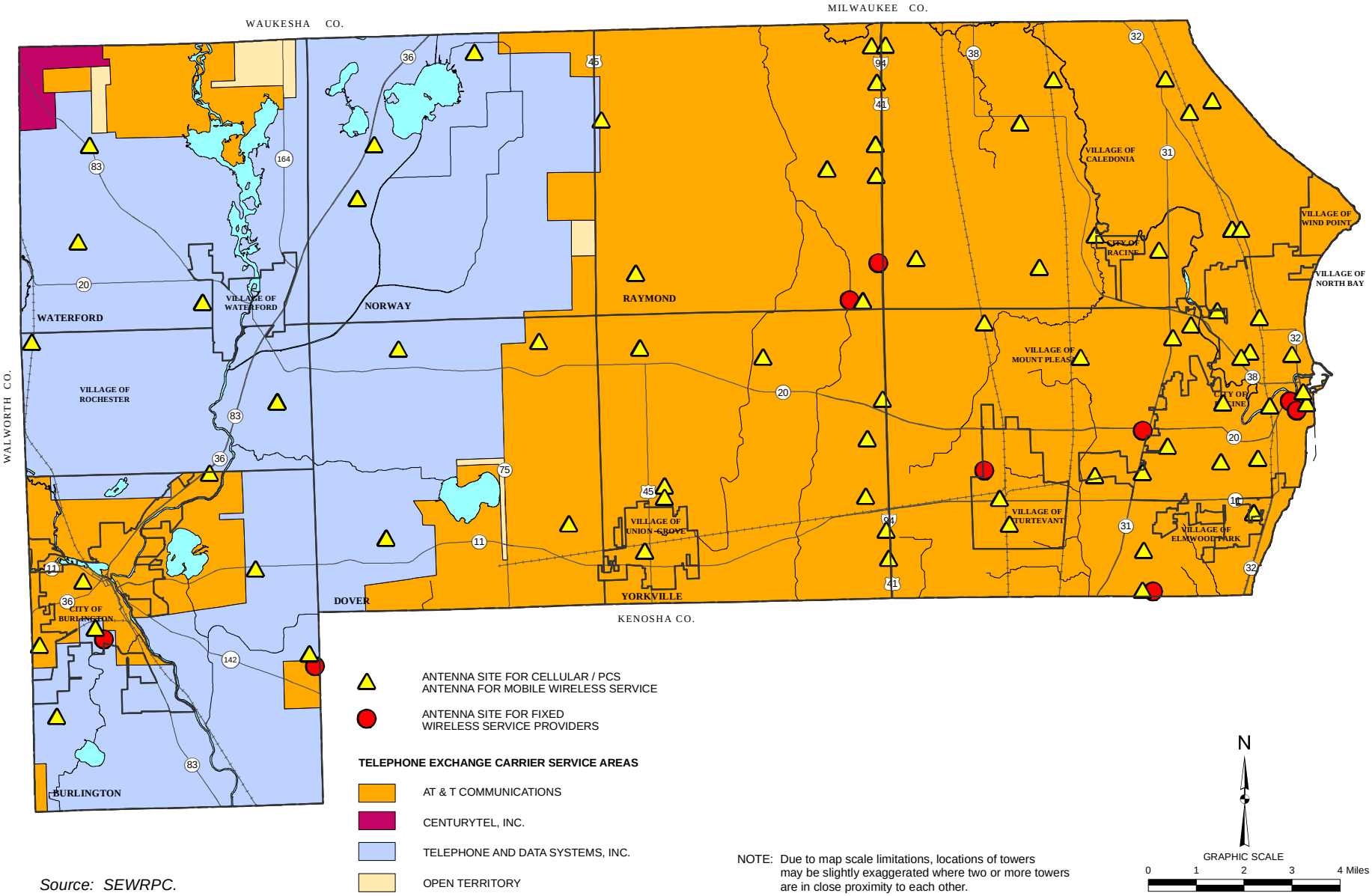
ELECTRIC TRANSMISSION LINES AND NATURAL GAS TRANSMISSION PIPELINES IN RACINE COUNTY



Source: Public Service Commission and SEWRPC.

Map 17

TELECOMMUNICATION FACILITIES IN THE RACINE COUNTY PLANNING AREA: 2005

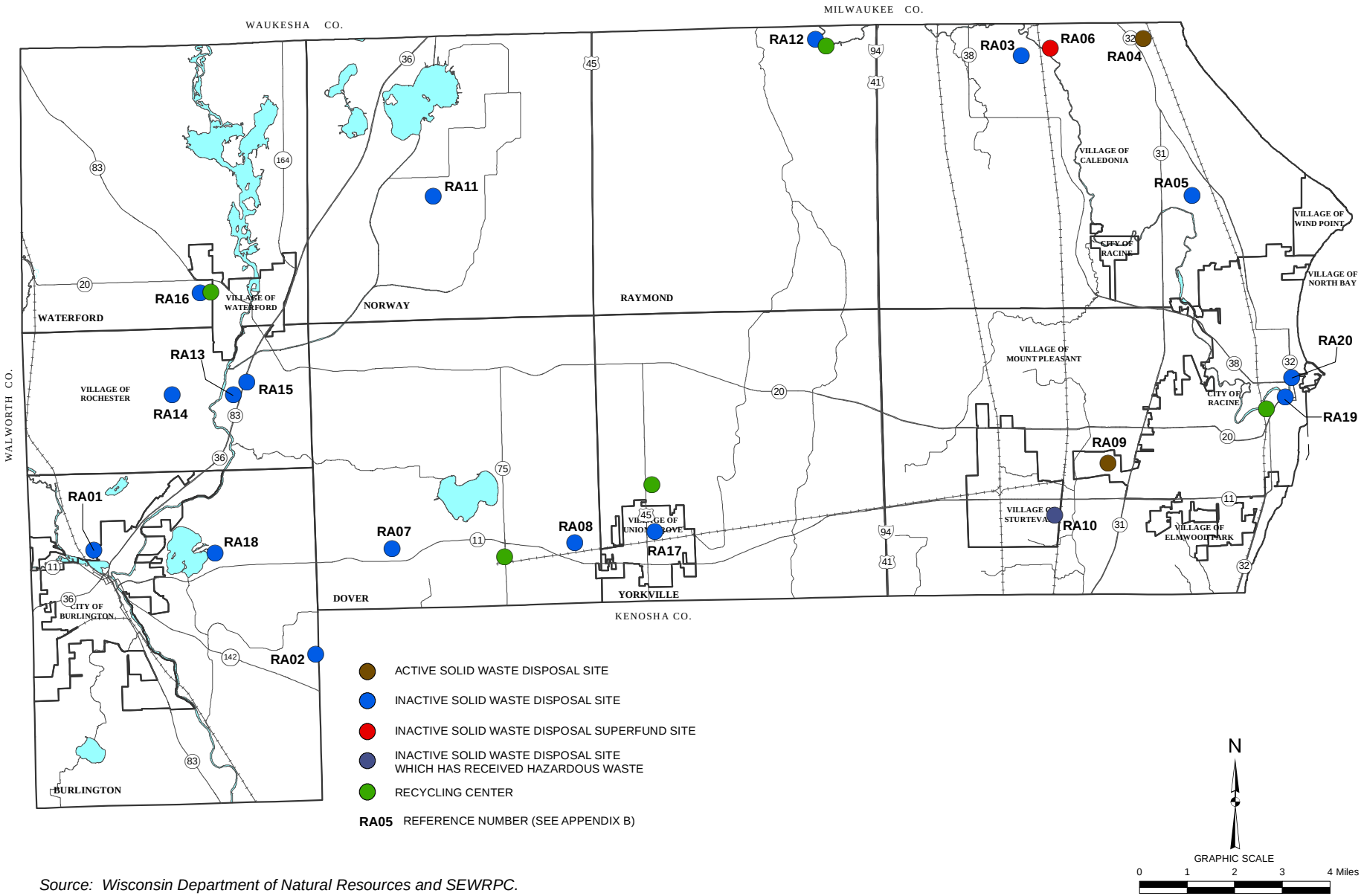


Source: SEWRPC.

NOTE: Due to map scale limitations, locations of towers may be slightly exaggerated where two or more towers are in close proximity to each other.

Map 18

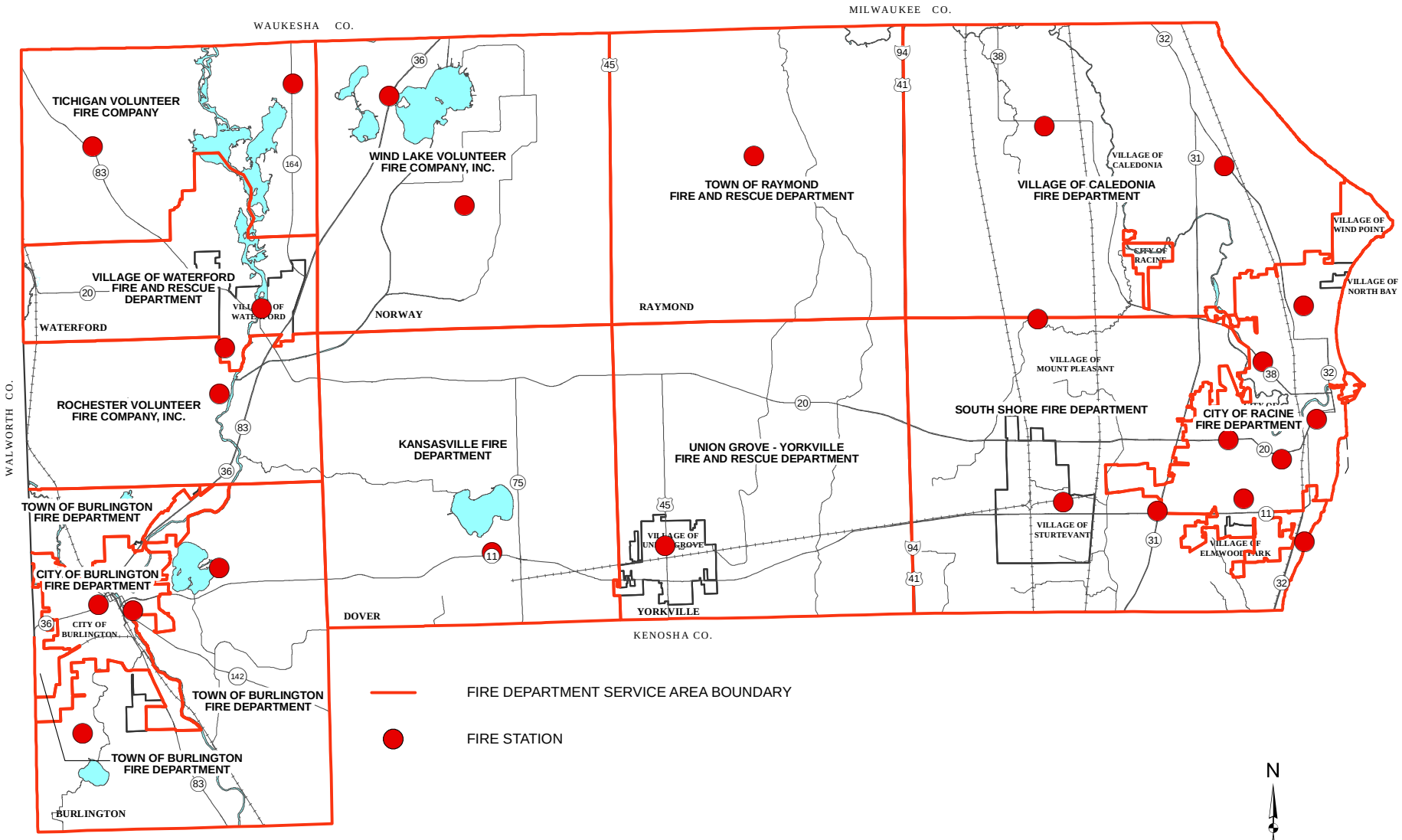
SOLID WASTE DISPOSAL SITES AND RECYCLING CENTERS IN RACINE COUNTY



Source: Wisconsin Department of Natural Resources and SEWRPC.

Map 19

FIRE STATIONS AND FIRE DEPARTMENT SERVICE AREAS IN THE RACINE COUNTY PLANNING AREA: 2008

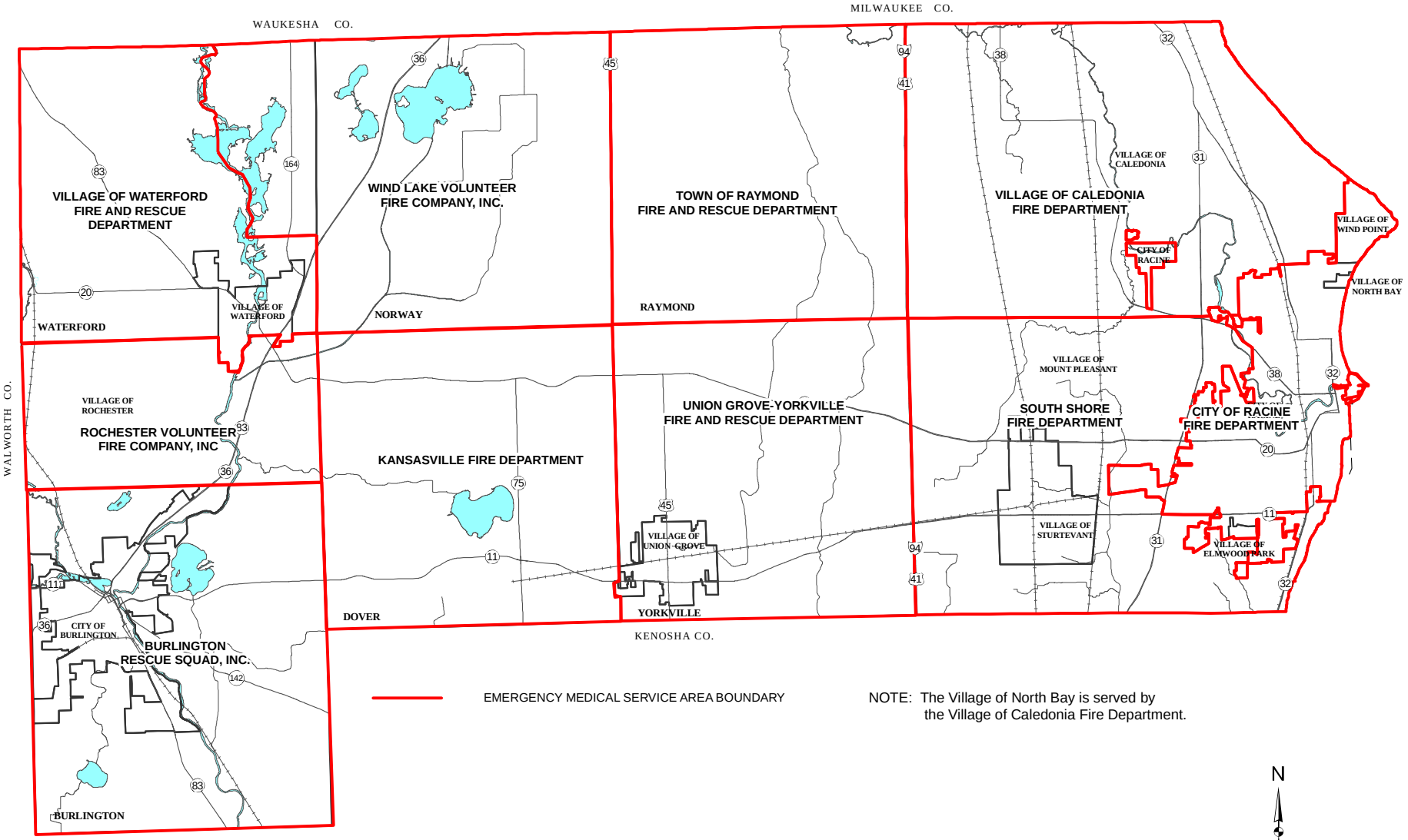


Source: SEWRPC.

NOTE: The Village of North Bay is served by the Village of Caledonia Fire Department.

Map 20

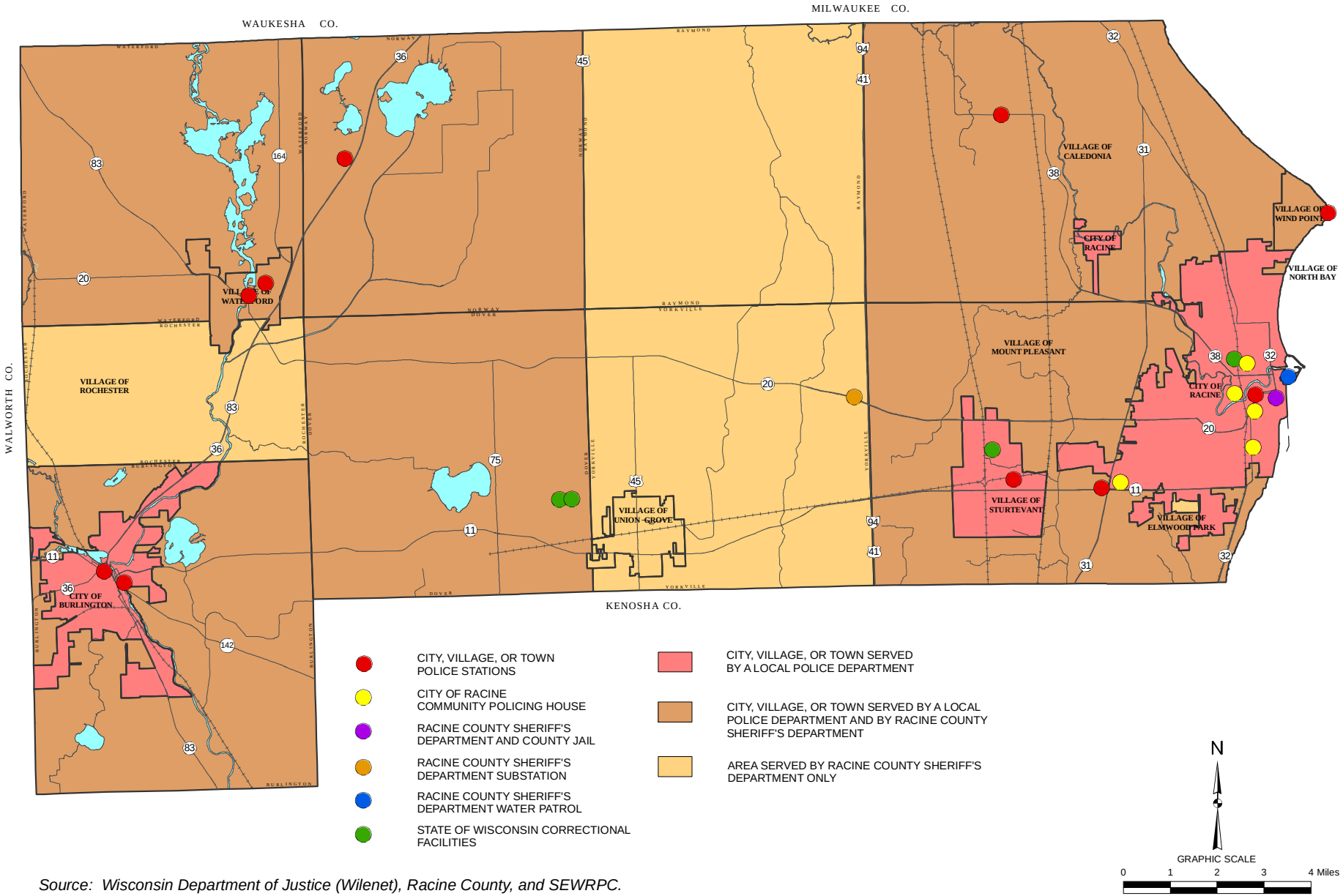
EMERGENCY MEDICAL SERVICE AREAS IN RACINE COUNTY: 2009



Source: Racine County Office of Emergency Management and SEWRPC.

Map 21

POLICE STATIONS, SERVICE AREAS, CORRECTIONAL FACILITIES, AND JAILS IN RACINE COUNTY



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

Table 18

WORKING STATUS OF FIRE FIGHTERS, EMERGENCY SERVICE LEVELS, AND LAW ENFORCEMENT DEPARTMENTS SERVING RACINE COUNTY: 2009

Fire/Rescue Department	Working Status of Fire Suppression Department	Emergency Service Arrangement	Working Status of Law Enforcement Department
City of Burlington	Full-time and part-time volunteers (City Fire Department[a])	Volunteer (Burlington Rescue Squad, Inc.[b])	Full-time (City Police Department)
City of Racine	Full-time (City Fire Department[a])	Full-time (City Fire Department[a])	Full-time (City Police Department)
Village of Caledonia	Full-time (Village Fire Department[a])	Full-time (Village Fire Department)	Full-time (Village Police Department)
Village of Elmwood Park	Contract with City of Racine	Contract with City of Racine	Contract with County Sheriff Department with local constable
Village of Mt. Pleasant	Full-time (South Shore Fire Department[a,c])	Full-time (South Shore Fire Department[a,c])	Full-time (Town Police Department)
Village of North Bay	Contract with City of Racine	Contract with City of Racine	Contract with Village of Wind Point Police with local constable
Village of Rochester[d]	Volunteer (Rochester Volunteer Fire and Rescue Company, Inc.[b])	Volunteer (Rochester Volunteer Fire and Rescue Company, Inc.[b])	Contract with County Sheriff Department
Village of Sturtevant	Full-time and part-time (South Shore Fire Department[a,c])	Full-time and part-time (South Shore Fire Department[a,c])	Full-time (Village Police and Fire Department)
Village of Union Grove	Volunteer (Union Grove-Yorkville Fire and Rescue Department[a])	Volunteer (Union Grove-Yorkville Fire and Rescue Department[a])	Contract with County Sheriff Department
Village of Waterford	Volunteer (Village of Waterford Fire and Rescue Department[a])	Volunteer (Village of Waterford Fire and Rescue Department[a])	Contract with County Sheriff Department, plus local one person police staff
Village of Wind Point	Contract with City of Racine	Contract with City of Racine	Part-time (Village Police Department)
Town of Burlington	Volunteer (Town Fire Department[a])	Volunteer (Burlington Rescue Squad, Inc.[b])	Full-time (Town Police Department)
Town of Dover	Volunteer (Kansasville Fire Department[a])	Volunteer (Kansasville Fire Department[a]) and Full-time[e]	Contract with County Sheriff Department with local constable[f]
Town of Norway	Volunteer (Wind Lake Volunteer Fire Company, Inc.[b])	Volunteer (Wind Lake Volunteer Fire Company, Inc.[b])	Part-time (Town Police Department)
Town of Raymond	Volunteer (Town Fire and Rescue Department[a])	Volunteer (Town Fire and Rescue Department[a])	Contract with County Sheriff Department
Town of Waterford	Volunteer (contracts with Village of Waterford Fire and Rescue Department[a] and Tichigan Volunteer Fire Department[b])	Volunteer (contracts with Village of Waterford Fire and Rescue Department[a] and Wind Lake Volunteer Fire Company, Inc.[b])	Full-time (Town Police Department)
Town of Yorkville	Volunteer (Union Grove-Yorkville Fire and Rescue Department[a])	Volunteer (Union Grove-Yorkville Fire and Rescue Department[a])	County Sheriff Department with local constable

[a] *Public departments.*

[b] *Private, nonprofit company.*

[c] *The Mt. Pleasant and Sturtevant Fire Departments were consolidated in January 2009 to form the South Shore Fire Department.*

[d] *During December 2008, the Village of Rochester and the Town of Rochester were consolidated as the Village of Rochester.*

[e] *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.*

[f] *On March 11, 2010 the Town of Dover ended its contract with the Racine County Sheriff's Department and created the Town of Dover Police Department.*

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

centers with a capacity of 20 children or more, and government administration buildings. Maps 22 through 27 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 2009, there were 50 identified users of extremely hazardous substances (EHS) classified as planning facilities and 145 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 195 facilities which are noted above as storing or producing hazardous materials are located throughout Racine County, as summarized in Table 19. A detailed listing of these facilities and location by address is available at the Racine County Office of Emergency Management.

Over the period from 1986 through 2008, there were about 32 spills of hazardous materials per year in Racine County. The majority of these were minor spills of petroleum products. However, there have been releases of chlorine, formaldehyde, sulfuric acid, 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 2006, there were 40 individual sites and seven historic districts[9] 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 2006 are presented on Table 20 and on Map 28, respectively.

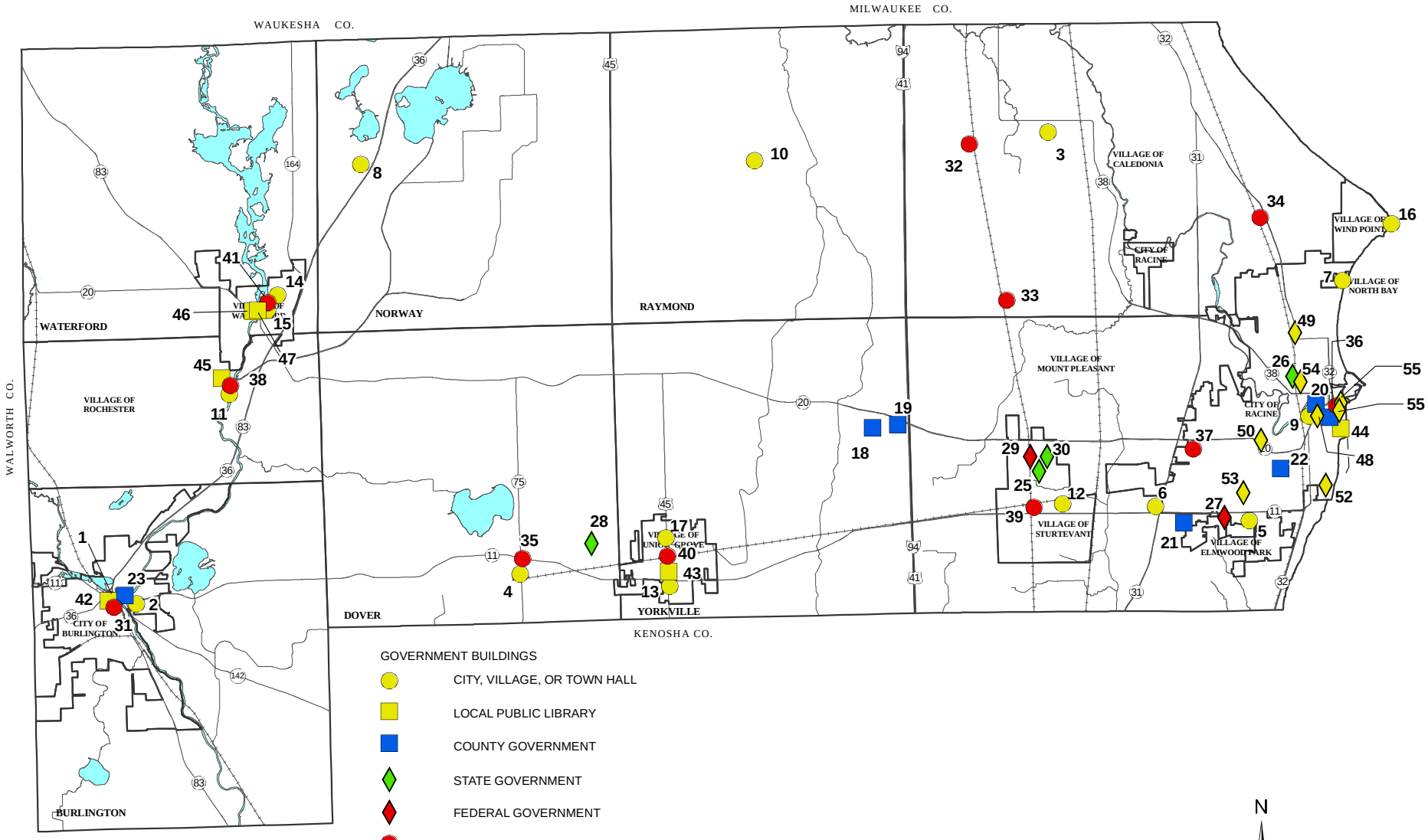
REGULATIONS AND PROGRAMS RELATED TO HAZARD MITIGATION

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 21, and below.

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

Map 22

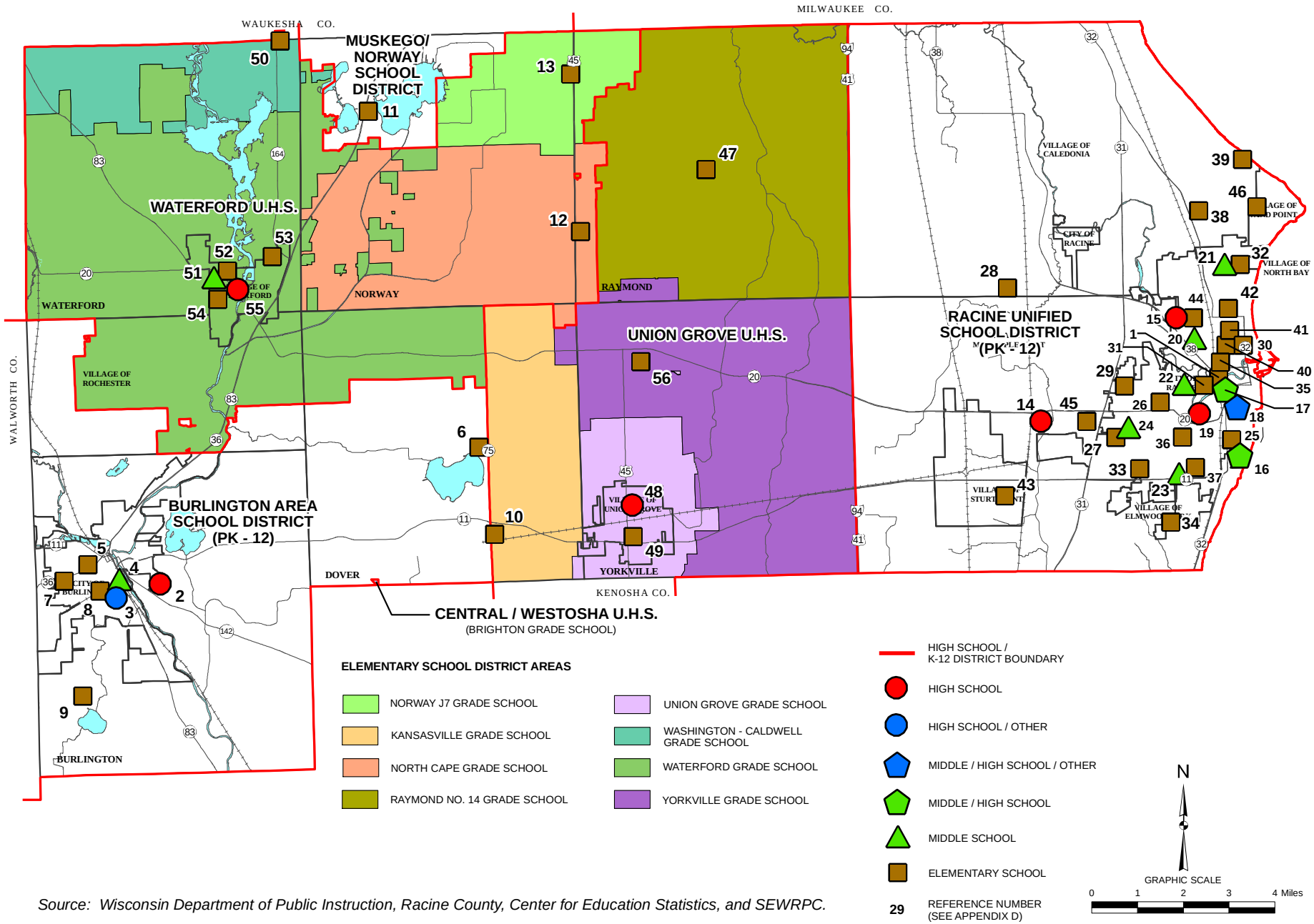
SELECTED GOVERNMENT BUILDINGS IN RACINE COUNTY: 2007



Source: Racine County and SEWRPC.

Map 23

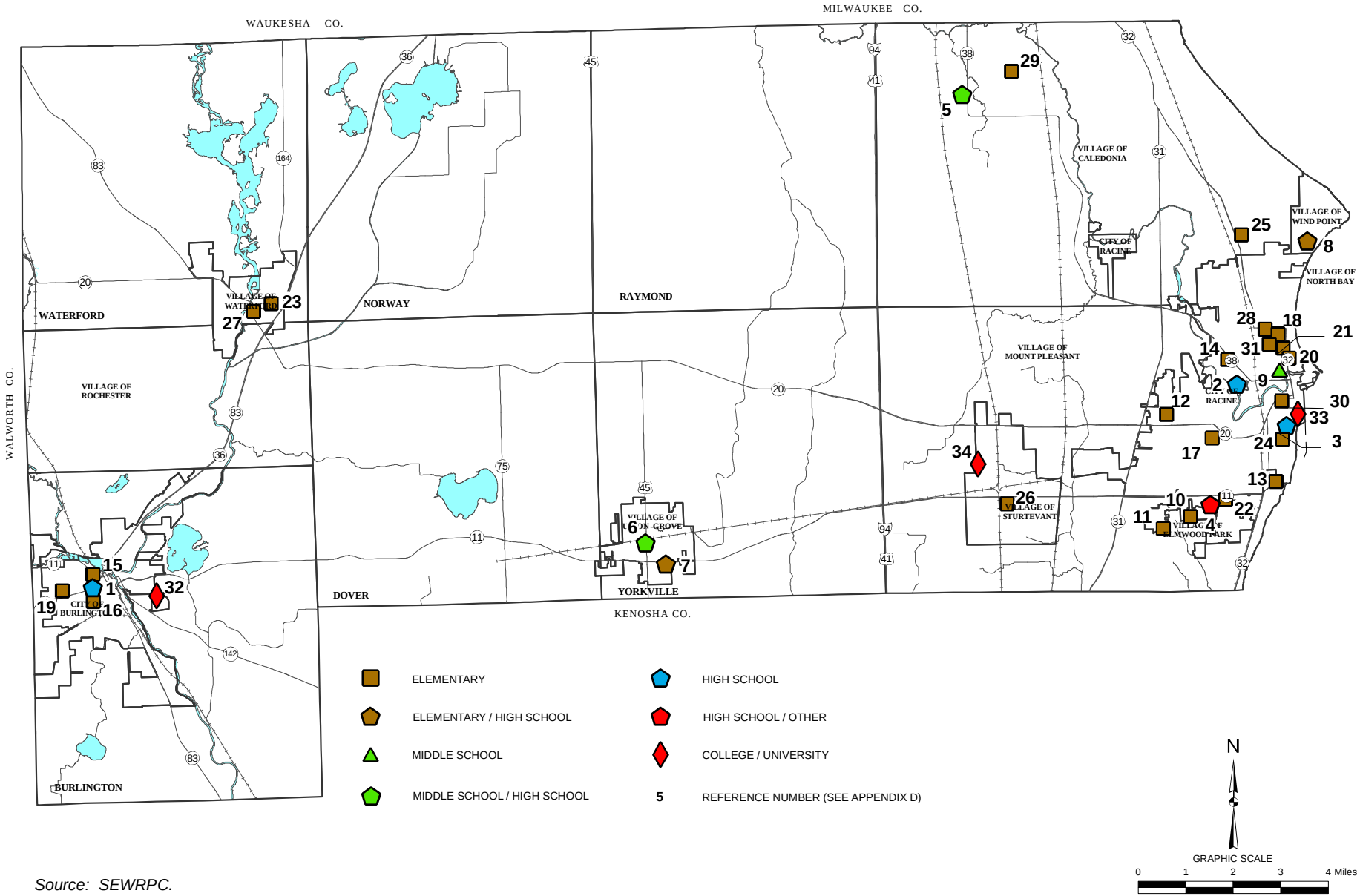
PUBLIC SCHOOLS AND SCHOOL DISTRICTS IN THE RACINE COUNTY PLANNING AREA: 2006



Source: Wisconsin Department of Public Instruction, Racine County, Center for Education Statistics, and SEWRPC.

Map 24

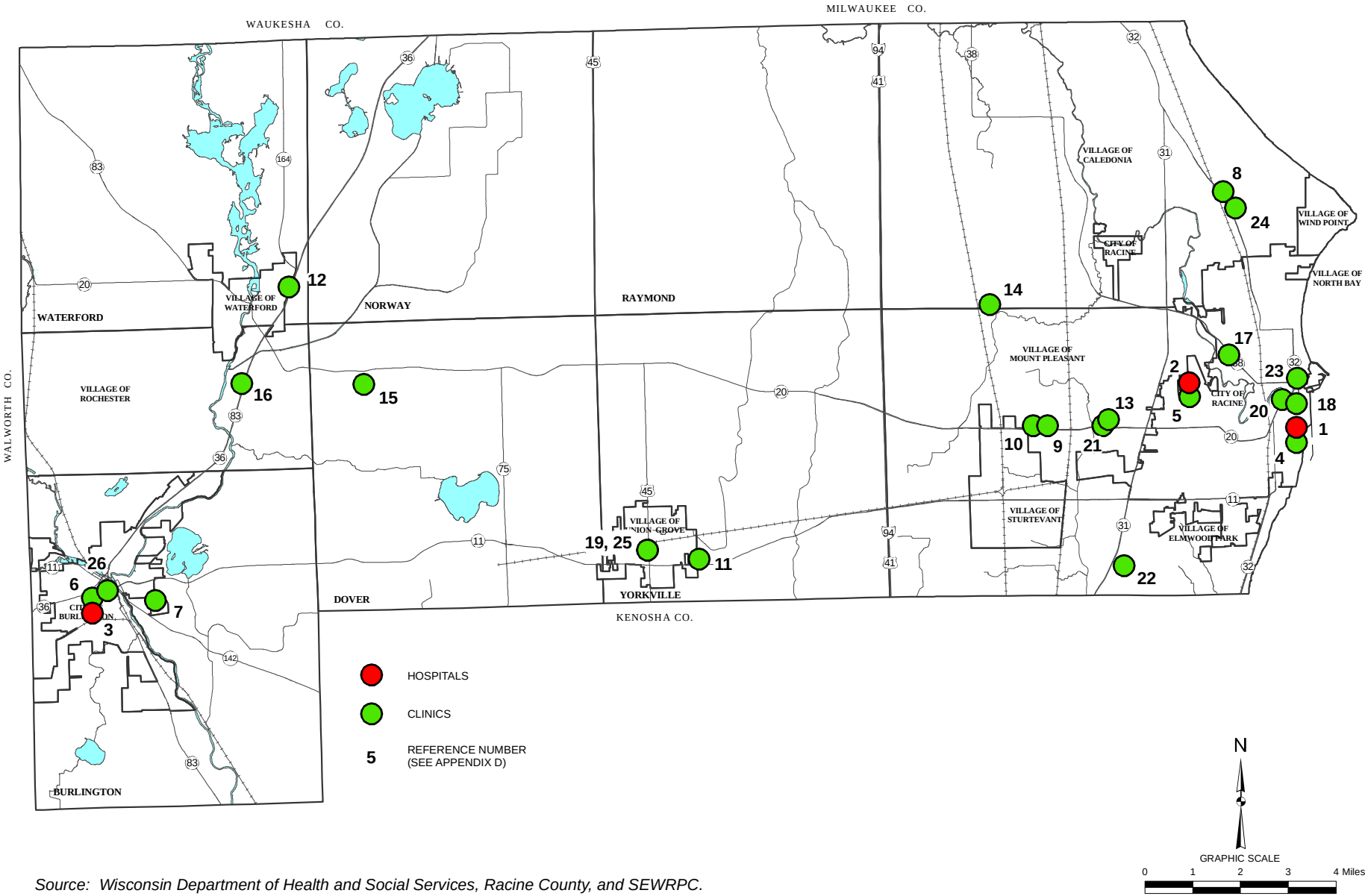
PRIVATE SCHOOLS AND TECHNICAL COLLEGES IN RACINE COUNTY: 2006



Source: SEWRPC.

Map 25

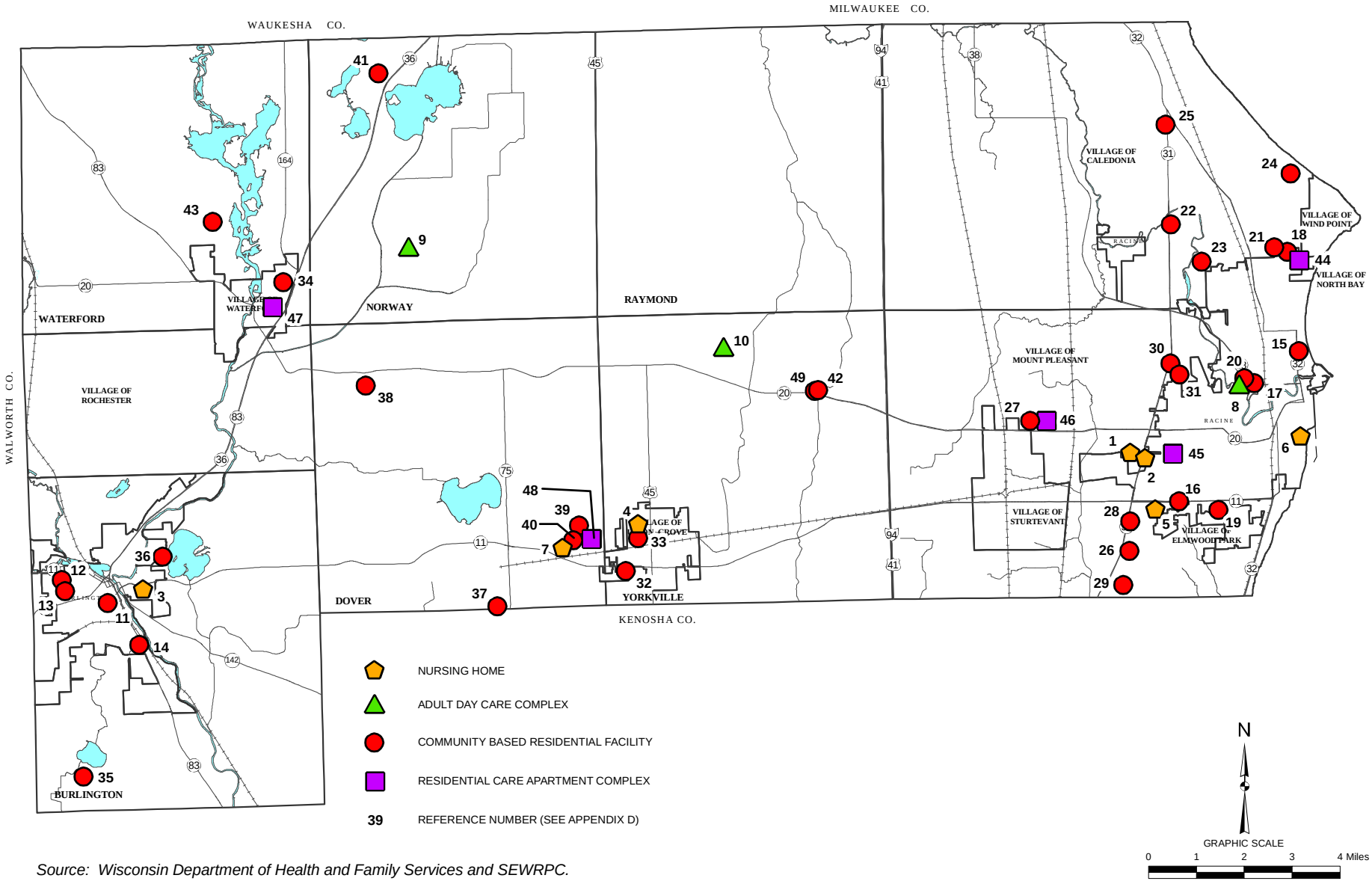
HOSPITALS AND CLINICS IN RACINE COUNTY: 2007



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

Map 26

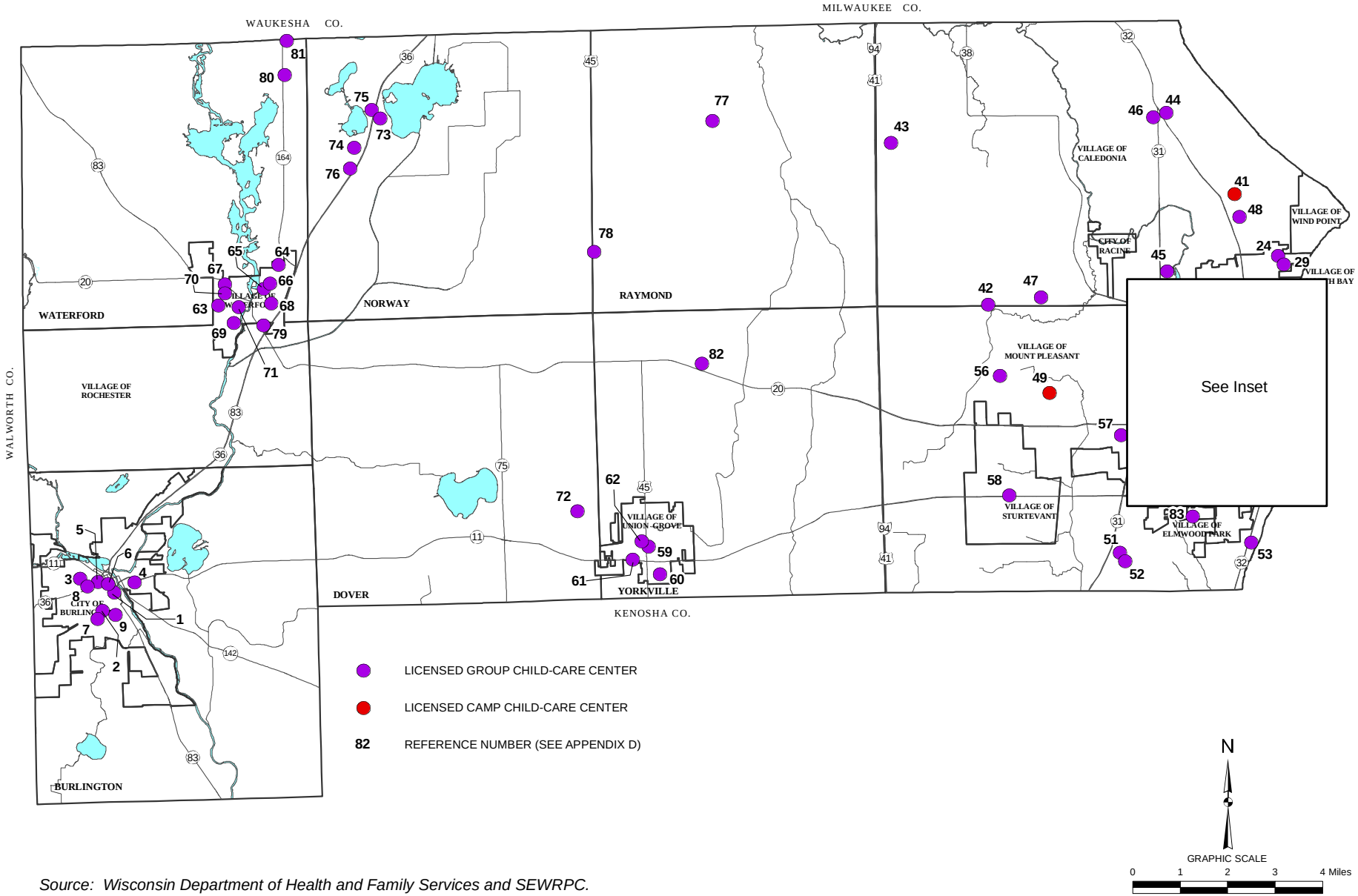
NURSING HOMES AND SELECTED ASSISTED LIVING FACILITIES IN RACINE COUNTY: 2006



Source: Wisconsin Department of Health and Family Services and SEWRPC.

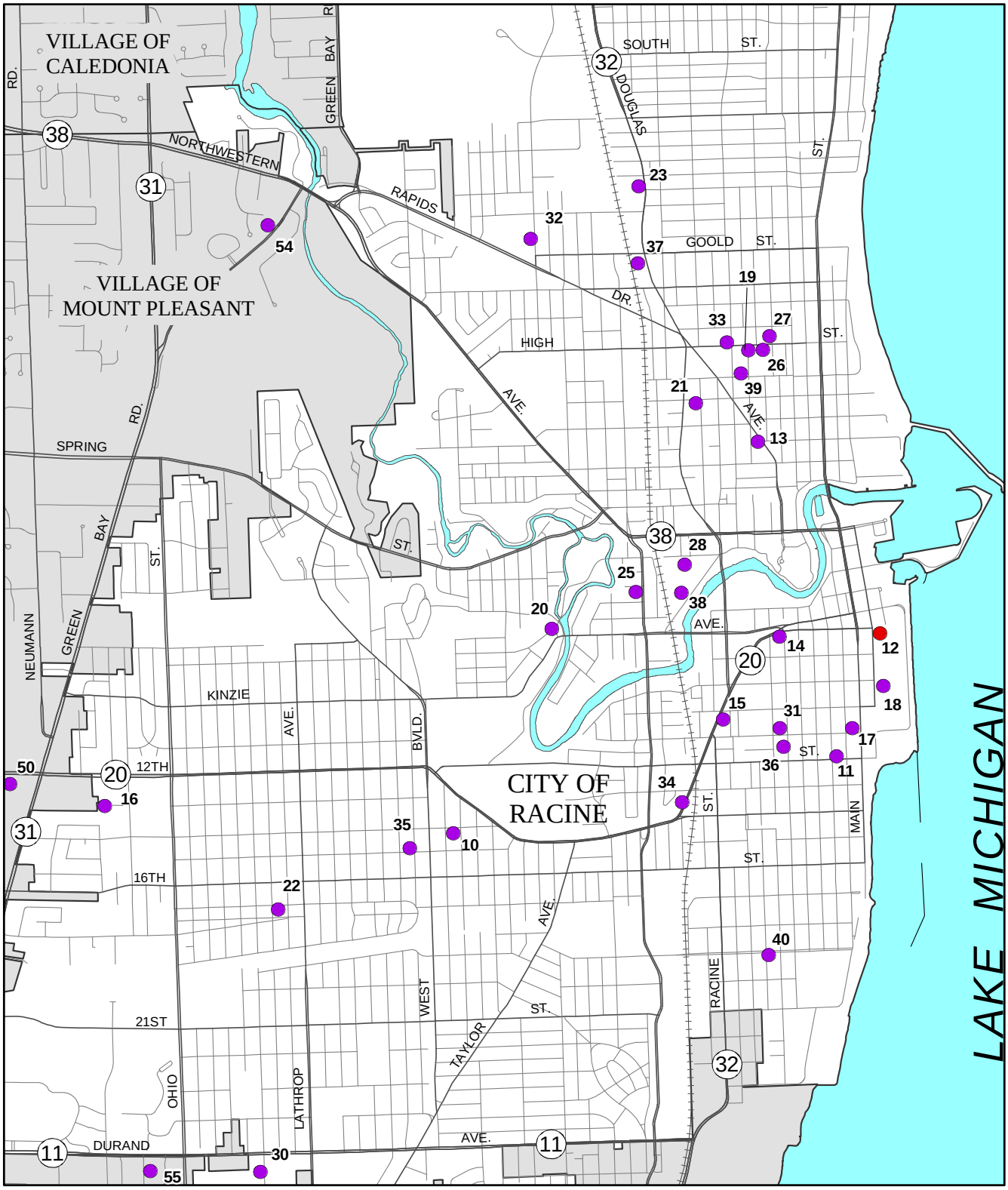
Map 27

CHILD-CARE CENTERS WITH A CAPACITY OF 20 OR MORE CHILDREN IN RACINE COUNTY: 2006



Source: Wisconsin Department of Health and Family Services and SEWRPC.

INSET to Map 27



- LICENSED GROUP CHILD-CARE CENTER
- LICENSED CAMP CHILD-CARE
- **37** REFERENCE NUMBER (SEE APPENDIX D)

N

GRAPHIC SCALE

0 0.5 1 Miles

Source: Wisconsin Department of Health and Family Services and SEWRPC.

Table 19

LOCATION OF FACILITIES WHICH STORE HAZARDOUS MATERIALS: 2009

Community	Number of Facilities	
	Reporting Facilities	Planning Facilities
Cities		
Burlington	19	11
Racine	44	16
Subtotal	63	27
Villages		
Caledonia	10	0
Elmwood Park	0	0
Mt. Pleasant	20	13
North Bay	0	0
Rochester	3	1
Sturtevant	11	5
Union Grove	7	0
Waterford	3	1
Wind Point	2	0
Subtotal	56	20
Towns		
Burlington	5	0
Dover	5	1
Norway	0	0
Raymond	5	1
Waterford	2	0
Yorkville	9	1
Subtotal	26	28
Total	145	50

Source: Racine County Office of Emergency Management.

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.

Floodland Zoning

Section 87.30 of the *Wisconsin Statutes* requires that cities, villages, and counties, with respect to their unincorporated areas, adopt floodland zoning to preserve the floodwater conveyance and storage capacity of the 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 of the *Wisconsin*

Table 20

HISTORIC SITES AND DISTRICTS IN RACINE COUNTY
LISTED ON THE NATIONAL REGISTER OF HISTORIC PLACES: 2006

Number on Map 28	Site Name	Location[a]	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	Town of Rochester[b]	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

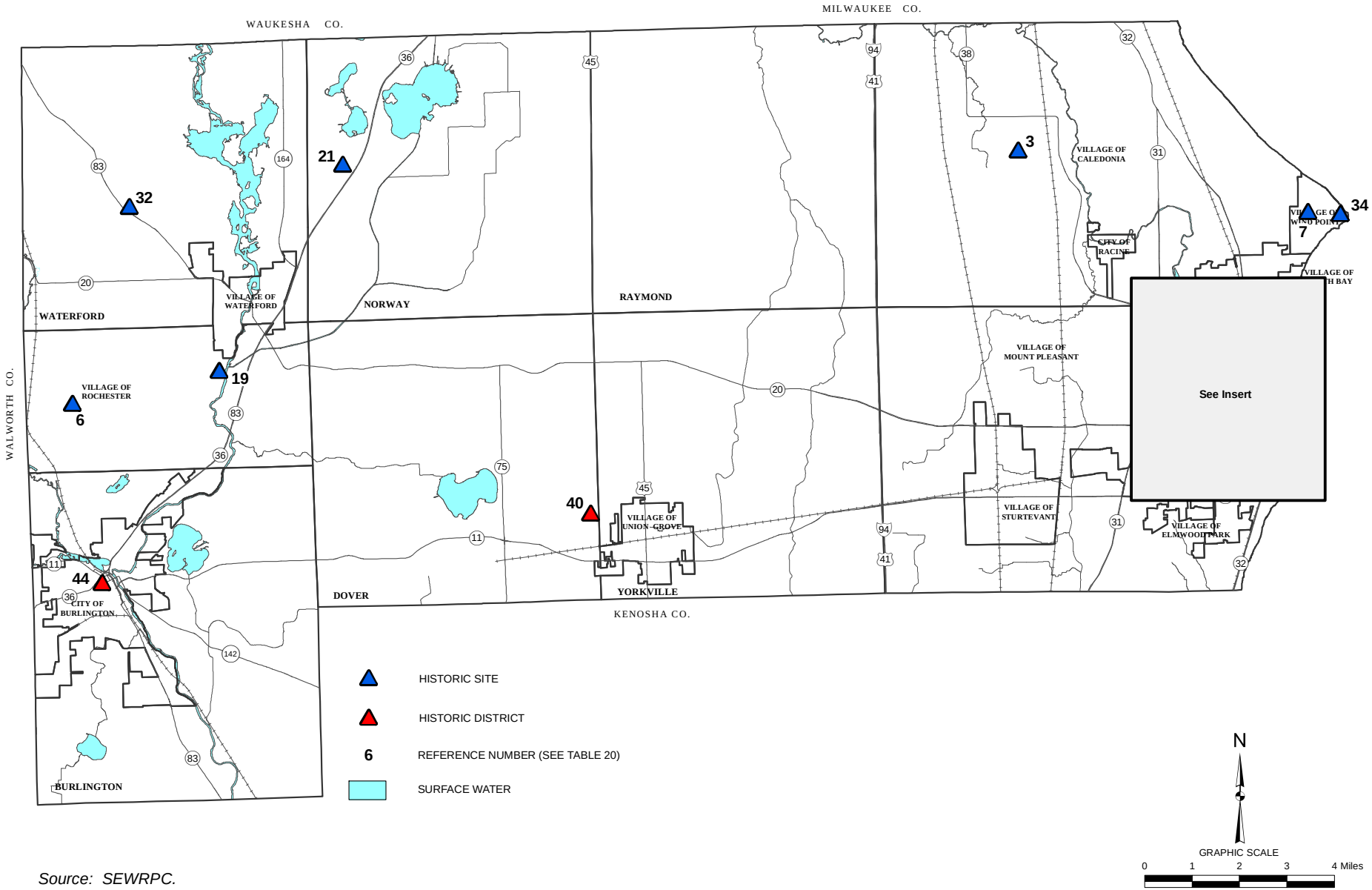
[a]*Indicates location given in U.S. Public Land Survey Township, Range, and Section.*

[b]*During December 2008 the Town of Rochester and the Village of Rochester were consolidated as the Village of Rochester.*

Source: State Historical Society of Wisconsin and SEWRPC.

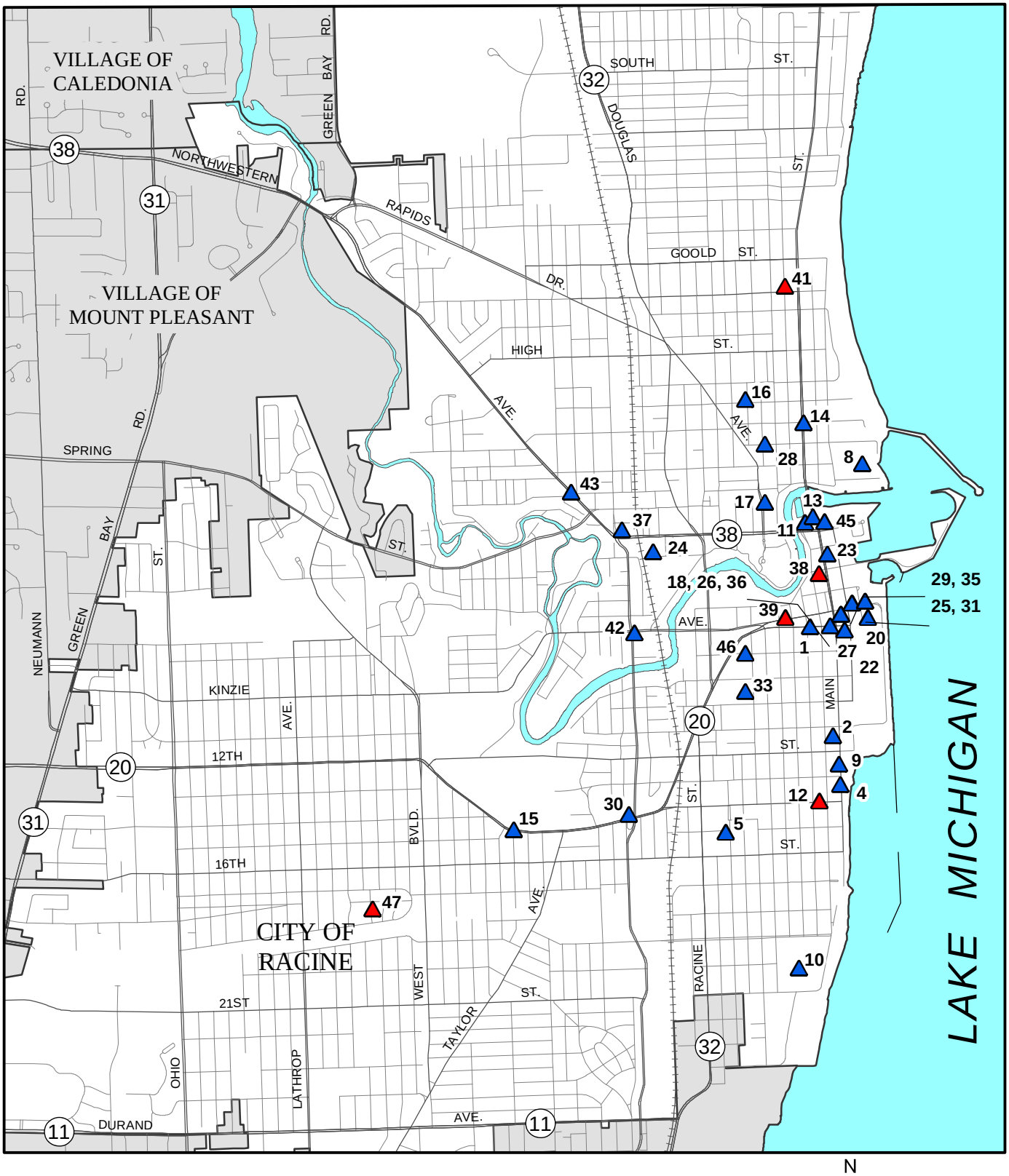
Map 28

NATIONAL AND STATE REGISTERS OF HISTORIC SITES AND DISTRICTS IN RACINE COUNTY: 2006



Source: SEWRPC.

INSET to Map 28



HISTORIC SITE

HISTORIC DISTRICT

33 REFERENCE NUMBER (SEE TABLE 20)

N

GRAPHIC SCALE

0 0.5 1 Miles

Source: SEWRPC.

Table 21

REGULATIONS AND PROGRAMS WITHIN RACINE COUNTY RELATED TO HAZARD MITIGATION: 2008

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	Floodplain and Shoreland– Chapter 20, Article VI, of Municipal Code, Ordinance 99-585, July 13, 1999
City of Burlington	Adopted	Adopted	Adopted	Adopted	Floodplain Chapter 315 Sections 12.2, 38, 39, and 40, November 9, 2006; Shoreland Chapter 315 Section 12.1, May 6, 2003
City of Racine	Adopted	Adopted	Adopted	Adopted Updated in October/ November 2009	Chapter 114 of Municipal Code, Floodplain–Article VIII; Shoreland–Article IX. Revision in effect as of December 5, 2006
Village of Caledonia	Adopted	Adopted	Adopted	Adopted	Floodplain–Title 16, Chapter 8, of Municipal Code undated Shoreland—Title 16, Chapter 1 of Municipal Code, December 6, 2005, as amended
Village of North Bay	Adopted	- -[a]	- -[b]	- -[e]	- -
Village of Elmwood Park	Adopted	- -[a]	- -[b]	- -[e]	- -
Village of Mt. Pleasant	Adopted	Adopted	County Ordinance[c]	- -[e]	Floodplain–Chapter 90, Article VIII of Municipal Code, February 11, 2008
Village of Rochester	Adopted	Adopted	Adopted	Adopted	Floodplain and Shoreland–Chapter 15 of Municipal Code, Sections 3, 5, 10, and 12, June 13, 1979, as amended. Revision in effect as of May 12, 1999
Village of Sturtevant	Adopted	Adopted	Adopted	Adopted	Floodplain–Chapter 20 of Municipal Code, July 1, 1977; Shoreland–Chapter 16 of Municipal Code, November 5, 1996
Village of Union Grove	Adopted	Adopted	- -[b]	- -[e]	Floodplain–Chapter 118 of Municipal Code, Article 2, Divisions 3, 5, and Articles III and IV. Revision in effect July 24, 2000
Village of Waterford	Adopted	Adopted	Adopted	- -[e]	Floodplain–Chapter 256 of Municipal Code, December 11, 2006. Shoreland–Chapter 255 of Municipal Code;. Revision in effect December 11, 2006
Village of Wind Point	Adopted	Adopted	Adopted	- -[e]	Floodplain–Chapter 10 of Municipal Code, Sections 11, 12, 15, and 21. Revision in effect September 19, 2000. Shoreland–Chapter 10 of Municipal Code, Sections 12, 13, 21, and 24, November 10, 1994. Revision in effect September 19, 2000
Town of Burlington	County Ordinance	County Ordinance	County Ordinance	Adopted	- -[d]
Town of Dover	County Ordinance	County Ordinance	County Ordinance	- -[e]	- -[d]
Town of Norway	County Ordinance	County Ordinance	County Ordinance	- -[e]	- -[d]
Town of Raymond	County Ordinance	County Ordinance	County Ordinance	- -[e]	- -[d]
Town of Waterford	County Ordinance	County Ordinance	County Ordinance	Adopted	- -[d]
Town of Yorkville	County Ordinance	County Ordinance	County Ordinance	- -[e]	- -[d]

[a] *Not required, since community has no floodplain.*

[b] *Not required, since community has no shoreland wetlands.*

[c] *The Village of Mt. Pleasant's ordinance is currently under Wisconsin Department of Natural Resources review.*

[d] *Covered under County Ordinance.*

[e] *Not reported by municipality.*

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

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 floodland 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 floodland zoning ordinances. The two municipalities without floodland 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 a navigable lake, pond, or flowage, or 300 feet of a navigable stream, or, to the landward side of the floodplain, whichever distance is greater, within their unincorporated areas. Minimum standards for county shoreland zoning ordinances are set forth in Chapter NR 115 of the *Wisconsin Administrative Code*. Chapter NR 115 sets forth minimum requirements regarding lot sizes and building setbacks; restrictions on cutting of trees and shrubbery; and restrictions on filling, grading, lagooning, dredging, ditching, and excavating that must be incorporated into county shoreland zoning regulations. In addition, Chapter NR 115 requires that counties place all wetlands five acres or larger and within the statutory shoreland zoning jurisdiction area into a wetland conservancy zoning district to ensure their preservation after completion of appropriate wetland inventories by the WDNR. 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 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, 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*. A shoreland-wetland ordinance adopted by the Village of Mt. Pleasant is currently under review by the WDNR. 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[10] for Racine County. That study recommended, and the current ordinance reflects,

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

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 an emergency operations plan[11] 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 emergency operations 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.

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.

The Town of Norway completed an emergency action plan[12] in 1997 which sets forth specific emergency procedures to be carried out in the event of flooding in the Town of Norway Sanitary District No. 1. These procedures are, in some cases, flood mitigation actions and, accordingly, are described further in Chapter V.

The Town of Burlington adopted a Town Emergency Plan in August 2003. This plan remains in effect.[13]

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[11]Racine County, Wisconsin, Racine County Emergency Operations Plan, *[Racine County, Racine Wisconsin], 1996.*

[12]*Town of Norway,* Norway Emergency Action Plan, *April 1997.*

[13]*Town of Burlington,* Town Emergency Plan, *August 14, 2003.*

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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 its 17 local units of government are preparing 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.[1] That plan incorporates and updates elements from other pertinent County and Regional plans as appropriate. Racine County has prepared and adopted a park and open space plan[2] to guide the County and local units of government in 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.[3] In addition, comprehensive watershed

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

[2]*SEWRPC Community Assistance Planning Report No. 134, 2nd Edition,* A Park and Open Space Plan for Racine County, *July 2001*.

[3]*SEWRPC Planning Report No. 48,* A Regional Land Use Plan for Southeastern Wisconsin: 2035*, June 2006.*

plans[4] 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 floodland 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 floodland 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 floodland preservation.

HAZARD MITIGATION GOALS AND OBJECTIVES FOR RACINE COUNTY HAZARD MITIGATION PLAN

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.

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 which reduces the exposure of people and real and personal property to shoreline erosion and bluff recession.

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[4]*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.*

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 22 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 22

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 elementary school facilities, and should have reasonable access through the appropriate component of the transportation system to employment, commercial, cultural, and governmental centers, 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; and secondary school 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 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.

OBJECTIVES AND STANDARDS

1. Floodlands 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 22 (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 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.

OBJECTIVES AND STANDARDS

1. In order to prevent significant property damage and safety hazards, the major components of the stormwater management system and the floodland 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 22 (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.[a]

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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[a]*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

In order 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 the updated 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 which 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 Task Force, 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 Task Force.

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 23.

As part of the updating process, the Task Force reevaluated the hazards to be considered using a hazard and vulnerability assessment tool. A copy of this tool is included in Appendix A. 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 business. 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.

Summary of Hazard and Vulnerability Assessment Tool Results

Methods

The assessment tools were completed at the March 30, 2009 meeting of the Racine County Hazard Mitigation Task Force, with 27 surveys being returned and analyzed. For each of 40 hazards, a risk was computed for each survey using the formula:

Risk(in %) = [(Probability/3) x (Human impact + Property impact + Business impact + 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.[1] The results from the assessment tool were analyzed for 40 hazards.[2]

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[1]*In this instance, the range between the minimum and maximum risks does not give meaningful information on the amount of agreement among Task Force members because in one of the surveys returned, zeros were entered for all hazards except one. This extended the lower end of the range for all hazards to zero, increasing the ranges for many risks and exaggerating the amount of disagreement among Task Force members.*

[2]*One hazard, Category A5: Other natural hazards, was not analyzed because examination of the survey forms indicated that several Task Force members interpreted this category as being a heading and did not complete this portion of the assessment tool.*

Table 23

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

Table 23 (continued)

Number of Priority Votes Received at Task Force 12/05/01 Meeting	Hazard Types
- -	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.

In order to assess the degree of agreement among Task Force 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 24. The average level of risk for hazards ranged from 13.6 percent for the lowest ranked hazard (wild animals) to 68.3 percent for the highest ranked hazard (flooding and stormwater damage). Eight of the 10 highest average risks belonged to natural hazards related to meteorological causes, mostly causes associated with either winter weather or severe storms. The remaining two of the 10 highest average risks belong to technological or human-induced hazards. The interquartile ranges for the 10 hazards with the highest average risks tended to be relatively large, indicating a diversity of opinion among Task Force members as to the level of risk posed by each of these hazards. In some instances, such as the hazards posed by flooding and stormwater damage, there was general agreement among Task Force members that the risk was relatively high, but disagreement as to just how high.

The 10 lowest average risks belonged to hazards related to a variety of causes, including technological or human-induced hazards related to land use, natural hazards related to geological events, natural hazards related to biological organisms, and hazards related to human behavior. The interquartile ranges for the 10 hazards with the lowest average risks were low, indicating strong agreement among Task Force members as to the level of risk posed by each of these 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

Table 24

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

Event	Minimum (percent)[a]	Maximum (percent)[a]	Average (percent)[a]	Rank	Interquartile Range (percent)[b]
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

Table 24 (continued)

Event	Minimum (percent)[a]	Maximum (percent)[a]	Average (percent)[a]	Rank	Interquartile Range (percent)[b]
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

[a]*Perceived threat increases with percentage.*

[b]*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.

and a ranking by risk was made based upon disaster history and emergency management experience. As a part of updating this plan, the review of hazards faced by the County was updated to include experiences that have occurred since the initial plan was drafted and the ranking by risk was reevaluated in light of this updated disaster history.

If disaster damages exceed the capabilities of local communities and State agencies, Federal assistance will be requested. Federal disaster assistance may be offered through a variety of programs. Assistance may be directed to agricultural producers, individuals and families, businesses, or local governments. Table 25 provides a summary of estimated damages and public assistance from disasters and emergencies in Racine County, both Presidential declarations and nondeclared, from 1971 through 2008.

Between 1993 and the end of 2008 Racine County has had seven presidential disaster declarations and two declared emergencies. The total documented estimated damages of these nine events exceeded $5.7 million. It should be noted that the damage estimates generally underestimate the actual damages which occurred. For example, during the year 2000 heavy rain event, damages which significantly exceed the amount set forth in Table 25 were reported to the Racine County Office of Emergency Management. For those events, $976,000 in State and Federal assistance was provided to Racine County communities, businesses, individuals, and farmers. In addition, an undetermined amount of damages may have been covered by insurance.

It should be noted this amount significantly underestimates the sum of all losses in Racine County from natural hazards. Almost every year there are significant weather events causing millions of dollars of damage for which no Federal disaster assistance was requested. Thus, losses from hazards in Racine County are significantly greater than the $5.7 million estimate shown in Table 25. 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. Since 1950, Racine County has experienced 505 weather hazard events, as summarized in Table 26. To illustrate the broader hazard damage

Table 25

SUMMARY OF ESTIMATED DISASTER DAMAGES AND ASSISTANCE IN RACINE COUNTY FOR SELECTED FEDERALLY DECLARED EMERGENCIES: 1993-JUNE 30, 2009

Date of Disaster	Estimated Damages			State and Federal Assistance		
	Public Damages	Private Damages	Total Damage	Public Assistance	Individual Assistance	Total Assistance
1993–Flood	N/A	N/A	N/A	$ 344,000	- -	$ 344,000
1998–Severe Storms/Flooding	N/A	$ 200,000	$ 200,000	- -	N/A	N/A
2000–Heavy Rains/ Severe Storms/Flooding	N/A	2,050,000	2,050,000	- -	$ 353,000	353,000
2000—Snow	N/A	N/A	N/A	279,000	- -	279,000
2004—Severe Storms/Flooding	N/A	1,000,000	1,000,000	N/A	127,000	127,000
2007—Severe Storms/Flooding	$ 170,000	300,000	470,000	N/A	190,000	190,000
2008—Snow	N/A	N/A	N/A	475,000	- -	- -
2008—Severe Storms/ Tornadoes/Flooding	2,024,000	N/A	2,024,000	N/A	1,894,000[a]	1,894,000[a]
2009—Severe Storms/Flooding	N/A	N/A	N/A	N/A	N/A	N/A
Total	$2,194,000	$3,550,000	$5,744,000	$1,098,000	$2,564,000	$3,187,000

NOTE: N/A indicates data not available.

[a]*Includes about $855,000 from individual assistance programs and about $1,039,000 in loans through the Small Business Administration.*

Source: Racine County Office of Emergency Management.

Table 26

WEATHER HAZARD EVENTS RECORDED IN RACINE COUNTY, WISCONSIN FROM 1950 THROUGH 2008 (SORTED BY NUMBER OF EVENTS)

Event	Total	Deaths[a]	Injuries[a]	Property Damage[b]	Crop Damage[b]
Dust Storms	0	0	0	$ 0	$ 0
Wild Fires/Forest Fires	0	0	0	0	0
Drought	11	0	0	0	265,000
Tornado	20	0	14	25,707,000	24,000
Lightning	27	1	8	1,363,000	0
Temperature Extremes	38	27	92	30,000	0
Snow and Ice	38	0	1	0	0
Flood	38	0	0	7,154,000	34,544,000
Fog	44	0	0	0	0
Hail	62	0	0	191,000	0
Thunderstorms/High Winds	227	5	35	20,217,000	2,196,000
Total	505	33	149	$54,662,000	$37,029,000

[a]*Deaths and injuries reported were, in some cases, based upon a geographic area impacted by the hazard event which affected Racine County and had a larger area of impact than the County itself.*

[b]*Dollar values were adjusted to year 2008 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).

potential, Table 26 summarizes the damages associated with the 505 natural hazard events which have occurred in Racine County since 1950. Those hazard events were estimated to have caused almost $92 million in damages, about 40 percent of that damage being crop damages.

The amount of estimated losses reported from major events has been increasing. Based upon the date of the occurrence in the events summarized in Table 26, there were over $26 million in hazard-related property damages and expenses and $13 million in crop damages reported to be associated with hazards which took place between 1998 and 2008. This is 43 percent of all reported damages over the period 1950 to 2008. One possible factor accounting for this is that the decade of the 1990s, including 1998 and 1999 was an unusually active one for natural disasters in the State of Wisconsin as a whole. 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 data summarized in Table 26 shows that thunderstorms and high winds are the most frequent weather hazards, followed by hail storms, fog, flooding, and snow and ice. Flooding is the most damaging weather hazard, followed by tornadoes and thunderstorms/high winds. Extreme temperature, primarily heat, is the most deadly weather hazard, followed by thunderstorms and high winds. 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, as shown in Table 27. Over the period 1990 through 2008, there have been 327 thunderstorm-related watches or warnings and 70 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 is most likely due to a combination of improved record keeping by health organizations and the longer life expectancy of individuals. Mortality from heat waves affects the elderly disproportionately.

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 and degree of importance assigned by the collective judgment of the Racine County Hazard Mitigation Task Force.

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 County Hazard Mitigation Task Force. The hazards to be specifically considered in the plan and their ranking are summarized in Table 28, along with qualitative information on the hazard severity. As part of the updating process, the ranking of hazards to be considered in the initial plan was reevaluated giving consideration to data related to the occurrence of hazards since the original plan and to the perceived risk associated with each hazard as summarized in Table 24.[3]

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[3]*The rankings in Table 28 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 Task Force and summarized in Table 24. Two modifications were made to the ranks derived: First, coastal erosion was moved from a rank of 7 to a rank of 6 in order to reflect the difficulty in determining actual damages. Second, flooding was moved from a rank of 2 to a rank of 1 in order to reflect its pervasive nature and the fact that many of the risks associated with it are avoidable. It is important to note that some of the natural hazards listed in Table 28 represent combinations of hazards listed in Table 24. For example, while specific risks associated with thunderstorms, such as hail and lightning are listed separately in Table 24, they are combined into one category in Table 28.*

Table 27

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
Total	172	155	55	15

Source: National Oceanic Atmospheric Administration, National Weather Service.

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.

In order to be comprehensive, the summary listing of hazards in Table 28 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 28.

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 44 fog

Table 28

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

Order	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)
	Natural Hazards						
1	Flooding	High	Medium	High	Low	Moderate	Large
2	Thunderstorm, High Wind, Hail, Lightning	High	Short	High	High	Long	Large
3	Tornadoes	Low	Medium	High	Medium	Short	Small
4	Temperature Extremes	Medium	Long	Low	High	Long	Large
5	Winter Storms	Medium	Medium	Low	Medium	Moderate	Large
6	Coastal Erosion	Low	Long	Medium	Low	Long	Small
7	Drought	Medium	Medium	Low	Low	Long	Large
8	Earthquake	Low	Short	Low	Low	Short	Large
	Other Hazards						
- -	Transportation Accidents	Medium	Short	Moderate	High	Short	Small
	Arterial Street and Roadway						
	Railroad						
	Airport						
- -	Contamination or Loss of Water Supply	Low	Short	Moderate	Medium	Moderate	Medium
- -	Hazardous Materials Incident	High	Short	Low	Medium	Moderate	Small
	Fixed Facility						
	Transportation						
- -	Emergency Medical Incidents	Low	Short	Low	High	Moderate to long	Small to large
- -	Terrorism Incident	Low	Short	Moderate to high	High	Short	Small to medium
- -	Power Outage Incident	Medium	Short	Low	Low	Short	Small to medium

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

events reported in and around Racine County in the period from December 12, 1999, through December 31, 2008. 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.

Wild Fires
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 wild fire 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 2001. 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 wild fire 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, 2008. 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.

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 19 percent of the electricity produced in Wisconsin.[4] This is produced by two nuclear power plants (three reactors) located in the State. Two of these power plants, Point Beach Unit 1 and Unit 2, are located in Two Creeks, Wisconsin, which is approximately 13 miles north by northwest of Manitowoc. The third power plant, the Kewaunee Nuclear Power Plant, is located in Carlton, Wisconsin, approximately 27 miles east of Green Bay. 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. 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

[4]*Wisconsin Office of Energy Independence, "Wisconsin Energy Statistics: 2008," 2008.*

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.

Two additional nuclear power plants, Units 1 and 2 in Zion, Illinois, were permanently shut down on February 13, 1998.[5] 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 converted the turbine-generators into synchronous condensers and isolated the spent fuel pool within a fuel building "nuclear island." The plant has been placed in SAFSTOR, where it will remain until about 2013 when the decommissioning trust fund will be sufficient to conduct DECON (immediate dismantlement) activities. Under SAFSTOR, often considered "delayed DECON," a nuclear facility is maintained and monitored in a condition that allows the radioactivity to decay; afterwards, it is dismantled. 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.[6]

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.

Disease or Biological Contaminants
This category heading has been incorporated as part of both the Emergency Medical Incidents and Terrorism Incident hazards sections of this report. The disease component within the public health category was separated into environmental toxins, venomous animal injuries, zoonoses (i.e., human infections derived from animals), immunization, allergens, and emergency management response. The biological contaminant component is a major element within the terrorism incident hazard.

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 us 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. For example, Racine County conducted a major airplane crash exercise in June 2003, which took over six months to plan and involved a team of over 25 individuals representing various agencies including the Racine County Sheriff's

[5]*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, *September, 2003.*

[6]Ibid.

Department, Racine County Emergency Management, Midwest Express Airlines (now Midwest Airlines), Racine Police Department, Racine Fire Department, Mt. Pleasant Fire Department, Caledonia Fire Department, Red Cross, Salvation Army, All Saints Healthcare, U.S. Coast Guard, the FBI and others.[7] 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 28.

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 nonmining 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 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 State of Wisconsin Department of Natural Resources (WDNR), Division of Air and Waste, have each established criteria that municipal solid waste landfills must meet in order to ensure the protection of human health and safety which 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 noncontainerized 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).[8]

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[7]*For more information on the Racine County Disaster Exercise, you may contact David Maack at 262-636-3515 or by email at davidm@racineco.com*

[8]*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.*

As summarized in Chapter II, as of 2009, there were two active and 18 inactive landfill sites located throughout Racine County, as shown on Map 18 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 above.[9] 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.[10] Some, however, can inflict physical damage 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 35,000 or more annual deer-vehicle collisions,[11] 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 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. [12] 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.

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[9]*Wisconsin Department of Natural Resources, Waste Management Activities in Wisconsin,* http://www.dnr.state.wi.us/org/aw/wm/, *revised July 10, 2003.*

[10]*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.

[11]*Wisconsin Department of Natural Resources,* Vehicle Killed Dear in Wisconsin Fiscal 2007 Report, http://www.dnr.state.wi.us/org/land/wildlife/HUNT/DEER/CKDFY07.pdf, *2008.*

[12]*University of Wisconsin Extension, Report No. G3564,* op. cit.

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 which address the identified vulnerabilities.

This section of the report, which includes a description of the methods and procedures utilized in developing the vulnerability assessment, is followed by the assessment for each of the identified hazards. The vulnerability assessment for each hazard includes, where applicable, a profile of hazard events, a description of potentially affected assets, and estimates of potential losses. In addition, the potential for future changes in the vulnerability of hazard and a summary of the variance of risks within the multi-jurisdictional study area is included for each of the identified hazards.

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.[13] 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 2000 and 2005 large-scale orthophotographs. All of the mapping was done utilizing geographic information system (GIS) ArcView 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 have been used and supplemented with information obtained from the HAZUS software; the National Oceanic and Atmospheric Administration National Climatic Data Center; the Wisconsin Department of Military Affairs, Division of Emergency Management; the U.S. Department of Agriculture Risk Management Center; 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, including the PC-based software, 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.

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[13]*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. See also Federal Emergency Management Agency,* State and Local Plan Interim Criteria Under the Disaster Mitigation Act of 2000*, July 11, 2002.*

A vulnerability description has been included for each of the applicable hazards listed in Table 28.

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. Floodlands are the wide, gently sloping areas contiguous to, and usually lying on both sides of, a stream channel. For planning and regulatory purposes, floodlands are normally defined as the areas subject to inundation by the one-percent-annual-probability (100-year recurrence interval) flood event. The floodlands shown on Map 6 in Chapter II of this report have been identified by Racine County, SEWRPC, and FEMA. Approximately 34.7 square miles, 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. A consideration in flood hazard mitigation is the potential for increased flooding due to dam failures. Since there are a number of major and minor dams in Racine County, including six rated by the State as being a high or significant hazard, future evaluation of floodplain areas related to dam failure should be considered. 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 2010 FEMA digital flood insurance rate maps for Racine County, which include all of the communities in the County.

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 lying in Racine County. A comprehensive watershed plan was prepared for that watershed in 1966[14] 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 about 260 residences were affected by basement flooding due to seepage and sewer backup. In addition, flood damages

[14]*SEWRPC Planning Report No. 9,* A Comprehensive Plan for the Root River Watershed*, July 1966.*

to crops and farming operations occurred in the Towns of Caledonia, Mt. 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.[15] 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 in Racine County. A comprehensive watershed plan was completed for that watershed in 1969[16] under the direction of the SEWRPC Fox River Watershed Committee. That plan was subsequently amended in 1975.[17] 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[18] 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 62ºF 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 flood was the highest recorded in the 53 years that the U.S. Geological Survey had operated the gaging station at Wilmot.[19] 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 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

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[15]*Since this event, the Towns of Caledonia and Mt. Pleasant have incorporated as villages.*

[16]*SEWRPC Planning Report No. 12,* A Comprehensive Plan for the Fox River Watershed, *April 1969.*

[17]*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.*

[18]*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.*

[19]*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.*

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 in Racine County. A comprehensive watershed plan was completed for that watershed in 1983[20] under the direction of the SEWRPC Pike River Watershed Committee. That plan was subsequently amended in 1996.[21] 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 of this flood event 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 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. The Kenosha County Park Commission spent $2,430 for cleanup and repairs at Petrifying Springs Park and estimated revenue losses due to flooding of the park and the golf course are reported to have been $10,800 on July 2, July 22, July 23, August 19, September 13, and September 14, 1978. 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.

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 of 1980 in which two people

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

[21]*SEWRPC* Amendment to the Pike River Watershed Plan, Kenosha and Racine Counties, *March 1996.*

were drowned near the mouth of the Pike River in Kenosha County just downstream of Racine County. The other incident occurred in July of 1968 in which one person was drowned, also near the mouth. 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. This area 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.

There are two structures 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 watershedwide floodland management planning is maintained.

Description of Recent Flood Events

Since 1990, there have been 39 flood events reported by the National Climatic Data Center affecting Racine County. Those flood events were reported to have caused property damages totaling, in 2008 dollars, about $41.7 million in damage, of which $34.5 million was related to crop damages. The most severe recent events occurred in June-July 1993, June 1996, August 1998, June 1999, July 2, 2000, May-June 2004, August 19-22, 2007, June 7-9, 2008, and June 19, 2009. These flood events, which are significant with regard to the current hazard mitigation planning effort for the County, include the following:

- 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 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 $4.0 million. Nine states, including Wisconsin, were declared a national disaster area. Statewide damages were estimated at $800 million in crop damages and $747 million 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. 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, Mt. Pleasant, Norway, Rochester, Waterford, and Yorkville.[22]

[22]*Since this event, the Towns of Caledonia and Mt. Pleasant have incorporated as villages and the Town of Rochester has consolidated with the Village of Rochester.*

- 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 $17 million in crop damage and $400,000 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 $200,000 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.

- The June 13, 1999, flood event, which caused widespread flood damages in a multi-county area, resulted in $150,000 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, and 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.

- The July 2, 2000, event in Southeastern Wisconsin was a combination of tornadoes, straight-line winds, hail, and flash flooding. The most significant cluster of thunderstorms developed over southern Columbia County and proceeded to move east/southeast through Dodge, Jefferson, Waukesha, Milwaukee, and Racine Counties. A supercell on the west end of this cluster produced some damaging straight-line winds and large hail up to 2.25 inches in diameter in Jefferson County. This supercell spawned a tornado at 5:30 p.m. about three-fourths of a mile northwest of the intersection of S. 27th Street and Ryan Road. This tornado moved east/southeast through Oak Creek, and then exited Milwaukee County at 7:06 p.m., where STH 32 goes south into Racine County about seven miles south/southeast of General Mitchell International Airport. The tornado continued for about 0.2 mile into Racine County, just east of STH 32, before dissipating about 2.9 miles northeast of Husher. No one was injured or killed by the tornado that traveled through Franklin and Oak Creek into Racine County. However, significant damage did occur. In Racine County, the tornado uprooted trees as it weakened. At least 50 homes and three farm buildings in eastern Racine County were damaged by the powerful winds, or by felled trees. 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. 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.

- The May-June 2004, flood event was the result of an extended period of light to moderate rain during the month of May followed by more severe rain occurring in late May and early June. Moderate flooding within Racine County was experienced on May 20 and 21, with a number of roads reported being flooded along with gravel washouts. Basement flooding was also reported south of the Village of Sturtevant. 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 estimated at $1,272,000 and $5,350,000, 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.

- The August 19-22, 2007, flood event was the result of a stalled surface frontal boundary that stretched from northern Iowa through northern Illinois. Warm, moist air flowing north up and over the boundary 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. 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. Fast flowing 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 $570,000 and $2,100,000, respectively.

- The June 7-9, 2008, flood event was the result of a slow moving surface boundary nearly parallel to the mid-level flow that affected southern Wisconsin. A strengthening low-level jet stream and strong moisture advection supported training of flood-producing thunderstorms. The heavy rain axis 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 32 near Racine recorded a peak flow rate of 8,050 cubic feet per second, which is by far 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 the Town of Norway. 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 $1,500,000 while public sector costs were estimated at $2,024,000. A total of nearly $4 million 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 18-19 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.

Vulnerability and Community Impacts Assessment

In order 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 structures, including critical facilities flooding, property values, and cropland flood damages.

The floodplain areas, as well as the watershed boundaries, within Racine County are shown on Map 6 in Chapter II of this report. These areas are generally located along the major stream system throughout the County. The floodplains have been delineated for nearly all of the major streams and lakes and selected smaller intermittent streams in the County. The source of the hydrologic and hydraulic data for each stream reach is shown on Map 29. 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 151 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.

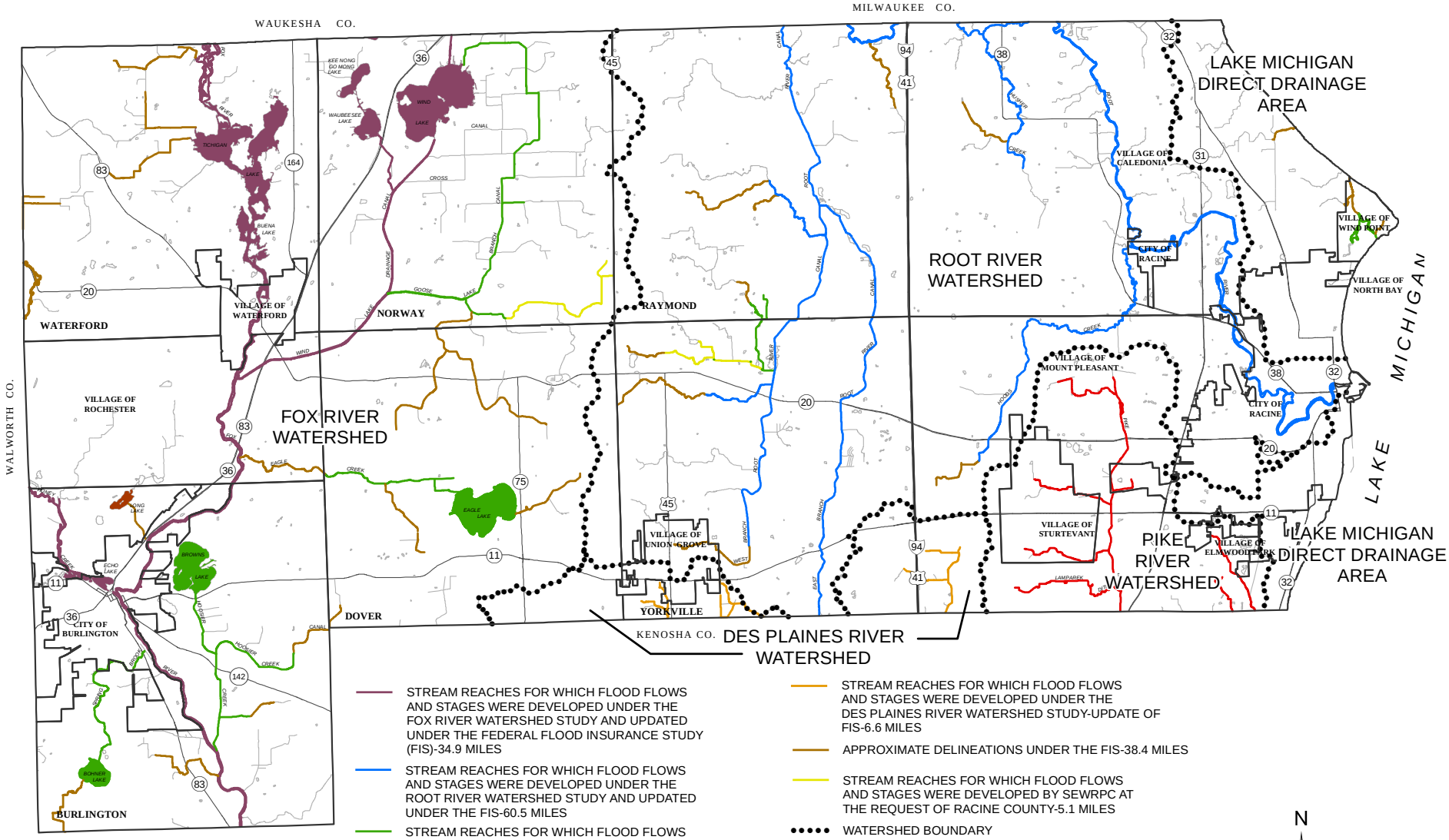
A review of the community assets described in Chapter II indicate the potential for flooding impacts to: 1) a variety of floodprone residential, commercial, and other developed land uses; 2) agricultural lands; 3) roadway transportation facilities; 4) critical community facilities; and 5) historic sites. 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 793 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 30 and 31. There are 617 residential structures, 56 industrial, business, and commercial structures, 43 agricultural buildings, 54 residential mobile homes, three government buildings, six community utility buildings, one school, one adult day care center, one group home, and 11 other buildings (recreational, garage, churches, and clock tower) involved. The specific location of each structure and its relationship to the floodplain is shown on the 2010 FEMA digital flood insurance rate maps for Racine County.

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, and a detailed field survey would be needed to determine if the structure is 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 these 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

Map 29

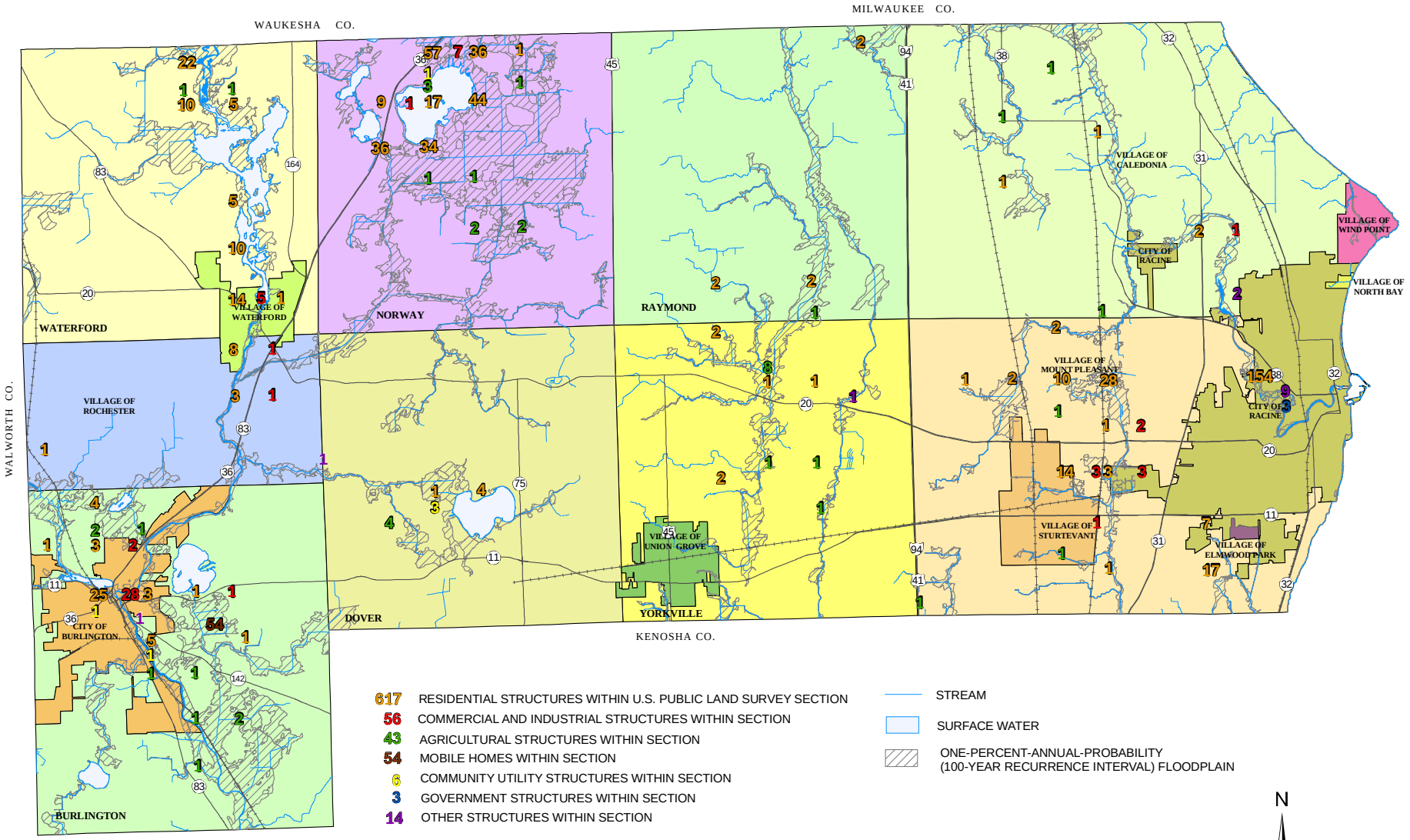
SOURCES OF FLOOD HAZARD DATA FOR STREAM REACHES IN RACINE COUNTY: 2009



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

Map 30

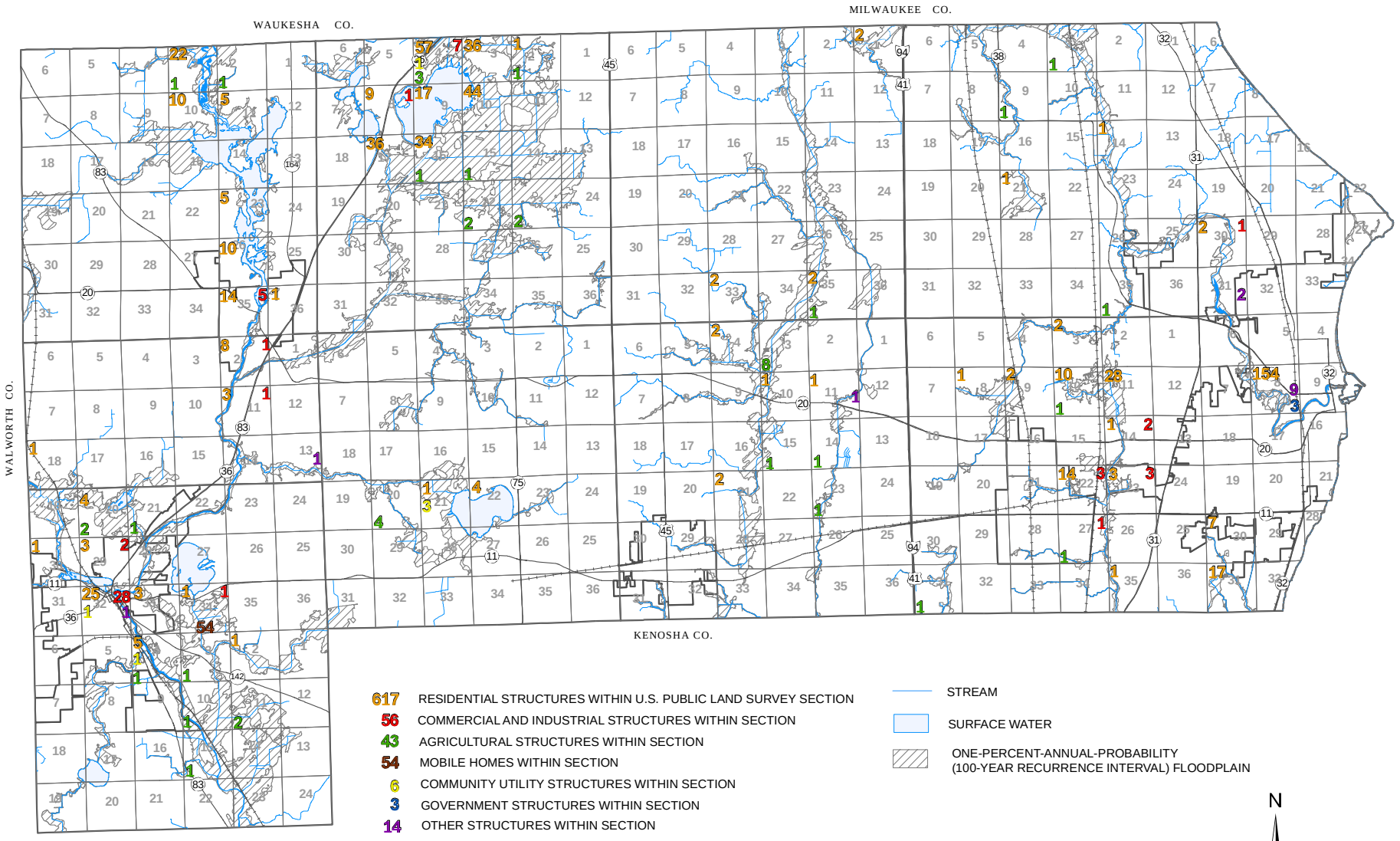
NUMBER OF STRUCTURES WITHIN FLOOD HAZARD AREAS BY CIVIL DIVISION IN RACINE COUNTY: 2008



Source: SEWRPC.

Map 31

NUMBER OF STRUCTURES WITHIN FLOOD HAZARD AREAS BY U.S. PUBLIC LAND SURVEY SECTION IN RACINE COUNTY: 2008



Source: SEWRPC.

station for at least the past 17 years, including during the large flood event in June 2008. However, the pumping station is proposed to be evaluated further as part of the next sewerage facilities planning program for the Town of Norway Sanitary District No. 1 to determine the potential impacts due to flooding and, if needed, further remediation.

There are three structures which are considered by FEMA to be repetitive- or substantial-loss properties in Racine County, two in the City of Racine and one in the Town of Norway. Repetitive-loss structures are those which have two or more flood insurance claims of at least $1,000 each. All three of these structures sustained damages during the June 7-9, 2008, flood event.

Detailed flood hazard data are available for all flood hazard areas identified. Estimated damages are included in Table 29 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. The total value of the 793 structures which are identified as being subject to flooding or stormwater drainage problems is about $99 million. Damages expected during a one-percent-annual-probability flood event are estimated to be $21.3 million and annual average damages are estimated to be $4.0 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 32 and 33 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 32), and fire and police stations (see Map 33). Three of these facilities—a private high school, a group home, and an adult daycare center—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 43 buildings identified as mass care facility sites (shelters) in Racine County. A listing of those facilities is available in the County Office of Emergency Management. 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 area.

As can be seen by review of Maps 32 and 33, 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 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 nature 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

Table 29

STRUCTURE FLOOD DAMAGE SUMMARY: RACINE COUNTY, WISCONSIN

Annual Flood Probability (percent)	Number of Structures in Floodplain	Flood Damages			Expected Annual Average Flood Damage
		Direct	Indirect	Total	
1	793	$17,763,230	$3,570,547	$21,333,777	$ 426,680
2	598	12,566,070	2,479,300	15,045,370	601,810
10	323	5,168,020	915,000	6,083,020	2,980,680
Total	- -	- -	- -	- -	$4,009,170

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

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 noted 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 damage to agricultural land has been significant, with crop damages totaling nearly $35 million over the period of 1950 to 2008. Thus, the average annual damages in the County can be approximated at $593,000 per year. There are about 12,000 acres of agricultural land located within the identified flood hazard area. Thus, the average annual flood damage is about $49 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.[23] 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 $62,000 in 2008 dollars, and about $168 per acre per year, for the floodprone lands located in the Town of Waterford.

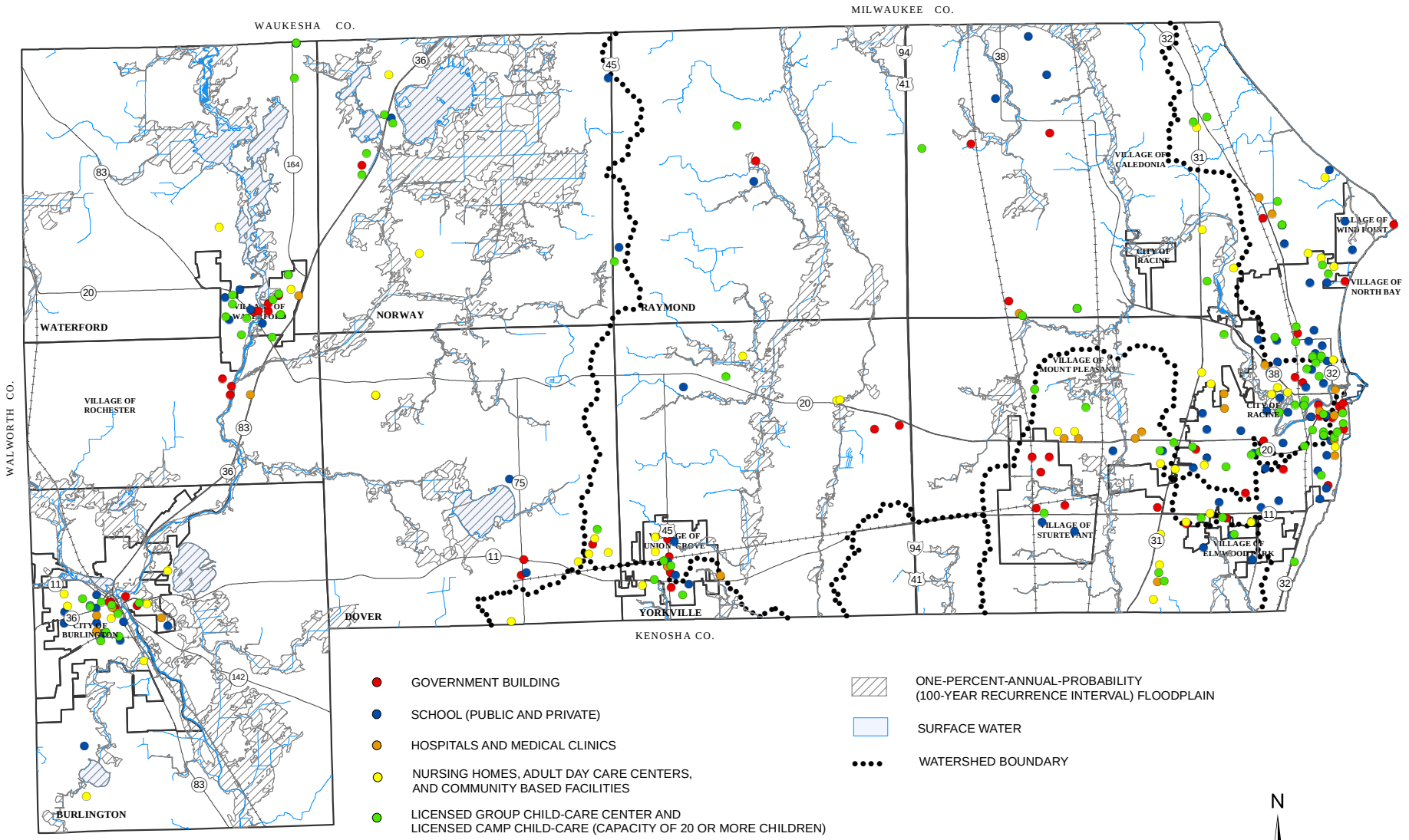
The second area of particular concern is lands in the Town of Norway drained by the Wind Lake Canal. These lands total about 4,000 acres, of which about 2,000 acres actually sustain damage during flood events. The frequency and severity of flooding in this area was analyzed in a 1975 drainage and water level control plan.[24] That study estimated the average annual damages on those lands at $186,000, or about $92 per acre per year. Given the estimating technique, including crop values used in 1975, the current flood damage estimates are

[23]*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.*

[24]*SEWRPC Community Assistance Planning Report No. 5,* op. cit.

Map 32

LOCATION OF CRITICAL COMMUNITY FACILITIES IN RELATION TO FLOODPLAINS IN RACINE COUNTY: 2005

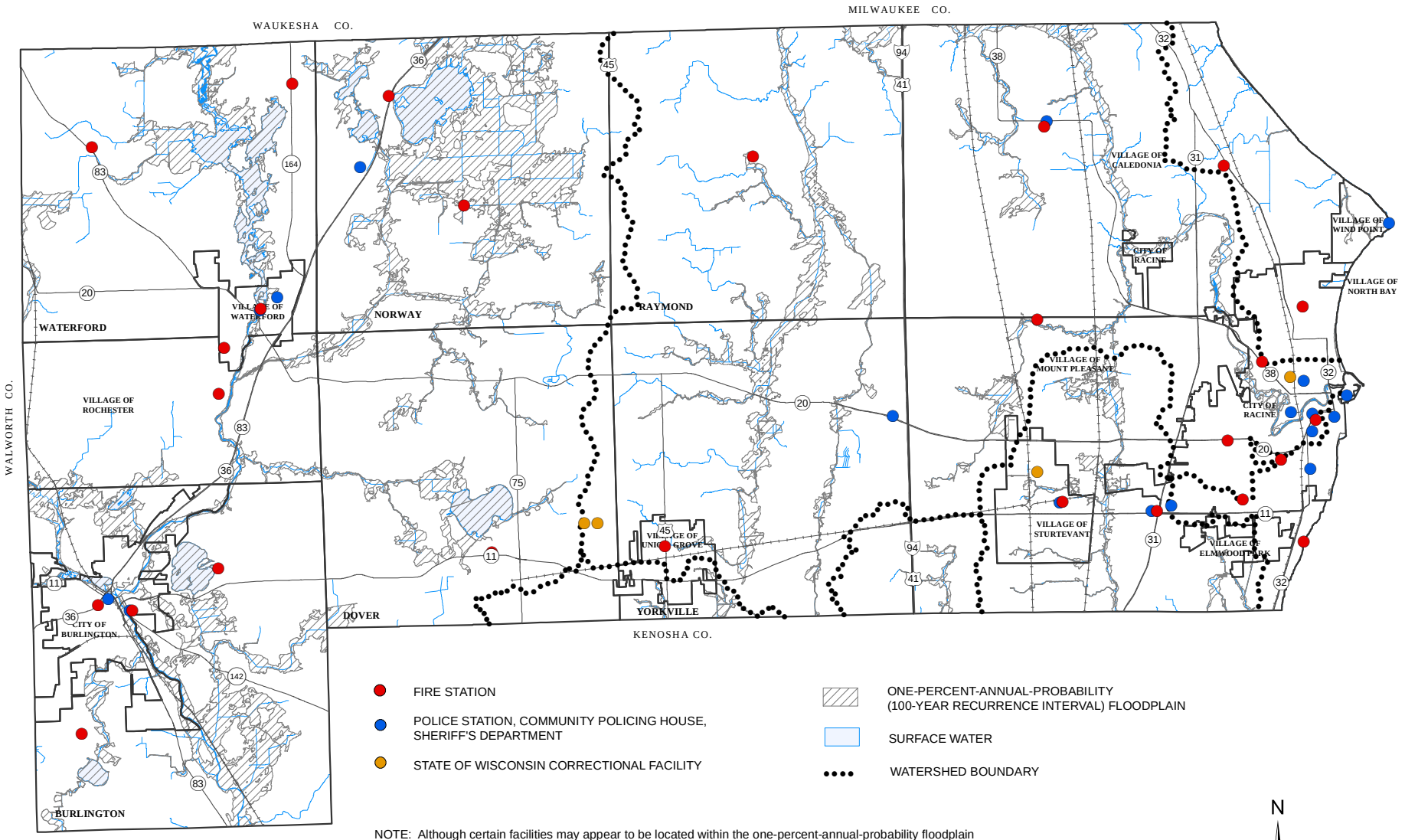


NOTE: Although certain facilities may appear to be located within the one-percent-annual-probability floodplain when displayed at this scale, detailed review at a larger scale indicates that none of the facilities are within the floodplain, with the exception of a private high school, a group home, and an adult day care center.

Source: SEWRPC.

Map 33

LAW ENFORCEMENT AND FIRE STATIONS IN RELATION TO FLOODPLAINS IN RACINE COUNTY: 2008



NOTE: Although certain facilities may appear to be located within the one-percent-annual-probability floodplain when displayed at this scale, detailed review at a larger scale indicates that none of the facilities are within the floodplain.

Source: SEWRPC.

expected to be similar. Thus, the average annual flood damage for this area was estimated at $90 per acre, or $180,000 in total, assuming 2,000 acres are impacted.

Given the foregoing, the two agricultural areas specifically considered account for about 41 percent of the agricultural damages countywide. The damages to the other approximately 9,600 acres in the floodplain area would be expected to have average losses of about $37 per acre, or about $351,000 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 Chapters V and VII and that planning serves as the basis of the assessment of stormwater drainage problem vulnerability. In general, such problems generally 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 30. For the Root River watershed, more detailed data under current and future conditions by land use category is documented in the regional water quality management plan update for the greater Milwaukee watersheds.[25] The planned increases in urban land use over the 35-year period from 2000 through 2035 range from 37 percent, or about 1 percent per year, in the Fox River watershed to 155 percent, or 4.4 percent per year, in the Pike River watershed.

An approximation of the expected increase in flood flows resulting from land use changes is summarized in Table 31. For the Fox River watershed, studies conducted under a March 1995 water level control plan[26] indicated only a modest increase in flood flows in Racine County, ranging from 1 to 4 percent, depending upon the type of storm event, due to land use changes over the 10-year period from 1990 to 2000. Similar studies conducted for the Root River under a 1990 stormwater drainage and flood control plan for the Milwaukee Metropolitan Sewerage District[27] indicated an increase in flow rates from 1985 to the year 2000 of 2 to 6 percent, depending upon the type of storm event, just upstream of the Racine-Milwaukee county line.

For the Pike River watershed, the potential increase in flows due to urbanization has been developed based upon recent SEWRPC analyses developed for ongoing Pike River stream restoration programs.[28] That data indicates an increase from 8 to 19 percent in flow rates over the period 1995 to 2020.

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[25]*SEWRPC Planning Report No. 50,* A Regional Water Quality Management Plan Update for the Greater Milwaukee Watersheds, *December 2007; SEWRPC Technical Report No. 39,* Water Quality Conditions and Sources of Pollution in the Greater Milwaukee Watersheds, *November 2007.*

[26]*SEWRPC Memorandum Report No. 102,* op. cit.

[27]*SEWRPC Community Assistance Planning Report No. 152,* A Stormwater Drainage and Flood Control System Plan for the Milwaukee Metropolitan Sewerage District, *December 1990.*

[28]*See April 17, 2000, SEWRPC letter to FEMA and supporting memorandum.*

Table 30

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

Watershed[a]	Total Watershed[b] Area (square miles)	Area in Urban Use				Percent Increase
		2000		2035		
		Area (square miles)	Percent of Total	Area (square miles)	Percent of Total	
Fox River	937.6	201.5	21.5	276.0	29.4	37
Pike River	51.5	17.0	33.2	43.3	84.7	155
Root River.....	197.6	63.9	32.3	98.5	49.8	54

[a]*Includes the watersheds located partially within Racine County where flooding conditions occur.*

[b]*Includes entire Wisconsin watershed area within and beyond Racine County.*

Source: SEWRPC.

It should be noted that the changes in flood flows resulting from future land use changes is considered to be conservatively high, as they are based upon no significant impact due to stormwater management measures and other programs designed to mitigate increases in flood flows. As is discussed in Chapters V and VII of this report, there are a number of programs in place which will tend to largely 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.

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 future. This conclusion highlights the importance of carrying out and implementing current floodplain and related ordinances and existing and ongoing stormwater management plans and regulations, as is discussed in Chapters V and VII of this report.

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 6 in Chapter II of this report and Map 29, 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. However, based upon the number of structures potentially impacted (see Maps 30 and 31), the extent of the agricultural flood damage potential, and the extent of roadway flooding, seven 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 32, along with the basis of special consideration over and above the countywide consideration.

VULNERABILITY ASSESSMENT FOR THUNDERSTORMS, HIGH WINDS, 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

Table 31

POTENTIAL INCREASE IN FLOOD FLOWS DUE TO URBANIZATION

Watershed	Potential Range of Percent Increases in Flood Flows Over a 10-Year Period[a]
Fox River	1-4
Root River	2-4
Pike River	3-8

[a]Range is based upon a range of recurrence intervals and types of flood events.

Source: SEWRPC.

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, and hail hazards are covered within this section. However, excessive rains that cause flash flooding, such as occurred in the summer storm events in 1998, 2000, 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 fronts can often be tracked across the entire State from west to east.[29] 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 1.0 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.[30] 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.[31] 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

[29]*National Weather Service Forecast Office.*

[30]*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.*

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

Table 32

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

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

NOTE: See Maps 30 and 31.

Source: SEWRPC.

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 and radio stations. In addition, the National Weather Service operates a 24-hour weather radio transmitter serving Kenosha and Racine Counties, operating at a frequency of 162.450 megahertz (MHz), from a location at CTH KR and Wood Road, Racine County.

High Winds

High-velocity, straight-line winds that are produced by thunderstorms and widespread nonthunderstorm high winds are the third most destructive natural hazard in Wisconsin and are responsible for most thunderstorm wind-related damages to property.[32] 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 damages similar to that of a tornado event. Depending upon their intensity, high 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 high 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. However, the 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

[32]*Wisconsin Emergency Management Department of Military Affairs,* State of Wisconsin Hazard Mitigation Plan, *July 2001*.

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.[33] Lightning is defined as a sudden and violent discharge of electricity from within a thunderstorm due to a difference in electrical charges, and represents a flow of electrical current from cloud to cloud or cloud to ground. Water and ice particles also affect the distribution of electrical charge. Lightning bolts can travel 20 miles before striking the ground. The air near a lightning bolt can be heated to 50,000 degrees Fahrenheit (ºF), 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, kills or injures people and livestock, starts untold numbers of forest fires and wildfires, and damage to electrical and electronic equipment. Lightning is a major cause of damage to farm buildings and equipment, is 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 contain a higher number of lightning events compared 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. Analysis of lightning-related human injuries and fatalities indicates that 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, 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, High-Wind, Hail, and Lightning Events

The gravity of any particular thunderstorm and related 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. Thunderstorms and related hazard events are second only to temperature extremes in regards to both total number of deaths and injuries, compared to other natural hazards recorded to impact Southeastern Wisconsin, as shown in Table 26. In addition, thunderstorms and related hazard events are the third most costly natural hazards to impact Racine County, following stormwater damage associated with floods and damage related to tornadoes.

[33]*National Oceanic and Atmospheric Administration.*

A total of 220 and 143 thunderstorm and high-wind events, respectively, have been recorded in Racine County during the 47-year period between September 1961 through December 2008. These events are shown on Map 34, and documented in terms of their magnitude and impact in Table 33, based upon data published by the National Climatic Data Center. As shown in Table 33 these storms can range from one or two events per year, up to 22 events per year, which demonstrates the high unpredictability of these events. In total, these thunderstorm and high-wind events have resulted in five deaths, 35 injuries, and over $22 million in property and crop damages within the southeastern portion of the State of Wisconsin. Most of these damages occurred as a result of a single, widespread, nonthunderstorm, high-wind event on November 10, 1998, which struck south-central and South-eastern Wisconsin and caused four deaths, 14 injuries, and more than $13 million in damages to property and crops.

An unexpected severe thunderstorm impacted Racine County on June 3, 2002. This storm event released an inch of rain. Associated high wind caused excessive debris accumulation and caused approximately 18,000 customers to lose electrical power. Trees and power lines had fallen throughout the Village of Sturtevant, the Town of Mt. Pleasant (now the Village of Mt. Pleasant), and the City of Racine.

A severe thunderstorm impacted Racine County on August 21, 2002 causing about $1.2 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; numerous lightning strikes—some that resulted in fire damage; and the early stages of a ground-based vortex that never made it to tornado status. At least 56,000 customers in southeastern Wisconsin lost electrical power as a result of lightning strikes and tree damage to power lines. Lightning strikes also blew out a home's windows in the City of Racine. 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.

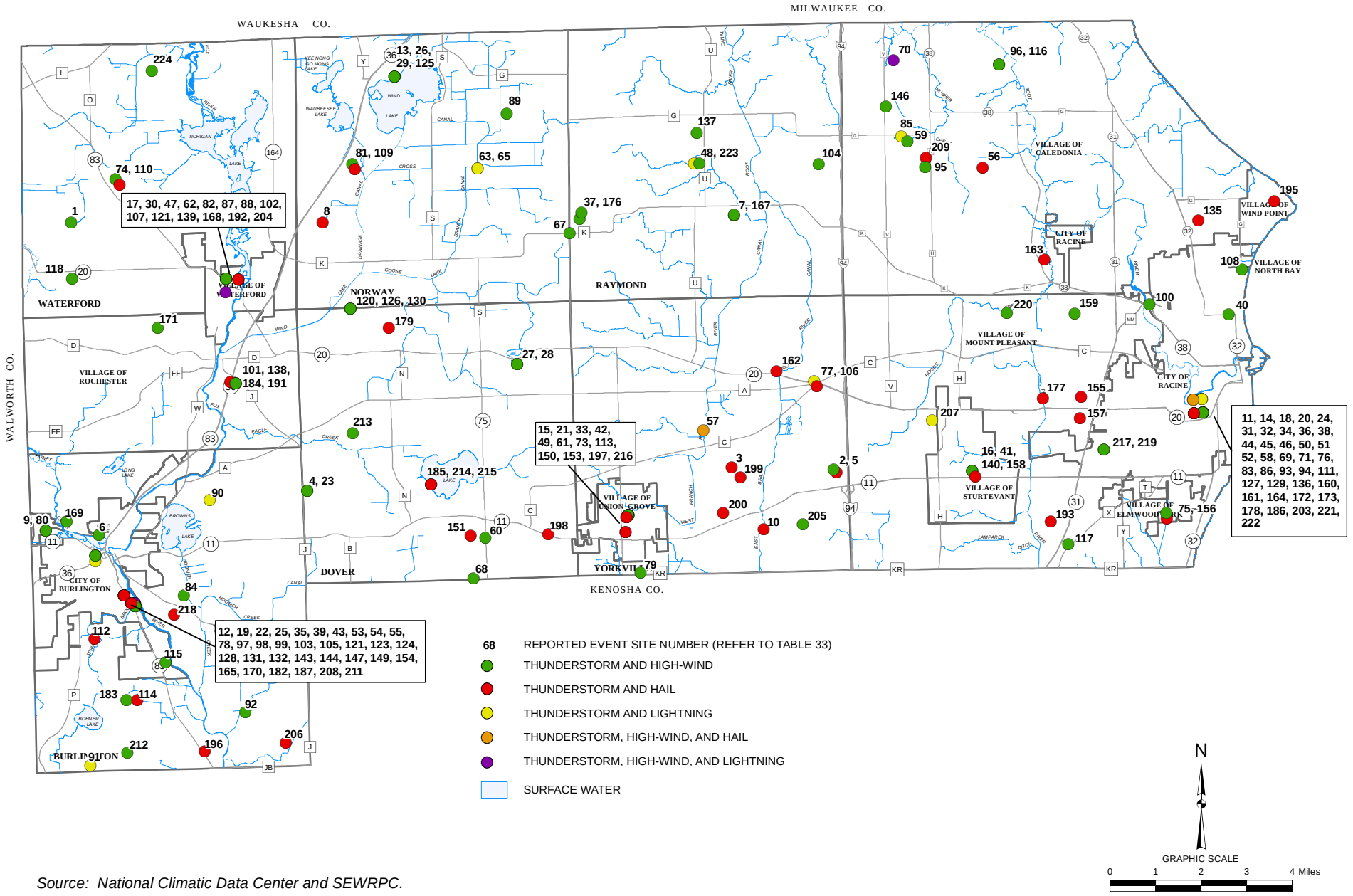
A powerful macroburst moved northeast through the eastern half of Racine County on June 18, 2007 and tore up hundreds of trees, blew over several semi-tractor trailers on IH 94 between STH 11 and STH 20, leveled a barn, destroyed a pole shed, ripped the roof off a home, and toppled about 30 power poles 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 $620,000. Damage to the power-poles and power-lines was approximately $90,000. Based on the structural damage, peak wind gusts were approximated at 87 knots (100 mph).

From 1964 to 2008, 62 major hailstorms were reported in Racine County that resulted in significant property damage throughout the southeastern areas of Wisconsin (see Map 34). In all, the National Climatic Data Center has recorded $191,000 in property damage from these hailstorm events as shown in Table 33. Most of these damages occurred as a result of two hailstorm events on May 14, and October 24, 2001, which struck south-central and Southeastern Wisconsin and caused about $61,000 and $121,000[34] in property damages, respectively.

[34]*Damage amounts adjusted to 2008 dollars using the Consumer Price Index.*

Map 34

THUNDERSTORM, HIGH-WIND, HAIL, AND LIGHTNING EVENTS REPORTED WITHIN RACINE COUNTY: SEPTEMBER 1961 THROUGH DECEMBER 2008



Source: National Climatic Data Center and SEWRPC.

Table 33

THUNDERSTORM, HIGH-WIND, HAIL, AND LIGHTNING EVENTS REPORTED IN RACINE COUNTY FROM SEPTEMBER 22, 1961 THROUGH DECEMBER 31, 2008

Number on Map 34	Date	City/Village/Town	Event Type				Magnitude	Reported Damages[a]			
			Thunderstorm	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (thousands of dollars)[b]	Crop Damage (thousands of dollars)[b]
1	September 22, 1961	Town of Waterford	X	X	- -	- -	0 knots	0	0	- -	- -
2	July 21, 1964	Town of Yorkville	X	- -	X	- -	1.25 inches	0	0	- -	- -
3	July 13, 1965	Town of Yorkville	X	- -	X	- -	0.75 inches	0	0	- -	- -
4	August 25, 1965	Town of Dover	X	X	- -	- -	50 knots	0	0	- -	- -
5	March 21, 1966	Town of Yorkville	X	X	- -	- -	0 knots	0	0	- -	- -
6	March 21, 1966	City of Burlington	X	X	- -	- -	0 knots	0	0	- -	- -
7	June 29, 1968	Town of Raymond	X	X	- -	- -	0 knots	0	0	- -	- -
8	August 11, 1969	Town of Norway	X	- -	X	- -	1.0 inch	0	0	- -	- -
9	June 16, 1973	City of Burlington	X	X	- -	- -	0 knots	0	0	- -	- -
10	May 16, 1974	Town of Yorkville	X	- -	X	- -	0.75 inch	0	0	- -	- -
11	June 13, 1975	City of Racine	X	X	- -	- -	0 knots	0	0	- -	- -
12	June 13, 1976	City of Burlington	X	X	- -	- -	52 knots	0	0	- -	- -
13	June 13, 1976	Town of Norway	X	X	- -	- -	0 knots	0	0	- -	- -
14	July 14, 1976	City of Racine	X	X	- -	- -	0 knots	0	0	- -	- -
15	June 5, 1977	Village of Union Grove	X	X	- -	- -	0 knots	0	0	- -	- -
16	August 28, 1977	Village of Sturtevant	X	X	- -	- -	0 knots	0	0	- -	- -
17	June 7, 1978	Village of Waterford	X	- -	X	- -	1.0 inch	0	0	- -	- -
18	July 22, 1978	City of Racine	X	X	- -	- -	0 knots	0	0	- -	- -
19	June 20, 1979	City of Burlington	X	- -	X	- -	1.75 inches	0	0	- -	- -
20	June 5, 1980	City of Racine	X	- -	X	- -	1.75 inches	0	0	- -	- -
21	July 15, 1980	Village of Union Grove	X	X	- -	- -	52 knots	0	0	- -	- -
22	July 16, 1980	City of Burlington	X	X	- -	- -	0 knots	0	0	- -	- -
23	July 20, 1980	Town of Dover	X	X	- -	- -	61 knots	0	0	- -	- -
24	May 29, 1981	City of Racine	X	X	- -	- -	63 knots	0	0	- -	- -
25	June 24, 1981	City of Burlington	X	X	- -	- -	60 knots	0	0	- -	- -
26	June 20, 1982	Town of Norway	X	X	- -	- -	0 knots	0	0	- -	- -
27	July 6, 1982	Town of Yorkville	X	X	- -	- -	61 knots	0	0	- -	- -
28	August 3, 1982	Town of Yorkville	X	X	- -	- -	0 knots	0	0	- -	- -
29	March 6, 1983	Town of Norway	X	X	- -	- -	0 knots	0	0	- -	- -
30	July 19, 1983	Village of Waterford	X	X	- -	- -	0 knots	0	0	- -	- -
31	July 19, 1983	City of Racine	X	X	- -	- -	0 knots	0	0	- -	- -
32	August 10, 1983	City of Racine	X	X	- -	- -	54 knots	0	0	- -	- -
33	May 18, 1984	Village of Union Grove	X	X	- -	- -	0 knots	0	0	- -	- -
34	May 18, 1984	City of Racine	X	X	- -	- -	55 knots	0	0	- -	- -
35	June 6, 1984	City of Burlington	X	X	- -	- -	0 knots	0	0	- -	- -
36	June 6, 1984	City of Racine	X	X	- -	- -	54 knots	0	0	- -	- -
37	July 9, 1984	Town of Raymond	X	X	- -	- -	0 knots	0	0	- -	- -
38	August 7, 1984	City of Racine	X	X	- -	- -	70 knots	0	0	- -	- -
39	August 7, 1984	City of Burlington	X	X	- -	- -	0 knots	0	0	- -	- -
40	August 7, 1984	City of Racine	X	X	- -	- -	61 knots	0	0	- -	- -
41	August 9, 1984	Village of Sturtevant	X	- -	X	- -	1.0 inch	0	0	- -	- -
42	May 26, 1985	Village of Union Grove	X	- -	X	- -	0.75 inch	0	0	- -	- -
43	June 27, 1986	City of Burlington	X	X	- -	- -	0 knots	0	0	- -	- -
44	July 19, 1986	City of Racine	X	X	X	- -	0 knots, 1.0-inch hail	0	0	- -	- -

Table 33 (continued)

Number on Map 34	Date	City/Village/Town	Event Type				Magnitude	Reported Damages[a]			
			Thunderstorm	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (thousands of dollars)[b]	Crop Damage (thousands of dollars)[b]
45	July 29, 1987	City of Racine	X	X	- -	- -	52 knots	0	0	- -	- -
46	August 3, 1988	City of Racine	X	X	- -	- -	0 knots	0	0	- -	- -
47	August 4, 1988	Village of Waterford	X	X	- -	- -	0 knots	0	0	- -	- -
48	August 4, 1988	Town of Raymond	X	X	- -	- -	0 knots	0	0	- -	- -
49	June 26, 1989	Village of Union Grove	X	X	- -	- -	0 knots	0	0	- -	- -
50	June 26, 1989	City of Racine	X	X	- -	- -	0 knots	0	0	- -	- -
51	July 27, 1989	City of Racine	X	X	- -	- -	0 knots	0	0	- -	- -
52	August 4, 1989	City of Racine	X	X	- -	- -	50 knots	0	0	- -	- -
53	March 13, 1990	City of Burlington	X	- -	X	- -	0.75 inch	0	0	- -	- -
54	March 13, 1990	City of Burlington	X	- -	X	- -	1.75 inches	0	0	- -	- -
55	August 18, 1990	City of Burlington	X	X	- -	- -	0 knots	0	0	- -	- -
56	March 27, 1991	Town of Caledonia	X	- -	X	- -	1.75 inches	0	0	- -	- -
57	July 7, 1991	Town of Yorkville	X	X	X	- -	0 knots, 1.0-inch hail	0	0	- -	- -
58	August 30, 1993	City of Racine	X	X	- -	- -	N/A	0	0	73	7
59	April 18, 1994	Town of Caledonia	X	X	- -	- -	N/A	0	0	7	- -
60	July 6, 1994	Town of Dover	X	X	- -	- -	N/A	0	0	705	71
61	April 18, 1995	Village of Union Grove	X	- -	X	- -	0.75 inch	0	0	- -	- -
62	June 6, 1995	Village of Waterford	X	X	- -	X	N/A	0	0	- -	- -
63	June 6, 1995	Town of Norway	X	- -	- -	X	N/A	0	0	- -	- -
64	June 7, 1995	City of Burlington	X	X	- -	- -	N/A	0	0	- -	- -
65	July 15, 1995	Town of Norway	X	- -	- -	X	N/A	0	1	- -	- -
66	July 27, 1995	City of Burlington	X	X	- -	- -	N/A	0	0	- -	- -
67	July 27, 1995	Towns of Norway and Raymond	X	X	- -	- -	N/A	0	0	- -	- -
68	July 27, 1995	Town of Dover	X	X	- -	- -	N/A	0	0	- -	- -
69	August 9, 1995	City of Racine	X	- -	- -	X	N/A	0	0	13	- -
70	August 28, 1995	Town of Caledonia	X	X	- -	X	N/A	0	0	- -	- -
71	August 28, 1995	City of Racine	X	X	- -	- -	N/A	0	0	138	- -
72	August 28, 1995	City of Burlington	X	X	- -	- -	N/A	0	0	- -	- -
73	August 28, 1995	Village of Union Grove	X	X	- -	- -	N/A	0	0	- -	- -
74	October 10, 1995	Town of Waterford	X	X	- -	- -	0 knots	0	9	- -	- -
75	March 20, 1996	City of Racine	X	X	- -	- -	0-60 miles per hour	0	1	44	- -
76	April 19, 1996	City of Racine	X	X	X	- -	0 knots, 0.75-inch hail	0	0	7	- -
77	June 2, 1996	Town of Yorkville	X	- -	X	- -	1 inches	0	0	- -	- -
78	October 29, 1996	City of Burlington	X	X	- -	X	0 knots	0	0	20	- -
79	October 29, 1996	Town of Yorkville	X	X	- -	- -	0-60-70 miles per hour	0	0	67	- -
80	October 30, 1996	City of Burlington	X	X	- -	- -	65 knots	0	0	26	- -
81	April 5, 1997	Town of Norway	X	X	- -	- -	0 knots	0	0	20	- -
82	April 6, 1997	Village of Waterford	X	X	- -	- -	0 knots	0	0	- -	- -
83	May 5, 1997	City of Racine	X	- -	X	- -	1.75 inches	0	0	- -	- -
84	June 24, 1997	Town of Burlington	X	X	- -	- -	0 knots	0	1	4	- -
85	June 30, 1997	Town of Caledonia	X	- -	- -	X	N/A	1	0	- -	- -
86	July 2, 1997	City of Racine	X	- -	- -	X	N/A	0	0	- -	- -
87	July 18, 1997	Village of Waterford	X	X	- -	- -	0 knots	0	0	- -	- -
88	July 26, 1997	Village of Waterford	X	X	- -	- -	0 knots	0	0	1	- -
89	August 3, 1997	Town of Norway	X	X	- -	- -	0 knots	0	0	659	- -
90	September 16, 1997	Town of Burlington	X	- -	- -	- -	N/A	0	0	39	- -

Table 33 (continued)

Number on Map 34	Date	City/Village/Town	Event Type				Magnitude	Reported Damages[a]			
			Thunderstorm	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (thousands of dollars)[b]	Crop Damage (thousands of dollars)[b]
91	September 16, 1997	Town of Burlington	X	- -	- -	- -	N/A	0	0	1	- -
92	September 19, 1997	Town of Burlington	X	X	- -	- -	0 knots	0	0	2	- -
93	September 29, 1997	City of Racine	X	X	- -	- -	N/A	0	0	1	- -
94	March 8, 1998	City of Racine	X	X	- -	- -	0 knots	0	0	279	- -
95	May 28, 1998	Town of Caledonia	X	X	- -	- -	0 knots	0	0	130	- -
96	May 31, 1998	Town of Caledonia	X	X	- -	- -	0 knots	0	0	1	- -
97	June 25, 1998	City of Burlington	X	X	- -	X	0 knots	0	0	102	- -
98	July 20, 1998	City of Burlington	X	X	- -	X	0 knots	0	0	6	- -
99	July 21, 1998	City of Burlington	X	X	- -	- -	87 knots	0	1	324	- -
100	November 10, 1998	City of Racine	X	X	- -	- -	0 knots	4	14	13,640	2,079
101	February 11, 1999	Town of Rochester	X	X	- -	- -	0 knots	0	1	2	- -
102	May 16, 1999	Village of Waterford	X	X	- -	- -	56 knots	0	0	- -	- -
103	June 6, 1999	City of Burlington	X	X	- -	- -	0 knots	0	0	1	- -
104	June 6, 1999	Town of Raymond	X	X	- -	- -	0 knots	0	0	6	- -
105	June 10, 1999	City of Burlington	X	X	- -	- -	0 knots	0	0	1	- -
106	June 22, 1999	Town of Yorkville	X	- -	- -	X	N/A	0	0	19	- -
107	July 23, 1999	Village of Waterford	X	X	- -	- -	0 knots	0	0	2	- -
108	July 23, 1999	City of Racine	X	X	- -	- -	0 knots	0	0	4	- -
109	August 10, 1999	Town of Norway	X	- -	X	- -	0.75 inch	0	0	- -	- -
110	March 8, 2000	Town of Waterford	X	- -	X	- -	1.0 inch	0	0	- -	- -
111	May 8, 2000	City of Racine	X	- -	X	- -	0.75 inch	0	0	- -	- -
112	May 8, 2000	Town of Burlington	X	- -	X	- -	1.0 inch	0	0	- -	- -
113	May 12, 2000	Village of Union Grove	X	- -	X	- -	1.75 inches	0	0	6	- -
114	May 18, 2000	Town of Burlington	X	- -	X	- -	1.75 inches	0	0	- -	- -
115	May 24, 2000	City of Burlington	X	X	- -	- -	N/A	0	0	4	- -
116	July 2, 2000	Town of Caledonia	X	X	- -	- -	0 knots	0	0	247	- -
117	July 2, 2000	Town of Mount Pleasant	X	X	- -	- -	0 knots	0	0	186	- -
118	August 5, 2000	Town of Waterford	X	X	- -	- -	0 knots	0	0	2	- -
119	February 9, 2001	City of Burlington	X	- -	- -	X	N/A	0	0	36	- -
120	April 7, 2001	Towns of Dover and Norway	X	X	- -	- -	57 knots	0	1	- -	- -
121	May 14, 2001	City of Burlington	X	- -	X	- -	1.5 inches	0	0	- -	- -
122	May 14, 2001	Village of Waterford	X	- -	X	- -	1.5 inches	0	0	61	- -
123	June 11, 2001	City of Burlington	X	X	- -	- -	54 knots	0	0	18	- -
124	August 9, 2001	City of Burlington	X	X	- -	- -	52 knots	0	0	- -	- -
125	September 3, 2001	Town of Norway	X	X	- -	- -	50 knots	0	0	- -	- -
126	September 19, 2001	Towns of Dover and Norway	X	X	- -	- -	N/A	0	0	- -	- -
127	September 20, 2001	City of Racine	X	- -	- -	X	N/A	0	0	11	- -
128	October 23, 2001	City of Burlington	X	- -	X	- -	0.75 inch	0	0	- -	- -
129	October 24, 2001	City of Racine	X	X	X	- -	2.75 inches	0	0	121	- -
130	December 5, 2001	Towns of Dover and Norway	X	X	- -	- -	N/A	0	0	127	- -
131	April 18, 2002	City of Burlington	X	X	- -	- -	52 knots	0	0	- -	- -
132	June 3, 2002	Cities of Burlington and Racine; Villages of Mt. Pleasant, Sturtevant, and Union Grove; Towns of Burlington, Dover, and Yorkville	X	X	- -	- -	58 knots	0	0	239	- -
133	June 3, 2002	City of Racine	X	X	- -	- -	50 knots	0	0	- -	- -
134	June 4, 2002	City of Racine	X	- -	- -	X	N/A	0	0	6	- -
135	June 15, 2002	Village of Caledonia	X	- -	X	- -	0.88 inch	0	0	- -	- -
136	June 15, 2002	City of Racine	X	- -	X	- -	0.75 inch	0	0	- -	- -
137	July 26, 2002	Town of Raymond	X	X	- -	- -	56 knots	0	0	4	2

Table 33 (continued)

Number on Map 34	Date	City/Village/Town	Event Type				Magnitude	Reported Damages[a]			
			Thunderstorm	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (thousands of dollars)[b]	Crop Damage (thousands of dollars)[b]
138	August 1, 2002	Village of Rochester	X	- -	X	- -	1.75 inch	0	0	- -	- -
139	August 21, 2002	Village and Town of Waterford	X	X	- -	- -	61 knots	0	0	- -	- -
140	August 21, 2002	City of Racine and Villages of Mt. Pleasant, Sturtevant, and Wind Point	X	X	- -	- -	74 knots	0	0	1,197	- -
141	August 21, 2002	City of Racine	X	- -	- -	X	N/A	0	0	12	- -
142	August 21, 2002	City of Racine	X	- -	- -	X	N/A	0	0	6	- -
143	September 19, 2002	City of Burlington	X	X	- -	X	56 knots	0	0	2	- -
144	October 4, 2002	City of Burlington	X	X	- -	- -	54 knots	0	0	- -	- -
145	May 11, 2003	City of Racine	- -	X	- -	- -	47 knots	0	0	35	- -
146	July 4, 2003	Village of Caledonia	X	X	- -	- -	52 knots	0	0	- -	- -
147	July 6, 2003	City of Burlington	X	X	- -	- -	52 knots	0	0	- -	- -
148	July 6, 2003	Village of Mt. Pleasant	X	- -	- -	X	N/A	0	0	1,170	- -
149	July 15, 2003	City of Burlington	X	X	- -	- -	52 knots	0	0	- -	- -
150	August 3, 2003	Village of Union Grove	X	- -	X	- -	0.75 inch	0	0	- -	- -
151	August 23,2003	Town of Dover	X	- -	X	- -	0.75 inch	0	0	- -	- -
152	April 18, 2004	Town of Yorkville	- -	X	- -	- -	43 knots	0	0	319	- -
153	May 8, 2004	Village of Union Grove	X	- -	X	- -	0.75 inch	0	0	- -	- -
154	May 9, 2004	City of Burlington	X	X	- -	- -	50 knots	0	0	- -	- -
155	May 20, 2004	Village of Mt. Pleasant	X	- -	X	- -	1.00 inch	0	0	- -	- -
156	May 20, 2004	Village of Mt. Pleasant	X	- -	X	- -	1.75 inch	0	0	- -	- -
157	May 20, 2004	Village of Mt. Pleasant	X	- -	X	- -	3.00 inch	0	0	- -	- -
158	May 21, 2004	Village of Sturtevant	X	X	- -	- -	56 knots	0	0	- -	- -
159	June 23, 2004	City of Racine and Village of Mt. Pleasant	X	X	- -	- -	69 knots	0	0	- -	- -
160	June 23, 2004	City of Racine	X	X	- -	- -	52 knots	0	0	- -	- -
161	June 23, 2004	City of Racine	X	- -	X	- -	0.88 inch	0	0	- -	- -
162	June 23, 2004	Town of Yorkville	X	- -	X	- -	0.75 inch	0	0	- -	- -
163	June 23, 2004	City of Racine and Village of Caledonia	X	- -	X	- -	1.00 inch	0	0	- -	- -
164	July 21, 2004	City of Racine	X	X	- -	- -	55 knots	0	0	11	- -
165	August 27, 2004	City of Burlington	X	X	- -	- -	52 knots	0	0	- -	- -
166	December 12, 2004	Village of Union Grove	- -	X	- -	- -	40 knots	0	0	39	- -
167	March 30, 2005	Town of Raymond	X	X	- -	- -	60 knots	0	0	55	- -
168	June 4, 2005	Village of Waterford	X	- -	X	- -	0.88 inch	0	0	- -	- -
169	July 23, 2005	Town of Burlington	X	X	- -	- -	52 knots	0	0	1	- -
170	July 23, 2005	City of Burlington	X	X	- -	- -	56 knots	0	0	3	- -
171	August 18, 2005	Village of Rochester	X	X	- -	- -	61 knots	0	0	1	- -
172	August 18, 2005	City of Racine	X	- -	X	- -	0.75 inches	0	0	- -	- -
173	August 18, 2005	City of Racine	X	- -	X	- -	1.00 inches	0	0	- -	- -
174	November 13, 2005	City of Racine	- -	X	- -	- -	55 knots	0	0	189	- -
175	March 13, 2006	City of Racine	- -	X	- -	- -	56 knots	0	0	- -	- -
176	April 22, 2006	Towns of Norway and Raymond	X	- -	X	- -	0.75 inch	0	0	- -	- -
177	May 17, 2006	Village of Mt. Pleasant	X	- -	X	- -	0.88 inch	0	0	- -	- -
178	May 17, 2006	City of Racine	X	- -	X	- -	0.75 inch	0	0	3	- -
179	May 17, 2006	Town of Dover	X	- -	X	- -	0.75 inch	0	0	- -	- -
180	May 29, 2006	City of Burlington	X	- -	- -	X	N/A	0	5	- -	- -
181	May 29, 2006	City of Burlington	X	- -	- -	X	N/A	0	2	- -	- -
182	June 21, 2006	City of Burlington	X	X	- -	- -	52 knots	0	0	- -	- -
183	June 21, 2006	Town of Burlington	X	X	- -	- -	52 knots	0	0	- -	- -
184	June 21, 2006	Village of Rochester	X	X	- -	- -	56 knots	0	0	- -	- -
185	July 17, 2006	Town of Dover	X	X	- -	- -	56 knots	0	0	1	- -
186	July 17, 2006	City of Racine	X	X	- -	- -	52 knots	0	0	5	- -
187	July 20, 2006	City of Burlington	X	X	- -	- -	52 knots	0	0	11	- -

Table 33 (continued)

Number on Map 34	Date	City/Village/Town	Event Type				Magnitude	Reported Damages[a]			
			Thunderstorm	High Winds	Hail	Lightning		Deaths	Injuries	Property Damage (thousands of dollars)[b]	Crop Damage (thousands of dollars)[b]
188	July 20, 2006	Village of Sturtevant	X	- -	- -	X	N/A	0	0	11	- -
189	July 20, 2006	City of Racine	X	- -	- -	X	N/A	0	0	11	- -
190	July 24, 2006	City of Racine	X	- -	- -	X	N/A	0	0	2	- -
191	July 27, 2006	Village of Rochester	X	X	- -	- -	52 knots	0	0	- -	- -
192	July 27, 2006	Village of Waterford	X	X	- -	- -	52 knots	0	0	5	- -
193	July 30, 2006	Village of Mt. Pleasant	X	- -	X	- -	0.75 inch	0	0	- -	- -
194	July 30,2006	City of Racine	X	- -	- -	X	N/A	0	0	3	- -
195	August 23, 2006	Village of Wind Point	X	- -	X	- -	0.75 inch	0	0	- -	- -
196	August 25, 2006	Town of Burlington	X	- -	X	- -	0.75 inch	0	0	- -	- -
197	October 2, 2006	Village of Union Grove	X	- -	X	- -	0.88 inch	0	0	- -	- -
198	March 21, 2007	Town of Yorkville	X	- -	X	- -	0.88 inch	0	0	- -	- -
199	March 21, 2007	Town of Yorkville	X	- -	X	- -	0.75 inch	0	0	- -	- -
200	March 21, 2007	Town of Yorkville	X	- -	X	- -	0.75 inch	0	0	- -	- -
201	March 21, 2007	Village of Mt. Pleasant	X	- -	X	- -	0.88 inch	0	0	- -	- -
202	April 4, 2007	City of Racine	- -	X	- -	- -	44 knots	0	0	5	- -
203	April 30, 2007	City of Racine	X	- -	- -	X	N/A	0	0	3	- -
204	June 7, 2007	Village of Waterford	X	X	- -	- -	61 knots	0	0	10	- -
205	June 18, 2007	Villages of Caledonia, Mt. Pleasant, and Sturtevant	X	X	- -	- -	74 knots	0	0	623	- -
206	June 21, 2007	Town of Burlington	X	- -	X	- -	0.75 inch	0	0	- -	- -
207	June 21, 2007	Village of Mt. Pleasant	X	- -	- -	X	N/A	0	0	3	- -
208	July 9, 2007	City of Burlington	X	- -	X	- -	1.00 inch	0	0	- -	- -
209	September 27, 2007	Village of Caledonia	X	- -	X	- -	0.75 inch	0	0	- -	- -
210	December 23, 2007	Village of Mt. Pleasant	- -	X	- -	- -	50 knots	0	0	10	- -
211	January 7, 2008	City of Burlington	X	- -	X	- -	0.75 inch	0	0	- -	- -
212	June 6, 2008	Town of Burlington	X	X	- -	- -	50 knots	0	0	- -	- -
213	June 6, 2008	Town of Yorkville	X	X	- -	- -	50 knots	0	0	- -	- -
214	June 6, 2008	Town of Dover	X	X	- -	- -	50 knots	0	0	- -	- -
215	June 6, 2008	Town of Dover	- -	- -	X	- -	0.75 inch	0	0	- -	- -
216	June 6, 2008	Village of Union Grove	X	X	- -	- -	52 knots	0	0	- -	- -
217	June 6, 2008	City of Racine	X	X	- -	- -	56 knots	0	0	75	- -
218	June 6, 2008	Town of Burlington	X	- -	X	- -	0.88 inch	0	0	- -	- -
219	June 8, 2008	City of Racine	X	X	- -	- -	56 knots	0	0	- -	- -
220	June 28, 2008	City of Racine and Village of Mt. Pleasant	X	X	- -	- -	56 knots	0	0	25	- -
221	July 2, 2008	City of Racine	X	X	- -	- -	51 knots	0	0	- -	- -
222	July 2, 2008	City of Racine	X	- -	X	- -	0.75 inch	0	0	- -	- -
223	July 7, 2008	Town of Raymond	X	- -	- -	X	N/A	0	0	3	- -
224	July 10, 2008	Town of Waterford	X	X	- -	- -	56 knots	0	0	5	- -
- -	Total	- -	220	143	62	27	- -	5	36	21,266	2,159

[a] *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.*

[b] *Dollar values were adjusted to year 2008 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).

From 1995 to 2008, 27 lightning events were reported in Racine County that resulted in significant property damage throughout the southeastern areas of Wisconsin (see Map 34). In all, the National Climatic Data Center has recorded $1.36 million in property damage, one death, and eight injuries from these lightning events, as shown in Table 33. Most of these damages occurred as a result of a lightning event on July 6, 2003. Fire resulting from a lightning strike caused about $1.2 million in damages to an apartment complex in the Village of Mt. Pleasant.

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 and related hazard events during the past 40-years reported to be impacted by Racine County, shown on Map 34, the locations of storm impact points are widely scattered throughout the County.

In order to assess the vulnerability of the Racine County area to thunderstorms and related storm hazards, 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 historical events have resulted in about $105,000 of reported damages per event. However, 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.

Potential Future Changes in Thunderstorm, High-Wind, Hail, and Lightning Conditions
Based upon recent historical data from the period 1995-2008, Racine County can expect to experience averages of 4.8 thunderstorm high/wind events per year, 1.9 lightning events per year, and 3.4 hail 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.

Changes in land use can have an impact on the potential for thunderstorm and related hazards to occur. 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 been decreased in recent years. These ongoing mitigation measures are described further in Chapter V.

Multi-Jurisdictional Thunderstorm, High-Wind, Hail, and Lightning Risk Management
Based upon a review of the historic patterns of 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 reporting 29 violent tornadoes during the year 2001. 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 34. 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 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 35. 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, 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. Tornado shelters are identified by appropriate signage in public buildings. The National Weather Service operates a 24-hour weather radio transmitter serving Kenosha and Racine Counties, operating at a frequency of 162.450 MHz, from a location at CTH KR and Wood Road, Racine 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.

Table 34

FUJITA SCALE CHARACTERISTICS

F-Scale	Wind Speed (miles per hour)[a]	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

[a]*Equivalent wind speeds associated with the Fujita Scale represent the fastest one-quarter mile wind.*

Source: National Oceanic and Atmospheric Administration.

Table 35

ENHANCED FUJITA SCALE CHARACTERISTICS

EF-Scale	Wind Speed (miles per hour)[a]	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

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

Source: National Oceanic and Atmospheric Administration.

Historical Tornado Problems

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 into Lake Michigan. On June 20, 1924, a tornado of unknown intensity touched down in the Towns of Yorkville, Mt. 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.[35]

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

[35]*Since this event the Towns of Caledonia and Mt. Pleasant have incorporated as villages.*

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, as shown in Table 34. Nevertheless, tornadoes are second only to stormwater damage associated with floods, as the most costly natural hazards to impact Southeastern Wisconsin.

A total of 20 tornadoes have been recorded in Racine County during the 51-year period from January 1957 to December 2007, or about one tornado every three years. These are shown on Map 35, and documented in terms of their magnitude and impact in Table 36, based upon data published by the National Climatic Data Center. In total, these 20 tornadoes have resulted in seven injuries and over $25 million in property and crop damages, with the average damage being $380,000 (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 51-year period, four were categorized as F2 events on the Fujita scale. These four tornado events collectively resulted in more than $24 million in property and crop damage in the County adjusted to reflect 2008 costs. The worst of these events was the tornado that occurred on March 21, 1966, which caused over $17 million in property damage adjusted to 2008 dollars. Of the remaining tornado events, six were classed as F1 tornadoes and 10 were classed as F0 or EF0 events.

As shown in Table 36, over time, tornado-associated costs and deaths have generally decreased in Southeastern Wisconsin, despite the fact that the number of tornadoes has not changed significantly over time. The decreased costs and deaths associated with tornadoes in the County parallels, and can possibly be attributed to, improvements in forecasting and advance warning systems.

Vulnerability and Community Impact Assessment

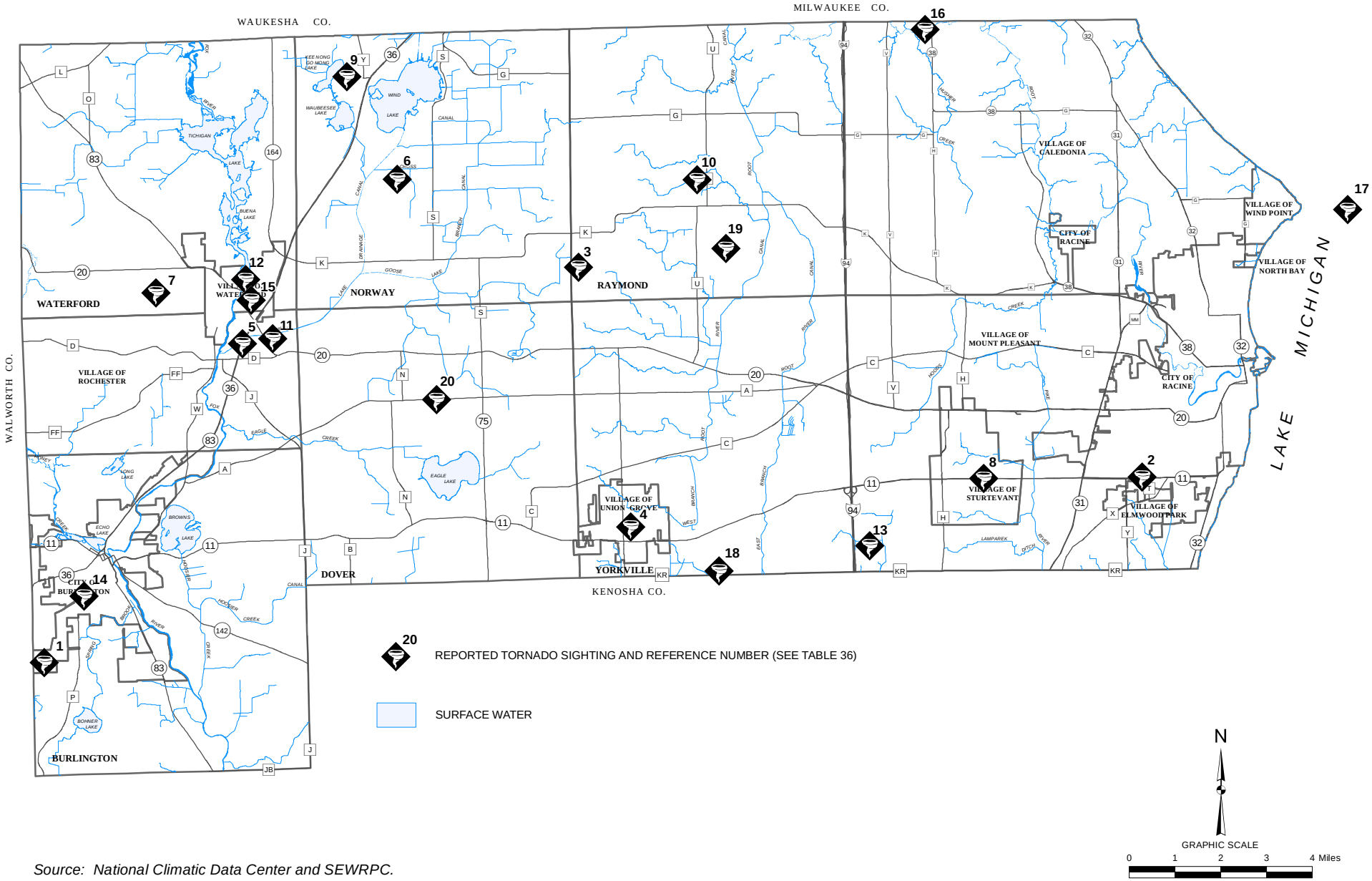
In order to assess the vulnerability of the Racine County area to tornado and related storm hazards, a review of the community assets described in Chapter II was made which indicates the potential for significant tornado impacts to: 1) a variety of residential, commercial, and other developed land uses; 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. As can be seen from the distribution of historic F1 and F2 tornado events during the past 51 years within Southeastern Wisconsin, shown on Map 35, 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. On average, the historic tornado events have resulted in $1.1 million of reported damages. However, two events have been responsible for a large percentage of the total damages. Thus, the average damages cost is not considered to be representative.

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.

Map 35

TORNADO EVENTS REPORTED WITHIN RACINE COUNTY: APRIL 1957 THROUGH DECEMBER 2008



Source: National Climatic Data Center and SEWRPC.

Table 36

TORNADO EVENTS REPORTED IN RACINE COUNTY: JANUARY 1, 1957 THROUGH DECEMBER 31, 2008

Number on Map 25	Date	City/Town/Village	Magnitude (Fujita)	Length (miles)	Width (yards)	Deaths	Injuries	Property Damage (millions of dollars)[a]	Crop Damage (millions of dollars)[a]
1	April 19, 1957	Town of Burlington	F2	3	50	0	2	1.866	0.00
2	September 26, 1959	City of Racine	F1	19	50	0	2	1.866	0.00
3	October 8, 1959	Town of Raymond	F2	2	33	0	2	0.187	0.00
4	March 21, 1966	Village of Union Grove	F2	13	200	0	0	17.173	0.00
5	July 10, 1966	Town of Rochester	F1	1	33	0	0	0.171	0.00
6	September 28, 1972	Town of Norway	F2	1	50	0	0	0.136	0.00
7	June 20, 1978	Town of Waterford	F0	2	33	0	0	0.000	0.00
8	June 20, 1979	Village of Sturtevant	F1	- -	- -	0	1	0.077	0.00
9	June 6, 1980	Town of Norway	F1	<1	33	0	0	0.008	0.00
10	July 3, 1983	Town of Raymond	F1	<1	20	0	0	0.053	0.00
11	May 26, 1985	Town of Rochester	F0	<1	30	0	0	0.006	0.00
12	August 16, 1987	Village of Waterford	F0	<1	23	0	0	0.000	0.00
13	August 16, 1987	Town of Mt. Pleasant	F0	<1	23	0	0	0.000	0.00
14	August 9, 1995	City of Burlington	F0	- -	- -	0	0	0.000	0.00
15	August 18, 1997	Village of Waterford	F0	- -	- -	0	0	0.013	0.00
16	July 2, 2000	Town of Caledonia	F0	<1	30	0	0	0.000	0.00
17	June 30, 2001	Lake Michigan east of the Village of Wind Point (water spout)	F0	- -	- -	0	0	0.303	0.01
18	August 25, 2001	Town of Yorkville	F1	4	50	0	7	3.827	0.01
19	September 27, 2007	Town of Raymond	EF0[b]	<1	20	0	0	0.001	0.00
20	June 6, 2008	Town of Dover	EF0[b]	3	50	0	0	0.020	0.00
Total	- -	- -	- -	- -	- -	0	14	25.707	0.02

[a]*Dollar values were adjusted to year 2008 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.*

[b]*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.

Potential Future Changes in Tornado Conditions

Changes in land use can have an impact on the potential for tornado 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.

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. There is some indication that the northwestern portion of the County may be more susceptible.

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." Heat deaths occur quietly, without headline-making destruction. The Centers for Disease Control and Prevention reports that on average, 688 people die each year, nationwide from excessive heat, more than lightning, tornadoes, floods, and hurricanes combined.[36] 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 in Table 37 for two selected observation stations in the Cities of Burlington and Racine in Racine County show extreme high and low temperatures and the departure from average temperatures recorded in the period from 1990 through 2008. The average high and low extreme temperatures for these two stations are 94.8ºF and -11.2ºF for the City of Burlington and 95.1ºF and -8.3ºF for the City of Racine during this period. Prolonged exposure to either of these temperatures could present a significant danger. It is worth noting 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. A measure of discomfort and the level of risk posed to people in high-risk groups is the Heat Index (HI) which is expressed in degrees Fahrenheit (ºF) and equals a relative humidity (RH) adjustment added to the actual air temperature. For example, if the air temperature is 94ºF. and the RH is 55 percent, the HI would equal about 106ºF. (see Table 38). Since HI values were devised for shady, light wind conditions, exposure to full sunshine can increase HI values by up to 15ºF. The level of risk to people in high-risk groups associated with different levels of the HI is shown in Table 39.[37] 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. 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).

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[36] *U.S. Centers for Disease Control and Prevention, "Heat-related Deaths—United States, 1999-2003,"* Morbidity and Mortality Weekly Reports, *Volume 55, July 28, 2008.*

[37] *High-risk groups include the very young, the old, and persons with chronic health conditions.*

Table 37

EXTREME TEMPERATURE AND DEPARTURE FROM AVERAGE TEMPERATURE CHARACTERISTICS WITHIN RACINE COUNTY: 1990-2008

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	-7	48.7	1.1
1991	98	-10	--[a]	--[a]	94	-6	48.2	0.6
1992	90	-15	45.9	-0.2	88	-7	46.0	-1.6
1993	92	-13	45.1	-1.0	94	-5	45.9	-0.7
1994	96	-26	45.6	-0.6	93	-24	46.9	0.3
1995	105	-8	45.9	-0.3	104	-5	46.6[b]	-0.1
1996	95	-27	43.5[b]	-2.6	96	-24	44.7	-2.0
1997	93	-13	44.5	-1.7	95	-11	46.5	-0.1
1998	94	-7	49.4	3.2	95	-4	51.2	4.6
1999	100	-22	47.2[b]	1.1	102	-16	49.3	2.7
2000	96	-15	46.1[b]	-0.1	90	-9	48.2	1.6
2001	94	-8	--[a]	--[a]	97	1	49.4	2.7
2002	97	-9	47.1	1.2	98	-7	48.9	1.7
2003	94	--[a]	--[a]	--[a]	98	-5	46.9	-0.3
2004	90	-13	45.7	-0.1	91	-11	--[a]	--[a]
2005	95	10	46.9	1.1	--[a]	--[a]	--[a]	--[a]
2006	95	14	47.6	1.8	98	11	49.5	2.3
2007	90	-19	46.5[b]	0.7	93	-13	48.3[b]	1.1
2008	92	-10	44.3	-1.6	90	-7	46.5	-0.8
Average	94.8	-11.2	46.1	0.0	95.1	-8.3	47.7	0.1

NOTE: N/A indicates data not available.

[a]*Ten or more daily values missing.*

[b]*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.

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.

Table 38

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 39

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.

- **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.

During the period from 1982 through 2008, 31 people died in Wisconsin due to exposure to cold. When vehicle accidents and fatalities, fires due to dangerous use of heaters, and other winter weather fatalities are also considered, it increases the severity of severe cold periods. Exposure to extreme cold temperatures can cause hypothermia and frostbite; can lead to loss of fingers and toes; or cause permanent kidney, pancreas, and liver injury, and even death. A major winter storm can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. Wind chill is not the actual temperature, but rather how wind and cold feel on exposed skin. As the wind increases, heat is carried away from the body at an accelerated rate, driving down the body temperature. A wind chill of -20°F will cause frostbite in just 30 minutes. Frostbite is damage to body tissue caused by extreme cold. Frostbite causes a loss of feeling and a white or pale appearance in extremities, such as fingers, toes, ear lobes, or the tip of the nose. If symptoms are detected seek immediate medical help. Hypothermia is a condition brought on when the body temperature drops to less than 95°F. Hypothermia may cause lasting kidney, liver, and pancreas problems or death. Warning signs include uncontrollable shivering, memory loss, disorientation, incoherence, slurred speech, drowsiness, and apparent exhaustion. If a person's temperature is below 95°F, medical care should be sought immediately. Infants and elderly people are most susceptible. Fifty percent of all cold-related injuries are expected to occur in people over 60 years old, more than 75 percent will happen to men, and about 20 percent will occur in the home.

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 106ºF on June 1, 1934. The highest temperature ever recorded in Wisconsin was 114ºF, which occurred on July 13, 1936, at the Wisconsin Dells. 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 104ºF and the heat index peaked at 125ºF. This was the very first time that the National Weather Service in Sullivan, Wisconsin, had issued a heat advisory and an excessive heat warning. There was a period of high temperatures in 1988, but that was a dry heat and the outcome was much different. This heat wave was unusual because high temperatures were combined with high humidity, resulting in a heat index, which peaked at 125ºF. The "summer of 1995" severe heat wave 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 July 1995 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.

On December 9, 1999, bitter-cold arctic air swept into Wisconsin on northwest winds of 20 to 40 mph. Temperatures dropped as much as 15ºF in 15 minutes as the strong front moved through. Wind chill values ranged from -25ºF to -50ºF. 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, just south of Racine 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 -35ºF to -60ºF 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 -23ºF recorded in the City of Racine.

Description of Recent Extreme Temperature Events

Extreme Heat

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 40 lists the extreme and record high and low temperature events in Southeastern Wisconsin from October 12, 1995, through December 31, 2008.

The most recent heat wave occurred during the summer of 2006. 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 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. 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. 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.

A 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 110ºF, eight people died, and numerous people suffered from heat-related sicknesses.

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 110ºF to as high as 125ºF. The heat wave was directly and indirectly responsible 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.

Most heat-related deaths occur in cities. Large urban areas become “heat islands.” Brick buildings, asphalt streets, and tar roofs store and radiate heat like a slow burning furnace. Heat builds up in a city during the day and cities are slower than rural areas to cool down at night. The amount of sunshine is an important contributing factor in urban heat waves. In addition, the stagnant atmospheric conditions associated with a heat wave trap ozone and other pollutants in urban areas. The worst heat disasters, in terms of loss of life, happen in large cities when a combination of high daytime temperatures, high humidity, warm nighttime temperatures, and an abundance of sunshine occurs for a period of several days. There are also socioeconomic problems that make some urban populations at greater risk. The elderly, disabled, and debilitated are especially susceptible to heat-related illness and death. 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 41). Over the period 1995-2007 about 66 percent of heat-related fatalities occurred in persons 60 years old and older (see Table 42).

Table 40

EXTREME TEMPERATURE EVENTS IN SOUTHEASTERN WISCONSIN
OCTOBER 12, 1995 THROUGH DECEMBER 31, 2008

Date	Time	Type	Deaths	Injuries
October 12, 1995	2:00 p.m.	Record warmth	0	0
December 9, 1995	3:00 a.m.	Extreme cold	2	0
January 30, 1996	2:00 a.m.	Extreme wind chill	2	0
January 31, 1996	12:00 a.m.	Extreme cold	0	10
February 1, 1996	12:00 a.m.	Extreme cold	0	3
January 17, 1997	12:00 a.m.	Extreme cold	4	18
March 26, 1998	6:00 a.m.	Record warmth	0	0
November 23, 1998	12:00 p.m.	Excessive heat	0	0
December 1, 1998	12:00 a.m.	Excessive heat	0	0
January 5, 1999	12:00 a.m.	Extreme cold	0	0
July 4, 1999	8:00 a.m.	Excessive heat	0	0
July 23, 1999	2:00 a.m.	Excessive heat	0	0
July 29, 1999	8:00 a.m.	Excessive heat	8	0
November 8, 1999	12:00 p.m.	Record warmth	0	0
November 13, 1999	1:00 p.m.	Record warmth	0	0
July 21, 2001	12:00 a.m.	Excessive heat	2	0
August 6, 2001	11:00 a.m.	Excessive heat	4	0
April 15, 2002	1:00 p.m.	Excessive heat	1	0
June 20, 2002	12:00 a.m.	Excessive heat	1	0
June 22, 2002	12:00 p.m.	Excessive heat	1	0
June 30, 2002	12:00 a.m.	Excessive heat	0	0
July 1, 2002	6:00 a.m.	Excessive heat	0	0
July 8, 2002	11:00 a.m.	Excessive heat	0	0
July 21, 2002	12:00 a.m.	Excessive heat	0	0
July 24, 2005	2:00 p.m.	Excessive heat	0	0
December 18, 2005	12:00 a.m.	Cold/wind chill	0	0
February 17, 2006	6:00 p.m.	Cold/wind chill	0	0
February 18, 2006	6:00 p.m.	Cold/wind chill	0	0
July 16, 2006	5:00 p.m.	Heat	0	0
July 30, 2006	6:00 p.m.	Heat	2	40
December 7, 2006	12:00 a.m.	Cold/wind chill	1	0
February 3, 2007	9:00 a.m.	Cold/wind chill	0	0
February 5, 2007	3:00 a.m.	Extreme cold/wind chill	0	0
January 25, 2008	12:00 a.m.	Cold/wind chill	1	0
January 30, 2008	2:00 a.m.	Cold/wind chill	0	0
February 10, 2008	12:00 a.m.	Extreme cold/wind chill	0	0
December 15, 2008	3:00 a.m.	Cold/wind chill	0	0
Total	- -	- -	29	71

Source: National Climatic Data Center.

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, -23ºF at Janesville (Rock County) and -20ºF 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 February 17, temperatures dropped overnight. Lowest 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

Table 41

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.

Table 42

NATIONWIDE HEAT-RELATED FATALITIES BY AGE AND GENDER: 1995-2007

Age Group	Female	Male	Unknown	Total	Percent of Total
0 to 9 Years Old	48	26	2	76	3
10 to 19 Years Old	3	18	0	21	1
20 to 29 Years Old	5	37	0	42	1
30 to 39 Years Old	30	93	0	123	4
40 to 49 Years Old	51	211	0	262	9
50 to 59 Years Old	73	284	0	357	12
60 to 69 Years Old	143	334	0	477	17
70 to 79 Years Old	335	347	0	682	24
80 to 89 Years Old	351	228	0	579	20
90 Years Old and Older	99	41	0	140	5
Unknown	11	71	46	128	4
Total	1,149	1,690	48	2,887	100
Percent	40	58	2	100	- -

Source: National Weather Service and SEWRPC.

-20ºF to -34ºF. Several outdoor activities and other social functions were cancelled. A massive arctic high-pressure system pushed southeast through the Western Great Lakes Region between February 3, to February 6, 2006, 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. Wind chills were generally in the -20 to -30 degree Fahrenheit range, reaching lows of -35 to -38 degrees Fahrenheit in Racine County during the early morning hours of February 5.

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 3ºF to 5ºF. 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.

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 from the period 1995-2008, Racine County can expect to experience an average of 2.6 extreme temperature 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.

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, Mt. 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 43. 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 runup.

Table 43

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.

The focus of the 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.[38] The second hazard, flooding from high lake levels, is being considered, along with flooding in other areas of the County. As noted previously, there are no structures identified in the floodplain associated with Lake Michigan, as documented in the 1976 and 1981 FIS studies for the City of Racine and Racine County, respectively. Those floodplain areas are delineated on the County large-scale topographic maps. With regard to the third hazard, storm wave damage, there are hazards in the County primarily in the City of Racine areas provided with sheet piling, breakwaters, and revetments. However, these shore protection structures, most notably those protecting the City sewage treatment and water plants, and the marina facilities, have been designed using standards suitable for major public and private facilities. In addition, the structures are maintained as needed. For example, the marina developed by the City and County of Racine, in the late 1980s is protected by breakwater structures. Racine County has an ongoing program to inspect and maintain these facilities. The breakwater was constructed in 1986, and over the next six years, about $1,149,000 was spent in maintenance and repairs. 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.

Low water levels can also cause problems with shore protection structures, such as rotting of timber pilings, which are normally under water, being exposed to air, as well as, significantly affecting shipping and boating and marina activity. Lake Michigan levels, as of August 2009, were about eight inches below normal, but well above the historic record low levels set in 1964 and 1965. During a March 2002 workshop,[39] Lake Michigan low-water-level problems were discussed as an important topic. With regard to Racine County, those problems include the potential for rotted timber sheet pile-supported breakwater (constructed as a Federal breakwater) in the Racine Harbor that needs rebuilding. The reported cost to repair 700 feet of damaged breakwater was about $2.0 million.

A 1982 Lake Michigan coastal erosion management study, prepared for Racine County with assistance from the Wisconsin Coastal Management Program, identified the extent of that 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

[38] *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.*

[39] *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.*

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 outfall 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.[40] 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 conditions in Racine County with relatively stable conditions for the most part in areas where shoreline development exists. The areas with severely unstable bluffs are 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 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 Racine County, offshore bathymetry was measured in 1995 and compared to 1977 data.

A Lake Michigan recession rate study[41] 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 estimates rates for recession which ranged from no recession to a recession of 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 developed for the Federal Emergency Management Agency. That agency then incorporated the data in an April 2000 national study prepared by The Heinz Center,[42] 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. Further analysis of the data used to develop the Racine County erosion rates may be forthcoming.

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[40]*SEWRPC Technical Report No. 36,* op. cit.

[41]*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.*

[42]*The H. John Heinz III Center for Science, Economics and the Environment,* Evaluation of Erosion Hazards, *April 2000.*

A 2005 study of shoreline erosion and shoreline erosion control structures showed that about 73 percent of the approximately 14.8 miles of Lake Michigan shoreline along Racine County are protected by shoreland protection structures consisting of groins, revetments, and seawalls or bulkheads.[43] 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 extant in 2005. These reaches are shown on Map 36. 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.

Vulnerability and Community Impacts 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; 5) critical community facilities; and 6) 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 these topographic maps and the mapping of critical community facilities, as shown on Maps 32 and 33, and the historic sites indicate that none of the facilities are located within the erosion risk distances.

The 1982 plan also provided estimates of potential property losses due to Lake Michigan shoreline erosion and identified areas with the most severe hazards. The economic value of the land and facilities located within the 25-year nonstructural erosion risk distance is approximately $9.3 million, 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.

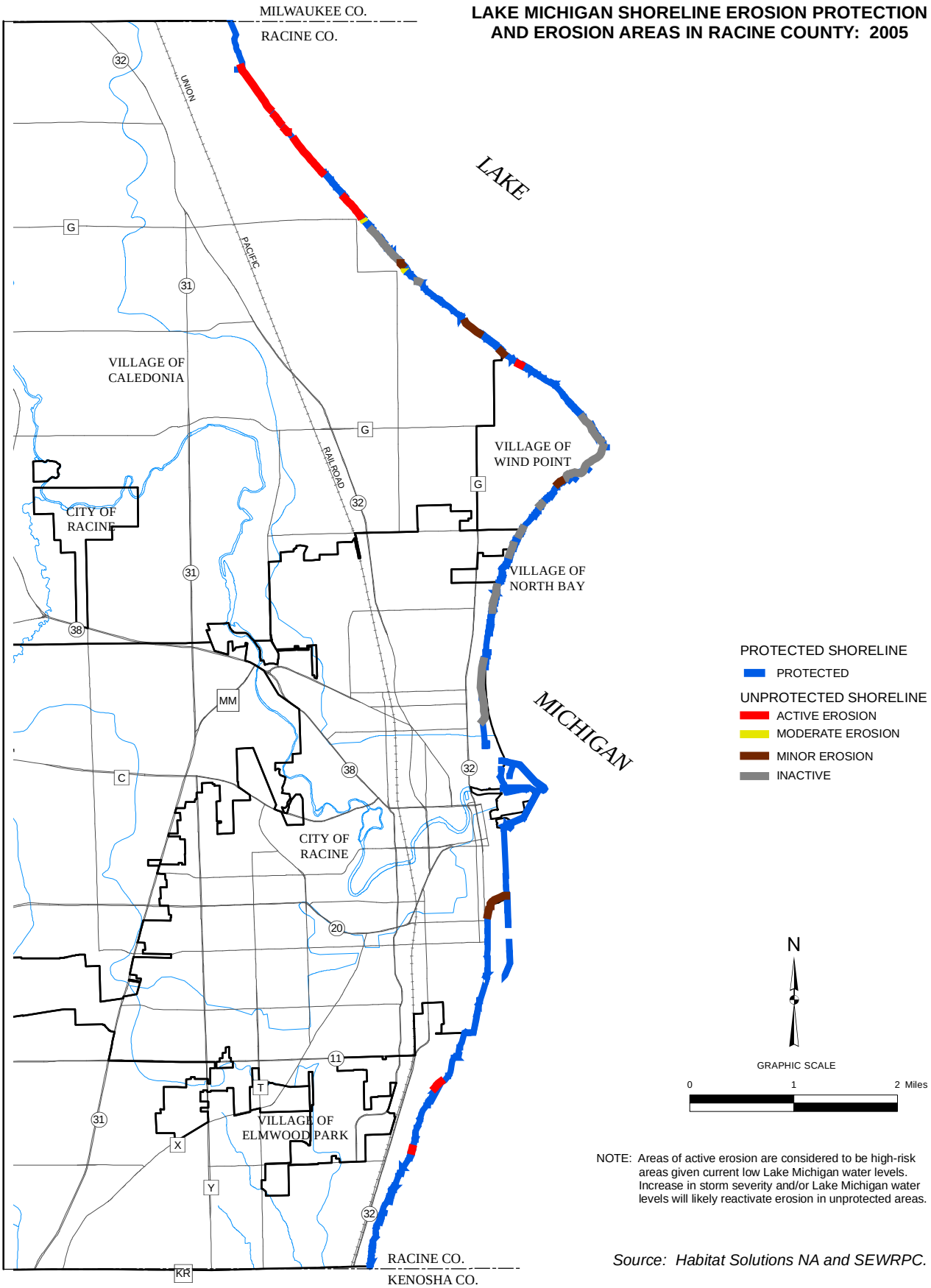
These identified levels of bluff recession pose problems for both developed and undeveloped portions of the Racine County coastline. Some of the most severe erosion hazards in the coastal area identified in the 1982 study are as follows:

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 study identified two actively eroding reaches along the shoreline in this general vicinity (Map 36).

[43] *SEWRPC Memorandum Report No. 171,* Assessment of Lake Michigan Shoreline Erosion Control Structures in Racine County, *January 2008.*

Map 36

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.

2. City of Racine: Two reaches were identified as particularly subject to shoreline erosion in the City of Racine. One is 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. The second is a reach extending 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.

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, the National Guard 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 36).

As previously noted, 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 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. This information can be found at: *http://huron.lre.usace.army.mil/coastal/LMPDS*.

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[44] in the past adjacent to the Crestview Subdivision and the Village of Caledonia Chapala 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. Because of the current zoning procedures which are in place, this situation has not occurred. In fact, because of the procedures set forth in the County zoning ordinance and the actions that have been taken by local units of government and individuals to construct and maintain shoreline protection measures, the current vulnerability to coastal erosion has been decreased, compared to the 1980 conditions. These ongoing mitigation measures are described further in Chapter V. This phenomenon has been

[44]*SEWRPC Community Assistance Planning Report No. 86,* A Lake Michigan Coastal Erosion Management Study for Racine County, Wisconsin, *October 1982.*

Table 44

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 36 and Map 8 in Chapter II of this report.

Source: SEWRPC.

documented in the previous report section which notes a decrease in shoreline erosion over time. The most current Lake Michigan shoreline erosion, as summarized on Map 36, and bluff stability conditions, as summarized on Map 8 in Chapter II of this report, are likely to remain similar or become less severe over time as ongoing mitigation measures are carried out.

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 36 and Map 8 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, Mt. 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 44, 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 mid-winter. Snowfall amounts in Racine County average 38 inches per season in the far southwest corner to about 45 inches near Lake Michigan.

Historic 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 37 major winter storm events reported since 1994. All of these storms contained some form of snow, sleet, freezing rain, or slippery road conditions (see Table 45). 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 anytime 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 1982-2008. 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.

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 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.

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 January 1-3, 1999. More than 10 inches fell in most southern counties with parts of Kenosha, Milwaukee, Ozaukee, Walworth, Washington, and Waukesha Counties receiving more than 18 inches of snow. 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.

Table 45

WINTER STORM AND ICE STORM EVENTS IN RACINE COUNTY: JANUARY 5, 1994 THROUGH DECEMBER 31, 2008

Date	Location (description)	Type	Deaths	Injuries
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 15, 1997	Southeastern Wisconsin	Heavy snow	0	0
January 8, 1998	Eastern one-third of Wisconsin	Winter storm	0	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 20, 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
February 13, 2007	Southeastern Wisconsin	Winter weather	0	0
February 23, 2007	Southeastern Wisconsin	Winter weather	0	0
December 1, 2007	Southeastern Wisconsin	Winter storm	0	0
January 21, 2008	Racine County	Winter weather	0	0
February 3, 2008	Southeastern Wisconsin	Winter weather	0	0
February 23, 2008	South-central and southeastern Wisconsin	Winter weather	0	0
- -	- -	Total	0	1

Source: National Climatic Data Center.

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.

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 were deposited. 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.

Vulnerability and Community Impact Assessment
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 hamper 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 (see Table 45). 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 1994-2008, Racine County can expect to experience an average of 2.6 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, the average annual number of events is not expected to change.

Multi-Jurisdictional Winter Storm Risk Management
Based upon a review of the historic 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

Climatologists define drought as a period of abnormally dry and/or unusually hot weather sufficiently prolonged for the corresponding deficiency of water to cause a "serious hydrologic imbalance." When a serious hydrologic

imbalance occurs in Wisconsin, soil moisture reserves, groundwater supplies, lake levels, and stream flows are negatively influenced. Water-dependent industries, including agriculture, public utilities, forestry, and tourism can potentially be affected. Two types of drought are experienced in Wisconsin, including Racine County: agricultural and hydrologic. Agricultural drought is a dry period of sufficient length and intensity that markedly reduces crop yields. Hydrologic drought is a dry period of sufficient length and intensity to affect lake and stream levels and the height of the groundwater table. These two types of drought may, but do not necessarily, occur at the same time.

Historic 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 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 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.

Description of Recent Drought Events

On Thursday, July 25, 2002, Wisconsin officially joined the other 49 states in being classified as having drought-like conditions, according to the National Oceanic and Atmospheric Administration's climate prediction center. Because of the lack of rain, 44.7 percent of the territory in the country's contiguous states were experiencing a severe or extreme drought. At a national level, this is the largest drought seen since 1934, when 63.9 percent of the country was affected. In 1987-1988 Wisconsin experienced its most severe drought in recent history, when also 36.7 percent of the country was experiencing similarly hot and dry conditions. 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 a low flow recurrence interval of between 75 and 100 years. Its 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. 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 going dry. 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.

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, Governor Doyle 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 $380,000[45] 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, Governor Doyle 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. 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. Monetary estimates of crop losses due to this drought in Racine County were not available; however, about $453,000[46] in indemnities were paid to farmers in the County from Federal crop insurance programs in 2005 for damages related to drought.

Vulnerability and Community Impact Assessment

Racine County is vulnerable to agricultural drought. There are about 120,000 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 15,000 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.

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.

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[45]*This loss has been adjusted to 2008 dollars.*

[46]*This loss has been adjusted to 2008 dollars.*

Potential Future Changes in Drought Conditions
Based upon recent historical data from the period 1992-2008, Racine County can expect to experience an average of 0.6 episodes of drought conditions per year. Some of these episodes are likely to be of short duration. It is not expected that the probability of drought will change.

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. Rather, 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 EARTHQUAKES

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. They can last from a few seconds to over five minutes and they may also occur as a series of tremors over a period of several days. The actual movement of the ground during an earthquake is seldom the direct cause of injury or death. Casualties may result from falling objects and debris, because the shocks shake, damage or demolish buildings and other structures. Disruption of communications; electrical power supplies; and gas, sewer, and water lines should be expected. Earthquakes may trigger fires, dam failures, landslides, or releases of hazardous material, compounding their disastrous effects.

Earthquakes are measured by two principal methods: seismographs and human judgment. The seismograph measures the magnitude of an earthquake and interprets the amount of energy released on the Richter Scale, a logarithmic scale with no upper limit. An earthquake measuring 6.0 on the Richter scale is 10 times more powerful than a 5.0 and one hundred times more powerful than an earthquake measuring 4.0. This is a measure of the absolute size or strength of an earthquake and does not consider the effect at any specific location. Most of Wisconsin's occurrences have not been severe, with one registering 5.1 on the Richter Scale.

Historic Earthquake Problems
Earthquakes that have affected Wisconsin from 1899 to 2008 are listed in Table 46. The most severe earthquake that affected Wisconsin was the record earthquake of 1811, which was centered along the New Madrid Fault. Most earthquakes that do occur in Wisconsin are very low in intensity and can hardly be felt. These very minor earthquakes are fairly common, occurring every few years. Moderate shaking was reported at many places in Wisconsin from the strong earthquake centered near Charleston, South Carolina, on August 31, 1886. Shaking was felt in Beloit, Janesville, and Milwaukee. A May 26, 1909, earthquake damaged a number of chimneys at Aurora, Illinois, and caused considerable damage to poorly constructed homes over a broad area from Bloomington, Illinois, to Platteville, Wisconsin. Two more moderate shocks affected the same area on January 2, 1912. The first tremor was at Aurora, Freeport, Morris, and Yorkville, Illinois, and was followed by a lighter shock. Felt reports were received from Madison and Milwaukee.

An earthquake centered in eastern Missouri on April 9, 1919, affected a broad area from Wisconsin to Mississippi and from Kansas to Ohio, approximately 320,000 square kilometers. In the epicentral region between St. Louis and New Madrid, windows were broken and plaster cracked. Two shocks of short duration were reported felt at Madison.

Scattered felt reports in Wisconsin were noted from a major earthquake in the St. Lawrence River region near La Malbaie, Quebec, Canada, on February 28, 1925. The magnitude 7.0 (Richter Scale) shock was felt over an area

Table 46

EARTHQUAKES IN WISCONSIN

Location	Date	Time (central standard time)	Location (latitude/longitude)	Magnitude
Kenosha	October 12, 1899	- -	42° 34'/87° 50'	3.0
Marinette	March 13, 1905	22:30	45° 08'/87° 40'	3.8
Shorewood	April 22, 1906	- -	43° 03'/87° 55'	3.0
Milwaukee	April 24, 1906	- -	43° 03'/87° 55'	- -
Marinette	January 10, 1907	- -	45° 08'/87° 40'	- -
Beloit	May 26, 1909	8:42	42° 30'/89° 00'	5.1
Madison	October 7, 1914	15:0	43° 05'/89° 23'	3.8
Madison	May 31, 1916	16:45	43° 05'/89° 21'	3.0
Fond du Lac	July 7, 1922	- -	43° 47'/88° 29'	3.6
Madison	October 18, 1931	15:12	43° 05'/89° 23'	3.4
Stoughton	December 6, 1933	23:55	42° 54'/89° 15'	3.5
Dubuque	November 7, 1938	23:30	42° 30'/90° 43'	3.0
Dubuque	November 7, 1938	1:15	42° 30'/90° 43'	"
Dubuque	November 7, 1938	3:30	42° 30'/90° 43'	"
Thunder Mountain	February 9, 1934	17:21	45° 11'/88° 10'	3.2
Milwaukee	May 6, 1947	15:27	43° 00'/87° 55'	4.0
Lake Mendota	January 15, 1948	11:40	43° 09'/89° 41'	3.8
Oostburg	July 18, 1956	15:30	43° 37'/87° 45'	3.8
Oostburg	July 18, 1956	17:00	43° 37'/87° 45'	"
South Milwaukee	October 13, 1956	- -	42° 55'/87° 52'	3.8
Beaver Dam	January 8, 1957	10:00	42° 32'/98° 48'	3.6
Bill Cross Rapids	February 28, 1979	12:4:55	45° 13'/89° 46'	<1.0 MoLg
Madison	January 9, 1981	9:15	43° 05'/87° 55'	- -
Madison	March 13, 1981	a.m.	43° 05'/87° 55'	- -
Oxford	June 12, 1981	10:30	43° 52'/89° 39'	- -
Milwaukee	February 12, 1987	13:12	42° 95'/87° 84'	- -
Milwaukee	February 12, 1987	13:16	43° 19'/87° 28'	- -
West Kenosha County	June 18, 1990	22:37	43° 60'/88° 20'	- -
Evansville, Indiana	June 18, 2002	22:37	38° 04'/87° 41'	5.0
Troy Grove, Illinois	June 28, 2004	11:10	41° 26'/88° 56'	4.1
West Salem, Illinois	April 18, 2008	3:37	38° 27'/87° 53'	5.2

Source: Wisconsin Geological and Natural History Survey, List of Earthquakes in Wisconsin*, Wisconsin Emergency Management, and SEWRPC.*

of approximately 5,000,000 square kilometers, including Milwaukee. Another strong Canadian earthquake (magnitude 6.25, Richter Scale) affected a large area of the northeastern and north-central United States on November 1, 1935. The area impacted was over 2,500,000 square kilometers and included most of eastern Wisconsin and scattered points elsewhere in the State.

Two strong earthquakes near Anna, Ohio, on March 2, and 8, 1937, caused damage to buildings in the epicentral area and were reported felt over a six-state region. The second shock was perhaps slightly stronger and more widespread than that of March 2nd, but the difference was not great. Both earthquakes were felt at Milwaukee; the latter tremor was also reported felt at Madison.

On November 23, 1939, a shock in southern Illinois having maximum intensity just short of damage caused slight disturbances over an unusually large area (390,000 square kilometers). Milwaukee and Racine felt minor vibrations from a moderate earthquake in south-central Michigan on August 9, 1947. Broken windows and

considerable plaster and chimney damage were observed over a 30-kilometer radius from the epicenter, located near Coldwater, Michigan. The total felt area covered approximately 130,000 square kilometers and included portions of Illinois, Indiana, and Ohio.

An earthquake on May 6, 1947, apparently centered just south of Milwaukee near the shore of Lake Michigan, caused only minor damage. There were no reports of injuries. The 4:25 a.m. CDT tremor shook buildings and rattled windows in many communities in a 7,770 square kilometer area of Southeastern Wisconsin. There were a few reports of broken windows at Kenosha and residents of other communities reported that dishes and glasses had fallen from shelves. The shock was felt in a 160-kilometer-wide strip from Sheboygan to the Wisconsin-Illinois border and extended from the lakeshore to Waukesha, 40 kilometers inland.

Description of Recent Earthquake Events

The strongest earthquake in the central United States in 74 years occurred on November 9, 1968, in south-central Illinois. The shock was felt over an area of approximately 1,500,000 square kilometers, including all or portions of 23 states and southern Ontario, Canada, and measured at magnitude 5.3. Another earthquake in Illinois, about 500 kilometers north of the 1968 epicenter, caused slight damage at several places in Illinois, Indiana, Iowa, and Wisconsin. The September 14, 1972, tremor was felt over 650,000 square kilometers, including Michigan, Minnesota, Missouri, Ohio, and Wisconsin. Cracked plaster was noted at Kewaskum, Milton, Nashotah, and Zenda, Wisconsin. A report from Browntown, Green County, noted that water pipes leaked after the shock.

Reports were received from Kansasville in Racine County and in Mt. Hope and Trevor, Wisconsin, following a magnitude 4.0 earthquake on April 3, 1974, centered near the 1968 epicenter in southern Illinois. Within one hour or so, a number of tornadoes passed through the area affected by the earthquake. It is possible some of the reports confused the effects caused by the earthquake and those caused by the tornadoes.

Two recent earthquakes—one centered near Troy Grove, Illinois, on June 28, 2004 and the other centered near West Salem, Illinois, on April 18, 2008—were felt by residents in southeastern Wisconsin (see Table 46). Both occurred early in the morning and woke sleeping residents and shook furniture.

Vulnerability and Community Impact Assessment

The earthquake threat to the Racine County is considered low. Minor damages, such as plaster cracking, have occurred, but most often the results have been only windows rattling and ground shaking. There is little risk, except to structures that are poorly constructed. Most of the felt earthquakes reported have been centered in adjacent and other states. The causes of these local quakes are poorly understood and they are thought to have resulted from the still-occurring rebound of the earth's crust after the retreat of the last glacial ice.

The nearest major active fault is the New Madrid Fault, which stretches along the central Mississippi River Valley in Missouri. Considerable attention has focused in recent years on seismic activity in the New Madrid seismic zone, which lies within the central Mississippi Valley, extending from northeast Arkansas, through southeast Missouri, western Tennessee, and western Kentucky to southern Illinois. Scientists at the Center for Earthquake Research and Information have computed a set of probabilities that estimates the potential for different magnitude earthquakes to occur at the New Madrid Fault. However, even an 8.3 magnitude earthquake at the New Madrid Fault would cause only minor damage in the southeastern corner of Wisconsin. At this time it is not possible to predict the exact date, duration, or magnitude of an earthquake.

Racine County is not likely to suffer directly from a severe earthquake. Thus, the community impacts are considered not to be significant.

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 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.[47] Hence, the transportation system of Racine County serves both personal and goods movements for a variety of private business, public transport, as well as recreational purposes. The transportation system within Racine County consists of an arterial street and highway system, public transit facilities, railway facilities, and airport facilities.

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. Interstate Highway 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 1.24 in the year 2007, with a total of 737 persons being killed in Wisconsin motor vehicle traffic crashes. Of those crashes with fatalities, 23 percent involved alcohol, 13 percent involved speed, and 22 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 2007 were 52 pedestrians, 10 bicyclists, and 110 motorcyclists.[48]

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 11 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.

Railway crashes/accidents were separated into several basic categories, including collisions, derailments, train yard accidents, railway-crossing incidents, trespassing incidents, and other incidents. Within the United States from 1994 through 2008 there were approximately 200 collisions, 2,000 derailments, 1,500 train yard accidents, 3,500 railway-crossing incidents, and 900 trespassing incidents per year. These averages hide one important trend:

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[47]*SEWRPC Planning Report No. 49,* A Regional Transportation System Plan for Southeastern Wisconsin: 2035, *June, 2006.*

[48]*Wisconsin Department of Transportation,* 2007 Wisconsin Traffic Crash Facts, *December 2008.*

the number of railway-crossing incidents has decreased steadily at an average rate of slightly less than 5 percent per year, from about 5,000 incidents per year in 1994 to about 2,400 incidents in 2008. 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. Approximately 89 percent of the railway crossings in the State of Wisconsin are at-grade crossings.[49] The remaining railway crossings are grade-separated overpasses or underpasses. Within the State of Wisconsin from 1994 though 2008, there were an average of 49 train accidents (not including railway-crossing incidents) per year and 102 railway-crossing incidents per year. Among these railway-crossing incidents, there were an average of eight fatalities and 39 injuries per year. In addition, from 1994 to 2008 there was an average of 11 trespasser-related casualties per year in Wisconsin. These averages obscure trends toward fewer railway accidents in the State. Over the period 2002 through 2008, there were an average of 35 train accidents (not including railway-crossing incidents) per year and 68 railway-crossing incidents per year. Among these railway-crossing incidents, there were an average of five fatalities and 22 injuries per year. Over the same period, there was an average of nine trespasser-related casualties per year in Wisconsin.

Airports

As described in Chapter II, there are 13 aircraft landing areas known to exist in Racine County (see Map 12 in Chapter II). Eight of these airports are open to the public and five 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 1996 to 2008, there were an average of 4,170 motor vehicle crashes per year that caused about 19 fatalities per year as reported within Racine County and shown in Table 47, based upon data published by the Wisconsin Department of Transportation. Table 47 indicates that the number of deaths and fatalities has remained relatively constant during this 13-year time period. Racine County data for the years 1999-2007, provided by the Wisconsin Department of Transportation, further indicated that the total number of fatalities and injuries associated with vehicle crashes and vehicle crashes involving injuries are greatest during the summer months of June through September and lowest during the month of February, compared to other months of year. The average number of vehicle crashes involving injuries and associated injuries ranged from a low of 106 crashes and 152 injuries in February to 151 crashes and 229 injuries in June over the period 1999 to 2007.

In 2007, a total of 798 accidents were reported to occur among five municipalities of Racine County. In total, these accident events in the Cities of Burlington and Racine and the Villages of Caledonia, Mt. Pleasant and, Sturtevant, resulted in eight deaths and more than 1,100 injuries, and an estimated economic loss of more than

[49]*U.S. Department of Transportation,* National Highway-Rail Crossing Inventory File*, April 12, 2009.*

Table 47

MOTOR VEHICLE-RELATED ACCIDENTS AND FATALITIES REPORTED IN RACINE COUNTY: 1996-2008

Year	Automobile Accidents	Fatalities
1996	4,398	- -
1997	3,985	19
1998	4,127	18
1999	4,038	13
2000	4,412	27
2001	4,199	22
2002	4,117	19
2003	4,119	17
2004	4,385	16
2005	4,303	25
2006	4,016	18
2007	4,165	15
2008	3,948	20
Average	4,170	19[a]

[a]*Average number of annual fatalities was computed for 1997-2008.*

Source: Wisconsin Department of Transportation and SEWRPC.

$65 million in total damages (see Table 48). Fifty-seven percent of the accidents among the municipalities were speed-related, whereas 24 percent involved alcohol, 7 percent involved pedestrians, 7 percent involved motorcyclists, and 5 percent involved bicycles.

Railways

From September 1994 to December 2008 there were a total of 72 reported railway accidents reported within Racine County. These events, documented in terms of their type of accident and casualties in Table 49, are based upon data published by the Federal Railroad Administration. As shown in Table 49 these accidents ranged from zero events per year up to 17 events per year. Nonetheless, the number of both rail equipment and railway-crossing accidents as shown in Table 49 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 2001 to 2008 was about 2.5, which is about one third of the average of 7.4 accidents per year over the period 1994 to 2000. In total, these accident events have resulted in eight deaths and 60 injuries within Racine County, but there has not been a reported fatality since the year 2006. 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.

Airports

According to the National Transportation Safety Board there were 22 air traffic accidents in Racine County between January 1, 1996, and May 31, 2009.[50] Each of these accidents involved private aircraft. Three events resulted in fatalities and one event resulted in serious injury. Events on June 29, 1996 and December 13, 1997 each resulted in one fatality. An event on September 30, 2004 resulted in three fatalities. An event on October 27, 2001 resulted in one serious injury. 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 2007, 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 29 percent of the traffic-related fatalities and injuries that occurred in 2007. 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

[50]*National Transportation Safety Board, Aviation Accident Database: accessed August 9, 2009.*

Table 48

MOTOR VEHICLE ACCIDENT TYPES, FATALITIES, INJURIES, AND ECONOMIC LOSSES REPORTED AMONG MUNICIPALITIES WITHIN RACINE COUNTY: 2007

Municipality	Types of Accidents					Fatalities	Injuries	Total Estimated Economic Loss[a]
	Bike	Pedestrian	Motorcycle	Alcohol	Speed			
City of Burlington	1	5	8	9	21	0	64	$ 3,553,700
Village of Caledonia	4	1	7	29	87	3	93	8,871,200
Village of Mt. Pleasant	5	4	1	18	49	3	243	15,307,800
City of Racine	33	46	36	125	272	2	711	35,974,500
Village of Sturtevant	1	1	1	10	24	0	40	2,046,400
Total	44	57	53	191	453	8	1,151	$65,753,600

[a]*Economic loss was calculated using 2006 National Safety Council estimates plus 3.0 percent to account for inflation. Cost multipliers used were: Fatality: $1,249,000, Incapacitating injury: $64,000, Nonincapacitating injury: $21,000, Possible injury: $11,900, and Property damage: $8,500.*

Source: Wisconsin Department of Transportation and SEWRPC.

Table 49

RAILWAY ACCIDENTS REPORTED WITHIN RACINE COUNTY FROM SEPTEMBER 9, 1994 THROUGH DECEMBER 31, 2008

Year	Type of Accident		Fatalities	Injuries
	Rail Equipment	Railway Crossing		
1994	1	5	0	2
1995	2	1	0	1
1996	0	4	1	3
1997	6	3	2	5
1998	8	9	0	15
1999	4	4	0	7
2000	4	1	0	4
2001	2	1	0	1
2002	1	2	0	6
2003	1	2	0	3
2004	2	3	3	3
2005	0	1	0	2
2006	1	3	2	4
2007	0	0	0	1
2008	0	1	0	3
Total	32	40	8	60

Source: Federal Railroad Administration and SEWRPC.

year 2007 occurred on Saturdays between hours of 10:00 p.m. to 6:00 a.m., followed by Fridays between the hours of 10:00 p.m. to 6:00 a.m. and 2:00 p.m. to 10:00 p.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.

In 2003, the traffic safety problems of the existing freeway system were assessed by estimating traffic crash rates for each one-tenth mile segment of the system over the period of 1996 to 1998.[51] As Map 37 indicates, there were several segments on IH 94 in Racine County that exceeded the County freeway system average crash rate of 61.3 crashes per 100 million vehicle-miles. These segments are primarily located at on and off ramp locations, with the most dangerous freeway segment near STH 20 and CTH C intersections.

Weather conditions can also significantly contribute to the vulnerability of vehicle-related accidents and associated injuries and deaths as shown in Tables 50 and 51. Rain and snow were associated with high 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 2007, in terms of fatalities, fog was associated with 11 fatalities and 364 injuries (see Table 50). In dry road conditions, foggy weather is also associated with a higher number of vehicle accidents than other adverse weather conditions, as shown in Table 51. Snow and slush road conditions, combined with snow, were associated with the highest number of vehicle-related accidents within Wisconsin in 2007.

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. Vulnerable communities include the Cities of Burlington and Racine; the Villages of Caledonia, Mt. Pleasant, Rochester, Sturtevant, and Union Grove, and the Towns of Burlington, Dover, Waterford, and Yorkville.

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, conditions of the 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.

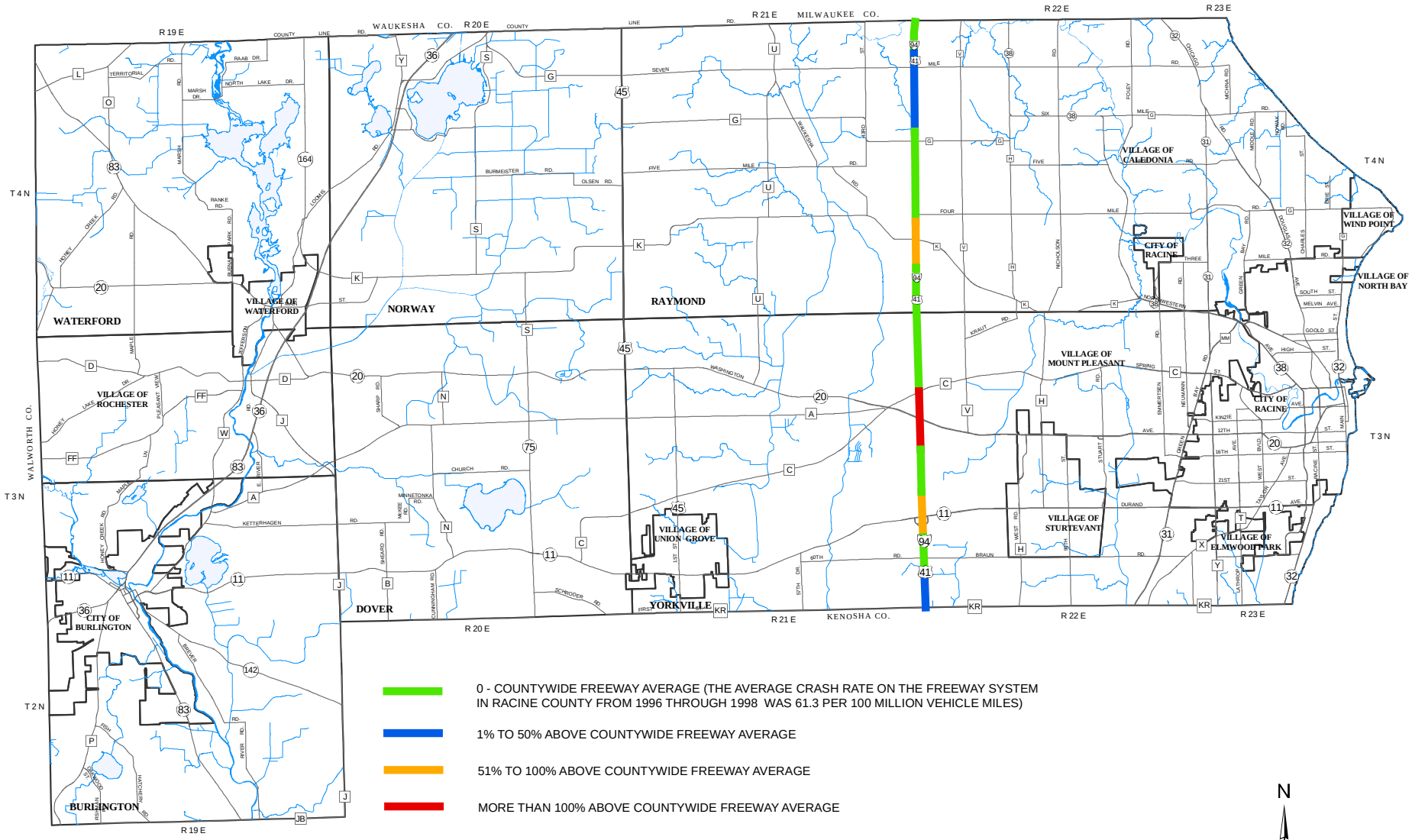
VULNERABILITY ASSESSMENT FOR CONTAMINATION OR LOSS OF WATER SUPPLY

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.

[51]*SEWRPC Planning Report No. 47*, A Regional Freeway System Reconstruction Plan for Southeastern Wisconsin, *May 2003.*

Map 37

CRASH RATES ON THE FREEWAY SYSTEM IN RACINE COUNTY: 1996-1998



Source: SEWRPC.

Table 50

SUMMARY OF ACCIDENT FATALITIES, INJURIES, AND PROPERTY DAMAGES AMONG WEATHER CONDITIONS REPORTED WITHIN THE STATE OF WISCONSIN: 2007

Weather Conditions	Fatal Crashes	Injury Crashes	Property Damage Crashes	Total Crashes	Total	
					Fatalities	Injuries
Clear	355	18,970	33,578	52,903	398	26,636
Cloudy	203	11,071	21,592	32,866	238	15,582
Snow	33	2,663	9,060	11,756	34	3,729
Rain	33	2,351	4,572	6,956	36	3,346
Blowing Sand/Dirt/Snow	5	247	695	947	5	356
Sleet/Hail	3	229	583	815	3	341
Fog/Smog/Smoke	11	255	503	769	11	364
Severe Crosswinds	2	34	68	104	2	56
Other	0	4	16	20	0	4
Unknown	10	224	17,753	17,987	10	262
Total	655	36,048	88,420	125,123	737	50,676

Source: Wisconsin Department of Transportation Bureau of Transportation Safety and SEWRPC.

Table 51

TOTAL NUMBER OF ACCIDENTS AMONG WEATHER AND ROAD CONDITIONS REPORTED WITHIN THE STATE OF WISCONSIN: 2007

Weather Conditions	Road Conditions							Total
	Dry	Wet	Snow/ Slush	Ice	Sand/Mud/ Dirt/Oil	Other	Unknown	
Clear	47,002	1,530	2,080	1,094	187	95	915	52,903
Cloudy	22,319	5,209	3,351	1,300	103	40	544	32,866
Snow	46	598	9,665	1,296	0	0	151	11,756
Rain	78	6,645	73	51	10	4	94	6,956
Blowing Sand/Dirt/Snow	15	15	580	318	2	1	16	947
Sleet/Hail	4	146	265	383	1	0	16	815
Fog/Smog/Smoke	140	454	30	28	3	1	13	769
Severe Crosswinds	34	9	31	29	0	0	1	104
Other	5	10	1	1	0	0	2	20
Unknown	464	48	162	27	4	4	17,278	17,987
Total	70,208	14,664	16,238	4,527	310	146	19,030	125,123

Source: Wisconsin Department of Transportation Bureau of Transportation Safety and SEWRPC.

As noted in Chapter II, about 27 million gallons per day (mgd) of surface water and 13 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, provides the basis for the

water carriage system of sanitary sewage conveyance essential to a high level of quality in urban life, is essential to good fire protection, and is also essential to all types of commercial and industrial development. Table 52 lists the active public and community private water supply systems in Racine County.

Groundwater Quality

Approximately 70 percent of Wisconsin'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 for fully describing the groundwater quality and its trends. Systematic studies of groundwater chemistry have not been conducted in Racine County; 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 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 exceedence 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 exceedences 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.

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, $CaMg(CO_3)_2$, 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.

Water 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.

There has been one report of another naturally occurring contaminant, arsenic, exceeding standards in the public water supplies in Racine County.[52] 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

[52]*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.*

Table 52

ACTIVE COMMUNITY WATER SUPPLY SYSTEMS IN RACINE COUNTY[a]

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[b]	21,819	Purchased surface water
Eagle Lake Manor	274	Groundwater
Harvest View Estates	400	Groundwater
Hickory Haven	303	Groundwater
Lakeview Specialty Hospital	300	Groundwater
North Cape Sanitary District	170	Groundwater
City of Racine Water Utility[c]	105,100	Surface water
Regency Club Condominiums	74	Groundwater
River Springs FLP	33	Groundwater
Southern Wisconsin Center	950	Groundwater
Spring Green #75	30	Groundwater
Spring Green Dorothy West	25	Groundwater
Spring Green Subdivision 1	27	Groundwater
St. Francis Retreat Center	30	Groundwater
Village of Union Grove Water Utility	4,101	Groundwater
Village of Waterford Water Utility	4,848	Groundwater
Village of Wind Point Water Utility	1,834	Purchased surface water

[a]*The Cozy Acres Subdivision's water system is listed as being closed as of July 18, 2007. The Francis Meadows Apartment's water system is listed as being closed as of June 6, 2005. The Hilltop Apartment's water system is listed as being closed as of October 1, 2002. The Jensen Motor Home Park water system is listed as being temporarily closed as of May 1, 2006. The Lakeview Terrace water system is listed as being closed as of February 7, 2003. The Spring Green Renee water system is listed as being closed as of September 1, 2002. The Spring Green Well Association's water system is listed as being closed as of September 1, 2003. The South Peterson Well Association's water system is listed as being closed as of September 24, 2003.*

[b]*As of 2006, the Caddy Vista Sanitary District and the Village of Caledonia Utility District No. 1 have been combined into the Caledonia West Utility District. As of 2007, the Crestview Sanitary District and the North Park Sanitary District have been combined into the Caledonia East Utility District. These districts are listed in the U.S. Environmental Protection Agency's Safe Drinking Water Information System as the Village of Caledonia Water Utility.*

[c]*As of 2007, 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.*

Source: U.S. Environmental Protection Agency, Safe Drinking Water Information System, June 11, 2009, and Wisconsin Department of Natural Resources Public Water Supply Systems Database, June 11, 2009.

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. 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.

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.

Sources of Contamination

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 53.

Vulnerability and Community Impact Assessment

The potential for water supplies to be interrupted could be 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; and
- Major facility malfunction or shutdown.

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 38). These areas have soils that consist of glacial sand and gravel outwash material that is 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; 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.[53]

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

[53]*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.*

Table 53

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
	Animal waste storage facilities
Accidental Spills	
	Landfills
Agricultural Activities:	
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.

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 (Wisconsin Division of Health, 1996). The exact source of the *Cryptosporidium* that caused this outbreak is still uncertain.

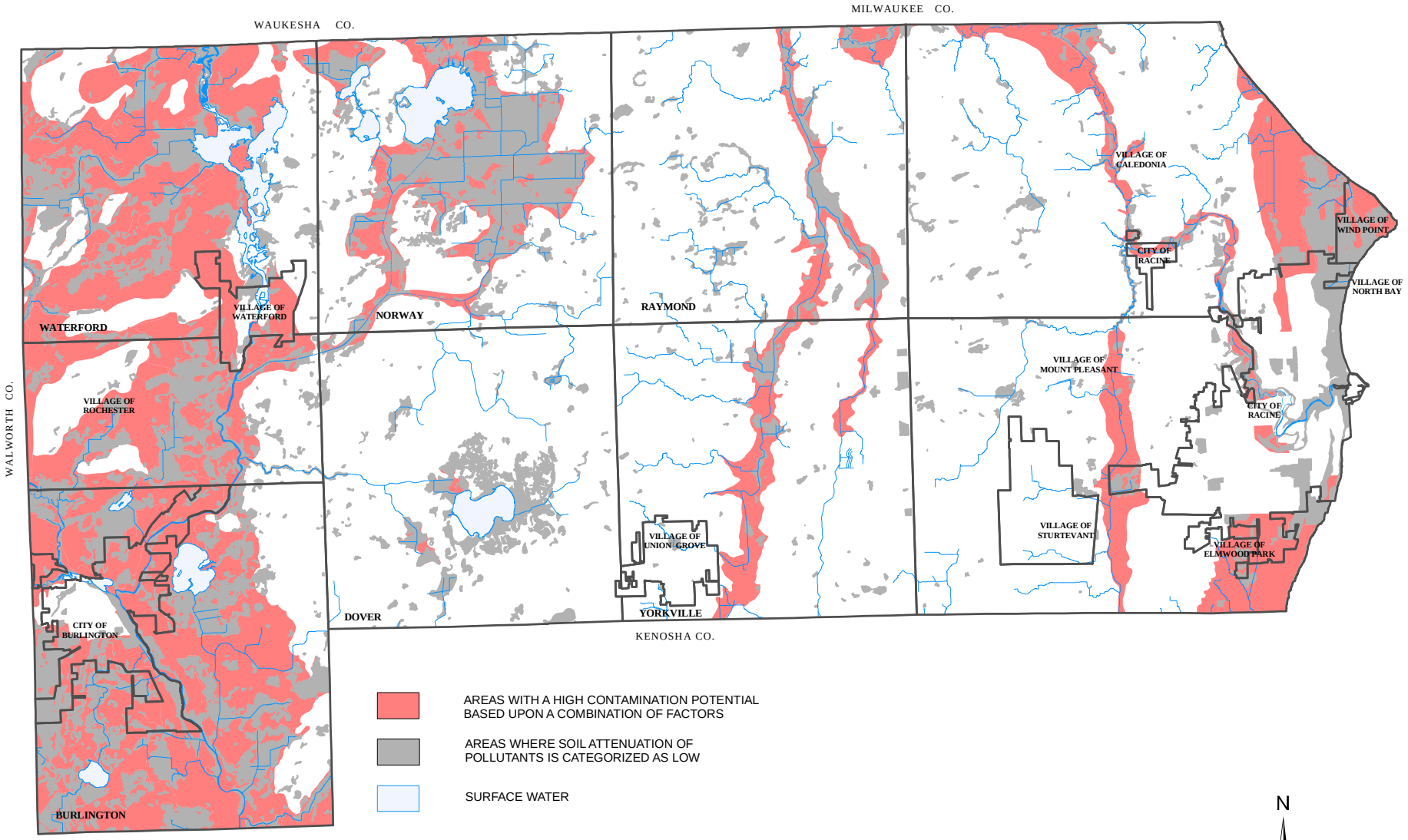
Typically, water supply facilities have a history of safe operation with very minimal malfunctions or shutdowns. The industry has been known for providing continuous service due to the use of high-quality and redundancy in equipment. However, the facilities are always subject to the potential for an unanticipated event which could interrupt services. 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 the water supplies were interrupted.

Map 38

AREAS NATURALLY VULNERABLE TO GROUNDWATER CONTAMINATION IN RACINE COUNTY



Source: Wisconsin Geological and Natural History Survey and SEWRPC.

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;
- 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 plan 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.[54] 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 retail gas stations to report. As noted in Chapter II, there are 195 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 Emergency Planning and Community Right-to-Know Act, 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 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.

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[54]*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.*

Rail
There are three railroad companies that operate in Racine County, as shown on Map 11 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.

Pipeline
Natural gas service is provided for the entire Racine County by the We Energies-Gas Operations. We Energies is the distributor of natural gas. In Racine County the main 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.

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 when establishing facility and system redundancy.

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 2,473 transportation-related hazardous material incidents reported over the period 2000 to 2008.[55] These resulted in four deaths and 47 injuries. In slightly less than half of these incidents, there was no damage to property. Property damages in those incidents that had damages ranged between $1 and about $250,000. The total damages reported as resulting from these incidents were about $2.9 million.

Description of Recent Hazardous Materials Incident Events
There have not been any significant reported hazardous materials incident problems within Racine County. Over the period 2000 to 2008, 25 transportation-related hazardous material incidents were reported in the County.[56] All were relatively minor. These incidents resulted in no deaths and one injury. Property damage was reported in two incidents, with total damages reported being less than $4,500. Of these incidents, 18 were related to roadways, six were related to railways and one was related to air transport. A total of four pipeline incidents have been recorded in Racine County during the 25-year period from 1984 through 2008. These events are documented in terms of their magnitude and impact in Table 54, based upon data published by the Federal Department of Transportation, Office of Pipeline Safety. As shown in Table 54, 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, one injury, and about $91,000[57] in property damages within Racine County. 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, 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

[55]*U.S Department of Transportation Pipeline and Hazardous Materials Safety Administration Incident Report Database, accessed on August 19, 2009.*

[56]Ibid.

[57]*Damages have been adjusted to 2008 dollars.*

Table 54

NATURAL GAS AND HAZARDOUS LIQUID PIPELINE DISTRIBUTION IN RACINE COUNTY: 1984-2008

Date	City	Natural Gas Pipeline	Hazardous Liquid Pipeline	Fatalities	Injuries	Property Damage
September 6, 1984	Racine	1	0	0	0	$ 0
February 28, 1986.....	Racine	1	0	0	0	0
February 26, 1988.....	Burlington	1	0	0	1	91,000[b]
August 9, 1990.....	Racine	0	1[a]	0	0	0
Total	- -	3	1	0	1	$91,000

[a]*Hazardous Liquid recorded in 1990 is gasoline.*

[b]*Dollar values were adjusted to year 2008 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.*

Source: Federal Department of Transportation Pipeline and Hazardous Materials Safety Administration; and SEWRPC.

County. One factor is the density of traffic and development. Certain pipeline sections, 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.

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.

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 in 1999-2004 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.

Description of Recent Public Health Emergencies

In the year 2006 there were more than 1,750 reported incidents of infectious diseases within Racine County as outlined in Table 55, based upon data published by the Bureau of Health in Wisconsin. The majority of these diseases were sexually transmitted diseases which comprised 1,480 of the reported cases (see Table 55). These

Table 55

CASES OF SELECTED INFECTIOUS DISEASES REPORTED IN RACINE COUNTY: 2006

Disease	Number of Reported Cases
Campylobacter Enteritis	35
Giardiasis	15
Hepatitis Type A	0
Hepatitis Type B[a]	19
Hepatitis Type C	109
Legionnaire's Disease	<5
Lyme	6
Measles	0
Meningitis, Aseptic	23
Meningitis, Bacterial	0
Mumps	33
Pertussis	9
Salmonellosis	19
Shigellosis	6
Tuberculosis	0
Sexually Transmitted Diseases	
Chlamydia	991
Genital Herpes	149
Gonorrhea	333
Syphilis	7
Immunizations (children in grades K-12) by Compliance	
Compliant	36,109
Noncompliant	767
Percent Compliant	97.9

[a]*Includes all positive HBsAg test results.*

Source: Bureau of Health, "Public Health Profiles Wisconsin 2006," November 2008.

vital statistics also demonstrate that about 98 percent of children in grades K through 12 have received all of the appropriate immunizations. Nonetheless, nearly 770 children are noncompliant in terms of obtaining immunizations and pose a potential significant health risk within Racine County.

During the spring and summer of 2009, there was an outbreak of a novel type-A influenza virus (H1N1) in Wisconsin. Between April 15 and August 12, about 6,350 confirmed and probable cases were reported in the State. The majority of these cases occurred in the Southeastern Wisconsin Region, mostly in Milwaukee County. The number of reported cases peaked in mid-June and declined to low levels by mid-July, although this may partially reflect changes in reporting by the CDC. As of August 12, 2009, 76 confirmed and probable cases had been reported in Racine County, representing an infection rate of 39 cases per 100,000 individuals. Statewide, at least six deaths have been reported as being caused by this novel influenza strain. None of these was in Racine County.

In the year 2006, there were more than 1,000 deaths due to selected diseases within Racine County as shown in Table 56. The majority of these mortalities were due to heart and cancer related illnesses. Pneumonia and influenza accounted for 39 deaths and a calculated death rate of 20 persons per 100,000 population. Other infectious diseases and parasitic illnesses accounted for 20 deaths in the year 2006. Table 56 also demonstrates that 46 deaths in 2006 were associated with alcohol and drug abuse within Racine County, which is higher than pneumonia and influenza related deaths.

Vulnerability and Community Impact Assessment

A review of the community assets described in Chapter II indicate the limited potential for significant public health emergency-related hazards to the population throughout Racine County. However, in general, those at greatest risk are the very young and the very old members of the community.

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, but limited, risk of medical incidents to occur within Racine County.

VULNERABILITY ASSESSMENT FOR TERRORISM

Terrorism can be defined as the unlawful use of force, violence, or biological attack against persons or property to intimidate or coerce a government, the civilian population or any segment of either, in the furthering of political or social objectives. 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

Table 56

MORTALITIES DUE TO SELECTED DISEASES REPORTED IN RACINE COUNTY: 2006

Disease	Number of Mortalities	Death Rates[a]
Heart Disease (total)	368	188
Ischemic Heart Disease	225	115
Cancer (total)	384	196
Tracheal/Bronchial/Lung	107	55
Colorectal	36	18
Female Breast	32	32[b]
Cerebrovascular Disease	67	34
Lower Respiratory Disease	89	46
Pneumonia and Influenza	39	20
Accidents	102	52
Motor Vehicle	27	14
Diabetes	43	22
Infectious Disease and Parasitic	20	10
Suicide	22	11
Alcohol and Drug Abuse as Underlying Cause of Death		
Alcohol	34	17
Tobacco Use	325	166
Other Drugs	12	13

[a]*Death rates are per 100,000 people.*

[b]*Based on female population.*

Source: Bureau of Health, "Public Health Profiles Wisconsin 2006," November 2008.

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. Several terrorist action possibilities are listed and briefly described below.

Bombing

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, the potential for mass damage and casualties, 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.

Airline Attack
After the events of September 11, 2001, questions were raised regarding the effectiveness of airline security at the time. Since the September 11 attacks, security at airports and onboard airliners has been escalated. Specific changes include the oversight and supervision of passenger and baggage screening by the Transport Security 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 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.

Chemical/Biological/Nuclear 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 as possible.

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.

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 and their initial and follow-up actions during any terrorist incident.

Historical Terrorism Problems
Wisconsin has been the target of several terrorist acts in the last 30 years.[58] However, there have been no reported terrorist activities within Racine County.

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[58]*Wisconsin Emergency Management Department of Military Affairs,* State of Wisconsin Hazard Mitigation Plan, *July 2001.*

Description of Recent Terrorism Events
There have not been any recent reported terrorist activities within Racine County.[59] However, a number of political activist, domestic terrorist and/or organized hate groups may be operating in or around the State.[60]

Vulnerability and Community Impact Assessment
A review of the community assets described in Chapter II indicate the potential for significant terrorism-related hazard impacts to: 1) a variety of residential, commercial, and other developed land uses; 2) roadway transportation system; 3) utilities; 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, such as a county fair.

VULNERABILITY ASSESSMENT FOR POWER OUTAGES

Electrical system outages are primarily caused by lightning and other weather-related hazard events, and, to a lesser extent, by equipment problems, fallen trees, animal contact, and human error.[61] Hence, this category 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, 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
Power outages in Racine County occur periodically and are usually the most widespread when caused by weather-related events. The most recent severe event occurred beginning June 3, 2002, when wind, lightning, and thunderstorm events began about 6:00 a.m. In Racine County, high wind caused excessive debris accumulation, and caused approximately 18,000 customers to lose electrical power. Trees and power lines were down in many locations in the Village of Sturtevant, the Town of Mt. Pleasant, and the City of Racine. About 200 utility wires were blown or knocked down in Racine and Kenosha Counties and lightning damaged numerous pieces of equipment. As of 10:00 a.m., about 4,000 customers were without service and scattered power failures lasted until the next day.

Vulnerability and Community Impact Assessment
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.

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[59] *Federal Bureau of Investigation, "Terrorism: 2002-2005."*

[60] *Federal Bureau of Investigation, "Terrorism in the United States 1998."*

[61] *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. See also Federal Emergency Management Agency*, State and Local Plan Interim Criteria Under the Disaster Mitigation Act of 2000*, July 11, 2002.*

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 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.

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 measures 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 the updated plan, the Racine County Hazard Mitigation Plan Task Force 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 Task force 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, served as the basis for the Task Force'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 Task Force 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 floodland and environmentally sensitive lands preservation element, a floodland 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.

Floodland and Environmentally Sensitive Lands Preservation Element

Floodland 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 floodland 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. The significant portion of the environmentally sensitive lands within the County, including wetlands, woodlands, and floodlands, are under protective ownership and/or zoning.

Floodplain Zoning and Wetland Preservation Zoning

As summarized in Table 21 in Chapter II of this report, floodland management regulations include the floodplain district zoning ordinances and shoreland or shoreland wetland zoning ordinances. The floodplain zoning ordinances are intended to preserve the floodwater conveyance and storage capacity of floodplain areas and to prevent the location of new flood-damage-prone development in flood hazard areas. The wetland preservation zoning ordinance seeks to maintain the stormwater and floodwater storage capacity of wetlands in the County and prohibits certain land uses detrimental to wetland areas. 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.

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. The most recent countywide and local land use planning efforts have been carried out under the County comprehensive planning program.[1] Racine County has taken an active role in preserving environmentally sensitive lands and currently has under ownership 2,615 acres of park and open space land located in 31 sites. The County recently completed a park and open space plan[2] which provides

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

[2]*SEWRPC Community Assistance Planning Report No. 134, 2nd Edition,* A Park and Open Space Plan for Racine County*, July 2001.*

for the preservation of environmental corridors and isolated natural resource areas. That plan is summarized on Map 39. The current status of ownership of park and open space sites by the County and State is shown on Map 40. 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.

Floodland Management Element

Mitigation measures specifically pertaining to floodland 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, there are three 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 initial County all hazards mitigation plan.

Floodland 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.[3] That plan was further amended as it affects Racine County in 1975 and 1995.[4] 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) floodland 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 is being implemented, steps are being 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.

Implementation of the downtown redevelopment plan, when completed, should significantly reduce flood problems in the City. However, the lands in the flood fringe area will still likely be considered floodplain, due to

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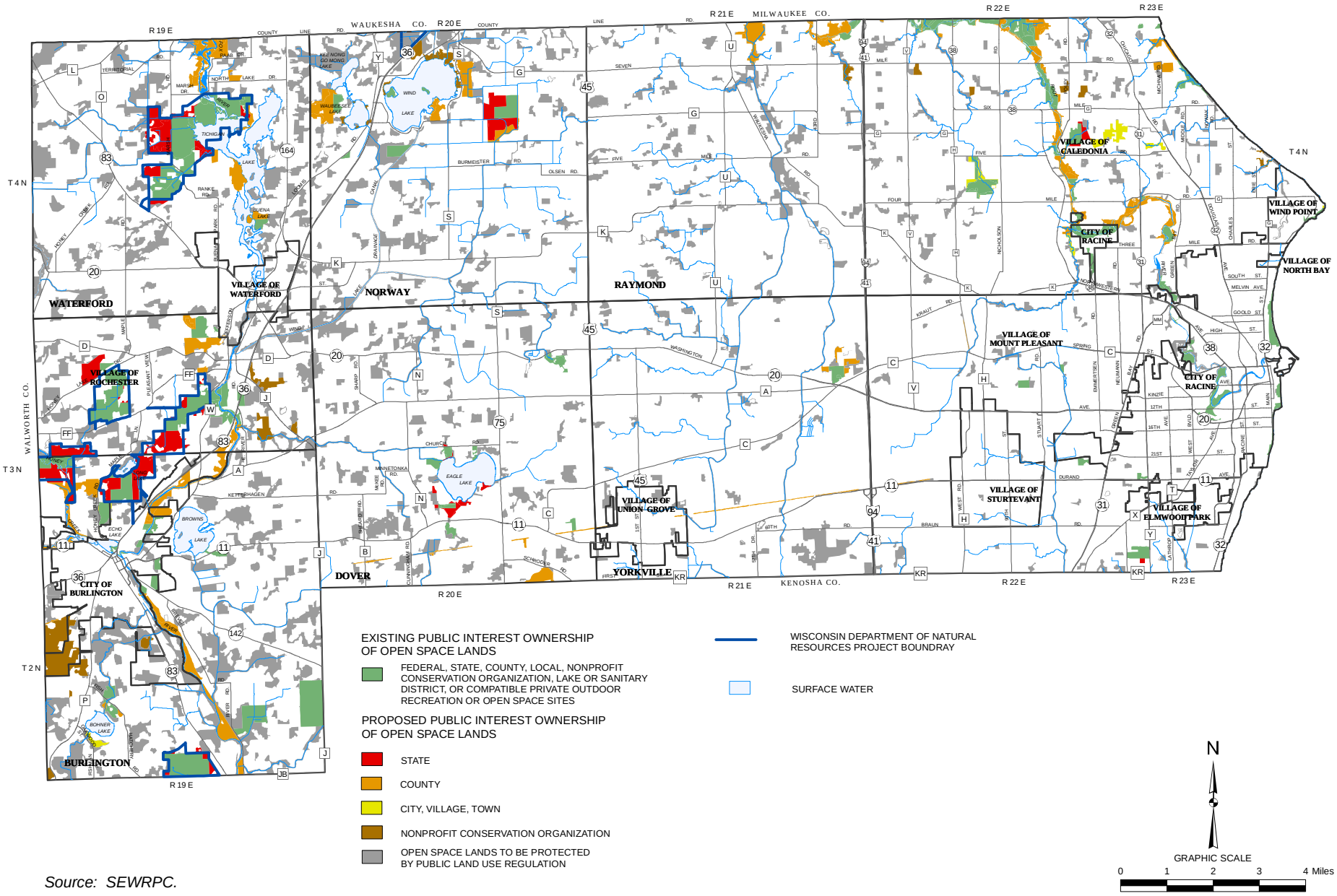
[3]*SEWRPC Planning Report No. 12,* A Comprehensive Plan for the Fox River Watershed, *Volume One,* Inventory Findings and Forecasts, *April 1969, and Volume Two,* Alternative Plans and Recommended Plan, *February 1970.*

[4]*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.*

Map 39

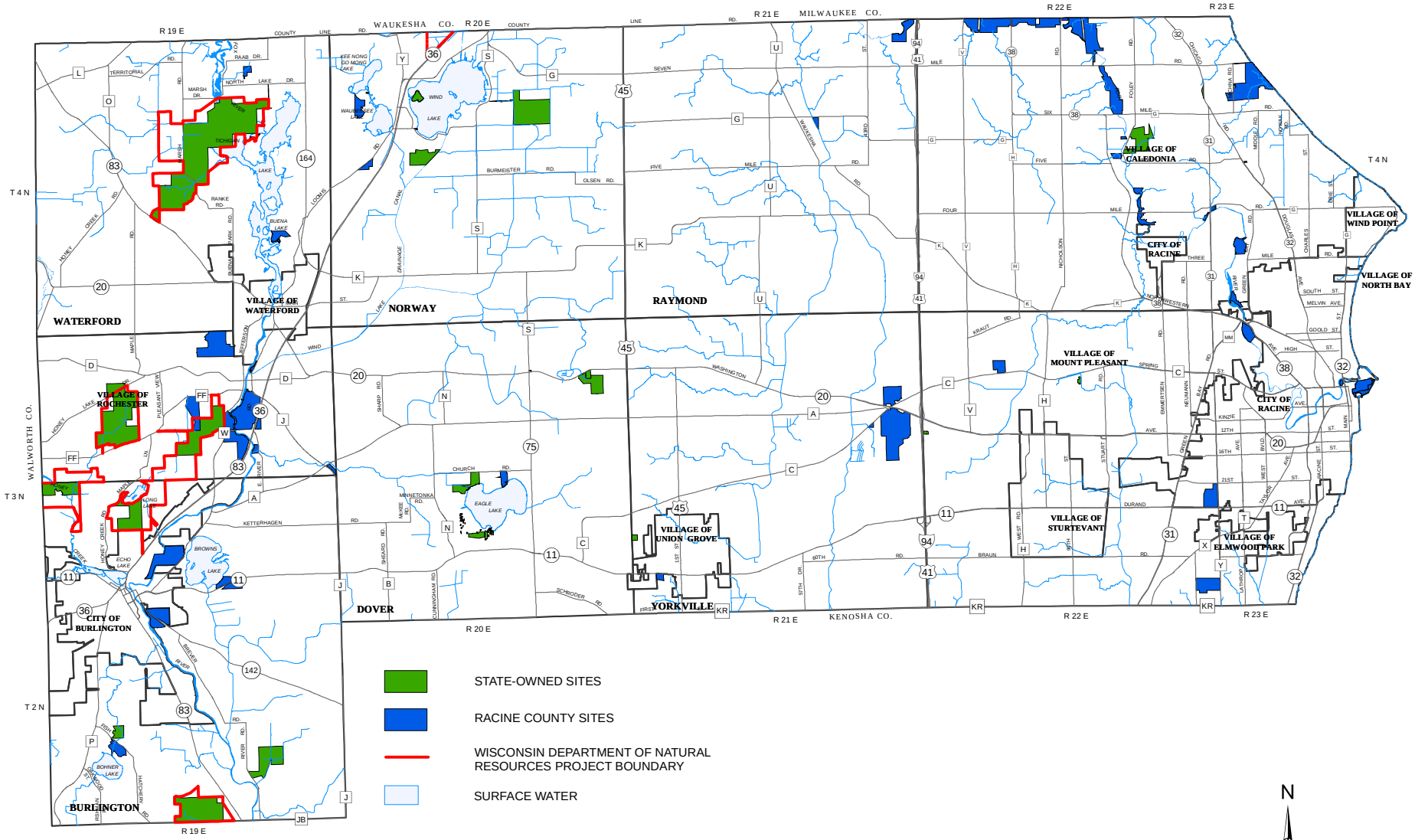
OPEN SPACE PRESERVATION ELEMENT OF THE RACINE COUNTY PARK AND OPEN SPACE PLAN: 2020



Source: SEWRPC.

Map 40

RACINE COUNTY AND STATE OF WISCONSIN PARK AND OPEN SPACE SITES: 2006



NOTE: More information on the mapped parks and open spaces can be found in Tables 10 and 12 of SEWRPC Community Assistance Planning Report No. 134, 2nd Edition, *A Park and Open Space Plan for Racine County*.

Source: SEWRPC.

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 outlets and, once the redevelopment is completed, working with the Wisconsin Department of Natural Resources (WDNR) and FEMA to refine the City's floodplain mapping.

The City of Burlington also, in 2001, adopted a stormwater management ordinance designed to reduce the potential of stormwater-related damage to property and public health from land development and redevelopment activities.

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 (see Appendix A for committee member list). The measures were then adapted for use in the current hazard mitigation planning program. As shown on Map 41, the plan calls for the following measures:

- Preservation of the remaining primary environmental corridor lands along the Fox River and its major tributaries in essentially natural open space uses. The corridors are to be preserved by a combination of public acquisition for parkway purposes and floodland and open space zoning.

- Reevaluation of the need for dikes and floodwalls in the City of Burlington, considering the current and planned City redevelopment actions. 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. Also, automatic backwater gates would be installed on existing storm sewer outfalls. The need for additional facilities should be reevaluated, given the current City of Burlington downtown redevelopment actions which have been designed to alleviate flooding problems.

- Construction of levees and channel improvements along the lower reaches of Hoosier Creek to protect flood-vulnerable agricultural areas, abate agricultural damages, and improve agricultural drainage.

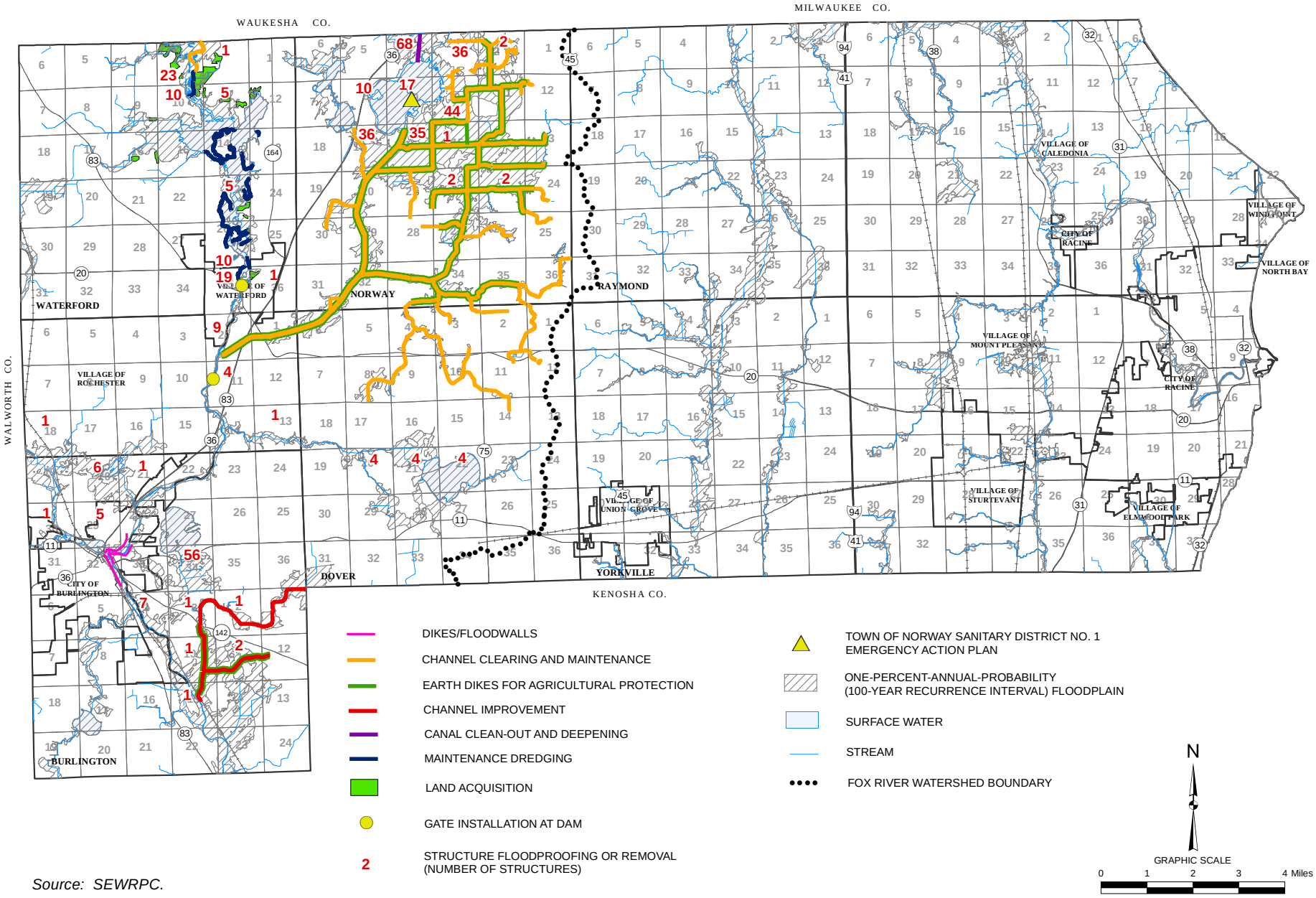
- Continued implementation of the emergency action plan for flooding that was developed in 1997 for the Town of Norway Sanitary District No. 1.[5] As shown on Map 42, about 32 percent of the land located within the Sanitary District's boundary is identified as floodplain. The emergency action plan sets 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.

- Floodproofing or removal of up to 436 structures identified using County large-scale topographic maps 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 on the County large-scale topographic maps as being located within the floodplain in order to obtain a more definitive assessment of their flood hazard status. Furthermore, this plan element is presented as an option, subject to the preference of the individual property owner. The number of structures identified that may require floodproofing has increased substantially since the initial hazard mitigation plan.

[5]*Town of Norway Emergency Action Plan Task Force,* Norway Emergency Action Plan*, April 1997.*

Map 41

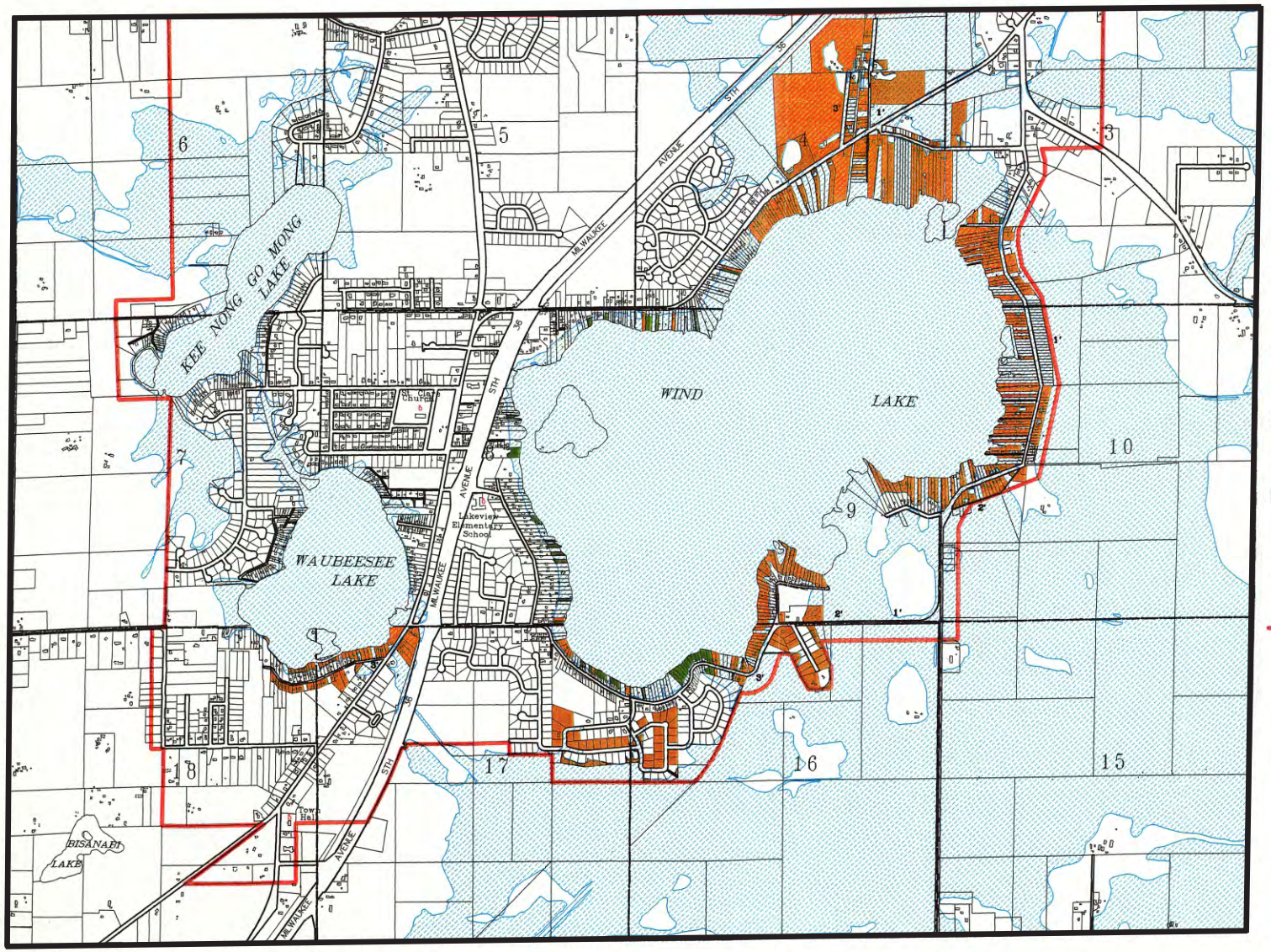
RECOMMENDED FLOODLAND MANAGEMENT MEASURES FOR THE FOX RIVER WATERSHED



Source: SEWRPC.

Map 42

TOWN OF NORWAY SANITARY DISTRICT NO.1 EMERGENCY ACTION PLAN



AREAS WITH INHABITED BUILDINGS LOCATED IN THE 100-YEAR RECURRENCE INTERVAL FLOODPLAIN AND WITH VEHICULAR DRY LAND ACCESS DURING A 100-YEAR FLOOD

AREAS WITH INHABITED BUILDINGS LOCATED IN THE 100-YEAR RECURRENCE INTERVAL FLOODPLAIN AND WITH NO VEHICULAR DRY LAND ACCESS DURING A 100-YEAR FLOOD

DEVELOPED AREAS WITH NO INHABITED BUILDINGS LOCATED IN THE 100-YEAR RECURRENCE INTERVAL FLOODPLAIN AND WITH NO VEHICULAR DRY LAND ACCESS DURING A 100-YEAR FLOOD

ONE-PERCENT-ANNUAL-PROBABILITY (100-YEAR RECURRENCE INTERVAL) FLOODPLAIN

LOCATION OF SHELTER FOR EVACUATED RESIDENTS

1' APPROXIMATE MAXIMUM FLOODING DEPTH ON ROADS DURING A 100-YEAR RECURRENCE INTERVAL FLOOD

BOUNDARY OF NORWAY SANITARY DISTRICT NO. 1

NORTH

400 0 400 800 1200 1600 FEET

GRAPHIC SCALE

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.

This change is the result of further consideration being given to the level of control for the recommended levees for the Hoosier Creek and Wind Lake Drainage Canal areas. Those levees are intended mainly to provide relief from flooding of agricultural land and would likely be designed to provide protection against a more frequent 10-percent-annual-probability flood event rather than the one-percent-annual-probability level of protection standard for structures. Thus, while the recommended levees would provide protection to these structures during more frequent events, flooding during rarer events would continue. As noted in Chapter IV, there are three structures considered by FEMA to be repetitive- or substantial-loss properties in Racine County one of which is located within the Fox River watershed.

- Installation of two 20-foot by four-foot radial gates in the Waterford Dam and reestablishment of the crest elevation in the east spillway of that dam.

- Installation of remote sensors to automate operation of the gates on the Waterford Dam.

- Lowering the water level in the Waterford Impoundment by 0.8 foot between December 1st and May 1st in order to provide additional storage volume during late winter/early spring runoff events.

- 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.

- Maintenance dredging along about 50 acres of shallow bays and other areas in the Waterford Impoundment.

- 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.

- Complete channel clean out operations of the Wind Lake Drainage Canal every 20 to 25 years.

- Clean out and deepening of the Muskego Canal.

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 properties; and 5) the maintenance of a skeleton stream-gaging network in the watershed.

As shown in Table 57, the estimated capital cost of implementing the Fox River watershed portion of the Racine County floodland management plan element would be $8,630,000.[6] Table 57 also shows the current implementation status of each plan element.

[6]*Total capital cost excludes fully implemented components.*

Table 57

PRINCIPAL FEATURES, COSTS, AND BENEFITS OF THE FLOODLAND MANAGEMENT PLAN ELEMENT FOR THE FOX RIVER WATERSHED

Component Description	Economic Analysis[a]							Implementation Status
	Capital Cost[b]		Annual Amortized Capital Cost (thousands)	Annual Operation and Maintenance Cost (thousands)	Total Annual Cost (thousands)	Annual Benefits (thousands)	Benefit-Cost Ratio	
	Item	(thousands)						
1. Construction of dikes and floodwalls in City of Burlington[c]	a. Earth dikes (12,500 feet)[c]	$ 294.0						
	b. Concrete floodwalls (2,100 lineal feet)[c]	1,268.9						
	c. 22 automatic drainage gates[c]	22.1	- -	- -	- -	- -	- -	- -
	d. Miscellaneous items[c]	778.1						
	Subtotal	$2,363.1[c]	$149.8[c]	$ 3.4[c]	$153.2[c]	$ 60.4[c]	0.4[c]	Partially implemented
2. Construction of levees and channel improvements along Hoosier Creek	a. Channel improvement (49,000 feet)	$ 493.4						
	b. Earth dikes (20,600 feet)	110.8						
	c. 66 surface water inlets	129.0	- -	- -	- -	- -	- -	- -
	d. Revegetation (112 acres)	138.9						
	e. Miscellaneous items	750.6						
	Subtotal	$1,622.7	$102.9	$18.7	$121.6	$253.2	2.1	Not implemented
3. Structure floodproofing or removal	a. Floodproof or remove up to 436 structures	- -	- -	- -	- -	- -	- -	Not implemented[d]
4. Installation of gates at Waterford Dam	a. Two 20-foot by four-foot radial gates, reestablish crest elevation in east spillway	$ 411.1	- -	- -	- -	- -	- -	- -
	b. Remote sensors	70.7						
	Subtotal	$ 481.8	$ 30.5	$ 7.5	$ 38.0	$599.3	15.8	Implemented[e]
5. Installation of gates at Rochester Dam	a. Two 16-foot by five-foot radial gates	$ 353.1	$ 22.4	$ 2.8	$ 25.2	$ 60.4	2.4	Implemented
6. Channel clean out in Fox River upstream from Waterford Impoundment	a. Remove selected sediment and debris from channel	$ 14.5	$ 0.9	$ 0.1	$ 1.0	- -	- -	Not implemented
7. Land acquisition	a. Purchase 370 acres of agricultural land in Town of Waterford	$1,216.2	$ 77.1	$ 0.0	$ 77.1	$120.6	1.6	Not implemented
8. Maintenance dredging within Waterford Impoundment	a. Dredge along 50 acres	$1,068.4	$ 67.7	$ 0.0	$ 67.7	$ 25.5	0.4	Partially implemented
9. Construct agricultural dikes along Wind Lake Drainage Canal and tributaries	a. 211,000 lineal feet of earth dike, install 40 pumping stations	$ 980.2	$ 62.1	$16.7	$ 78.8	$673.6	8.5	Not implemented

Table 57 (continued)

Component Description	Economic Analysis[a]							
	Capital Cost[b]		Annual Amortized Capital Cost (thousands)	Annual Operation and Maintenance Cost (thousands)	Total Annual Cost (thousands)	Annual Benefits (thousands)	Benefit-Cost Ratio	Implementation Status
	Item	(thousands)						
10. Channel clean out of Wind Lake Drainage Canal	a. Clear 7.0 miles of Wind Lake Drainage Canal, 40.0 miles of lateral canals	$ 836.2	$ 53.0	$16.7	$ 69.7	- -	- -	Not implemented
11. Channel clean out and deepening along Muskego Canal	a. Remove debris and deepen by three feet 0.6 mile of canal	$ 46.4	$ 2.9	$ 2.3	$ 5.2	$ 78.0	15.0	Implemented

[a]*Economic analyses are based on an annual interest rate of 6 percent and a 50-year amortization period and project life. Amounts shown are in 2008 dollars.*

[b]*Includes engineering, administration, and contingencies.*

[c]*City of Burlington needs and components are recommended to be reevaluated, given the extensive recent and ongoing downtown area improvements which include flood mitigation actions.*

[d]*Structure floodproofing/removal to be carried out at discretion of property owners.*

[e]*Automated controls were installed in 1977 when control gates were installed. Due to operational problems, use of sensors was discontinued in 1980. Due to improvements in state-of-the-art technologies, the plan calls for further consideration of re-automating the gate operation.*

Source: SEWRPC.

In 1977 the west spillway of the Waterford Dam was reconstructed with the proposed control gates. 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. The additional control gates 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.

In addition to the program above, the mitigation strategy includes a provision for the Town of Norway Sanitary District No. 1 to include in its next sewerage facility planning program an evaluation of the flooding potential impacts on the sewage pumping station located north of Loomis Road and east of the Muskego Canal.

Floodland Management Plan for the Root River Watershed

In 1966, SEWRPC adopted a comprehensive plan for the Root River watershed.[7] That plan was further amended as it affects Racine County in 1990.[8] 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 floodland management measures have also been evaluated that address upstream flooding problems in Milwaukee County. As part of the evaluation of those alternatives, including their potential impact on flooding in Racine County, updated flood discharges and stages were developed for the Root River main stem through Racine County.[9] That evaluation was designed to ensure that measures implemented in Milwaukee County do not compound problems in Racine County.

Recent Local Actions

The City of Racine completed a Flood Response Plan in 2003.[10] 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. The purpose of the study is 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. Understanding this relationship will improve coordinated activities by the City before and during flood events and improve service to residents. Total study cost is $11,500.

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[7]*SEWRPC Planning Report No. 9,* A Comprehensive Plan for the Root River Watershed, *July 1966.*

[8]*SEWRPC Community Assistance Planning Report No. 152,* A Stormwater Drainage and Flood Control System Plan for the Milwaukee Metropolitan Sewerage District, *December 1990.*

[9]Ibid.

[10]*Earth Tech, Inc.,* Flood Response Plan Spring Flood Control, *August 2003.*

The June 2009 flood event caused significant flooding in the Village of Union Grove 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.

The Town of Raymond Drainage District began collecting funds from their stormwater utility in 2008. 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 Drainage District indicated that the crossing is impassable anytime two or more inches of rain falls and that this is the District's most pressing flooding location. 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 floodplain.

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 (see Appendix A for committee member list). These mitigation measures were subsequently adapted for use in the current hazard mitigation planning program. As shown on Map 43, the plan calls for the following measures:

- Preservation of the remaining primary environmental corridor lands along the Root River and its major tributaries in essentially natural open space uses. The corridors are to be preserved by a combination of public acquisition for parkway purposes and floodland and open space zoning.

- 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 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.

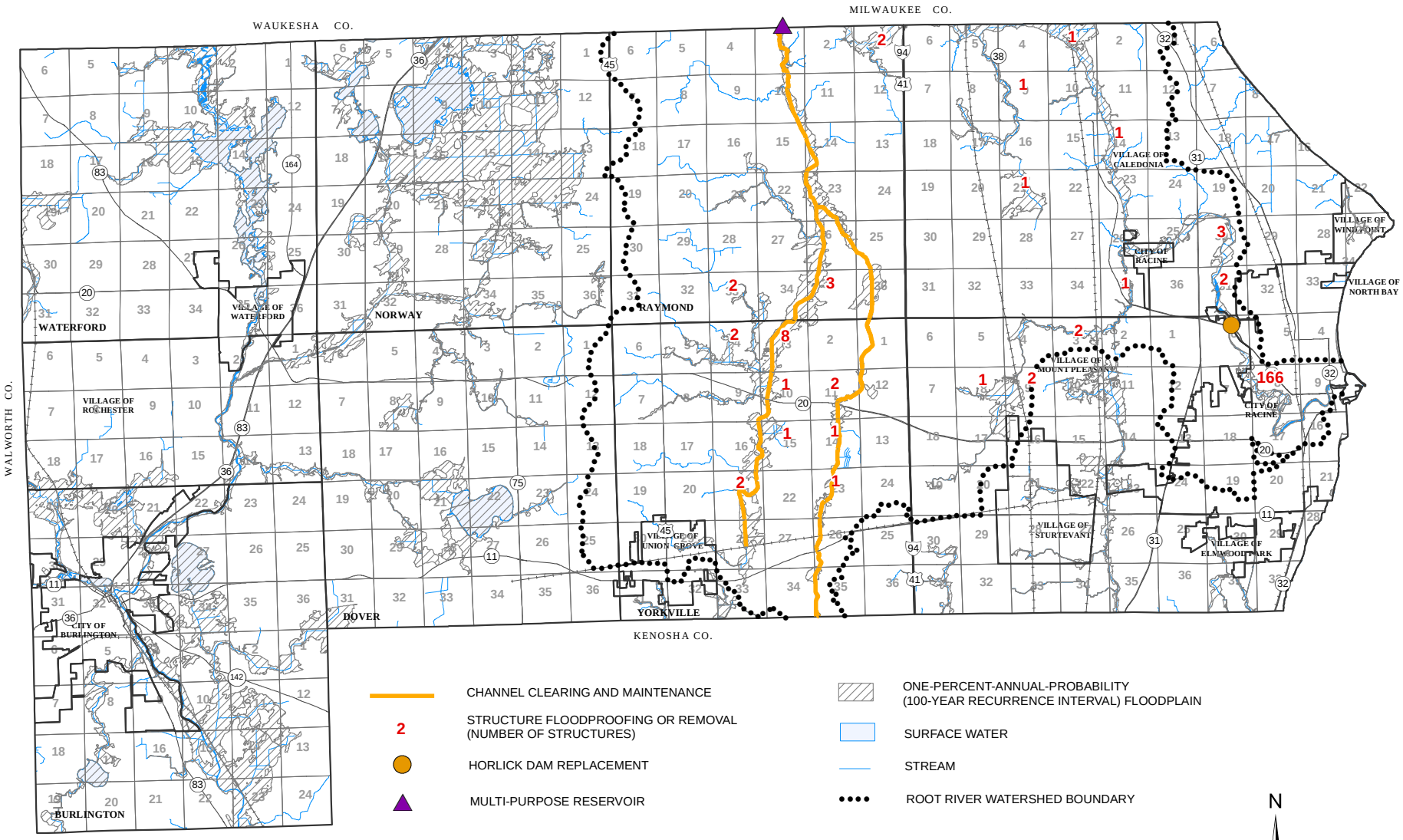
- Floodproofing or removal of up to 206 structures identified using County large-scale topographic maps as potentially being located in the one-percent-annual-probability floodplain. While this number of structures may include some agricultural structures, no garages or small outbuildings are included in this total. In this regard, field surveys should be made of those structures identified on the County large-scale topographic maps as being located within the one-percent-annual-probability floodplain in order to obtain a more definitive assessment of their flood hazard status. 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. This is the result of recent revisions to the one-percent-annual-probability floodplain. As noted in Chapter IV, there are three structures considered by FEMA to be repetitive- or substantial-loss properties in Racine County, two of which are located in the Root River watershed.

- The construction of a multi-purpose—flood control, water quality enhancement, low-flow augmentation, and recreational use—reservoir at the confluence of the North Branch of the Root River and the Root River Canal in the City of Franklin in Milwaukee County. The reservoir, identified as Oakwood Lake, was intended to be the focal point for the development of a major regional park. Due to site limitations, this reservoir would provide only modest flood control benefits.

- Restoration of the Horlick Dam to preserve this unique historic structure and to provide the focal point for the development of a major park.

Map 43

MAJOR FLOODLAND MANAGEMENT MEASURES FOR THE ROOT RIVER WATERSHED



Source: SEWRPC.

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; and 4) the maintenance of a skeleton stream-gaging network in the watershed.

As shown in Table 58, the estimated capital cost of implementing the Root River watershed portion of the Racine County floodland management plan element would be $19,084,500.[11] Table 58 also shows the current implementation status of each plan element.

Some elements of the floodland management plan that have been implemented to date include the reconstruction of the Horlick Dam in the early 1970s, channel clearing along the east and west branches of the Root River Canal in the early 1980s in conjunction with implementation of a nonpoint source pollution control program, and the establishment by Racine County of a parkway acquisition program.

Efforts to develop the multi-purpose reservoir in the City of Franklin were initiated in the early 1980s, including a proposal to develop the reservoir as a part of an urban State park. These initial efforts were, however, abandoned. At the present time there is no interest being expressed by Milwaukee County, the WDNR, or other agencies to carry out this plan element. This proposal has been reconsidered a number of times since it was first recommended, the most recent being in 1990.[12] At that time, it was found that the construction of the reservoir would result in no major flood damage abatement benefits. It was noted, however, that it would provide recreational and water quality benefits and it was recommended that the development of Oakwood Lake continue to be pursued by State and local officials. However, given the status of interest at this time and the functioning purpose, this project is not being carried into the final plan recommendations in this hazard mitigation plan.

In 2009 the Town of Raymond Drainage District submitted permit applications to the WDNR to clear the Root River Canal in the four-mile-long reach from the confluence of the East and West Branch north to the Racine County border. The total estimated cost for the project is $100,000 and work is scheduled to be completed in winter 2010.

Floodland Management Plan for the Pike River Watershed

In 1983, SEWRPC adopted a comprehensive plan for the physical development of the Pike River watershed.[13] That plan was further amended as it relates to Racine County in 1987, 1996, and 1997.[14] In the preparation of that plan, a concerted effort was made to offer for public evaluation a full range of physically feasible alternative plan subelements 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.

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[11]*Total capital cost excludes fully implemented components.*

[12]*SEWRPC Community Assistance Planning Report No 152,* op. cit.

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

[14]*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 58

PRINCIPAL FEATURES, COSTS, AND BENEFITS OF THE FLOODLAND MANAGEMENT PLAN ELEMENT FOR THE ROOT RIVER WATERSHED

Component Description	Economic Analysis[a]							Implementation Status
	Capital Cost[b]		Annual Amortized Capital Cost (thousands)	Annual Operation and Maintenance Cost (thousands)	Total Annual Cost (thousands)	Annual Benefits (thousands)	Benefit-Cost Ratio	
	Item	(thousands)						
1. Channel clearing and maintenance along the Root River Canal	a. Clear 21.9 of canal	$ 547.5	$ 34.7	$ 18.0	$ 52.7	$23.7	0.4	Partially implemented
2. Structure floodproofing or removal	a. Floodproof or remove up to 206 structures	- -	- -	- -	- -	- -	- -	Not implemented[c]
3. Construct multi-purpose reservoir	a. 660-acre reservoir	$18,442.1	$1,169.2	$284.7	$1,453.9	$94.9[d]	- -	Not implemented
4. Restoration of Horlick Dam	a. Construct gravity dam along downstream face of existing dam	$ 227.8	- -	- -	- -	- -	- -	Implemented
	b. Snagging and cleaning of impoundment	94.9	- -	- -	- -	- -	- -	Not implemented
	Subtotal	$ 322.7	$ 20.4	$ 0.0	$ 20.4	$ 0.0	- -	- -

[a] *Economic analyses are based on an annual interest rate of 6 percent and a 50-year amortization period and project life. Amounts shown are in 2008 dollars.*

[b] *Includes engineering, administration, and contingencies.*

[c] *Structure floodproofing/removal to be carried out at discretion of property owners.*

[d] *Amount shown represents flood control benefit only.*

Source: SEWRPC.

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.

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 mitigation measures recommended under the watershed study were subsequently adapted for use in the current hazard mitigation planning effort. This plan was further refined in 1987, 1996 and 1997. As shown on Map 44, the plan calls for the following measures:

- Preservation of the remaining primary environmental corridor lands along the Pike River and its major tributaries in essentially natural open space uses. The corridors are to be preserved by a combination of public acquisition for parkway purposes and floodland and open space zoning.

- Channel enlargement and rehabilitation along 5.25 miles of the Pike River main stem between County Line Road (CTH KR) and Spring Street (CTH C). The enlargement consists of widening the existing channel above the current low-flow channel to increase floodwater conveyance and storage capacity. A total of four wetland/storage basins would be constructed along this stream reach. In addition, the storage basins and channel bottom would be planted with wetland vegetation, while the upper channel slopes and adjacent buffer zones would be planted with prairie vegetation. In-stream fish habitat structures would also be constructed.

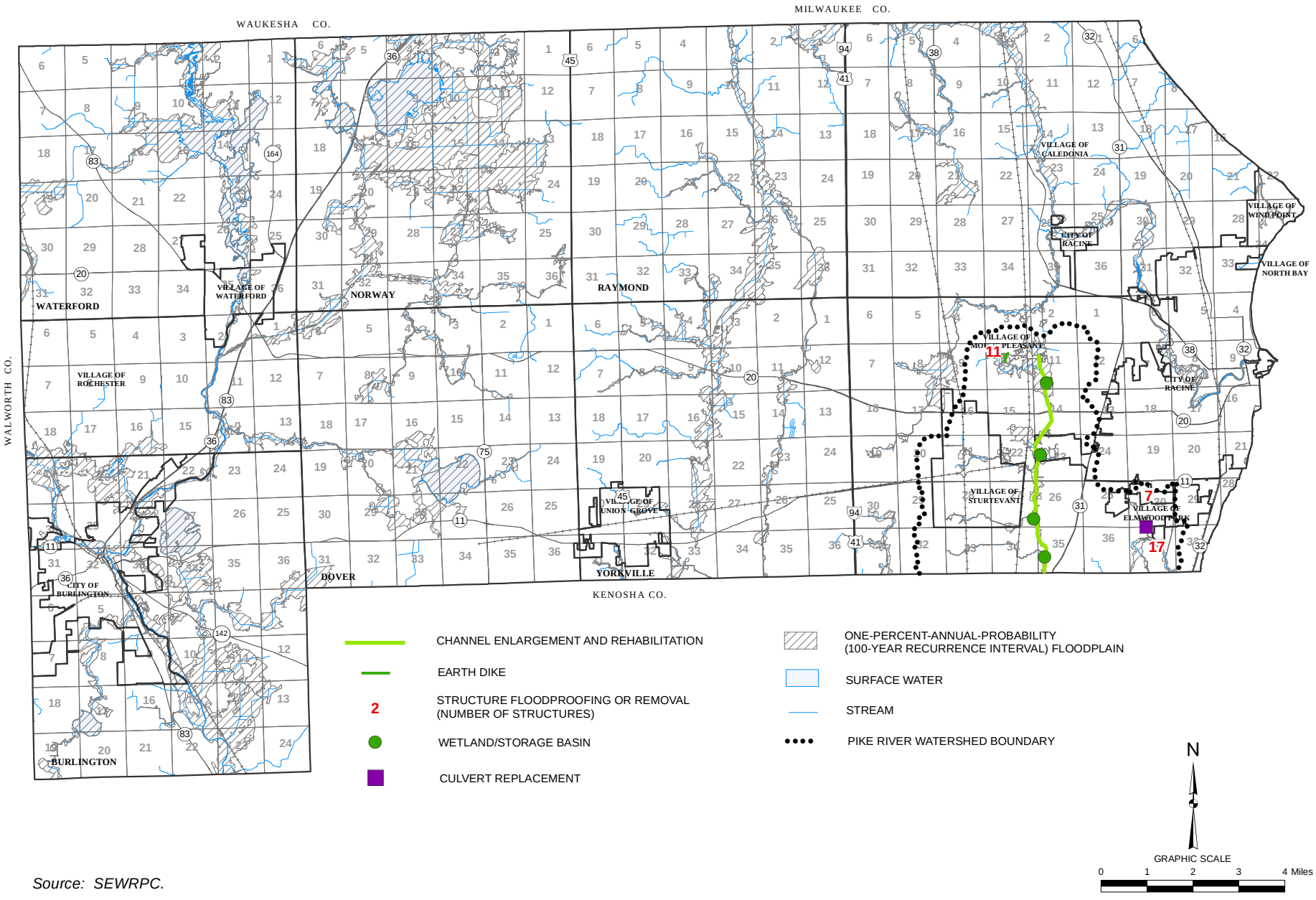
- Construction of an earthen berm upstream of Old Spring Street to protect residential structures along the Bartlett Branch. The berm would be about 500 feet long, with an average height of about five feet.

- Replacement of the Chicory Road crossing of Sorenson Creek with a new clear-span bridge having a waterway opening of about 30 feet.

- Floodproofing or removal of about 35 structures that would not be removed through the structural measures noted above. 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 on the County large-scale topographic maps as being located within the one-percent-annual-probability floodplain in order to obtain a more definitive assessment of their flood hazard status. Furthermore, this plan element is presented as an option, subject to the preference of the individual property owner. The number of structures identified has decreased by one since the initial hazard mitigation plan. This reflects the demolishing of one structure. None of the three structures in Racine County considered by FEMA to be repetitive- or substantial-loss properties are located in the Pike River watershed.

Map 44

RECOMMENDED FLOODLAND MANAGEMENT MEASURES FOR THE PIKE RIVER WATERSHED



Source: SEWRPC.

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; and 4) the maintenance of a skeleton stream-gaging network in the watershed.

As shown in Table 59, the estimated capital cost of implementing the Pike River watershed portion of the Racine County floodland management plan element would be $16,898,200.[15] Table 59 also shows the current implementation status of each plan element.

Elements of the floodland management plan that have been implemented to date include the construction of the earthen berm along the Bartlett Branch, and portions of the Pike River channel restoration project. The Village of Mt. Pleasant Storm Water Utility District had completed construction of the Phases 1 through 4A of the Pike River project (Spring Street (CTH C) to the Canadian Pacific Railway) as of 2009. Detailed design and construction of the remaining 2.5 miles (Phases 4B through 9) are in progress. It is expected that this project will be completed over the next six to eight years.

Floodland Management Plan for the Des Plaines River Watershed

SEWRPC has completed a comprehensive plan for the Des Plaines River watershed.[16] 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 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 Racine County portion of the Des Plaines River watershed was developed and adopted by the Des Plaines River Watershed Committee (see Appendix A for committee member list). These mitigation measures were subsequently adapted for use in the current hazard mitigation planning program. As shown on Map 45, the plan calls for the following measures:

[15]*Total capital cost excludes fully implemented components.*

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

Table 59

PRINCIPAL FEATURES, COSTS, AND BENEFITS OF THE FLOODLAND MANAGEMENT PLAN ELEMENT FOR THE PIKE RIVER WATERSHED

Component Description	Economic Analysis[a]							Implementation Status
	Capital Cost[b]		Annual Amortized Capital Cost (thousands)	Annual Operation and Maintenance Cost (thousands)	Total Annual Cost (thousands)	Annual Benefits (thousands)	Benefit-Cost Ratio	
	Item	(thousands)						
1. Pike River channel enlargement and rehabilitation	a. Construct 5.25 miles of channel modifications and four wetland/storage basins	$16,609.4	$1,053.0	$21.7	$1,074.7	$150.6	0.1	Partially implemented
2. Berm along Bartlett Branch	a. 500-foot-long earth berm	$ 121.2	$ 7.7	$ 1.0	$ 8.6	$ 63.9	7.4	Implemented
3. Chicory Road culvert replacement along Sorenson Creek	a. Install new clear-span bridge with 30-foot opening width	$ 288.8	$ 18.3	$ 0.0	$ 18.3	$ 13.8	0.8	Not implemented
4. Structure floodproofing or removal	a. Floodproof or remove up to 35 structures	- -	- -	- -	- -	- -	- -	Not implemented[c]

[a] *Economic analyses are based on an annual interest rate of 6 percent and a 50-year amortization period and project life. Amounts shown are in 2008 dollars.*

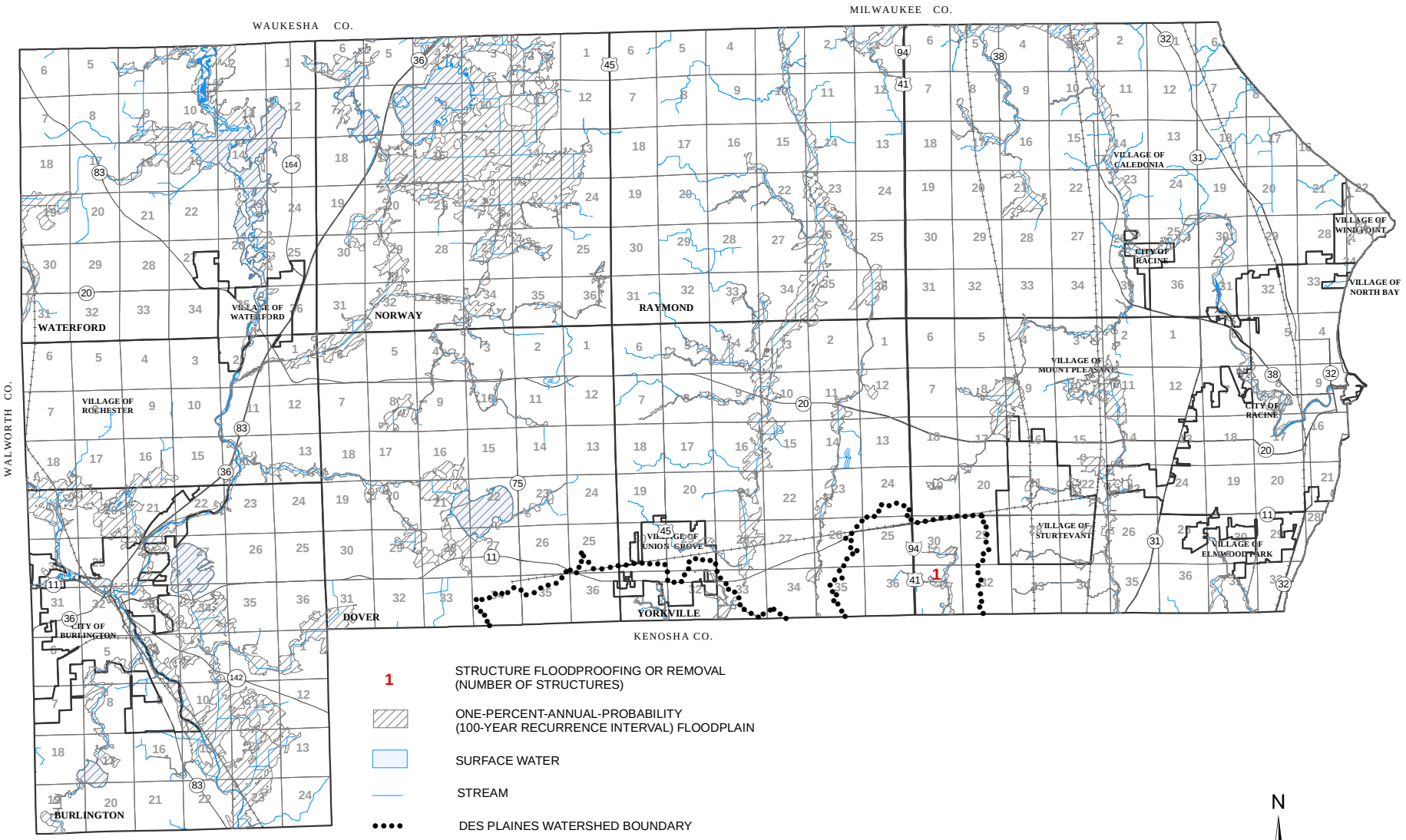
[b] *Includes engineering, administration, and contingencies.*

[c] *Structure floodproofing/removal to be carried out at discretion of property owners.*

Source: Village of Mt. Pleasant Utility District and SEWRPC.

Map 45

RECOMMENDED FLOODLAND MANAGEMENT MEASURES FOR THE DES PLAINES RIVER WATERSHED



NOTE: In the Des Plaines River watershed, prairie restoration is recommended on 20 percent of suitable farmland and wetland restoration is recommended on suitable rural land within the one-percent-annual-probability floodplain. Also, control of peak rates of runoff from new development is recommended, with the one-percent-probability peak flow being limited to 0.30 cfs per acre and the 50-percent-probability peak flow being limited to 0.04 cfs per acre.

Source: SEWRPC.

- Preservation of the remaining primary environmental corridor lands along the Des Plaines River and its major tributaries in essentially natural open space uses. 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 two- 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 100-year 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.

- Floodproof one structure identified on the County large-scale topographic maps as potentially being located in the one-percent-annual-probability floodplain. In this regard, a field survey should be made of that structure to obtain a more definitive assessment of its flood hazard status. Furthermore, this plan element is presented as an option, subject to the preference of the individual property owner. None of the three structures in Racine County considered by FEMA to be repetitive- or substantial-loss properties are located in the Des Plaines River watershed.

In addition to the measures outlined above, the preliminary floodland management element contains the following accessory measures to meet special needs within the watershed:

- Use 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.[17]

- 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.

- Determination by lending institutions of the floodprone status of properties prior to granting a mortgage.

[17]*Such updating is in progress under the FEMA Map Modernization program.*

- 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.

- Providing property owners with information regarding the extent of flood hazard areas.

- Publicizing the watershed study through news media and a public hearing.

- Incorporation of channel maintenance functions in the operations of responsible governmental units.

- Maintenance of 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 60, the estimated capital cost of implementing the overall Des Plaines River watershed floodland management plan elements pertinent to Racine County would be $9,287,000. 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 less than $750,000 and is largely associated with the provision of stormwater detention for new development and conversion of rural lands to wetland and prairie conditions.

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 Management Plans

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.

Within Racine County, certain municipalities are required to obtain State stormwater discharge permits. Those municipalities with approved permits include Racine County, the City of Racine, and Villages of Caledonia, Mt. Pleasant, Sturtevant, and Wind Point. As a part of the permit application process, these communities also have adopted stormwater-related ordinances.

In addition to the communities listed above, the plan as it relates to the Des Plaines River watershed, specifically recommends that the Village of Union Grove prepare a stormwater management plan. The Village of Union Grove is currently working on the plan which is scheduled for completion in 2010. The remaining urban communities in the County are also encouraged to prepare such plans. In those townships that are anticipated to

Table 60

PRINCIPAL FEATURES, COSTS, AND BENEFITS OF THE RECOMMENDED FLOODLAND MANAGEMENT PLAN FOR THE DES PLAINES RIVER WATERSHED

Component Description	Economic Analysis[a,b]							Status of Implementation
	Capital Cost[c]		Annual Amortized Capital Cost (thousands)	Annual Operation and Maintenance and Land Rental Costs (thousands)	Total[d] Annual Cost (thousands)	Annual[d] Benefits (thousands)	Benefit-Cost Ratio	
	Item	(thousands)						
Watershedwide								
a. Provide onsite detention storage facilities for planned new development	Detention facilities, including land cost	$6,881.7[e]	$436.3[e]	$70.1[e]	$506.4[e]	- -	- -	Partially implemented
b. Restore prairie conditions on 6.0 square miles of agricultural land	Prairie Restoration	$693.1 to $1,955.4[f]	$43.9 to $124.0[f]	$1.1 to $78.8[f]	$45.0 to $202.8[f]	- -	- -	Not implemented
c. Restore wetland conditions on 3.1 square miles of agricultural land in the 100-year floodplain	Wetland Restoration	$178.8 to $448.5[f]	$11.3 to $28.4[f]	$0.3 to $20.3[f]	$11.6 to $48.7[f]	- -	- -	Not implemented
d. Floodproof one residential structure	Floodproofing	$1.4	$0.1	$1.7	$1.8	- -	- -	Not implemented
	Total	$7,755 to $9,287	$491.6 to $588.8	$73.2 to $170.9	$564.8 to $759.7	- -	- -	- -

[a] *Economic analyses are based on an annual interest rate of 6 percent and a 50-year amortization period and project life. Amounts shown are in 2008 dollars.*

[b] *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 $630,000 to $750,000.*

[c] *Includes engineering, administration, and contingencies.*

[d] *Annual benefits and costs used in the benefit-cost analysis include only the direct benefits derived from the abatement of monetary flood damages, and the direct costs attendant to implementation of the floodland management measures, including capital and operation and maintenance costs. Environmental and recreational benefits and costs were not addressed in the benefit-cost analysis since these represent intangible benefits and costs and, therefore, cannot be readily quantified.*

[e] *Incremental cost between control of two-year and 100-year events.*

[f] *Cost reflects range from minimal wetland and prairie operation and maintenance to active management.*

Source: SEWRPC.

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.[18] 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.[19] 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 SEWRPC study.

At the request of local representatives, Commission staff compared and evaluated these two studies.[20] 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 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 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

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[18]*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.*

[19]*Crispell-Snyder, Inc., Consulting Engineers,* East Side Storm Water Management Study-Village of Waterford, *2004.*

[20]*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.*

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.

Finally, the evaluation 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.

The Village of Waterford and the Towns of Norway and Waterford received a $1.2 million grant in 2008 from the Federal Emergency Management Agency's Hazard Mitigation Grant Program to replace a pump station for the Racine County Farm Drainage District No. 1. This grant was disaster assistance in response to the June 2008 flooding. This grant was contingent upon the creation of a stormwater utility. The Village and the Towns are currently pursuing formation of this stormwater utility. It is anticipated that work will begin on the pump station sometime in 2010.

The June 2009 rain storms 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.

Stormwater-Related Regulations

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 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. As noted above, Racine County, the City of Racine, and the Villages of Caledonia, Mt. Pleasant, Sturtevant, and Wind Point have adopted such ordinances as part of their discharge permit program.

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, cable television, pamphlet development, individual seminars, the internet, and community speaking engagements. Appendix F shows an example of a self-help guide for local property owners that was prepared for one community.

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 channel enlargement and restoration project currently taking place, the Mt. Pleasant Storm Water Drainage District held a series of public information meetings on that project. The District has also published a summary document of the project that is available to the public.

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.

This involvement may be accomplished, in part, through the participation of Citizen Corps. Citizen Corps was created to help coordinate volunteer activities that will make communities safer, stronger, and better prepared for people to respond to any emergency situation. Citizen Corps is coordinated nationally by FEMA, in conjunction and cooperation with other Federal entities, State and local governments, first responders and emergency managers, and the volunteer community. Citizen Corps activities include:

- Educating residents about disaster preparedness;
- Implementing public education and outreach efforts;
- Providing training to improve citizen preparedness, prevention, and response capabilities;
- Promoting the importance of drills in the home, workplace and school;
- Coordinating citizen participation in community disaster response activities; and
- Coordinating volunteer opportunities that support local efforts in mitigation, preparedness, response, and recovery.

The activities of Citizen Corps are coordinated through local Citizen Corps councils. In March 2006, the Racine and Kenosha Citizen Corps officially joined to become one council.

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. An exception is the Village of North Bay, for which FEMA has published a Flood Hazard Boundary Map (FHBM). The plan calls for the continued participation of Racine County and the municipalities in the NFIP. The 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. The 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. Finally, as the flood control measures are implemented, the 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 61.

FEMA has completed a preliminary 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. An Open House was held to review the Preliminary FIS and DFIRM on September 20, 2007. Participants in the Open House included community government officials and the public. It is anticipated that the Racine County FIS and DFIRM will become effective by the end of 2010. Following the updated FIS and DFIRM becoming effective, it will likely be necessary for municipalities in the County to update their floodland zoning ordinances in order to maintain NFIP eligibility.

Lending Institution and Real-Estate-Agent Policies

The 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 traded in accord with rules of Wisconsin Department of Regulation and Licensing, Bureau of Direct Licensing and Real Estate.

Stream Channel Maintenance

The 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 linings, clearing debris and sediment from open channels, maintenance of

Table 61

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
Cities						
Burlington	Y	Y	10/05/1973	05/15/1978	10/02/2009	05/15/1978
Racine	Y	Y	- -	06/01/1973	01/02/1976	06/01/1973
Villages						
Caledonia	Y	Y	- -	04/01/1982[a]	04/01/1982	12/05/2008
Elmwood Park	Y	N[b]	- -	- -	- -	- -
Mt. Pleasant	Y	Y	- -	04/01/1982[c]	04/01/1982	04/28/2008
North Bay[d]	Y	N	09/06/1974	- -	09/10/1976	- -
Rochester[e]	Y	Y	01/09/1974	01/02/1981	01/02/1981	01/02/1981
Sturtevant	Y	Y	05/24/1974	06/04/1980[f]	06/04/1980	04/08/2008
Union Grove	Y	Y	- -	06/17/1986	06/17/1986[g]	06/17/1986
Waterford	Y	Y	12/17/1973	01/02/1981	01/02/1981	01/02/1981
Wind Point	Y	Y	06/28/1974	09/30/1980	09/30/1980	09/30/1980
Towns						
Burlington	Y	Y	05/20/1977[h]	04/01/1982[h]	04/01/1982[h]	04/01/1982[h]
Dover	Y	Y	05/20/1977[h]	04/01/1982[h]	04/01/1982[h]	04/01/1982[h]
Norway	Y	Y	05/20/1977[h]	04/01/1982[h]	04/01/1982[h]	04/01/1982[h]
Raymond	Y	Y	05/20/1977[h]	04/01/1982[h]	04/01/1982[h]	04/01/1982[h]
Waterford	Y	Y	05/20/1977[h]	04/01/1982[h]	04/01/1982[h]	04/01/1982[h]
Yorkville	Y	Y	05/20/1977[h]	04/01/1982[h]	04/01/1982[h]	04/01/1982[h]
County						
Racine County	Y	Y	05/20/1977	04/01/1982	04/01/1982	04/01/1982

[a]*The Village of Caledonia has adopted Racine County flood insurance rate map panels 550340 0020, 0025, 0045, and 0050 dated April 1, 1982 and the flood boundary and floodway map panels 550347 0020, 0025, 0045, and 0050 dated April 1, 1982.*

[b]*There are no floodlands mapped in the Village of Elmwood Park.*

[c]*The Village of Mt. Pleasant is using Racine County flood insurance rate map panels 550347 0045B, 0070B, and 0075 dated April 1, 1982.*

[d]*The Village of North Bay has a sanction date of September 6, 1975.*

[e]*During December 2008, the Town of Rochester and the Village of Rochester were consolidated as the Village of Rochester. Both jurisdictions participated in the initial Racine County hazard mitigation plan.*

[f]*The Village of Sturtevant has also annexed areas from Racine County flood insurance rate map panels 550347 0045B, and 0070B dated April 1, 1982.*

[g]*No elevations determined. All zone A, C, and X.*

[h]*In Wisconsin, towns are covered under county eligibility in the National Flood Insurance Program.*

Source: Federal Emergency Management Agency.

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. The 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.

Survey of Buildings in and Near the One-Percent-Annual-Probability Floodplain

As noted in Chapter II, the extent of the one-percent-annual-probability floodplain has been delineated on the Racine County large-scale topographic maps. 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, the 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 all other structural floodland management plan elements called for in this plan have been implemented. 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 procedures.

A review of the Letters of Map Change (LOMC) information on the FEMA website reveals that 152 LOMC have been submitted for Racine County properties from 1997 to 2009. LOMC include two categories; Letters of Map Amendment (LOMA) and Letters of Map Revision (LOMR). LOMA include those properties that have completed a survey and under existing conditions are above the one-percent-annual-probability floodplain. In Racine County 106 properties have effective LOMA. Another 43 properties have effective Letters of Map Revision based on Fill (LOMR-F). These LOMR-F properties have been filled and it has been confirmed via survey that the structure has been raised above the one-percent-annual-probability flood stage elevation.

HAZARD MITIGATION PLAN COMPONENT FOR THUNDERSTORM, HIGH-WIND, HAIL, AND LIGHTNING HAZARDS

As described in Chapter IV, 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 Task Force in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

Identification of Alternative Mitigation Strategies

All thunderstorms and related hazard 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. However, only 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.

Thunderstorms and High Wind

While it may not be possible to accurately identify specific areas where there is significant risk from thunderstorm and related hazard events, or the number or severity of the events, measures can be taken to reduce the potential damage caused by thunderstorm and related hazards wherever they may occur in the County. High-wind events associated with thunderstorms are very similar to tornadoes, except they are more common and usually less powerful than tornadoes. In the review by the Racine County Hazard Mitigation Plan Task Force as part of the updating process, the following measures to reduce vulnerability to high winds were 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 structures ability to withstand greater wind velocities and encourage provision of safe rooms, especially in structures that do not have a basement. Building code provisions considered may include requirements, such as construction methods that employ cross-bracing, anchoring of walls to foundation, and anchoring roof rafters to walls (also mitigates tornado risk) and measures to provide wind protection and retrofits for vulnerable features, such as windows, garage doors, patio doors, double-wide entry doors, siding, and

bracing for walls and rafters (also mitigates tornado risk). Additional building code provisions may include requirements related to using tie-downs and proper anchoring of mobile and manufactured homes and anchoring of attachments, such as carports and porches, to mobile and manufactured homes.

Structural

- Establish, update, and/or monitor public early warning systems and networks;
- 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;
- Promote planting windbreaks for farm crops; and
- Bury and protect power and utility lines.

Public Informational and Educational Programming

- Increase public education and awareness of the potential severity of thunderstorms;
- Increase the coverage and use of National Oceanic and Atmospheric Administration (NOAA) radios;
- 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 G); and
- Produce and distribute emergency preparedness information related to thunderstorm hazards.

Hailstorms

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 any accidents. Advance warning systems 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. In the review by the Racine County Hazard Mitigation Plan Task Force as part of the updating process the following measures to reduce vulnerability to hail were 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 increase requirements for hail-impact-resistant roofing and other materials.

Public Informational and Educational Programming

- Increase public education and awareness of the potential severity of hailstorms.

Lightning

All of Racine County is at risk from lightning and personal protection is paramount for lightning safety. Many people incur injuries or are killed due to misinformation and inappropriate behavior during thunderstorms. A few simple precautions can reduce many of the dangers posed by lightning. The individual is ultimately responsible for his/her personal safety and has the right to take appropriate action when threatened by lightning. In the review by the Racine County Hazard Mitigation Plan Task Force as part of the updating process the following measures to reduce vulnerability to lightning were identified as viable for this update of the Racine County hazard mitigation plan.

Nonstructural

- Enforce existing local ordinances, in terms of adequate grounding of newly constructed buildings;

- Local fire suppression departments obtain and maintain equipment to help detect or mitigate lightning-related fires, such as thermal imaging devices.

Structural

- Use surge protectors on critical electronic equipment; and

- 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.

Public Informational and Educational Programming

- Promote public awareness of proven lightning safety guidelines to reduce the risk of lightning hazards;

- Support public information regarding lightning hazards and cost effective mitigation measures;

- Help produce and distribute educational materials on lightning safety to the public;

- Encourage residents to develop a Family Emergency Preparedness Plan and to use proper fire alarm systems; and

- Encourage the expansion of the availability of the NOAA severe weather alert systems.

Current Programs

Federal and State Programs

The National Weather Service issues severe thunderstorm watches and warnings when there is a threat of severe weather conditions, including high winds, hail, lightning, and tornadoes. 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. The Wisconsin Division of Emergency Management, 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. 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, a number of local emergency management and fire departments have instituted educational programs and communications on public safety.

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.

As described in Chapter II, Racine County has developed an emergency operations 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 thunderstorms, high-wind, and hail events.

Analysis of the vulnerability of humans, infrastructure, and economic production to thunderstorm and related hazard 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 23 warning and communication siren systems, with 14 located within the City of Racine, four within the City of Burlington, two within the Village of Sturtevant, and one within each of the Villages of Rochester, Union Grove, and Waterford.

Racine County was redesignated by the National Weather Service as a *StormReady*® community on November 23, 2008. This designation is valid through November 23, 2012. *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 in order to qualify for this designation. Specifically, in order 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 Task Force 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. Developed urban areas located within unincorporated areas, such as major lake developments, should also be considered as areas needing 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.

In addition, feasible, nonstructural and structural mitigation actions include ordinance review and possible refinement, which may be applicable at the town, city, or village levels to encourage use of appropriate building codes; provision of 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 coordinated emergency operations 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 H), and review and action by the Racine County Hazard Mitigation Task Force as a part of the updating process (see Appendix A), the following mitigation measures related to thunderstorms, high-wind, hail, and lightning events are included in the Racine County hazards mitigation plan:

- Maintenance and potential expansion of early warning and communication systems to include Emergency Alert System (EAS) capabilities and expanded use of emerging technologies. In this regard, the expanded use of the NOAA Weather Radio among residents is encouraged. This weather radio continuously broadcasts National Weather Service forecasts, warnings and crucial weather information. NOAA Weather Radio also provides direct warning to the public for natural, man-made, or technological hazards, and is the primary trigger for activating the EAS on commercial radio, television, and cable systems;

- Promotion of educational and informational programming, especially related to the early warning network, NOAA Weather Radio and EAS broadcasts, and to individual actions to protect citizens, property, and businesses. Citizen Corps may be able to provide assistance in these educational efforts;

- Ongoing review and enforcement of building code ordinance requirements; and

- Continued coordination of emergency operations and response plans among governmental units and first responders.

Because these measures are intended to be ongoing efforts, the Task Force 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 Task Force 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 Task Force 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 and encourage provision of safe rooms, especially in structures that do not have a basement. Building code provisions considered may include requirements, such as construction methods that employ cross-bracing, anchoring of walls to foundation, and anchoring roof rafters to walls, tie-downs and proper anchoring of mobile and manufactured homes and anchoring of attachments, such as carports and porches, to mobile and manufactured homes, and measures to provide wind protection and retrofits for vulnerable features, such as windows, garage doors, patio doors, double-wide entry doors, siding, and bracing for walls and rafters;

- Conduct of an inventory and inspection of facilities to ensure the quality, quantity, and accessibility of adequate tornado shelters; and

- Establish safe and appropriate locations for temporary debris disposal sites.

Structural

- Establish, update, and/or monitor public early warning systems and networks;

- 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, and other vulnerable public areas;

- 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; and

- Bury and protect power and utility lines.

Public Informational and Educational Programming

- Increase public education and awareness of the potential severity of thunderstorms;

- Increase the coverage and use of NOAA Weather Radios and Emergency Alert System broadcast awareness;

- 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 G); and

- Produce and distribute emergency preparedness information related to thunderstorm hazards.

Current Programs

Federal and State Programs

The National Weather Service issues severe thunderstorm watches and warnings when there is a threat of severe weather conditions, including high winds, hail, lightning, and tornadoes. The National Weather Service also 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. The Wisconsin Division of Emergency Management, 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. 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, a number of local emergency management and fire departments have instituted educational programs and communications on public safety.

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 of the local citizens to have a weather radio. In addition, NOAA Weather Radio has a 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 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.

As described in Chapter II, Racine County has developed an emergency operations 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 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 23 warning and communication siren systems, with 14 located within the City of Racine, four within the City of Burlington, two within the Village of Sturtevant, and one within each of the Villages of Rochester, Union Grove, and Waterford.

Racine County was redesignated as a *StormReady*® community for the period November 23, 2008 through November 23, 2012. This program is described in the previous section on hazard mitigation plan components for thunderstorm, 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. Developed urban areas located within unincorporated areas, such as major lake developments, should also be considered as needing early warning systems. The best shelters are specifically designed tornado shelters or safe rooms. Lacking such shelters, taking refuge in a basement near supporting walls or pillars, and away from windows, or, if there is no basement, taking shelter in smaller interior, windowless rooms, such as hallways or closets, can offer some protection and are the next best options. Cars, mobile homes, garages, and outbuildings are not safe shelters from tornadoes. 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.

In addition, feasible, nonstructural and structural mitigation actions include ordinance review and possible refinement, which may be applicable at the town, city, or village levels to encourage use of appropriate building codes; 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 due to flooding, 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 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 H), and review and action by the Racine County Hazard Mitigation Task Force (see Appendix A), the following mitigation measures related to tornado hazard events are included in the updated Racine County hazards mitigation plan:

- Develop an effective means of warning at-risk populations, including installation and maintenance of early warning systems to include EAS capabilities and expanded use of emergency technologies;

- 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, mobile home parks, fairgrounds, and other vulnerable public areas;

- Promote educational and informational programming, especially related to the early warning network, including NOAA Weather Radio and EAS broadcasts, and to individual actions to protect citizens, property, and businesses. Citizen Corps may be able to provide assistance in these educational efforts;

- Ongoing review and 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 Task Force 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 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 Task Force 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. Extreme heat and cold events combined are the number one most deadly natural hazards that Racine County must confront. Temperature extremes should be expected with each summer and winter season, making this hazard the least difficult to plan and prepare for. 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. 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, poor, and debilitated 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 Task Force 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

- Organize neighborhood outreach groups who look after vulnerable groups and individuals;
- Provide special arrangements for payment of heating bills; and
- Increase coverage and use of NOAA Weather Radio and EAS broadcasts.

Structural

- Conduct of an inventory and inspection of facilities to ensure the quality, quantity, and accessibility of adequate heating and/or cooling centers in the community.

Public Informational and Educational Programming

- Increase public education and awareness of the potential severity of temperature extreme events; and
- Produce and distribute emergency preparedness information related to temperature extremes.

Current Programs

Federal and State Programs

The National Weather Service issues advisory statements to media, emergency management, and public health officials in advance of and during conditions of excessive heat. 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 rules 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.

The Wisconsin Division of Emergency Management, 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. 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 a number of brochures, booklets, and pamphlets available for the public on extreme heat and other general emergency management-related topics. These programs are described in the previous report section on tornado hazards.

Racine County was redesignated as a *StormReady*® community for the period November 23, 2008 through November 23, 2012. This program, which includes actions related to extreme heat conditions, is described in the section above on hazard mitigation plan components for thunderstorm, high-wind, hail, and lightning hazards.

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 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 for, and awareness of, elderly neighbors. Community and school-based informational programs should continue to be conducted by the County in partnership with Federal, State and local authorities.

Multi-Jurisdictional Considerations

Extreme temperature events do not impact municipalities as a whole, they are primarily a public health concern and ultimately prevention should fall to the neighborhood watch groups and local authorities. These events affect individuals, typically the elderly, sick, and invalid, 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 H), and review and action by the Racine County Hazard Mitigation Task Force (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;
- Provide special arrangements for payment of heating bills;
- Identify and advertise a list of available heating and or cooling shelters in the immediate area;
- Increase coverage and use of NOAA Weather Radio and EAS broadcasts; and
- Promotion of educational and informational programming. Citizen Corps may be able to provide assistance in these educational efforts.

Because these measures are intended to be ongoing efforts, the Task Force decided to retain them in the updated plan.

HAZARD MITIGATION PLAN COMPONENT FOR LAKE MICHIGAN COASTAL HAZARDS

As described in Chapter IV, Lake Michigan shoreline erosion, flooding, and 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 Task Force 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.[21] 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 Task Force 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.

[21] *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.*

- Development and adoption of shoreland zoning ordinances incorporating bluff setback provisions. (Guidance on setback provisions is available from the Wisconsin Coastal Management Program).

- Construction and maintenance of 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. Structural shore protection measures should be provided if it can be shown that such measures will effectively reduce shoreline erosion and not adversely affect adjacent sections of the shoreline to impair public rights in navigable waters; that there will be no significant reduction in public access, use, and enjoyment of the shoreline environment; and that any adverse impacts on fish and wildlife resources caused by the structure will be compensated for by providing fish and wildlife preservation measures. Table 62 sets forth minimum criteria to use as a basis for structure design.

- Relocation of 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.[22])

- Conduct an assessment of the effectiveness of shoreline protection structures in the County. Such an assessment of structures along Lake Michigan in Racine County was completed in 2008.

- Continuation of ongoing programs to update and 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.

- Review wastewater treatment plant outfall capacity to determine capacity at high lake levels. The Racine Utility has completed a wastewater treatment facility plan[23] 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.

- Public informational and educational programming covering:

    — Information on shoreland erosion and related hazards to serve as a "fair warning" guide for, and a valuable service to, groups, such as realtor-brokers, shoreline property owners, developers, lending institutions, and prospective buyers.

    — Property owner guidance on proper shoreline and bluff management actions, such as vegetation and drainage practices.

    — Permitting and zoning: A number of educational materials have been developed through the cooperative efforts with the State Coastal Management Program.

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[22]*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.*

[23]*Rust Environment and Infrastructure, and Applied Technologies,* Facilities Plan for the Racine Wastewater Utility, *February 1998.*

Table 62

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	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 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 3. Consider design wave height, wave direction, and the erosive impacts of wave action on the proposed structure
Structural Design	1. Size structure for design waves expected for a two-percent-annual-probability lake level, or 584.2[a] feet above the National Geodetic Vertical Datum (1929)[b] 2. Provide measures to protect the base of the structure against wave scouring 3. Design loose rubble revetment structures with a slope not greater than one vertical on two horizontal 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 5. Provide measures to prevent excessive erosion along the flanks of the structure 6. Provide adequate bedding materials to prevent undercutting of the structure
Bluff Stabilization	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 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 3. If necessary, provide for interception drainage of surface water runoff to prevent surface erosion and saturation of the soils in the bluff 4. Provide adequate vegetative cover of the bluff slope after regrading

[a]*U.S. Army Corps of Engineers Detroit District, Revised Phase I Report on the Great Lakes Open-Coast Flood Levels, April 1988.*

[b]*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.*

Current Programs

Federal Programs

A long-term project to assess the economic impact of the water levels in the Great Lakes is being coordinated by the Army Corps of Engineers, Detroit District. 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 Corps has organized the Lake Michigan Potential Damages Study (LMPDS). The objective of this research project is to create a modeling procedure and engineering-management tool for estimating economic effects of lake level changes and related social, environmental and cultural impacts. The LMPDS modeling approaches are expected to be the framework for economic assessments for each of the other Great Lakes. The LMPDS is also intended to be a forum for concerted information system development between international, Federal, State, County, township and municipal governance about the Lake Michigan resource base.

The Army Corps of Engineers 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.

In March 2009 FEMA produced a Draft Great Lake Coastal Guidelines Update which includes new methodology to determine flood hazard zones within the FEMA Region V coastal zone. Once the text is finalized, FEMA will initiate a formal 60-day public review process. Future steps include pilot studies to evaluate the new methodologies at specific Great Lakes locations and then a prioritization of coastal mapping needs within the 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.

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, Bureau of Housing and 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 University of Wisconsin Sea Grant is a statewide program of basic and applied research, education, and 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.

Local Programs

As reported in Chapter II, Racine County, the City of Racine, and the Villages of Caledonia and Wind Point have adopted shoreland zoning ordinances which apply to the Lake Michigan shoreland area.[24] The Racine County ordinance applies to nearly one-half of the shoreline, including nearly all of the potentially developable land and most of the highly erodible bluff areas. The current County shoreland policy and regulation regarding Lake Michigan setbacks for development and shore protection is sound and represents current planning recommendations. The ordinance provides for the use of shoreline protection and bluff stabilization structural measures, as well as bluff setbacks for development in portions of the County where urban shoreline development exists or is envisioned, and provides for a larger setback for development in other parts of the County where structural protection is not envisioned to be used due to limited planned urban development. The County policies and regulations also provide for specific procedures for the design and review of shore protection measures. These shoreline policies and regulations were developed under the guidance of a County Technical Subcommittee and are documented in a 1982 Lake Michigan coastal erosion management plan.[25]

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[24]*The Village of Mt. Pleasant has approved a shoreline zoning ordinance which, as of October 2009, was under review by the WDNR.*

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

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 recently assessed.[26]

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 H), and review and action by the Racine County Hazard Mitigation Task Force (see Appendix A), the following mitigation measures related to Lake Michigan coastal hazards are included in the updated Racine County Hazard Mitigation Plan:

- Continued enforcement and review of the County shoreland regulations and policies relating to set-backs for new development 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.

- Reevaluation of 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.[27]

- Continued construction and maintenance of 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.

- Continuation of ongoing programs to update and refine coastal hazard area data using geographic information system technology.

- Conducting an assessment of the vulnerability of the City of Racine water treatment plant and water treatment plant operations to Lake Michigan water levels based upon currently accepted design ranges. The vulnerability analysis would include potential impairments to water intake withdrawal capacity, treated sewage discharge rates, as well as plant flooding. This analysis should consider storm surges and wave, as well as a range of Lake Michigan stillwater levels.

- Public informational and educational programming on shoreline erosion hazards and proper property owner shoreline and bluff management actions. Citizen Corps may be able to provide assistance in these educational efforts.

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[26]*SEWRPC Community Assistance Planning Report No. 171,* Assessment of Lake Michigan Shoreline Erosion Control Structures in Racine County, *January 2008.*

[27]Ibid.

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 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 Task Force 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, winter storm events can pose a serious threat to Racine County. Severe winter weather can include blizzards, freezing sleet, and dangerous combinations of temperatures and wind. Winter storms may last for days or weeks 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 leading natural hazard cause of deaths in the State. Additionally, fatalities associated with winter storms include heart attacks while shoveling snow 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 and snow may be associated with a winter storm. In the review by the Racine County Hazard Mitigation Plan Task Force 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.

Nonstructural

- Review local building codes to determine if revisions are needed to improve the structures ability to withstand greater wind velocities and snow weight. Building code provisions considered may include requirements, such as construction methods that employ cross-bracing, anchoring of walls to foundation, and anchoring roof rafters to walls (also mitigates tornado risk) and measures to provide wind protection and retrofits for vulnerable features, such as windows, garage doors, patio doors, double-wide entry doors, siding, and bracing for walls and rafters.

- Review the energy efficiency and winter readiness of critical facilities and housing in the community.

Structural

- 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;

- Establish, update, and/or monitor public early warning systems and networks;

- 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; 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;

- Increase the coverage and use of NOAA Weather Radio and EAS broadcasts;

- 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 G); and

- Produce and distribute emergency preparedness information related to winter storm hazards.

Current Programs

Federal and State Programs

The Wisconsin Division of Emergency Management, 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 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.

In the event of severe winter weather, the National Weather Service posts winter weather bulletins. These bulletins consist of advisories, watches, and warnings that are issued concerning expected winter weather conditions. Some are used to alert the public of potentially dangerous weather-related advisories for events such as snow, winter weather, freezing rain or freezing drizzle, and blowing snow. Others are used to warn the public of more serious weather situations which could pose a threat to life and property: winter storm watch and winter storm, heavy snow, blizzard, ice storm, and sleet warnings. These bulletins are disseminated over a number of telecommunication channels, including the NOAA Weather Radio, the NOAA Weather Wire, and the State law enforcement TIME system. 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.

Local Programs

Programs within Racine County include those conducted by the Racine County Office of Emergency Management. These programs are described in the previous report section on tornado hazards. Community strategies include plowing, salting and sanding roads, maintaining the health of urban trees to minimize damage from ice storms, and promoting sound levels of home insulation. Older homes can be vulnerable to heat loss and any home is vulnerable to power loss, therefore, possession of an alternative heat and power source is a consideration in protecting against winter storm hazards.

As described in Chapter II, Racine County has developed an emergency operations 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 winter storm events.

Racine County was redesignated as a *StormReady*® community for the period November 23, 2008 through November 23, 2012. This program is described in the section above on hazard mitigation plan components for thunderstorm, high-wind, 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, 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. 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 blinding and ice. 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 under-way 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 H), and review and action by the Racine County Hazard Mitigation Task Force (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;
- Provide special arrangements for payment of heating bills;
- Identify and advertise a list of available heated shelters in the immediate area;
- Increase coverage and use of NOAA Weather Radio and EAS broadcasts;
- Promotion of educational and informational programming. Citizen Corps may be able to provide assistance in these educational efforts;
- 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.

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 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 Task Force 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, drought events pose a limited threat to Racine County. 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 areas. Racine County has about 125,000 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 Task Force 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

- 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 include monitoring soil moisture levels and planting crops that will tolerate low moisture levels;
- 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
- Consider crop insurance programs.

Structural

- Promote planting windbreaks for farm crops;
- Encourage the WDNR, U.S. Geological Survey, National Weather Service, and U.S. Army Corps of Engineers to continue to operate and monitor stream gaging stations and groundwater monitoring wells.

Public Informational and Educational Programming

- Increase public education and awareness of the potential severity of drought events; and
- Produce and distribute emergency preparedness information related to droughts.

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 Southeastern 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. 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.unl.edu/dm); 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.

The USDA's Farm Service Agency (FSA) provides information about conservation, commodity programs, crop insurance, and farm loans, along with State and county contacts.

When serious drought conditions occur, an Interagency Drought Task Force, with Federal, State and private sector agencies involved is typically organized. The Task Force brings together the resources and technical expertise of the various agencies, including the University of Wisconsin-Extension, to address all aspects of the drought. Examples of key activities included the operation of a Hay Hotline that matches those in need of hay or feed with potential suppliers from locations throughout the nation and the Farmers Assistance Line operated by the Department of Agriculture. The Assistance Line provides information and referrals for family farmers on a wide variety of legal, financial, employment, and personal health issues. In addition, numerous other organizations provide public safety information, most notably the American Red Cross.

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.

Priority Mitigation Measures

Based upon the foregoing evaluation, consideration of risk (see Appendix H), and review and action by the Racine County Hazard Mitigation Task Force (see Appendix A), the following mitigation measures related to drought events are included in the updated hazard mitigation plan for Racine County:

- Encourage multi-agency approaches to 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;

- Evaluate and design water supply systems that are not vulnerable to drought events; and

- Farm operators evaluate the economics of crop insurance programs.

Because these measures are intended to be ongoing efforts, the Task Force decided to retain them in the updated plan.

HAZARD MITIGATION PLAN COMPONENT FOR EARTHQUAKES

As described in Chapter IV, earthquakes are natural hazard events of minimal 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 Task Force in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

Identification of Alternative Mitigation Strategies

Earthquakes pose a very minor threat to Racine County, and, as discussed in Chapter IV, the community impacts are not considered to be significant. Historically, earthquakes have only caused moderate shaking to be felt in Racine County and have not resulted in any major destruction. The New Madrid fault is the nearest major, active fault and it lies nearly 500 miles south of Racine County. Earthquake tremors have occurred in Racine County, but are very rare events and of a weak magnitude. They are, therefore, a low-priority hazard under the Racine County mitigation plan update.

Earthquakes can cause considerable damage to life and property if they reach a strong magnitude. Measures can be taken to reduce the potential injuries and fatalities caused by earthquakes wherever they may occur in the County. In review by the Racine County Hazard Mitigation Plan Task Force as part of the updating process, the following measures to reduce vulnerability to earthquake events 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 structures ability to withstand moderate shaking. Building code provisions considered may include requirements, such as construction methods that employ cross-bracing, anchoring of walls to foundation, and anchoring roof rafters to walls and retrofits for vulnerable features, such as windows, garage doors, patio doors, double-wide entry doors, siding, and bracing for walls and rafters; and

- Use safe interior designs and furniture arrangements.

Public Informational and Educational Programming

- Increase public education and awareness of the potential of earthquakes;

- Increase the coverage and use of NOAA Weather Radio and EAS broadcasts;

- Encourage residents to develop a Family Emergency Preparedness Plan including the preparation of a Disaster Supply Kit (see Appendix G); and

- Produce and distribute emergency preparedness information related to earthquake hazards.

Current Programs

Federal and State Programs

Racine County is not likely to suffer directly from a severe earthquake. The primary concern to Racine County is the disruption in the provision of essential goods and services from the direct-impact area of a major earthquake.

The Central United States Earthquake Consortium (CUSEC), under FEMA, is engaged in an ongoing effort to reduce the hazards associated with earthquakes. Although Wisconsin is not one of the states directly involved in this program, Wisconsin Division of Emergency Management and the State indirectly benefit from its planning and actions. The program's hazard reduction efforts focus on determining the potential consequences of major earthquake events in the New Madrid seismic zone, reducing or managing negative consequences through use of zoning or building codes, increasing enforcement of local mitigation codes or regulations, and significantly increasing public awareness of earthquake consequences and actions that can be taken to minimize adverse effects.

Priority Mitigation Measures
Based upon the foregoing evaluation, consideration of risk (see Appendix H), and review and action by the Racine County Hazard Mitigation Task Force (see Appendix A), the following mitigation measures related to earthquake events are included in the updated Racine County hazards mitigation plan:

- Promotion of educational and informational programming to protect citizens, property, and businesses;
- Ongoing review and enforcement of building code ordinance requirements; and
- Continued coordination of emergency response plans among governmental units and first responders.

Because these measures are intended to be ongoing efforts, the Task Force 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 Task Force in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

Identification of Alternative Mitigation Strategies
There are significant numbers of injuries and deaths, and significant property damages primarily associated with roadway transportation systems, compared to railway and airport transportation, as discussed in Chapter IV. In addition, motor vehicle-related accidents within Racine County are influenced by such factors as road conditions, time of day, weather conditions, traffic conditions, as well as complicated by differences in gender, differences in age, and alcohol usage.

Roadways
Roadway intersections and highway segments at on- and off-ramp locations are areas that are significantly more dangerous than other areas among the automotive transportation system within Racine County. However, vehicle-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 Task Force 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. All of the measures noted are currently underway through the actions of the Wisconsin Department of Transportation (WisDOT) and County and local law enforcement programs and regulations.

Nonstructural

- Continue to monitor and upgrade the transportation system, when necessary, to reduce accident exposure and provide for increased travel safety and personal security;[28] and

- Continue to promote law enforcement including traffic violations, weight and travel restrictions, and designated truck routes.

Structural

- Continue to improve the design, routing, and traffic control at problem roadway areas.

Public Informational and Educational Programming

- Promote driver safety hazard awareness, especially to drivers within the 14 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;

- Develop trained, equipped, and prepared emergency first responders as well as search and rescue teams;

- Enforce the law requiring use of seatbelts for adults and children[29] and the use of helmets when riding a motorcycle; and

- Promote awareness of the influence of alcohol usage on driving safety.

Railways

Railway intersections are areas that are significantly more dangerous than other areas among the railway transportation system within Racine County. A freight train moving at 55 miles per hour, or an eight-car passenger train moving at 79 miles per hour, can take a mile or more to stop. However, 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 Task Force 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. Nearly all of these measures are currently being carried out, to some degree, by the State, County, and local units of government and the railroads concerned.

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[28]*SEWRPC Planning Report No. 49,* A Regional Transportation System Plan for Southeastern Wisconsin: 2035, *June 2006.*

[29]*Wisconsin Department of Transportation,* Wisconsin Strategic Highway Safety Plan: 2006-2008, *October 2006; Wisconsin Department of Transportation,* Wisconsin Federal Fiscal Year 2009 Highway Safety Performance 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.

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, 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 WisDOT is currently involved in a variety of long-range transportation planning activities for airport, bicycle, highway, pedestrian, rail, and roadway systems.[30] Connections 2030, which was released for public review over the period July 24, 2009 to August 31, 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. This plan was adopted and published on the WisDOT website in October 2009. 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.[31] 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 in order to improve safety and reduce costs. The WisDOT, 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. These are available on the WisDOT website.

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[30]*For more information about Wisconsin Department of Transportation Programs and Services, see* http://www.dot.wisconsin.gov/ *and for specific information on the State Connections 2030 transportation plan see* http://www.dot.wisconsin.gov/projects/state/connections2030.htm.

[31]*For general local planning guidance and tools, see* http://www.dot.wisconsin.gov/localgov/. *For projects specific to the southeastern portion of the State, including Racine County, see* http://www.dot.wisconsin.gov/projects/se.htm.

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.

Local Programs

As described in Chapter II, Racine County has developed an emergency operations 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 Office of Emergency Management, jointly organized a realistic drunk driving accident reenactment which was held on April 23, 2001, as part of Project DUI. Project DUI helps to inform citizens on the hazards of drunk driving by showing people the consequences of drinking and driving. Over 100 spectators viewed this demonstration that involved local fire and police agencies, in addition to a special appearance by the Flight for Life helicopter.

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 and public informational and educational programming systems.

Priority Mitigation Measures

Based upon the foregoing evaluation, consideration of risk (see Appendix H), and review and action by the Racine County Hazard Mitigation Task Force (see Appendix A), the following mitigation measures related to transportation accident-related hazard events are included in the updated Racine County hazards mitigation plan:

- Continued promotion of educational and informational programming, especially related to driver safety, and to individual actions to protect citizens, property, and businesses;
- Continued monitoring and improvement of the transportation system through design, routing, and traffic control at problem areas;
- Continued enforcement of traffic violations, weight and travel restrictions, and designated truck routes;
- Continued evaluation and refinement of safety components and consideration of railway and airport facilities;
- Continued support of training, state-of-the-art equipment, planning, and preparedness of first responders as well as search and rescue teams;
- Continued evaluation of the roadway system in the County for proper separation distances of ramps and frontage roads;
- Consideration, as part of roadway reconstruction projects, of the need for roadway shoulders in areas designated for bicycle or pedestrian trail systems; and
- Continued coordination of emergency response plans among governmental units and first responders.

Because these measures are intended to be ongoing efforts, the Task Force 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 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 Task Force 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 over-use. Contamination and loss of water supply events generally provide no warning, making it difficult for potentially affected areas to take preventative actions. 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 Task Force 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

- Promote development of a thorough drinking water supply risk and threat assessment that identifies potential vulnerabilities and targets for sabotage and terrorism attack;
- Promote measures to protect groundwater recharge areas, including promotion of regional activities to protect groundwater recharge areas outside of the County boundaries;
- Develop wellhead protection plans and establish setbacks from wellhead locations;
- Identify failing onsite sewage disposal systems 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;
- Utilize GIS technology to identify important groundwater management areas; and
- Incorporate a groundwater protection element in future land use planning activities.

Structural

- Manage stormwater runoff more effectively;
- Locate and properly abandon old and improperly abandoned wells;
- Maintenance and potential upgrading of water disinfection capabilities, including emergency disinfection equipment;

- Maintain municipal water and sewer infrastructure at acceptable operating standards;

- Develop a standard emergency operation plan for each public water supply system in order to plan procedures for mechanical failures, power outages, unsafe samples, and threats or acts of terrorism;

- Develop and implement wellhead protection plans to minimize the potential for contamination of groundwater supplies; and

- Promote proper location, installation, cleaning, monitoring, and maintenance of septic systems.

Public Informational and Educational Programming

- Encourage residents to develop a Family Emergency Preparedness Plan including the preparation of a Disaster Supply Kit (see Appendix G); and

- Train operators and plant personnel in security awareness and reporting protocols.

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 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.

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 881 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 has identified groundwater recharge areas with high and very high recharge potential and has made recommendations relative to groundwater recharge area protection.[32]

Programs within Racine County include those conducted by the Racine County Office of Emergency Management. This program was described in a previous section on tornado events.

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.

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- or contamination-related problems.

Priority Mitigation Measures
Based upon the foregoing evaluation, consideration of risk (see Appendix H), and review and action by the Racine County Hazard Mitigation Task Force (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:

- Promotion of educational and informational programming related to water safety issues. Citizen Corps may be able to provide assistance in these educational efforts;

- Encourage multi-agency approaches to water conservation, loss and contamination prevention and trend-monitoring;

- Preparation of emergency operation 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; and

- Preparation and implementation of wellhead protection plans.

Because these measures are intended to be ongoing efforts, the Task Force decided to retain them in the updated plan.

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[32]*SEWRPC Planning Report No. 52,* A Regional Water Supply Plan for Southeastern Wisconsin, *in preparation.*

HAZARD MITIGATION PLAN COMPONENT FOR HAZARDOUS MATERIAL INCIDENTS

As described in Chapter IV, hazardous material incidents are human-induced hazard events 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 Task Force 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 Task Force 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

- Promote community and operator compliance with industry safety regulations and standards; and

- Promote development of site emergency plans for schools, factories, office buildings, shopping malls, hospitals, and other appropriate sites.

Structural

- Promote proper design, construction, maintenance and inspections of hazardous material storage facilities, pipelines, and other related facilities;

- 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;

- 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.

Current Programs

Federal and State Programs

In accordance with The Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986 and Chapter 166 of the *Wisconsin Statutes*, a Local Emergency Planning Committee has been established in Racine

County and in other counties in Wisconsin. The Wisconsin Division of Emergency Management 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).

In the State of Wisconsin, there are eight regional emergency response teams that mitigate Level A releases at fixed facilities, as well as transportation incidents. One of these response teams is located in the City of Racine. A Level A release involves the most hazardous types of materials and requires the highest degree of protection for the emergency responder, including both respiratory and skin protection. Wisconsin Division of Emergency Management develops policy and administers the programs that support regional emergency response teams.

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 is shared with the public through the Racine County Local Emergency Planning Committee. 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.

Local Programs

The Racine County Office of Emergency Management and the LEPC have developed a countywide emergency response plan and continue to work on offsite facility plans, as needed, and to update them on a regular basis. 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 also 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.

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.

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. In addition, the City of Racine has a certified Hazardous Materials Team, made up of firefighters who 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.

As described in Chapter II, Racine County has developed an emergency operations 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 the major component of the planned mitigation action with regard to the continued compliance with safety regulation standards and enforcement and public informational and educational programming systems. Other potential mitigation actions include expansion of the current household hazardous waste management program.

Multi-Jurisdictional Considerations
Hazardous material incidents could potentially impact all municipalities within the County.

Priority Mitigation Measures
Based upon the foregoing evaluation, consideration of risk (see Appendix H), and review and action by the Racine County Hazard Mitigation Task Force (see Appendix A), the following mitigation measures related to hazardous material incidents are included in this update of the Racine County hazards mitigation plan:

- Promotion of educational and informational programming related to hazardous material safety, and to individual actions to protect citizens, property, and businesses. Citizen Corps may be able to provide assistance in these educational efforts;
- Promote community and operator compliance with industry safety regulations and standards;
- Promotion of ongoing enforcement of Federal, State, and County regulatory standards;
- Support existing, and consider expansion of, household waste management control programs;
- Continued support of training, equipment, planning, and preparedness of first responders; and
- Continued coordination of emergency response plans among governmental units, businesses and first responders.

Because these measures are intended to be ongoing efforts, the Task Force 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 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 Task Force 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 the vast majority of the reported emergency medical incidents were associated with infectious diseases compared to any other natural or human-induced hazard events. The 2002 West Nile Virus situation is an example of a potential health incident. In the review by the Racine County Hazard Mitigation Plan Task Force as part of the updating process, the following measures to reduce vulnerability to emergency medical incidents and related hazards have been identified as viable for this update of the Racine County hazard mitigation plan.

Nonstructural

- Continue maintenance of a community public health system with adequate numbers of medical staff and sufficient disease monitoring and surveillance capabilities to adequately protect the population from small- and large-scale epidemics;

- Promote development of site emergency plans for schools, factories, office buildings, shopping malls, hospitals, and other appropriate sites;

- Promote the development of emergency plans for local units of government;

- Provide community support of clinics and school health services; and

- Implement preventive actions directed toward a specific medical situation. For example, preventive actions considered for West Nile Virus 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.

Structural

- Improve ventilation techniques in areas/facilities prone to crowding, or that may involve exposure to contagion or noxious atmospheres;

- Promote demolition and clearance of vacant condemned structures to prevent rodent infestations;

- Continue to maintain community water and sewer infrastructure at high operating standards, a redundant backup facility; and

- Promote pollution control, enforcement, and cleanup, including proper disposal of chemicals and scrap materials.

Public Informational and Educational Programming

- Promote public awareness of the causes, symptoms, and protective actions for disease outbreaks and other potential public health emergencies;

- Promote public awareness of radon dangers and personal protection actions for these dangers;

- Encourage residents to receive immunizations against communicable diseases, including annual and special-strain flu shots;

- Promote preventive actions for specific medical situations, such as West Nile Virus actions involving reducing public unprotected exposure to mosquitoes;

- Promote training, planning, and preparedness for a variety of mass-casualty incidents; and

- Develop trained, equipped, and prepared emergency first responders.

Current Programs

Federal and State Programs

The Department of Health and Human Services (HHS) is the United States 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 includes more than 300 programs, covering a wide spectrum of activities. Some highlights include:

- Medical and social science research;

- Preventing outbreak of infectious disease, including immunization services;

- Assuring food and drug safety;

- Medicare (health insurance for elderly and disabled Americans) and Medicaid (health insurance for low-income people);
- Financial assistance and services for low-income families;
- Improving maternal and infant health;
- Head Start (pre-school education and services);
- Preventing child abuse and domestic violence;
- Substance abuse treatment and prevention;
- Services for older Americans, including home-delivered meals;
- Comprehensive health services for Native Americans; and
- Medical preparedness for emergencies, including potential terrorism.

HHS is the largest grant-making agency in the Federal government, providing almost 87,000 grants in fiscal year 2009. The HHS Medicare program is the nation's largest health insurer, handling more than one billion claims per year.

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. The Department's programs are administered by 11 HHS operating divisions, including eight agencies in the U.S. Public Health Service and three human services agencies. 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 Centers for Disease Control and Prevention (CDC) is an agency of the Department of Health and Human Services and 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. 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. CDC seeks to accomplish its 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.

The Wisconsin Department of Health Services (DHS)[33] works in partnership with local governments, health and human services agencies, private providers, and concerned and affected citizens to:

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[33]*As of July 1, 2008, the former Wisconsin Department of Health and Family Services became the Wisconsin Department of Health Services (WDHS) and the Wisconsin Department of Children and Families (WDCF) was created. The WDHS continues to provide the health-related programs that were the responsibility of the old department, while the WDCF provides programs that serve children and families, such as child welfare services, child support services, child care programs, and Wisconsin Works (W-2).*

- Foster the availability and accessibility of care, treatment and other assistance for persons most in need through careful planning of services and efficient distribution and use of resources.

- Promote individual, family and community well-being and health through vigorous programs to reduce or prevent avoidable illness, disability or dependency and their associated costs.

- Encourage local public and private initiative and support for human service programs.

- Give priority to the interests and needs of vulnerable persons including children and the elderly, those in need of long-term support, and families.

- Provide for public safety and protection through programs for adult criminal offenders who are mentally or emotionally impaired.

- Provide incentives and oversight so that public funds are put to effective use. Programs must be characterized by acceptable quality without unnecessary cost, accountability without needless paper-work, creativity and innovation without loss of purpose, and efficiency without jeopardizing access, equity or availability.

- Carry out these responsibilities with the participation and advice of communities, providers, clients, and citizens in a way that respects the dignity and self-reliance of everyone involved.

The DHS' mission is to protect and promote the health and safety of the people of Wisconsin. The Department's goals are to assure the health, safety, and well-being of Wisconsin citizens, while emphasizing prevention; make Wisconsin a national leader in reforming health care; improve the lives of Wisconsin seniors and people with disabilities; increase opportunities for children to grow up safe, healthy, and successful in strong families; and create a high-performing organization that is customer-focused and values their partners and employees.

In addition to these aforementioned programs there are a number of other related programs within the State of Wisconsin that include: Wisconsin Division of Public Health (WDPH), Wisconsin Hospital Association (WHA), Wisconsin Association of Local Health Departments and Boards (WALHDAB), Wisconsin Medical Society (WMS), University of Wisconsin and The Medical College of Wisconsin, Bureau of Local Public Health Practice and Emergency Management Services, Wisconsin Emergency Management (WEM), Wisconsin Primary Health Care Association (WPHCA), Rural Wisconsin Health Cooperative (RWHC), Wisconsin Office of Rural Health (WORH), and the Children's Hospital of Wisconsin Poison Center.

Local Programs

As described in Chapter II, there are a total of 13 fire and rescue departments; 26 hospitals and major clinics; three health departments; and 48 nursing homes, adult day care complexes, community-based residential facilities, and residential care apartment complexes distributed throughout Racine County (see Appendix D for more details).

As described in Chapter II, Racine County has developed an emergency operations plan which sets forth an all-hazards action plan. The County has also developed an emergency operations plan and response manual for County operations in the event of an influenza pandemic.[34] 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 a variety of natural and human-induced hazardous incidents. Racine City and County officials gathered on October 11, 2007 to test their

[34]*Racine County,* Pandemic Influenza Emergency Response Manual, *September 2009.*

respective Pandemic Flu Human Resource Plans. Because the plans are similar, city and county officials worked together to develop the exercise. The exercise was funded through a public health grant obtained by the Racine Health Department.

Evaluation of Alternatives and Identification of Mitigation Actions
Based upon review of the above by the Racine County Hazard Mitigation Plan Task Force as part of the updating process, the current ongoing programs represent the major component of the planned mitigation action with regard to the continued prevention, control, and preparedness for medical emergency incidents, and public informational and educational programming systems.

Multi-Jurisdictional Considerations
Emergency medical incidents could potentially impact all municipalities within the County.

Priority Mitigation Measures
Based upon the foregoing evaluation, consideration of risk (see Appendix H), and review and action by the Racine County Hazard Mitigation Task Force (see Appendix A), the following mitigation measures related to public health emergencies are included in this update of the Racine County hazards mitigation plan:

- Promote educational and informational programming related to general public health and safety issues. In this regard, increasing awareness of specific public health issues is important. For example, topics, such as pandemic influenza, radon dangers and viable prevention efforts, and West Nile Virus prevention measures, should be specifically covered;

- Strengthen public health infrastructure to support surveillance, response, reporting, and research, and to implement prevention and control programs;

- Provide the public health work force with the knowledge and tools needed for the early detection and control of diseases and disease vectors;

- Continue and review policies for vacant structure demolition to minimize potential rodent infestation;

- Implement specific health issue mitigation and prevention strategies;

- 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 services; and

- Continue coordination of emergency response plans among governmental units, businesses and emergency management services.

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 TERRORISM INCIDENTS

As described in Chapter IV, terrorism involving human-induced hazard events is 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 Task Force 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 throughout Racine County. The magnitude and scope of a terrorism incident is also 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 Task Force 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.

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 development of site emergency plans for schools, factories, office buildings, shopping malls, hospitals, and other appropriate sites;

- Promote alertness, awareness, and monitoring of organizations and activities that may threaten the community;

- Establish clear communication lines with the Wisconsin Department of Military Affairs, Division of Emergency Management, as the means to access assistance from the Wisconsin National Guard;

- Provide legitimate channels of political and public expression;

- Establish avenues of reporting (and potential rewards) for information preventing terrorist incidents and sabotage;

- Promote consistent use of computer data back-up systems and anti-virus software;

- Develop and promote workable population protection plans such as evacuation and in-place sheltering plans, as appropriate;

- Promote increased security measures at water supply facilities that could include increased security patrols, and/or increased monitoring for pathogens and chemical toxins;

- Establish a Citizen Corps program and encourage citizen involvement in the various components of that program;

- Establish and train Community Emergency Response Teams (CERT) coordinated with County and local emergency operations planning and programs; and

- Expand the use of Neighborhood Watch.

Structural

- Heighten security at public gatherings, special events, and critical community facilities and industries.

Public Informational and Educational Programming

- Promote public awareness of terrorism-related dangers and personal protection actions for these dangers;

- Promote community awareness of designated shelters and accident warning systems;

- Promote greater awareness of, and provision for, mental health services in schools, workplaces, and institutional settings;

- Increase coverage and use of NOAA Weather Radio, which can provide notification to the community during any period of emergency, including enemy attack;

- Promote adequate training, equipment, planning, and preparedness for local law enforcement, fire and rescue departments, and other responders for a variety of terrorist/sabotage/WMD attacks; and

- Promote development and testing 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.

Wisconsin anti-terrorism efforts are coordinated by the Wisconsin Division of Emergency Management within the Department of Military Affairs in cooperation with 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 with the Wisconsin Division of Emergency Management 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, there are a total of 13 fire and rescue departments; 26 hospitals and major clinics; three health departments; and 48 nursing homes, adult day care complexes, community-based residential facilities, and residential care apartment complexes distributed throughout Racine County (see Appendix D for more details). Nine 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. 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. 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.

Programs within Racine County also include the Racine County Office of Emergency Management programs. The Racine County Office of Emergency Management has a number of brochures, booklets, and pamphlets available for the public on terrorism safety and other general emergency management-related topics.[35]

As described in Chapter II, Racine County has developed an emergency operations 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.

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[35]*For more information, contact the Racine County Office of Emergency Management at (262) 636-3515 or write to Racine County Office of Emergency Management, 730 Wisconsin Avenue, Racine, Wisconsin 53403.*

The initial Racine County hazard mitigation plan recommended establishing a Citizen Corps program within the County. A Racine County Citizen Corps council was established. The Racine and Kenosha Citizen Corps officially joined to become one council in March 2006. Members of the Southeast Wisconsin Citizen Corps Council (SEWICC) are equally divided between Racine and Kenosha County residents and meetings have rotated between the two counties. The mission of the Southeast Wisconsin Citizen Corps Council is to collaborate among community agencies to promote volunteerism and individual preparedness for natural and man-made disasters.

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.

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 H), and review and action by the Racine County Hazard Mitigation Task Force (see Appendix A), the following mitigation measures related to terrorism incidents are included in this update of the Racine County hazards mitigation plan:

- Continue and expand educational and informational programming related to public health and safety issues due to terrorist incidents;

- 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 support of training, equipment, planning, and preparedness for local law enforcement, fire and rescue departments, and other emergency management services;

- Continue coordination of emergency response plans among Federal, State, and local governmental units, businesses, and emergency management services;

- Continue involvement in the Citizen Corps program and encourage citizen involvement in the various components of that program;

- Continue to train Community Emergency Response Teams (CERT) coordinated with County and local emergency operations planning and programs; and

- Expand the use of Neighborhood Watch.

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 COMPONENTS FOR POWER OUTAGES

As described in Chapter IV, power outages are hazard events of moderate 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 Task Force in light of the updated hazard mitigation goals and hazard conditions documented in Chapters III and IV, respectively.

Current 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. Informational and educational material related to power outage preparedness and mitigative measures are also available from the American Red Cross.[36]

Mitigative Actions
In the review by the Racine County Hazard Mitigation Plan Task Force 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. Such measures can include implementation of maintenance and operational improvements, equipment upgrading, 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 Office of Emergency Management to keep County officials informed of outage prevention practices and outage reaction activities during outages.

- Encourage the installation of backup power generators at critical facilities.

- Encourage development of business resumption plans to be put into place following an outage.

[36] *American Red Cross, "Be Red Cross Ready: Power Outage Checklist," 2009.*

- Continue and refine public informational and educational programming to include information on safety during outages and preparation for outages. With regard to safety during outages, We Energies[37] offers the following recommendations:

  — Stay away from fallen wires, broken utility poles, or tree limbs on power lines.

  — Don't leave burning candles unattended.

  — Unplug sensitive electronic equipment.

  — Don't use extension cords between homes or across yards or streets.

  — Keep outdoor grills, stoves, or ovens outside.

  — 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.

  — Create a family plan on procedures to be used if an outage occurs.

With regard to preparing for a power outage, We Energies recommends[38] creating an emergency plan which 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.

Because most of these measures are intended to be ongoing efforts, the Task Force 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 63 and on Map 46. Table 63 also includes a ranking evaluation of the mitigation measures identified in each hazard category based upon relative cost, direct benefits, likely indirect benefits and list of communities affected summarized below. Finally, Table 63 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 H 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.

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[37] *We Energies, "Safety During a Power Outage."*

[38] *We Energies, "Preparing for a Power Outage."*

Table 63

COST-BENEFIT ANALYSIS SUMMARY OF MEASURES INCLUDED IN THE RACINE COUNTY ALL-HAZARDS MITIGATION PLAN

Hazard	Mitigation Measures	Estimated Cost: 20-Year[a]			Costs of Implementation[c]			Direct Benefits				Indirect Benefits[d]	Community/Jurisdictions Affected (see Map 46)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)	Benefit-Cost Ratio[b]	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Flooding and Related Stormwater Drainage Problems	Floodland and Environmentally Sensitive Land Preservation Element												
	• Floodplain and wetland zoning[e]	- -[f]	- -[f]	- -	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[e]	- -[g]	- -[g]	- -	- -	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
	Floodland Management Plan Element												
	Fox River Watershed												
	• Installation of gates at Waterford Dam	$ 481.8	$ 7.5	15.8	- -	- -	X	X	X	- -	- -	3	Racine County and Village of Waterford
	• Channel clean out and deepening along Muskego Canal	46.4	2.3	15.0	X	- -	- -	X	X	- -	- -	- -	Racine County and Town of Norway
	• Construct agricultural dikes along Wind Lake Drainage Canal and tributaries	980.2	16.7	8.5	- -	X	- -	X	X	- -	- -	- -	Racine County; Towns of Dover, Norway; and Village of Rochester
	• Installation of gates at Rochester Dam	353.1	2.8	2.4	- -	X	- -	X	X	- -	- -	4	Racine County and Village of Rochester
	• Construction of levees and channel improvements along Hoosier Creek	1,622.7	18.7	2.1	- -	- -	X	X	X	- -	- -	3	Racine County and Town of Burlington
	• Land acquisition[e]	1,216.2	0.0	1.6	- -	- -	X	X	X	- -	- -	4	Racine County and Town of Waterford
	• Construction of dikes and floodwalls in City of Burlington[h]	2,363.1[h]	3.4[h]	0.4	- -	- -	X	X	X	- -	- -	- -	City of Burlington
	• Maintenance dredging within Waterford Impoundment	1,068.4	0.0	0.4	- -	- -	X	X	X	- -	- -	3	Racine County, Town of Waterford, and Village of Waterford
	• Channel clean out of Wind Lake Drainage Canal	836.2	16.7	- -	- -	X	- -	X	X	- -	- -	3	Racine County; Towns of Dover and Norway; and Village of Rochester
	• Channel clean out in Fox River upstream from Waterford Impoundment	14.5	0.1	- -	X	- -	- -	X	X	- -	- -	3	Town of Waterford

Table 63 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20-Year[a]			Costs of Implementation[c]			Direct Benefits				Indirect Benefits[d]	Community/Jurisdictions Affected (see Map 46)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)	Benefit-Cost Ratio[b]	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Flooding and Related Stormwater Drainage Problems (continued)	Floodland Management Plan Element–Fox River Watershed (continued)												
	• Structure floodproofing or removal[e,i]	- -	- -	- -	- -	- -	X	X	X	- -	- -	4	Racine County; City of Burlington; Towns of Burlington, Dover, Norway, and Waterford; and Villages of Rochester and Waterford
	• Evaluation of pumping station flooding impacts and, if needed, mitigative actions	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -	Town of Norway Sanitary District No. 1
	Root River Watershed												
	• Channel clearing and maintenance along the Root River Canal	$ 547.5	$18.0	0.4	- -	X	- -	X	X	- -	- -	3	Racine County and Towns of Raymond and Yorkville
	• Structure floodproofing or removal[e,i]	- -	- -	- -	- -	X	- -	X	X	- -	- -	4	Racine County; City of Racine; Villages of Caledonia and Mt. Pleasant; and Towns of Raymond, and Yorkville
	• Restoration of Horlick Dam	322.7	0.0	- -	- -	X	- -	X	X	- -	- -	4	City of Racine
	Pike River Watershed												
	• Berm along Bartlett Branch	$121.2	$ 1.0	7.4	- -	X	- -	X	X	- -	- -	3	Racine County and Village of Mt. Pleasant
	• Chicory Road culvert replacement along Sorenson Creek	288.8	0.0	0.8	- -	X	- -	X	X	- -	- -	3	Racine County and Village of Mt. Pleasant
	• Pike River channel enlargement and rehabilitation	16,609.4	21.7	0.1	- -	- -	X	X	X	- -	- -	3	Racine County and Village of Mt. Pleasant
	• Structure floodproofing or removal[e,l]	- -	- -	- -	- -	X	- -	X	X	- -	- -	4	Racine County, City of Racine, and Villages of Mt. Pleasant and Sturtevant
	Des Plaines River Watershed[j]												
	• Provide onsite detention storage facilities for planned new development[e]	$ 6,881.7[k]	$70.1[k]	- -	- -	- -	X	X	X	- -	- -	3	Racine County, Town of Yorkville, and Villages of Mt. Pleasant and Union Grove
	• Restore prairie conditions[e]	$693.1 to $1,955.4[l]	$1.1 to $78.8[l]	- -	- -	X	- -	- -	X	- -	- -	4	Racine County, Town of Yorkville, and Villages of Mt. Pleasant and Union Grove
	• Restore wetland conditions[e]	$178.8 to $448.5[l]	$0.3 to $20.3[l]	- -	- -	X	- -	- -	X	- -	- -	4	Racine County, Town of Yorkville, and Village of Mt. Pleasant
	• Floodproof one residential structure[e,l]	1.4	1.7	- -	X	- -	- -	X	X	- -	- -	4	Racine County and Village of Mt. Pleasant

Table 63 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20-Year[a]			Costs of Implementation[c]			Direct Benefits				Indirect Benefits[d]	Community/Jurisdictions Affected (see Map 46)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)	Benefit-Cost Ratio[b]	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Flooding and Related Stormwater Drainage Problems (continued)	Stormwater Management Plan Element • Stormwater management plans[e]	- -[m]	- -[m]	- -	X	- -	- -	X	X	- -	- -	3	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
	• Stormwater-related regulations[e]	- -[n]	- -[n]	- -	X	- -	- -	X	X	- -	- -	3	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	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	4	Racine County and all local jurisdictions[p]
	Secondary Plan Element • National Flood Insurance Program and map updating[e]	- -[f]	- -[f]	- -	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
	• Lending institution and real estate agent policies[e]	- -[f]	- -[f]	- -	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
	• Channel maintenance	- -[f]	- -[f]	- -	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
	• Stormwater management facilities maintenance[e]	- -[f]	- -[f]	- -	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

Table 63 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20-Year[a]			Costs of Implementation[c]			Direct Benefits				Indirect Benefits[d]	Community/Jurisdictions Affected (see Map 46)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)	Benefit-Cost Ratio[b]	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Flooding and Related Stormwater Drainage Problems (continued)	Secondary Plan Element (continued) • Survey of buildings near flood hazard area[e]	$25.5	- -	- -	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
Thunderstorm, High-Wind, Hail, and Lightning Hazards	Maintenance and potential expansion of early warning and communication systems, with emphasis on NOAA Weather Radio, EAS broadcasts, and expanded use of emergency technologies	- -[q]	- -[q]	- -	- -	X	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Educational and informational programming, especially related to the early warning network, and to individual actions to protect citizens, property, and businesses	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Ongoing review and enforcement of building code ordinance and requirements	- -[f]	- -[f]	- -	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
	Continued coordination of emergency operation and response plans among governmental units and first responders	- -[f]	- -[f]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
Tornadoes	Maintenance and potential expansion of early warning systems and communications, with emphasis on NOAA Weather Radio, EAS broadcasts, and expanded use of emergency technologies	- -[q]	- -[q]	- -	- -	X	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	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	- -[r]	- -[r]	- -	- -	X	- -	X	X	X	X	5	Racine County and all local jurisdictions[p]
	Educational and informational programming, especially related to the early warning network, and to individual actions to protect citizens, property, and businesses	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]

Table 63 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20-Year[a]			Costs of Implementation[c]			Direct Benefits				Indirect Benefits[d]	Community/Jurisdictions Affected (see Map 46)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)	Benefit-Cost Ratio[b]	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Tornadoes (continued)	Ongoing review enforcement of building code ordinances requirements	--[f]	--[f]	--	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
	Continued coordination of emergency response and operation plans among governmental units and first responders	--[f]	--[f]	--	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions[p]
Extreme Temperature Events	Organize neighborhood outreach groups who look after vulnerable groups and individuals	--[q]	--[q]	--	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions[p]
	Provide special arrangements for payment of heating bills	--[q]	--[q]	--	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions[p]
	Identify and advertise a list of available heating and or cooling shelters in the immediate area	--[o]	--[o]	--	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions[p]
	Educational and informational programming	--[o]	--[o]	--	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions[p]
Lake Michigan Coastal Hazards	Continued enforcement of County shoreland zoning ordinance[e]	--[f]	--[f]	--	X	--	--	X	X	X	X	5	Racine County; City of Racine; and Villages of Caledonia, Mt. Pleasant, North Bay, and Wind Point
	Review Lake Michigan shoreline municipal shoreland ordinances[e]	--[f]	--[f]	--	X	--	--	X	X	X	X	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	$ 50.0	--	--	X	--	--	X	--	--	--	3	Racine County; City of Racine; and Villages of Caledonia, Mt. Pleasant, North Bay and Wind Point
	Continued construction and maintenance of shoreline protection structures	--[r]	--[r]	--	--	X	--	X	X	--	--	3	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[e]	17.0	--	--	X	--	--	X	--	--	--	3	Racine County; City of Racine; and Villages of Caledonia, Mt. Pleasant, North Bay and Wind Point
	Construct additional outfall capacity at the City of Racine wastewater treatment plant	1,703.0	--	--	--	--	X	X	X	--	--	3	City of Racine

Table 63 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20-Year[a]			Costs of Implementation[c]			Direct Benefits				Indirect Benefits[d]	Community/Jurisdictions Affected (see Map 46)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)	Benefit-Cost Ratio[b]	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Lake Michigan Coastal Hazards (continued)	Review water and wastewater treatment plant capacity and level of protection under range of Lake Michigan water levels	- -[r]	- -[r]	- -	- -	X	- -	X	- -	- -	- -	4	City of Racine
	Public informational and educational programming	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
Winter Storm Events	Organize neighborhood outreach groups who look after vulnerable groups and individuals	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Provide special arrangements for payment of heating bills	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Identify and advertise a list of available heated shelters in the immediate area	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Increase coverage and use of NOAA Weather Radio and EAS broadcasts	- -[q]	- -[q]	- -	- -	X	- -	X	- -	X	X	5	Racine County and all local jurisdictions[p]
	Educational and informational programming	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Ongoing review and enforcement of building code ordinance requirements	- -[f]	- -[f]	- -	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	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Continued coordination of emergency response plans among governmental units and first responders	- -[f]	- -[f]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Continue and refine State, County, and local road maintenance programs	- -[f]	- -[f]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Work with utilities to assess and improve electrical service reliability	- -[f]	- -[f]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
Drought Events	Encourage multi-agency approaches to water conservation, drought prediction, and stream and ground water monitoring	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	4	Racine County and all local jurisdictions[p]
	Educational and informational programming	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	3	Racine County and all local jurisdictions[p]

Table 63 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20-Year[a]			Costs of Implementation[c]			Direct Benefits				Indirect Benefits[d]	Community/Jurisdictions Affected (see Map 46)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)	Benefit-Cost Ratio[b]	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	--[f]	--[f]	--	X	--	--	X	--	--	--	3	Racine County and all local jurisdictions[p]
	Evaluate and design water supply systems which are not vulnerable to drought	--[r]	--[r]	--	X	--	--	X	--	--	--	3	Racine County and all local jurisdictions[p]
	Evaluate economics of crop insurance	--[t]	--[t]	--	X	--	--	X	--	--	--	3	Racine County and all local jurisdictions[p]
Earthquake Events	Educational and informational programming	--[o]	--[o]	--	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions[p]
	Ongoing review and enforcement of building code ordinance and requirements	--[f]	--[f]	--	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
	Continued coordination of emergency response plans among governmental units and first responders	--[f]	--[f]	--	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions[p]
Transportation Accident Related Events	Continued promotion of educational and informational programming, especially related to driver safety, and to individual actions to protect citizens, property, and businesses	--[f]	--[f]	--	X	--	--	X	--	--	--	5	Racine County and all local jurisdictions[p]
	Continued monitoring and improvement of the transportation system through design, routing , and traffic control at problem areas	--[f]	--[f]	--	X	--	--	X	X	X	X	5	Racine County and all local jurisdictions[p]
	Continued enforcement of traffic violations, weight and travel restrictions, and designated truck routes	--[f]	--[f]	--	X	--	--	X	X	X	X	5	Racine County and all local jurisdictions[p]
	Continued evaluation and refinement of safety components of railway facilities	--[f]	--[f]	--	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
	Continued evaluation and refinement of safety components of airport facilities	--[f]	--[f]	--	X	--	--	X	X	X	X	5	Cities of Burlington and Racine; Towns of Burlington, Norway, Raymond, and Yorkville; and Village of Rochester.

Table 63 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20-Year[a]			Costs of Implementation[c]			Direct Benefits				Indirect Benefits[d]	Community/Jurisdictions Affected (see Map 46)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)	Benefit-Cost Ratio[b]	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Transportation Accident Related Events (continued)	Continued support of training, state-of-the-art equipment, planning, and preparedness of first responders, as well as search and rescue teams	- -[f]	- -[f]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Continued coordination of emergency response plans among governmental units and first responders	- -[f]	- -[f]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Incorporate appropriate separation distances for frontage roads and ramps and shouldering where bicycle and pedestrian trails are noted	- -[r]	- -[r]	- -	- -	X	- -	X	X	X	X	5	Racine County and all local jurisdictions[p]
Contamination or Loss of Water Supply	Educational and informational programming related to water safety issues	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Encourage multi-agency approaches to water conservation, loss and contamination prevention and trend-monitoring	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	4	Racine County and all local jurisdictions[p]
	Preparation of emergency operation plans for each public water supply system	- -[q]	- -[q]	- -	- -	X	- -	X	- -	- -	- -	5	Cities of Racine and Burlington; Villages of Caledonia, Mt. Pleasant, Union Grove, and Waterford; and Town of Yorkville
	Continued coordination of emergency response plans among governmental units and first responders	- -[f]	- -[f]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
Hazardous Material Events	Educational and informational programming related to hazardous material safety, and to individual actions to protect citizens, property, and businesses	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Promote community and operator compliance with industry safety regulations and standards	- -[f]	- -[f]	- -	X	- -	- -	X	X	X	X	5	Racine County and all local jurisdictions[p]
	Promotion of ongoing enforcement of Federal, State, and County regulatory standards	- -[o]	- -[o]	- -	X	- -	- -	X	X	X	X	5	Racine County and all local jurisdictions[p]
	Support existing or consider expansion of household waste management control programs, which should include hazardous material disposal sites for public citizens	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Continued support of training, equipment, planning, and preparedness of first responders	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]

Table 63 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20-Year[a]			Costs of Implementation[c]			Direct Benefits				Indirect Benefits[d]	Community/Jurisdictions Affected (see Map 46)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)	Benefit-Cost Ratio[b]	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Hazardous Material Events (continued)	Continued coordination of emergency response plans among governmental units, businesses, and first responders	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
Public Health Emergencies	Educational and informational programming related to public health and safety issues. Increase informational and educational activities for specific health issues, such as West Nile Virus	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Strengthen public health infrastructure to support surveillance, response, reporting, and research, and to implement prevention and control programs	- -[q]	- -[q]	- -	- -	X	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Provide the public health work force with the knowledge and tools needed for early detection and control of diseases and disease vectors	- -[q]	- -[q]	- -	- -	X	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Implement specific health issue-related mitigation strategies, such as mosquito reduction measures for West Nile Virus	- -[q]	- -[q]	- -	X	- -	- -	X	- -	X	X	5	Racine County and all local jurisdictions[p]
	Ensure prompt implementation of prevention strategies and enhance communication of public health information about emerging diseases, their vectors, and control measures	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Continued support of training, equipment, planning, and preparedness of emergency management services	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Continued coordination of emergency response plans among governmental units, businesses, and emergency management services	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
Terrorism Incidents	Continue and expand educational and informational programming related to public health and safety issues due to terrorist incidents	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	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	- -[q]	- -[q]	- -	- -	X	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]

Table 63 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20-Year[a]			Costs of Implementation[c]			Direct Benefits				Indirect Benefits[d]	Community/Jurisdictions Affected (see Map 46)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)	Benefit-Cost Ratio[b]	Low	Moderate	High	Enhanced Preparedness/ Protection	Reduced Property Damage	Reduced Injuries	Reduced Mortalities		
Terrorism Incidents (continued)	Continued maintenance and potentially enhance security measures at water treatment facilities, including increased pathogen and chemical monitoring and emergency drinking water supply source alternative planning	- -[q]	- -[q]	- -	- -	X	- -	X	- -	X	X	5	Racine County and all local jurisdictions[p]
	Continued support of training, equipment, planning, and preparedness for local law enforcement, fire and rescue departments, and other emergency management services	- -[q]	- -[q]	- -	- -	X	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Continued coordination of emergency response plans among Federal, State, and local governmental units, businesses, and emergency management services	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Establish Citizens Corps Program and encourage citizen involvement	- -[u]	- -[u]	- -	- -	X	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Establish and train community emergency response team	- -[u]	- -[u]	- -	- -	X	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Expand neighborhood watch program	- -[q]	- -[q]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
Power Outages	Continue to review and implement programs to improve reliability of power supply facilities	- -[f]	- -[f]	- -	X	- -	- -	X	- -	- -	- -	3	Racine County and all local jurisdictions[p]
	Coordinate activities and communication regarding prevention and response to power outages	- -[f]	- -[f]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Encourage backup power generation facilities	- -[f]	- -[f]	- -	X	- -	- -	X	- -	- -	- -	5	Racine County and all local jurisdictions[p]
	Public information and education	- -[o]	- -[o]	- -	X	- -	- -	X	- -	- -	- -	3	Racine County and all local jurisdictions[p]

[a] *All cost expressed in 2008 dollars.*

[b] *For further details on the benefit-cost analysis of floodland mitigation alternatives refer to Tables 57, 58, 59, and 60.*

[c] *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*

Footnotes to Table 63 (continued)

[d] *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

[e] *This mitigation measure is related but not essential to continued compliance with the requirements of the National Flood Insurance Program.*

[f] *Costs covered under ongoing activity.*

[g] *Costs are included under Racine County Park and Open Space Plan Implementation.*

[h] *Flood mitigation measures and project costs to be reviewed and refined to reflect ongoing City of Burlington downtown redevelopment program.*

[i] *Structure floodproofing or removal to be evaluated on a site-by-site basis and to be carried out at the discretion of property owners.*

[j] *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 $630,000 to $750,000.*

[k] *Incremental cost between control of two-year and 100-year events.*

[l] *Cost reflects range from minimal wetland and prairie operation and maintenance to active management.*

[m] *Costs to be determined by each community based upon logical subwatershed area. Estimated cost is from $1,090,000 to $1,330,000 countywide.*

[n] *Cost of ordinance development is covered under ongoing programs. Cost of implementation is not determined.*

[o] *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 $18,000 per year.*

[p] *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.*

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

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

[s] *To be conducted as part of next needed facility planning program.*

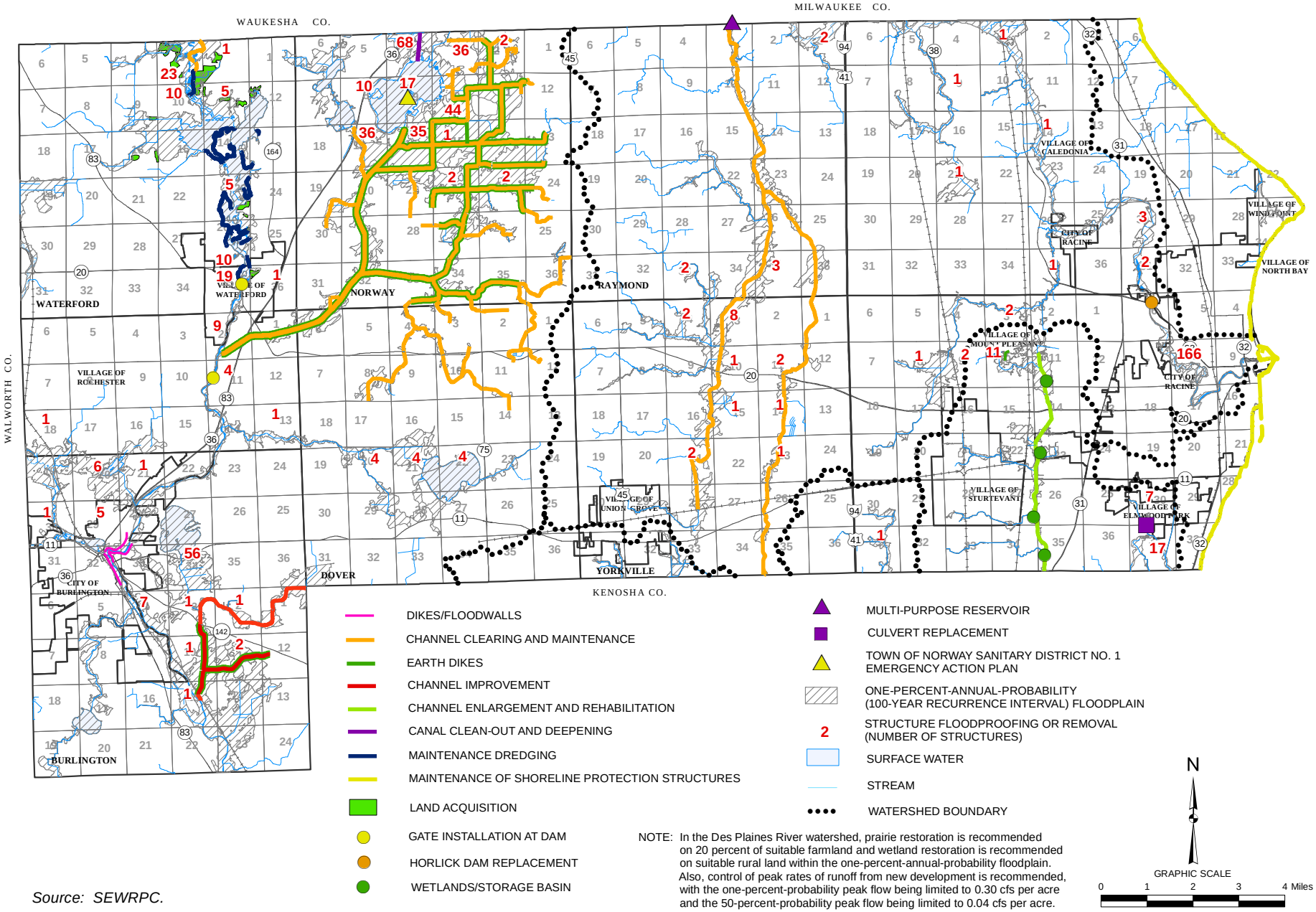
[t] *Private property costs to be expended as needs arise.*

[u] *Costs to be determined.*

Source: SEWRPC.

Map 46

SUMMARY OF MEASURES INCLUDED IN RACINE COUNTY ALL-HAZARDS MITIGATION PLAN: 2010



NOTE: In the Des Plaines River watershed, prairie restoration is recommended on 20 percent of suitable farmland and wetland restoration is recommended on suitable rural land within the one-percent-annual-probability floodplain. Also, control of peak rates of runoff from new development is recommended, with the one-percent-probability peak flow being limited to 0.30 cfs per acre and the 50-percent-probability peak flow being limited to 0.04 cfs per acre.

Source: SEWRPC.

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—i.e. benefit-cost ratio less than one (see Estimated 20-Year Cost section below).

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 further evaluated based upon relative cost, direct benefits, and likely indirect benefits and ranked accordingly as shown in Table 63. 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 H. Greatest priority is recommended to be given to those mitigation measures that directly or indirectly resulted in minimized loss of life or injury.

Estimated 20-Year Cost

Table 63 includes a summary of the estimated 20-year capital cost, average annual operation and maintenance cost and benefit-cost ratio, where possible, for each mitigation measure. It is important to note that the annual benefits and cost used in the benefit-cost analysis include only the direct benefits derived from the abatement of monetary flood damages, and the direct costs attendant to implementation of the floodland management measures, including capital and operation and maintenance costs. Hence, environmental, recreational or other intangible benefits and costs that cannot be readily quantified were not addressed or reflected in the final benefit-cost ratio number as shown in Table 63 (see also Tables 57, 58, 59, and 60). A benefit-cost ratio equal to one indicates that the monetary costs equal the monetary benefits and a ratio greater than one indicates that the benefits exceed the costs.

Where appropriate, the primary mitigation actions as shown in Table 63 were ranked by the benefit-cost ratio, which indicates the priority that these measures be implemented that provide the greatest benefit versus the cost. However, it is important to note that there may be other reasons beyond flood damage reduction or enhancement of property values, which may significantly affect the priority of implementation of the mitigation measures identified in Table 63. In addition, there were 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 further prioritized based upon comparison of the relative cost of implementation, direct benefits and indirect benefits (see Direct and Indirect Benefits section below).

Cost of Implementation

An estimated cost of implementation was developed in order to categorize the relative cost of each of the priority mitigation measures as shown in Table 63. The 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 including:

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

This cost categorization 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 (see Direct and Indirect Benefits section below).

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 not known, these would be a direct result of implementation of a particular mitigation measure. In contrast, 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

As shown above and in Table 63, the greatest indirect benefit was allocated to those mitigation measures that may ultimately result in minimized loss of life or injury.

Communities/Jurisdictions Affected

Table 63 also indicates a list of the communities affected for each hazard and corresponding priority mitigation measure. Map 46 corresponds with Table 63 and shows the map based priority mitigation actions, identified in Table 63, for Racine County and the corresponding cities, towns, and villages.

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Chapter VI

PLAN ADOPTION, IMPLEMENTATION, MAINTENANCE, AND REVISION

This updated hazard mitigation plan 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 implement it, that is, to convert 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 as part of its broader, ongoing program being conducted under the County partnership with the Federal Emergency Management Agency (FEMA) through the *Project Impact* program. The plan update set forth in this report was begun in 2009, 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, 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, is directly involved in a partnership role for all-hazard mitigation planning. That agency prepared and periodically updates a State all-hazard mitigation plan; provides technical assistance and guidance for local all-hazards planning; and administers the Pre-Disaster Mitigation Program for FEMA.

- The rules outline State and local mitigation planning guidelines for accessing Hazard Mitigation Program 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 Hazard Mitigation Grant Program (HMGP) project grants. This element is important because it requires local adoption of an all-hazards mitigation plan to remain eligible for certain future mitigation funds. This element can be taken care of if the communities formally adopt the County plan. Alternatively, communities could carry out separate planning.

- The rules and related guidance provide more specificity 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 state-wide 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 this 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. (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. Copies of the report were 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 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 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 this updated plan. As draft chapters of the updated plan were completed, copies were placed in downloadable form on the website of the Southeastern Wisconsin Regional Planning Commission (SEWRPC) and a webpage was available on the SEWRPC website on which members of the public could ask questions and submit comments 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. Copies of the report were 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 Wisconsin Department of Military Affairs, Division of Emergency Management. In addition, County and SEWRPC staffs have been available to meet with communities on an individual basis to review the plan and consider adoption and implementation steps. A status report on adoption of the plan update by the County and local units of government is maintained by the Racine County Office of Emergency Management.

An important first step in implementation of the updated all-hazards mitigation plan for Racine County is the formal adoption of the plan update by the County and local units of government. 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 control, and public works development planning and programming.

PLAN IMPLEMENTATION STRATEGIES

The recommended all 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 implement it—that is, to convert the plan into action policies and programs—have been specified. Following formal adoption of the updated plan by Racine County and the local units of government, 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 Task Force; 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 the Wisconsin Department of Military Affairs, Division of Emergency Management, and FEMA is also essential.

A summary of the plan elements and selected implementation strategy information, including costs, designated management agencies, and schedules is included in Table 64. In addition, corresponding mitigation measures are also summarized on Map 46 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 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.[1]

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; 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 2009. However, because funding programs and opportunities are constantly changing, the involved County and local units of government staffs have and will continue to become familiar with 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 the Wisconsin Department of Military Affairs, Division of Emergency Management. These programs are described below.

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

Table 64

RACINE COUNTY ALL-HAZARDS MITIGATION PLAN SUMMARY AND IMPLEMENTATION STRATEGIES

Hazard	Mitigation Measures	Estimated Cost: 20 Year[a]		Designated Management Agency (see notes for abbreviations)	Plan Implementation Schedule	Implementation Status Notes	Potential Funding Programs (see Appendix J)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)				
Flooding and Related Stormwater Drainage Problems	Floodland and Environmentally Sensitive Land Preservation Element						
	• Floodplain and wetland zoning	- -[b]	- -[b]	RC, LU	In place and ongoing	Plan implementation is largely in place; some review and refinement needed in local community ordinance	1, 2, 4, 12, 14, 18, 22, 23, 24, 27, 31, 37, 38, 39, 40, 41, 43, 51
	• Environmentally sensitive area and open space preservation action	- -[c]	- -[c]	RC, LU with involvement of WDNR, WCMP, WIN	Largely in place and ongoing	Plan implementation is largely in place or ongoing; additional actions needed in some areas	1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 17 18, 21, 22, 23, 25, 29, 32, 33, 37, 38, 39, 40, 41, 43, 58, 59
	Floodland Management Plan Element						1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 21, 22, 23, 25, 29, 32, 33, 36, 37, 38, 39, 40, 41, 43, 58
	Fox River Watershed						
	• Construction of dikes and floodwalls in City of Burlington[d]	$2,361.1[d]	$ 3.4[d]	CB	2010	Partially implemented	
	• Construction of levees and channel improvements along Hoosier Creek	1,622.7	18.7	RC, KC, RCDB, TB, TD	To be determined	Not implemented	
	• Structure floodproofing or removal[e]	- -	- -	PP	To be determined	Not implemented	
	• Installation of gates at Waterford Dam	481.8	7.5	- -	Completed	Implemented	
	• Installation of gates at Rochester Dam	353.1	2.8	- -	Completed	Implemented	
	• Channel clean out in Fox River upstream from Waterford Impoundment	14.5	0.1	SFRC	To be determined	Not implemented	
	• Land acquisition	1,216.2	0.0	SFRC, RC	To be determined	Not implemented	
	• Maintenance dredging within Waterford Impoundment	1,068.4	0.0	SFRC, RC	To be determined	Partially implemented	
	• Construct agricultural dikes along Wind Lake Drainage Canal and tributaries	980.2	16.7	RCDB	To be determined	Not implemented	
	• Channel clean out of Wind Lake Drainage Canal	836.2	16.7	RCDB	To be determined	Not implemented	
	• Channel clean out and deepening along Muskego Canal	46.4	2.9	- -	Completed	Implemented	
	• Evaluate sewage pumping station flooding potential as part of next sewerage system facilities plan	- -	- -	TNSD	To be determined	Not implemented	
	Root River Watershed						1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 21, 23, 25, 33, 43, 53
	• Channel clearing and maintenance along the Root River Canal	$ 547.5	$ 18.0	RCDB	To be determined	Partially implemented	
	• Structure floodproofing or removal[e]	- -	- -	PP	To be determined	Not implemented	
	• Restoration of Horlick Dam	322.7	0.0	- -	Completed	Implemented	
	Pike River Watershed						1, 2, 3, 4, 5, 6, 8, 11, 12, 18, 33, 43, 53, 58, 59, 62
	• Pike River channel enlargement and rehabilitation	$16,609.4	$ 21.7	MPSUD	2010	Partially implemented	
	• Berm along Bartlett Branch	121.2	1.0	- -	Completed	Implemented	
	• Chicory Road culvert replacement along Sorenson Creek	288.8	0.0	MPSUD	To be determined	Not implemented	
	• Structure floodproofing or removal[e]	- -	- -	RC, CR, MPSUD, PP	To be determined	Not implemented	

Table 64 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20 Year[a]		Designated Management Agency (see notes for abbreviations)	Plan Implementation Schedule	Implementation Status Notes	Potential Funding Programs (see Appendix J)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)				
Flooding and Related Stormwater Drainage Problems (continued)	Des Plaines River Watershed						1, 2, 3, 4, 5, 6, 11, 18, 22, 25, 29, 31, 32, 36, 37, 38, 43, 58, 59, 60, 61
	• Provide onsite detention storage facilities for planned new development	- -[f]	- -[f]	PP, RC, LU	Ongoing	Not implemented	
	• Restore prairie conditions	- -[f]	- -[f]	RC, CO	2020	Not implemented	
	• Restore wetland conditions	- -[f]	- -[f]	RC, CO	2020	Not implemented	
	• Floodproof two residential structures[e]	- -[f]	- -[f]	PP	2020	Not implemented	
	Stormwater Management Plan Element						4, 7, 12, 13, 17, 18, 25, 34, 37, 43
	• Stormwater Management Plans	- -[g]	- -[g]	RC, LU	2010	Partially implemented	
	• Stormwater-Related Regulations	- -[h]	- -[h]	RC, LU	2010	Partially implemented	
	Public Information and Education Element	- -[i]	- -[i]	RC, UWX, LU, MPSUD	Ongoing	Partially implemented	4, 21, 25, 27, 34, 42, 43, 44
	Secondary Plan Element						8, 9, 11, 12, 15, 25, 28, 37, 41, 43, 50
	• National Flood Insurance Program and Map Updating	- -[b]	- -[b]	RC, LU	Ongoing	Partially implemented	
	• Lending Institution and Real Estate Agent Policies	- -[b]	- -[b]	LU, PP	Ongoing	Partially implemented	
	• Channel Maintenance	- -[b]	- -[b]	RC, LU, MPSUD	Ongoing	Partially implemented	
	• Stormwater Management Facilities Maintenance	- -[b]	- -[b]	RC, LU, MPSUD, PP	Ongoing	Partially implemented	
	• Survey of Buildings Near Flood Hazard Area	$ 25.5	- -	RC, LU, MPSUD	2005	Not implemented	
Thunderstorm, High-Wind, Hail, and Lightning Hazards	Maintenance and potential expansion of early warning and communication systems, with emphasis on NOAA Weather Radio, EAS broadcasts, and expanded use of emergency technologies	- -[i]	- -[i]	RC, LU	Ongoing	Partially implemented	17, 42, 43, 44, 45, 46
	Educational and informational programming, especially related to the early warning network, and to individual actions to protect citizens, property, and businesses	- -[j]	- -[j]	RC, LU, UWX	Ongoing	Partially implemented	
	Ongoing review and enforcement of building code ordinance and requirements	- -[b]	- -[b]	RC, LU, WDC	Ongoing	Partially implemented	
	Continued coordination of emergency operation and response plans among governmental units and first responders	- -[b]	- -[b]	RC, LU	Ongoing	Partially implemented	
Tornadoes	Maintenance and potential expansion of early warning systems and communications, with emphasis on NOAA Weather Radio, EAS broadcasts, and expanded use of emergency technologies	- -[i]	- -[i]	RC, LU	Ongoing	Partially implemented	17, 42, 43, 44, 45, 46, 50
	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	- -[i]	- -[i]	RC, LU	2010	Partially implemented	
	Educational and informational programming, especially related to the early warning network, and to individual actions to protect citizens, property, and businesses	- -[i]	- -[i]	RC, LU, UWX	Ongoing	Partially implemented	
	Ongoing review enforcement of building code ordinances requirements	- -[b]	- -[b]	RC, LU, WDC	Ongoing	Partially implemented	
	Continued coordination of emergency response and operation plans among governmental units and first responders	- -[b]	- -[b]	RC, LU	Ongoing	Partially implemented	

Table 64 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20 Year[a]		Designated Management Agency (see notes for abbreviations)	Plan Implementation Schedule	Implementation Status Notes	Potential Funding Programs (see Appendix J)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)				
Extreme Temperature Events	Organize Neighborhood outreach groups who look after vulnerable groups and individuals	- -[i]	- -[i]	RC, LU	Ongoing	Partially implemented	42, 43, 44, 45, 47, 53
	Provide special arrangements for payment of heating bills	- -[i]	- -[i]	RC, LU, UC	Ongoing	Partially implemented	
	Identify and advertise a list of available heating and or cooling shelters in the immediate area	- -[j]	- -[j]	RC, LU, UWX	Ongoing	Partially implemented	
	Educational and informational programming	- -[j]	- -[j]	RC, LU, UWX	Ongoing	Partially implemented	
Lake Michigan Coastal Hazards	Continued Enforcement of County Shoreland Zoning Ordinance	- -[b]	- -[b]	RC	Ongoing	Implemented	10, 19, 21, 22, 52, 54, 55
	Review Lake Michigan shoreline municipal shoreland ordinances	- -[b]	- -[b]	LU	Ongoing	Partially implemented	
	Reevaluation of the effectiveness of Lake Michigan shoreline protection structures in the County at 10-year intervals	$ 50.0	- -	RC, LU, WDNR, WCMP, SEWRPC	2015	Not implemented	
	Continued construction and maintenance of shoreline protection structures	- -[k]	- -[k]	RC, LU, WDNR, SGI	Ongoing	Implemented	
	Continue ongoing programs to update and refine coastal hazard area data using geographic information system technology	17.0	- -	RC, LU, UWX, WDNR, SEWRPC	2004	Not implemented	41, 42
	Construct additional outfall capacity at the City of Racine wastewater treatment plant	1,703.0	- -	LU	2010	Not implemented	52, 54, 55
	Review water and wastewater treatment plant capacity and level of protection under range of Lake Michigan water levels	- -[l]	- -[l]	LU	2010	Partially implemented	26, 52, 54, 55
	Public informational and educational programming	- -[j]	- -[j]	RC, LU, UWX, WCMP	Ongoing	Partially implemented	25, 42, 44, 52, 54, 55
Winter Storm Events	Organize neighborhood outreach groups who look after vulnerable groups and individuals	- -[i]	- -[i]	RC, LU	Ongoing	Partially implemented	42, 43, 44, 45, 49, 50
	Provide special arrangements for payment of heating bills	- -[i]	- -[i]	RC, LU, UC	Ongoing	Partially implemented	
	Identify and advertise a list of available heated shelters in the immediate area	- -[j]	- -[j]	RC, LU, UWX	Ongoing	Partially implemented	
	Increase coverage and use of NOAA Weather Radio and EAS broadcasts	- -[i]	- -[i]	RC, LU	Ongoing	Partially implemented	
	Educational and informational programming	- -[j]	- -[j]	RC, LU, UWX	Ongoing	Partially implemented	
	Ongoing review and enforcement of building code ordinance requirements	- -[b]	- -[b]	RC, LU, WDC	Ongoing	Partially implemented	
	Work with agencies to establish a system for short-term sheltering	- -[i]	- -[i]	RC, LU	Ongoing	Partially implemented	
	Continued coordination of emergency response plans among governmental units and first responders	- -[b]	- -[b]	RC, LU	Ongoing	Partially implemented	
	Continue and refine State, County, and local road maintenance programs	- -[b]	- -[b]	RC, LU, WDOT	Ongoing	Partially implemented	
	Work with utilities to assess and improve electrical service reliability	- -[b]	- -[b]	RC, LU, PP, UC	Ongoing	Partially implemented	

Table 64 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20 Year[a]		Designated Management Agency (see notes for abbreviations)	Plan Implementation Schedule	Implementation Status Notes	Potential Funding Programs (see Appendix J)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)				
Drought Events	Encourage multi-agency approaches to water conservation, drought prediction, and stream and ground water monitoring	-[i]	-[i]	RC, LU, WDNR	Ongoing	Partially implemented	15, 40, 42, 43, 44, 47, 49, 50
	Educational and informational programming	-[j]	-[j]	RC, LU, UWX, WDATCP	Ongoing	Partially implemented	
	Support agricultural programs that promote soil health, preserve soil moisture, and help to minimize loss of crops and topsoil in event of a drought	-[b]	-[b]	RC, UWX, PP, WDATCP	Ongoing	Partially implemented	
	Evaluate and design water supply systems which are not vulnerable to drought	-[k]	-[k]	RC, PP	Ongoing	Partially implemented	
	Evaluate economics of crop insurance	-[m]	-[m]	PP	Ongoing	Partially implemented	
Earthquake Events	Educational and informational programming	-[j]	-[j]	RC, LU, UWX	Ongoing	Not implemented	15, 17, 43, 44, 45, 46
	Ongoing review and enforcement of building code ordinance and requirements	-[b]	-[b]	RC, LU, WDC	Ongoing	Partially implemented	
	Continued coordination of emergency response plans among governmental units and first responders	-[b]	-[b]	RC, LU	Ongoing	Partially implemented	
Transportation Accident Related Events	Continued promotion of educational and informational programming, especially related to driver safety, and to individual actions to protect citizens, property, and businesses	-[b]	-[b]	RC, LU, WDOT	Ongoing	Partially implemented	37, 44, 55, 57
	Continued monitoring and improvement of the transportation system through design, routing, and traffic control at problem areas	-[b]	-[b]	RC, LU, WDOT	Ongoing	Partially implemented	
	Continued enforcement of traffic violations, weight and travel restrictions, and designated truck routes	-[b]	-[b]	RC, LU, WDOT	Ongoing	Partially implemented	
	Continued evaluation and refinement of safety components of railway and airport facilities	-[b]	-[b]	RC, LU, WDOT	Ongoing	Partially implemented	
	Continued support of training, state-of-the-art equipment, planning, and preparedness of first responders, as well as search and rescue teams	-[b]	-[b]	RC, LU, WDOT	Ongoing	Partially implemented	
	Continued coordination of emergency response plans among governmental units and first responders	-[b]	-[b]	RC, LU, WDOT	Ongoing	Partially implemented	
	Incorporate appropriate separation distances for frontage roads and ramps and shouldering where bicycle and pedestrian trails are noted	-[k]	-[k]	RC, LU, WDOT	Ongoing	Partially implemented	
Contamination or Loss of Water Supply	Educational and informational programming related to water safety issues	-[j]	-[j]	RC, LU, UWX, WDNR	Ongoing	Partially implemented	19, 26, 29, 34, 36, 42, 43, 44, 46, 56
	Encourage multi-agency approaches to water conservation, loss and contamination prevention and trend-monitoring	-[i]	-[i]	RC, LU, UWX, WDNR	Ongoing	Partially implemented	

Table 64 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20 Year[a]		Designated Management Agency (see notes for abbreviations)	Plan Implementation Schedule	Implementation Status Notes	Potential Funding Programs (see Appendix J)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)				
Contamination or Loss of Water Supply (continued)	Preparation of emergency operation plans for each public water supply system. The Wisconsin Department of Natural Resources correspondence on this element, including basic security measures is shown in Appendix I	-[i]	-[i]	LU, WDNR	2005	Partially implemented	
	Continued coordination of emergency response plans among governmental units and first responders	-[b]	-[b]	RC, LU	Ongoing	Partially implemented	
Hazardous Material Events	Educational and informational programming related to hazardous material safety, and to individual actions to protect citizens, property, and businesses	-[j]	-[j]	RC, LU, UWX, WDNR, WDEM	Ongoing	Partially implemented	42, 43, 44, 46, 47, 48, 56
	Promote community and operator compliance with industry safety regulations and standards	-[b]	-[b]	RC, UWX, LU, WDEM	Ongoing	Partially implemented	
	Promotion of ongoing enforcement of Federal, State, and County regulatory standards	-[j]	-[j]	RC, LU, WDEM	Ongoing	Partially implemented	
	Support existing or consider expansion of household waste management control programs, which should include hazardous material disposal sites for public citizens	-[i]	-[i]	RC, LU, WDNR	2005	Partially implemented	
	Continued support of training, equipment, planning, and preparedness of first responders	-[b]	-[b]	RC, LU, WDEM	Ongoing	Partially implemented	
	Continued coordination of emergency response plans among governmental units, businesses, and first responders	-[b]	-[b]	RC, LU, WDEM	Ongoing	Partially implemented	
Public Health Emergencies	Educational and informational programming related to public health and safety issues. Increase informational and educational activities for specific health issues, such as West Nile Virus	-[j]	-[j]	RC, LU, UWX, WDPH	Ongoing	Partially implemented	43, 44, 47, 48, 49, 58
	Strengthen public health infrastructure to support surveillance, response, reporting, and research, and to implement prevention and control programs	-[i]	-[i]	RC, LU, WDPH	Ongoing	Partially implemented	
	Provide the public health work force with the knowledge and tools needed for early detection and control of diseases and disease vectors	-[i]	-[i]	RC, LU, WDPH, PP	Ongoing	Partially implemented	
	Implement specific health issue-related mitigation strategies, such as mosquito reduction measures for West Nile Virus	-[i]	-[i]	RC, LU, WDPH, PP	Ongoing	Partially implemented	
	Ensure prompt implementation of prevention strategies and enhance communication of public health information about emerging diseases, their vectors, and control measures	-[i]	-[i]	RC, LU, WDPH, PP	Ongoing	Partially implemented	
	Continued support of training, equipment, planning, and preparedness of emergency management services	-[b]	-[b]	RC, LU, WDPH, WDEM, PP	Ongoing	Partially implemented	
	Continued coordination of emergency response plans among governmental units, businesses, and emergency management services	-[b]	-[b]	RC, LU	Ongoing	Partially implemented	

Table 64 (continued)

Hazard	Mitigation Measures	Estimated Cost: 20 Year[a]		Designated Management Agency (see notes for abbreviations)	Plan Implementation Schedule	Implementation Status Notes	Potential Funding Programs (see Appendix J)
		Capital (thousands)	Average Annual Operation and Maintenance (thousands)				
Terrorism Incidents	Continue and expand educational and informational programming related to public health and safety issues due to terrorist incidents	-[j]	-[j]	RC, LU, UWX, WDEM	Ongoing	Partially implemented	43, 44, 45, 46, 47, 48, 49, 58
	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	-[i]	-[i]	RC, LU, WDEM, WDPH	Ongoing	Partially implemented	
	Continued maintenance and potential enhanced security measures at water treatment facilities, including increased pathogen and chemical monitoring and emergency drinking water supply source alternative planning	-[i]	-[i]	RC, LU, WDNR, WDEM	Ongoing	Partially implemented	
	Continued support of training, equipment, planning, and preparedness for local law enforcement, fire and rescue departments, and other emergency management services	-[i]	-[i]	RC, LU, WDEM	Ongoing	Partially implemented	
	Continued coordination of emergency response plans among Federal, State, and local governmental units, businesses, and emergency management services	-[i]	-[i]	RC, LU, WDEM	Ongoing	Partially implemented	
	Establish Citizens Corp Program and encourage citizen involvement	-[n]	-[n]	RC, LU	2005	Implemented	
	Establish and train community emergency response team	-[n]	-[n]	RC, LU	2005	Implemented	
	Expand neighborhood watch program	-[i]	-[i]	RC, LU	2005	Partially implemented	
Power Outages	Continue to review and implement programs to improve reliability of power supply facilities	-[b]	-[b]	RC, LU, UC	Ongoing	Partially implemented	43, 44, 46
	Coordinate activities and communication regarding prevention and response to power outages	-[b]	-[b]	RC, LU, UC	Ongoing	Partially implemented	
	Encourage backup power generation facilities	-[b]	-[b]	RC, LU, UC	Ongoing	Partially implemented	
	Public information and education	-[j]	-[j]	RC, LU, UC, UWX	Ongoing	Partially implemented	

Footnotes to Table 64

NOTE: The following abbreviations are used for designated management agencies:

CB	=	City of Burlington
CO	=	Conservation Organizations
CR	=	City of Racine
KC	=	Kenosha County
LU	=	General Purpose Local Units of Government
MPSUD	=	Mt. Pleasant Stormwater Utility District
PP	=	Private Property Owners
RC	=	Racine County
RCDB	=	Racine County Drainage Board
SEWRPC	=	Southeastern Wisconsin Regional Planning Commission
SFRC	=	Southeastern Wisconsin Fox River Commission
SGI	=	Sea Grant Institute
TB	=	Town of Burlington
TD	=	Town of Dover
TNSD	=	Town of Norway Sanitary District No. 1
UC	=	Utility Company
UWX	=	University of Wisconsin-Extension
WCMP	=	WDA Coastal Management Program
WDATCP	=	Wisconsin Department of Agriculture, Trade and Consumer Protection
WDC	=	Wisconsin Department of Commerce
WDEM	=	Wisconsin Division of Emergency Management
WDNR	=	Wisconsin Department of Natural Resources
WDOT	=	Wisconsin Department of Transportation
WDPH	=	Wisconsin Division of Public Health
WIN	=	Root-Pike Watershed Initiative Network

[a]*All cost expressed in 2008 dollars.*

[b]*Costs covered under ongoing activity.*

[c]*Costs are included under Racine County Park and Open Space Plan Implementation.*

[d]*Flood mitigation measures and project costs to be reviewed and refined to reflect ongoing City of Burlington downtown redevelopment program.*

[e]*Structure floodproofing or removal to be evaluated on a site-by-site basis and to be carried out at the discretion of property owners.*

[f]*Racine County portion of project is estimated to be about $5,677,000.*

[g]*Costs to be determined by each community based upon logical subwatershed area. Estimated cost is from $1,090,000 to $1,330,000 countywide.*

[h]*Cost of ordinance development is covered under ongoing programs. Cost of implementation is not determined.*

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

[j]*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 $18,000 per year.*

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

[l]*To be conducted as part of next needed facility planning program.*

[m]*Private property costs to be expended as needs arise.*

[n]*Costs to be determined.*

Source: SEWRPC.

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 mitigation activities with FEMA funding, structures must be insured under the NFIP. Under the HMGP, the balance of the costs is 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. HMGP funds must be applied for within 60 days of the declaration. The State, as HMGP grantee, is responsible for identifying and prioritizing projects. 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 HMGP gives priority to properties identified by FEMA as repetitive-loss properties.

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. 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. Increased cost of compliance (ICC) coverage under the NFIP may provide a funding source for bringing noncompliant structures into compliance after a flood loss.

Public Assistance Program

FEMA's Public Assistance Program 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. The Public Assistance Program may pay for mitigation measures under Section 406 of the Stafford Act. This applies to improvements incorporated into a repair or rebuild.

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 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. 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, and minor localized flood reduction projects.

Repetitive Flood Claims Program

FEMA's Repetitive Flood Claims Program (RFC) provides funds on an annual basis to reduce the risk of flood damage to individual properties insured under the NFIP that have had one or more claim payments for flood damages. RFC provides up to 100 percent Federal funding for projects in communities that meet the reduced capacity requirements. Examples of eligible projects include property acquisition, structure removal or relocations, structure elevation, dry floodproofing of nonresidential structures and historic residential structures, and minor localized flood reduction projects.

Severe Repetitive Loss Program

FEMA's Severe Repetitive Loss Program (SRL) provides funds on an annual basis to reduce the risk of flood damage to residential structures insured under the NFIP that are qualified as severe repetitive loss structures. This program provides up to 90 percent Federal funding for eligible projects. Examples of eligible projects include

property acquisition, structure removal or relocations, structure elevation, dry floodproofing of historic residential structures, mitigation reconstruction, and minor localized flood reduction projects.

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 Commerce.

The Community Development Block Grant Emergency Assistance Program is a special program that the Wisconsin Department of Commerce, Division of Housing and Community Development 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, counties, and villages with populations less than 50,000 and all counties except Milwaukee, Waukesha and Dane 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 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.[2] 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, and municipal telecommunications. Grant funds are available on a continual basis. The maximum grant for any single applicant is $750,000 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 Corps of Engineers programs are potential sources of funding for implementing the floodland management recommendations of this plan. In order to be eligible for funding, the plan components must meet specific Corps economic feasibility and other criteria. The programs which may be applicable include the following:

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[2]*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.*

- Section 22—Water resources planning assistance—50 percent Federal, 50 percent local cost share.

- Section 205—Small flood control projects—Maximum $7.0 million per project, 65 percent Federal, 35 percent local cost share.

- Section 208—Clearing debris and sediment from channels for flood prevention—Maximum $500,000 per project, 65 percent Federal, 35 percent local cost share.

- Section 14—Emergency streambank and shoreline protection—Maximum $1.5 million per project, 65 percent Federal, 35 percent local cost share.

STATE PROGRAMS

Wisconsin Department of Natural Resources
The Wisconsin Department of Natural Resources (WDNR) operates programs that may serve as potential funding sources for flood mitigation efforts by the County and local communities (see also Appendices J and K). Some of these programs are described below.

Municipal Flood Control Grants
Under Chapter NR 199, "Municipal Flood Control Grants," of the *Wisconsin Administrative Code* municipalities, including cities, towns, and villages, as well as metropolitan sewerage districts are eligible for cost-sharing grants from the State for projects such as acquisition and removal of structures; floodproofing and elevation of structures; riparian restoration projects; acquisition of vacant land, or purchase of easements, to provide additional flood storage or to facilitate natural or more efficient flood flows; construction of facilities for the collection, detention, retention, storage, and transmission of stormwater and groundwater for flood control and riparian restoration projects; and preparation of flood mapping projects. Municipalities and metropolitan sewerage districts are eligible for up to 70 percent State cost-share funding for eligible projects, and would have to provide at least a 30 percent local match. Applications are due on July 15 of each calendar year.

Urban Green Space Program
The WDNR Urban Green Space (UGS) program provides 50 percent matching grants to cities, villages, towns, counties, public inland lake protection and rehabilitation districts, and qualified nonprofit conservation organizations for the acquisition of land. The intent of the program is to provide natural open space within or near urban areas and protect scenic or ecological features.

Urban Rivers Grants Program
The WDNR Urban Rivers Grants Program (URGP) provides 50 percent matching grants to municipalities to acquire land or rights to land on or adjacent to rivers that flow through urban areas, in order to preserve or restore urban rivers or riverfronts for the purposes of economic revitalization and the encouragement of outdoor recreational activities.

Stormwater Management Program
The WDNR administers a Targeted Runoff Management (TRM) grant program provided for under Section 281.65(4c) of the *Wisconsin Statutes.* Local governmental units may be reimbursed up to 70 percent of eligible costs associated with installing Best Management Practices (BMPs) to limit or end nonpoint water pollution. Grant awards cannot exceed $150,000. Grants provided under this program may be used for projects to control nonpoint source pollution and may be available to partially support dual-purpose (quality and quantity) detention ponds, streambank protection projects, or other stormwater management facilities.

The WDNR also administers an Urban Nonpoint Source and Stormwater Grant Program provided for under Section 281.66 of the *Wisconsin Statutes*. Cities, towns, villages, and counties are eligible for grants under this program to improve urban water quality by limiting or ending sources of urban nonpoint source pollution. Funded

projects are site-specific and targeted to address high priority problems in urban project areas. Two types of grants are available under this program: planning grants and construction grants. Constructions grants are made for construction 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. The maximum possible grant is $200,000 ($150,000 for construction activities and $50,000 for land acquisition or easements). 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.

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, changing outside circumstances that may affect the plan and efforts to implement it, and the need for any changes to the plan and/or to how it is being implemented. The plan should also be reviewed following each hazard event occurrence to assess its continued viability and the need for revisions.

Plan Monitoring
Annual Review
Role of the Racine County Hazard Mitigation Task Force
Toward ensuring successful monitoring of the hazard mitigation plan for Racine County, the County intends that the Racine County Hazard Mitigation Task Force meet at least annually to review the plan and the status of its implementation, as well as develop and recommend any necessary revisions 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, for consideration and possible adoption by those bodies. The revisions would be proposed, considered, and adopted in the form of formal amendment to the hazard mitigation plan. This review process will be coordinated and conducted by the 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 County Hazard Mitigation Task Force, in its review process, will periodically examine the plan and the efforts to implement it with respect to 1) whether any hazards affecting the County and local units of government have changed, and, if so, how they have changed; 2) whether any hazard mitigation goals and objectives have changed, or need to be changed; 3) the degree and extent of progress made in implementing previously identified hazard mitigation actions; 4) whether the plan elements and 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 review and guidance of the Hazard Mitigation Task Force 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 Task Force or the County Board.

Role of the Racine County Office of Emergency Management Staff
The meetings of the Racine County Hazard Mitigation Task Force will continue to be publicly noticed and salient decisions recorded in the County Office of Emergency Management files and, where appropriate, on the County web site and in the relevant press releases among others. Meetings of the Racine County Hazard Mitigation Task Force 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 County Office of Emergency Management staff will ensure that appropriate notices, agendas, and other documentation are provided to interested persons and task force 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.

Issues and concerns raised at the community level through this program of public participation and involvement, as well as any other issues actively solicited from the local communities shall be included in the agenda for the regularly scheduled annual meetings of the Racine County Hazard Mitigation Task Force. Additional Task Force meetings may be held as necessary to ratify issues to be included on the agenda, review the implementation of the mitigation measures during the previous year, and the performance of the participating agencies with a view toward enhancing and improving response to natural and other hazard events.

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. These reviews will form part of the agendas of the Racine County Hazard Mitigation Task Force meetings.

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 should be reevaluated at approximately 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, including the need for certain facilities and the location, size, and capacity of facilities, 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 updated plan should be initiated by the County Office of Emergency Management approximately 24 months prior to expiration of this updated plan.

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APPENDICES

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Appendix A

PERTINENT COMMITTEE MEMBERSHIP LISTS AND MATERIALS RELEVANT TO THE RACINE COUNTY HAZARD MITIGATION PLAN

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Figure A-1

ANNOUNCEMENT OF REFORMATION OF
RACINE COUNTY HAZARD MITIGATION TASK FORCE

Hahn, Michael G.

From: Maack, David [David.Maack@goRacine.org]
Sent: Wednesday, March 04, 2009 9:10 AM
To: Hahn, Michael G.
Subject: FW: Hazard Mitigation Task Force

Importance: High

-----Original Message-----
From: Maack, David
Sent: Tuesday, March 03, 2009 10:45 AM
To: Richardson, Rob; 'Boconnel@cityofracine.org'; 'Ancona, Paul'; scott.mcbride@we-energies.com; 'France, Paul - DMA'; 'Gray, Roxanne - DMA'; 'Michael.Friis@wisconsin.gov'; Lehman, Jon; 'Michael.Luba@Wisconsin.gov'; 'rusty kapela'; Kacala, Gordy; Caron, Roger; Baker, Beverlee; Anderson, Julie; vf@execpc.com; cebert2@wi.rr.com; papascf87@aol.com; Jeff Bratz (jab158@tds.net); Jeff RCFCA Ehrhart (j2k2farm@sbcglobal.net); John Prochniak (tacmed00@sbcglobal.net); KMW1@wi.net; RC/WI - Madisen James M; Richard Chief Lodle (lodle@att.net); wpjensen@wi.rr.com; Alan RCFCA Babe (E-mail); artscola@aol.com; baumgart@tds.net; Bill RCFCA Miller (E-mail); Bob Mayer; Bud RCFCA Eastman (E-mail); Campbellkidz04@sbcglobal.net; cfiberard@hotmail.com; Chris Bernal-Fire Bells; Chris RCFCA Bernau (E-mail); crewconstruction@aol.com; Dan RCFCA Rueter (E-mail); dembroskihar@mac.com; Dick Roeder; dolezal@tds.net; dvoss@volunteercneterofracine.org; egaschauer@TDS.net; explorer post 500; fyrpix@sbcglobal.net; Garrett; Garrett RCFCA Forkner (E-mail); Gary Kroes; gkaminskis@mtpleasantwi.gov; Greg Havel; Greg RCFCA Elblein (E-mail); Greg RCFCA Havel (E-mail); Jdahms4@wi.rr.com; Jerry RCFCA Semrad (E-mail); jkeiser@mtpleasantwi.gov; Kacmarcik, Robert; Kevin.Bush@cityofracine.org; LaFrance911@hotmail.com; Lt. Bryan Tello; Maack, David; Mark RCFCA Hetzel (E-mail); Mark.Polzin@cityofracine.org; mpierce@mtpleasantwi.gov; Pete RCFCA Peterson (E-mail); Pete RCFCA Waselchuk (E-mail); plee509@wi.rr.com; Rehab38@wi.rr.com; Richard RCFCA Bosworth (E-mail); Richard RCFCA Peterson (E-mail); Rmarshall9@wi.rr.com; RRobins73@yahoo.com; Sean Marschke; ssalvo@mtpleasantwi.gov; Steve RCFCA Denman (E-mail); Steve.Hansen@cityofracine.org; Susan.wanggaard; Tichigan FD; Tim Allen; Tom Czerniak; Tom RCFCA Czerniak (E-mail); Tsn2@tds.net; Union Grove Fire; Wags1@wi.rr.com; Wayne RCFCA Myers (E-mail); William Bouma (E-mail); Stacey Wians; Cheryl Mazmanian (E-mail); FrancesPetrick; Janelle Grammer; Jennifer Johnson; marcia.fernholz@cityofracine.org; mgesner@calmpjthealth.com; Michele.Breheim@cityofracine.org; mseitz; todroad@aol.com; bpfeffer@caledoniawi.com; BSasse@mtpleasantwi.gov; ghanson; Gibbs, Kathy; hwydept@townofburlington.com; info@windpointwi.us; larryg@bizwi.rr.com; niewolny@tds.net; Orlando, Dennis; Prott, David; publicworks@sturtevant-wi.gov; 'Richard.jones@cityofracine.org'; teeg@cityofracine.org; Town of Yorkville; beaufordbailey@hotmail.com; Cjdenman@ra.rockwell.com; cwilson@bizwi.rr.com; dkroesnpsd@tds.net; Eagle Lake; Gbeck@waterfordUHS.K12.wi.us; Jerry Nelson; jtomasek@windpointwi.us; Keith.haas@cityofracine.org; Mark Osmundsen; mmoorenpsd@tds.net; Packback4@tds.net; Rpucely@mtpleasantwi.gov; Sanitation1_TON@hotmail.com; Zortman, Robert; Basley, Dennis; Bauer, Thomas; BrianLondre; Brown, Kevin; Carlson, Robert; Christensen, Karl; Coughlin, David; Formolo, James; Gonzalez, Gonzalo; Halliday, William; Hanrahan, John; JamesFormolo; JamesMuir; Jennings, Eric; Klatt, Dan; Lamke, Thomas; Laux, Carl; Londre, Brian; Mattke, William; Muir, James; Richmond, Charles; RobertCarlson; RobertKacmarcik; Schmidt, Paul; Sikora, Steven; Stratman, James; Sweet, Thomas; ThomasSweet; Thompson, Brenda; Walder, Denise; Wearing, Douglas; Weidner, James; Zimmermann, Brian; todd.bluhm@aurora.org; Andy Johnson; Dave Piccolo (E-mail); Diane Huck (E-mail); Jeff Crogan; Jennifer Garbo; Mark Messina; marty.schutte@aurora.org; robert swenarski; Rommel O. Bote' MD (E-mail); Timothy Zarzecki; Jerry Baldukas (jbaldukas@cityofracine.org); Sean Marschke (sgtsmm@yahoo.com); Skip Twardosz (twodoors42@wi.rr.com); wendy.younglove@dot.state.wi.us; Arthel.Howell@cityofracine.org; Bill Gabbey; Bradley.Hompe@doc.state.wi.us; Brian Smith; Chief Meier; chiefmeier@caledoniawipd.com; chiefsevick@townofburlington.com; coachmallwitz@aol.com; Diane.williams@doc.state.wi.us; gahlmanc@sturtevant-wi.gov; John Barnes; Kent.Demers@Wisconsin.gov; kurt.wahlen@cityofracine.org; lawrence.mahoney@doc.state.wi.us; michael.cockroft@doc.state.wi.us; noland@gtc.edu; Norway PD; Randy.Dunkel@wisconsin.gov; Ray Knapp; Robert.Humphreys@doc.state.wi.us; Ruth Donalds-DOC; Ruthdonalds@aol.com; Scot Eisenhauer; Shurley@cityofracine.org; Sturtevant PD; Thomas.Christensen@cityofracine.org; Tom Petersen; Varla.bishop@dot.state.wi.us; Warden Mitchell; wardendanb@yahoo.com; Waterford PD; wlsoffice@wi.rr.com; Al Days; Al Days; alexander@yorkville.k12.wi.us; BSagadin@prairieschool.com; Burlington School District; concordia@wi.rr.com; Damaschke, Gary; Drought School; drubach@cchsnet.org; dvanswol@racinechristianschool.com; hdavis@nextgenerationnow.org; info@21stprepschool.org; jgrogan@uniongroveonline.com; John Thielen; jschroeder@mnsd.k12.wi.us; jweiss@saintcats.org; Karcher Middle Schol; kbranch@21stprepschool.org; kbrandstetter@waterforduhs.k12.wi.us; kramer1@stthomas.pvt.k12.wi.us;

ljackson@stmb.org; Magar, Dave; mpietsch@mystcharles.org; nbickel@lhsar.org; nbickel@racinelutheran.com; NGN1; principal@st-ritas.org; rlewisrms@tds.net; rmorelan@21stprepschool.org; rtadeo@cchsnet.org; Sacred Heart; school@stjohnsburlington.org; sjarcine@execpc.com; Slupski, Z. George; Stephanie.Kratochvil@racine.k12.wi.us; stjohnschurch@hotmail.com; stlucy@archmil.org; StSebPrinc@StSebRacine.org; stsebschool@stsebracine.org; sumner-coonL@sjdms.org; trinity@trinityracine.com; Trinitycaledonia@wi.rr.com; Waterford School; witekl@archmil.org; David C. Voss (lt@wi.net); JDobbs@cityofracine.org; John Prochniak (JProchniak@mtpleasantwi.gov); Steve Janus; Tom Karkow (news@racineradio.com); Bohn, Mike - RSM; France, Paul (Paul.France@wisconsin.gov); Bob Miller; bohn@execpc.com; DavidMaack; Greenwood, Lori; Matthew Baitinger; Miller, Bob; Mark Janiuk (villageadmin@sturtevant-wi.gov); Wind Point; dbaumeister@townofburlington.com; Kevin Lahner; LArndt@mtpleasantwi.gov; mandreasen@mtpleasantwi.gov; thomaskramer@wi.rr.com; tlebak@caledoniawi.com; todct@aol.com; townofraymond@core.com; townwtfrd@tds.net; Vwaterford.clerk@tds.net; asradbah@att.net; astreif@townofburlington.com; Caledonia Village Clerk; CFamille Cohen-Norway; Christensen, Wendy M.; cityclerk@burlington-wi.gov; Edmands, Juliet; elmwoodpark@wi.rr.com; Jan Winget; Janice.Johnson-Martin@cityofracine.org; Lerickson@wi.rr.com; Mrudrud@wi.rr.com; Pat Campbell; Racine City Clerk; Rochester, Town & Village; Rochestertown@wi.rr.com; Sturtevant Village Clerk; villageofelmwoodpark@yahoo.com; NAMI Racine; Mary Black (mblack@girlscoutsracineco.org); (Robert_Edmonds@usc.salvationarmy.org); dant@racinecountyfoodbank.org; Yorkville UMC; 211; bartthom@yahoo.com; Bethany Apartments; bonnie.stankevitz@sai-inc.org; borstl@wi-redcross.org; burgerb@milwpc.com; Cathy Markstrom; Cheryl.axforsd@goodwillservices.org; Dave Blank; davemaurer@unitedwayracine.org; deb_johnson@usc.salvationarmy.org; delerys@aol.com; director@burlingtonloveinc.org; donna.menarek@sai-inc.org; Jamesdhuycke@safehaven.org; jamesdhuycke@safehavenofracine.org; jhalliday@countrysidehumanesociety.org; jrusfeldt@wi.rr.com; kb9mma@kb9mma.com; kb9zaf@arrl.net; kc9eow@yahoo.com; Laurl Borst; laurlborst; ldevinny@lsswis.org; lighthouse@sewisbsa.com; Liz Mendez; Lyndsey Nelson; Marilyn Pelky; marlene@careersindustries.com; Mary.McIlvaine@cityofracine.org; michael_curry@charter.net; millerc@wi-redcross.org; Milwaukee Red Cross; mtree@llor.org; nirizarry@ccmke.org; Pat_crowell@usc.salvationarmy.org; pat641@wi.rr.com; pediconek@wi-redcross.org; rcpe@rootcom.net; Red Cross; rosanne@tds.net; roskac@wi-redcross.org; RSVP; sengel@thearcofracine.org; swahl@allsaintshealthcare.org; terri_leece@usc.salvationarmy.org; tim_litherland@usc.salvationarmy.org; tkirk@llor.org; truckeyd@wi-redcross.org; wa9jmo@wi.net
Subject: Hazard Mitigation Task Force
Importance: High

Racine County's Planning & Development Department and its Office of Emergency Management will be convening a Hazard Mitigation Task Force. Its primary mission will be to update the Racine County Hazard Mitigation Plan. This plan has been very critical over the past two years, as we have faced unprecedented flooding in Racine County. Without this plan, municipalities in Racine County would not be eligible for hazard mitigation grants.

Therefore, it is essential that each municipality be represented on this task force. County Executive McReynolds will be extending a personal invitation to each Chief Elected Official in Racine County. We also seek a cross-section of community interests, including law enforcement, fire, public health, public works, engineering, elected and appointed officials, and representatives from both the private sector and non-profits.

Our first meeting will be on Monday, March 30th from 1:30 PM-3:30 PM at the Ives Grove Office Complex-Auditorium, 14200 Washington Ave, Sturtevant. At this meeting we will review the scope of work and begin updating our local risk areas.

This first meeting is the most crucial to our planning process. To confirm your attendance, please contact our Planning and Development Department at 262.886.8470 or by email at julie.anderson@goRacine.org.

David L. Maack, CEM, CPM
Racine County Emergency Management
262.636.3515
e-mail: david.maack@goRacine.org
www.racineco.com/emergencymanagement
"Building a Disaster Resistant Community-Making Disaster Resistance a Way of Life"

NEWS RELEASE

RACINE COUNTY
Office of the County Executive
WILLIAM L. MCREYNOLDS

730 Wisconsin Avenue
Racine, WI 53403
262-636-3273
fax: 262-636-3549
William.McReynolds@goRacine.org

FOR IMMEDIATE RELEASE
March 27, 2009

CONTACT: Geoff Greiveldinger
(262) 636-3120
Geoff.Greiveldinger@goRacine.org

RACINE COUNTY AND MUNICIPALITIES TO START HAZARD MITIGATION PLANNING

Racine, WI – Racine County Executive Bill McReynolds announced the launch of a hazard mitigation planning process in cooperation with its 17 municipalities to make Racine County safer and more resistant to disasters. A $30,000 Pre-Disaster Mitigation Grant from the Federal Emergency Management Agency will fund the update to the Racine County Hazard Mitigation Plan.

This plan will look at the different hazards that Racine County faces and then develop a "roadmap" outlining potential cost-effective hazard mitigation activities, some of which may be eligible for future grant funding. Without an approved plan neither Racine County nor the municipalities within Racine County would be eligible for hazard mitigation grants.

"Over the past two years, I have personally met many of our residents whose homes were badly flooded during the events of summer 2007 and spring 2008," commented McReynolds. "By working together on this plan, hopefully we can identify strategies that will minimize or even prevent a reoccurrence. That is why I have invited all municipalities in Racine County to participate in this process."

County and municipal elected officials and staff will join in a multidisciplinary workgroup to examine disaster-related risks and vulnerabilities within the county and to develop mitigation strategies to reduce future losses.

McReynolds will host a kick-off meeting of this workgroup on Monday, March 30th from 1:30 PM-3:30 PM at the Ives Grove Office Complex-Auditorium, 14200 Washington Ave, Sturtevant. At this meeting, the scope of work will be reviewed and the workgroup will begin updating local risk areas.

If you would like more information about the process or have interest in providing your input, please contact Racine County's Planning and Development Director Julie Anderson at 262.886.8470 or Racine County's Emergency Management Coordinator David Maack at 262.636.3515.

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Figure A-2

MEMBERS OF THE RACINE COUNTY HAZARD MITIGATION TASK FORCE

William L. McReynolds, Chairman ..... County Executive, Racine County
Michael G. Hahn ..... Chief Environmental Engineer, Southeastern Wisconsin Regional Planning Commission
Julie Anderson ..... Director of Planning and Development, Racine County
Mark J. Anderson ..... Chief of Police, City of Burlington
Kathleen Angel ..... Federal Consistency and Coastal Hazards Coordinator, Wisconsin Coastal Management Program
Tony Beyer ..... Water Systems Engineer, Village of Mount Pleasant
Chris Bennett ..... Village Trustee, Village of Rochester
Joseph E. Boxhorn ..... Senior Planner, Southeastern Wisconsin Regional Planning Commission
Roger Caron ..... President, Racine Area Manufacturers and Commerce
Jeff Crogan ..... Safety Manager, Wheaton Franciscan Health Care-All Saints
Thomas Czerniak ..... Fire Chief, Union Grove-Yorkville Fire Department
Tom Ditscheit ..... Police Chief, Town of Waterford Police Department
James Dobbs ..... Lieutenant, City of Racine Police Department
Rebecca Ewald ..... Village Administrator, Village of Waterford
Marcia Fernholz ..... Environmental Health Director, City of Racine Health Department
Paul France ..... Region Director, Wisconsin Emergency Management
Scott Geyer ..... Village of Mt. Pleasant Police Department
Mike Gitter ..... Racine Water and Wastewater Utility
Barbara Grant ..... Village Administrator, Village of Wind Point
Roxanne K. Gray ..... State Hazard Mitigation Officer, Wisconsin Division of Emergency Management
Ray Gromacki ..... Chairman, Town of Dover
Al Hagermann ..... Department of Public Works, Town of Raymond
John Hanrahan ..... Chief Deputy, Racine County Sheriff's Department
David Hendrix ..... Building Inspector, Town of Norway
Ken Hinz ..... Director of Public Works, Town of Waterford
Matt Johnson ..... Town of Waterford Police Department
Richard M. Jones ..... City Engineer, City of Racine
Bob Kacmarcik ..... Sergeant, Racine County Sheriff's Department
Gary Kasterton ..... Chairman, Town of Raymond
Thomas Kramer ..... Treasurer, Town of Norway
Cathy LaFaive-Markstrom ..... Southeast Wisconsin Citizen Corps Coordinator, Volunteer Center of Racine County
Tom Lebak ..... Village Administrator, Village of Caledonia
Scott Lettney ..... Deputy Attorney, City of Racine
Michael A. Luba ..... Root-Pike River Basin Team Supervisor, Wisconsin Department of Natural Resources
David L. Maack ..... Emergency Management Coordinator, Racine County Office of Emergency Management
Jim Markstrom ..... Emergency Coordinator, Racine County ARES/RACES
Logan Martin ..... Community Development Coordinator, Village of Mt. Pleasant
Sean Marschke ..... Police Chief, Village of Sturtevant

Figure A-2 (continued)

Cheryl Mazmanian ..... Health Officer, Western Racine County Health Department
Scott McBride..... Principal Account Manager, We Energies
Brett McDonald..... Shop Operations Manager Department of Public Works, Racine County
Terrence J. McMahon.....Supervisor, Town of Yorkville
Dale Mentink..... Assistant Fire Chief, Raymond Fire Department
Ronald R. Meyer ..... Planning Director, Village of Mt. Pleasant
James E. Moyer ..... Chairman, Town of Yorkville
Thierno Ndao..... Programmer/Analyst, Information Technology Department, City of Racine
Betty J. Novy..... Clerk-Treasurer, Village of Rochester
Mark Osmundsen .....Public Works Director, Village of Union Grove
Aaron Owens..... Research Analyst, Southeastern Wisconsin Regional Planning Commission
Thomas S. Petersen .....Captain, Village of Mt. Pleasant Police Department
Richard L. Peterson ..... Deputy Chief, City of Burlington Fire Department
Mark E. Pierce..... Deputy Chief, South Shore Fire Department
Rob N. Richardson .....Director of Information Systems, Racine County
Richard Roeder.....Fire Chief, Village of Caledonia Fire Department
Linda Sodermann.....Local Affairs Principal Representative, We Energies
Charles R. Stachowski.....Supervisor of Public Works, Village of Sturtevant
Skip Twardosz.....Emergency Government, Town of Burlington
Audrey Viau .....President, Village of Elmwood Park
Kurt Whalen .....Police Chief, City of Racine Police Department
Alan Whalen..... Collection System Supervisor, Racine Wastewater Utility

Figure A-3

ACTIVITIES OF THE RACINE COUNTY HAZARD MITIGATION TASK FORCE

Racine County Department of Emergency Management
Racine County Department of Planning and Development
Southeastern Wisconsin Regional Planning Commission

Notice of Meeting and Agenda

RACINE COUNTY HAZARD MITIGATION TASK FORCE

DATE: March 30, 2009

TIME: 1:30 to 3:30 p.m.

PLACE: Auditorium
Ives Grove Office Complex
14200 Washington Avenue
Sturtevant, WI 53177

AGENDA:

1. Welcome: County Executive William L. McReynolds

2. Introductions

3. Overview of hazard mitigation plan updating process: Roxanne K. Gray, State Hazard Mitigation Officer, Wisconsin Division of Emergency Management

4. Background on the update to the Racine County Hazard Mitigation Plan: Michael G. Hahn, SEWRPC Chief Environmental Engineer

    a. Initial 2004 plan

    b. Main plan components to be reviewed and revised

    c. Schedule for the plan update (Attachment 1)

5. Connection between the ongoing County comprehensive plan and the hazard mitigation plan update (maps and tables will be distributed at the meeting): Julie A. Anderson, Racine County Planning and Development Director, and Mike Hahn

6. Review of hazard mitigation goals established for the 2004 plan (Attachment 2): Mike Hahn

7. Review hazards list (Attachment 3): David L. Maack, Racine County Emergency Management Coordinator

8. Other business

9. Next meeting

10. Adjourn

Michael G. Hahn
Secretary

Enclosures

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Attachment 1

WORK SCHEDULE FOR UPDATING THE RACINE COUNTY HAZARD MITIGATION PLAN

Task	Estimated Completion Date
Submit First Quarterly Report to Wisconsin Division of Emergency Management	January 15, 2009
Update Planning Team Membership	March 1, 2009
Kickoff Meeting	March 30, 2009
Public Participation	September 2008 through August 2010
Submit Second Quarterly Report to Wisconsin Division of Emergency Management	April 15, 2009
Review of Established Goals and Objectives	April 30, 2009
Develop Updated Community Profiles Consistent with the Ongoing County Comprehensive Plan	April 30, 2009
Identify and Describe Hazards	April 30, 2009
Survey Designated Management Agencies Regarding Status of Implementation of Original Plan	May 14, 2009
Update Risk and Vulnerability Assessments	May 14, 2009
Submit Third Quarterly Report to Wisconsin Division of Emergency Management	July 15, 2009
Development of Updated Mitigation Actions	September 18, 2009
Submit Fourth Quarterly Report to Wisconsin Division of Emergency Management	October 15, 2009
Development of Plan Maintenance Process	November 9, 2009
Submit Draft Plan Update	December 7, 2009
Revise Plan Based on State Review	April 7 through June 30, 2010
Formal Adoption	July 1, 2010 through August 31, 2010
Submit Final Plan Update for Approval	October 7, 2010

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Attachment 2

HAZARD MITIGATION GOALS AND OBJECTIVES
FOR RACINE COUNTY HAZARD MITIGATION PLAN

The following goals were established for the initial Racine County hazard mitigation planning program,[1] based, in part, upon goals previously established in watershed, park and open space, and land use planning programs.

1. **Land Use:** A spatial distribution of the various land uses which minimizes hazards and dangers to health, welfare, and safety; further enhances 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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[1]*SEWRPC Community Assistance Planning Report No. 266,* Racine County Hazard Mitigation Plan, *August 2004.*

Attachment 3

HAZARD IDENTIFICATION SUMMARY TO BE USED TO SOLICIT INPUT FROM RACINE COUNTY HAZARD MITIGATION TASK FORCE

Number of Priority Votes Received at Task Force 03/30/09 Meeting	Hazard Types
	A. Natural Hazards
	1. Flooding and stormwater drainage
	2. Tornado or high straight-line wind event
	3. Earthquake
	4. Lake Michigan coastal erosion (long-term lake level changes)
	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
	B. Loss of Infrastructure Systems
	1. Contamination or loss of water supply system
	2. Loss of sewerage system
	3. Loss of telecommunication
	4. Electrical system outage
	5. Computer system incident
	C. Hazardous Material Incidents and Transportation Incidents
	1. Railroad incidents
	2. Roadway incidents
	3. Pipeline incidents
	4. Fixed facility incidents (industries, bulk fuel storage sites, grain elevators, agricultural chemical storage, and explosives, including fireworks storage)
	5. Aircraft (flight path)
	D. Violence and Terrorism
	1. Correctional center incident
	2. Civil unrest
	3. Terrorism incident (bomb threat, hostage situation, biological incident)
	4. Workplace violence
	5. School violence

Number of Priority Votes Received at Task Force 03/30/09 Meeting	Hazard Types
	E. Biological/Health Risks
	1. Radon gas
	2. Communicable disease outbreak or epidemic
	3. Biological contaminants (anthrax, smallpox, etc.)
	F. Mass Fire or Emergency Medical Incidents
	1. Major fire (structure(s) or rural area wild fire or grain field fire)
	2. Explosion
	3. Mass casualty incident
	4. Building collapse or cave-in
	G. Miscellaneous Hazards
	1. Quarries
	2. Landfills
	3. Wild animals
	4. Insects
	5. Recreational vehicles (snowmobiles)

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SUMMARY NOTES OF THE MARCH 30, 2009, MEETING OF THE RACINE COUNTY HAZARD MITIGATION TASK FORCE

INTRODUCTION

The first meeting of the Racine County Hazard Mitigation Task Force was convened at the Racine County Ives Grove Office Complex at 1:35 p.m. The meeting was called to order by County Executive, William L. McReynolds. Attendance was taken by circulating a sign-in sheet and a quorum was declared present.

In attendance at the meeting were the following individuals:

William L. McReynolds, Chairman	County Executive, Racine County
Michael G. Hahn, Secretary	Chief Environmental Engineer, Southeastern Wisconsin Regional Planning Commission
Julie Anderson	Director of Planning and Development, Racine County
Kathleen Angel	Federal Consistency and Coastal Hazards Coordinator Wisconsin Coastal Management Program
Joseph E. Boxhorn	Senior Planner, Southeastern Wisconsin Regional Planning Commission
Roger Caron	President, Racine Area Manufacturers and Commerce
Jeff Crogan	Safety Manager, Wheaton Franciscan Healthcare-All Saints
Tom Ditscheit	Police Chief, Town of Waterford Police Department
Jim Dobbs	Lieutenant, City of Racine Police Department
Rebecca Ewald	Village Administrator, Village of Waterford
Marcia Fernholz	Environmental Health Director, City of Racine Health Department
Paul France	Region Director, Wisconsin Emergency Management
Roxanne K. Gray	State Hazard Mitigation Officer, Wisconsin Division of Emergency Management
Ray Gromacki	Chairman, Town of Dover
Al Hagermann	Department of Public Works, Town of Raymond
John Hanrahan	Chief Deputy, Racine County Sheriff's Department
David Hendrix	Building Inspector, Town of Norway
Ken Hinz	Department of Public Works, Town of Waterford
Richard M. Jones	Public Works Commissioner, City of Racine
Gary Kastenson	Chairman, Town of Raymond
Cathy LaFaive-Markstrom	Southeast Wisconsin Citizen Corps Coordinator, Volunteer Center of Racine County
Tom Lebak	Village Administrator, Village of Caledonia
Scott Letteney	Deputy Attorney, City of Racine
Michael Luba	Root and Pike Basin Supervisor, Wisconsin Department of Natural Resources
David L. Maack	Emergency Management Coordinator, Racine County Emergency Management Department
Jim Markstrom	Emergency Coordinator, Racine County ARES/RACES
S.M. Marschke	Police Chief, Village of Sturtevant Police Department
Logan Martin	Community Development Coordinator, Village of Mount Pleasant
Scott McBride	Principal Account Manager, We Energies
Brett McDonald	Shop Operations Manager, Racine County Public Works Department
Ronald R. Meyer	Planning Director, Village of Mount Pleasant

Thierno Ndao	Programmer/Analyst, Information Technology Department, City of Racine
Mark Osmundsen	Public Works Director, Village of Union Grove
Thomas S. Petersen	Captain, Village of Mount Pleasant Police Department
Rob N. Richardson	Director of Information Systems, Racine County
Richard Roeder	Fire Chief, Village of Caledonia Fire Department
Skip Twardosz	Emergency Government, Town of Burlington
Kurt Whalen	Police Chief, City of Racine Police Department
Allan Wheeler	Collection System Supervisor, Racine Wastewater Utility

County Executive McReynolds welcomed all those in attendance and thanked them for their interest and participation in this important program. He thanked David Maack, Julie Anderson, and the Southeastern Wisconsin Regional Planning Commission (SEWRPC) for the work done five years ago on the initial plan. He noted that this plan ensures eligibility for Federal Emergency Management Agency hazard mitigation grants for the communities within the County. As an example, he stated that the Village of Mount Pleasant received a grant in 2008 to acquire two floodprone structures. He indicated a desire to receive input for other potential projects. Mr. McReynolds then asked each of those in attendance to introduce themselves.

Following introductions, Mr. McReynolds noted that an agenda had been provided with the notice of the meeting. Mr. Maack stated that the current effort would update the plan that was developed five years ago. He indicated that he expects that updating this plan will require three meetings of the Task Force. He indicated that broad participation is needed for the planning process and reiterated the importance of identifying potential projects for inclusion in the plan.

OVERVIEW OF HAZARD MITIGATION PLANNING PROCESS

Mr. Maack introduced Roxanne Gray of the Wisconsin Division of Emergency Management. At Mr. Maack's request, Ms. Gray presented an overview of hazard mitigation plan updating process.

[Secretary's Note: Ms. Gray's presentation is attached hereto as Exhibit A.]

Following her presentation, Ms. Gray noted that it is important that the update process be thoroughly documented.

Mr. Maack asked Ms. Gray to explain the reference in her presentation to low-interest loans from the Small Business Administration (SBA). Ms. Gray responded that individual assistance from FEMA has to go to a primary home. Under this program, there is a limit of $28,000 for home repairs. If there are additional needs, the homeowner would need to apply to the SBA for a low-interest loan and be denied, in order to qualify for other needs assistance from FEMA.

BACKGROUND ON THE UPDATE TO THE RACINE COUNTY HAZARD MITIGATION PLAN

Mr. Maack introduced Michael G. Hahn of the SEWRPC staff. At Mr. Maack's request, Mr. Hahn presented background on the initial plan, the main plan components to be reviewed, and a schedule for the plan update.

[Secretary's Note: Mr. Hahn's presentation is attached hereto as Exhibit B.]

Mr. Hahn stated that as the update of the plan proceeds, SEWRPC staff will present updated text to the Task Force and look for comments and updated information. He noted that information from the ongoing Racine County Comprehensive Plan will be incorporated into the updated plan. He continued that the inventory and assessment of erosion control structures along Lake Michigan that SEWRPC recently published in collaboration with the County and coastal municipalities will also be incorporated into the updated plan.

As part of the review of the hazard mitigation goals established for the initial plan, Mr. Hahn proposed changing the wording of the land use goal for the plan to read: "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." He explained that the new wording contained less redundancy than the old wording.

CONNECTION BETWEEN COUNTY COMPREHENSIVE PLAN AND HAZARD MITIGATION PLAN UPDATE

Ms. Anderson and Mr. Hahn distributed a set of maps and tables from the ongoing Racine County Comprehensive Plan to the Task Force. Ms. Anderson explained that every City, Village, and Town in the County is a partner in the comprehensive plan planning process. She noted that this is the third year of the planning process. She reviewed the maps and tables. She also indicated that floodplain maps are currently being updated by FEMA and wetland maps are being updated by the Wisconsin Department of Natural Resources.

Mr. Maack asked whether the comprehensive plan maps were available as GIS layers. Ms. Anderson answered that they were not; however, the County is moving toward converting them to a geodatabase.

REVIEW OF HAZARDS LIST

Mr. Maack asked the Task Force to review the Hazard and Vulnerability Assessment Tool attached to the meeting agenda. He indicated that this form contained the list of hazards considered in the development of the initial plan. He asked the Task Force if these hazards still pertained and whether other hazards should be added to the list. After discussion by the Task Force, it was decided to include long-term lake level changes in the list as a hazard separate from Lake Michigan coastal erosion, remove recreational vehicles from the list of hazards, and consolidate biological contaminants into terrorism incidents. Mr. Maack noted that the wording of the terrorism incident category would be revised to use the CBRNE (chemical, biological, radiological, nuclear, explosive) nomenclature.

Mr. Maack explained to the Task Force how to complete the Hazard and Vulnerability Assessment Tool, and he asked them to complete the tool. He indicated that the results from the assessment tool would be distributed with the meeting minutes.

[Secretary's Note: A summary of the results from the Hazard and Vulnerability Assessment Tool is attached hereto as Exhibit C.]

CONCLUDING DISCUSSION

Mr. Maack asked that the Task Force provide him or Ms. Anderson with information on hazard mitigation projects implemented in the last five years and local mitigation projects that are needed. He indicated that they would forward this information to SEWRPC staff for incorporation into the updated plan.

TIME AND DATE OF NEXT MEETING

After discussion, it was agreed that a tentative date for the next Task Force meeting would be set for Wednesday, June 17, 2009, at 1:30 p.m. at the Racine County building. Mr. Maack indicated that a notice, agenda, materials to review, and minutes would be sent out about a week ahead of the meeting.

ADJOURNMENT

There being no further business, the meeting was adjourned by unanimous consent at 3:00 p.m.

Respectfully Submitted,

Michael G. Hahn
Secretary

Attachments

#143989 V1 - CAPR-266 2ND ED SUMMARY NOTES 03/30/09
330-3021
MGH/JEB/pk
05/11/09

HAZARD MITIGATION

Roxanne Gray
Wisconsin Emergency Management
608-242-3211
Roxanne.gray@wisconsin.gov

What is Mitigation?

- Mitigation is any action taken to eliminate or reduce the long-term risk to human life and property from natural and technological hazards

Break the Cycle

- Mitigation is one of the phases of emergency management (preparedness, response and recovery)
- Can occur in any phase
- Only phase that breaks the cycle
  - Damage, repair, damage

Mitigation Examples

- Structural (dams, retention ponds, levees)
- Land-use planning
- Stronger building codes
- Removing persons out of harms way

More Examples

- Raise appliances and utilities
- Install back-flow valves
- Proper landscaping
- Retrofit for wind resistance
- Construct a safe room
- Mobile Home Tie-Downs
- NOAA Weather Radios
- Education and Public Awareness
- INSURANCE (flood and sewer)

Why Mitigation

- $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 plus 2 snow emergencies

2008 Floods

- 31 counties (30 for IA and 30 for PA)
- $763,618,860 + in damages
- Incident period June 5 to July 25
- "Incident of National Significance"

- Interstates and hundreds of state and local roads closed
- DNR monitored over 200 dams
- WEM provided over 700,000 sandbags
- 35 shelters – 2,623 people
- 7 Fixed Feeding Sites and 36 Mobile Feeding Sites for 77,065 meals
- 2,500 wells tested; 28% contaminated
- 161 WWTP diverted raw sewage – 90 million gallons
- 3 confirmed deaths
- Set records on 38 river gauges
- 810 square miles of land flooded

FEMA INDIVIDUAL ASSISTANCE

- 40,814 registrations for Individual Assistance; $55,612,943 approved
  - Home Repair
  - Rental Assistance
  - Other Needs Assistance
- 1,949 SBA low-interest loans approved for $48,024,000
- 9,844 visited 16 DRCs & 3 mobile DRCs

PUBLIC ASSISTANCE

- Estimated $76 million in eligible damages to public infrastructure and emergency response costs
- 858 applicants (local and state governments and PNPs) for assistance

For every dollar spent on mitigation, $4 is saved in future damages.
(Per the National Institute of Building Sciences -2005)

Reasons to Plan

- Disasters cost too much
- State/Federal aid insufficient
- Can prevent damages
- Less impact and speed response and recovery process
- Mitigation happens at the local level

"You are aware, of course, of the urgency of this meeting."

DMA2K

- Disaster Mitigation Act of 2000
- PL 106-390 signed into law 10/30/00
- Establish a national disaster hazard mitigation program
  - Section 203 – Pre-Disaster Mitigation Program
  - Section 322 – Mitigation Planning Requirement

Vision

- To reduce disaster losses thru pre-disaster mitigation planning by pre-identifying, cost-effective mitigation.
- Mitigation planning would then streamline and speed up the recovery process

State Hazard Mitigation Plan Goals

- Minimize human, economic and environmental disruption from natural hazards;
- Enhance public education about disaster preparedness and resistance, and expand public awareness of natural hazards;
- Encourage hazard mitigation planning;

- Support intergovernmental coordination and cooperation among federal, state and local authorities regarding hazard mitigation activities; and
- Improve the disaster resistance of buildings, structures, and infrastructure whether new construction, expansion or renovation.

Planning Criteria Criteria (Section 201.6)

- Planning Process
- Risk Assessment
- Mitigation Strategy
- Plan Maintenance Process
- Plan Adoption
- Plan Review

PLANNING DEADLINES

- Must have an approved All Hazards Mitigation Plan to receive PDM, HMGP, FMA, SRL (exception RFC)
- Local Plans have to be reviewed, updated, and re-approved every 5 years
- Racine County Plan expires 2/23/10

5-Year Plan Update Requirements

- Review recommended revisions from the review of the approved plan
- Follow Plan Maintenance Section of the approved plan; if different document the new process
- Evaluate, review, analyze and update each section of the plan

- Follow federal and state guidance
- Address any data deficiencies identified in the first plan
- Formally adopted by participating jurisdictions
- Approved by the State and FEMA
- FEMA Local Plan Update Guidance (7-1-08)

Things to Consider

- Goals and objectives still current
- Update data in the risk assessment
- Include data on disasters that may have occurred since the initial plan
- Have hazards change? Any new hazards
- Have conditions changed
- Have priorities changed

- Have data deficiencies been addressed or do they still exist
- Do mitigation recommendations need to be revised or new ones added based on changed conditions
- Document progress on mitigation actions taken since last update
- Are there changes in levels of funding
- Implementation problems

Exhibit B

RACINE COUNTY
HAZARD MITIGATION PLAN UPDATE TASK FORCE
MEETING 1: MARCH 30, 2009

Racine County Wisconsin
Since 1836

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

KENOSHA-MILWAUKEE-OZAUKEE-WALWORTH-WASHINGTON-WAUKESHA-RACINE

Initial Report was Published in 2004

RACINE COUNTY
HAZARD MITIGATION PLAN

2

BACKGROUND ON THE COUNTY HAZARD MITIGATION PLAN

- Local government partners:
  - City of Burlington
  - City of Racine
  - Village of Caledonia
  - Village of Elmwood Park
  - Village of Mount 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 Rochester
  - Town of Waterford
  - Town of Yorkville

3

BACKGROUND ON THE COUNTY HAZARD MITIGATION PLAN

Additional Partners

- Racine County Executive's Office
- Sherriff's, Police, and Fire Departments
- Public Works Departments
- Racine County Economic Development Commission
- Sustainable Racine
- Racine Area Manufacturers and Commerce
- Wisconsin Division of Emergency Management
- Wisconsin DNR
- Wisconsin Coastal Management Program
- UW-Extension
- National Weather Service
- American Red Cross
- We Energies

4

2004 Plan Components to be Reviewed and Revised

- Update community profiles consistent with the ongoing County comprehensive plan
- Review established plan goals and objectives
- Identify and describe hazards
- Update risk and vulnerability assessments
- Develop updated mitigation activities
- Plan maintenance process

5

WORK SCHEDULE FOR UPDATING THE RACINE COUNTY HAZARD MITIGATION PLAN *(Agenda Attachment 1)*

Task	Estimated Completion Date
Submit First Quarterly Report to Division of Emergency Management	January 15, 2009
Update Planning Team Membership	March 1, 2009
Kick-off Meeting	March 30, 2009
Public Participation	September 2008 through August 2010
Submit Second Quarterly Report to Wisconsin Division of Emergency Management	April 15, 2009
Review of Established Goals and Objectives	April 30, 2009
Summarize Updated Community Profiles Consistent with the Ongoing County Comprehensive Plan	April 30, 2009
Identify and Describe Hazards	April 30, 2009
Survey Designated Management Agencies Regarding Status of Implementation of Original Plan	May 14, 2009
Update Risk and Vulnerability Assessments	May 14, 2009
Submit Third Quarterly Report to Wisconsin Division of Emergency Management	July 15, 2009
Development of Updated Mitigation Actions	September 15, 2009
Submit Fourth Quarterly Report to Division of Emergency Management	October 15, 2009
Development of Plan Maintenance Process	November 9, 2009
Submit Draft Plan Update	December 7, 2009
Revise Plan Based on State Review	April 1 through June 30, 2010
Formal Adoption	July 1, 2010 through August 31, 2010
Submit Final Plan Update for Approval	October 1, 2010

6

1

Review Hazard Mitigation Goals for 2004 Plan (Agenda Attachment 2)

Land Use: A spatial distribution of the various land uses which minimizes hazards and dangers to health welfare and safety 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 and which minimizes hazards and dangers to health, welfare, and safety, as well as further enhancing the economic base of the County.

PROPOSED REVISION - 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.

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Review Hazard Mitigation Goals for 2004 Plan (Agenda Attachment 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.

8

Review Hazard Mitigation Goals for 2004 Plan (Agenda Attachment 2)

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.

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.

9

Review Hazard Mitigation Goals for 2004 Plan (Agenda Attachment 2)

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.

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.

10

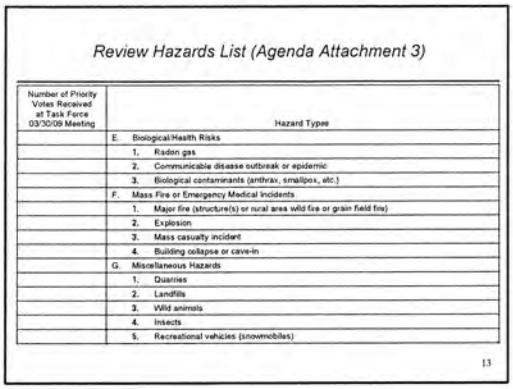
Review Hazard Mitigation Goals for 2004 Plan (Agenda Attachment 2)

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.

11

Review Hazards List (Agenda Attachment 3)

12



Review Hazards List (Agenda Attachment 3)

Number of Priority Votes Received at Task Force 03/30/09 Meeting	Hazard Type
	E. Biological/Health Risks
	1. Radon gas
	2. Communicable disease outbreak or epidemic
	3. Biological contaminants (anthrax, smallpox, etc.)
	F. Mass Fire or Emergency Medical Incidents
	1. Major fire (structure(s) or rural area wild fire or grain field fire)
	2. Explosion
	3. Mass casualty incident
	4. Building collapse or cave-in
	G. Miscellaneous Hazards
	1. Quarries
	2. Landfills
	3. Wild animals
	4. Insects
	5. Recreational vehicles (snowmobiles)

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Exhibit C

Summary of Hazard and Vulnerability Assessment Tool Results

Methods

The assessment tools were completed at the March 30, 2009 meeting of the Racine County Hazard Mitigation Task Force, with 27 surveys being returned and analyzed. For each hazard in each survey, a risk was computed using the formula:

Risk(in %) = [Probability/3 x (Human impact + Property impact + Business impact + 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 risk, 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. In this instance, the range between the minimum and maximum risks does not give meaningful information on the amount of agreement among Task Force members because in one of the surveys returned, zeros were entered for all hazards except one. This extended the lower end of the range for all hazards to zero, increasing the ranges for many risks and exaggerating the amount of disagreement among Task Force members.

In order to assess the degree of agreement among Task Force 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.

The results from the assessment tool were analyzed for 40 hazards. One hazard, Category A5: Other natural hazards, was not analyzed because examination of the survey forms indicated that several Task Force members interpreted this category as being a heading and did not complete this portion of the assessment tool.

Results

The results from the assessment tool are summarized in Table 1. The average level of risk for hazards ranged from 13.6 percent for the lowest ranked hazard (wild animals) to 68.3 percent for the highest ranked hazard (flooding and stormwater damage). Eight of the 10 highest average risks belonged to natural hazards related to meteorological causes, mostly causes associated with either winter weather or severe storms. The remaining two of the 10 highest average risks belong to technological hazards. The interquartile ranges for the 10 hazards with the highest average risks tended to be relatively large, indicating a diversity of opinion among Task Force members as to the level of risk posed by each of these hazards. In some instances, such as the hazards posed by flooding and stormwater damage, there was general agreement among Task Force members that the risk was relatively high, but disagreement as to just how high.

The 10 lowest average risks belonged to hazards related to a variety of causes, including technological hazards related to land use, natural hazards related to geological events, natural hazards related to biological organisms, and hazards related to human behavior. The interquartile ranges for the 10 hazards with the lowest average risks were low, indicating strong agreement among Task Force members as to the level of risk posed by each of these hazards.

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Table 1

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

Event	Minimum (percent)[a]	Maximum (percent)[a]	Average (percent)[a]	Rank	Interquartile Range (percent)[b]
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

Table 1 (continued)

Event	Minimum (percent)[a]	Maximum (percent)[a]	Average (percent)[a]	Rank	Interquartile Range (percent)[b]
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

[a]*Perceived threat increases with percentage.*

[b]*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.

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Racine County Department of Emergency Management
Racine County Department of Planning and Development
Southeastern Wisconsin Regional Planning Commission

Notice of Second Meeting and Agenda

RACINE COUNTY HAZARD MITIGATION TASK FORCE

DATE: June 17, 2009

TIME: 1:30 to 3:30 p.m.

PLACE: Auditorium
Ives Grove Office Complex
14200 Washington Avenue
Sturtevant, WI 53177

AGENDA:

1. Introductions

2. Review of Summary Notes of the March 30, 2009, Task Force Meeting

3. Review of preliminary draft Chapter I, "Introduction and Background," of SEWRPC Community Assistance Planning Report No. 266 (CAPR No. 266), 2nd Edition, *Racine County Hazard Mitigation Plan Update: 2010-2015* (SEWRPC staff) **[NOTE: Preliminary draft chapters can be viewed at sewrpc.org, click on "Environmental Planning" in the left margin, then "Racine County Hazard Mitigation Plan Update", then select the chapter that you want to review. Past meeting summary notes and past and current meeting agendas can also be accessed from that web page. Chapters I through III will be placed on the web site between June 5 and 9.]**

4. Review of preliminary draft Chapter II, "Basic Study Area Inventory and Analysis," of SEWRPC CAPR No. 266, 2nd Edition (SEWRPC staff)

5. Review of preliminary draft Chapter III, "Hazard Mitigation Goals" (SEWRPC staff)

6. Other business

7. Next meeting

8. Adjourn

Michael G. Hahn
Secretary

#145118 V1 - CAPR-266 2ND ED NOTICE 06/17/09 MTG
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06/01/09

SUMMARY NOTES OF THE JUNE 17, 2009, MEETING OF THE RACINE COUNTY HAZARD MITIGATION TASK FORCE

INTRODUCTION

The second meeting of the Racine County Hazard Mitigation Task Force was convened at the Racine County Ives Grove Office Complex at 1:35 p.m. The meeting was called to order by County Emergency Management Coordinator David L. Maack. Attendance was taken by circulating a sign-in sheet and a quorum was declared present.

In attendance at the meeting were the following individuals:

David L. Maack, Acting Chairman	Emergency Management Coordinator, Racine County Emergency Management Department
Michael G. Hahn, Secretary	Chief Environmental Engineer, Southeastern Wisconsin Regional Planning Commission
Julie Anderson	Director of Planning and Development, Racine County
Kathleen Angel	Federal Consistency and Coastal Hazards Coordinator Wisconsin Coastal Management Program
Joseph E. Boxhorn	Senior Planner, Southeastern Wisconsin Regional Planning Commission
Tony Beyer	Water Systems Engineer, Village of Mt. Pleasant
Chris Bennett	Village Trustee, Village of Rochester
Jeff Crogan	Safety Manager, Wheaton Franciscan Healthcare-All Saints
Thomas Czerniak	Fire Chief, Union Grove-Yorkville Fire Department
Tom Ditscheit	Police Chief, Town of Waterford Police Department
Marcia Fernholz	Environmental Health Director, City of Racine Health Department
Mike Gitter	Racine Water and Wastewater Utility
Barbara Grant	Village Administrator, Village of Wind Point
Ray Gromacki	Chairman, Town of Dover
David Hendrix	Building Inspector, Town of Norway
Richard M. Jones	Public Works Commissioner, City of Racine
Bob Kacmarcik	Sergeant, Racine County Sheriff's Department
Scott Letteney	Deputy Attorney, City of Racine
Cheryl Mazmanian	Health Officer, Western Racine County Health Department
S.M. Marschke	Police Chief, Village of Sturtevant Police Department
Brett McDonald	Shop Operations Manager, Racine County Public Works Department
Terrence J. McMahon	Supervisor, Town of Yorkville
Dale Mentink	Assistant Fire Chief, Raymond Fire Department
James E. Moyer	Chairman, Town of Yorkville
Aaron W. Owens	Research Analyst, Southeastern Wisconsin Regional Planning Commission
Thomas S. Petersen	Captain, Village of Mount Pleasant Police Department
Rob N. Richardson	Director of Information Systems, Racine County
Richard Roeder	Fire Chief, Village of Caledonia Fire Department
Linda Sodemann	Local Affairs Principal Representative, We Energies
Skip Twardosz	Emergency Government, Town of Burlington
Audrey Viau	President, Village of Elmwood Park
Allan Wheeler	Collection System Supervisor, Racine Wastewater Utility

Mr. Maack welcomed all those in attendance and thanked them for their interest and participation in this important program. Ms. Anderson reminded those attending to sign in on the sign-in sheet.

Mr. Maack asked Mr. Hahn to describe the use of the Commission website in the planning process. Mr. Hahn stated that to facilitate review of draft plan chapters by the many members of the Task Force, drafts of plan chapters are being posted on the Environmental Planning page on the Commission website (www.sewrpc.org). He indicated that Commission staff will continue to do this and will provide hard copy of the material at meetings of the Task Force. He also noted that there is a comment form on the website that can be used to comment directly on drafts of chapters.

[Secretary's Note: Copies of the Racine County Hazard Mitigation Plan Update webpage and the comment page from the Commission website are attached hereto as Exhibit A.]

Mr. Hahn noted that County staff and Commission staff are obtaining all the updated information that they are able to; however, they will need help from the communities in obtaining some information that will be identified during review of draft chapters at Task Force meetings. He stressed the importance of the communities providing information and participating in the planning process in order to be under the jurisdiction of the plan.

REVIEW OF SUMMARY NOTES OF THE MARCH 30, 2009 TASK FORCE MEETING

At Mr. Maack's request, Mr. Hahn reviewed the summary notes from the March 30, 2009, meeting of the Task Force. Mr. Hahn stated that an analysis of the results from the Hazard and Vulnerability Assessment Tool were attached to the meeting notes. He noted that Table 1 gives a ranking of the perceived risk of hazards. He explained that this ranking is derived from the average risk computed from the assessment tool. He noted that Commission staff also computed the interquartile range of the scores as a measure of agreement among Task Force members as to the perceived risk. He explained that the smaller interquartile ranges indicate greater agreement among Task Force members. He stated that Table 1 will be included in Chapter IV of the report.

Mr. Hahn asked whether there were any comments, corrections, or additions to the summary notes. None were offered.

REVIEW OF PRELIMINARY DRAFT CHAPTER I, "INTRODUCTION AND BACKGROUND," OF SEWRPC COMMUNITY ASSISTANCE PLANNING REPORT NO. 266 (CAPR 266), 2ND EDITION, *RACINE COUNTY HAZARD MITIGATION PLAN UPDATE: 2010-2015*

At Mr. Maack's request, Mr. Hahn reviewed the preliminary draft of Chapter I, "Introduction and Background." Mr. Hahn said that, based on the need for the hazard mitigation plan update report to serve as a complete, stand-alone document, incorporating those parts of the initial plan that are still valid, the Commission staff used the initial report as a template for this update. He noted that significant changes and additions to the text are highlighted. He reiterated that FEMA regulations require that all jurisdictions covered by a multi-jurisdictional plan participate in the planning process. He stated that Table I-1 will document participation. In addition, he noted that the report will include an appendix documenting participation in the Task Force.

[Secretary's Note: An initial draft of this appendix should be available for the next meeting.]

Mr. Hahn stated that the draft chapter also documents plan maintenance activities for the time period 2004 to 2008. Tables I-2 and I-3 list local government outreach and hazard mitigation activities, respectively. He noted that these tables are currently blank, and stated that County staff and Commission staff will require information from the municipalities on their activities in order to complete these tables.

Mr. Hahn stated that the erroneous reference to the Town of Mount Pleasant in the footnote on page 3 will be corrected.

[Secretary's Note: Footnote number 2 on page 3 was revised to read as follows. (The revised text and added text in this and all subsequent revisions indicated in these summary notes is indicated in bold letters for clarification only. The report text will not be bold):

"During September 2003, the Town of Mount Pleasant was incorporated as a village. During **November 2005**, the Town of **Caledonia** was incorporated as a village. During **December** 2008, the Town of Rochester and the Village of Rochester were consolidated."]

Mr. Richardson asked that a reference to the emergency management page on the County's website be added to the list of outreach activities on page 5. Mr. Hahn said that this would be done.

[Secretary's Note: The following sentence was added at the end of the first full paragraph on page 5:

"In addition, the Racine County Office of Emergency Management makes information about emergency preparedness, including hazard mitigation, available to the public through its pages on Racine County's website."]

Mr. Gromacki noted that the last paragraph on page 1 does not include adoption of the hazard mitigation plan by the towns. Mr. Hahn replied that adoption of the plan by the County covers the towns.

REVIEW OF PRELIMINARY DRAFT CHAPTER II, "BASIC STUDY AREA INVENTORY AND ANALYSIS," OF SEWRPC CAPR 266, 2ND EDITION

At Mr. Maack's request, Mr. Hahn reviewed the preliminary draft of Chapter II, "Basic Study Area Inventory and Analysis." Mr. Hahn indicated that the incorporation dates in the section on civil divisions on page 1 have been corrected.

[Secretary's Note: The sixth and seventh sentences in the third paragraph on page 1 were revised to read:

"During **November 2005**, the Town of **Caledonia** was incorporated as a Village. During **December** 2008, the Town of Rochester and the Village of Rochester were consolidated."]

Mr. Hahn referred to page 2 and noted that the demographic and economic characteristics section has been updated to reflect that most recent available data. He stated that the existing land use in the draft chapter is based upon year 2000 land use data. He explained that this is the most current data available and that it represents an update from the initial plan, which was based upon 1995 land use data. Mr. Hahn noted that an inventory of mobile homes in the County has been added to the land use section. He explained that this was done because of the vulnerability of these structures to some types of severe weather events, especially high winds.

Mr. Maack asked whether a section could be added to draft chapter on the number of farms in the County. Mr. Hahn replied that this would be examined.

Mr. Hahn stated that planned land use indicated in Map II-3 represents 2035 conditions and that this reflects the most current update of the regional land use plan.

Mr. Hahn next reviewed the section on surface water resources and flood hazard areas. He stated that the costs on flood mitigation plans will be quantified and updated. He noted that the new FEMA digital flood insurance rate maps, which are largely based upon data developed by the Commission, should be available by 2010 and that these maps will be used for the risk assessment.

Mr. Hahn stated that a new subsection related to an inventory and evaluation of shoreline protection structures has been added to the section on Lake Michigan shoreline erosion hazard areas. It summarizes the results of a study completed in 2005. The study was represents the implementation of a recommendation in the hazard mitigation initial plan. He noted that some text on page 5 that refers to this study would be corrected.

[Secretary's Note: The last complete sentence on page 5 was revised to read:

"In 2005, Dr. Scudder Mackey of Habitat Solutions NA and the SEWRPC staff complete a study of shoreline erosion **control structures** along Lake Michigan for its entire length in Racine County."]

Mr. Hahn reviewed the transportation systems and utility systems sections. He indicated that the information on water utility systems reflects data developed as part of the ongoing regional water supply planning program. Mr. Moyer asked that Yorkville be included among the public water supply systems that utilize groundwater as a source of supply. Mr. Hahn replied that Yorkville would be added.

[Secretary's Note: The sixth sentence of the last paragraph on page 7 was revised to read:

"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."]

Mr. Hahn reviewed the section on public safety facilities and services. He noted that the draft chapter contains some updates on these facilities, but that the staff will require assistance from the communities to fill in the details. Mr. Ditscheit asked whether the Town of Dover has a limited-time constable. Mr. Gromacki responded that it does. Mr. Hahn indicated that the chapter will be updated to reflect this.

[Secretary's Note: The second sentence of the sixth paragraph on page 9 was revised to read:

"In addition, the Village of Waterford has a limited police presence and the Villages of Elmwood Park and North Ban and the **Towns** of **Dover and** Yorkville provide limited law enforcement through part-time town constables."]

Mr. Hahn reviewed the sections on hazardous materials storage and use, historic sites, and regulations and programs related to hazard mitigation. In reference to floodland zoning, he noted that it is now common practice to refer to the 100-year recurrence interval flood event as the one-percent-annual-probability flood event. He explained that while both terms refer to the same event, the latter term better reflects the likelihood of such a flood. He stated that the latter term is defined and will be used in the report.

Mr. Hahn described Table II-14, "Regulations and Programs within Racine County Related to Hazard Mitigation: 2008," indicating that it contains references to local codes. He asked that the Task Force assist the staff in completing this table. Mr. Twardosz commented that the Town of Burlington has an emergency operations plan. Mr. Maack reported that the City of Racine is currently updating its emergency operations plan. Mr. Maack also asked that the Town of Rochester be removed from Table II-14 to reflect the consolidation with the Village of Rochester. Mr. Hahn answered that the table would be updated to reflect these comments.

Mr. Hahn pointed out that highlighting will be added to the tables in Chapter II to indicate new information and changed conditions.

Mr. Hahn stated that this draft chapter includes an extensive set of maps, many of which were developed by the Commission staff for the Racine County comprehensive plan. He added that there are three appendices associated with this chapter: Appendix B lists solid waste disposal sites in the County, Appendix C lists law enforcement

facilities and fire stations in the County, and Appendix D lists a variety of critical community facilities in the County.

Mr. Maack asked whether it would be best to inventory only larger child care facilities. He explained that the smaller facilities tend to enter and leave the market rapidly. After some discussion by the Task Force, it was decided to inventory only those child care facilities with a capacity of 20 children or more.

[Secretary's Note: Table D-7 and Map II-24 were revised to only show those child care facilities with a capacity of 20 or more children. The first sentence in the last paragraph on page 9 was revised to read:

"In addition to fires 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."]

Mr. Roeder commented that the Caddy Vista Sanitary District, the Village of Caledonia Utility District, the Crestview Sanitary District, and the North Park Sanitary District have been consolidated into the Caledonia Utility District and asked that Map II-10 reflect this. Mr. Marschke noted that the Racine Water Utility now provides retail water service for the Village of Sturtevant. Mr. Hahn answered that Map II-10 would be revised to reflect these changes.

REVIEW OF PRELIMINARY DRAFT CHAPTER III, "HAZARD MITIGATION GOALS," OF SEWRPC CAPR 266, 2ND EDITION

At Mr. Maack's request, Mr. Hahn reviewed the preliminary draft of Chapter III, "Hazard Mitigation Goals." He pointed out that this draft chapter uses FEMA's definitions of goals and objectives, which are somewhat different from those used by the Commission. He indicated that there is only one change in the draft chapter. The first goal has been reworded to make it read more clearly. He added that this set of goals can be amended or added to; however, it would be helpful if any changes were suggested soon. Mr. Maack asked whether the Commission staff had any recommendations for additional goals. Mr. Hahn replied that Commission staff thinks that the goals presented in the draft chapter are adequate.

Mr. Hahn noted that Table III-1 lists objectives and standards that support each of the goals.

OTHER BUSINESS

Mr. Hahn indicated that County staff and SEWRPC staff intend to submit a draft of the updated plan to the Wisconsin Division of Emergency Government for their review by December 5, 2009. He indicated that the next meeting of the Task Force will review Chapters IV, V, and VI which present risk assessment; mitigation strategies; and plan adoption, implementation, maintenance, and revision, respectively.

Mr. Hendrix asked at which level of government responsibility for responding to emergency situations and disasters resides. Mr. Hahn replied that the local municipality has the main role and that the County, State, and Federal Government provide assistance to the local government when necessary. He explained that this plan is not an emergency response plan. Instead, he continued, it seeks to mitigate the impacts of any disaster situations. Mr. Maack concurred with Mr. Hahn and added that the County Office of Emergency Management plans to provide a template to the local communities on emergency response and emergency operations planning in November of this year.

TIME AND DATE OF NEXT MEETING

After discussion, it was agreed that the next Task Force meeting would be tentatively scheduled for Wednesday, November 4, 2009, at 1:30 p.m. at the Racine County Ives Grove Office Complex. Mr. Maack indicated that a notice, agenda, materials to review, and minutes would be sent out about a week ahead of the meeting.

ADJOURNMENT

There being no further business, the meeting was adjourned by unanimous consent at 2:20 p.m.

Respectfully Submitted,

Michael G. Hahn
Secretary

Attachments

#145446 V1 - CAPR-266 2ND ED SUMMARY NOTES 06/17/09
330-3021
MGH/JEB/pk
10/26/09

Exhibit A

Southeastern Wisconsin Regional Planning Commission

Draft Chapters and Meeting Materials

Submit a Comment on the Study

Racine County Hazard Mitigation Plan Update

Draft Chapters of Report (PDF files)

- Chapter I, Introduction and Background – Preliminary Draft
- Chapter II, Basic Study Area inventory and Analysis – Preliminary Draft
- Chapter III, Hazard Mitigation Goals – Preliminary Draft
- Appendix B - Solid Waste Disposal Sites in Racine County: 2009 – Preliminary Draft
- Appendix C - Police Stations, County Sheriff Offices, and Fire Stations in Racine County: 2009 – Preliminary Draft
- Appendix D - Critical Community Facilities in Racine County– Preliminary Draft

Meeting Materials (PDF files)

- March 30, 2009
  - Agenda
  - Meeting Summary Notes
- June 17, 2009
  - Agenda

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Southeastern Wisconsin Regional Planning Commission

Draft Chapters and Meeting Materials

Submit a Comment on the Study

Racine County Hazard Mitigation Plan Update

Comment on the Plan

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 Plan Task Force and to the Commission for deliberations in preparing the final plan.

First Name:*

Last Name:*

E-mail address:*

Organization:

PO Box/Street address:

City:*

State:* WI

Zip:

* Denotes a required field

Press the "Submit" button when finished.

Submit

You may also submit a comment via the following:

E-Mail: jboxhorn@sewrpc.org

Fax: (262) 547-1103

U.S. Mail: Southeastern Wisconsin Regional Planning Commission
P.O. Box 1607
Waukesha, WI 53187-1607

If you have any questions please contact:

Michael Hahn
SEWRPC Chief Environmental Engineer
(262) 547-6722, extension 243

Racine County Department of Emergency Management
Racine County Department of Planning and Development
Southeastern Wisconsin Regional Planning Commission

Notice of Third Meeting and Agenda

RACINE COUNTY HAZARD MITIGATION TASK FORCE

DATE: November 4, 2009

TIME: 1:30 to 3:30 p.m.

PLACE: Auditorium
Ives Grove Office Complex
14200 Washington Avenue
Sturtevant, WI 53177

AGENDA:

1. Introductions

2. Review of Summary Notes of the June 17, 2009, Task Force Meeting

3. Review of preliminary draft Chapter IV, "Analysis of Hazard Conditions," of SEWRPC Community Assistance Planning Report No. 266 (CAPR No. 266), 2nd Edition, *Racine County Hazard Mitigation Plan Update: 2010-2015* (SEWRPC staff) **[NOTE: Preliminary draft chapters can be viewed at sewrpc.org, click on "Environmental Planning" in the left margin, then "Racine County Hazard Mitigation Plan Update", then select the chapter that you want to review. Past meeting summary notes and past and current meeting agendas can also be accessed from that web page. Chapters IV through VI will be placed on the web site between October 26 and 30.]**

4. Review of preliminary draft Chapter V, "Hazard Mitigation Strategies," of SEWRPC CAPR No. 266, 2nd Edition (SEWRPC staff)

5. Review of preliminary draft Chapter VI, "Plan Adoption, Implementation, Maintenance, and Revision," SEWRPC CAPR No. 266, 2nd Edition (SEWRPC staff)

6. Other business

7. Adjourn

Michael G. Hahn
Secretary

#147625 V1 - CAPR-266 2ND ED NOTICE 11/04/09 MTG
MGH/JEB/pk
10/26/09

SUMMARY NOTES OF THE NOVEMBER 4, 2009, MEETING OF THE RACINE COUNTY HAZARD MITIGATION TASK FORCE

INTRODUCTION

The second meeting of the Racine County Hazard Mitigation Task Force was convened at the Racine County Ives Grove Office Complex at 1:30 p.m. The meeting was called to order by County Emergency Management Coordinator David L. Maack. Attendance was taken by circulating a sign-in sheet and a quorum was declared present.

In attendance at the meeting were the following individuals:

David L. Maack, Acting Chairman	Emergency Management Coordinator, Racine County Emergency Management Department
Michael G. Hahn, Secretary	Chief Environmental Engineer, Southeastern Wisconsin Regional Planning Commission
Julie Anderson	Director of Planning and Development, Racine County
Mark J. Anderson	Chief of Police, City of Burlington
Joseph E. Boxhorn	Senior Planner, Southeastern Wisconsin Regional Planning Commission
Jeff Crogan	Safety Manager, Wheaton Franciscan Healthcare-All Saints
James Dobbs	Lieutenant, City of Racine Police Department
Marcia Fernholz	Environmental Health Director, City of Racine Health Department
Scott Geyer	Village of Mt. Pleasant Police Department
Barbara Grant	Village Administrator, Village of Wind Point
Matt Johnson	Town of Waterford Police Department
Richard M. Jones	Public Works Commissioner, City of Racine
Thomas Kramer	Treasurer, Town of Norway
Scott Letteney	Deputy Attorney, City of Racine
S.M. Marschke	Police Chief, Village of Sturtevant Police Department
Terrence J. McMahon	Supervisor, Town of Yorkville
Dale Mentink	Assistant Fire Chief, Raymond Fire Department
Betty J. Novy	Clerk-Treasurer, Village of Rochester
Richard L. Peterson	Deputy Chief, City of Burlington Fire Department
Mark Pierce	Deputy Chief, South Shore Fire Department
Richard Roeder	Fire Chief, Village of Caledonia Fire Department
Charles R. Stachowski	Supervisor of Public Works, Village of Sturtevant
Skip Twardosz	Emergency Government, Town of Burlington

Mr. Maack welcomed all those in attendance and thanked them for their interest and participation in this important program. Ms. Anderson reminded those attending to sign in.

REVIEW OF SUMMARY NOTES OF THE MARCH 30, 2009 TASK FORCE MEETING

At Mr. Maack's request, Mr. Hahn reviewed the summary notes from the June 17, 2009, meeting of the Task Force. Mr. Hahn stated that a draft of Appendix A is included with the minutes. Mr. Twardosz commented that the Town of Burlington had sent some additions and corrections to Chapters I-III. Mr. Boxhorn responded that these would be incorporated into the chapters.

Mr. Hahn asked whether there were any additional comments, corrections, or additions to the summary notes. None were offered.

REVIEW OF PRELIMINARY DRAFT CHAPTER IV, "ANALYSIS OF HAZARD CONDITIONS," OF SEWRPC COMMUNITY ASSISTANCE PLANNING REPORT NO. 266 (CAPR 266), 2ND EDITION, *RACINE COUNTY HAZARD MITIGATION PLAN UPDATE: 2010-2015*

At Mr. Maack's request, Mr. Boxhorn reviewed the preliminary draft of Chapter IV, "Analysis of Hazard Conditions." Mr. Boxhorn said that this chapter was intended to update the identification of hazards and to assess the vulnerability of the communities to each hazard. He indicated that the corresponding chapter from the initial plan served as the starting point for this draft chapter. He stated that the inventories of hazard occurrence and severity were updated and that the vulnerability of the communities to the hazards was reassessed. He noted that significant changes and additions to the text are highlighted. Mr. Boxhorn called the Task Force member's attention to the preliminary draft of Appendix N of the report. He stated that the purpose of the analyses in this appendix was to put the impacts of the hazards considered in Chapter IV into a form that could be compared for the purpose of prioritizing mitigation strategies. He noted that two sets of comparisons were made. In the first, the hazards were compared on the basis of the average annual numbers of mortalities and injuries that resulted from hazard occurrences. In the second, the hazards were compared on the basis of the average annual dollar value of property damages and crop damages that resulted from hazard occurrences.

Mr. Peterson questioned whether flood hazards should be ranked as high a shown in Appendix N, noting that many of the same locations flood regularly. Mr. Maack responded that while annual flooding along the Root River generally affects agricultural lands, more significant flooding occurred in the City of Racine in 2008. He continued that projects can be developed to mitigate these routine occurrences. Mr. Hahn added that flood hazards can be geographically located better than many other hazards and that there are well-developed strategies to address them.

There were no further questions or comments on the preliminary draft chapter.

REVIEW OF PRELIMINARY DRAFT CHAPTER V, "HAZARD MITIGATION STRATEGIES," OF SEWRPC CAPR 266, 2ND EDITION

At Mr. Maack's request, Mr. Hahn reviewed the preliminary draft of Chapter V, "Hazard Mitigation Strategies." He indicated that the corresponding chapter from the initial plan served as the starting point for this preliminary draft chapter. He noted that significant changes and additions to the text are highlighted. He indicated that in drafting this chapter, the Commission staff contacted each municipality to find out what actions had been taken.

Mr. Hahn reviewed the section of the preliminary draft chapter on the hazard mitigation plan component for flooding and related stormwater drainage problems. He pointed out that the subsection on floodland management was organized by watershed. He noted that the inventories conducted for this updating of the plan showed that there are three repetitive loss or severe repetitive loss structures within the County.

Mr. Hahn noted that the number of structures recommended for floodproofing or removal in the Fox River watershed had increased over the number recommended in the initial plan. This had occurred, he explained, because further consideration had been given to the level of control for the recommended levees for the Hoosier Creek and Wind Lake Drainage Canal areas. These levees, he continued, are intended mainly to provide relief from flooding of agricultural land and would be likely be designed to provide protection against a 10-percent annual probability flood event, rather than the one-percent annual probability level of protection standards for structures.

Mr. Twardosz asked whether the area of the floodplain and changes in floodplain area since the initial hazard mitigation plan was developed could be inventoried by community. Mr. Hahn replied that Commission staff would look into this.

[Secretary's Note: In response to this comment, a table indicating the amount of area of one-percent-annual-probability floodplain area in municipality was developed and was added to Chapter II. It is shown in Exhibit A. In addition, the following sentence was inserted after the third sentence of the first full paragraph on page 4 of Chapter II:

"The area of one-percent-annual-probability floodplain in each community is given in Table II-7a."

Changes in floodplain boundaries may occur due to implementation of flood mitigation projects, or redelineation of existing flood profiles using updated topographic mapping. In the Southeastern Wisconsin Region, it is customary for SEWRPC to map floodplain boundaries based on planned land use conditions. There is no continuous accounting for the effects of changes in land use or other factors affecting flooding over relatively short time periods. With the exception of areas along the upper reaches of Pike Creek in the Village of Mt. Pleasant, and expansion of the Root River floodplain in certain reaches, there are no known significant changes in the delineated one-percent-annual-probability floodplain since the initial hazard mitigation plan. Because of the many possible causes for floodplain boundary changes, it was decided that quantification of such changes could be misleading, and only the currently-mapped conditions were inventoried.]

Mr. Twardosz noted that there are differences between floodplain maps that SEWRPC currently uses and the drafts of the new Federal Emergency Management Agency (FEMA) floodplain maps. Mr. Hahn replied that when the new FEMA maps come out, they will be consistent with the Commission maps.

Mr. Hahn noted that the number of structures recommended for floodproofing or removal in the Root River watershed had increased over the number recommended in the initial plan. He explained that this reflects revisions to the floodplain boundary.

In reference to the discussion on page 7 of the preliminary draft chapter regarding the Town of Raymond Drainage District conducting an evaluation of the 3 Mile Road crossing of East Branch of the Root River Canal, Ms. Anderson stated that the evaluation was completed. It showed no impact to the floodplain.

[Secretary's Note: In response to this comment, the first paragraph on page 7 was revised to read (The revised and added text in this and all subsequent revisions indicated in these summary notes is indicated in bold letters for clarification only. The report text will not be bold. Highlighting in these notes does indicate highlighting in the report text):

"The Town of Raymond Drainage District began collecting funds from their stormwater utility in 2008. In 2009 Town of Raymond Drainage District **conducted** an evaluation of the 3 Mile Road crossing over the East Branch Root River Canal. The Drainage District indicated that the crossing is impassable anytime two or more inches of rain falls and that this is the District's most pressing flooding location. 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 floodplain.**"]

Mr. Hahn stated that the number of structures recommended for floodproofing or removal in the Pike River watershed had decreased over the number recommended in the initial plan. He explained that this reflects the demolishing of one structure.

Mr. Hahn stated that only headwater portions of the Des Plaines watershed are in Racine County and there are no significant flood hazards in this area.

Mr. Hahn reviewed the subsection of the preliminary draft chapter related to the stormwater management element of the plan. In reference to the second to last paragraph on page 12, Mr. Kramer commented that the Village of Waterford and the Towns of Norway and Waterford received a grant $1.2 million to improve stormwater drainage in an industrial area adjacent to the STH 164 and STH 36 corridor. He noted that this grant was contingent upon creating a stormwater management district.

[Secretary's Note: In response to this comment, the second to last paragraph on page 12 was revised to read:

"The Village of Waterford and the Towns of Norway and Waterford **received a $1.2 million grant** in **2008 from** the **Federal Emergency Management Agency's Hazard Mitigation Grant Program to replace a pump station for the Racine County Farm Drainage District No. 1. This grant was disaster assistance in response to the June 2008 flooding. This grant was contingent upon the creation of a stormwater utility. The Village and the Towns are currently pursuing formation of this stormwater utility. It is anticipated that work will begin on the pump station sometime in 2010.**"]

Mr. Hahn stated that FEMA has completed a preliminary update of the Racine County Flood Insurance Study. He noted that the maps have not been finalized, but that he anticipates that they should be effective by the end of 2010. He stated that Commission staff will ensure consistency between the Commission's maps and the new FEMA maps.

Mr. Hahn noted that the extent of the one-percent-annual-probability floodplain was delineated on the basis of large-scale topographic maps. Because these delineations can only be considered approximate in regards to building grades, the plan calls for the 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 implementation of all other structural floodland management plan elements called for in the plan.

Mr. Hahn reviewed the other sections of the preliminary draft chapter. With reference to coastal hazards, he noted that FEMA has produced a Draft Great Lakes Coastal Guidelines Update which included new methodology to determine coastal zone flood hazards. He indicated that this could ultimately lead to a remapping of flood hazards along the Great Lakes coastal areas that would subsequently be reflected in Federal flood insurance studies.

With reference to Lake Michigan coastal hazards, Mr. Hahn pointed out to the Task Force that a recommendation for conducting reevaluations of the effectiveness of Lake Michigan shoreline protection measures in the County at a 10-year interval has been added to the priority mitigation measures.

Mr. Hahn called the Task Force's attention to Table V-6. He stated that this table presents the costs and benefits of the priority mitigation measures. He noted that the costs of many of the measures could not be quantified. These, he continued, were divided into three categories. He indicated that those that were expected to cost less than about $100,000 to implement were classified as low cost, those that were expected to cost between about $100,000 and $1 million to implement were classified as moderate cost, and those expected to cost more than $1 million to implement were classified as high cost.

Ms. Anderson asked whether the structures indicated as being in the one-percent-annual-probability floodplain on Map V-3 included buildings other than inhabited structures. Mr. Hahn responded that while these structures may have included some agricultural structures, no garages or small outbuildings were included. He noted that

structures were included if they appeared to be a significant component of potential flood damages. Ms. Anderson commented that it would be helpful to describe what sorts of structures were included.

[Secretary's Note: The following text was added after the first sentence in the fifth bullet point on page 4:

"While this number of structures may include some agricultural structures, no garages or small outbuildings are included in this total."

The following text was added after the first sentence in the third bullet point on page 7:

"While this number of structures may include some agricultural structures, no garages or small outbuildings are included in this total."

The following text was added after the first sentence in the fifth bullet point on page 9:

"While this number of structures may include some agricultural structures, no garages or small outbuildings are included in this total."]

Ms. Anderson commented that stormwater drainage is a major issue in the County. She noted that the County is dealing with this issue relative to the Norway/Dover Drainage District. Mr. Hahn noted that the preliminary draft chapter could also include more information on an agricultural drainage and urban stormwater study that the Commission conducted for the Racine County Farm Drainage District No. 1. He added that this study was recently updated.

[Secretary's Note: The updating of the study referred in Mr. Hahn's comments is summarized in Exhibit B, which was added to Chapter V after the fifth full paragraph on page 12.]

Mr. McMahon stated that stormwater issues are a top concern in the Town of Yorkville.

There were no further questions or comments on the preliminary draft chapter.

REVIEW OF PRELIMINARY DRAFT CHAPTER VI, "PLAN ADOPTION, IMPLEMENTATION, MAINTENANCE, AND REVISION," OF SEWRPC CAPR 266, 2ND EDITION

At Mr. Maack's request, Mr. Boxhorn reviewed the preliminary draft of Chapter VI, "Plan Adoption, Implementation, Maintenance, and Revision." He stressed the need local adoption of the plan, noting that FEMA requires local adoption for the cities and villages to remain eligible for certain funding streams. Mr. Maack added that the County will pursue local adoption of the plan following approval by Wisconsin Emergency Management and FEMA in 2010.

There were no further questions or comments on the preliminary draft chapter.

OTHER BUSINESS

Mr. Boxhorn stated that questions or comments on these preliminary draft chapters or on the related appendices can be provided to the SEWRPC staff via the comments page on the SEWRPC website.

TIME AND DATE OF NEXT MEETING

Mr. Hahn stated that this was the last planned meeting of the Task Force. He indicated that the summary notes from this meeting would be posted on the SEWRPC website and that the Task Force would be able to comment on those notes through the comments page on the website. He also stated that it was possible that a meeting would be scheduled sometime in 2010, after review of the plan by Wisconsin Emergency Management, if the comments from Wisconsin Emergency Management warranted action by the Task Force. Ms. Anderson and Mr. Maack thanked the members of the Task Force and the SEWRPC staff for their efforts.

ADJOURNMENT

There being no further business, the meeting was adjourned by unanimous consent at 3:15 p.m.

EDITS TO PRELIMINARY DRAFT CHAPTER II, "BASIC STUDY AREA INVENTORY AND ANALYSIS," OF SEWRPC CAPR 266, 2ND EDITION IN RESPONSE TO COMMENTS AT THE JUNE 17, 2009 MEETING OF THE RACINE COUNTY HAZARD MITIGATION TASK FORCE

At the June 17, 2009 meeting of the Task Force, Mr. Maack requested that an inventory of farms and agricultural lands be added to Chapter II. In response to this request, the material attached herein as Exhibit C was added to Chapter II after the first full paragraph on page 3.

Respectfully Submitted,

Michael G. Hahn
Secretary

Attachments

#148045 V1 - CAPR-266 2ND ED SUMMARY NOTES 11/04/09
330-3021
MGH/JEB
11/11/09, 11/20/09, 11/23/09

Exhibit A

Table II-7a

AREAL EXTENT OF ONE-PERCENT-ANNUAL-PROBABILITY FLOODPLAIN BY CIVIL DIVISION IN RACINE COUNTY: 2006

Civil Division	Area (square miles)
Cities	
Burlington	0.9
Racine	0.5
Villages	
Caledonia	2.2
Elmwood Park	0.0
Mt. Pleasant	2.4
North Bay	<0.1
Rochester	1.0
Sturtevant	0.1
Union Grove	0.1
Waterford	0.1
Wind Point	0.1
Towns	
Burlington	6.7
Dover	2.4
Norway	10.1
Raymond	2.6
Waterford	2.9
Yorkville	2.6
Total	34.7

Source: SEWRPC.

Exhibit B

[Material to be inserted after the fifth full paragraph on page 12 of Chapter V of CAPR-266-2]

In 1993, Commission staff developed an agricultural drainage and urban stormwater management plan for the Racine County Farm Drainage District No. 1.[1] 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.[2] 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 SEWRPC study.

At the request of local representatives, Commission staff compared and evaluated these two studies.[3] 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

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[1]*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.*

[2]*Crispell-Snyder, Inc., Consulting Engineers,* East Side Storm Water Management Study-Village of Waterford, *2004.*

[3]*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.*

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 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 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.

Finally, the evaluation 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.

Exhibit C

[Material to be inserted after the first full paragraph on page 3 of Chapter II of CAPR-266-2]

Map II-1a shows lands in agricultural uses in Racine County in 2000. According to the National Agricultural Statistics Service, in 2007, there were 652 farms in the County.[1] The average farm size was about 185 acres, although it is important to note that the size of about half of the farms in the County was 45 acres or less. The estimated value of land and farm buildings associated with these farms was about $576 million, in 2008 dollars. Common crops grown in the County include corn for grain and silage, soybeans, winter 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 II-6a. In 2000, about 125,000 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 11,000 acres in agricultural land uses. In addition, two villages, the Villages of Rochester and Sturtevant, had over 1,000 acres in agricultural land uses. Cultivated lands comprised the largest category of agricultural land uses, accounting over 107,000 acres, or about 86 percent of agricultural lands in the County. Pasture and unused lands accounted for about 11,200 acres, or about 9 percent of the County's agricultural lands. Special agricultural uses and farm buildings accounted for about 3,800 acres and 2,100 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 2000.

Map II-1a also shows the agricultural lands that are within the one-percent-annual-probability floodplain in Racine County in 2000. About 12,100 acres of agricultural land, or slightly less than 10 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 II-6b.

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[1] *U.S. Department of Agriculture National Agricultural Statistics Service*, 2007 Census of Agriculture: Wisconsin State and County Data, *February 2009.*

Table II-6a

AGRICULTURAL LANDS IN RACINE COUNTY: 2000

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)
Cities							
Burlington	651.7	130.9	0.0	2.3	0.0	11.1	795.5
Racine	16.2	8.8	0.0	0.0	0.0	0.0	25.0
Villages							
Caledonia	13,917.0	1,352.0	34.9	127.5	67.8	227.3	15,726.5
Elmwood Park	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mt. Pleasant	11,180.7	513.2	0.0	59.9	135.7	152.9	12,042.4
North Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rochester	4,472.0	1,101.0	10.3	63.2	0.0	109.6	5,756.1
Sturtevant	985.1	97.0	0.0	41.5	0.0	7.2	1,130.8
Union Grove	470.8	82.6	0.0	0.0	0.0	8.8	562.2
Waterford	275.2	71.2	0.0	0.0	0.0	5.1	351.5
Wind Point	10.8	0.0	0.0	0.0	0.0	0.0	10.8
Towns							
Burlington	8,848.2	1,783.0	18.3	1.2	423.0	182.4	11,256.1
Dover	16,072.6	922.0	0.0	16.5	206.3	283.8	17,501.2
Norway	10,236.2	947.0	0.0	7.1	2,864.4	212.5	14,267.2
Raymond	15,133.1	1,215.7	0.0	146.0	60.3	320.6	16,875.7
Waterford	10,131.4	1,687.8	55.5	14.5	0.5	236.4	12,126.1
Yorkville	14,974.9	1,264.4	0.0	72.9	38.3	346.2	16,696.2
Total	107,374.9	11,176.6	119.0	552.6	3,796.3	2,103.9	125,123.3

Source: SEWRPC.

Table II-6b

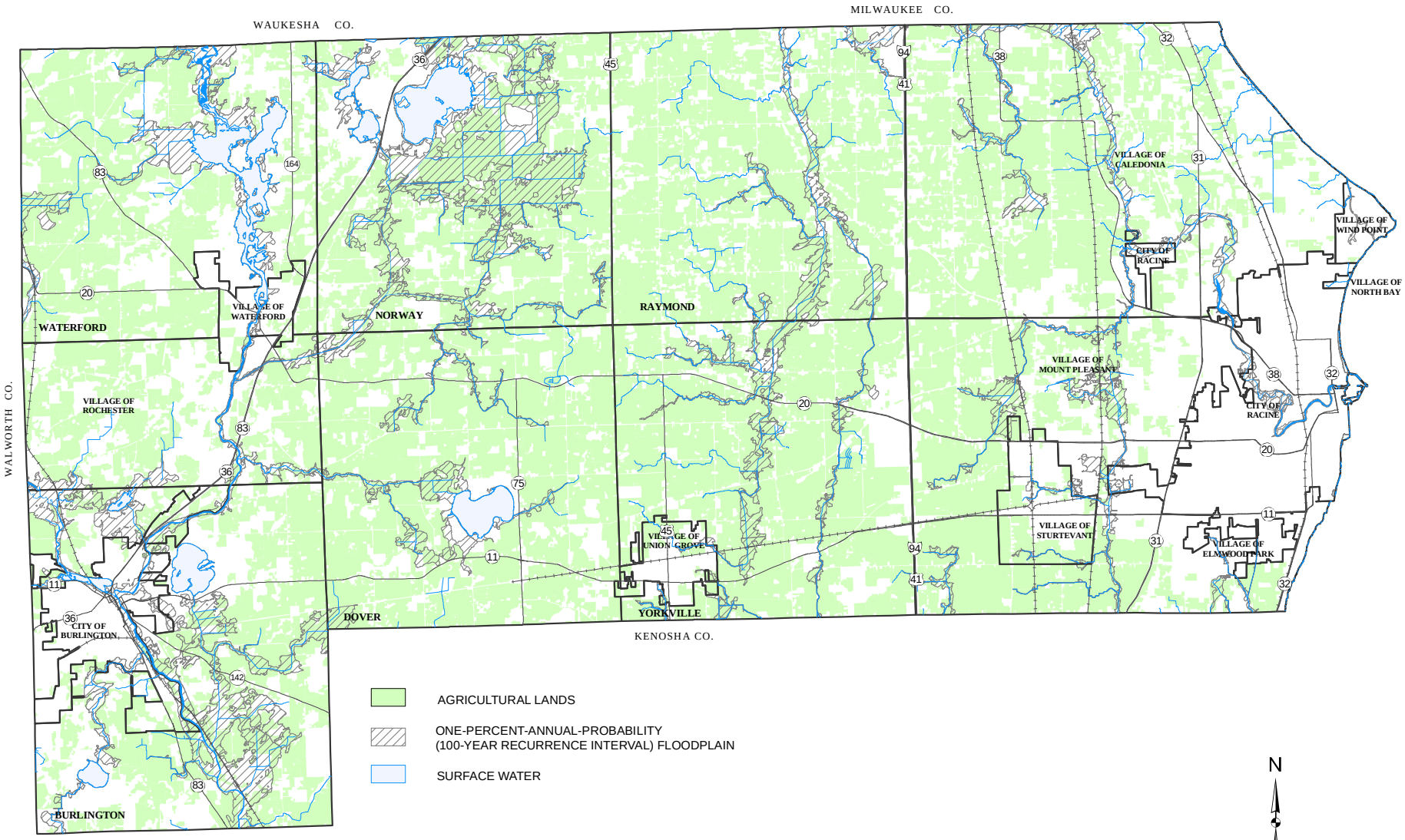
AGRICULTURAL LANDS WITHIN THE ONE-PERCENT-ANNUAL-PROBABILITY FLOODPLAIN IN RACINE COUNTY: 2000

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)
Cities							
Burlington	110.1	16.2	0.0	0.0	0.0	11.1	126.3
Racine	2.5	0.0	0.0	0.0	0.0	0.0	2.5
Villages							
Caledonia	355.5	53.2	18.5	1.2	0.0	1.7	430.1
Elmwood Park	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mt. Pleasant	823.6	165.8	0.0	0.0	1.1	1.5	993.4
North Bay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rochester	86.3	35.9	9.0	0.0	0.0	0.5	137.7
Sturtevant	41.3	11.2	0.0	0.0	0.0	0.0	30.8
Union Grove	21.1	4.0	0.0	0.0	0.0	0.8	25.9
Waterford	2.3	6.4	0.0	0.0	0.0	0.0	8.7
Wind Point	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Towns							
Burlington	1,567.0	303.7	5.3	0.0	8.7	5.7	1,891.4
Dover	974.4	33.6	0.0	6.3	43.0	2.7	1,054.7
Norway	1,971.5	113.7	0.0	0.0	2,467.7	9.8	4,564.7
Raymond	912.2	71.0	0.0	30.5	0.3	1.0	1,015.0
Waterford	353.5	79.5	8.9	0.0	0.0	0.1	442.0
Yorkville	1,148.2	133.4	0.0	0.0	36.8	20.8	1,339.2
Total	8,369.5	1,027.6	42.7	34.2	2,559.6	44.6	12,078.2

Source: SEWRPC.

Map II-1a

AGRICULTURAL LANDS IN RACINE COUNTY: 2000



Source: SEWRPC.

Figure A-4

RELEVANT REGIONAL AND LOCAL ADVISORY COMMITTEES: 2009

RACINE COUNTY MULTI-JURISDICTIONAL ADVISORY COMMITTEE

Mary Kacmarcik, Chair ..... Supervisor, Town of Waterford
Connie Mellem, Vice Chair ..... Trustee, Village of North Bay
Don Charlier ..... Planning Commissioner, Town of Norway
Pete Christensen ..... Trustee, Village of Wind Point
Kimberly Christman ..... Trustee, Village of Union Grove
Richard Goetsch ..... Planning Commissioner, Town of Dover
Kenneth Hall ..... Supervisor, Racine County
Michael A. Hayek ..... Village Engineer, Village of Caledonia
Mark C. Janiuk ..... Administrator, Village Sturtevant
Ronald R. Meyer ..... Planning Director, Village of Mt. Pleasant
Robert Miller ..... Mayor, City of Burlington
James Millonzi ..... Supervisor, Town of Raymond
James Moyer ..... Chairman, Town of Yorkville
Brian F. O'Connell ..... Director of City Development, City of Racine
Phil Peterson ..... Planning Commissioner, Town of Burlington
Tom Roanhouse ..... Trustee, Village of Waterford
Audrey Viau ..... President, Village of Elmwood Park
Michael Weinkauf ..... Supervisor, Town of Rochester

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C. Barry Bateman ..... Airport Director, General Mitchell International Airport
Wayde B. Buck ..... Airport Director, Kenosha Regional Airport
John B. Capelle ..... Director of Community Development, City of West Bend
Justin Drew ..... City Planner, City of Hartford
Thomas J. Gorlinski ..... Former Supervisor, Kenosha County Board; Former Commissioner, Southeastern Wisconsin Regional Planning Commission
David M. Green ..... Director, Bureau of Aeronautics, Wisconsin Department of Transportation
N. David Mann ..... Vice-President and Airport Manager, Batten Airport, Racine
Keith Markano ..... Airport Manager, Waukesha County-Crites Field
George E. Melcher ..... Director, Department of Planning and, Development, Kenosha County
Daniel J. Millenacker ..... Community Planner, U.S. Department of Transportation, Federal Aviation Administration
Paul M. Roback ..... Community Resource Development Educator, University of Wisconsin-Extension, Ozaukee County
Douglas Seymour ..... Director of Community Development, City of Oak Creek
Albert Stanek ..... Chief of Intercity Planning, Bureau of Planning and Economic Development Division of Transportation Investment Management, Wisconsin Department of Transportation
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Susan E. Robertson..... Manager, Village of Fox Point
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WATERSHED COMMITTEE

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John F. Burke ..... Manager, Halter Wildlife Area
James D'Antuono ..... Illinois Fox Basin Team Leader, Wisconsin Department of Natural Resources
Virgil Gentz ..... Chairman, Town of Paris
Richard L. Gossling ..... Chairman, Town of Bristol
Ronald L. Johnson ..... Chairman, Kenosha County Land and Water Conservation Committee;Supervisor, Kenosha County Board
Wayne E. Koessl ..... Representative, WISPARK Corporation
Jeffrey B. Labahn ..... Director, Department of City Development, City of Kenosha
Douglas J. Noble ..... Supervisor, Kenosha County Board
Michael R. Pollocoff ..... Administrator, Village of Pleasant Prairie
Steve Richter ..... Director of Conservation and Land Management, The Nature Conservancy
James M. Smith ..... Chairman, Town of Somers
Edward St. Peter ..... General Manager, City of Kenosha Water Utility
Ronald Thomas ..... Executive Director, Chicago Metropolitan Agency for Planning
Michael D. Warner ..... Executive Director, Lake County Stormwater Management Commission

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EMERGENCY PLANNING COMMITTEE

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James Madisen Vice-Chair ..... Battalion Chief, City of Racine Fire Department
David L. Maack, Secretary ..... Emergency Management Coordinator, Racine County Office of Emergency Management
Matt Baitinger ..... North American Environmental, Health, and Safety Manager, JohnsonDiversey
Mike Bohn ..... Senior Process Safety Specialist, Hexion Specialty Chemicals
James Dobbs ..... Lieutenant, City of Racine Police Department
Thomas Karkow ..... News Director, WRJN Radio
Brian Londre ..... Lieutenant, Racine County Sheriff's Department
Sean Marschke ..... Police Chief, Village of Sturtevant
Robert Miller ..... Mayor, City of Burlington
Dave Piccolo ..... EMS Coordinator, Wheaton Franciscan-All Saints Hospital

Figure A-5

PUBLIC INFORMATION MEETING ON THE RACINE COUNTY HAZARD MITIGATION PLAN UPDATE

On Tuesday, April 27, 2010 staff from the Racine County Office of Emergency Management, the Racine County Department of Planning and Development, and the Southeastern Wisconsin Regional Planning Commission (SEWRPC) conducted a public informational meeting on the update of the Racine County Hazard Mitigation Plan. The session provided the public an opportunity to learn about and comment on the findings and recommendations documented in the preliminary draft of SEWRPC Community Assistance Planning Report No. 266, 2nd Edition, *Racine County Hazard Mitigation Plan Update: 2010-2015*. This meeting was held from 4:00-6:30 p.m. at the Ives Grove Office Complex and Public Works Facility, 14200 Washington Avenue, Sturtevant, Wisconsin.

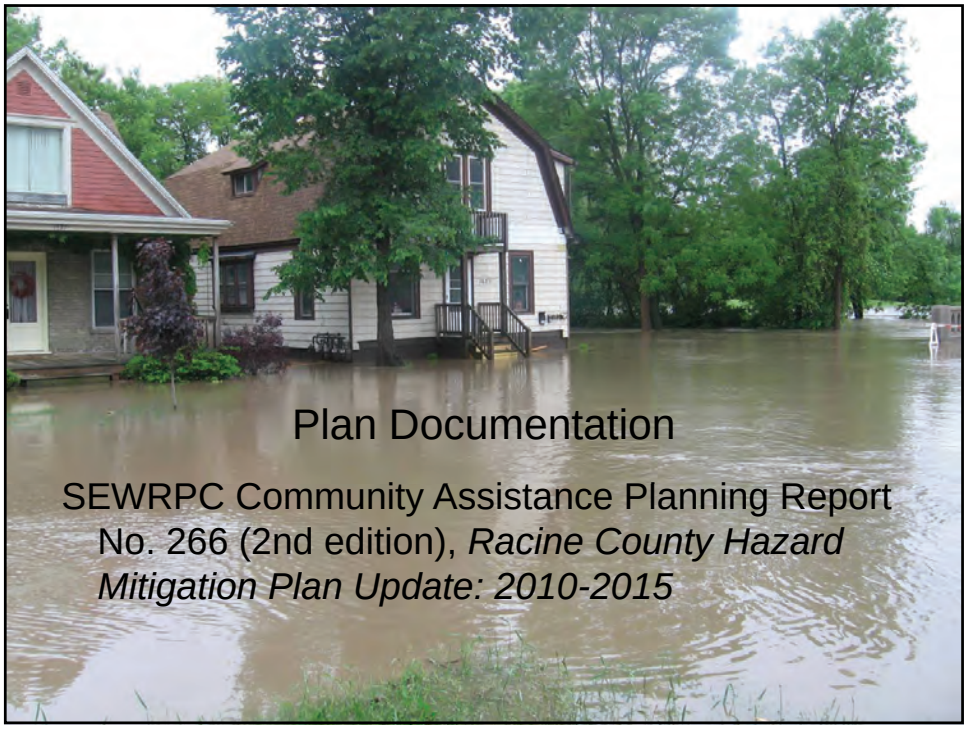
The session began with a meeting in "open house" format, which provided an opportunity for the public to meet with the County and Commission staffs to receive information, ask questions, and provide written comments. A copy of a Commission staff presentation is attached herein as Exhibit A.

Announcements of the meeting were made on the County's website and through paid advertisements in the Racine Journal-Times Newspaper on April 13, 2010 and April 20, 2010. A copy of the announcement is attached herein as Exhibit B.

In addition to accepting comments on the preliminary draft of the plan update at this meeting, County and Commission staffs accepted written comments until May 18, 2010 through U.S. Mail and though a comment screen on the Commission's website. No comments were received.

Plan Preparation Staff

- Racine County Office of Emergency Management
- Racine County Department of Planning and Development
- Southeastern Wisconsin Regional Planning Commission

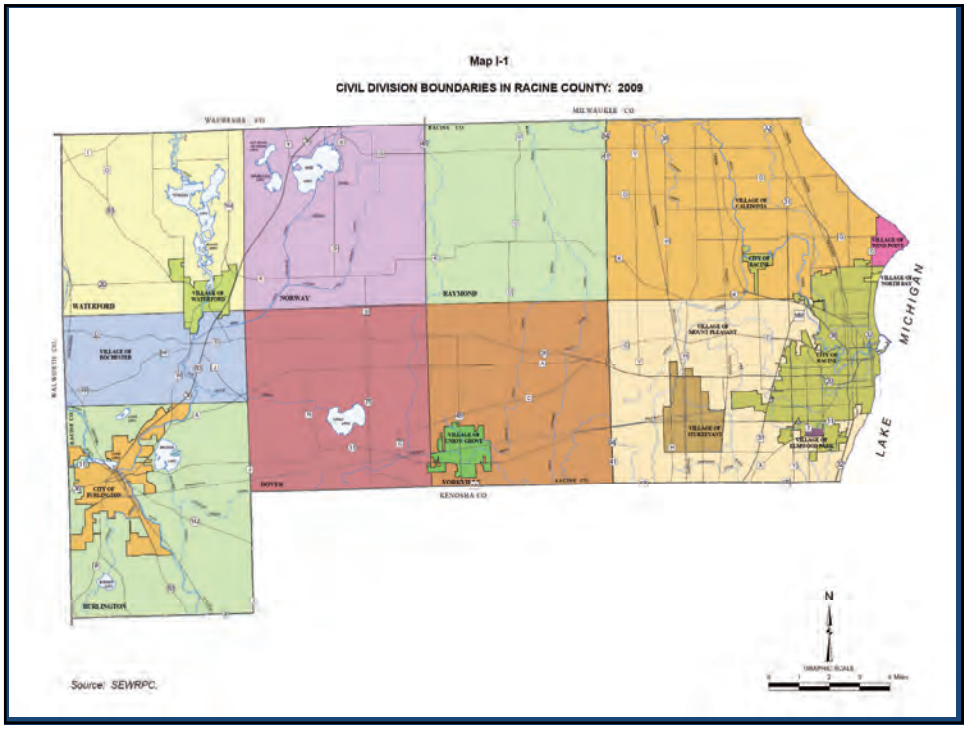


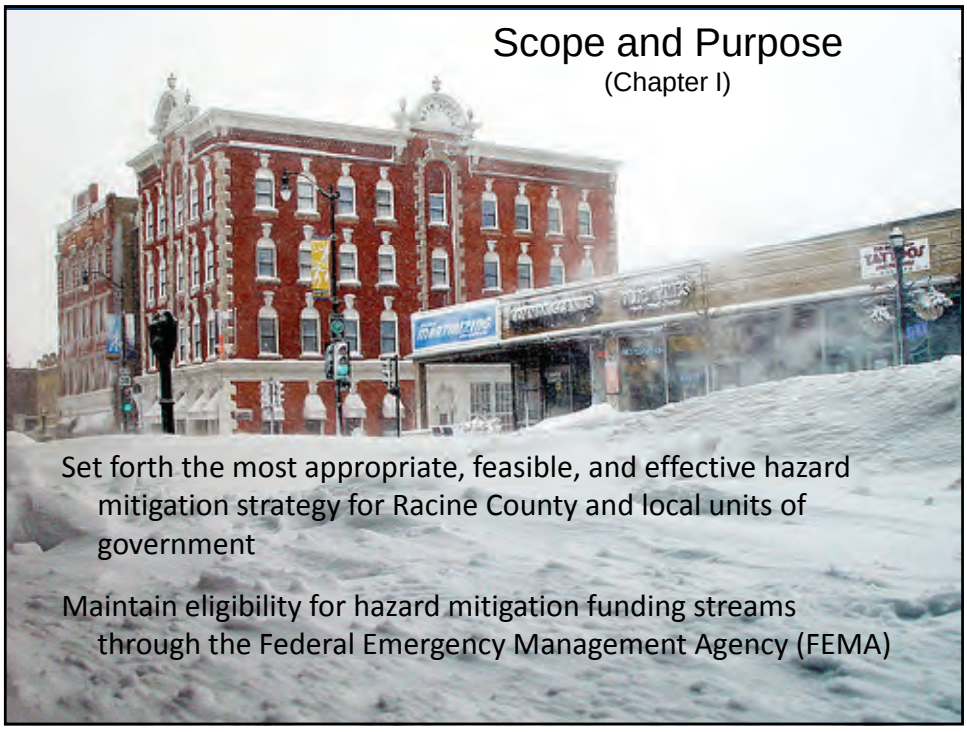
Plan Documentation

SEWRPC Community Assistance Planning Report No. 266 (2nd edition), *Racine County Hazard Mitigation Plan Update: 2010-2015*

Participating Jurisdictions

- 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


Map I-1
CIVIL DIVISION BOUNDARIES IN RACINE COUNTY: 2009
WATERFORD
NORWAY
RAYMOND
DOVER
BURLINGTON
MICHIGAN
LAKE
Source: SEWRPC.
N


Scope and Purpose
(Chapter I)
Set forth the most appropriate, feasible, and effective hazard mitigation strategy for Racine County and local units of government
Maintain eligibility for hazard mitigation funding streams through the Federal Emergency Management Agency (FEMA)

Racine County Hazard Mitigation Plan Task Force

Oversaw plan updating activities

Comprised of

- Elected officials, appointed officials, agency representatives, business representatives, knowledgeable citizens
- Law enforcement agencies, fire and EMS departments, public health departments, public works departments, engineering departments, private sector firms, nonprofit organizations

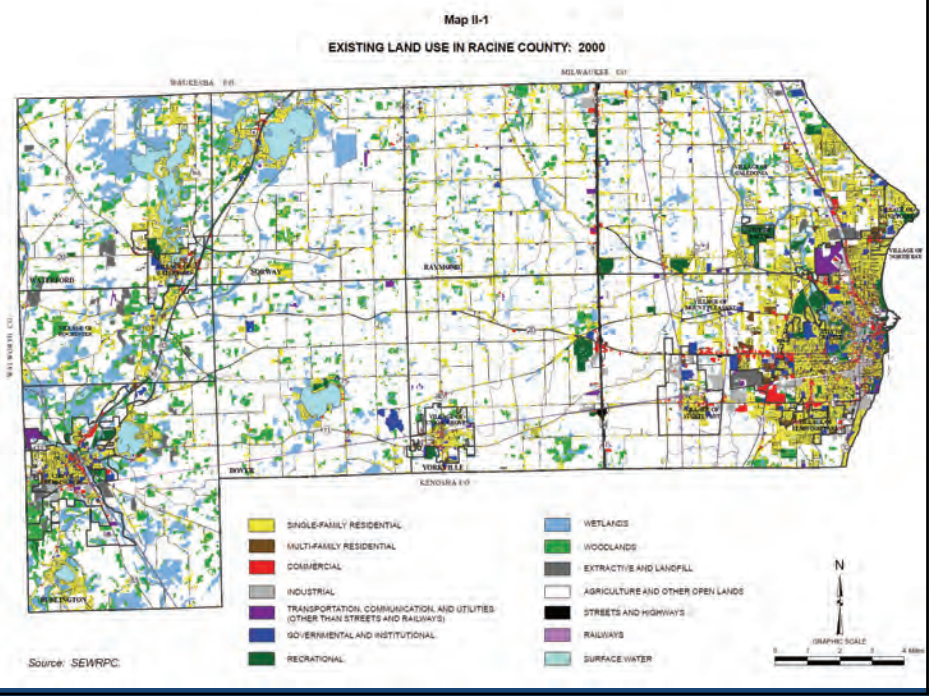
Plan Update Activities

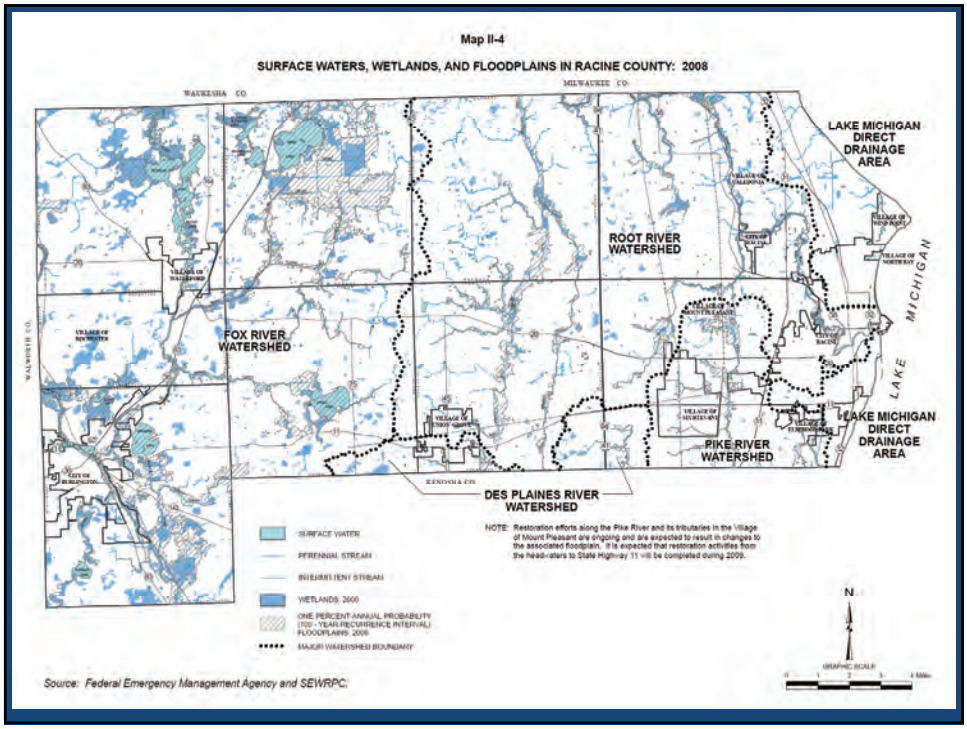
(Described in Chapter I)

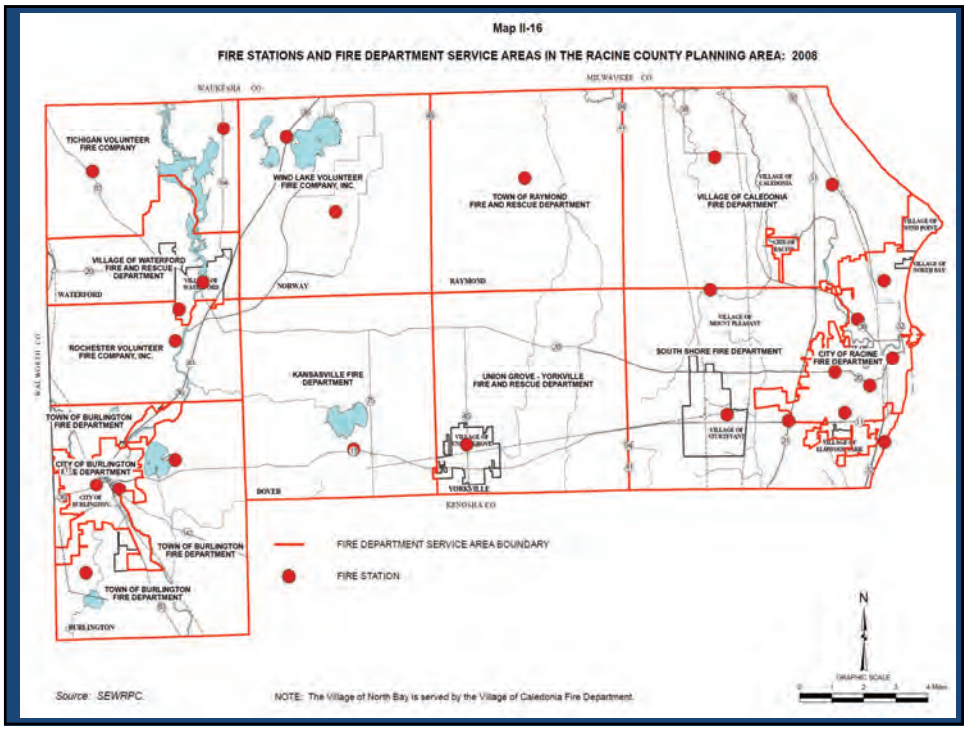
- Review implementation activities
- Update inventories of natural and built features
- Review and reevaluate identification of hazards
- Update and reevaluate risk analysis
- Review and revise mitigation goals
- Review and revise mitigation strategies
- Update plan implementation and maintenance
  - Update potential funding sources

Inventory Data
(Chapter II)

- Demographic characteristics
- Existing and planned land use
- Surface water and Lake Michigan shoreline
- Transportation and utility systems
- Critical community facilities
- Existing regulations and programs




Map II-4
SURFACE WATERS, WETLANDS, AND FLOODPLAINS IN RACINE COUNTY: 2008
WAUKESHA CO.
MILWAUKEE CO.
LAKE MICHIGAN DIRECT DRAINAGE AREA
ROOT RIVER WATERSHED
FOX RIVER WATERSHED
LAKE MICHIGAN
LAKE MICHIGAN DIRECT DRAINAGE AREA
PIKE RIVER WATERSHED
DES PLAINES RIVER WATERSHED
KENOSHA CO.
WALWORTH CO.
NOTE: Restoration efforts along the Pike River and its tributaries in the Village of Mount Pleasant are ongoing and are expected to result in changes to the associated floodplain. It is expected that restoration activities from the headwaters to State Highway 11 will be completed during 2009.
SURFACE WATER
PERENNIAL STREAM
INTERMITTENT STREAM
WETLANDS: 2000
ONE PERCENT ANNUAL PROBABILITY (100 - YEAR RECURRENCE INTERVAL) FLOODPLAINS: 2000
MAJOR WATERSHED BOUNDARY
N
GRAPHIC SCALE
Source: Federal Emergency Management Agency and SEWRPC.


Map II-16
FIRE STATIONS AND FIRE DEPARTMENT SERVICE AREAS IN THE RACINE COUNTY PLANNING AREA: 2008
WAUKESHA CO.
MILWAUKEE CO.
TICHIGAN VOLUNTEER FIRE COMPANY
WIND LAKE VOLUNTEER FIRE COMPANY, INC.
TOWN OF RAYMOND FIRE AND RESCUE DEPARTMENT
VILLAGE OF CALEDONIA FIRE DEPARTMENT
VILLAGE OF WATERFORD FIRE AND RESCUE DEPARTMENT
WATERFORD
NORWAY
RAYMOND
ROCHESTER VOLUNTEER FIRE COMPANY, INC.
SOUTH SHORE FIRE DEPARTMENT
CITY OF RACINE FIRE DEPARTMENT
KANSASVILLE FIRE DEPARTMENT
UNION GROVE - YORKVILLE FIRE AND RESCUE DEPARTMENT
TOWN OF BURLINGTON FIRE DEPARTMENT
CITY OF BURLINGTON FIRE DEPARTMENT
DOVER
YORKVILLE
KENOSHA CO.
WALWORTH CO.
FIRE DEPARTMENT SERVICE AREA BOUNDARY
FIRE STATION
N
GRAPHIC SCALE
Source: SEWRPC.
NOTE: The Village of North Bay is served by the Village of Caledonia Fire Department.

Hazard Identification
(Chapter IV)

Task Force Input

- Hazard and Vulnerability Assessment Tool

Past Hazard Experience

- Frequency of occurrence
- Property and crop damages
- Fatalities and injuries

Hazard Identification
(Chapter IV)

<u>Natural Hazards</u>

- Flooding
- Thunderstorm, high wind, hail, lightning
- Tornadoes
- Temperature extremes
- Winter storms
- Coastal erosion
- Drought
- Earthquake

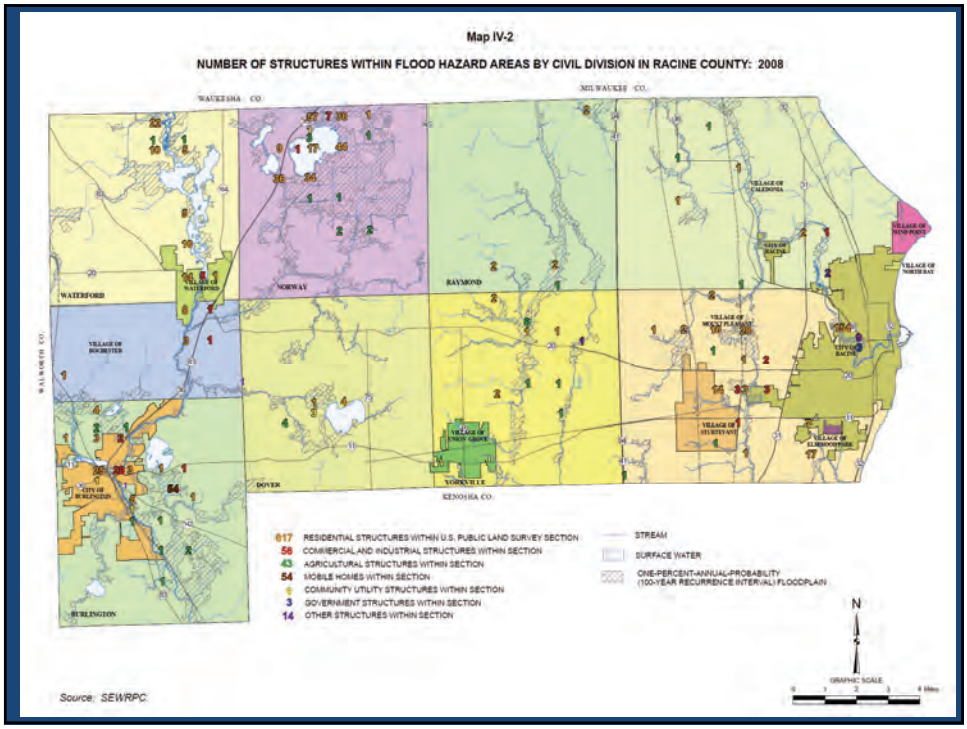
Hazard Identification
(Chapter IV)

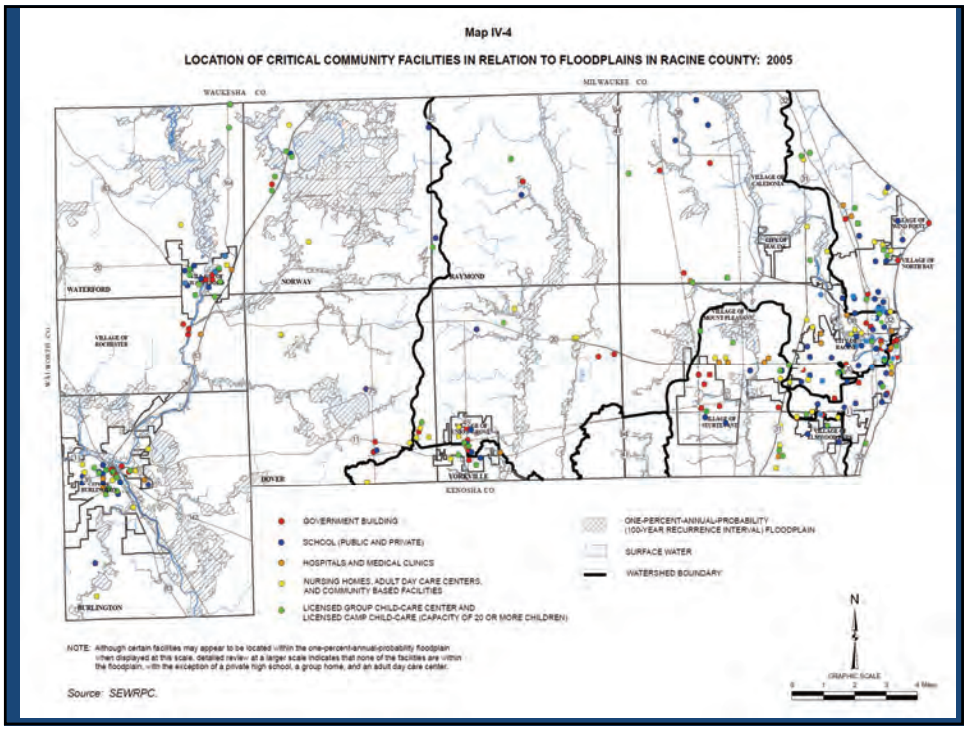
Other Hazards

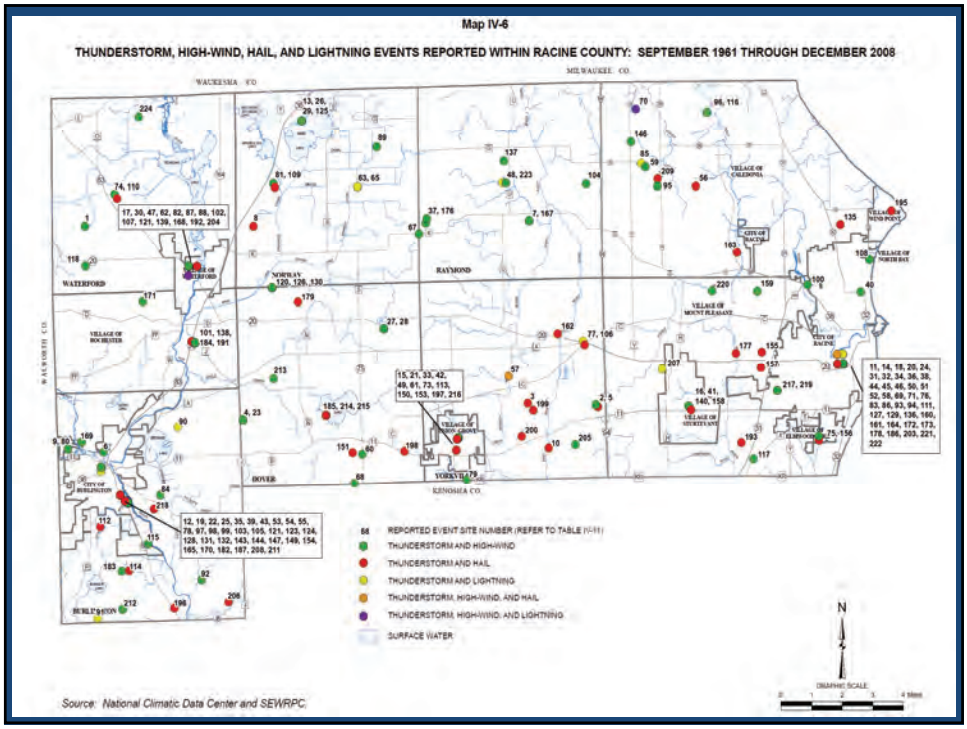
- Transportation accidents
  - Street and roadway, railroad, airport
- Contamination or loss of water supply
- Hazardous material incidents
  - Fixed facility, transportation
- Emergency medical incidents
- Terrorism
- Power outage

Vulnerability Assessment Format
(Chapter IV)

- Description of Hazard
- Historical Experience with the Hazard
- Recent Hazard Events
- Vulnerability and Community Impacts Assessment
- Potential Future Changes
- Multi-Jurisdictional Risk Assessment


Map IV-2
NUMBER OF STRUCTURES WITHIN FLOOD HAZARD AREAS BY CIVIL DIVISION IN RACINE COUNTY: 2008
WAUKESHA CO.
MILWAUKEE CO.
WALWORTH CO.
KENOSHA CO.
WATERFORD
NORWAY
RAYMOND
DOVER
YORKVILLE
BURLINGTON
VILLAGE OF ROCHESTER
VILLAGE OF CALEDONIA
VILLAGE OF MOUNT PLEASANT
VILLAGE OF SOUTH MILWAUKEE
VILLAGE OF SUMMIT
VILLAGE OF ELMWOOD PARK
VILLAGE OF NORTH BAY
CITY OF RACINE
617 RESIDENTIAL STRUCTURES WITHIN U.S. PUBLIC LAND SURVEY SECTION
56 COMMERCIAL AND INDUSTRIAL STRUCTURES WITHIN SECTION
43 AGRICULTURAL STRUCTURES WITHIN SECTION
54 MOBILE HOMES WITHIN SECTION
6 COMMUNITY UTILITY STRUCTURES WITHIN SECTION
3 GOVERNMENT STRUCTURES WITHIN SECTION
14 OTHER STRUCTURES WITHIN SECTION
STREAM
SURFACE WATER
ONE-PERCENT-ANNUAL-PROBABILITY (100-YEAR RECURRENCE INTERVAL) FLOODPLAIN
N
GRAPHIC SCALE
Source: SEWRPC.


Map IV-4
LOCATION OF CRITICAL COMMUNITY FACILITIES IN RELATION TO FLOODPLAINS IN RACINE COUNTY: 2005
WAUKESHA CO.
MILWAUKEE CO.
WALWORTH CO.
KENOSHA CO.
WATERFORD
NORWAY
RAYMOND
DOVER
YORKVILLE
BURLINGTON
GOVERNMENT BUILDING
SCHOOL (PUBLIC AND PRIVATE)
HOSPITALS AND MEDICAL CLINICS
NURSING HOMES, ADULT DAY CARE CENTERS, AND COMMUNITY-BASED FACILITIES
LICENSED GROUP CHILD-CARE CENTER AND LICENSED CAMP CHILD-CARE (CAPACITY OF 20 OR MORE CHILDREN)
ONE-PERCENT-ANNUAL-PROBABILITY (100-YEAR RECURRENCE INTERVAL) FLOODPLAIN
SURFACE WATER
WATERSHED BOUNDARY
NOTE: Although certain facilities may appear to be located within the one-percent-annual-probability floodplain when displayed at this scale, detailed review at a larger scale indicates that none of the facilities are within the floodplain, with the exception of a private high school, a group home, and an adult day care center.
N
GRAPHIC SCALE
Source: SEWRPC.



Hazard Mitigation Goals
(Chapter III)

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.

Hazard Mitigation Goals
(Chapter III)

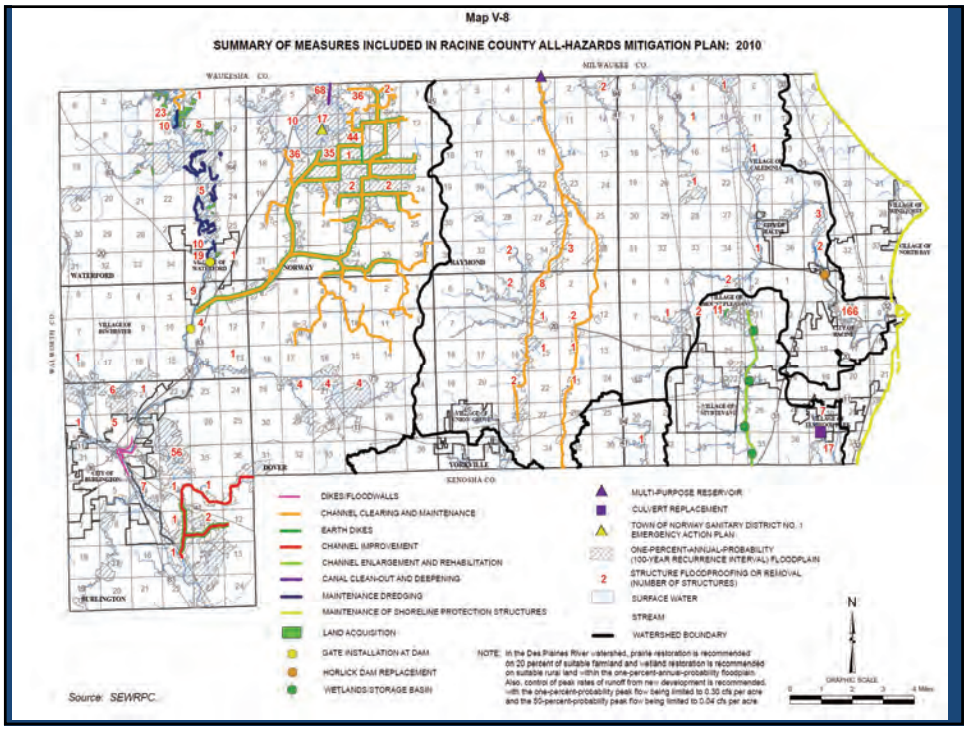
3. An integrated transportation system which, through its location, capacity, and design, will safely, economically, and effectively serve the existing and proposed land use pattern and promote the implementation of the land use plan, meeting the current and anticipated travel demand and minimizing the 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.

Hazard Mitigation Goals
(Chapter III)

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 which reduces the exposure of people and real and personal property to shoreline erosion and bluff recession.

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
- Selected and set forth priority mitigation measures



Priority Flood Mitigation Strategies

(Chapter V)

- Floodland and wetland zoning and zoning review
- Preservation of open and sensitive areas
- Purchase, demolition, and removal or floodproofing of 677 structures
- Channel cleaning, maintenance, or rehabilitation
- Stormwater management planning and regulation
- Stormwater management facility maintenance
- NFIP map updating
- Survey of buildings near flood hazard areas

Priority Mitigation Strategies for Weather-related Hazards

(Chapter V)

- 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

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

Priority Ranking of Hazards

Mortality and Injury	Property and Crop Damage
Transportation – Street and Road	Transportation – Street and Road
Emergency Medical Incidents	Flooding
Temperature Extremes	Thunderstorm/High Wind
Transportation – Railroad	Lake Michigan Coastal Erosion
Thunderstorm/High Wind	Drought
Lightning	Tornadoes
Winter Storms	Lightning
Transportation – Airport	Hail
Tornadoes	Hazmat Incident – Transportation
Hazmat Incident – Transportation	Hazmat Incident – Fixed Facility

Plan Implementation
(Chapter VI)

For each priority mitigation strategy

- Estimated costs
- Designated management agencies
- Noted current implementation status
- Identified potential funding sources

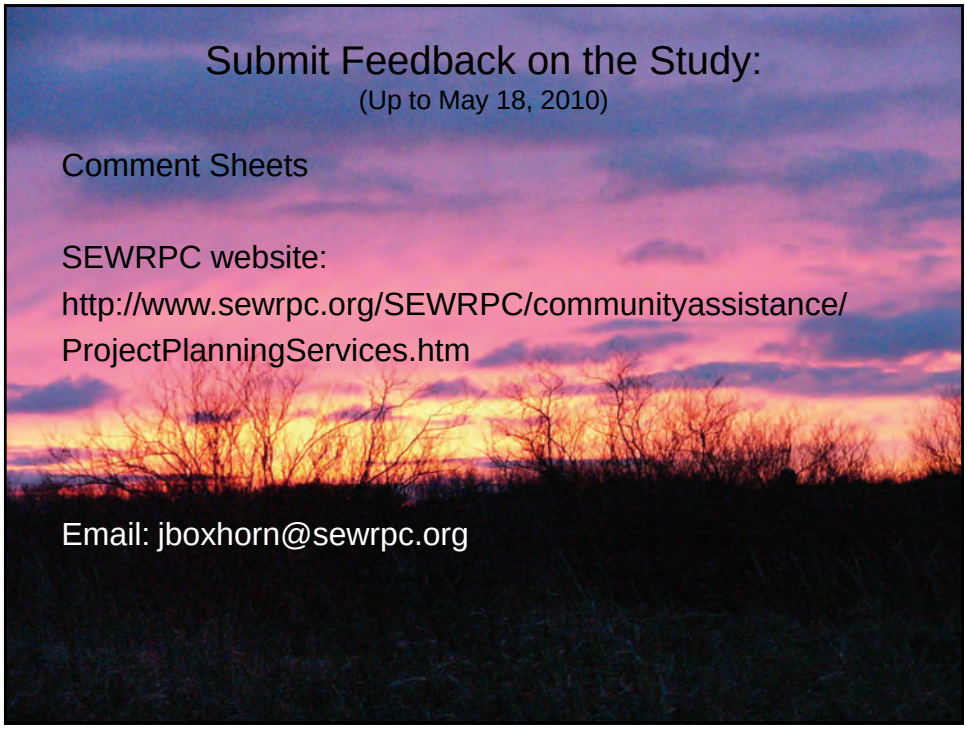
Plan Adoption
(Chapter VI)

The plan will need to be adopted by:

- Racine County Board
- Governing bodies of cities and villages

The plan will need be approved by FEMA

The plan has been reviewed by the Wisconsin Division of Emergency Management and their comments incorporated.


Submit Feedback on the Study:
(Up to May 18, 2010)
Comment Sheets
SEWRPC website:
http://www.sewrpc.org/SEWRPC/communityassistance/ProjectPlanningServices.htm
Email: jboxhorn@sewrpc.org

Notice is hereby given that a Public Information Meeting on the Hazard Mitigation Plan Update for Racine County will be held from 4:00 p.m. to 6:30 p.m. on Tuesday, April 27, 2010, at the Ives Grove Office Complex, Conference Room A, 14200 Washington Ave, Sturtevant, WI. The purpose of the meeting is to allow review, comment and questions about the Racine County Hazard Mitigation Plan update. Copies of the report chapters, including the recommended plan chapter, may be reviewed at the Southeastern Wisconsin Regional Planning Commission (SEWRPC) website at:

http://www.sewrpc.org/SEWRPCFiles/CommunityAssistance/RacineHazardMitigation/capr-266-2nd-ed-draft-racine-c3.pdf

For more detailed information about how to comment on the plan update, please email Julie.Anderson@GORacine.org or request information by calling 262-886-8470. This meeting location is handicap accessible. If you have other special needs, contact 262-886-8470 or the TTD/TRS operator at 1-800-947-3529.

Dates: Apr. 13 & 20, 2010

Julie A. Anderson
Planning & Development Director

Appendix B

SOLID WASTE DISPOSAL SITES IN RACINE COUNTY: 2009

Identification Number[a]	Civil Division	Location by U.S. Public Land Survey	Operator	Status
RA1	City of Burlington	T3N, R19E, Section 29, NE, SE	Town of Burlington	Inactive
RA2	Town of Burlington	T2N, R19E, Section 1, SE, SE	Town of Burlington	Inactive
RA3	Village of Caledonia	T4N, R22E, Section 3, NW, SW	Caledonia Corporation	Inactive
RA4	Village of Caledonia	T4N, R22E, Section 1, N	Wisconsin Electric Power Company	Active; MON
RA5	Village of Caledonia	T4N, R23E, Section 19, NW, SE	Hillside Sand and Gravel	Inactive
RA6	Village of Caledonia	T4N, R22E, Section 3, NE, SE	Hunt's Disposal Landfill	Inactive; Superfund site
RA7	Town of Dover	T3N, R20E, Section 29, NW, SE	N/A	Inactive
RA8	Town of Dover	T3N, R20E, Section 25, SE, SW	Center for the Developmentally Disabled	Inactive
RA9	City of Racine	T3N, R22E, Section 23, SE, NE	Kestrel Hawk Park	Active
RA10	Village of Mt. Pleasant	T3N, R22E, Section 27, SW, NE	Town of Mt. Pleasant	Inactive; has received hazardous waste
RA11	Town of Norway	T4N, R20E, Section 21, SW, NE	Town of Norway	Inactive
RA12	Town of Raymond	T4N, R21E, Section 2, SE, NE	Waste Management of Wisconsin Reclamation, Inc.	Inactive
RA13	Village of Rochester	T3N, R19E, Section 11, SE, NW	Village of Rochester	Inactive
RA14	Village of Rochester	T3N, R19E, Section 10, NW, SW	Racine County Highway Department	Inactive
RA15	Village of Rochester	T3N, R21E, Section 11, NW, SE	Village of Rochester	Inactive
RA16	Town of Waterford	T4N, R19E, Section 34, SE, NE	Town of Waterford	Inactive
RA17	Town of Yorkville	T3N, R21E, Section 29, SW, NW	Village of Union Grove	Inactive
RA18	Town of Burlington	T3N, R19E, Section 27, NE, SE	N/A	Inactive
RA19	City of Racine	T3N, R23E, Section 9, SE, SW	Cape and Sons Construction	Inactive
RA20	City of Racine	T3N, R23E, Section 9, SW, NE	City of Racine	Inactive

NOTES: 1. 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.

2. MON = Site is being monitored.

N/A = Data is currently not available.

[a]*See Map 18.*

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: 2009

Table C-1

POLICE STATIONS, COUNTY SHERIFF OFFICES OR SUBSTATIONS, AND CORRECTIONAL FACILITIES[a]

Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
City of Burlington Police	City of Burlington	224 E. Jefferson Street	Chief Peter Nimmer	(262) 342-1000	(262) 763-5158
Town of Burlington Police	Town of Burlington	32288 Bushnell Road	Chief Michael P. Sevick	(262) 763-9461	(262) 763-9461
Village of Caledonia Police	Village of Caledonia	6900 Nicholson Road	Chief Jeffrey Meier	(262) 835-4423	(262) 835-4799
Village of Mt. Pleasant Police	Village of Mt. Pleasant	6200 Durand Avenue	Chief Tim Zarzecki	(262) 884-0454	- -
Racine City Police Main Station	City of Racine	730 Center Street	Chief Kurt Wahlen	(262) 635-7700	(262) 636-9332
Racine City Police	City of Racine	1522 W. 6th Street	- -	(262) 635-7863	- -
Racine City Police	City of Racine	1750 Mead Street	- -	(262) 635-7862	- -
Racine City Police	City of Racine	1140 Geneva Street	- -	(262) 635-7928	- -
Racine City Police	City of Racine	1009 Davis Place	- -	(262) 635-2880	- -
Racine County Sheriff	City of Racine	717 Wisconsin Avenue	Sheriff Robert D. Carlson	(262) 636-3211	(262) 637-5279
Sheriff Patrol Station	Town of Yorkville	14116 Washington Avenue	- -	(262) 886-9465	- -
Village of Sturtevant Police	Village of Sturtevant	2801 89th Street	Chief Sean M. Marschke	(262) 886-7208	(262) 886-7212
Racine County Sheriff's Department	Village of Union Grove	925 15th Avenue	- -	- -[b]	- -
Town of Waterford Police	Waterford Town	415 N. Milwaukee	Chief Tom Ditscheit	(262) 534-2119	(262) 534-7789
Village of Waterford Police	Village of Waterford	122 N. Second Street	Chief John Schanning	(262) 534-3911	(262) 534-5980
Town of Norway Police Station	Town of Norway	6419 Heg Park Road	Chief John Hanrahan	(262) 895-6211	(262) 895-3651
Racine Correctional Institution	Village of Sturtevant	2019 Wisconsin Street	Warden, Robert Humphreys	(262) 886-3214	(262) 886-3514
Racine Youthful Offender Correctional Facility	City of Racine	1501 Albert Street	Warden Floyd Mitchel	(262) 638-1999	(262) 638-1777
Robert Ellsworth Correctional Facility	Town of Yorkville	21425-A Spring Street	Superintendent Suzanne Schmitt	(262) 878-6000	(262) 878-6015
Southern Oaks Girls School	Town of Yorkville	21425-B Spring Street	Superintendent Jane Dier-Zimmel	(262) 878-6500	(262) 878-6520
Racine County Jail	City of Racine	717 Wisconsin Avenue	Sheriff Robert D. Carlson	(262) 636-3217	(262) 636-3470
Racine County Juvenile Detention	City of Racine	1212 Taylor Avenue	Superintendent Jonathan Delgrave	(262) 638-6735	(262) 638-6376

[a] *On March 11, 2010, the Town of Dover created the Town of Dover Police Department. The Department is located at the Dover Town Hall, 4110 S. Beaumont Road, Kansasville and is headed by Chief Joe Cashin. The Department's telephone number is (262) 878-2200.*

[b] *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
Caledonia Fire Station No. 1	Village of Caledonia	6900 Nicholson Road	Chief Richard Roeder	262-835-2050	262-835-4192
Caledonia Fire Station No. 2	Village of Caledonia	6040 Douglas Avenue	Chief Richard Roeder	262-639-9090	- -
Caledonia/South Shore Station No. 3[a]	Village of Caledonia	9433 Northwestern Avenue	Chief Richard Roeder/ William Bouma	262-884-1182/ 262-763-7842	262-884-3571/ 262-767-0987
Burlington Fire Station	City of Burlington	165 W. Washington Street	Chief Richard Lodle	262-763-7842	262-767-8602
Kansasville Fire Department	Town of Dover	23730 Durand Avenue	Chief Jeff Bratz	262-878-3811	262-534-4796
Racine Fire Station No. 1	City of Racine	810 8th Street	Chief Steve Hansen	262-635-7900	262-635-7864
Racine Fire Station No. 2	City of Racine	2430 Northwestern Avenue	Chief Steve Hansen	262-635-7852	- -
Racine Fire Station No. 6	City of Racine	2101 16th Street	Chief Steve Hansen	262-635-7856	- -
Racine Fire Station No. 7	City of Racine	3821 Washington Avenue	Chief Steve Hansen	262-635-7857	- -
Racine Fire Station No. 8	City of Racine	1107 Lombard Avenue	Chief Steve Hansen	262-635-7858	- -
Racine Fire Station No. 9	City of Racine	2430 Blaine Avenue	Chief Steve Hansen	262-635-7859	- -
Raymond Fire Station	Town of Raymond	2255 76th Street	Chief Alan Babe	262-835-1687	262-835-4449
Rochester Fire Station	Village of Rochester	31020 Academy Road	Chief Tim Dahlberg	262-534-3444	262-642-5910
South Shore Fire Station No. 1[a]	Village of Sturtevant	2801 89th Street	Chief William Bouma	262-554-3041	- -
South Shore Fire Station No. 2[a]	Village of Mt. Pleasant	3809 Sheridan Road	Chief William Bouma	262-632-2100	- -
South Shore Fire Station No. 3[a]	Village of Mt. Pleasant	9433 Northwestern Avenue	Chief William Bouma	262-884-1182	- -
South Shore Fire Station No. 4[a]	Village of Mt. Pleasant	6200 Durand Avenue	Chief William Bouma	262-554-8812	262-554-1163
Tichigan Fire Station No. 1	Tichigan	8205 Big Bend Road	Chief Todd Bluhm	262-662-3570	262-662-4589
Tichigan Fire Station No. 2	Tichigan	6838 Caldwell Road	Chief Todd Bluhm	- -	- -
Burlington Fire Station No. 1	Town of Burlington	32288 Bushnell Road	Chief Craig Ebert	262-763-3070	262-539-3075
Burlington Fire Station No. 2	Town of Burlington	7211 McHenry	Chief Craig Ebert	- -	- -
Burlington Fire Station No. 3	Town of Burlington	30130 Meadow Drive	Chief Craig Ebert	- -	- -
Union Grove-Yorkville Fire Department	Village of Union Grove and Town of Yorkville	700 Main Street	Chief Thomas Czerniak	262-878-4181	262-878-4177
Waterford Safety Building	Village of Waterford	122 N. Second Street	Chief Steve Denman	262-534-5930	262-534-9580
Waterford West Side Fire Station	Village of Waterford	818 Mohr Avenue	Chief Steve Denman	262-514-7019	
Wind Lake Fire Station No. 1	Wind Lake	7857 S. Loomis Road	Chief Tim Halter	262-895-7533	262-895-6601
Wind Lake Fire Station No. 2	Wind Lake	5517 East Wind Lake Road	Chief Tim Halter	- -	- -

[a]*The Mt. Pleasant and Sturtevant Fire Departments were consolidated in January 2009 to form the South Shore Fire Department.*

Source: Racine County Office of Emergency Management and SEWRPC.

Appendix D

CRITICAL COMMUNITY FACILITIES IN RACINE COUNTY

Table D-1

PUBLIC SCHOOLS: 2006

Identification Number[a]	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
1	21st Century Preparatory School[b]	City of Racine	1220 Mound Avenue	Robert Morelan	(262) 598-6026	(262) 598-0031
2	Burlington High School	City of Burlington	400 McCanna Parkway	Barbara Kopack Hill	(262) 763-0200	(262)-763-0216
3	Southern Lakes Consortium Alternative High School	City of Burlington	225 Robert Street	Shari Brondtad	(262) 767-2626	- -
4	Nettie E. Karcher Middle School	City of Burlington	225 Robert Street	Marty McGinley	(262) 763-0190	- -
5	Cooper Elementary School	City of Burlington	249 Conkey Street	Dan Armstrong	(262) 763-0180	- -
6	Dover Elementary School	Town of Dover	23303 Church Road	Susan Mosher	(262) 878-5000	(262) 878-5701
7	Dr. Edward G. Dyer Elementary School	City of Burlington	201 S. Kendrick Avenue	Joyce Uglow	(262) 763-0220	(262) 767-5583
8	Waller Elementary School	City of Burlington	195 Gardner Avenue	Victoria Libbey	(262) 763-0185	(262) 763-0187
9	Winkler Elementary School	Town of Burlington	34150 Fulton Street	Linda Luger	(262) 539-2726	(262) 539-2217
10	Kansasville Elementary School	Town of Dover	4101 S. Beaumont Avenue	Giles Williams	(262) 878-3773	(262) 878-1231
11	Lakeview Elementary School	Town of Norway	2633 Fries Lane	Dawn Marisch	(262) 895-7540	(262) 895-7631
12	North Cape Elementary School	Town of Raymond	11926 Hwy. K	Petra Walker	(262) 534-3894	(262) 835-2311
13	Drought Elementary School	Town of Norway	21016 Seven Mile Road	Jeff Gorn	(262) 895-7778	- -
14	J.I. Case High School	Village of Mt. Pleasant	7345 Washington Avenue	Stephanie Phernetton	(262) 619-4200	(262) 619-4259
15	Horlick High School	City of Racine	2119 Rapids Drive	Angela Apmann	(262) 619-4300	(262) 619-4390
16	Keith R. Mack Achievement Center	City of Racine	1325 Park Avenue	Robert Holzem	(262) 664-6600	(262) 664-6644
17	The R.E.A.L. School[b]	City of Racine	5915 Erie Street	Robert Holzem	(262) 664-8100	(262) 664-8110
18	Walden III Middle and High School	City of Racine	1012 Center Street	Robert Holzem	(262) 664-6259 MS (262) 664-6250 HS	(262)664-6255
19	Washington Park High School	City of Racine	1901 12th Street	Dan Thielan	(262) 619-4400	(262) 619-4490
20	Gilmore Middle School	City of Racine	2330 Northwestern Avenue	Kevin Brown	(262) 619-4260	(262) 619-4272
21	Jerstad Agerholm Middle School	City of Racine	3601 LaSalle Street	Cheri Kulland	(262) 664-6075	(262) 664-6120

Table D-1 (continued)

Identification Number[a]	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
22	McKinley Middle School[b]	City of Racine	2326 Mohr Avenue	Lori Sue Pelk	(262) 664-6150	(262) 664-6196
23	Mitchell Middle School	City of Racine	2701 Drexel Avenue	Robert Wilhelmi	(262) 664-6400	(262) 664-6444
24	Starbuck Middle School	City of Racine	1516 Ohio Street	Sandra Johannsen Brand	(262) 664-6500	(262) 664-6510
25	Stephen Bull Fine Arts Elementary School[c]	City of Racine	815 De Koven Avenue	Doug Clum	(262) 664-6800	(262) 664-6810
26	Fratt Elementary	City of Racine	3501 Kinzie Avenue	James Hass	(262) 664-8150	(262) 664-8160
27	Giese Elementary	City of Racine	5120 Byrd Avenue	Anne Swanson	(262) 664-8250	(262) 664-8250
28	Gifford Elementary	Village of Caledonia	8332 Northwestern Avenue	Steven Russo	(262) 619-4550	(262) 619-4595
29	Goodland Elementary School	City of Racine	4800 Graceland Boulevard	Billie Marie Novick	(262) 664-6850	(262) 664-6870
30	Janes Elementary School[d]	City of Racine	1425 N. Wisconsin Avenue	Deborah Coca	(262) 664-6550	(262) 664-6553
31	Jefferson Lighthouse Elementary	City of Racine	1722 W. Sixth Street	Soren Gojewski	(262) 664-6900	(262) 664-6910
32	Jerstad Agerholm Elementary	City of Racine	3535 LaSalle Street	Cecilia Holley-Young	(262) 664-6050	(262) 664-6054
33	S.C. Johnson Elementary School	City of Racine	2420 Kentucky Street	Kim DeLao	(262) 664-6950	(262) 664-6960
34	Jones Elementary	City of Racine	3300 Chickory Road	Sharon Campbell	(262) 664-8050	(262) 664-8060
35	Julian Thomas Elementary School	City of Racine	930 Martin Luther King Drive	Staci Kimmons	(262) 664-8400	(262) 664-8400
36	Knapp School	City of Racine	2701 17th Street	Gayle Thomas	(262) 664-8000	(262) 664-8010
37	Mitchell Elementary School	City of Racine	2713 Drexel Avenue	Robert Wilhelmi	(262) 664-6400	(262) 664-6444
38	North Park Elementary School	Village of Caledonia	4748 Elizabeth Street	Mark Zanin	(262) 664-6450	(262) 664-6450
39	Olympia Brown Elementary School	Village of Caledonia	5915 Erie Street	Kathleen Johnson	(262) 664-6650	(262) 664-6650
40	P-COC Elementary School	City of Racine	914 Saint Patrick Street	- -	(262) 631-7122	- -
41	Red Apple Elementary School	City of Racine	914 St. Patrick Street	Les Hunt	(262) 619-4500	(262) 619-4505
42	Roosevelt Elementary School	City of Racine	915 Romayne Avenue	Jeff Rassmussen	(262) 664-8300	(262) 664-8300
43	Schulte Elementary School	Village of Sturtevant	8515 Westminster Drive	Shelley Geiselman Kritek	(262) 644-6300	(262) 644-6310
44	Wadewitz Elementary School	City of Racine	2700 Yout Street	Ursula Hamilton Perry	(262) 664-6000	(262) 664-6005
45	West Ridge Elementary	Village of Mt. Pleasant	1347 S. Emmertsen Road	Christopher Thompson	(262) 664-6200	(262) 664-6225
46	Wind Point Elementary	Village of Wind Point	290 Jonsue Lane	Irene Nahabedian	(262) 664-6125	(262) 664-6141
47	Raymond Elementary	Town of Raymond	2659 S. 76th Street	George Slupski	(262) 835-2929	(262) 835-2087
48	Union Grove High School	Village of Union Grove	3433 S. Colony Avenue	Allan Mollerskov	(262) 878-2434	(262) 878-4056
49	Union Grove Elementary School	Village of Union Grove	1745 Milldrum Street	Brenda Stevenson	(262) 878-2015	(262) 878-3133
50	Washington-Caldwell Elementary School	Town of Waterford	8937 Big Bend Road	Mark Pienkos	(262) 895-7972	(262) 662-9888
51	Fox River Middle School	Village of Waterford	921 W. Main Street	Darlene Markle	(262) 534-8240	(262) 534-8241
52	Evergreen Elementary School	Village of Waterford	817 West Main Street	Chris Multhauf	(262) 534-8210	(262) 534-8211
53	Trailside Elementary School	Village of Waterford	615 N. Milwaukee Avenue	Jeff Worgull	(262) 534-8220	(262) 534-8221

Table D-1 (continued)

Identification Number[a]	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
54	Woodfield Elementary School	Village of Waterford	905 Barnes Drive	Shirley Guelig	(262) 534-8230	(262) 534-8231
55	Waterford Union High School	Village of Waterford	100 Field Drive	Eric Blake	(262) 534-3189	(262) 534-4971
56	Yorkville School	Town of Yorkville	18621 Washington Avenue	Eileen Graf	(262) 878-3759	(262) 878-3794
- -	Lyons Center Elementary School	City of Burlington	1622 Mill Street	Christine Anderson	(262) 763-5380	- -
- -	Racine Early Education Center	City of Racine	2015 Franklin Street	Chuck Leonard	(262)-664-8200	(262) 664-8225

[a]*Identification number on Map 23.*

[b]*Charter School.*

[c]*Magnet School.*

[d]*Year-round school.*

Source: Racine County Office of Emergency Management and SEWRPC.

Table D-2

PRIVATE SCHOOLS AND TECHNICAL COLLEGES: 2006

Identification Number[a]	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
1	St. Mary's Catholic Central High School	City of Burlington	148 McHenry Street	Greg Groth	(262) 763-1510	(262) 763-1509
2	Lutheran High School	City of Racine	251 Luedtke Avenue	Randy Baganz	(262) 637-6538	- -
3	St. Catherine High School	City of Racine	1200 Park Avenue	Christopher P. Olley	(262) 632-2785	- -
4	Taylor Alternative School	City of Racine	3131 Taylor Avenue	- -	(262) 553-4100	- -
5	Country View Christian Academy	Village of Caledonia	10717 6 1/2 Mile Road	- -	(262) 995-1311	- -
6	The Eugene Quality Academy	Village of Union Grove	1030 Main Street	- -	(262) 770-0239	- -
7	Union Grove Christian	Village of Union Grove	417 15th Avenue	Lee Morey	(262) 878-1265	(262) 878-1264
8	Prairie School	Village of Wind Point	4050 Lighthouse Drive	- -	(262) 260-3845	- -
9	San Juan Diego Middle School	City of Racine	1101 Douglas Avenue	Marybeth Zuhlke	(262) 619-0402	(262) 898-9524
10	Concordia Lutheran School—Holly Cross Campus	Village of Elmwood Park	3350 Lathrop Avenue	Jeannine Feurstenau	(262) 554-7010	(262) 833-0322
11	Racine Baptist School	City of Racine	4835 Taylor Avenue	John Williams	(262) 554-8079	- -
12	Racine Christian School	City of Racine	912 Virginia Street	David Van Swol	(262) 634-0961	(262) 634-7467
13	Racine Montessori School	City of Racine	2317 Howe Street	Rita Lewis	(262) 637-7892	- -
14	Sacred Heart Grade School	City of Racine	2023 Northwestern Avenue	- -	(262) 637-2012	- -
15	St. Charles Borromeo Catholic School	City of Burlington	449 Conkey Street	Margaret Pietsch	(262) 763-2848	(262) 763-3818
16	St. Mary Grade School	City of Burlington	225 W. State Street	Loretta Jackson	(262) 763-1515	(262) 763-1508
17	St. Edward Grade School	City of Racine	1435 Grove Avenue	- -	(262) 636-8044	- -
18	St. John Nepomuk Grade School	City of Racine	1923 Green Street	- -	(262) 637-9349	- -
19	St. John's Lutheran School	City of Burlington	198 Westridge Avenue	- -	(262) 763-2377	- -
20	St. John's Lutheran School	City of Racine	510 Kewaunee Street	Janet Pesch	(262) 633-2758	- -
21	St. Joseph Grade School	City of Racine	1525 Erie Street	Joe Majowski	(262) 633-2403	(262) 633-8285
22	St. Lucy's Grade School	City of Racine	3035 Drexel Avenue	Rudee Koepke	(262) 554-1801	- -
23	St. Peter's Lutheran School	Village of Waterford	145 S. 6th Street	- -	(262) 534-6066	(262) 534-2571
24	St. Richard of Chichester	City of Racine	1510 Villa Street	- -	(262) 637-7673	- -
25	St. Rita School	Village of Caledonia	4433 Douglas Avenue	Diana Lesnjak	(262) 639-3333	(262) 639-3346
26	St. Sebastian's Grade School	Village of Sturtevant	3030 95th Street	Carol Smith	(262) 886-2806	(262) 886-2055
27	St. Thomas Aquinas Grade School	Village of Waterford	302 S. Second Street	Pam Kramer	(262) 534-2265	(262) 534-5549
28	Trinity Lutheran School	City of Racine	2055 Geneva Street	Gary Marxhausen	(262) 632-1766	(262) 632-3838
29	Trinity Lutheran Evangelical Church and School	Village of Caledonia	7900 Nicholson Road	Michael Hertig	(262) 835-4326	(262) 835-0707

Table D-2 (continued)

Identification Number[a]	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
30	Wisconsin Lutheran School	City of Racine	734 Villa Street	James H. Boehm	(262) 633-7143	- -
31	Small World Montessori School	City of Racine	1008 High Street	- -	(262)-632-6797	- -
32	Gateway Technical College, Burlington Center	City of Burlington	380 McCanna Parkway	- -	(262) 767-5200	(262) 767-5201
33	Gateway Technical College, Racine Campus	City of Racine	1001 S. Main Street	- -	(262) 619-6200	(262) 619-6201
34	Gateway Technical College, CATI	Village of Sturtevant	2320 Renaissance Boulevard	- -	(262) 898-7514	(262) 898-7590
- -	Concordia Lutheran School—Faith Campus	Village of Sturtevant	8500 Durand Avenue	Jeannine Fuerstenau	(262) 884-0991	(262) 833-0322
- -	John Paul II Academy	City of Racine	2023 Northwestern Avenue	Robert Hesse	(262)-637-2012	(262) 637-5130
- -	Wisconsin Lutheran School—Lower School	City of Racine	2920 Bate Street	James H. Boehm	(262) 633-7143	- -

[a]*Identification number on Map 24.*

Source: Racine County Office of Emergency Management and SEWRPC.

Table D-3

SELECTED GOVERNMENT ADMINISTRATION BUILDINGS: 2007

Identification Number[a]	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	Beverly Gill	(262) 342-1161	(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) 835-4451	(262) 835-2388
4	Dover Town Hall	Town of Dover	4110 S. Beaumont Avenue	Marilyn Rudrud	(262) 878-2595	(262) 878-2595
5	Elmwood Park Village Hall	Village of Elmwood Park	3554 Taylor Avenue	Jennifer A. Vliegenthart	(262) 554-7818	- -
6	Mt. Pleasant Town Hall	Village of Mt. Pleasant	6126 Durand Avenue	Juliet Edwards	(262) 554-8750	(262) 554-6785
7	North Bay Village Hall	Village of North Bay	3615 Hennepin Place	Elisabeth Erickson	(262) 639-2334	
8	Norway Town Hall	Town of Norway	6419 Heg Park Road	Camille Cohen	(262) 895-6335	(262) 895-6601
9	Racine City Hall	City of Racine	730 Washington Avenue	Janice Johnson-Martin	(262) 636-9103	(262) 636-9298
10	Raymond Town Hall	Town of Raymond	2255 S. 76th Street	Kari D. L. Morgan	(262) 835-4426	(262) 835-4449
11	Rochester Village Hall	Village of Rochester	203 W. Main Street	Betty J. Novy	(262) 534-2431	(262) 534-4084
12	Sturtevant Village Hall	Village of Sturtevant	2801 89th Street	Mary Hanstad	(262) 886-7201	(262) 886-7205
13	Union Grove Village Hall	Village of Union Grove	925 15th Avenue	Janet Winget	(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	Vicki L. Zuehlke	(262) 534-3980	(262) 534-5373
16	Wind Point Village Hall	Village of Wind Point	215 E. Four Mile Road	Jeanne Tamasek	(262) 639-3524	(262) 639-5727
17	Yorkville Town Hall	Town of Yorkville	925 15th Avenue	Judy Aimone	(262) 878-2123	(262) 878-1680
Other Local Government Facilities						
48	City of Racine Municipal Court	City of Racine	800 Center Street	- -	(262) 636-9263	- -
49	Cesar Chavez Community Center	City of Racine	2221 Douglas Avenue	Ray Hammermann	(262) 636-9454	- -
50	Domer/Tyler Community Center	City of Racine	2301 12th Street	Sue Henry	(262) 636-9414	- -
51	Festival Park	City of Racine	5 5th Street	- -	(262) 636-9229	- -
52	Dr. John Bryant Community Center	City of Racine	601 21st Street	Lesia Hill-Driver	(262) 636-9235	- -
53	Humble Park Community Center	City of Racine	2200 Blaine Avenue	Jason Mars	(262) 636-9226	- -
54	Dr. Martin Luther King Jr. Community Center	City of Racine	1134 Martin Luther King Jr. Drive	James Wilson	(262) 636-9237	- -
55	Memorial Hall	City of Racine	72 7th Street	- -	(262) 636-9169	- -

Table D-3 (continued)

Identification Number[a]	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
County						
18	Ives Grove Office Complex and Public Works Facility	Town of Yorkville	14200 Washington Avenue	- -	(800) 522-6240	- -
19	Convention and Visitors Bureau	Town of Yorkville	14015 Washington Avenue	- -	(262) 884-6400	- -
20	Child Support	City of Racine	818 6th Street	- -	(262) 636-3247	(262) 636-3446
21	Health Officer	Village of Mt. Pleasant	3205 Wood Avenue	Frances Petrick	(262) 554-2200	(262) 554-2015
22	Racine County Human Services Department	City of Racine	1717 Taylor Avenue	- -	(262) 638-6321	(262) 638-6376
23	Racine County Service Center	City of Burlington	209 N. Main Street	- -	(262) 767-2900	(262) 767-2949
24	Racine County Court House	City of Racine	730 Wisconsin Avenue	- -	(262) 636-3121	- -
State						
25	Racine Correctional and Transitional Facility, Wisconsin Department of Corrections	Village of Sturtevant	2019 Wisconsin Avenue	Robert Humphreys	(262) 886-3214	(262) 886-3514
26	Racine Youthful Offender Correctional Facility, Wisconsin Department of Corrections	City of Racine	1501 Albert Street	Floyd Mitchell	(262) 638-1999	(262) 638-1777
28	Southern Oaks Girls School, Wisconsin Department of Corrections	Town of Dover	21425B Spring Street	Jane Dier-Zimmel	(262) 878-6500	(262) 878-6250
30	Wisconsin Department of Natural Resources Service Center	Village of Sturtevant	9531 Rayne Road	- -	(262) 884-2300	(262) 884-2306
Federal—U.S. Post Offices						
31	Burlington	City of Burlington	100 S. Pine Street	Alan Krysiak	(262) 763 6300	(262) 763-2268
32	Caledonia	Village of Caledonia	11510 County Road G.	Judy Grove	(262) 835-1774	- -
33	Franksville	Village of Caledonia	3319 Roberts Street	John Pucely	(262) 886-3664	(262) 886-2825
34	Four Mile Station	Village of Caledonia	2635 Four Mile Road	- -	(262) 681-7866	(262) 681-9732
35	Kansasville	Town of Dover	3825 S. Beaumont Avenue	Charles Vines	(262) 878-1032	- -
36	Racine	City of Racine	603 S. Main Street	Ronald A. Farnsworth	(262) 632-1921	(262) 632-0454
37	West Racine	City of Racine	1300 Perry Avenue	- -	(262) 632-1008	(262) 632-3014
38	Rochester	Village of Rochester	208 W. Main Street	Michele L. Gronke	(262) 534-6100	- -
39	Sturtevant	Village of Sturtevant	2849 Wisconsin Street	Mary B. Olsen	(262) 886-4104	(262) 886-3948
40	Union Grove	Village of Union Grove	830 Main Street	Wayne C. Litza	(262) 878-1100	(262) 878-0201
41	Waterford	Village of Waterford	218 N. Milwaukee Street	Richard H. Gramza	(262) 534-3255	(262) 534-3091
Federal—Other Facilities						
27	Social Security Administration	City of Racine	4020 Durand Avenue	- -	(262) 554-4089	- -
29	U.S. Army Corps of Engineers	Village of Sturtevant	1855 Wisconsin Avenue	- -	(262) 884-3011	- -

Table D-3 (continued)

Identification Number[a]	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
Public Libraries						
42	Burlington Public Library	City of Burlington	166 E. Jefferson Street	- -	(262) 342-1130	- -
43	Graham Public Library	Village of Union Grove	1215 Main Street	- -	(262) 878-2910	- -
44	Racine Public Library	City of Racine	75 7th Street	Jessica MacPhail	(262) 636-9170	- -
45	Rochester Public Library	Village of Rochester	208 W. Spring Street	- -	(262)-534-3533	(262)-534-3533
46	Waterford Library	Village of Waterford	123 N. River Street	Pam Belden	(262) 534-3988	(262) 534-9624
47	Lakeshores Libraries Main Office	Village of Waterford	106 W. Main Street	Bernie Bellin	(262) 514-4500	(262) 514-4544

[a]*Identification number on Map 22.*

Source: Racine County Office of Emergency Management and SEWRPC.

Table D-4

HOSPITALS AND MAJOR CLINICS

Identification Number[a]	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
1	All Saints Healthcare—St. Luke's Hospital	City of Racine	1320 Wisconsin Avenue	- -	(262) 687-4011	- -
2	All Saints Healthcare—St. Mary's Medical Center	City of Racine	3801 Spring Street	- -	(262) 687-4011	- -
3	Aurora Health Care—Memorial Hospital of Burlington	City of Burlington	252 McHenry Street	- -	(262) 767-6000	(262) 767-6380
4	All Saints Healthcare—Racine Family Medical Center	City of Racine	1320 Wisconsin Avenue	- -	(262) 687-4011	- -
5	All Saints Healthcare—St. Luke's Health Pavilion	City of Racine	3821 Spring Street	- -	(262) 687-3160	- -
6	Aurora Health Center	City of Burlington	248 McHenry Street	- -	(262) 767-8000	(262) 767-6463
7	Aurora Health Center	City of Burlington	300 McCanna Parkway	- -	(262) 767-7000	(262) 767-7152
8	Aurora Health Center	Village of Caledonia	5333 Douglas Avenue	- -	(262) 752-2100	(262) 752-2122
9	Aurora Health Center	Village of Mt. Pleasant	8348 Washington Avenue	- -	(262) 884-4000	(262) 884-4177
10	Aurora Health Center	Village of Mt. Pleasant	8400 Washington Avenue	- -	(262) 321-3000	(262) 321-3011
11	Aurora Health Center	Village of Union Grove	4320 67th Drive	- -	(262) 878-1211	(262) 878-1270
12	Aurora Health Center	Village of Waterford	818 Forrest Lane	- -	(262) 514-3700	(262) 514-3865
13	Blood Center of Southeastern Wisconsin	Village of Mt. Pleasant	1120 S. Sunnyslope Road	- -	(262) 877-4376	- -
14	Caledonia/Mt. Pleasant Health Department	Village of Caledonia	10005 Northwestern Avenue	- -	(262) 835-6429	(262) 835-6433
15	Lakeview NeuroRehabilitation Center	Town of Dover	1701 Sharp Road	- -	(262) 534-7297	(262) 534-7257
16	Pro Health Care Medical Clinic	Village of Rochester	210 S. Milgate Drive	- -	(262) 514-8888	- -
17	Racine Community Care Center	City of Racine	2405 Northwestern Avenue	- -	(262) 635-6411	- -
18	Racine Health Department	City of Racine	730 Washington Avenue	- -	(262) 636-9201	- -
19	Union Grove Community Health Center	Village of Union Grove	1120 Main Street	- -	(262) 878-4424	- -
20	Wheaton Franciscan—All Saints Dialysis East	City of Racine	818 6th Street	- -	(262) 687-6363	- -
21	Wheaton Franciscan—All Saints Dialysis West	Village of Mt. Pleasant	1139 Warwick Way	- -	(262) 687-7551	- -
22	Wheaton Franciscan Medical Group—Bankers Roas	Village of Mt. Pleasant	6232 Bankers Road	- -	(262) 687-7606	- -
23	Wheaton Franciscan—Main Street	City of Racine	1 Main Street	- -	(262) 687-6100	(262) 687-6992
24	Wheaton Franciscan—Four Mile Road	Village of Caledonia	2408 Four Mile Road	- -	(262) 687-5995	(262) 687-5990
25	Wheaton Franciscan—Union Grove	Village of Union Grove	1120 Main Street	- -	(262) 878-4424	- -
26	Western Racine County Health Department	City of Burlington	156 E. State Street	Cheryl Mazmanian	(262) 763-4930	(262) 763-4928

[a]*Identification number on Map 25.*

Source: Racine County Office of Emergency Management and SEWRPC.

Table D-5

HEALTH DEPARTMENTS

Identification Number[a]	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
14	Caledonia/Mt. Pleasant Health Department[b]	Village of Caledonia	10005 Northwestern Avenue	Margaret Gesner	(262) 835-6429	(262) 835-6433
18	City of Racine Health Department[c]	City of Racine	730 Washington Avenue	Marcia Fernholz	(262) 636-9201	- -
26	Western Racine County Health Department[d]	City of Burlington	156 E. State Street	Cheryl Mazmanian	(262) 763-4930 or (800) 688-4930	(262) 763-4925

[a] *Identification number on Map 25.*

[b] *The Caledonia/Mt. Pleasant Health Department Serves the Villages of Caledonia, Mt. Pleasant, North Bay, and Sturtevant.*

[c] *The City of Racine Health Department serves the City of Racine and the Villages of Elmwood Park and Wind Point.*

[d] *The Western Racine County Health Department serves the City of Burlington; the Villages of Rochester, Union Grove, and Waterford; and the Towns of Burlington, Dover, Norway, Raymond, Waterford, and Yorkville.*

Source: Racine County Office of Emergency Management and SEWRPC.

Table D-6

CHILD CARE CENTERS WITH A CAPACITY OF 20 OR MORE CHILDREN

Identification Number[a]	Facility Name	Community	Address	Class[b]	Capacity
1	Divine Child Children's Center II (St. John Divine Episcopal Church)	City of Burlington	216 E. Chandler Boulevard	Group	20
2	In His Arms Preschool	City of Burlington	417 S. Kane Street	Group	50
3	Lifetime Learners Montessori School	City of Burlington	257 Kendall Street	Group	24
4	Noah's Ark Nursery School	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	61
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	R/K CAA Head Start Burlington Site	City of Burlington	209 Wainwright Avenue	Group	23
10	Atonement Lutheran Child Care	City of Racine	2915 Wright Avenue	Group	90
11	Busy Bee's Child Care Center LLC	City of Racine	1143 College Avenue	Group	30
12	Camp Cool Waters – YMCA	City of Racine	725 Lake Avenue	Camp	30
13	Care Bear Childcare Center	City of Racine	1300 Douglas Avenue	Group	22
14	Child Harbor Learning Center	City of Racine	703 Washington Avenue	Group	92
15	Child Universe Day Care Center	City of Racine	1015 Washington Avenue	Group	50
16	Christ Church Cc/Sunshine Mountain Preschool	City of Racine	5109 Washington Avenue	Group	97
17	EV United Methodist Mothers Day Out	City of Racine	212 11th Street	Group	89
18	Gateway Tech Col Early Childhood Lab	City of Racine	901 Lake Avenue	Group	70
19	Growing Place Day Care Center	City of Racine	725 High Street	Group	35
20	Holy Communion Preschool Center	City of Racine	2000 W. 6th Street	Group	34
21	Innovative Child Care Center I	City of Racine	1448 Geneva Street	Group	44
22	Jack & Jill Day Care Center	City of Racine	1650 Russet Street	Group	65
23	Kiddie Land CC & Learning Center, LLC	City of Racine	2510 Douglas Avenue	Group	25
24	Kindercare Learning Ctrs-3 Mile Road	City of Racine	700 3 Mile Road	Group	134
25	Little Angels Educational Center	City of Racine	522 N. Memorial Drive	Group	64
26	Little Lamb Nursery	City of Racine	725 High Street	Group	24
27	Love Has No Boundaries Child Care/Learning Center	City of Racine	702 High Street	Group	38
28	Next Generation Now	City of Racine	1220 Mound Avenue	Group	159
29	North Side Preschool	City of Racine	3825 Erie Street	Group	44
30	Pitter Patter Preschool Racine	City of Racine	3034 Kentucky Street	Group	48
31	R/K CAA Head Start Center Grand Avenue	City of Racine	1032 Grand Avenue	Group	260
32	RMI Children of Excellence Center	City of Racine	2200 Mt Pleasant Street	Group	20
33	Small World Montessori School	City of Racine	1008 High Street	Group	50
34	Special Kiddz	City of Racine	1322 Washington Avenue	Group	26
35	St Edward's Child Development Center	City of Racine	1430 Grove Avenue	Group	81
36	St Paul Child Development Center	City of Racine	1120 Grand Avenue	Group	50
37	X-Cite – Racine	City of Racine	2052 Douglas Avenue	Group	49
38	YMCA SACC - 21St Century	City of Racine	1220 Mound Avenue	Group	35
39	Y's Kids Red Apple	City of Racine	914 St Patrick Street	Group	25
40	YWCA Kids Klub Fine Arts	City of Racine	815 Dekoven Avenue	Group	25
41	Camp Cool Waters - Crawford Park	Village of Caledonia	5199 Chester Lane	Camp	30
42	Little City Kids, LLC	Village of Caledonia	10127 Northwestern Avenue, Franksville	Group	51
43	Oakwood Discovery Stage, Inc.	Village of Caledonia	13207 CTH G	Group	110
44	Prince Of Peace Preschool/Day Care	Village of Caledonia	4340 Six Mile Road	Group	35
45	SC Johnson Child Care Learning Center	Village of Caledonia	3901 STH 31	Group	392

Table D-6 (continued)

Identification Number[a]	Facility Name	Community	Address	Class[b]	Capacity
46	Serendipity Preschool & Child Care	Village of Caledonia	4811 Six Mile Road	Group	85
47	TLC School Age Program Gifford	Village of Caledonia	8332 Northwestern Avenue	Group	92
48	YWCA Kids Klub North Park School	Village of Caledonia	4748 Elizabeth Street	Group	25
49	Camp Cool Waters Smolenski Park	Village of Mt. Pleasant	430 Stuart Road	Camp	30
50	Little Saints Child Care Center	Village of Mt. Pleasant	5625 Washington Avenue	Group	154
51	Mount Pleasant Renaissance School	Village of Mt. Pleasant	6150 Taylor Avenue	Group	84
52	R/K CAA Head Start Taylor Avenue	Village of Mt. Pleasant	6150 Taylor Avenue	Group	119
53	Racine Co Opportunity Center Sheridan	Village of Mt. Pleasant	4214 Sheridan Road	Group	100
54	Racine Cooperative Preschool	Village of Mt. Pleasant	2500 N Green Bay Road	Group	42
55	Rainbow Corner	Village of Mt. Pleasant	3015 Pritchard Drive	Group	37
56	TLC Childcare Center	Village of Mt. Pleasant	9605 Spring Street	Group	120
57	Y's Kids Westridge School	Village of Mt. Pleasant	1347 Emmertsen Road	Group	32
58	Kids Town USA CCC, Inc.	Village of Sturtevant	9500 Durand Avenue	Group	71
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	54
61	Total Learning Child Care, Inc.	Village of Union Grove	1408 15th Avenue	Group	40
62	Western Racine County Headstart	Village of Union Grove	1100 Main Street	Group	25
63	Homestead Day Care, LCC-Woodfield Elementary	Village of Waterford	905 Barnes Drove	Group	30
64	It's All About Kids @ Trailside Elementary	Village of Waterford	615 N. Milwaukee Street	Group	40
65	It's All About Kids Child Care Center	Village of Waterford	237 N. Milwaukee Street	Group	38
66	It's All About Kids Child Care	Village of Waterford	401 N. Milwaukee Street	Group	24
67	Little Thinkers-W. Main Street	Village of Waterford	817 W. Main Street	Group	56
68	Rainbow Preschool St Peters Lutheran Church	Village of Waterford	145 S. 6th Street	Group	36
69	The Way To Grow Preschool	Village of Waterford	455 S. Jefferson Street	Group	20
70	Today's Child Learning Center, Inc.	Village of Waterford	817 W. Main Street	Group	34
71	Today's Child Learning Center, Inc.	Village of Waterford	214 S. Water Street	Group	65
72	Little Thinkers-Spring Street	Town of Dover	21425 Spring Street	Group	71
73	Lakeview Elementary School SACC	Town of Norway	26335 Fries Lane, Wind Lake	Group	56
74	"Little V.I.P." Child Care	Town of Norway	6710 S. Loomis Road, Wind Lake	Group	45
75	Lots For Tots Early Educational Center	Town of Norway	7345 S. Loomis Road, Wind Lake	Group	50
76	Mustard Seed Preschool	Town of Norway	6321 Heg Park Road, Wind Lake	Group	24
77	Raymond Country Preschool	Town of Raymond	8217 CTH G, Franksville	Group	20
78	Kids Country Child Care, LLC	Town of Raymond	3862 N. Raynor Avenue	Group	27
79	Homestead Day Care, LLC II	Town of Rochester[c]	29200-B Evergreen Drive	Group	35
80	Homestead Day Care, LLC	Town of Waterford	8221 Big Bend Road	Group	23
81	Homestead Day Care, LLC-Washington	Town of Waterford	8937 Big Bend Road	Group	20
82	Kids Korner Prschool & School Age Programss	Town of Yorkville	17645 Old Yorkville Road	Group	45
83	Denaene's Land of Love	Village of Elmwood Park	3554 Taylor Avenue	Group	50

[a] *Identification number corresponds to digital file data for Map 27.*

[b] *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.*

[c] *The Town of Rochester and the Village of Rochester were consolidated into the Village of Rochester in December 2008.*

Source: Wisconsin Division of Health and Family Services, Racine County, and SEWRPC.

Table D-7

NURSING HOMES, ADULT DAY CARE CENTERS, AND ASSISTED LIVING FACILITIES

Identification Number[a]	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
Nursing Homes						
1	Becker Shoop Center	Village of Mt. Pleasant	6101 16th Street	Carole McCarthy	(262) 637-7486	(262) 637-7451
2	Lincoln Village Convalescent Center	City of Racine	1700 C.A. Becker Drive	Laurel Gerber	(262) 637-9751	(262) 637-9329
3	Mt. Carmel Medical and Rehabilitation Center	City of Burlington	677 E. State Street	Thomas Skirren	(262) 763-9531	(262) 763-7579
4	Oak Ridge Care Center, Inc.	Village of Union Grove	1400 8th Avenue	Bonnie Christensen	(262) 878-2788	(262) 878-4456
5	Ridgewood Health Care Center	Village of Mt. Pleasant	5455 Durand Avenue	Frances Petrick	(262) 554-6440	(262) 554-2211
6	Wheaton Franciscan Healthcare—Lakeshore Manor	City of Racine	1320 Wisconsin Avenue	Bernadine Flores	(262) 687-2241	(262) 687-2488
7	Wisconsin Veterans Home—Boland Hall	Town of Dover	21425 E. String Street	Patrick Shaughnessy	(262) 878-6702	(262) 878-6758
Adult Day Care Complexes						
8	Lincoln Lutheran Adult Day Care Services	City of Racine	2000 Domanik Road	Ruth Stauersbol	(262) 637-6531	- -
9	Personally Yours Elder Care, LLC	Town of Norway	4525 Gunderson Road	Melinda Dolphin	(262) 895-6666	- -
10	Abundant Blessings Day Services, LLC	Town of Yorkville	2308 Raymond Avenue	Renee Sparks	(262) 930-5176	- -
Community-Based Residential Facilities						
11	Crabtree House	City of Burlington	224 Edward Street	Mack Crabtree	(262) 763-3315	- -
12	Hil Hilside	City of Burlington	373 Church Street	Tracy Noble	(262) 767-2897	- -
13	Hil Kendric Home	City of Burlington	265 N. Kendrick Avenue	Tracy Noble	(262) 767-7411	- -
14	Pine Brook Pointe	City of Burlington	1001 S. Pine Street	Mary Pearce	(262) 767-1516	- -
15	Genesis Chatham House	City of Racine	1636 Chatham Street	Pauline Ortloff	(262) 637-2679	- -
16	Genesis Durand House	City of Racine	4606-8 Durand Avenue	- -	(262) 554-7728	- -
17	Genesis Spring Place Manor	City of Racine	1725-27 Spring Place	Pauline Ortloff	(262) 633-3889	- -
18	Genesis St. Clair House	City of Racine	4107-09 St. Clair Street	Pauline Ortloff	(262) 681-3202	- -
19	Genesis Taylor Home	City of Racine	3131 Taylor Avenue	Pauline Ortloff	(262) 554-5952	- -
20	Prospect Heights Community Living C	City of Racine	2015 Prospect Street	Ann Wirtz	(262) 898-1029	- -
21	Stafford Manor, LLC	City of Racine	4208 Marquette Drive	Scott Esser	(262) 639-1846	- -
22	Serenity Terrace, LLC	Village of Caledonia	6406 W. Johnson Avenue	Vivian Degrave	(262) 681-6562	- -
23	St. Monica's Senior Citizens Home	Village of Caledonia	3920 N. Green Bay Road	Irene Hanika	(262) 639-5050	- -
24	Villa St. Anna	Village of Caledonia	5737 Erie Street	Stephen Kuklin	(262) 722-5100	- -
25	Willowgreen	Village of Caledonia	4208 Marquette Drive	Scott Chappell	(262) 681-7210	- -
26	Harbor House Racine	Village of Mt. Pleasant	6109 Braun Road	- -	(262) 554-6765	- -

Table D-7 (continued)

Identification Number[a]	Facility Name	Community	Address	Contact Name	Telephone Number	Fax Number
Community-Based Residential Facilities (continued)						
27	Harmony of Racine	Village of Mt. Pleasant	8600 Corporate Drive	Sarah Searles	(262) 884-8097	- -
28	New Beginnings Grove Homes II	Village of Mt. Pleasant	3509 S. Green Bay Road	Nan Lentz	(262) 554-9566	- -
29	New Beginnings Grove Homes IV	Village of Mt. Pleasant	6545 Lincolnshire Drive	Nan Lentz	(262) 552-2955	- -
30	New Beginnings Grove Homes V	Village of Mt. Pleasant	1449 N. Green Bay Road	Nan Lentz	(262) 633-9920	- -
31	Newman Manor II	Village of Mt. Pleasant	4604 Spring Street	Josie M. Garcia	(262) 488-1300	- -
32	Shepherds Home & School	Village of Union Grove	1805 15th Avenue	William Amstutz	(262) 878-5620	- -
33	Timber Oaks	Village of Union Grove	1390 8th Avenue	Bruce Barrett	(262) 878-5620	- -
34	Hil Fox Mead Group Home	Village of Waterford	516 Fox Mead Crossing	Tracy Noble	(262) 514-3500	- -
35	Green Hills	Town of Burlington	8339 Fishman Road	Mack Crabtree	(262) 539-4119	- -
36	Arbor View Communities	Town of Burlington	34201 Arbor Lane	Carolyn Wheeler	(262) 539-2728	- -
37	Hil Dover Home	Town of Dover	23310 County Line Road	- -	(262) 569-5520	- -
38	Lakeview Rehabilitation Center	Town of Dover	1701 Sharp Road	Steve Pietroske	(262) 534-7297	- -
39	Wisconsin Veterans Home—Shemanske	Town of Dover	21425-C E. Spring Street	Patrick Shaughnessy	(262) 878-6752	- -
40	Wisconsin Veterans Home—Fairchild	Town of Dover	21425-D E. Spring Street	Patrick Shaughnessy	(262) 878-6752	- -
41	Affinity Health Care, LLC	Town of Norway	8208 Racine Avenue, Wind Lake	Paula Heyer	(262) 895-3052	- -
42	Eagle House	Town of Yorkville	807 53rd Drive	Angela Anderson	(262) 835-8370	- -
43	Lakeview Waterford House	Town of Waterford	5310 Buena Park Road	- -	(262) 534-4864	- -
Residential Care Apartment Complexes						
44	Bay Pointe at the Atrium	City of Racine	3900 N. Main Street	Pam Lidington	(262) 639-1100	- -
45	Home Harbor	City of Racine	1600 Ohio Street	Jennifer Stratton	(262) 619-0000	(866) 278-7063
46	Harmony Commons Racine	Village of Mt. Pleasant	8500 Corporate Drive	Sarah Searles	(262) 833-0810	- -
47	Waterford Senior Living	Village of Waterford	301 S. 6th Street	Meghan Giese	(262) 534-4800	- -
48	Wisconsin Veterans Home—Gates Hall	Town of Dover	21425 E. Spring Street	Patrick Shaughnessy	(262) 878-6752	- -

NOTE: Adult family homes (which serve fewer than five persons) as defined by the Wisconsin Department of Health and Family Services are not included.

[a]*Identification number on Map 26.*

Source: Wisconsin Department of Health and Family 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[a]	SEWRPC	In progress

Land Use Plans		
Community	Plans Prepared by	Date
Village of Caledonia	Planning and Design Institute (PDI)	May 2006
Village of Mt. Pleasant	Village of Mt. Pleasant, Crispell-Snyder, Inc., and Russell Knetzger	January 2003
Village of Rochester[b]	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	May 2004
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	May 1995

Park and Open Space Plans		
Community	Plans Prepared by	Date
City of Burlington	Mead and Hunt Inc.	November 1987
City of Racine	SEWRPC	July 2003
Village of Caledonia	Village of Caledonia	2007
Village of Mt. Pleasant	SEWRPC	April 2003
Village of Union Grove	SEWRPC	July 2003
Village of Waterford	Village of Waterford	2004
Town of Norway	Michael V. Raap, Cullinane Design	January 1990
Town of Waterford	SEWRPC	January 1990
Town of Raymond	Racine County	January 1979

[a]*Multi-jurisdictional covering all of Racine County.*

[b]*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

EXAMPLE OF MATERIAL PUBLISHED AS PART OF CITY OF BROOKFIELD INFORMATIONAL AND EDUCATIONAL EFFORTS DIRECTED TOWARD SOLVING LOCAL HOMEOWNERS' FLOODING AND SANITARY SEWER BACKUP PROBLEMS

CITY OF BROOKFIELD

STORMWATER FLOODING & SANITARY SEWER BACKUPS

CAUSES, PREVENTIONS AND CLEAN-UP TIPS

JUNE 1999

IMPORTANT NOTICE OF DISCLAIMER

The material contained in this brochure is offered for informational purposes only. The City does not warrant or guarantee the effectiveness of any of the alternatives discussed. Individual properties must be assessed on a case by case basis by the property owner and appropriate professionals in the area of flood proofing.

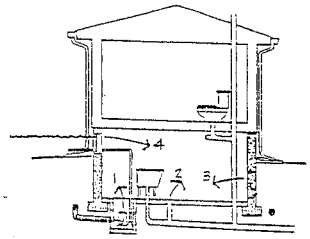
Reference: *Protecting Your Home from Flood Damage. Revised.1996. 2nd Edition.* Federal Emergency Management Agency

2

CAUSES

There are four ways water can get into your basement:

1. Through the drainage tile system's sump.
2. Backing up through the sanitary sewer lines under the house.
3. Seeping through cracks in the walls and floors.
4. Over the surface of the ground through windows and doorways.

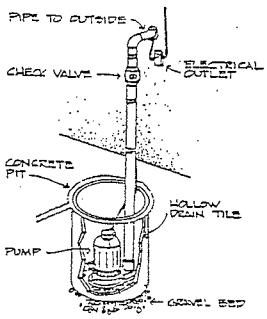


1. SUMP BACKUP

The sump in your drainage system is directly connected to the drain tiles, and therefore to the water in the ground outside your basement walls. A sump will back up when the pump fails, when the power fails, or when the pump is overloaded.

The first condition can be prevented by proper pump maintenance and operation according to the manufacturer's owner's manual. This includes periodic cleaning of the debris screen, even during high water. A clogged intake is as bad as having no pump.

One of the most common causes of basement flooding is not pump failure, but electrical failure. Power losses often accompany severe storms. Backup systems with batteries or generators are available commercially and experienced flood victims will tell you they are well worth the cost.



******SAFETY NOTE******

Be sure your backup generator exhausts to the outdoors. Just like your car engine, a gasoline powered generator creates deadly carbon monoxide gas.

****

Pump overload occurs when there is more groundwater coming into the drain tiles than the pump can handle. There are two methods to prevent this. One method is to have a second or even a third pump on hand. Each pump should have its own outflow pipe. The second method is to make sure the outflow pipes drain on top of the ground, well away from the house. The City of Brookfield does not allow sump pumps to drain into the municipal sanitary sewer system because it overloads the system pumps or treatment facilities.

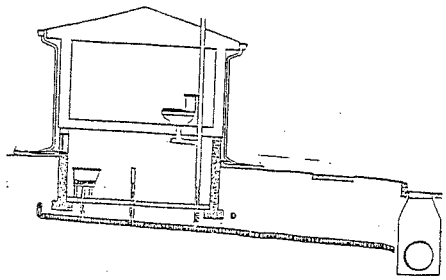
2. SEWER BACKUP

A sanitary sewer backup occurs when the municipal system is overloaded with clear water from inflow and infiltration. There are four ways to protect against this type of backup: install a standpipe, a plug, a back water valve, or an overhead/hung sewer. High volumes of clear water overload the system and backups occur in basements.

STANDPIPE

A pipe inserted or screwed into the floor drain will allow the sewer backup to seek its own level without flowing into your basement. The pipe need only be tall enough to be higher than street level. As water rises, it will flow out of the sanitary sewer manholes into the street, rather than out of the floor drain.

A standpipe may be more dependable than a plug that could pop out. However, one shortcoming of a standpipe is that one must be home to install it.



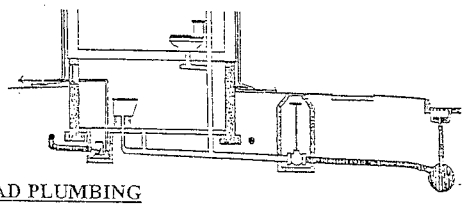
PLUG

Since the basement floor drain in the lowest point in your house, it is the first place of entry for backed up sewage. The drain can be closed with a rubber or wooden plug during heavy rains. Some drains are threaded for a screw-in plug. Plugs can usually be brought at a hardware or plumbing supply store. This is the simplest and cheapest way to stop sewer backup. However, the sewer could backup into the next higher opening, probably a sink drain or toilet.

VALVE

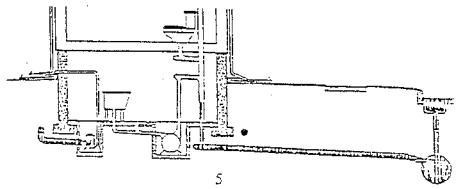
A backwater valve installed in the sewer line is more expensive than a plug or a standpipe. However, there are several advantages. Valves operate automatically, are a permanent part of your system and prevent the sewer from backing up into the basement.

A backwater valve may require periodic maintenance, and therefore must have an access point so it can be cleaned or repaired.



OVERHEAD PLUMBING

Your plumbing can be rebuilt so that the basement sewage drains to a sump. Sewage is then pumped up to the height of the sewer system's manhole. From this height, it flows by gravity into the system. The sewer system will back up onto the street before it could get high enough to back up into your house. Just as with a sump pump, pumps for overhead plumbing require a back up system in case of power failure.



3. SEEPAGE

Whether from heavy local rains and water standing in your yard, broken or plugged drain tiles or surface flooding, the ground around your house can become saturated with water. If there are cracks in your walls or floors, saturated ground will allow seepage of water into your basement.

The best ways to deal with seepage are to ensure that walls are waterproof and to relieve the groundwater through subsurface drain tiles. Cracks can be repaired and the walls can be waterproofed from inside or outside. Waterproofing on the outside of the wall is more effective because groundwater pressure forces the sealer into the foundation. The best technique is to dig a ditch around the basement wall and apply a commercial sealant. Drain tile systems have proven very effective in dealing with high groundwater. Water is kept away from the walls by draining down to the drain tiles. Water flows to the sump and is pumped out. Therefore, one of the best protections against seepage is to ensure you have a drain system and sump pump that work properly.

4. SURFACE STORMWATER FLOODING

One of the most serious types of damage to your basement will come from flood waters on top of the ground. This is caused from overflow of a nearby stream, or if your building is located in a low spot, from the collection of runoff from heavy rains.

One of the first responses to this sort of flooding is to seal the openings, such as the windows. This can be done by replacing windows with glass blocks or raising window wells above the water level. A low wall can be built around the stairwells.

The biggest problem with closing the direct openings to your basement is that water will still stand on the ground next to your house and will likely seep down along the walls. However, unlike other seepage problems, surface flooding will deliver more water than your sump pumps can handle. Split levels, bi-levels and houses with the basement floor no more than three or four feet below ground level are probably strong enough to deal with this, especially if the walls are built of concrete. However, if the difference in flood heights and the floor of the basement is greater than three feet and the wall is made of block or masonry, the most effective method of preventing water from reaching the walls is through proper grading or creating swales to divert water away from the home.

Remember to be a considerate neighbor and make sure your actions do not interfere with drainage on adjacent properties.

PREVENTIONS

Once the source of water has been determined, the following information may be used to remedy the problems. Consult a professional in your area for assistance.

Sump Pumps

Sump: A hole designed to collect water.

Sump Pump: Used to remove water from basements and other low areas.

A sump consists of a perforated liner set in a hole lined with coarse stone. The stone helps collect water and filter out fine particles. A filter cloth may extend the life of the sump by preventing it from silting up. Perforated water-collection pipes draining to the sump make it more effective.

A sump pump is usually either the submersible type with a motor and impeller under water, or the pedestal type with the impeller under water and motor on top. Both types have an automatic switch. Both types will work until the electricity is shorted by the water. With the submersible type, this happens at the end of the electrical supply wire. With the pedestal type, it happens when the water reaches the motor on top of the pedestal. Both types should have a one-way valve that will not allow the water to flow back into the discharge hose or pipe.

Caution:

Electricity and water are a hazardous combination. The sump pump must be wired into a grounded receptacle that only allows one plug. A second nearby outlet should be equipped with a ground fault circuit interrupter (GFCI). This second outlet should be handy so that people working near the sump pump will not be tempted to unplug it to use the outlet, thereby placing themselves in danger.

Installing a Floor Drain Plug

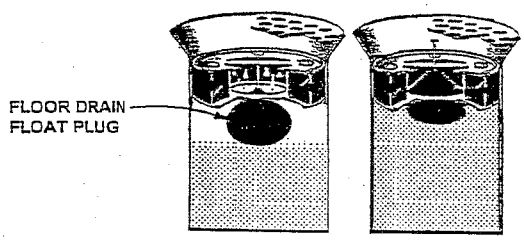
The easiest way to stop sewer backup is to plug the opening where the backup can first enter the house. The sanitary system's lowest opening in the house is the floor drain. Commercial plugs are available that can be placed in the floor drain below the grate. Bolts on metal end pieces are tightened, causing a rubber gasket to expand and seal the plug in the pipe.

A plug not only stops water from entering the house but it prevents it from leaving the house as well. Because of this, it may be best to put the plug in place only during heavy rains.

You may install a plug with a float. The float allows water to drain out of the basement. When the sewer backs up, the float rises and plugs the drain. A float plug permanently installed will not interfere with the floor drain's normal operation.

Caution:

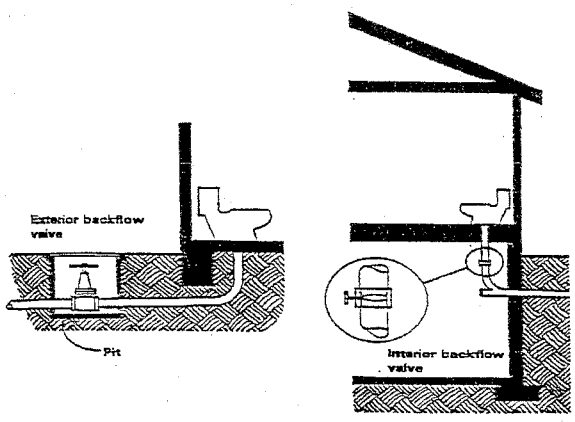
- → Float plugs may be blocked open by even small amounts of debris.
- → Floor drain plugs do not stop backup from coming out of the next lowest opening, for example a laundry tub or basement toilet.
- → In older houses the sewer lines under the basement floor may be clay tile. A build up of water pressure can damage the sewer lines.



Certain repairs are not permitted for substantially damaged buildings. Check with your local building official or floodplain administrator before beginning repairs.

Installing a Backflow Valve

The sewage/septic system is designed to remove sewage from a house. If flood water enters the system, the sewage can backup and enter your home. To help prevent this, install a backflow valve in the sewer line. The backflow valve is opened by the flow of sewage exiting your home, but closes when the flow reverses preventing sewage from backing up into your home. Check with your local building official for permitting and code requirements. It is recommended that this work be done by a qualified, licensed plumbing contractor.



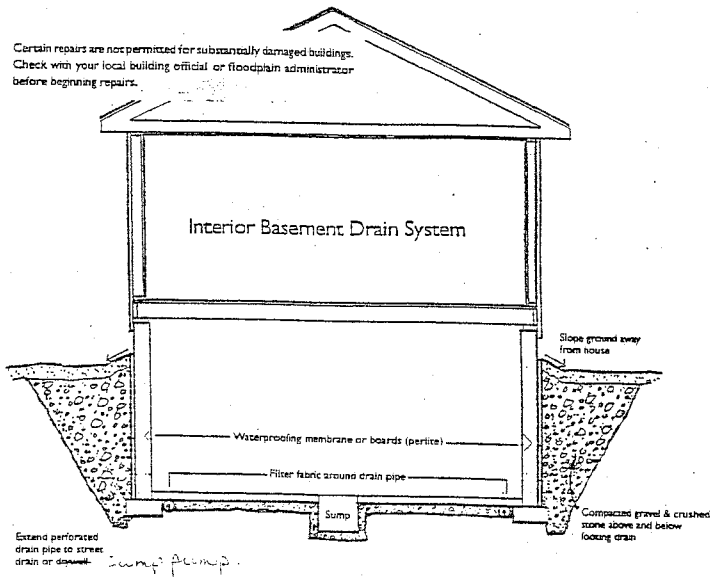
Certain repairs are not permitted for substantially damaged buildings. Check with your local building official or floodplain administrator before beginning repairs.

Installing an Interior Foundation Drainage System

Some homes need a basement foundation drain system to collect and carry away groundwater. This may involve cutting the floor slab, excavating a trench and installing drains along the inside perimeter of all footings. These drains should slope to a low point from which a single line can carry the water away from the house, or to a sump pump.

The basement drainage retrofit depicted below is a simple, generic system utilizing perforated drain pipe, wrapped in filter fabric, and imbedded in crushed stone. Other, more sophisticated systems, some of which are patented, are available to correct serious basement drainage problems. Consult an architect, engineer or licensed specialty contractor for specific information and recommendations regarding system alternatives.

Certain repairs are not permitted for substantially damaged buildings. Check with your local building official or floodplain administrator before beginning repairs.

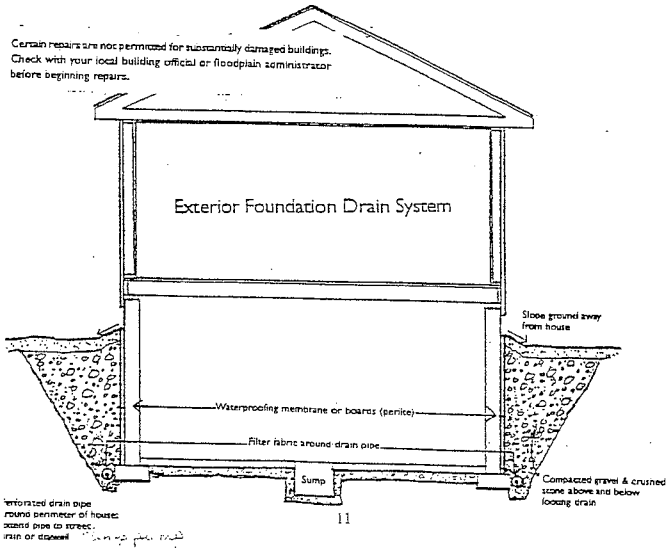


Installing an Exterior Foundation Drainage System

All houses need a well-developed drain system to collect and carry away groundwaters. This means establishing drains around all footings with perforated pipe surrounded by crushed stone backfill to drain water that seeps through the ground. These drains should slope to a low point from which a single line should carry the water away from the house, to a sump pump which discharges to a storm sewer, or to the ground surface away from the house.

A 4" deep bed of gravel under the lab should allow water to run to a central collection point where there is a sump pump with a continuous power source. If you have a lot of water under the slab, you may need to install perforated pipe drain lines to carry the water to the sump pump.

As with other retrofitting systems, a sealed house will usually need a sewer backflow protection device.



Sealing Openings In Walls

If your house is being flooded by flowing waters entering through windows or doors, you can temporarily close up those openings during a flood and keep that water out.

Metal or wooden shields can be made to fit the openings. These can then be secured to the openings with bolts or slid into special positioning channels to stop the flow of water. On the inside, the shields need to have a special rubber gasket or they should be installed with a bead of caulking to make them water tight. Sandbags can also be stacked in doorways or window wells and vents to make the openings water resistant.

NOTE: Houses should be shielded from floodwater entry, but generally shielded not more than 1 ½ feet. Exterior water deeper than this could push the walls in if there is no water inside to push back with equal force.

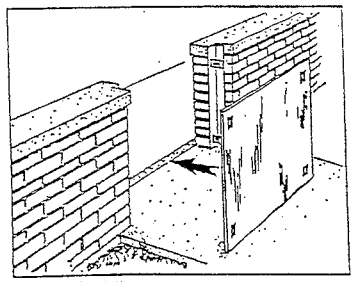
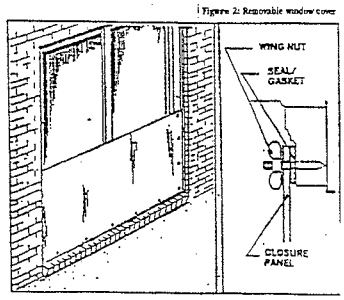


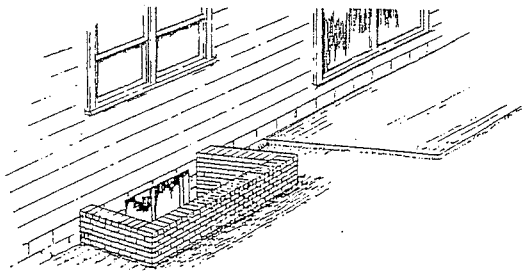
Figure 1: Bolt-on flood shield

Figure 2: Removable window cover

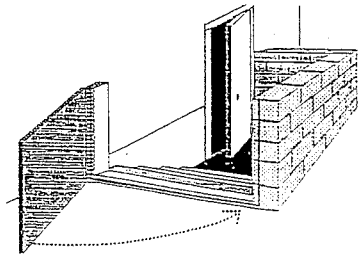


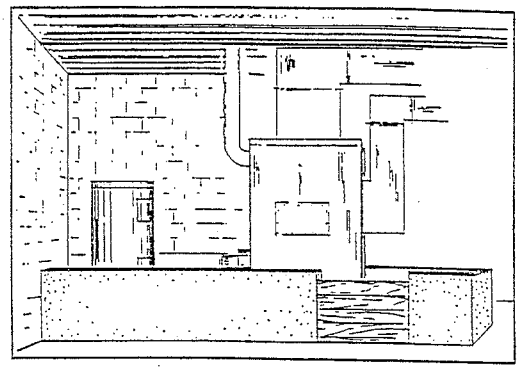
Installing an Exterior Floodwall

An exterior floodwall can protect a window well or stair against low level flash flooding. Walls should be supported by and securely tied into a footing so that they will not be undercut by scouring. Flood walls can be constructed of masonry or concrete. It is important to understand the flood situation you are working with and your soil conditions in order to properly evaluate if a flood wall is the right solution for you. Flood walls are not effective when the ground becomes saturated.

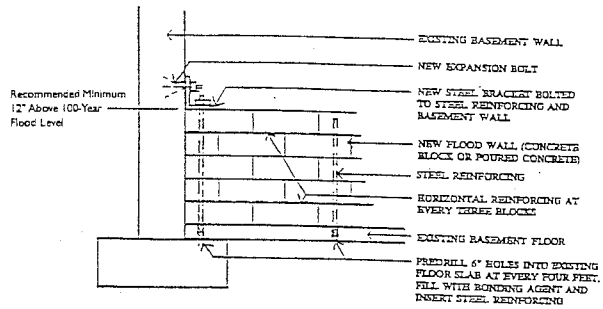


Construct a watertight masonry flood wall around the perimeter of the opening. The wall should not exceed three feet in height and must be constructed of properly reinforced poured concrete or sufficient concrete masonry units to prevent failure under flood conditions. Install proper footing and anchor to existing walls. Install a watertight, spring-loaded steel access door and watertight gaskets on sides and bottom of frame at any necessary opening. Be sure all work conforms to State and local building codes.

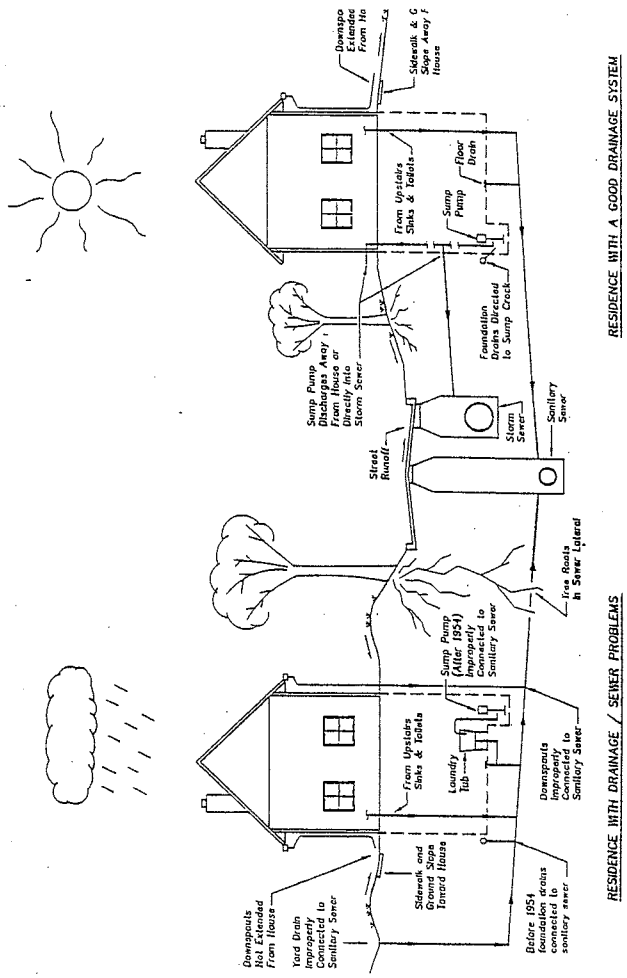




An interior flood wall can be built to accommodate low levels of flooding. The wall must enclose the utilities and be built 1 foot above the 100 year flood elevation. The wall must be constructed of either concrete blocks or poured concrete and reinforced with steel rods in order to be able to resist the pressure of the floodwaters. It is important to anchor the new wall into the existing basement wall and floor so that it is not pushed around by the floodwaters. For best protection, do not install gates which open into the enclosure.



Helpful Information on Maintaining a Dry Basement



CLEAN-UP TIPS

The most important thing to remember is to give your house plenty of time to dry! Rushing to rebuild before everything dries can cause many problems. The rule of thumb is, if it takes a week for visible moisture to disappear, it will take at least another week for unseen parts to dry. Here are some inexpensive measures you can take to make your recovery easier after the next flood.

UTILITIES

Electrical: Move the main breaker or fuse box and utility meters above the flood level for your house. Label each circuit. If the electrical code allows, raise the electrical outlets and switches above the flood level.

Equipment: If you plan to replace a flooded furnace, water heater, or air conditioner, install the new one on a higher floor. If your new air conditioner or heat pump will be outside, install it on a platform above your flood level. A water heater can be put anywhere near a hot water pipe. An updraft furnace in a basement can be replaced with a downdraft furnace on a floor above the flood protection level. Heavy appliances may be placed on raised platforms inside the house where the flood protection level is not too high. Make sure washers/dryers will not vibrate off the blocks or platform during use. A one or two foot waterproof floodwall around appliances will protect them from shallow flooding.

WALLS

Wash and disinfect the studs and sills if the wallboard and insulation were removed. If rebuilding, consider metal studs and sills as they are less damaged by water than wooden ones. Pressure-treated wood resists mildew and wood-eating insects but may swell when soaked. Warning: Some pressure-treated wood should not be used inside the house. It depends on the chemicals used to treat them. Ask your lumber company for consumer information that gives specific precautions.

WALLBOARD

If you install the wall board horizontally (four feet high), you'll only have to replace half the wall if the next flood is less than 4 feet deep.

Leave the wall open 1 inch above the sill. The baseboards will hide the gap, but all you have to do next floodtime is remove the baseboard and the wall cavity will drain freely and air will circulate better. (Not applicable if local code requires a fire wall).

Greenboard or other moisture-resistant wallboard may be more sturdy than regular wallboard, but replacement is required as it presents the same health hazards when soaked with floodwaters.

FLOORS

Particle board or plywood fall apart when wet for lengthy periods. Floor joists and some wood floors regain their shape when naturally dried. Use screws or screw nails on floors and stairs to minimize warping. Completely dry subflooring before laying new flooring or carpeting. Renail, then sand or place a new underlayment for a new floor.

PAINTS

Completely dry the surface before painting. This may take several weeks, but paint will peel if applied over a damp surface. Coat concrete surfaces with penetrating sealer for easier future cleanup. Coat water-stained areas with shellac or commercial stain killer first or the stains will bleed through the paint. Dryproofing requires thick plastic or rubberized sheeting. Waterproofing paints do not keep out floodwaters.

Windows

The best protection from high wind damage is boarding up all windows or installing hurricane shutters. Taping windows will not prevent storm breakage. To board up windows, cut plywood to fit all doors and windows. Label for quick pairing of coverings and openings. Store with the nails/fasteners for attachment.

Water Resistant Products

→ Concrete, concrete block, or glazed brick

→ Clay, concrete, or ceramic tile

→ Indoor-outdoor carpeting, synthetic backing (not fastened down)

→ Vinyl, terrazzo, or rubber floor covering, with waterproof adhesives

→ Metal doors and window frames

→ Polyester-epoxy paints (Warning: do not use mildew-resistant paint indoors as it contains a toxic ingredient).

→ Stone, slate, cast stone with waterproof mortar

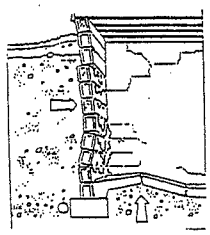
→ Mastic, silicone, polyurethane formed-in place flooring

→ Polystyrene plastic foam insulation

→ Water-resistant glue

Pumping Out a Flooded Basement

If your basement is flooded, don't rush to pump it out.



Water in the ground outside your house will still be pushing hard against the outside of your basement walls, and the water inside your basement faster than the water outside drains out of the ground, the outside pressure will be greater than the inside pressure, causing walls and floor to crack and possible collapse.

How to Safely Pump Water Out of your Basement

→ Never go into a flooded basement unless you are sure the electricity is off.
→ Start pumping the water out of the basement when floodwaters no longer cover the ground.
→ Don't use gasoline-powered pumps or generators indoors. Gasoline engines create deadly carbon monoxide exhaust fumes.
→ Pump the water level down 2 or 3 feet. Mark the level, and wait overnight.

→ Check the water level the next day. If the water level went back up over your mark, it is still too early to drain your basement. Wait 24 hours, then pump the water down 2 or 3 feet again. Mark the level and check it the next day.
→ When the water stops rising, pump down another 2 or 3 feet and wait overnight. Repeat steps 4 and 5 until all water is pumped out of the basement.

What to Do After Draining Your Basement

→ Disinfect the floors and walls to remove bacteria left from the floodwaters.
→ Before turning the power back on, check any electrical service that may have been damaged. Replace any wiring, switches, outlets that were wet during the flood.
→ Remove heating and air conditioning vents or registers as soon as possible and hose out the ductwork. Those ducts that were flooded will have mud and bacteria in them.
→ Check your water system for leaks in pipes that may have been moved.
→ Check your water supply to be certain it is not contaminated.
→ Check all other utilities and drains for damage from the floodwaters.

BROOKFIELD
Community Development Department 796-6646
2000 North Calhoun Road, Brookfield, WI 53005-5095 6/99

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Appendix G

HOMEOWNER DISASTER PREPARATION INFORMATION

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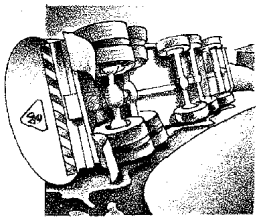
Your Family Disaster Supplies Kit

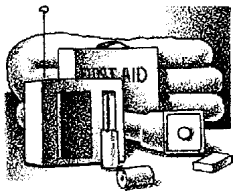
Disasters happen anytime and anywhere. And when disaster strikes, you may not have much time to respond.



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?



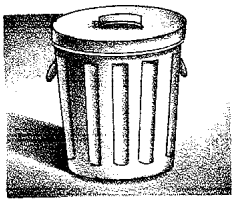
Your family will cope best by preparing for disaster *before* it strikes. One way to prepare is by assembling a Disaster Supplies Kit. Once disaster hits, you won't have time to shop or search for supplies. But if you've gathered supplies in advance, your family can endure an evacuation or home confinement.

To prepare your kit

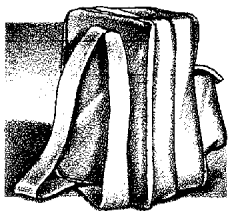
- Review the checklist in this brochure.
- Gather the supplies that are listed. You may need them if your family is confined at home.
- Place the supplies you'd most likely need for an evacuation in an easy-to-carry container. These supplies are listed with an asterisk (*).

SUPPLIES

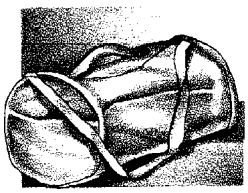
There are six basics you should stock in your home: water, food, first aid supplies, clothing and bedding, tools and emergency supplies and special items. Keep the items that you would most likely need during an evacuation in an easy-to-carry container—suggested items are marked with an asterisk (*). 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, granloa 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

- ❑ Mess kits, or paper cups, plates and plastic utensils*
- ❑ Emergency preparedness manual*
- ❑ Battery operated radio and extra batteries*
- ❑ Flashlight and extra batteries*
- ❑ Cash or traveler's checks, change*
- ❑ Non-electric can opener, utility knife*
- ❑ Fire extinguisher: small canister, ABC type
- ❑ Tube tent
- ❑ Pliers
- ❑ Tape
- ❑ Compass
- ❑ Matches in a waterproof container
- ❑ Aluminum foil
- ❑ Plastic storage containers
- ❑ Signal flare
- ❑ Paper, pencil
- ❑ Needles, thread
- ❑ Medicine dropper
- ❑ Shut-off wrench, to turn off household gas and water
- ❑ Whistle
- ❑ Plastic sheeting
- ❑ Map of the area (for locating shelters)

Sanitation

- ❑ Toilet paper, towelettes*
- ❑ Soap, liquid detergent*
- ❑ Feminine supplies*
- ❑ Personal hygiene items*
- ❑ Plastic garbage bags, ties (for personal sanitation ases)
- ❑ Plastic bucket with tight lid
- ❑ Disinfectant
- ❑ Household chlorine bleach

Clothing and Bedding

*Include at least one complete change of clothing and footwear per person.

- ❑ Sturdy shoes or work boots*
- ❑ Rain gear*
- ❑ Blankets or sleeping bags*
- ❑ Hat and gloves
- ❑ Thermal underwear
- ❑ 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

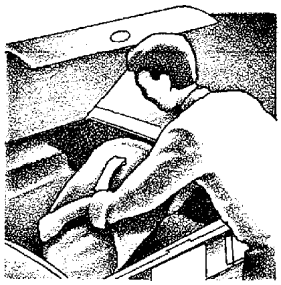
For Adults*

- ❑ 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.

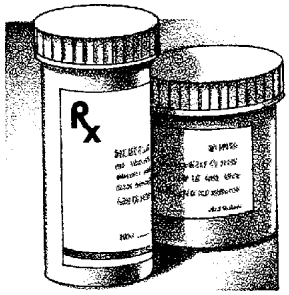
- Will, insurance policies, contracts, deeds, stocks and bonds
- Passports, social security cards, immunization records
- Bank account numbers
- Credit card account numbers and companies
- Inventory of valuable household goods, important telephone numbers
- Family records (birth, marriage, death certificates)

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.



CREATE A FAMILY DISASTER PLAN

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

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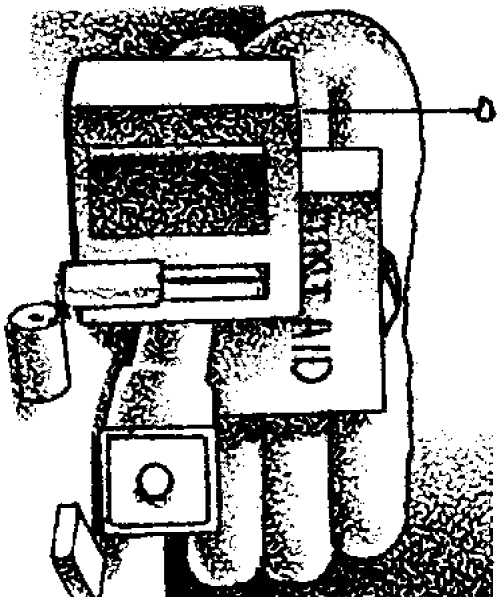

Your Family Disaster Supplies Ki

HURRICANE • FLASH FLOOD • HAZARDOUS MATERIALS SPIL

Appendix H

HAZARD RISK ANALYSIS AND PRIORITIZATION: 2009

NATURAL AND OTHER HAZARD RISK ANALYSIS

The major natural and other hazards that have been identified as potentially affecting Racine County have been compared in this appendix and ranked by risk for implementation of the mitigation measures set forth in Tables 63 and 64 in Chapters V and VI of this report, respectively. 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 of this report. Specifically, this prioritization is based upon the protection of human life and health and protection from property damages throughout Racine 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 H-1 and H-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 flooding hazards during a severe thunderstorm event. Nonetheless, since the causes of disasters of the past will likely be the best predictor of future disasters, an attempt was made to normalize all of the hazard incidences to an annual average in order to understand the relative potential level of risk each hazard poses to Racine County on an annual basis (see Tables H-1 and H-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 28 were ranked with respect to their severity in terms of the sum of the number of annual death and injuries caused and then by frequency of occurrence of each type of hazard event as shown in Table H-1.

The top 10 hazards from a combined total of 19 natural and other hazards based upon death and injury incidences, as shown in Table H-1, in order of appearance, indicate that transportation-related accidents in streets and

Table H-1

PRIORITY RANKING OF NATURAL AND OTHER HAZARDS AFFECTING RACINE COUNTY BASED UPON MORTALITY AND INJURY

Order Based on Task Force Prioritization[a]	Natural and Other Hazards	Period of Record	Number of 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
- -	Transportation Accidents-Arterial Street and Roadway	1999-2008	4,194.9	19.1	2,370.0	2,389.1	1
- -	Emergency Medical Incidents	2005	9,949.0[b]	20.0[c]	- -[d]	20.0	2
4	Temperature Extremes	1995-2008	2.6	2.1	5.1	7.2	3
- -	Transportation Accidents-Railroad	1994-2008	4.8	0.5	4.0	4.5	4
2	Thunderstorms/High Wind	1995-2008	15.7	0.3	1.9	2.2	5
- -	Lightning	1995-2008	1.9	0.7	0.6	1.3	6
5	Winter Storms	1994-2008	2.6	0.0	0.7	0.7	7
- -	Transportation Accidents-Airports	1996-2008	1.7	0.4	0.3	0.7	8
3	Tornadoes	1992-2008	0.5	0.0	0.5	0.5	9
- -	Hazardous Material Incidents-Transportation	2000-2008	2.8	0.0	0.1	0.1	10
- -	Hail	1995-2008	3.4	0.0	0.0	0.0	11
1	Flooding	1990-2008	2.0	0.0	0.0	0.0	12
6	Lake Michigan Coastal Erosion	1975-1995	1-2 (feet of erosion per year)	0.0	0.0	0.0	13
7	Drought	1992-2008	0.6	0.0	0.0	0.0	14
8	Earthquake	1992-2008	0.2	0.0	0.0	0.0	15
- -	Hazardous Materials Incident-Fixed Facility	1984-2008	0.2	0.0	0.0	0.0	16
- -	Power Outage Incidents	1992-2008	- -[e]	- -[e]	- -[e]	- -[e]	17
- -	Contamination or Loss of Water Supply	1970-2002	0.0	0.0	0.0	0.0	18
- -	Terrorism Incident	1972-2008	0.0	0.0	0.0	0.0	19

[a] *For more details see Hazard Identification section and Table 28 in Chapter IV in this report.*

[b] *Based upon the emergency medical responses by the City of Racine Fire Department, the Village of Mt. Pleasant Fire Department, the Village of Sturtevant Fire Department, and the Union Grove-Yorkville Fire and Rescue Department in 2005.*

[c] *Based upon the total number of infectious and parasitic disease-related mortalities in 2006.*

[d] *No data available.*

[e] *Incidents have been recorded to occur, however, as of September 24, 2008 no data exist to calculate annual averages.*

Source: National Climatic Data Center; U.S. Department of Transportation, Pipeline and Hazardous Material Safety Administration; National Transportation Safety Board; Wisconsin Department of Transportation; Kenosha County Division of Emergency Management; and SEWRPC.

Table H-2

PRIORITY RANKING OF NATURAL AND OTHER HAZARDS AFFECTING RACINE COUNTY BASED UPON PROPERTY AND CROP DAMAGE

Order Based on Task Force Prioritization[a]	Natural and Other Hazards	Period of Record	Number of Incidents per Year (average)	Total Property Damage per Year (thousands of dollars)[b]	Total Crop Damage per Year (thousands of dollars)[b]	Sum of Property and Crop Damage per Year (thousands of dollars)[b]	Priority Ranking Based on Analysis
- -	Transportation Accidents-Arterial Street and Roadway	1999-2008	4,194.9	21,559.4[c]	0.0	21,559.4	1
1	Flooding	1990-2008	2.0	376.5	1,818.1	2,194.6	2
2	Thunderstorm/High Wind	1994-2008	4.8	1,342.8	145.9	1,488.7	3
6	Lake Michigan Coastal Erosion	1975-1995	1-2 (feet of erosion per year)	830.0[d]	0.0	830.0[d]	4
7	Drought	1992-2008	0.6	0.0	311.9	311.9	5
3	Tornadoes	1992-2008	0.5	244.9	0.1	245.0	6
- -	Lightning	1995-2008	1.9	104.8	0.0	104.8	7
- -	Hail	1995-2008	3.4	14.7	0.0	14.7	8
- -	Hazardous Materials Incidents-Transportation	2000-2008	2.8	4.5	0.0	4.5	9
- -	Hazardous Materials Incident-Fixed Facility	1984-2008	0.2	3.6	0.0	3.6	10
4	Temperature Extremes	1995-2008	2.6	2.2	0.0	2.2	11
- -	Emergency Medical Incidents	2005	9,949.0[e]	0.0	0.0	0.0	12
- -	Transportation Accidents-Railroad	1994-2008	4.8	- -[f]	- -[f]	- -[f]	13
5	Winter Storms	1994-2008	2.6	- -[f]	- -[f]	- -[f]	14
- -	Transportation Accidents-Airports	1996-2008	1.7	- -[f]	- -[f]	- -[f]	15
8	Earthquake	1992-2008	0.2	0.0	0.0	0.0	16
- -	Power Outage Incidents	1992-2008	- -[g]	- -[g]	- -[g]	- -[g]	17
- -	Contamination or Loss of Water Supply	1970-2002	0.0	0.0	0.0	0.0	18
- -	Terrorism Incidents	1972-2008	0.0	0.0	0.0	0.0	19

[a] *For more details see Hazard Identification section and Table 28 in Chapter IV in this report.*

[b] *Dollar values were adjusted to year 2008 by using the average annual Consumer Price Index (CPI) values from the U.S. Department of Labor, Bureau of Labor Statistics.*

[c] *Estimated from the number of property damage accidents reported and National Safety Council estimates of per accident property damage for each year.*

[d] *Annual estimate based on the 25-year risk erosion distances within Racine County.*

[e] *Based upon the emergency medical responses by the City of Racine Fire Department, the Village of Mt. Pleasant Fire Department, the Village of Sturtevant Fire Department, and the Union Grove-Yorkville Fire and Rescue Department in 2005.*

[f] *No data available.*

[g] *Incidents have been recorded to occur, however, as of September 24, 2008 no data exist to calculate annual averages.*

Source: National Climatic Data Center; U.S. Department of Transportation, Pipeline and Hazardous Material Safety Administration; National Transportation Safety Board; Wisconsin Department of Transportation; Kenosha County Division of Emergency Management; and SEWRPC.

roadways, emergency medical incidents, temperature extremes, railroad accidents, thunderstorm/high winds, lightning, winter storms, airport accidents, tornadoes, and transportation-related hazardous material incidents pose the greatest risk to human life and injury compared to other hazards experienced in Racine County. These hazards comprise those that have been demonstrated, based on past occurrence, to pose risk to human life and injury in Racine County. Transportation-related accidents among roadways, railroads, airports, and hazardous material incidents comprise four of the top 10 hazards. Table H-1 indicates that transportation-related hazard incidents represent the greatest risk to human life and injury. 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. There were several segments on IH 94 that exceeded the Racine County freeway system average crash rate of 61.3 crashes per 100 million vehicle-miles as shown of Map 36 in Chapter IV of this report. These are primarily located at on and off ramp locations.

Emergency medical incidents and temperature extreme incidents ranked as the second and third highest risk in Racine County, respectively. The vulnerability and community impact assessment in Chapter IV identified that these hazards were primarily related to public health concerns, and the individuals at greatest risk are the very young, the very old, and the sick persons within the community.

The severe weather-related natural hazards of thunderstorms/high wind, lightning, winter storms, and tornadoes also comprised four of the top 10 most costly hazards in terms of injuries and lost lives and, therefore, pose a significant risk to public health and safety within Racine County. The vulnerability and community impact assessment indicates that the entire County is at risk from these hazards as shown on Maps 34 and 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.

The remaining nine hazards have not been recorded to cause mortality and injury in Racine County based upon known data. These include hail, flooding, Lake Michigan coastal erosion, drought, earthquake, fixed facility hazardous material incidents, power outages, contamination or loss of water supply, and terrorism. It is important to note that although flooding, Lake Michigan coastal erosion, drought, hail, and fixed facility hazardous material incidents have not been recorded to cause mortality and injury, these hazards rank among the top 10 recorded to be associated with significant property damage costs to Racine County (see Table H-2), which illustrates significant differences between ranking hazards by impacts on human life and safety and ranking hazards by property damage (see the Property Damage section below).

Table H-1 also shows that contamination or loss of water supply and terrorism have not been reported to have occurred in Racine County. Due to the importance of human life and health of individuals within Racine County, the high potential for a mass casualty event related to these hazards, and the fact that such incidents have been recorded elsewhere in the State of Wisconsin, these hazards were incorporated into the updated all-hazard mitigation plan in implementation strategies by the Racine County Hazard Mitigation Task Force (see Appendix A of this report).

The priority rankings based upon death and injury in this update are similar to those presented in the initial Racine County hazard mitigation plan. While the rank order of most of the hazards in terms of mortality and injuries has changed, the ranks of all but one hazard are within two positions of their ranking in the initial plan. In addition, the top 10 most costly hazards in terms of mortality and injuries in this update include nine of the 10 that were found to be among the most costly in the initial hazard mitigation plan. The major changes in this ranking are that the priority ranking of tornadoes based on mortality and injuries has moved from thirteenth most costly to ninth most costly and that the priority ranking of hail has moved from eighth most costly to eleventh most costly.

Property Damage

Another way to assess the vulnerability of Racine County to natural and other hazards is to examine the property damage they cause. 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 and then by frequency of occurrence of each type of hazard event as shown in Table H-2.

The top 10 hazards from a combined total of 19 natural and other hazards, as shown in Table H-2 in order of appearance based upon total annual property damages, are that transportation accidents in streets and roadways, flooding, thunderstorms/high winds, Lake Michigan coastal erosion, drought, tornadoes, lightning, hail, transportation-related hazardous material incidents, and fixed facility-related hazardous material incidents. Among the top 10 hazards, transportation-related accidents on roadways were identified as the number one risk to property as compared to any other hazards in Racine County. 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. Transportation-related hazardous material incidents also ranked ninth among the top 10 risks to property damage within the County.

Natural hazards associated with severe weather, flooding, Lake Michigan coastal erosion, and drought comprised seven of the 10 most costly hazards relative to property damage in Racine County. The severe weather-related natural hazards include thunderstorm/high winds, tornadoes, lightning, and hail. Severe thunderstorms and high winds ranked as the third most costly hazard, relative to property damage, in the County and create greater property damages than all other severe-weather related hazards combined. The vulnerability and community impact assessment indicates that the entire county is at risk from these hazards as shown on Maps 34 and 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.

Flooding and Lake Michigan coastal erosion ranked as the second and fourth most costly hazards in the County, respectively. The vulnerability and community impact assessment indicates that the flooding hazard risks are associated with the major river and lake systems within and adjacent to Racine County and include the Fox River, Root River, Pike River, and Des Plaines River watersheds (see Maps 30, 31, 32, and 33 in Chapter IV of this report) and the coastal erosion risks are associated with the Lake Michigan shoreline (see Maps 8 and 9 in Chapter II of this report). The impact assessment also indicates that, due to the economic importance and extent of agriculture in Racine County, flooding is the most costly hazard in terms of potential crop damage compared to the other hazards.

Drought ranked as the fifth most costly hazard in Racine County due to crop losses. Temperature extremes ranked as the eleventh most costly hazard in the County. Both of these hazards do have the potential to seriously affect crop losses in Racine County, as discussed in the vulnerability assessment in Chapter IV of this report.

While fixed facility-related hazardous material incidents comprise the tenth most costly hazard in Racine County, it should be noted that most of the known damages relate to one pipeline incident that occurred in 1988.

Based upon known data, the remaining eight hazards as shown in Table H-2 have not been recorded to be associated with property damages within Racine County. These hazards include emergency medical incidents, transportation-related accidents at railways and airports, winter storms, earthquakes, power outage incidents, contamination or loss of water supply, and terrorism. It is important to note that, although these hazards have not been recorded to cause property damage, several of them rank among the top 10 hazards recorded to be associated with significant mortality and injury costs to Racine County (see Table H-1). These include emergency medical incidents, transportation-related accidents at railways and airports, and winter storms. For this reason, these hazards were incorporated into the updated all-hazard mitigation plan and implementation strategies by the Racine Hazard Mitigation Task Force (see Appendix A).

The priority rankings based upon property and crop damage in this update are similar to those presented in the initial Racine County hazard mitigation plan. While the rank order of most of the hazards in terms of mortality and injuries has changed, the ranks of most hazards are within one position of their ranking in the initial plan. In fact, most of the changes in rank involve a lowering of priority by one step in response to the rank of hazardous material incidents at fixed facilities moving from eighteenth most costly to tenth most costly. Most of the remaining changes reflect the change in the rank of drought from eighth most costly to fifth most costly. It is important to note that the top 10 most costly hazards in terms of property and crop damage in this update include nine of the 10 that were found to be among the most costly in the initial hazard mitigation plan.

RANKING SUMMARY

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 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 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 Wisconsin disasters 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 Plan Task Force into the final hazard mitigation plan and implementation strategies, as summarized in Chapter V of this report.

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 intakes 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. Chorine, 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. 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 , www.wi-infragard.com , www.awwa.org , www.awwa.org/waterweek/wwlast.htm , 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 Knobeloch, 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	1. Floodproofing 2. Relocation 3. Elevation of structures 4. Property acquisition 5. Safe room construction	75 percent Federal cost-share assistance; 12.5 percent State match and 12.5 percent local match required[a]	Within 60 days of a Presidential disaster declaration
2	FEMA	Flood Mitigation Assistance Program	State agencies and participating NFIP communities	1. Elevation, relocation, or demolition of insured structures 2. Acquisition 3. Dry floodproofing 4. Minor structural projects 5. Beach nourishment activities	$ 20 million available nationally;[b] 75 percent Federal cost-share assistance; 25 percent local match required; two types of grants: Planning grant and project grant[c]	- -
3	FEMA	Public Assistance Program	State agencies and local communities	1. Rebuilding infrastructure damaged during a flood 2. Building infrastructure for portions of a community that are to be relocated outside of floodplains 3. Limited assistance with structural elevation and relocation	75 percent Federal cost-share assistance; the State determines the local match	Within 30 days of a Presidential disaster declaration
4	FEMA	Pre-Disaster Mitigation Program	States and local communities	1. Acquisition and relocation of structures in flood hazard areas 2. Floodproofing 3. Minor structural projects 4. Flood control projects for critical facilities 5. Management costs 6. Informational activities 7. Plan preparation 8. Technical assistance 9. Safe room construction	75 percent Federal cost-share assistance; 25 percent State or local match is required;	- -
5	FEMA	Repetitive Flood Claims Program	State agencies and participating NFIP communities	1. Elevation, relocation, or demolition of insured structures 2. Floodproofing 3. Minor localized flood reduction projects	100 percent Federal cost share assistance, if the proposed activity cannot be funded under the Flood Mitigation Assistance 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
6	FEMA	Severe Repetitive Loss Program	State agencies and participating NFIP communities	1. Elevation, relocation, or demolition of insured structures 2. Floodproofing 3. Minor localized flood reduction projects 4. Mitigation reconstruction	75 percent Federal cost-share assistance, 25 percent Sate or local match is required	- -
7	U.S. Army Corps of Engineers (USCOE)	Small Flood Damage Reduction Program	State and local units of government	1. Projects designed to reduce the impact of flood events 2. Projects must be designed and constructed by the Corps	50 to 65 percent Federal cost-share assistance above $100,000 and cannot exceed $7,000,000; 35 to 50 percent local match is required	None
8	USCOE	Clearing and Snagging for Flood Control Program	State and local units of government	1. Removal of obstructions that restrict floodflows of navigable waters 2. Projects must be designed and constructed by the Corps	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
9	USCOE	Emergency Bank Protection Program	Local communities	1. Bank protection of highways, highway bridges, essential public works, churches, hospitals, schools, and other nonprofit public services from flood induced erosion	Federal share cannot exceed $1,500,000 for a given project; cost-share program with local match of 35 percent for design and construction required	- -
10	USCOE	Small Hurricane and Storm Damage Reduction Program	State agencies and local units of government	1. Beach nourishment 2. Floodproofing 3. Other structural and nonstructural storm damage reduction projects	Federal share cannot exceed $5,000,000 for a given project; cost-share program with local match of 35 percent for design and construction required	- -
11	USCOE	Water Resources Development and Flood Control Acts	Local governments	1. Water resources planning assistance 2. Emergency streambank and shoreline protection	50 percent for studies and 65 percent for project implementation of Federal cost-share assistance; 35 to 50 percent local match is required	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
12	USCOE	Flood Hazard Mitigation and Riverine Ecosystem Restoration Program	Local governments	1. Flood hazard mitigation to include relocation of threatened structures 2. Riverine ecosystem restoration such as conservation or restoration of natural floodwater storage areas 3. Planning activities to determine responses to future flood situations 4. Project areas must be in a floodplain	50 percent for studies and 65 percent for project implementation of Federal cost-share assistance; 35 to 50 percent local match is required	Undetermined
13	U.S. Department of Agriculture (USDA)	Watershed Protection and Flood Prevention Program	State and local units of government	1. Watershed protection 2. Flood prevention measures 3. Projects are intended to be larger scale 4. Watersheds can be no larger than 250,000 acres	$85.0 million available nationally[b]; technical assistance and cost-sharing are provided; 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
14	U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS)	Emergency Watershed Protection Program	Individual landowners provided they have a local sponsor such as a local unit of government	1. Sale of agricultural floodprone lands to NRCS for floodplain easements 2. Land must have a history of repeated flooding (at least twice in the past 10 years) 3. Landowner retains most of the rights as before the sale 4. NRCS has authority to restore the floodplain function and value	The USDA pays the landowner 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; 25 percent local match is required[d]	Variable
15	NRCS	Emergency Conservation Program	Individual landowners	1. Regrading and shaping farmland 2. Restoring conservation structures 3. Redistribution of eroded soil 4. Debris removal 5. Projects must be in response to natural disaster	Up to 64 percent Federal cost-share assistance; the remaining percentage is the landowner's responsibility	After a designated State or Presidential disaster declaration
16	U.S. Department of Housing and Urban Development and Wisconsin Department of Commerce, Division of Housing and Community Development	Community Development Block Grant Program	Local governments	1. Emergency response activities related to flood events 2. Long-term needs related to flooding issues	75 to 100 percent Federal cost-share assistance; 0 to 25 percent local match may be required	After 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
17	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
18	Wisconsin Department of Natural Resources (WDNR)	Municipal Flood Control Grants Chapter NR 199 of the *Wisconsin Administrative Code*	Cities, villages, towns, metropolitan sewerage districts	1. Acquisition and removal of structures 2. Flood proofing and elevation of structures 3. Riparian restoration projects 4. Acquisition of vacant land or purchase of easements 5. Construction of stormwater and groundwater facilities related to flood control and riparian restoration projects 6. Flood mapping	70 percent State cost-share assistance; 30 percent local match	March 15
19	Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP)	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
20	DATCP	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	Tax incentives on an annual basis	None
21	WDNR	Lake Planning Grant Program, Chapter NR 190 of the *Wisconsin Administrative Code*	Local units of governments, lake districts, and nonprofit conservation organizations	1. Gathering and analyzing water quality information 2. Land use planning within lake watersheds 3. Gathering and compiling demographic information pertinent to individual lakes 4. Developing lake management plans	Up to 75 percent State cost-share assistance, not to exceed $10,000; 25 percent local match is required; lakes are eligible for more than one grant, however, the total amount of State dollars cannot exceed $100,000	February 1 and August 1
22	WDNR	Lake Protection Grant Program, Chapter NR 191 of the *Wisconsin Administrative Code*	Local units of government, lake districts, and nonprofit conservation organizations	1. Land acquisition for easement establishment 2. Wetland restoration 3. Lake restoration projects 4. Other projects involving lake improvement	75 percent State cost-share which cannot exceed $200,000; 25 percent local match is required	May 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
23	WDNR	Stewardship Grant Program, Chapter NR 47 of the *Wisconsin Administrative Code*	Local government and nonprofit conservation organizations	1. Streambank protection projects 2. Land acquisition of stream corridors for water quality improvement	50 percent State cost-share assistance; 50 percent local match is required	May 1
24	WDNR	Urban Rivers Grant Program	Local units of government	1. Land acquisition to preserve open areas in urban environments adjacent to streams and rivers	50 percent State cost-share assistance; 50 percent local match is required	May 1
25	WDNR	Urban Nonpoint Source and Stormwater Grants Program. Funding is through Chapter NR 155 of the *Wisconsin Administrative Code*	Local units of government	1. Planning 2. Educational and information activities 3. Ordinance development and enforcement 4. Training 5. Storm water detention ponds 6. Streambank and shoreline stabilization	70 percent State cost-share assistance for projects not involving construction, requiring a 30 percent local match; 50 percent State cost-share assistance for projects involving construction, requiring a 50 percent local match	May 1
26	WDNR	Targeted Runoff Management Grants, Chapter 120 of the *Wisconsin Administrative Code*; in the future, specific rural nonpoint source abatement measures will be funded under proposed Chapter NR 151 of the *Wisconsin Administrative Code*	Local units of government	1. Complying with nonpoint source performance standards 2. Improving 303(d) waters 3. Protecting outstanding water resources 4. Compliance with a notice of discharge for an animal feeding operation 5. Addressing a water quality concern of national or statewide importance, such as the Upper Mississippi River concerns	70 percent State cost-share assistance; 30 percent local match is required. Rural projects cannot exceed $30,000 in funding and urban projects cannot exceed $150,000	May 1
27	WDNR	River Protection Grant Program, Chapter NR 195 of the *Wisconsin Administrative Code*	Local units of government and nonprofit conservation organizations	1. Activities designed to develop partnerships that protect river ecosystems 2. Educational projects 3. Activities associated with river management plan development 4. Land acquisition 5. Ordinance development 6. Installation of practices to control nonpoint source pollution	75 percent State cost-share assistance; 25 percent local match is required	May 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
28	WDNR	Wisconsin Forest Landowner Grant Program	Individual landowners[e]	1. Stream buffers 2. Streambank stabilization 3. Wetland Restoration	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
29	USDA	Water and Waste Disposal Systems for Rural Communities	Local units of governments, nonprofit organizations, associations, and districts	1. Installation, repair, improvement or expansion of a rural water facility 2. Installation, repair, improvement or expansion of a rural waste disposal facility 3. Collection and treatment of sanitary waste, stormwater and solid wastes	$1,368 million in loans, $857 million in grants, $75 million in guaranteed loans, $49 million disaster loan program, $2,700 million Reinvestment Recovery Act Direct Loans[b]	Determined by State USDA office
30	U.S. Department of Agriculture, Farm Services Agency (FSA)	Conservation Reserve Program	Individual landowners in a 10- or 15-year contract	1. Riparian buffers 2. Trees 3. Windbreaks 4. Grassed waterways	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[f]
31	USDA FSA	Conservation Reserve Enhancement Program	Individual landowners in a 10- or 15-year contract	1. Filter strips 2. Riparian buffers 3. Grassed waterways 4. Permanent grasses (only in specially designated grassland project areas) 5. Wetland development and restoration	50 percent Federal cost-share assistance; one-time signing incentive payment (up to $150 per acre); practice incentive payment (about 40 percent of cost of establishing practice); annual rental payment; State of Wisconsin lump sum payment; Wisconsin practice incentive payment (about 20 percent of cost of establishing practice)	Ongoing
32	NRCS	Conservation Stewardship Program	Individual landowners in a five-year contract	1. Filter strips 2. Riparian buffers 3. Wildlife corridors 4. Stream habitat improvement	Payments for maintaining and/or enhancing natural resources not to exceed $40,000 per year or $200,000 over a five-year period	Annually
33	NRCS	Environmental Quality Incentives Program	Individual landowner in a three-year contract	1. Animal waste management practices 2. Soil erosion and sediment control practices 3. Nutrient management 4. Groundwater protection 5. Habitat improvement	Up to 75 percent Federal cost-share assistance; 25 percent local match is required	Annually[g]

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	USEPA	Targeted Watershed Grants	Watershed organizations nominated by State Governors or Tribal leaders	1. Watershed-based projects to protect water resources 2. Training and technical assistance to local partnerships	75 percent maximum Federal cost-share assistance. Minimum 25 percent non-Federal match	November
35	USEPA	Pesticide Environmental Stewardship Grants	State government including State agencies	1. Implementation of pollution control measures 2. Plan development which includes strategies to reduce pesticide risk	$500,000 available nationally[b]; locally grants are provided up to a maximum of $50,000	Ongoing
36	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	1. Monitoring resources 2. Developing alternative management measures 3. Managing information with respect to those resources	Federal cost-share program with no local match required; average financial assistance has been $250,000 per project	None
37	U.S. Department of Transportation (USDOT)	Transportation Enhancement Program	State and local units of government	1. Wetland preservation and restoration 2. Stormwater treatment systems to address runoff from roads and highways 3. Reduce vehicle-caused wildlife mortality while maintaining habitat connectivity	80 percent Federal cost-share assistance; 20 percent local match is required	- -
38	Kenosha/Racine Land Trust	Stewardship Grant Program, Urban Green Space Program	Land trusts, local units of government, and nonprofit organizations	1. Land acquisition for greenway space in urban areas, protection of scenic or ecological features, and wildlife habitat improvement	- -	- -
39	WDNR	Stewardship Grant Program, Urban Green Space Program	Local units of government , lake protection and rehabilitation districts, and nonprofit conservation organizations	1. Land acquisition for greenway space in urban areas, protection of scenic or ecological features, and wildlife habitat improvement	50 percent State cost-sharing assistance; 50 percent local match is required	- -
40	USDOT	Transportation Enhancement Program	State and local units of government	1. Land acquisition for: scenic easements, pedestrian and bike trails, and abandoned railway corridors	50 percent Federal cost-share assistance; 50 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
41	Eastman Kodak	American Greenway Grants	Land trusts, local units of government, and nonprofit organizations	1. Ecological assessments 2. Mapping and surveying 3. Planning activities 4. Creative projects that work to establish greenways in communities 5. Must have matching funds from other sources 6. Must show that the project will be completed	Grants with a maximum amount of $2,500	March 1 to June 1
42	USEPA	Environmental Education Grants Program	Local or State education agencies, colleges, and nonprofit organizations, State environmental agencies, and noncommercial education broadcasting agencies	1. Improving environmental education teaching skills 2. Educating teachers, students, or the public about human health problems 3. Building capacity for environmental education programs 4. Education communities 5. Educating the public through print, broadcast, or other media	$3.4 million available nationally[b]; 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
43	Wisconsin Emergency Management	Hazards Mitigation Section	State and local units of government	1. Mitigation Planning 2. Technical Assistance 3. Mitigation Projects	75 percent Federal cost-share assistance; 25 percent local match	- -
44	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	- -
45	U.S. Department of Housing and Urban Development	Community Development Block Grant Program	Local governments	1. Relocation and demolition 2. Housing Grants to fund the rehabilitation of housing to meet current building codes 3. Construction of public facilities and improvements	75 to 100 percent Federal cost-share assistance; 0 to 25 percent local match may be required	- -
46	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	- -
47	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	- -

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
48	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	- -
49	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	- -
50	Wisconsin Department of Commerce Division of Housing and Community Development	Home Investment Partnerships Program	Local Communities and nonprofit organizations	Supports rental rehabilitation, weatherization related repairs, accessibility improvements and rental housing development	75 percent Federal cost-share assistance; 25 percent homeowner match	- -
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 urban sprawl and transportation infrastructure	Finance the cost of developing a comprehensive plan for eligible applicants, local match may be required	November
52	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 $1,500,000 is available to all counties adjacent to Lakes Superior and Michigan	November 2
53	Root-Pike Watershed Initiative Network	Root-Pike Watershed Initiative Network Grant Program	State and local units of government, nonprofit organizations	Awards grants and offers advisement to organizations for projects that preserve, promote, and protect land and water resources in the Root River and Pike River Watersheds	$30,000 in grants are awarded twice a year, in April and November	August and January
54	Great Lakes Protection Fund	Great Lakes Protection Fund	State and local units of government, nonprofit organizations and individuals	1. To improve the health of the Great Lakes 2. To promote the interdependence of healthy ecological and economic systems 3. To support innovative, creative, and venturesome ideas	Finance the total cost of accepted projects	Continuous applications process

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	Joyce Foundation	Joyce Foundation Grant program	State and local units of government, nonprofit organizations and individuals	1. To improve the health of the Great Lakes 2. To promote the interdependence of healthy ecological and economic systems 3. To support innovative, creative, and venturesome ideas 4. Developing improved regulatory approaches 5. Better understanding of the supply of and demand for Great Lake 6. Creating transportation alternatives to reduce over reliance on automobiles	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
56	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
57	U.S. Fire Administration FEMA	Assistance to Firefighters Grant Program	City, Counties, Village, Township Fire Departments, and nonaffiliated EMS organizations	1. Firefighter and EMT training 2. Fire fighting and EMS equipment 3. Firefighter personal protective equipment	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
58	National Fish and Wildlife Foundation (NFWF)	Wal-Mart Stores, Inc. Acres for America	State and local units of government, nonprofit conservation organizations	1. Acquisition or permanent easement for conservation of habitat	$2.5 million available annually; minimum 50 percent local match required, higher local match preferred	Preproposals due April 1 and September 1 Full proposals due June 1 and November 1
59	NFWF	Five-Star Restoration Program	Public or private organizations that engage in community-based restoration projects	1. Wetland restoration projects 2. Riparian restoration projects 3. Projects must be part of a larger watershed project 4. Projects must have at least five contributing parties	$225,000 available nationally annually; project awards range from $10,000 to $40,000, average award $20,000; minimum 50 percent local match required, higher local match preferred	February
60	U.S. Fish and Wildlife Service (FWS)	North American Wetlands Conservation Fund	State and public agencies	1. Property acquisition for the protection of wetlands that migratory birds, fish, and wildlife are dependent on 2. Wetland restoration and protection projects 3. Habitat restoration projects	50 percent Federal cost-share assistance; 50 percent local match is required	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
61	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
62	NFWF	Sustain Our Great Lakes Community Grant Program	State and local units of government, nonprofit organization	1. Wetland restoration, enhancement, and protection projects 2. Tributary restoration, enhancement, and protection projects 3. Shoreline restoration, enhancement, and protection projects 4. Projects must be in Great Lakes watershed	Grant awards range from $25,000 to $150,000. No match is required; however, the ratio of matching funds offered is considered during review.	October 15

NOTE: Table was updated in 2009 as a part of the plan update process.

[a]*The nonFederal share is 25 percent. In Wisconsin, the State Division of Emergency Management pays 12.5 percent and the local community pays 12.5 percent.*

[b]*Available on an annual basis.*

[c]*Municipalities must have a flood mitigation plan to be eligible for a project grant.*

[d]*In kind services are allowed as a part of the local cost-share assistance.*

[e]*Applicants must have a Forest Stewardship Plan prepared by a forester in place on their land or be applying to have one prepared.*

[f]*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.*

[g]*EQIP in southeastern Wisconsin provides minimal funding.*

Source: SEWRPC.

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Appendix K

FUNDING PROGRAMS CONTACT INFORMATION[a]

Administrator of Grant Program	Name of Grant Program	Address	Phone Number	Internet Web Address
Federal Emergency Management Agency (FEMA)	Hazard Mitigation Grant Program Public Assistance Program	Federal Emergency Management Agency Region V 536 South Clark Street, 6th Floor Chicago, IL 60605	(312) 408-5500	www.fema.gov/government/grant/hmgp/index www.fema.gov/government/grant/pa/index
FEMA	Flood Mitigation Assistance Program Predisaster Mitigation Program Repetitive Flood Claims Grant Program Severe Repetitive Loss Program	Headquarters: Federal Emergency Management Agency Mitigation Directorate 500 C Street, SW Washington, DC 20472	(202) 646-2500	www.fema.gov/government/grant/fma/index www.fema.gov/government/grant/pdm/index www.fema.gov/government/grant/rfc/index www.fema.gov/government/grant/srl/index
FEMA	Firefighters Grant Program	Assistance to Firefighters Grant Program Federal Emergency Management Agency Region V 536 South Clark Street, 6th Floor Chicago, IL 60605	(217) 726-9550	www.firegrantsupport.com/afg/
National Fish and Wildlife Foundation (NFWF)	Five Star Restoration Program	National Fish and Wildlife Foundation 1133 15th Street, NW, Suite 1100 Washington, DC 20005	(202) 857-0166	www.nfwf.org/FiveStar
NFWF	Wal-Mart Stores, Inc. Acres for America Program Sustain Our Great Lakes Program	National Fish and Wildlife Foundation Central Partnership Office 1 Federal Drive St. Paul, MN 55111	(612) 713-5173 (612) 713-5185	www.nfwf.org
U.S. Army Corps of Engineers (USCOE)	Small Flood Damage Reduction Program Snagging and Clearing for Flood Control Emergency Bank Protection Program Water Resources Development and Flood Control Act Small Hurricane and Storm Damage Reduction Program	U.S. Army Corps of Engineers 111 N. Canal Street, Suite 600 Chicago, IL 60606 U.S. Army Corps of Engineers 477 Michigan Avenue, Room 617 Detroit, MI 48226	(312) 353-6400 (313) 226-6760	www.usace.army.mil
USCOE	Flood Hazard Mitigation and Riverine Ecosystem Restoration Program	U.S. Army Corps of Engineers Planning Division 20 Massachusetts Ave, NW Washington, DC 20314	(202) 761-0115	www.usace.army.mil

Administrator of Grant Program	Name of Grant Program	Address	Phone Number	Internet Web Address
U.S. Department of Agriculture (USDA)	Watershed Protection and Flood Prevention Program	Headquarters: Department of Agriculture Natural Resources Conservation Service P.O. Box 2890 Washington, DC 20013	(202) 720-3534	www.ftw.nrcs.usda.gov/programs.html
USDA	Water and Waste Disposal Systems for Rural Communities	U.S. Department of Agriculture Rural Utilities Service Water and Environmental Programs Room 4050-S, Stop 1548 1400 Independence Avenue, SW Washington, DC 20250	(202) 690-2670	www.usda.gov/rus/water/programs.htm
USDA	Watershed Protection and Flood Prevention Program	Headquarters: Department of Agriculture Natural Resources Conservation Service 1400 Independence Avenue, SW Washington, DC 20250	(202) 720-3534	www.nrcs.usda.gov/programs/watershed
USDA, Natural Resources Conservation Service (NRCS)	Emergency Watershed Protection Program	U.S. Department of Agriculture Natural Resources Conservation Service 8030 Excelsior Drive Madison, WI 53717	(608) 662-4422	www.nrcs.usda.gov
NRCS	Emergency Conservation Program Conservation Stewardship Program Environmental Quality Incentives Program	U.S. Department of Agriculture Natural Resources Conservation Service 1012 Vine Street Union Grove, WI 53182	(262) 878-1243	www.nrcs.usda.gov
USDA, Farm Services Agency (FSA)	Conservation Reserve Program Conservation Reserve Enhancement Program	U.S. Department of Agriculture Farm Services Agency 1012 Vine Street Union Grove, WI 53182	(262) 878-1234	www.fsa.usda.gov
U.S. Environmental Protection Agency (USEPA)	Targeted Watershed Grants	Erin Collard Environmental Protection Agency Office of Wetlands, Oceans, & Watersheds 1200 Pennsylvania Avenue NW Washington, DC 20460	- -	www.epa.gov/twg
USEPA	Environmental Education Grants Program	U.S. Environmental Protection Agency Office of Environmental Education (1704) Ariel Rios Building 1200 Pennsylvania Avenue, NW Washington, DC 20460	(202) 260-8619	www.epa.gov/enviroed/grants.html

Administrator of Grant Program	Name of Grant Program	Address	Phone Number	Internet Web Address
USEPA	Pesticide Environmental Stewardship Grants	U.S. Environmental Protection Agency Office of Prevention, Pesticides, and Toxic Substances Office of Pesticides Ariel Rios Building 1200 Pennsylvania Avenue, NW Washington, DC 20460	(703) 308-7035	www.epa.gov/oppbppd1/PESP
U.S. Fish and Wildlife Service (FWS)	North American Wetlands Conservation Fund	U.S. Fish and Wildlife Service Division of Bird Habitat Conservation 4401 North Fairfax Drive Arlington, VA 22203	(703)-358-1784	www.fws.gov/birdhabitat/Grants/NAWCA/index.shtm
FWS	Partners for Fish and Wildlife Habitat Restoration Program	U.S. Fish and Wildlife Service Branch of Habitat Restoration 4401 North Fairfax Drive Arlington, VA 22203	(703)-358-2201	www.fws.gov/partners/
U.S. Geological Survey (USGS)	Upper Mississippi River System Long Term Resource Monitoring Program	Upper Midwest Environmental Sciences Center 2630 Fanta Reed Road LaCrosse, WI 54603	(608) 781-6221	www.emewc.usgs.gov/ltrmp.html
U.S. Department of Housing and Urban Development	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) 708-1322	www.hud.gov/offices/cpd/communitydevelopment/programs/drsi/index.cfm
U.S. Department of Transportation (DOT)	Transportation Enhancement Program	U.S. Department of Transportation 400 Seventh Street, SW Washington, DC 20590	(202) 366-4000	www.dot.gov
U.S. Small Business Administration	Disaster Loan Program	U.S. Small Business Administration Disaster Loan Program 101 Marietta Street NW Atlanta, GA 30303-2725	(404) 331-0333	www.sba.gov/services/disasterassistance/index.html
Wisconsin Department of Administration (WDOA)	Comprehensive Planning Grant	Department of Administration Division of Intergovernmental Relations P.O. Box 8944 Madison, WI 53708	(608) 267-3369	www.doa.state.wi.us/compplanning
WDOA	Wisconsin Costal Management	Department of Administration 101 East Wilson Street Madison, WI 53702	(608) 267-6917	www.doa.state.wi.us/section.asp?linkid=65&locid=9

Appendix K (continued)

Administrator of Grant Program	Name of Grant Program	Address	Phone Number	Internet Web Address
Wisconsin Department of Agriculture Trade and Consumer Protection (DATCP)	Land and Water Resource Management Program Farmland Preservation Program	Wisconsin Department of Agriculture, Trade and Consumer Protection Agricultural Resource Management 2811 Agriculture Drive P.O. Box 8911 Madison, WI 53708	(608) 224-4500	www.datcp.state.wi.us
Wisconsin Department of Commerce	Home Investment Partnerships Program (HIPP) Community Development Block Grants (CDBG)	Wisconsin Department of Commerce 201 W. Washington Avenue P.O. Box 7970 Madison, WI 53707-7970	HIPP: (608) 266-9185 CDBG: (608) 267-3682	commerce.wi.gov
Wisconsin Department of Health Services (WDHS)	Chemical Contamination	Wisconsin Division of Public Health Bureau of Environmental and Occupational Health 1 W. Wilson Street, Room 150 Madison, WI 53701	(608) 264-9880	www.dhs.state.wi.us/
WDHS	Communicable and Infectious Diseases	Wisconsin Division of Public Health Bureau of Communicable Diseases 1 W. Wilson Street, Room 318 Madison, WI 53701	(608) 267-9363	www.dhs.state.wi.us/
Wisconsin Department of Natural Resources (WDNR)	Municipal Flood Control Grants	Wisconsin Department of Natural Resources Grant Program Manager-CF/2 P.O. Box 7921 Madison, WI 53707-7921	(608) 267-7152	www.dnr.state.wi.us/org/caer/cfa/Ef/flood/grants.html
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 UWEX-Lakes Partnership UW-Stevens Point 1900 Franklin Street Stevens Point, WI 54481	(262) 574-2130 (715) 346-2116	dnr.wi.gov/org/caer/cfa/Grants/Lakes/Largelake.html dnr.wi.gov/org/caer/cfa/Grants/Lakes/smalllake.html www.uwsp.edu/cnr/uwexlakes/grants
WDNR	Stewardship Grant Program Urban Rivers Grant Program River Protection Grant Program	Wisconsin Department of Natural Resources 2300 N. Dr. Martin Luther King Jr. Drive P.O. Box 12436 Milwaukee, WI 53212	(414) 263-8610	www.dnr.state.wi.us
WDNR	Targeted Runoff Management Grants Urban Nonpoint Source and Storm Water Grants Program	Wisconsin Department of Natural Resources Bureau of Watershed Management P.O. Box 7921 Madison, WI 53707-7921	(608) 267-7568	www.dnr.state.wi.us

Administrator of Grant Program	Name of Grant Program	Address	Phone Number	Internet Web Address
WDNR	Wisconsin Forest Landowner Grant Program	Wisconsin Department of Natural Resources 9531 Rayne Road, Suite IV Sturtevant, WI 53177	(262) 884-2390	www.dnr.state.wi.us
WDNR	Remediation and Redevelopment Program	Wisconsin Department of Natural Resources 2300 N. Dr. Martin Luther King Jr. Drive P.O. Box 12436 Milwaukee, WI 53212	(414) 263-8688	ua.dnr.state.wi.us/org/aw/rr
WDNR (Utilizing U.S. Department of Interior Funding)	Land and Water Conservation Fund Grants Stewardship Grant Program	Wisconsin Department of Natural Resources 2300 N. Dr. Martin Luther King Jr. Drive P.O. Box 12436 Milwaukee, WI 53212 or U.S. Department of the Interior National Park Service, Recreation Programs 1849 C Street NW Washington, DC 20240	(414) 263-8704 (202) 565-1200	www.dnr.state.wi.us www.ncrc.nps.gov/lwcf
WisDOT	Transportation Enhancement Program	U.S. Department of Transportation 400 Seventh Street, SW Washington, DC 20590	(202) 366-4000	www.dot.gov
Wisconsin Emergency Management	Hazard Mitigation Section	Wisconsin Emergency Management 2400 Wright Street P.O. Box 7865 Madison WI 53707-7865	(608) 242-3232	emergencymanagement.wi.gov/
Wisconsin Public Service Commission	Public Utilities Assistance	Wisconsin Public Service Commission 610 North Whitney Way, P.O. Box 7854 Madison, Wisconsin 53707-7854	(608) 266-5481	psc.wi.gov/
University of Wisconsin – Extension	Extension Disaster Education Network	UW-Extension headquarters 432 N. Lake Street Madison, WI 53706	(608) 262-3980	lgc.uwex.edu/Disaster/index.html
Eastman Kodak	American Greenway Grants	American Greenways The Conservation Fund 1655 N. Fort Meyer Drive, Suite 1300, Arlington, Virginia 22209-3199	(703) 525-6300	www.conservationfund.org
Great Lake Protection Fund	Great Lake Protection Fund Grants Program	Great Lakes Protection Fund 1560 Sherman Avenue, Suite 880 Evanston, IL 60201	(847) 425-8150	www.glpf.org/index.html
Joyce Foundation	Joyce Foundation Grant Program	The Joyce Foundation 70 West Madison Street Suite 2750 Chicago, Illinois 60602	(312) 782-2464	www.joycefdn.org

Administrator of Grant Program	Name of Grant Program	Address	Phone Number	Internet Web Address
Kenosha/Racine Land Trust	Urban Green Space Program Stewardship Grant Program	Kenosha/Racine Land Trust, Inc. P.O. box 085153 Racine, WI 53408-5153	262-552-0448	www.krlt.org/
Root-Pike Watershed Initiative Network	Root-Pike Watershed Initiative Grants program	Root-Pike WIN P.O. Box 044164 Racine, WI 53404	(262) 898-2055	www.rootpikewin.org/index.asp

NOTE: Table was updated in 2009 as a part of the plan update process.

[a]*A complete listing of U.S. government assistance programs can be found at the Catalog of Federal Domestic Assistance web site:* www.cfda.gov.

Source: SEWRPC.

Appendix L

GLOSSARY

Asset – Any man-made or natural feature that has value, including, but not limited to people; buildings; infrastructure like bridges, roads, and sewer and water systems; lifelines like electricity and communication resources; or environmental, cultural, or recreational features like parks, dunes, wetlands, or landmarks.

Base Flood – Flood that has a 1 percent probability of being equaled or exceeded in any given year. Also known as the 1 percent annual probability flood event.

Base Flood Elevation (BFE) – Elevation of the base flood in relation to a specified datum, such as the National Geodetic Vertical Datum of 1929. The Base Flood Elevation is used as the standard for the National Flood Insurance Program.

Bedrock – The solid rock that underlies loose material, such as soil, sand, clay, or gravel.

Building – A structure that is walled and roofed, principally above ground and permanently affixed to a site. The term includes a manufactured home on a permanent foundation on which the wheels and axles carry no weight.

Coastal High Hazard Area – Area, usually along an open coast, bay, or inlet, that is subject to inundation by storm surge and, in some instances, wave action caused by storms, or seismic sources.

Coastal Zones – The area along the shore where Lake Michigan meets the land as the surface of the land rises above the Lake. This land/water interface includes beaches, bluffs, and land areas having direct drainage to the Lake.

Community Rating System (CRS) – An NFIP program that provides incentives for NFIP communities to complete activities that reduce flood hazard risk. When the community completes specified activities, the insurance premiums of policyholders in these communities are reduced.

Contour – A line of equal ground elevation on a topographic (contour) map.

Critical Facility – Facilities that are critical to the health and welfare of the population and that are especially important following hazard events. Critical facilities include, but are not limited to, shelters, police and fire stations, and hospitals.

Displacement Time – The average time (in days) which the building's occupants typically must operate from a temporary location while repairs are made to the original building due to damages resulting from a hazard event.

Duration – How long a hazard event lasts.

Earthquake – A sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of earth's tectonic plates.

Erosion – Wearing away of the land surface by detachment and movement of soil and rock fragments, during a flood or storm or over a period of years, through the action of wind, water, or other geologic processes.

Erosion Hazard Area – Area anticipated to be lost to shoreline retreat over a given period of time. The projected inland extent of the area is measured by multiplying the average annual long-term recession rate by the number of years desired.

Essential Facility – Elements that are important to ensure a full recovery of a community or state following a hazard event. These would include: government functions, major employers, banks, schools, and certain commercial establishments, such as grocery stores, hardware stores, and gas stations.

Extent – The size of an area affected by a hazard or hazard event.

Fault – A fracture in the continuity of a rock formation caused by a shifting or dislodging of the earth's crust, in which adjacent surfaces are differentially displaced parallel to the plane of fracture.

Federal Emergency Management Agency (FEMA) – Independent agency created in 1978 to provide a single point of accountability for all Federal activities related to disaster mitigation and emergency preparedness, response and recovery.

Fire Potential Index (FPI) – Developed by USGS and USFS to assess and map fire hazard potential over broad areas. Based on such geographic information, national policy makers and on-the-ground fire managers established priorities for prevention activities in the defined area to reduce the risk of managed and wildfire ignition and spread. Prediction of fire hazard shortens the time between fire ignition and initial attack by enabling fire managers to pre-allocate and stage suppression forces to high fire risk areas.

Flash Flood – A flood event occurring with little or no warning where water levels rise at an extremely fast rate.

Flood – A general and temporary condition of partial or complete inundation of normally dry land areas from: 1) the overflow of inland or tidal waters, 2) the unusual and rapid accumulation or runoff of surface waters from any source, or 3) mudflows or the sudden collapse of shoreline land.

Flood Depth – Height of the flood water surface above the ground surface.

Flood Elevation – Elevation of the water surface above an established datum, e.g. National Geodetic Vertical Datum of 1929, North American Vertical Datum of 1988, or Mean Sea Level.

Flood Hazard Area – The area shown to be inundated by a flood-of a given magnitude on a map.

Flood Insurance Rate Map (FIRM) – Map of a community, prepared by the Federal Emergency Management Agency, that shows both the special flood hazard areas and the risk premium zones applicable to the community.

Flood Insurance Study (FIS) – A study that provides an examination, evaluation, and determination of flood hazards and, if appropriate, corresponding water surface elevations in a community or communities.

Floodplain – Any land area, including watercourse, susceptible to partial or complete inundation by water from any source.

Floodway – The stream channel and that portion of the adjacent floodplain that must remain open to permit passage of the base flood without raising the water surface elevation.

Frequency – A measure of how often events of a particular magnitude are expected to occur. Frequency describes how often a hazard of a specific magnitude, duration, and/or extent typically occurs, on average. Statistically, a hazard with a 100-year recurrence interval is expected to occur once every 100 years on average, and would have a 1 percent chance—its probability—of happening in any given year. The reliability of this information varies depending on the kind of hazard being considered.

Functional Downtime – The average time (in days) during which a function (business or service) is unable to provide its services due to a hazard event.

Geographic Area Impacted – The physical area in which the effects of the hazard are experienced.

Geographic Information Systems (GIS) – A computer software application that relates physical features on the earth to a database to be used for mapping and analysis.

Ground Motion – The vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter, but soft soils can further amplify ground motions.

Hazard – A source of potential danger or adverse condition. Hazards include naturally occurring events such as floods, earthquakes, tornadoes, coastal storms, landslides, and wildfires that strike populated areas. A natural event is a hazard when it has the potential to harm people or property.

Hazard Event –A specific occurrence of a particular type of hazard.

Hazard Identification – The process of identifying hazards that threaten an area.

Hazard Mitigation – Sustained actions taken to reduce or eliminate long-term risk from hazards and their effects.

Hazard Profile – A description of the physical characteristics of hazards and a determination of various descriptors including magnitude, duration, frequency, probability, and extent. In most cases, a community can most easily use these descriptors when they are recorded and displayed as maps.

HAZUS (Hazards U.S.) – A GIS-based nationally standardized earthquake loss estimation tool developed by FEMA.

Hydrology – The science of dealing with the waters of the earth. A flood discharge is developed by a hydrologic study.

Infrastructure – Refers to the public services of a community that have a direct impact on the quality of life. Infrastructure includes communication technology, such as phone lines or Internet access; vital services, such as public water supplies and sewage treatment facilities; and includes an area's transportation system, such as airports, heliports; highways, bridges, tunnels, roadbeds, overpasses, railways, bridges, rail yards, depots; and waterways, canals, locks, seaports, ferries, harbors, dry-docks, piers and regional dams.

Intensity – A measure of the effects of a hazard event as a particular place.

Loss of Bearing Strength – Results when the soil supporting structures liquefies. This can cause structures to tip and topple.

Lowest Floor – Under the NFIP, the lowest floor of the lowest enclosed area (including basement) of a structure.

Magnitude – A measure of the strength of a hazard event. The magnitude (also referred to as severity) of a given hazard event is usually determined using technical measures specific to the hazard.

Mitigation Plan – A systematic evaluation of the nature and extent of vulnerability to the effects of natural hazards typically present in the State and includes a description of actions to minimize future vulnerability to hazards.

National Flood Insurance Program (NFIP) – Federal program created by Congress in 1968 that makes flood insurance available in communities that enact minimum floodplain management regulations in 44 CFR §60.3.

National Geodetic Vertical Datum of 1929 (NGVD) – Datum established in 1929 and used in the NFIP as a basis for- measuring flood, ground, and structural elevations, previously referred to as Sea Level Datum or Mean Sea Level. The Base Flood Elevations shown on most of the Flood Insurance Rate Maps issued by the Federal Emergency Management Agency are referenced to NGVD.

National Weather Service (NWS) – Prepares and issues flood, severe weather, and coastal storm warnings and can provide technical assistance to Federal and State entities in preparing weather and flood warning plans.

Planimetric – Describes maps that indicate only man-made features like buildings.

Planning – The act or process of making or carrying out plans; the establishment of goals, policies and procedures for a social or economic unit.

Probability – A statistical measure of the likelihood that a hazard event will occur.

Recurrence Interval – The time between hazard events of similar size in a given location. It is based on the probability that the given event will be equaled or exceeded in any given year.

Repetitive Loss Property – A property that is currently insured for which two or more National Flood Insurance Program losses (occurring more than 10 days apart) of at least $1,000 each have been paid within any 10-year period since 1978.

Replacement Value – The cost of rebuilding a structure. This is usually expressed in terms of cost per square foot, and reflects the present-day cost of labor and materials to construct a building of a particular size, type, and quality.

Richter Scale – A numerical scale of earthquake magnitude devised by seismologist C.F. Richter in 1935.

Risk – The estimated impact that a hazard would have on people, services, facilities, and structures in a community; the likelihood of a hazard event resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms, such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to a specific type of hazard event. It also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

Riverine – Of or produced by a river.

Scale – A proportion used in determining a dimensional relationship; the ratio of the distance between two points on a map and the actual distance between the two points on the earth's surface.

Scarp – A steep slope.

Scour – Removal of soil or fill material by the flow of flood waters. The term is frequently used to describe storm-induced, localized conical erosion around pilings and other foundation supports where the obstruction of flow increases turbulence.

Seismicity – Describes the likelihood of an area being subject to earthquakes.

Special Flood Hazard Area (SFHA) – An area within a floodplain having a 1 percent or greater chance of flood occurrence in any given year (100-year floodplain); represented on Flood Insurance Rate Maps by darkly shaded areas with zone designations that include the letter A or V.

Stafford Act – The Robert T. Stafford Disaster Relief and Emergency Assistance Act, PL 100-107 was signed into law November 23, 1988, and amended the Disaster Relief Act of 1974, PL 93-288. The Stafford Act is the statutory authority for most Federal disaster response activities, especially as they pertain to FEMA and its programs.

State Hazard Mitigation Officer (SHMO) – The representative of state government who is the primary point of contact with FEMA, other State and Federal agencies, and local units of government in the planning and implementation of pre- and post-disaster mitigation activities.

Storm Surge – Rise in the water surface above normal water level on the open coast due to the action of wind stress and atmospheric pressure on the water surface.

Structure – Something constructed. (See also Building).

Substantial Damage – Damage of any origin sustained by a structure in a Special Flood Hazard Area whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage.

Surface Faulting – The differential movement of two sides of a fracture—in other words, the location where the ground breaks apart. The length, width, and displacement of the ground characterize surface faults.

Topographic – Characterizes maps that show natural features and indicate the physical shape of the land using contour lines. These maps may also include manmade features.

Tornado – A violently rotating column of air extending from a thunderstorm to the ground.

Vulnerability – Describes how exposed or susceptible to damage an asset is. Vulnerability depends on an asset's construction, contents, and the economic value of its functions. Like indirect damages, the vulnerability of one element of the community is often related to the vulnerability of another. For example, many businesses depend on uninterrupted electrical power—if an electric substation is flooded, it will affect not only the substation itself, but a number of businesses as well. Often, indirect effects can be much more widespread and damaging than direct ones.

Vulnerability Assessment – The extent of injury and damage that may result from a hazard event of a given intensity in a given area. The vulnerability assessment should address impacts of hazard events on the existing and future built environment.

Wave Runup – The height that the wave extends up to on steep shorelines, measured above a reference level (the normal height of the sea, corrected to the state of the tide at the time of wave arrival).

Wildfire – An uncontrolled fire spreading through vegetative fuels, exposing, and possibly consuming structures.

Zone – A geographical area shown on a Flood Insurance Rate Map (FIRM) that reflects the severity or type of flooding in the area.

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RACINE COUNTY HAZARD MITIGATION TASK FORCE

William L. McReynolds, Chairman ..... County Executive, Racine County
Michael G. Hahn ..... Chief Environmental Engineer, Southeastern Wisconsin Regional Planning Commission
Julie Anderson ..... Director of Planning and Development, Racine County
Mark J. Anderson ..... Chief of Police, City of Burlington
Kathleen Angel ..... Federal Consistency and Coastal Hazards Coordinator, Wisconsin Coastal Management Program
Tony Beyer ..... Water Systems Engineer, Village of Mount Pleasant
Chris Bennett ..... Village Trustee, Village of Rochester
Joseph E. Boxhorn ..... Senior Planner, Southeastern Wisconsin Regional Planning Commission
Roger Caron ..... President, Racine Area Manufacturers and Commerce
Jeff Crogan ..... Safety Manager, Wheaton Franciscan Health Care-All Saints
Thomas Czerniak ..... Fire Chief, Union Grove-Yorkville Fire Department
Tom Ditscheit ..... Police Chief, Town of Waterford Police Department
James Dobbs ..... Lieutenant, City of Racine Police Department
Rebecca Ewald ..... Village Administrator, Village of Waterford
Marcia Fernholz ..... Environmental Health Director, City of Racine Health Department
Paul France ..... Region Director, Wisconsin Emergency Management
Scott Geyer ..... Village of Mt. Pleasant Police Department
Mike Gitter ..... Racine Water and Wastewater Utility
Barbara Grant ..... Village Administrator, Village of Wind Point
Roxanne K. Gray ..... State Hazard Mitigation Officer, Wisconsin Division of Emergency Management
Ray Gromacki ..... Chairman, Town of Dover
Al Hagermann ..... Department of Public Works, Town of Raymond
John Hanrahan ..... Chief Deputy, Racine County Sheriff's Department
David Hendrix ..... Building Inspector, Town of Norway
Ken Hinz ..... Director of Public Works, Town of Waterford
Matt Johnson ..... Town of Waterford Police Department
Richard M. Jones ..... City Engineer, City of Racine
Bob Kacmarcik ..... Sergeant, Racine County Sheriff's Department
Gary Kasterton ..... Chairman, Town of Raymond
Thomas Kramer ..... Treasurer, Town of Norway
Cathy LaFaive-Markstrom ..... Southeast Wisconsin Citizen Corps Coordinator, Volunteer Center of Racine County
Tom Lebak ..... Village Administrator, Village of Caledonia
Scott Lettney ..... Deputy Attorney, City of Racine
Michael A. Luba ..... Root-Pike River Basin Team Supervisor, Wisconsin Department of Natural Resources
David L. Maack ..... Emergency Management Coordinator, Racine County Office of Emergency Management
Jim Markstrom ..... Emergency Coordinator, Racine County ARES/RACES
Logan Martin ..... Community Development Coordinator, Village of Mt. Pleasant
Sean Marschke ..... Police Chief, Village of Sturtevant
Cheryl Mazmanian ..... Health Officer, Western Racine County Health Department
Scott McBride ..... Principal Account Manager, We Energies
Brett McDonald ..... Shop Operations Manager Department of Public Works, Racine County
Terrence J. McMahon ..... Supervisor, Town of Yorkville
Dale Mentink ..... Assistant Fire Chief, Raymond Fire Department
Ronald R. Meyer ..... Planning Director, Village of Mt. Pleasant
James E. Moyer ..... Chairman, Town of Yorkville
Thierno Ndao ..... Programmer/Analyst, Information Technology Department, City of Racine
Betty J. Novy ..... Clerk-Treasurer, Village of Rochester
Mark Osmundsen ..... Public Works Director, Village of Union Grove
Aaron Owens ..... Research Analyst, Southeastern Wisconsin Regional Planning Commission
Thomas S. Petersen ..... Captain, Village of Mt. Pleasant Police Department
Richard L. Peterson ..... Deputy Chief, City of Burlington Fire Department
Mark E. Pierce ..... Deputy Chief, South Shore Fire Department
Rob N. Richardson ..... Director of Information Systems, Racine County
Richard Roeder ..... Fire Chief, Village of Caledonia Fire Department
Linda Sodermann ..... Local Affairs Principal Representative, We Energies
Charles R. Stachowski ..... Supervisor of Public Works, Village of Sturtevant
Skip Twardosz ..... Emergency Government, Town of Burlington
Audrey Viau ..... President, Village of Elmwood Park
Kurt Whalen ..... Police Chief, City of Racine Police Department
Alan Whalen ..... Collection System Supervisor, Racine Wastewater Utility