MONROE COUNTY WISCONSIN

MULTI-HAZARDS MITIGATION PLAN 2019-2023

This plan was prepared by the Mississippi River Regional Planning Commission through a cooperative cost sharing agreement with the Monroe County Board of Supervisors, the Mississippi River Regional Planning Commission, Wisconsin Emergency Management, and the Federal Emergency Management Agency.

ABSTRACT

Title: MONROE COUNTY MULTI-HAZARDS MITIGATION PLAN

Plan Purpose: This plan's purpose it to identify goals, projects and actions the county, other local governments and other organizations can undertake to reduce hazard risks to life, health and property.

This plan through properly addressing the federal requirements in the Disaster Mitigation Act of 2000 makes the county and other local governments that participated in the planning process eligible for Federal Hazard Mitigation Grant Programs. These programs can assist in planning, relocation and infrastructure projects that reduce and sometimes eliminate losses and damage from hazards.

Plan Participants: This plan was prepared under the direction of the County Emergency Management Committee who coordinated their plan development efforts through the County Emergency Management Coordinator. The Mississippi River Regional Planning Commission who wrote a planning grant to fund this plan was contracted with to write the plan and facilitate public meetings.

Plan Contact Information:

Monroe County Emergency Management Coordinator
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MONROE COUNTY, WISCONSIN MULTI-HAZARDS MITIGATION PLAN 2019-2023

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1.0 MONROE COUNTY MULTI-HAZARDS MITIGATION PLANNING PROCESS

Disaster Mitigation Act of 2000-DMA2K

The development of the Monroe County All-Natural Hazards Mitigation Plan and this update to that plan was the result of the passage of the Disaster Mitigation Act of 2000 (DMA2K). This Act (Public Law 106-390) signed into law on October 30, 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The Act attempts to stem the losses from disasters, reduce future public and private expenditures, and to speed up response and recovery from disasters. The following is a summary of the Act that pertains to local governments and tribal organizations.

- The Act establishes a new requirement for local governments and tribal organizations to prepare an All-Hazard Mitigation Plan in order to be eligible for funding from FEMA through the Pre-Disaster Mitigation Assistance Program and Hazard Mitigation Grant Program.
- The Act establishes a requirement that natural hazards such as tornadoes, floods, wildfires need to be addressed in the risk assessment and vulnerability analysis parts of the All Hazard Mitigation Pan. Manmade hazards such as hazardous waste spills are encouraged but not required to be addressed.
- The Act authorizes up to seven percent of Hazard Mitigation Grant Program funds available to a state after a federal disaster to be used for development of state, local, and tribal organization All Hazard Mitigation Plans.
- The Act establishes November 1, 2004 as the date by which local governments and tribal organizations are to prepare and adopt their respective plans in order to be eligible for FEMA Hazard Mitigation Grant Program and November 1, 2003 Pre-Disaster Mitigation Program.
- If a plan is not prepared by November 1, 2004, and a major disaster is declared, in order for a local government or tribal organization to be eligible to receive funding through the Hazard Mitigation Grant Program, they must agree to prepare an All Hazards Mitigation Plan within one year.
- In addition, by not having an All Hazard Mitigation Plan, local governments and tribal organizations cannot utilize funding through the Pre-Disaster Mitigation Grant Program.

Plan Committees and Organizations

The existing Monroe County All Hazard Mitigation Plan 2012-2016 included all local units of government and organizations that desired to participate in it. This update of that plan will also include all local units of government and organizations that desire to participate. This includes the county along with the Towns of Adrian, Angelo, Byron, Clifton, Glendale, Grant, Greenfield, Jefferson, Lafayette, La Grange, Leon, Lincoln, Little Falls, New Lyme, Oakdale, Portland, Ridgeville, Scott, Sheldon, Sparta, Tomah, Wellington, Wells, Wilton, the Villages of Cashton, Kendall, Melvina, Norwalk, Oakdale, Ontario, Rockland, Warrens, Wilton, Wyeville and the Cities of Sparta and Tomah. The update of the plan was prepared under the guidance of the County Public Safety and Justice Committee. Members of this committee are: Wallace Habhegger, Douglas Path, Rod Sherwood, Paul Steele and Greg Vinslauski. The County, being a member of the Mississippi River Regional Planning Commission, contracted with them to facilitate the updating of the plan under the direction of the County Emergency Management Coordinator.

County Departments

Meetings were held with the Land Conservation, Zoning, Highway, Land Information and Health Departments to explain the plan updating process and to get those departments to review the mitigation projects listed and to update/add to that list.

Public Involvement

The County used two surveys, committee meetings, a special public risk assessment and project identification public meeting, a public hearing and news releases as methods to garner public input into the plan. See Table 1-1 for a listing of the representatives who received surveys. In addition, a draft of the updated plan was sent to adjacent counties for their review and comments.

Surveys. To ensure the opportunity for inclusion of all municipalities and organizations into the planning process a risk assessment survey was mailed to all village presidents, town chairmen, mayors, county supervisors, chiefs of police, the county sheriff and fire chiefs. A listing of who received this survey can be found in Table 1-1 on page 1-4. This risk assessment survey asked the respondents to rank 24 natural hazards and one manmade hazard on a high, medium or low basis based on their opinion of a given hazards probable threat to their community's health and public safety. The survey also asked the respondents for suggestions on projects or programs that they perceive as being needed to reduce future losses from the various hazards. The results of this survey can be found on Tables 3-1 and 3-3. A copy of this survey can be found in Appendix A.

In addition to the risk assessment survey every municipality within Monroe County was mailed a copy of their hazard mitigation projects list from the first plan. Each municipality was asked to update this listing by striking out those projects which have been

completed and adding new projects to be included in the updated plan. Also, a hazard mitigation project identification survey was mailed to all county supervisors, chiefs of police, the county sheriff, fire chiefs, the county zoning administrator and the county land conservation coordinator. A listing of who received this survey can be found in Table 1-2 on page 1-5 and a copy of the survey can be found in Appendix A. A second survey was mailed out to those not responding to the first survey. Due to flooding during the development of this update a third hazard mitigation survey was mailed in October 2018. The projects identified through this process as well as others are listed in Chapter 4.

Public Safety and Justice Committee Meetings

During the course of the period in which the plan was being developed the Monroe County Public Safety and Justice Committee included the Multi-Hazards Mitigation Plan Update on their agenda. These meetings are open to the public and input from the public was accepted at these meetings. A copy of an Emergency Management Committee meeting agenda can be found in Appendix B.

Public Meetings and Hearings

The County held a public hearing on August 14, 2019 to present a draft of the updated plan and to receive public comments on the draft. The public was notified of the public hearings through a Class Two notice in the County's official newspaper, the Monroe County Herald. Due to significant flooding in August of 2018, each municipality was sent a notification of the public hearing. A copy of the public notice can be found in Appendix B. Comments regarding the plan were taken at the public hearing and for 2 weeks after the hearing. Comments were then incorporated into the plan.

Municipal and Business Participation. All local municipalities were mailed the risk assessment surveys. The municipalities receiving the survey were the Towns of Adrian, Angelo, Byron, Clifton, Glendale, Grant, Greenfield, Jefferson, Lafayette, La Grange, Leon, Lincoln, Little Falls, New Lyme, Oakdale, Portland, Ridgeville, Scott, Sheldon, Sparta, Tomah, Wellington, Wells, Wilton, the Villages of Cashton, Kendall, Melvina, Norwalk, Oakdale, Ontario, Rockland, Warrens, Wilton, Wyeville and the Cities of Sparta and Tomah. In addition of these municipalities were mailed their project listing from the first plan and were asked to update this list. The survey was mailed out to these same municipalities regarding mitigation projects in October 2018 due to severe flooding. See Table 1-3 on page 1-6 for a listing of who responded to these surveys. And lastly all these municipalities were asked to approve the updated plan by resolution. In order to accomplish this each municipality is required by law to have the adoption of the resolution as an agenda item for their board meeting. In an effort to get local business input a draft of the plan was sent to the Monroe County Economic Development, the Sparta Area Chamber of Commerce, the Cashton Area Development Corporation, the Tomah Chamber of Commerce and the Warrens Area Business Association for their review and comments.

Neighboring Communities, Academia and Nonprofits Participation. Emergency Management Directors of neighboring Counties were sent copies of the draft plan for their review and comments. The Cashton, Norwalk-Ontario-Wilton, Sparta and Tomah school districts were sent copies of the draft for their review and comment. Nonprofit organizations were given the opportunity to participate in the public hearings as these were notified through Class Two notices.

MRRPC Bimonthly Meetings

During this plan update and continuing until the final approval from FEMA, the Monroe County Multi-Hazards Mitigation Plan update was an agenda item at every MRRPC Bimonthly meeting. These bimonthly meetings, which are announced through the press and direct mailings, are open to the public. Commissioners, the public, and other interested parties were updated as to the progress of the plan and their comments and suggestions were accepted. A copy of a MRRPC Bimonthly meeting agenda can be found in Appendix C.

Funding for the Monroe County Multi-Hazards Mitigation Plan

In February 2017, the County was awarded a Federal Emergency Management Agency grant in the amount of $43,743.82 to update to their Multi-Hazards Mitigation Plan and complete countywide parcel mapping. A requirement of the grant is a 25% local match. In April 2017, the Mississippi River Regional Planning Commission signed a contract with Monroe County that called for the MRRPC to prepare the plan and provide most of the local matching share for the portion of the grant directed toward updating the mitigation plan. The Monroe County Emergency Management Department will provide the remaining match through in-kind services.

Incorporated Plans, Studies, Reports and Technical Data

The following is a list of plans, studies and reports that were used to assist in preparing this plan.

Plan Name	How used
Hazard Analysis for the State of Wisconsin, November 2008	Provided data for historical natural hazard events.
State of Wisconsin Hazard Mitigation Plan 2016	Provided dates and amounts of damage for the various natural hazards
National Climatic Data Center	Provided data for history and damage amounts for the various natural hazards
Hazard Analysis and Mitigation, Monroe County	Provided data for on the history and damage amounts for the various natural hazards and provided a source of mitigation projects
Wisconsin Department of Natural Resources Dam Database	Provided list of dams within Monroe County
Wisconsin Department of Administration, Hazard Material Site Database	Provided a list of hazardous material sites located within the County
Monroe County Emergency Operations Pan	Provided contact information and emergency operating details
Monroe County Hazardous Materials Response Plan	Provided a list of hazardous material sites
Municipal Emergency Response Plans	Provided emergency actions for various municipalities
Emergency Action Plan for Lake Tomah	Provided a list of emergency actions for Lake Tomah
Flood Insurance Study	Provided information on floodplains within the county
Angelo Dams Emergency Action Plan	Provided a list of emergency actions for Angelo Dams
Norwalk Dam 1991	Provided information pertaining to the Norwalk Dam

Plan Contents

In order to meet FEMA's local mitigation plan requirements Monroe County's Multi-Hazard Mitigation Plan is organized into the following five parts which also follow the Resource Guide to All Hazard Mitigation Planning in Wisconsin.

(1) Planning Process
(2) Planning Area
(3) Risk Assessment
(4) Mitigation Strategy
(5) Plan Maintenance and Adoption

Updated Items

During this update each of the chapters of the old plan were reviewed and updated. The following items were updated during this process:

Chapter 1: Monroe County Local Emergency Management Committee members were listed; survey information was updated and the table identifying who received surveys was updated;
Chapter 2: Population, housing and land use tables were updated;
Chapter 3: Updated risk assessments, historical data, vulnerability data, 100-year floodplain data, flood potential, updated critical facilities tables and maps and added train derailment information;
Chapter 4: Updated mitigation projects lists by identifying completed projects and adding new projects;
Chapter 5: Reviewed maintenance schedule and updated list of municipalities which have approved the plan.

Plan Contact Information

For further information pertaining to this plan contact:
Emergency Management Coordinator
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Table 1-1
Risk Assessment Survey Mailing List

Municipalities
Adrian Town Chairman
Angelo Town Chairman
Byron Town Chairman
Clifton Town Chairman
Glendale Town Chairman
Grant Town Chairman
Greenwood Town Chairman
Jefferson Town Chairman
Lafayette Town Chairman
La Grange Town Chairman
Leon Town Chairman
Lincoln Town Chairman
Little Falls Town Chairman
New Lyme Town Chairman
Oakdale Town Chairman
Portland Town Chairman
Ridgeville Town Chairman
Scott Town Chairman
Sheldon Town Chairman
Sparta Town Chairman
Tomah Township Chairman
Wellington Township Chairman
Wells Township Chairman
Wilton Township Chairman
Cashton Village President
Kendall Village President
Melvina Village President
Norwalk Village President
Oakdale Village President
Ontario Village President
Rockland Village President
Warrens Village President
Wilton Village President
Wyeville Village President
Sparta City Mayor
Tomah City Mayor

Emergency Response Organizations
Cashton First Responders
Cataract First Responders
Oakdale First Responders
Norwalk First Responders
Warrens First Responders
Sparta Ambulance Service
Tomah Ambulance Service
Wilton Ambulance Service
Fire Chief, Cashton Fire Department
Fire Chief, Fort McCoy Fire Department
Fire Chief, Kendall Fire Department
Fire Chief, Norwalk Fire Department
Fire Chief, Oakdale Fire Department
Fire Chief, Sparta Fire Department
Fire Chief, Tomah Fire Department
Fire Chief, Warrens Fire Department
Fire Chief, Wilton Fire Department
Police Chief, Village of Cashton
Police Chief, Village of Kendall
Police Chief, City of Sparta
Police Chief, City of Tomah
Police Chief, Village of Norwalk
Police Chief, Village of Wilton
Monroe County Sheriff

Table 1-2
Projects Needs Survey Mailing List

Municipalities		County Departments and Emergency Response Organizations
Adrian Town Chairman	Wilton Town Chairman	Cashton First Responders
Angelo Town Chairman	Cashton Village President	Cataract First Responders
Byron Town Chairman	Kendall Village President	Oakdale First Responders
Clifton Town Chairman	Melvina Village President	Norwalk First Responders
Glendale Town Chairman	Norwalk Village President	Warrens First Responders
Grant Town Chairman	Oakdale Village President	Sparta Ambulance Service
Greenwood Town Chairman	Ontario Village President	Tomah Ambulance Service
Jefferson Town Chairman	Rockland Village President	Wilton Ambulance Service
Lafayette Town Chairman	Warrens Village President	Cashton Fire Department
La Grange Town Chairman	Wilton Village President	Fort McCoy Fire Department
Leon Town Chairman	Wyeville Village President	Kendall Fire Department
Lincoln Town Chairman	Sparta City Mayor	Norwalk Fire Department
Little Falls Town Chairman	Tomah City Mayor	Oakdale Fire Department
New Lyme Town Chairman		Sparta Fire Department
Oakdale Town Chairman		Tomah Fire Department
Portland Town Chairman		Warrens Fire Department
Ridgeville Town Chairman		Wilton Fire Department
Scott Town Chairman		Village of Cashton
Sheldon Town Chairman		Village of Kendall
Sparta Town Chairman		City of Sparta
Tomah Town Chairman		City of Tomah
Wellington Town Chairman		Village of Norwalk
Wells Town Chairman		Village of Wilton
		Monroe County Sheriff

Table 1-3
Municipal Surveys Results

Municipality	Risk Assessment Survey		Mitigation Projects Survey		
	Received Survey	Returned Survey	Received Survey	Mailed Survey Back	Replied by individual meeting or phone conference
T. Adrian	X	X	X	X	
T. Angelo	X		X		
T. Byron	X		X		
T. Clifton	X		X		
T. Glendale	X		X		
T. Grant	X	X	X	X	
T. Greenwood	X		X		
T. Jefferson	X		X		
T. Lafayette	X	X	X	X	
T. La Grange	X	X	X	X	
T. Leon	X	X	X	X	
T. Lincoln	X		X		
T. Little Falls	X	X	X	X	
T. New Lyme	X		X		
T. Oakdale	X		X		
T. Portland	X	X	X	X	
T. Ridgeville	X		X		
T. Scott	X		X		
T. Sheldon	X		X		
T. Sparta	X	X	X	X	
T. Tomah	X	X	X	X	
T. Wellington	X		X		
T. Wells	X		X		
T. Wilton	X		X		
V. Cashton	X		X		
V. Kendall	X		X		
V. Melvina	X		X		
V. Norwalk	X		X		
V. Oakdale	X	X	X	X	
V. Ontario	X	X	X	X	
V. Rockland	X	X	X	X	
V. Warrens	X		X		
V. Wilton	X	X	X	X	
V. Wyeville	X		X		
C. Sparta	X	X	X	X	
C. Tomah	X	X	X	X	

2.0 MONROE COUNTY PLANNING AREA

General Geography

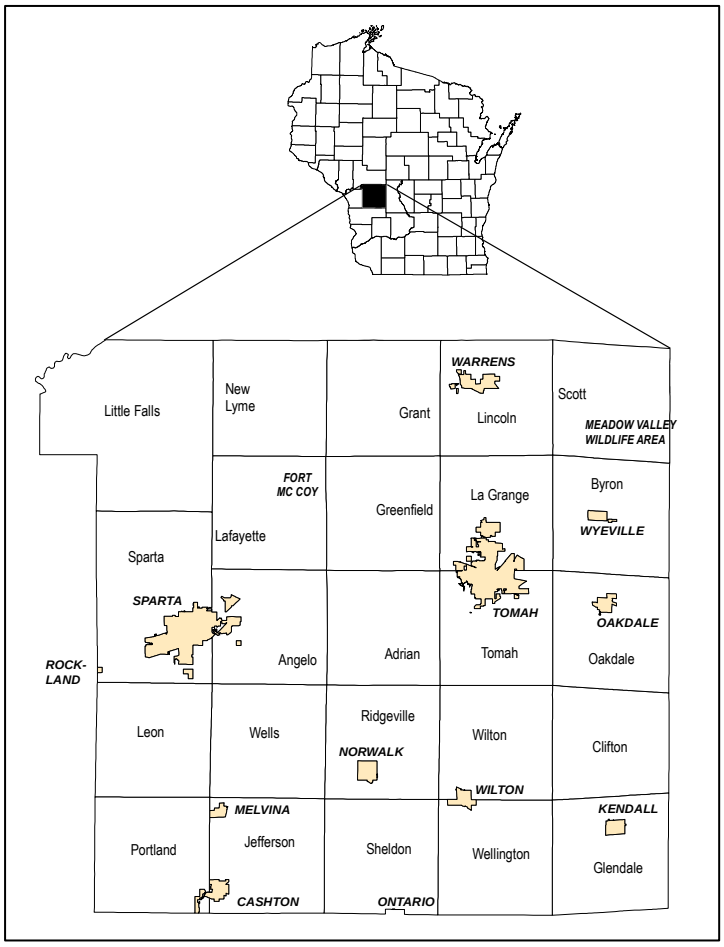
Monroe County, established in 1854, is located in west central Wisconsin and is bordered on the west by La Crosse County, on the south by Vernon county, on the east by Juneau County and on the north by Jackson County. The county is approximately 33 miles from east to west and 30 miles across from north to south. The total area is approximately 586,828 acres, or 916.92 square miles. Monroe County's population according to the 2010 Census was 44,673. The population rose to an estimated 2018 population of 46,363 (a 3.8% increase). Sparta (10,058) and Tomah (9,424) are the two largest incorporated communities. Sparta is located in the west-central part of the county and is the county seat. The two largest towns are the Town of Sparta (3,209) and the Town of La Grange (2,006).

The largest city in land area in the county is Tomah, with an area of 8.16 square miles. The smallest city in land area is Sparta with 7.901 square miles. Cashton is the largest village in land area, with 1.2 square miles. The town with the largest land area is Little Falls, which covers 68.69 square miles. There are 2 cities, 9 villages and 24 town governments in the county. The Ho-Chunk Nation also owns land in the City of Tomah and Towns of Byron, Greenfield, La Grange, Leon and Oakdale. The Fort McCoy Military Reservation is located in parts of six township and encompasses 60,000 acres. The Meadow Valley Wildlife Area, owned primarily by the U.S. Fish and Wildlife Service (USFWS) and managed cooperatively by the USFWS and Wisconsin DNR, is located on 16,000 acres of Scott Township.

Monroe County lies 155 miles northwest of Milwaukee; 146 miles southwest of Green Bay; 93 miles northwest of Madison; 91 miles south of Wausau; 78 miles south of Eau Claire; and 23 miles east of La Crosse. Major metropolitan areas outside of Wisconsin with transportation linkages to Monroe County are: Chicago 215 mile southeast; Minneapolis-St. Paul 133 miles northwest; and Duluth 206 miles north.

Land Use

The primary land use in Monroe County is agriculture, with dairy farming being the dominant type. Cranberries operations comprise a large portion of the landscape in the northeast part of the county.



Driftless Area

The driftless area, an area covering 15,425,920 acres or 24,103 square miles covers all or part of 57 counties in southeast Minnesota, southwest Wisconsin, northeast Iowa and a small portion of northwest Illinois in the Upper Mississippi River Basin. Monroe County except for a small portion of the north east corner is part of this unique area, an area that was by-passed by the last continental glacier some 10,000 years ago resulting in a steep, rugged landscape. The area is characterized by deeply dissected bedrock plateaus with ridgetops which are moderately broad and highly dissected. The ridgetop elevations in the county range from about 1,350 feet to about 1,450 feet. The valleys are short with very steep sides are from 300 feet to 400 feet below the ridgetops. The northeastern and east-central parts of the county are part of the lake basin of Glacial Lake Wisconsin. Relief in this glaciated part of the county is very mild compared to the rest of the county.

Demographic and Economic Profile

Population. Monroe County experienced a growth in population from 44,673 in 2010, to an estimated 46,109 in 2017, a 3.1 percent increase. This rate of growth was higher than the State (1.7%) but lower than the Nation (5.5%), Table 2-1. Incorporated communities ranged in population from 104 in the Village of Melvina to 9,881 in the City of Sparta. Town populations range from 133 in Scott to 3,196 in Sparta. The fastest growing City or Village from 2010-2017 was the City of Tomah, which grew 4.2 percent. The fastest growing town from 2010-2017 was the Town of Angelo which grew 11.5%, Table 2-1.

Table 2-1
Monroe County Population and Land Area Data

	Population				Land Area (Sq.Miles)		
Jurisdiction	2010	2017	# Change 10-17	% Change 10-17	Land	Water	Total
T. Adrian	762	790	28	3.5	35.24	0.01	35.25
T. Angelo	1,296	1,464	168	11.5	34.39	0.13	34.52
T. Byron	1,342	1,354	12	0.9	35.46	0.58	36.04
T. Clifton	690	694	4	0.6	34.12	0	34.12
T. Glendale	667	689	22	3.2	35.59	0.01	35.6
T. Grant	495	498	3	0.6	35.76	0.16	35.92
T. Greenfield	707	718	11	1.5	35.33	0.06	35.39
T. Jefferson	819	869	50	5.8	34.73	0	34.73
T. Lafayette	396	411	15	3.6	35.3	0.04	35.34
T. La Grange	2,007	1,997	-10	-0.5	29.79	1.59	31.38
T. Leon	1,086	1,134	48	4.2	35.72	0	35.72
T. Lincoln	835	847	12	1.4	33.08	0.83	33.91
T. Little Falls	1,523	1,587	64	4.0	68.42	0.42	68.84
T. New Lyme	168	179	11	6.1	35.41	0.49	35.9
T. Oakdale	772	791	19	2.4	35.65	0.08	35.73
T. Portland	808	836	28	3.3	35.79	0.01	35.8
T. Ridgeville	501	528	27	5.1	34.25	0.04	34.29
T. Scott	135	133	-2	-1.5	33.96	2.62	36.58
T. Sheldon	727	752	25	3.3	35.37	0	35.37
T. Sparta	3,128	3,196	68	2.1	47.31	0	47.31
T. Tomah	1,400	1,434	34	2.4	31.25	0	31.25
T. Wellington	621	650	29	4.5	35.42	0	35.42
T. Wells	519	538	19	3.5	35.67	0	35.67
T. Wilton	1,027	1,060	33	3.1	34.89	0	34.89
Town Totals	**22,431**	**23,149**	**718**	**3.1**	**877.9**	**7.07**	**884.97**
V. Cashton	1,102	1,103	1	0.1	1.26	0	1.26
V. Kendall	472	466	-6	-1.3	0.76	0	0.76
V. Melvina	104	104	0	0.0	0.48	0	0.48
V. Norwalk	638	637	-1	-0.2	1.03	0	1.03
V. Oakdale	297	289	-8	-2.8	0.77	0	0.77
V. Ontario	0	0	0	0.0	0.004	0	0.004
V. Rockland	0	0	0	0.0	0.07	0	0.07
V. Warrens	363	354	-9	-2.5	1.5	0.02	1.52
V. Wilton	504	498	-6	-1.2	0.89	0	0.89
V. Wyeville	147	137	-10	-7.3	0.56	0	0.56
C. Sparta	9,522	9,881	359	3.6	7.9	0.06	7.96
C. Tomah	9,093	9,491	398	4.2	7.71	0.39	8.1
Village & City Totals	**22,242**	**22,960**	718	3.1	22.934	**0.47**	**23.404**
Monroe County	**44,673**	**46,109**	**1,436**	**3.1**	**900.834**	**7.54**	**908.374**
Wisconsin	**5,686,986**	**5,783,278**	**96,292**	**1.7**	**54,310**	**11,888**	**65,498**
United States	**308,748,538**	**325,719,178**	**16,970,640**	**5.5**	**3,537,422**	**181,272**	**3,718,694**

*Part of the Village of Ontario is located in Vernon County and part of the Village of Rockland is located in La Crosse County
Source: 1) 2010 Populations: U.S. Department of Commerce-Bureau of the Census

2) 2017 Population Estimates: State of Wisconsin-Department of Administration, Demographic Services Center

3) Monroe County and Jurisdictions Land/Water Area: Monroe County Land Information Office

4) Wis. and U.S. Land/Water Area: U.S. Census Bureau, 2000 Census of Population and Housing, Summary Population and Housing Characteristics

Housing. Between the years 2010 to 2017 the percent of housing growth in Monroe County was higher than both the State and Nation. The number of housing units in the County increased from 19,202 in 2010 to 19,758 in 2017, an increase of 2.81 percent. The percentage increases for the State of Wisconsin and the Nation was 2.81% and 2.72% respectively. The City of Sparta with 4,598 housing units in 2017 had the most housing units of any community. The municipality with the largest percentage increase from 2010-2017 was the Town of Oakdale, with a 12.5 percent increase in housing units, See Table 2-2.

Table 2-2
Monroe County Housing and Housing Units Per Square Mile

	Housing Units				Housing Units Per Sq. Mile of Land Area			
Jurisdiction	2010	2017	Number Change 10-17	Percent Change 10-17	2010	2017	Number Change 10-17	Percent Change 10-17
T. Adrian	303	312	9	2.88%	8.60	8.85	9	0.03
T. Angelo	557	531	-26	-4.90%	16.14	15.38	-26	-0.05
T. Byron	592	591	-1	-0.17%	16.43	16.40	-1	0.00
T. Clifton	256	239	-17	-7.11%	7.50	7.00	-17	-0.07
T. Glendale	287	304	17	5.59%	8.06	8.54	17	0.06
T. Grant	235	245	10	4.08%	6.54	6.82	10	0.04
T. Greenwood	326	349	23	6.59%	9.21	9.86	23	0.07
T. Jefferson	257	257	0	0.00%	7.40	7.40	0	0.00
T. Lafayette	132	147	15	10.20%	3.74	4.16	15	0.11
T. La Grange	782	813	31	3.81%	24.92	25.91	31	0.04
T. Leon	428	423	-5	-1.18%	11.98	11.84	-5	-0.01
T. Lincoln	387	409	22	5.38%	11.41	12.06	22	0.06
T. Little Falls	648	673	25	3.71%	9.41	9.78	25	0.04
T. New Lyme	94	100	6	6.00%	2.62	2.79	6	0.06
T. Oakdale	294	336	42	12.50%	8.23	9.40	42	0.14
T. Portland	327	328	1	0.30%	9.13	9.16	1	0.00
T. Ridgeville	212	207	-5	-2.42%	6.18	6.04	-5	-0.02
T. Scott	71	74	3	4.05%	1.94	2.02	3	0.04
T. Sheldon	255	258	3	1.16%	7.21	7.29	3	0.01
T. Sparta	1,176	1,179	3	0.25%	24.86	24.92	3	0.00
T. Tomah	575	655	80	12.21%	18.40	20.96	80	0.14
T. Wellington	256	235	-21	-8.94%	7.23	6.63	-21	-0.08
T. Wells	229	243	14	5.76%	6.42	6.81	14	0.06
T. Wilton	309	300	-9	-3.00%	8.86	8.60	-9	-0.03
Town Totals	**8,988**	**9,208**	220	2.39%	10.16	10.40	220	0.02
V. Cashton	497	448	-49	-10.94%	394.44	355.56	-49	-0.10
V. Kendall	233	220	-13	-5.91%	306.58	289.47	-13	-0.06
V. Melvina	44	39	-5	-12.82%	91.67	81.25	-5	-0.11
V. Norwalk	237	270	33	12.22%	230.10	262.14	33	0.14
V. Oakdale	137	133	-4	-3.01%	177.92	172.73	-4	-0.03
V. Ontario (Pt)*	0	0	0	0	0.00	0.00	0	0.00
V. Rockland (Pt)*	0	0	0	0	0.00	0.00	0	0.00
V. Warrens	375	380	5	1.32%	246.71	250.00	5	0.01
V. Wilton	233	218	-15	-6.88%	261.80	244.94	-15	-0.06
V. Wyeville	70	60	-10	-16.67%	125.00	107.14	-10	-0.14
C. Sparta	4,192	4,598	406	8.83%	526.63	577.64	406	0.10
C. Tomah	4,196	4,184	-12	-0.29%	518.02	516.54	-12	0.00
Village & City Totals	**10,214**	**10,550**	**336**	**3.18%**	**436.42**	**450.78**	**336**	**0.03**
Monroe County	**19,202**	**19,758**	**556**	**2.81%**	**21.14**	**21.75**	**0.61**	**0.03**
Wisconsin	**2,624,358**	**2,668,692**	**44,334**	**1.66%**	**40.07**	**40.74**	**0.68**	**0.02**
United States	**131,704,730**	**135,393,564**	**3,688,834**	**2.72%**	**35.42**	**36.41**	**0.99**	**0.03**

*Part of the Village of Ontario is located in Vernon County and part of the Village of Rockland is located in La Crosse County

Source: U.S. Department of Commerce-Bureau of the Census

Employment and Industry.

Employment for those aged 16 and older in the County decreased from 21,840 employees in 2010 to 21,433 employees in 2017 a decrease of 1.9 percent. This decrease in employment is in contrast to both the State and the Nation which experienced increases of 1.0% and 1.8% respectively. The top three employment sectors in the County in 2017 were Educational, Health and Social Services (21.8%), Manufacturing (17.7%), and Retail trade (11.2%). The employment sectors which experienced the largest percentage growth during this time period was Other services (except public administration), which saw a growth of 17.7 percent. The employment sector which saw the largest percentage decrease was Wholesale trade which decrease by 32.3 percent. See Table 2-3.

Table 2-3

Employment by Industry

	Monroe County					Wisconsin					United States				
	2010 [1]		2017 [2]		% Change 10-17	2010 [1]		2017 [2]		% Change 10-17	2010 [1]		2017 [2]		% Change 10-17
	No. Emp.	%	No. Emp.	%		No. Emp.	%	No. Emp.	%		No. Emp.	%	No. Emp.	%	
Agriculture, forestry, fishing and hunting, and mining	1,323	6.1	1,186	5.5	-10.4	71,071	2.4	70,575	2.4	-0.7	2,843,703	1.9	2,817,922	1.9	-0.9
Construction	1,342	6.1	1,163	5.4	-13.3	155,081	5.3	160,587	5.5	3.6	9,256,637	6.3	9,564,541	6.4	3.3
Manufacturing	3,827	17.5	3,784	17.7	-1.1	536,806	18.4	540,274	18.4	0.6	15,316,355	10.3	15,477,389	10.3	1.1
Wholesale trade	585	2.7	396	1.8	-32.3	77,724	2.7	79,418	2.7	2.2	3,993,420	2.7	4,042,867	2.7	1.2
Retail trade	2,248	10.3	2,401	11.2	6.8	330,945	11.4	331,399	11.3	0.1	17,027,853	11.5	17,167,000	11.4	0.8
Transportation and warehousing, and utilities	1,393	6.2	1,332	6.2	-2.3	124,870	4.3	127,961	4.4	2.5	7,411,283	5.0	7,681,579	5.1	3.6
Information	280	1.3	261	1.2	-6.8	47,931	1.6	48,221	1.6	0.6	3,131,838	2.1	3,173,300	2.1	1.3
Finance, insurance, real estate, and rental and leasing	774	3.5	842	3.9	8.8	177,499	6.1	177,957	6.1	0.3	9,731,609	6.6	9,908,320	6.6	1.8
Professional, scientific, management, administrative, and waste management services	967	4.4	1,081	5.0	11.8	236,958	8.1	243,554	8.3	2.8	16,516,075	11.2	17,001,157	11.3	2.9
Educational, health and social services	4,482	20.6	4,669	21.8	4.2	677,098	23.3	682,285	23.2	0.8	34,202,980	23.1	34,781,348	23.1	1.7
Arts, entertainment, recreation, accommodation and food services	1,832	8.4	1,816	8.5	-0.9	252,787	8.7	254,526	8.7	0.7	14,316,298	9.7	14,586,646	9.7	1.9
Other services (except public administration)	734	3.4	859	4.0	17.0	120,714	4.1	121,136	4.1	0.3	7,275,839	4.9	7,371,226	4.9	1.3
Public Administration	2,083	9.5	1,643	7.7	-21.1	100,855	3.5	101,987	3.5	1.1	6,977,436	4.7	7,025,870	4.7	0.7
Total Employees	21,840		21,433		-1.9	2,910,339		2,939,880		1.0	148,001,326		150,599,165		1.8

[1] Census 2010, Profile of Selected Economic Characteristics

[2] 2013-2017 American Community Survey 5-Year Estimates, Industry by Occupation for the Civilian Employed Population 16 Years and over

Monroe County Top Employers

According to Wisconsin Department of Workforce Development the top employers in Monroe County are:

Employer	Number of Employees	Employer	Number of Employees
Fort McCoy	1,000 – 4,999	Sparta Area School District	250 - 499
Northern Engraving	1,000 – 4,999	Cardinal Co.	250 - 499
U.S. Veteran's Medical Center	500 - 999	Walmart Supercenter	250 - 499
Walmart Distribution Center	500 - 999	Century Foods LLC	250 - 499
Toro Co.	500 - 999	Mathews Archery	250 - 499

General Development Pattern

Land Use Trends. Real estate assessment records from 2013 to 2018 provide the most current land use information for the County. In 2018 Agricultural land totaled 243,330 acres or 57.0% of land use in the County. This was followed by Agricultural Forest - 65,660 acres (15.3%); Undeveloped - 46,625 acres (10.9%); Forest - 42,278 acres (9.9%); Residential - 18,226 acres (4.3%); Other - 5,157 acres (1.2%); Commercial - 3,422 acres (0.8%); and Manufacturing - 2,688 acres (0.6%). The rural nature of the County is clearly indicated with 82.2 percent of the land being used for agriculture and forests, Table 2-4.

Agricultural assessed land (Agriculture and Agriculture Forest categories) declined slightly between the years 2013 and 2018 from 310,897 acres to 309,393 acres in 2018 or 0.5 percent. While the more urban forms of land use, Residential, Commercial and Manufacturing increased from 2013 – 2018. Residential land use increased by 1,234 acres or 7.3 percent, Commercial land use increased by 281 acres or 8.9 percent and Manufacturing land use increased by 214 acres or 8.7 percent.

Table 2-4
Monroe County Land Use

	2013		2018	
	Acres	Percent of County	Acres	Percent of County
Residential (1)	16,992	4.2	18,226	4.3
Commercial (1)	3,141	0.7	3,422	0.8
Manufacturing (1)	2,474	0.6	2,688	0.6
Agricultural (1)	244,137	56.8	243,733	57.0
Undeveloped (1)	46,241	10.8	46,625	10.9
Agricultural Forest (1)	66,760	15.5	65,660	15.3
Forest (1)	44,655	10.4	42,278	9.9
Other (2)	5,227	1.2	5,157	1.2
County Total	**429,627**	**100**	**414,728**	**100**

(1) Wisconsin Department of Revenue - 2013 and 2018 Final Statement of Assessments

(2) Includes water areas but excludes the Mississippi River. Also includes tax exempt lands as identified by the Wisconsin Department of Revenue. These tax-exempt lands include city, village, town, county, state, and federally owned lands as well as: School districts, lake districts, sewer districts, vocational and technical districts, colleges, universities, forest management lands, some non-profit organization lands, cemeteries, and shelters. State Statute 70.11 lists all tax-exempt properties which would be included in this category.

Housing Development Trends. Between 2010 -2017 there was a slight increase in residential housing. In 2010 there were 19,202 housing units in Monroe County, while there were 19,758 housing units in 2017, an increase of 556 housing units or 2.81 percent (US Census Bureau). City and Villages increased more than the Towns did, the City and Villages increased by 336 units while the Towns increased by 220 units. Of the 36 municipalities, 19 experienced an increase in housing units, 14 experienced a decrease and 3 stayed the same. The City of Sparta saw the largest increase with 406 new housing units. This is 73 percent of all new housing units, Table 2-2. The number of acres classified as residential increased from 16,992 in 2013 to 18,226 in 2018 an increase of 7.3 percent. Favorable housing market conditions which included low interest rates help to explain the housing units increase.

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3.0 MONROE COUNTY RISK ASSESSMENT

The following is Monroe County's assessment of each of the natural hazards identified as occurring in the State of Wisconsin. Each natural hazard is assessed on the historical occurrence of the hazard, the vulnerability to a given hazard, the probability of the hazard occurring again and a local official's opinion survey. A final risk assessment designation of high, moderate or low is then assigned to each hazard based on a total score from ratings within each of these four assessment factors. Each jurisdiction in the county has the same risk to each hazard with the exception of flooding. The Village of Cashton does not have a high risk of Riverine or Flash flooding but are susceptible to Stormwater Flooding. See Map 3-6 for flood prone areas. Monroe County has not experienced a lot of development therefore the vulnerability to the various hazards has not increased or decreased with the exception of flooding.

An overall risk assessment rating of 22 points or greater equates to a "high" risk assessment designation for a given hazard. A risk assessment rating of 15 to 21 points equates to a moderate risk assessment designation and a rating of 14 points or less results in a low risk assessment rating for a given hazard. Table 3-2 provides a summary of the ratings for all the natural hazards.

The following is a description of how the ratings are determined for each assessment and how these ratings result in the final risk assessment designation.

Historical Occurrence Rating Criteria:
Historical occurrence refers to the number of times a particular hazard occurred in the past. Because historical records for the hazards vary greatly each hazard is assessed on occurrences within a 25-year period.

• Less than 4 occurrences in the past 25 years =Low rating, 1-3 points
• 4 to 7 occurrences in the past 25 years = Moderately Low rating, 3-5 points
• 8 to 12 occurrences in the past 25 years = Moderately High rating, 5-7 points
• More than 12 occurrences in the past 25 years = High rating, 7-9 points

Vulnerability Rating Criteria:
Vulnerability is a measure of how people, buildings, structures, personal property, and other things considered important are adversely affected by a given hazard. Some aspects to help measure the magnitude of vulnerability in the county have been quantified in Tables 3-1 and 3-2. These tables show the maximum extent of vulnerability within the county. The vulnerability of a population, buildings, structures, transportation routes and businesses will vary from one community to another and from one hazard to another.

• Less than 10% of population or property adversely affected =	Negligible rating, 1-3 points
• Ten to less than 25% of population or property adversely affected =	Limited rating, 3-5 points
• Twenty-Five to less than 50% of the population or property adversely affected =	Critical rating, 5-7 points
• More than 50% of the population or property adversely affected =	Catastrophic rating, 7-9 points

Probability Rating Criteria:
Probability rating is a measure of the likelihood and frequency of hazard occurring in the future.

• Less than 1% probability in the next 100 years =	Unlikely rating, 1-3 points
• From 1% and 10% probability in the next year or at least one chance in next 100 years	Possible rating, 3-5 points
• Over 10% to nearly 100% probability in the next year or at least one chance in the next 10 years =	Likely rating, 5-7 points
• Nearly 100% chance in the next year =	Highly Likely rating, 7-9 points

Local Official Hazard Survey Rating Criteria:
In April of 2017 a local official's survey was mailed to county board supervisors, village presidents, town chairman, mayors, chiefs of police, the sheriff, and fire department chiefs in the county. Each county official was asked to rank the county's natural hazards as high, medium, or low regarding their opinion on each hazard's threat to health and public safety.

• A majority of local officials were of the opinion that this hazard posed a "low" threat to health and public safety in comparison to the 17 other hazards =	Low rating, 1-3 points
• A majority of local officials were of the opinion that this hazard posed a "medium" threat to health and public safety in comparison to the other 17 hazards =	Medium rating, 3-6 points
• A majority of local officials were of the opinion that this hazard posed a "high" threat to health and public safety in comparison to the other 17 hazards =	High rating, 6-9 points

Risk Assessment Designation:
The risk assessment designation is determined by adding the rating points assigned from historical occurrences, vulnerability, probability and the local official survey factors. These summations for each hazard are then assigned a low, moderate, or high threat based on numerical rank.

• A combined risk factor rating of 11 points or less =	Low Threat
• A combined risk factor rating of 12 to 22 points =	Moderate Threat
• A combined risk factor rating of 23 points or more =	High Threat

3.1 Monroe County, Hailstorm Risk Assessment

Hailstorm Definition: A hailstorm is a weather condition where atmospheric water particles form into rounded or irregular masses of ice that fall to earth. Hail is a product of strong thunderstorms that frequently move across the state. 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.

Hailstorms normally range from the size of a pea to that of a golf ball, but sizes larger than baseballs have occurred with the most severe storms. They form when subfreezing temperatures cause water in thunderstorm clouds to accumulate around an icy core. When strong underlying winds no longer can support their weight, the hailstones fall earthward. Hail tends to fall in swaths that may be 20-115 miles long and 5-30 miles wide. The swath is not normally a large, continuous bombardment of hail, but generally consists of a series of hail strikes that are produced by individual thunderstorm clouds traversing the same general area. 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 crops of the interior plains of the U.S. because they dent vehicles and structures, break windows, damage roofs and batter crops to the point that significant agricultural losses result. Serious injury and loss of human life, however, are rarely associated with hailstorms.

Hailstorm History and Frequency:

1960's: 6 reported events by National Climatic Data Center (NCDC), 8/2/63, 5/7/64, 7/8/64, 7/10/64, 5/15/68, 6/26/69, 1.0-2.0" size hailstorms.

1970's: 3 reported events by NCDC, 8/22/71, 6/14/74, 7/3/75, 1.75" size hailstorms.

1980's: 7 reported events by NCDC –5/30/80, 4/3/81, 7/3/83, 7/19/83, 4/25/86, 5/8/88, 7/8/89, .75" to 2.00" size hailstorms

1990's: 16 reported events by NCDC – (8/26/90 Sparta), (5/16/92 Cataract, Warrens, Tunnel City), (8/1/92 Tomah), (4/24/94 Oakdale), (7/31/94 Fort McCoy), (6/7/95 Norwalk), (8/7/95 T. Angelo), (5/18/96 Leon), (7/16/97 Kendall), (9/19/97 Wilton-$15,000 PD), (5/12/98 Cataract), (5/28/98 Tomah), (6/24/98 Sparta, Tomah-$20,000 PD & $25,000 CD, Warrens-$15,00 PD & $30,000 CD), 8/14/98 Norwalk), (6/8/99 Tomah-$15,000 CD), (7/8/99 Norwalk-$15,000 CD), .75" to 1.75" size hailstorms. Damage totals of $35,000 PD and $100,000 CD.

2000's: 28 reported events by NCDC –(6/1/00 Tunnel City-$2,500 CD, Oakdale-$250,000 PD & $50,000 CD), (9/3/00 Warrens-$750 PD & $5,000 CD), (9/11/00 Sparta-$7,500 PD), (5/10/01 Cashton-$1,500 PD), (6/11/01 Cashton, Portland, Norwalk-$1,500 CD, Sparta_$2,00 CD, Tomah-$1,750 PD & $3,000 CD, Four Corners, Cataract, Tunnel City), (6/17/01 Sparta, Tomah-$8,000 PD, Melvina), (4/18/02 Tomah, Warrens), (5/30/02 Tomah, Wyeville), (7/4/03 Sparta), (4/17/04 Cashton, Glendale), (5/7/04 Sparta), (6/8/04 Warrens), (6/23/04 Tomah), (7/25/05 Tomah), (9/7/05 Oakdale), (5/25/06 Sparta), (6/6/06 Shennington), (7/27/06 Norwalk-$800 PD

& $2,000 CD), (8/23/06 Kirby-$15,000 PD & $500,000 CD, Warrens-$510,000 PD & $3,550,000 CD, Tunnel City-$80,000 PD & $80,000 CD, Tomah-$10,000 PD & $5,000 CD, Oakdale-$65,000 PD & $105,000 CD) , (8/25/06 Norwalk-$1,000 PD & $2,000 CD), 3/21/07 Angelo, Fort McCoy), (3/25/07 Cataract, Cashton, Melvina), (6/7/07 Sparta-$50,000 PD & $3,000 CD, Angelo-$25,000 PD, Cataract-$25,000 PD, Warrens), (6/28/08 Leon, Tomah, Oakdale), (7/10/08 Watermill, Tomah, Fort McCoy), (8/4/08 Leon), (5/6/09 Sparta), (7/27/09 Four Corners, Sparta, Sparta Municipal Airport-$2,500 PD & $20,000 CD, Fort McCoy Airport-$2,000 PD & $10,000 CD, Wilton-$25,000 PD), 0.75" to 4.50" hail storms. Damage totals of $1,055,800 PD & $4,366,000 CD.

2010's: 20 reported events by NCDC –(4/3/11 Sparta), (4/10/11 Sparta, Fort McCoy Airport, Tomah-$6,500 PD, Warrens), (5/1/11 Tomah Airport-$10,00 PD, Watermill, Fort McCoy Airport), (5/22/11 Tomah Airport, Kirby, Norway Ridge-$268,000 PD), (6/6/11 Angelo, Fort McCoy, Ridgeville), (8/16/12 Sparta), (6/21/13 Tomah), (8/6/13 Sparta), (4/12/14 Leon, Tomah), (7/7/14 Sparta, Leon, Norwalk, Glendale), (8/1/14 Oakdale), (4/9/15 Cashton, Leon, Sparta Municipal Airport), (5/3/15 Watermill), (7/13/15 Sparta, Portland, Cataract, Fort McCoy, Angelo), (5/31/16 Four Corners), (5/17/17 Sparta), (7/6/17 Warrens, Valley Junction), (7/9/17 Angelo, Cataract), (6/15/18 Oakdale), (6/30/18 Sparta), 0.75" to 3.75" hail storms. Damage totals of $285,000 PD.

PD = Property Damage and CD = Crop Damage

Wisconsin averages between two to three hail days per year as recorded by National Weather Service stations, although this may not be indicative of the number of hailstorms which occur within a county or larger area during any given hail season. The months of maximum hailstorm frequency are May through September with approximately 85% of hailstorms occurring during this period. Unfortunately, hailstorms are most frequent during the four months of the growing and harvesting seasons for most crops in the state. According to the National Weather Service, about 20% of all severe weather events in Wisconsin are hail events in which hailstones are at least ¾ inch in diameter. Serious hailstorms with hailstones 1.5 inch or larger in diameter are not common.

Between 1990 and the end of 2018 the NCDC reported 64 Hailstorm events. Of these 64 events 16 events (25%) resulted in property damage and 12 (18.8%) had crop damage reported. The total property damage reported for the 16 events was $7,869,300,000 and crop damage reported totaled $4,466,000 during 12 events. Based upon this historical data when Monroe County experiences a hailstorm large enough to cause property damage or crop damage the average amount of property damage to occur is $493,519 and the average amount of crop damage is $372,166. Between 1990 and 2018 Monroe County averaged 2.2 hailstorm events per year. Based upon these averages the county can expect to experience 11 hailstorms within the next 5-year period. If historical trends continue the county can expect that 25% of these storms will be strong enough to cause property damage. This would result in 3 storms strong enough to cause property damage resulting is $1,318,557 in property damage. In addition, 18.8% of the hailstorms would cause crop damage. This would result in 2 storms causing $744,332 of crop damage during that same 5-year period.

Hailstorm Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns hailstorms a risk factor of 24 indicating this natural hazard is a high risk to the county. Critical facilities vulnerability to hailstorms would be limited primarily to damage to the building's roof and windows and would not interrupt services provided by these facilities except in extreme cases. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In Monroe County there are 954 businesses and industries that employ 15,766 people, with an annual payroll of approximately $650 million, see Table 3-5. For most businesses and industries hailstorms pose a moderate hazard risk with damage confined to building roofs and windows. Examples of businesses that are particularly vulnerable to hail damage include car and truck dealerships that display vehicles outdoors, greenhouses, and nurseries that store plants and trees outdoors. Auto dealerships can suffer significant losses to their vehicles.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Agriculture is a significant part of the county's economy. The overall threat of hailstorm is ranked as high and agricultural crops can sustain significant damage and economic loss from hailstorms. Hailstorms occur most frequently in the county in the months from May through September which coincides with the planting and harvesting of most crops in the county making those crops vulnerable to hailstorms.
- Roads and Highways. Hail damage can occur to any vehicle exposed to elements, whether moving or parked. Hail, although when it is lying on the ground, can cause icing conditions, usually is melted before mitigation action such as sanding, salting, or plowing is done. It can occur in seasons when highway trucks are not setup for snow and ice control.

- Railroads. Hail can cause cessation of rail work crews. Hail can cause damage to windshields and headlight covers of locomotives and Maintenance of Way (M of W) equipment. Hail can cause damage to signal lamp covers. Hail can also cause damage to building roofs.
- Airway. Hail can cause damage to aircraft skin and control surfaces. Such damage may be critical to the safety and integrity of the aircraft and its control. Hail can cause icing and clogging of engines of small planes in flight. Hail can damage runway lighting fixtures.
- Waterways. Hail can damage watercraft windows, lights, instruments and communication devices.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities vulnerability to hailstorms would be limited to damage to the roofs, windows and electrical service, and would not interrupt services provided by these facilities except in extreme cases.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities vulnerability to hailstorms would be limited to the building roofs, windows and electrical service and would not interrupt services provided by these facilities except in extreme cases.
- Hazardous Material Sites. Hazardous material containers in transport can be broached by any accident to the transport mode caused by hail. Hazardous material in storage has no severe impacts caused directly by hail.

Hailstorm Risk Assessment Designation

Hailstorm Historical Occurrence Rating: High - 9
Hailstorm Vulnerability Rating: Negligible - 4
Hailstorm Probability Rating: Highly Likely - 8
Hailstorm Local Official Survey Rating: Medium - 5
Hailstorm Risk Assessment Designation: **High Threat - 26 points**
See Table 3-2 for a detailed analysis to determine the above Rise Assessment Designation.

Hailstorm Hazard Mitigation Ideas: ● Remove or protect vulnerable attachments such as awnings, antennas and signs on buildings ● Replace vulnerable shingles and siding with hail resistant building materials ● Protect or relocate essential utility and communication equipment ● Provide county residents with public information on hailstorms during severe weather awareness ● Promote the purchase of hail insurance ● Have at least one highway truck at each shop, with a plow and sander that can easily be quickly mounted to respond to emergency situations ● Provide a shed or covered area to store government vehicles if a hail storm is predicted

3.2 Monroe County, Lightning Storm Risk Assessment

Lightning Storm Definition: Lightning is 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. Nationally, lightning causes extensive damage to buildings and structures, kills or injures people and livestock, starts untold numbers of forest fires and wildfires and disrupts electromagnetic transmissions.

To the general public lightening is often perceived as a minor hazard. However, lightning-caused damages, injuries and deaths establish lightning as a significant hazard associated with any thunderstorm in any part of the state. Damage from lightning occurs four ways:

1) Electrocution/severe shock of humans and animals;
2) Vaporization of materials along the path of the lightning strike;
3) Fire caused by the high temperatures associated with lightning (10,000-60,000°F); and
4) The sudden power surge that can damage electrical/electronic equipment.

Large outdoor gatherings (sporting events, concerts, campgrounds, etc.) are particularly vulnerable to lightning strikes that could result in injuries and deaths. Early warning of lightning hazards, combined with prudent protective actions, can greatly reduce the likelihood of lightning-related injuries and deaths.

Lightning Storm History and Frequency:

2000's 3 reported events by NCDC – (7/20/06 Tomah-$15,000 PD), (3/28/07 Sparta-$20,000 PD) and (8/3/09 Oakdale-$25,000 PD).

2010's: 2 reported events by NCDC – (6/14/11 Sparta Airport-$15,500 PD) and (4/9/15 Sparta-$2,000 PD).

Wisconsin has a high frequency of property losses due to lightning. Insurance statistics show that two out of every 100 farms are struck by lightning or have a fire that may have been lightning-caused each year. According to National Weather Service reports, Monroe County experienced 5 lightning events between 2000 and 2018 with no injuries and deaths recorded. From 2006 through 2017, 376 people were struck and killed by lightning in the United States. Almost two thirds of the deaths occurred to people who had been enjoying outdoor leisure activities. June, July, and August are the peak months for lightning activity across the United States and the peak months for outdoor summer activities. As a result, more than 70% of the lightning deaths occurred in the months of June, July, and August.

Lightning Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns lightning a risk factor of 24 indicating this natural hazard is a high risk to the county.
- Business and Industry. For most business and industries, lightning poses a moderate hazard risk. The damages caused by lightning to buildings and the potential injuries and deaths resulting from a lightning strike established lighting as a significant hazard associated with any thunderstorm. Lightning can cause electrocution and severe shock in humans, fires in buildings and the sudden power surges resulting from lightning can cause significant damages to a business/industries electrical services, and electronic equipment such as computers and motors and communications systems. The manufacturing industry could experience disruptions caused by lightning strikes to their product processes that could result in the company sustaining economic losses.
- Agriculture. The overall hazard risk ranking for lightning for agriculture is high. The damages caused by lightning strikes can be a significant hazard because lighting strikes can cause electrocution or severe shock to humans and farm animals, fire risk to buildings and sudden power surges associated with lightning strikes can cause significant damage to electrical services, motors and milking machinery. Workers in fields and animals in open spaces are particularly vulnerable to lighting strikes. Tree plantations are also susceptible to fires causes by lightning strikes.
- Roads and Highways. Severe lightning in Wisconsin is invariably accompanied by heavy rains, which can limit visibility for drivers. Lightning can cause trees, or parts of trees, to suddenly fall across the road. Lightning can be a hazard to people who attempt to leave their vehicle at service plazas, etc.
- Railroads. Severe lightning can be hazardous to railway track and other workers. Lightning can cause trees, or parts of trees, to suddenly fall across railroad tracks. Lightning can cause electric signals and remote-controlled switches to malfunction. Lightning can cause radio communications outages.
- Airway. Lightning can cause malfunction of aircraft communications and navigation devices. Lightning can be hazardous to airport workers and passengers who must access the aircraft by walking across an open field/taxi area.
- Waterways. Lightning can be hazardous to workers exposed on decks, or at locks during the storm. Lightning can disrupt electronic devices and communications.
- Municipal Water. In the county there are 19 municipal wells and waters systems in operation, see Table 3-10. These facilities vulnerable to lighting would include fire damage to facilities from lightning strikes, damage to a facility's electrical service, electronic equipment and motors. Municipal water service would not be interrupted except in extreme cases.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities operating in the county, see Table 3-11. These facility's vulnerability to lightning would include fire damage to facilities from lighting strikes, damage to the facilities electrical service, electronic equipment and motors and as a result of power surges, wastewater treatment service would not be interrupted except in extreme cases.
- Hazardous Material Sites. The impact of lightning storms on hazardous material is specific to the type of material and its storage or transportation conditions. A lightning strike to a fixed storage building, while having little impact on transportation modes, could start a fire or explosion with the stored hazardous material.

Lightning Storm Risk Assessment Designation

Lightning Storm Historical Occurrence Rating: High - 9
Lightning Storm Vulnerability Rating: Negligible - 2
Lightning Storm Probability Rating: Highly Likely - 7

Lightning Storm Local Official Survey Rating: Medium/High - 6
Lightning Storm Risk Assessment Designation: **High Threat - 24 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Lightning Storm Hazard Mitigation Ideas: ● Communities may use outreach programs to promote awareness of thunderstorm/lightning dangers – for example: consider placing lightning safety tips and/or action plan in game programs, flyers, scorecards etc. and during Severe Weather Awareness Week emphasize issues on weather related disaster preparedness through public education ● Local and state governments can invest in public early warning systems/networks, as well as train people to serve as weather spotters ● Promote establishment of indoor warning systems at all critical facilities and public gathering locations ● When thunder is heard, seek shelter inside the nearest building or enclosed vehicle (e.g., a car, bus or truck). If shelter is not available, avoid trees or tall objects because electricity may be conducted from that object to other nearby objects or persons ● Avoid high ground, water, open spaces and metal objects (golf clubs, umbrellas, fences, tools) ● When indoors, turn off appliances and electronic devices and remain inside until the storm passes ● Surge protection can be installed on critical electronic equipment (*protection devises such as lightning rods and grounding can be installed on critical facilities*) ● Remove taller trees in the vicinity of vulnerable structures ● Specimen trees growing along roadways, or in rest areas or landscaped areas, can be protected by properly installed lightning rods ● Local airports can suspend operations during severe lightning storms ● Major hazardous material storage sites should be protected with properly installed lightning rods

3.3 Monroe County, Thunderstorm Risk Assessment

Thunderstorm Definition: Thunderstorms are severe and violent forms of convection produced when warm moist air is overrun by dry cool air. As the warm air rises *thunderheads* (cumulo-nimbus clouds) form and cause the strong winds, lightning, thunder, hail, and rain associated with these storms. The National Weather Service definition of a *severe thunderstorm* is a thunderstorm event that produces any of the following: downbursts with winds of 58 miles per hour or greater (often with gusts of 74 miles per hour or greater), hail ¾ of an inch in diameter or greater, or a tornado.

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

On the ground directly beneath the storm system, the mature thunderstorm is initially felt as rain, which is soon joined by a strong downdraft. The downdraft spreads out from the cloud in gusting divergent winds and brings a marked drop in temperature. Even where the rain has not reached the ground, this cold air stream flowing over the earth's surface is a warning that the storm's most violent phase is about to mature.

A thunderstorm often lasts no more than 30 minutes in a given location because an individual thunderstorm cell frequently moves between 30 and 50 miles per hour. However, strong frontal systems may spawn more than one squall line composed of many individual thunderstorm cells. Thunderstorms may occur individually, in clusters or as a portion of a large line of storms that may stretch across the entire state. Thus, it is possible that several thunderstorms may affect an area in the course of a few hours.

Severe thunderstorms can cause injury or death and can also result in substantial property damage. They may cause power outages, disrupt telephone service and severely affect radio communications and surface/air transportation, which may seriously impair the emergency management capabilities of the affected jurisdictions.

Thunderstorm History and Frequency:

1960's 6 reported events by NCDC – 5/14/61, 5/22/62, 9/3/64, 7/10/66, 6/15/67 and 8/8/69.

1970's: 11 reported events by NCDC – 6/12/70, 7/31/70, 8/29/70, 5/15/71, 6/12/71, 6/20/74, 6/4/75, 8/21/75, 6/13/76, 7/14/77 and 6/30/78 (61 knots).

1980's: 10 reported events by NCDC – 6/23/81, 7/12/81, 7/25/82, 6/30/83, 7/3/83, 7/18/83, 6/26/84, 7/14/84, 5/24/89 and 7/8/89. Magnitude of winds for these events ranged from 55 knots to 60 knots.

1990's: 19 reported events by NCDC – 8/10/92, (4/24/94 Cataract-$50,000 PD, Tomah-$50,000 PD), (6/7/95 Norwalk-$35,000 PD), (8/14/95 Tomah), (5/19/96 Sparta-$800 PD), (6/29/96 Tunnel City), (8/7/96 Cataract-$500 PD, Sparta-$15,000 PD, Tomah-$500 PD, Oakdale-$300 PD), (4/5/97 Cataract-$6,000 PD, Wilton-$2,000 PD), (6/5/97 Ridgeville), (5/15/98 Tomah-$24,000 PD, Warrens-$5,000 PD, Oakdale), (5/30/98 Sparta-$12,000 PD), (5/31/98 Norwalk-$13,000 PD & $15,000 CD, Sparta-$12,000 PD, Ridgeville-$15,000 PD), (6/18/98 Cashton-$1,000,000 PD, Tomah-$10,000 PD, Oakdale-$1,200 PD), (6/27/98 Sparta-$74,000 PD & $6,000 CD, Tomah-$333,000 PD & $231,000 CD, Cataract-$167,000 PD & $66,000 CD, Cashton-$175,000 PD & $25,000 CD, Fort McCoy-$88,000 PD & $20,000 CD, Warrens-$22,000 PD & $12,000 CD), (8/14/98 Cataract-$15,000 CD), (6/6/99 Sparta-$15,000 PD, Tomah-$20,000 PD), (7/8/99 Portland-$800 PD & $10,000 CD) and (7/30/99 Tomah-$500 PD). Magnitude of winds for these 19 events ranged from 50 knots to 80 knots. Total damages: $2,147,600 PD and $400,000 CD.

2000's: 23 reported events by NCDC – (6/1/00 Tunnel City, Tomah, Oakdale-$200,000 PD & $25,000 CD), (6/11/01 Oakdale-$750 PD, Tomah-$200 PD, Sparta-$2,300 PD) ,(6/17/01 Sparta-$1,900 PD, Tomah-$2,500 PD), (8/12/01 Wyeville-$5,000 PD), (7/21/02 Sparta), (6/24/03 Sparta-$500 PD, Tomah-$1,500 PD), (7/4/03 Sparta-$1,500 PD 7 $750 CD, Tomah-$750 PD), (8/28/03 Sparta-$750 PD & $1,500 CD, Tomah-$10,000 PD, Cashton-$750 PD), (6/23/04 Four Corners, Cataract-$1,200 PD, Norwalk-$750 PD), (6/29/05 Melvina-$3,000 PD, Cashton-$2,500 PD, Tomah-$1,500 PD), (7/23/05 Warrens-$500 PD, Sparta-$500 PD), (7/25/05 Shennington-$500 PD), (8/29/05 Sparta-$600 PD, Norwalk-$700 PD), (9/12/15 Sparta-$750 PD), (9/13/05 Countywide-$5,000 PD & $5,000 CD, Wilton-$10,000 PD & $8,000 CD), (8/23/06 Warrens-$660,000 PD & $6,500,000 CD, Kirby-$150,000 PD & $1,500,000 CD, Tomah-$500,000 PD), (6/7/07 Warrens-$750 PD), (8/11/07 Cataract-$2.500 PD, Warrens-$9,000 PD, Tunnel City), (9/21/07 Sparta-$1,000 PD, Wilton-$500 PD), (6/7/08 Kendall-$14,000 PD & $5,000 CD, Glendale-$5,500 CD), (7/7/08 Tunnel City-$1,000 PD), (7/10/08 Cataract-$2,000 PD, Sparta, Fort McCoy Airport, Tunnel City, Warrens, Shennington-$500 PD) (7/27/09 Fort McCoy Airport-$68,000 PD & $40,000 CD). Magnitude of winds for these 23 events ranged from 50 knots to 85 knots. Total damages: $1,665,150 PD and $8,090,750 CD.

2010's: 29 reported events by NCDC – (6/25/10 Tomah-$1,000 PD), 7/14/10 Tunnel City, Wilton-$500 PD), 8/13/10 Sparta-$200 PD, Tomah-$1,000 PD, Wilton-$250 PD), (4/10/11 Melvina-$5,000 PD, Tomah), (7/1/11 Sparta-$10,000 PD, Wyeville-$9,000 PD), (7/11/11 Leon-$2,000 PD), (7/18/11 Cataract-$50,000 PD), (7/24/11 Fort McCoy Airport-$1,400 PD, Tomah-$2,300 PD), (9/2/11 Portland-$9,000 CD, Cashton-$4,000 PD, St. Mary's-$15,000 PD, Cataract-$5,000 PD, Wilton-$5,000 PD, Tomah, Oakdale-$7,000 PD), (5/24/12 Countywide-$2,000 PD), (8/16/12 Leon), (8/6/13 Angelo-$20,000 PD), (6/16/16 St. Mary's-$200 PD), (8/25/14 Sparta-$25,000 PD, Cataract-$22,000 PD, Tomah-$3,000 PD), (6/9/16 Leon-$5,000 PD), (7/13/15 Cataract-$2,000 PD), (7/18/15 Sparta-$10,000 PD), (9/6/15 Warrens-$10,000 PD, Sparta-$2,000 PD), (4/2/16 Countywide-$200 PD), (6/25/16 Sparta-$10,000 PD), (6/26/16 Kirby-$1,000 PD, Tomah-$1,000 PD), (7/5/16 Wilton-$40,000 PD), (8/4/16 Cashton-$3,000 PD), (3/6/17 Tunnel City-$3,000 PD), (5/17/17 Portland-$3,000 PD, Sparta-$2,000 PD, Tomah-$4,000 PD, Melvina), (6/16/17 Portland-$2,000 PD, Tomah-$2,000 PD), (7/5/17 Watermill), (7/12/17 Tomah-$2,000 PD), (8/27/18 Sparta-$25,000 PD, Tomah-$5,000 PD, Watermill-$15,000 PD). Magnitude of winds for these 29 events ranged from 38 knots to 61 knots. Total Damages: $330,050 PD and $9,000 CD.

PD = Property Damage and CD = Crop Damage

Thunderstorm frequency is measured in terms of incidence of *thunderstorm days* or days on which thunderstorms are observed. Wisconsin averages between 30 and 50 thunderstorm days per year depending on location, with the southwestern area of the state normally having more thunderstorms than the rest of the state. A given county may experience ten or more thunderstorm days per year. According to the National Weather Service Publication, *Storm Data*, in the past 30 years, Wisconsin has experienced hurricane force winds of 75 mph or higher on 120 days or about 4 days per year on average. Within the same period there have been 17 days when winds at or above 100 mph have been documented. This means that winds similar to a Category 2 Hurricane are experienced about one day every two years on average in Wisconsin. Thunderstorm winds can be fatal. During the period from 1982 to 2001, 20 fatalities have been attributed to wind from severe thunderstorms.

In Wisconsin, thunderstorms and their associated high winds can occur throughout the state during any month of the year with little or no notice, but their highest frequency is during the period of May through September. They also occur most often between the hours of noon and 10:00 p.m.

Between 1990 and 2018 the NCDC reported 71 Thunderstorm events in Monroe County. Of these 71 Thunderstorms 63 of them resulted in property damage and 12 had crop damage reported. The total property damage reported for these 63 thunderstorms was $4,142,800 with the largest amount of damage from the 8/23/06 storm which had $1,310,000 in damages. The total crop damage reported totaled $8,499,750 during those 12 storms with the largest amount reported from the 8/23/06 storm which had $8,000,000 in damages. Based upon this historical data when Monroe County experiences a thunderstorm large enough to cause property damage or crop damage the average amount of property damage to occur is $65,759 and the average amount of crop damage is $708,312. Between 1990 and 2018 Monroe County averaged 2.2 thunderstorms per year. Based upon these averages the County can expect to experience 11 thunderstorms within the next 5-year period. If historical trends continue the county can

expect that 89% of these storms will be strong enough to cause property damage. This would result in 10 storms strong enough to cause property damage resulting is $657,590 in property damage. In addition, 17% of these storms will cause crop damage. This would result in 2 storms causing $1,416,624 of crop damage during that same 5-year period.

Thunderstorm Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns thunderstorms a risk factor of 24 indicating this natural hazard is a high risk to the county. Thunderstorms can produce heavy rains and downbursts that induce straight-line winds with high wind speeds. Buildings could be damaged by the high winds and temporary flooding could occur in low-lying areas where these facilities are located. Thunderstorms can also produce three violently destructive natural elements which include lightning, tornadoes, and hailstorms which are discussed separately in this chapter. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. Thunderstorms can cause damage to buildings by the high winds created by the storms and temporary flooding could occur in low-lying areas where these facilities are located. Thunderstorms can also produce violent destructive natural elements including lightning, tornadoes and hailstorms that can cause severe damage to buildings and can cause injuries and deaths to human.
- Agriculture. Thunderstorms can cause significant damage to agricultural crops, buildings and livestock. Heavy rains can cause erosion, wash out seedlings and create standing water in fields. Downspouts and straight-line winds can cause damage to buildings and flatten crops. The other natural elements that are produced by thunderstorms, including lightning, hailstorms and tornadoes can cause severe damage to crops, buildings and livestock.
- Roads and Highways. Heavy rains can limit visibility for drivers. Electric traffic signals can malfunction. Washouts and spot flooding can occur. Debris cleanup from roadway is needed soon after the storm.
- Railroads. Signals and electric switches can malfunction. Washouts and spot flooding can occur. Debris cleanup from tracks and right-of-way is needed soon after the storm. Damage to freight in poorly fitted cars or covered loads can cause problems, often discovered days or weeks later.
- Airway. Flight operations of aircraft, especially small planes, can be disrupted during the storm. Planes from other areas passing over the County may put down at airports as "port of refuge". Small aircraft parked on ground at private airports may be damaged.
- Waterways. Poor visibility storms can cause safety problems to boat operators. Improperly tied up boats could break loose from piers.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities vulnerability to thunderstorms would include damage from high winds and heavy rainfall and could pollute underground wells. Other natural elements that are produced by thunderstorms include lightning, hailstorms, and tornadoes and can cause severe damage to municipal water facilities and equipment. Services provided by these facilities would not be interrupted except in extreme cases.
- Wastewater Treatment Facilities. There are 11 wastewater treatment facilities in operation in the county, see Table 3-11. The facilities vulnerability to thunderstorms would include damage to buildings and equipment from high winds. Heavy rainfall could cause holding ponds to overflow and treatment facilities could be inundated with water that could cause system failure. Thunderstorms can also produce lightning, hailstorms and tornadoes that could severely damage the wastewater treatment facilities and equipment. Services provided by these facilities would not be interrupted except in extreme cases.
- Hazardous Material Sites. The impact of thunderstorms on hazardous material is specific to the type of material and its storage or transportation conditions. Material in a state of transportation is more vulnerable than material in storage.

Thunderstorm Risk Assessment Designation

Thunderstorm Historical Occurrence Rating: High - 9
Thunderstorm Vulnerability Rating: Negligible - 2
Thunderstorm Probability Rating: Highly Likely - 8
Thunderstorm Local Official Survey Rating: Medium/High - 5
Thunderstorm Risk Assessment Designation: **High Threat – 24 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Thunderstorm Hazard Mitigation Ideas: ● Communities may use outreach programs to promote awareness of thunderstorm dangers - for example: during Severe Weather Awareness Week emphasize issues on weather related disaster preparedness through public education ● Local and state governments can invest in public early warning systems/networks, as well as train people to serve as weather spotters ● Provide weather radios to critical areas ● Public and private buildings can be designed with structural bracing, shutters, laminated glass in window panes, and hail resistant roof shingles or flashing to minimize damage ● Bury power lines with consideration for maintenance and repair ● Promote indoor warnings at all critical facilities ● Communities my adopt building codes requiring weatherproofing such as wall and roof anchoring, reinforcement of walls, ceilings and floors, etc. ● Cleaning and clearing culverts, drains, and waterways must be kept uppermost as a maintenance practice ● An emergency plan for retrieving and securing run away barges should be developed in cooperation with the barge towing industry and water-based terminals

3.4 Monroe County, Tornado/High Winds Risk Assessment

Tornado/High Winds Definition: A tornado is a relatively short-lived storm composed of an intense rotating column of air, extending from a thunderstorm cloud system. It is nearly always visible as a funnel, although its lower end does not necessarily touch the ground. Average winds in a tornado, although never accurately measured, are between 100 and 200 miles per hour, but some may have winds exceeding 300 miles per hour. For standardization, the following are National Weather Service definitions of a tornado and associated terms:

- *Tornado* – a violently rotating column of air that is touching the ground
- *Funnel Cloud* – a rapidly rotating column of air that does not touch the ground
- *Downburst* – A strong downdraft, initiated by a thunderstorm, which induces an outburst of straight-line winds on or near the ground. They may last anywhere from a few minutes in small-scale micro-bursts to periods of up to 20 minutes in large, longer macro-bursts. Wind speeds in downbursts can reach 150 mph, in the range of a tornado.

A tornado path averages four miles but may reach up to 300 miles in length. Widths average 300-400 yards, but severe tornadoes have cut swaths a mile or more in width or have formed groups to two or three funnels traveling together. On the average, tornadoes move between 25 and 45 miles per hour, but speeds over land of up to 70 mph have been reported. Tornadoes rarely last more than a couple of minutes over a spot or more than 15-20 minutes in a ten-mile area, but their short periods of existence do not limit their devastation of an area.

The destructive power of a tornado results primarily from its high wind velocities and sudden changes in pressure. Wind and pressure differentials probably account for 90 percent of tornado-caused damage. Since tornadoes are generally associated with severe storm systems, they are usually accompanied by hail, torrential rain and intense lightning. Depending on their intensity, tornadoes can uproot trees, down power lines and destroy buildings. Flying debris can cause serious injury and death.

Pre January 31, 2007-TORNADO DAMAGE SCALE			
Scale	**Wind Speeds**	**Damage**	**Frequency**
F0	40 to 72 MPH	Some damage to chimneys, TV antennas, roof shingles, trees and windows	29%
F1	73 to 112 MPH	Automobiles overturned, carports destroyed, trees uprooted	40%
F2	113 to 157 MPH	Roofs blown off houses, sheds and outbuildings demolished; mobile homes overturned	24%
F3	158 to 206 MPH	Exterior walls & roofs blown off homes. Metal buildings collapsed or are severely damaged. Forests & farmland flattened.	6%
F4	207 to 260 MPH	Few walls, if any, standing in well-built homes. Large steel and concrete missiles thrown far distances.	2%
F5	261 to 318 MPH	Homes leveled with all debris removed. Schools, motels and other larger structures have considerable damage with exterior walls and roofs gone. Top stories demolished.	Less than 1%
Post January 31, 2007 TORNADO DAMAGE SCALE			
Scale	**Wind Speeds**	**Damage**	**Frequency**
EF0	60 to 85 MPH	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees	53.50%
EF1	86 to 110 MPH	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; broken windows	31.60%
EF2	111 to 135 MPH	Considerable damage. Roofs torn off well-constructed houses; foundations shifted; mobile homes destroyed; trees uprooted; cars lifted	10.70%
EEF3	136 to 165 MPH	Severe damage. Entire stories of houses destroyed; damage to large buildings; trains overturned	3.40%

EF4	166 to 200 MPH	Devastating damage. Houses leveled; and cars thrown	0.70%
EF5	> 200 MPH	Total destruction. Houses swept off foundation; automobile sized missiles thrown through the air; high rise buildings deformed	Less than 0.1%

The new scale takes into account quality of construction and standardizes different kinds of construction. Meteorologists and engineers deemed the wind speeds on the original scale as being too high, and engineering studies indicated that slower winds than initially estimated cause the respective degrees of damage.

Downbursts are characterized by straight-line winds. Downburst damage is often highly localized and resembles that of tornadoes. There are significant interactions between tornadoes and downbursts and a tornado's path can also be affected by downbursts. Because of this, the path of a tornado can be very unpredictable, including veering right and left or even a U-turn.

Tornado/High Winds History and Frequency:

1950's: 1 reported event by NCDC – (4/19/57 Tornado F3-$250,000 PD).

1960's: 4 reported events by NCDC – (8/28/60 Tornado F2-$25,000 PD), (4/11/65 Tornado F1-$25,000 PD), (7/16/65 Tornado F1), (8/6/68 Tornado F0).

1970's: 4 reported events by NCDC – (7/18/71 Tornado F2-$250,000 PD), (6/14/74 Tornado F1-$2,000 PD), (8/30/74 Tornado F0-$2,500 PD), (5/10/79 Tornado F2-$25,000 PD).

1980's: 3 reported events by NCDC – (8/12/85 Tornado F2-$2,500,000 PD), (6/26/86 Tornado F2-$250,000 PD), (5/8/88 Tornado F2-$250,000 PD).

1990's: 2 reported events (*1 tornado & 1 high wind*) by NCDC – (4/24/94 Tornado F1-$50,000 PD & $5,000 CD), (11/10/98 Winds gusts of 55knots-$175,000 PD).

1 reported event reported by Wisconsin Emergency Management – 1998 High Winds and Severe Storms, $11.1million in Public-Government Property and Facilities Damage and $36.8 million in Private-Individual Property, Crop and Facilities Damage to Monroe and 13 other counties, *Presidential Disaster Declaration*.

2000's: 7 reported events (5 *tornadoes & 2 high winds)* by NCDC – (6/1/00 Tornado F1 Cataract-$10,000 PD & $15,000 CD), (7/9/00 Tornado F1 Norwalk-$50,000 PD & $15,000 CD), (4/7/01 Winds of 52 knots $1,500 PD), (9/7/01 Tornado F0 Angelo-$20,000 PD, 1 injury), (10/25/01 Winds of 41 knots), (6/23/04 Tornado F1 Warrens-$75,000 PD, 3 injuries), (8/18/05 Tornado F1 Tomah-$40,500 PD & $10,000 CD).

2010's: 4 reported events (3 tornadoes and 1 high wind) by NCDC – (10/26/10 50 Winds of 50 knots $12,000 PD), (5/22/11 Tornado EF1 Leon-$915,000 PD), (5/22/11 Tornado EF2 Tunnel City-$510,000 PD), (8/27/18 Tornado EF1 Watermill-$25,000 PD).

PD = Property Damage and CD = Crop Damage

All counties in Wisconsin have recorded at least two tornadoes in the period for 1844-2018. The National Weather Service reported that Monroe County experienced 21 tornadoes during this period. In 1998, High winds in Monroe and 13 other counties caused so much damage that the region received a Presidential Disaster Declaration. The history above details tornadoes and high winds in the County from 1957 through 2018.

According to the NCDC between 1990 and 2018 Monroe County experienced 9 tornadoes. These 9 tornadoes caused $1,788,500 in property damage, ranging from $20,000 on 9/7/01 to $915,000 on 5/22/11. Using this historical data Monroe County can expect to experience a tornado once every 4 years, which would cause $198,398 in property damage.

Tornado/High Winds Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Tornado/High Winds a risk factor of 26 indicating this natural hazard is a high risk to the county. Critical facility's vulnerability to tornadoes and high winds could adversely affect 25 percent of the county's population or property in a single event, see Table 3-2. While tornadoes occur infrequently in the County, 21 occurred in the years 1844-2018. Tornadoes and High winds can cause critical facilities to sustain substantial damage or could be completely destroyed, causing injury and even death. High winds and storms occur more frequently than tornadoes in the county. In 1998, three events were reported in the county. In the events, Monroe County and thirteen other county critical facilities sustained $11.1 million in damages to public and government property and the area received a

Presidential Disaster Declaration. The services provided by these facilities would not be interrupted except in extreme cases. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.

- Business and Industry. In Monroe County there are 954 businesses and industries, see Table 3-5. For businesses and industries tornadoes and high winds pose a high hazard risk in the county. Buildings could sustain substantial damage or be completely destroyed causing injuries and even death. High winds occur more frequently and the extent of the damage to buildings is determined by wind speed. The damages could range from damage to chimney, roof shingles and broken windows to exterior wall and roofs blown off buildings or the buildings could collapse. Businesses that are particularly vulnerable to tornadoes and high winds are car and truck dealerships.
- Agriculture. Tornadoes and high winds pose a high hazard threat to agricultural buildings, crops and livestock. Tornadoes and high winds can cause significant damage to buildings and can cause injuries and deaths. These events can flatten crops and forests.
- Roads and Highways. Trailers, especially high profile, empty, or lightly loaded trailers, are susceptible to being blown over, or otherwise adversely impacted, by high winds. As wind speed increases, even sub-tornado speeds can adversely impact vehicle handling, especially on bridges or open areas with long wind sweeps. Gusty winds are particularly dangerous as they occur sporadically and unexpectedly and can cause unpredicted handling problems. High winds can blow fine soil/sand and other debris across the road and cause visibility problems, or direct damage to vehicles being struck by large blowing debris. Debris blown by high winds, sometimes rather large pieces of wood, tree limbs, or trash barrels, are blown onto highways and can cause safety problems even after the winds have subsided. Vehicles traveling on highways on ridge tops and oriented in a north-south direction are more subject to high wind damage than are highways in valleys or running parallel to the predominant wind direction.
- Railroads. High profile and/or lightly loaded cars, especially the "high cube" boxcars typically used to carry auto parts, can be blown over in high winds. Parked individual rail cars that are not properly chocked, or brake set can be set in motion by high winds striking the car at a critical angle. Heavy debris striking trains during a high wind episode can cause direct damage to the locomotive or cars. Wind deposited debris on the tracks can cause safety problems after the winds have subsided.
- Airway. Light weight general aviation aircraft, typical of the type most likely to be based at or using the Tomah airport are the most prone to wind damage while parked on the ground. Larger planes and jets are susceptible to flying debris while parked on the ground.
- Waterways. High winds can have the same impact to pleasure crafts on lakes as vehicles on roadways, with the wave action across long reaches of water creating potential for capsizing vessels.
- Municipal Water. In the county there are 19 municipal wells and water systems, see Table 3-10. These facilities and equipment could be significantly damaged or destroyed as a result of tornadoes and high winds. The services provided by these facilities would not be interrupted except in extreme cases.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities operating in the county, see Table 3-11. These facilities and equipment could be significantly damaged or destroyed as a result of tornadoes and high winds. The services provided by these facilities would not be interrupted except in extreme cases.
- Hazardous Material Sites. Hazardous material in transit is exposed to the same dangers as the mode of transport. Hazardous material in storage is more vulnerable than other material, and storage buildings should be storm reinforced.

Tornado/High Winds Risk Assessment Designation

Tornado/High Winds Historical Occurrence Rating: High - 7
Tornado/High Winds Vulnerability Rating: Critical - 5
Tornado/High Winds Probability Rating: Highly Likely - 6
Tornado/High Winds Local Official Survey Rating: High - 8
Tornado/High Winds Risk Assessment Designation: **High Threat – 26 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Tornado/High Winds Hazard Mitigation Ideas: ● Local and state governments can invest in public early warning systems/networks, as well as train people to serve as weather spotters ● Provide weather radios to critical areas ● Encourage development of storm shelters in each community readily accessible to the public● Strengthen public and private structures by using engineering measures and construction techniques that may include structural bracing, straps and clips, anchor bolts, laminated or impact-resistant glass, reinforced pedestrian and garage doors, window shutters, waterproof adhesive sealing strips, or interlocking roof shingles ● Construct and use concrete safe rooms in homes and shelter areas of mobile home parks, fairgrounds, shopping malls, or other vulnerable public areas ● Anchor manufactured homes and exterior

attachments such as carports and porches ● Communities my adopt building codes requiring weatherproofing such as wall and roof anchoring, reinforcement of walls, ceilings and floors, etc. ● Secure loose yard items like yard and patio furniture ● Protect temporary debris disposal sites by fencing and/or locating away from populated areas ● Require use of special roofing shingles designed to interlock and resist uplift forces ● Bury power lines ● Designed failure mode to power line design ● Provide backup power resources that can enable critical facilities to continue basic services and can be used by businesses to ensure security and protect refrigerated goods ● Prune trees near power lines ● Promote public education during Severe Weather Awareness Week ● Promote preparation of a home tornado plan and assembling a disaster supply kit ● Highway agencies need to begin immediate patrols after high winds have swept through an area to clean dangerous debris off the road and shoulder, and insure road signs and traffic signal are visible and functioning ● Railroad company maintenance-of-way forces should conduct patrols as soon as possible after a heavy wind event to remove debris on the tracks ● An emergency plan for retrieving and securing run away barges should be developed in cooperation with the barge towing industry and water-based terminals

3.5 Monroe County, Riverine/Flash Flooding/Storm Water Flooding Risk Assessment

Riverine/Flash Flooding Definition: Flooding occurs when a river, stream, lake or other body of water overflows its banks onto normally dry land or there is an excessive pooling of surface water. These events can be slow to develop or happen very quickly. Flash floods are usually the result of excessive precipitation or rapid snowmelt and can occur suddenly with awesome power. Increased demand for housing along Wisconsin's waterfronts increases flooding vulnerability.

Flood related hazards in Wisconsin arise from a complex set of hydrologic and hydraulic interactions, including excessive precipitation, rapid snowmelt, ice or debris jams in waterway channels and dam or levee failures. These result in river flooding, stream flooding, coastal flooding and erosion, bank slumping, inland lake flooding, flash flooding, flooding from levee and dam failure and storm water runoff and ponding.

The effects of flooding can be devastating and cause extensive property damage. Although the probability of serious injury and loss of life is usually low, flooding increases the likelihood of long-term health hazards from water-borne diseases, mold, mildew, insect infestation and contaminated drinking water. Long-term damage to the environment may also result from flooding of sites containing hazardous materials or waste.

Major floods in Wisconsin tend to occur either in the spring when melting snow adds to runoff from rain or in summer and early fall after intense rainfalls. Flooding which occurs in the spring due to snowmelt and/or prolonged periods of heavy rain is characterized by a slow build-up of flow and velocity in rivers and streams over a period of days. This build-up continues until the river or stream overflows its banks, for as long as a week or two. The water then slowly recedes inch by inch to its original level. The expected occurrence and location of this type of flooding is fairly predictable and normally there is sufficient time for the orderly evacuation of people and property.

Flash flooding, which usually results from surface runoff after intense rains or the failure of water control structures, also poses a threat to all areas of Wisconsin. This is an extremely dangerous form of flooding because it is not very predictable. It can occur very quickly, precluding evacuation to higher ground to prevent loss of life. Small and normally calm rivers and streams will rise very rapidly when surrounding soil and terrain are unable to accommodate intense precipitation. Raging torrents of water can rip through waterways, surging well beyond normal banks and sweeping away everything in their path. Houses, structures, bridges, and boulders can be tossed and rolled by a flash flood. The strength of the water current, carrying debris and surging through an area, can cause serious injuries and death. It can also interrupt power, disable fuel sources, make roads impassable, hamper response efforts and strand people in their homes awaiting rescue.

Riverine/Flash Flooding History and Frequency:

1990's: 2 reported events by NCDC: (6/27/98-Urban Flood Tomah, $25,000 PD); and (6/27/98-Flash Flood Countywide, $8,000 PD & $5,000 CD).

2000's: 5 reported events by NCDC – (5/17/00 Countywide flash flooding, $8,000 PD, $5,000 CD); (6/16/04 – North portion of County flash flooding, $140,000 PD, $30,000 CD & Countywide flooding, $75,000 PD, $35,000 CD); (6/7/08 Leon & Sparta flooding $220,000

PD, $762,000 CD & Melvina flash flooding, $1,350,000 PD, $500,000 CD); (7/10/08 Tomah flash flood $10,000 PD, $2,000 CD); and (7/11/08 Tunnel City flooding $4,000 PD.

3 Presidential Disaster Declarations: (1) 2000-Heavy rains/storms/flooding, $37.6 million- Public Gov't Property and Facilities Damage and $25.2 million Private-Individual Property, Crop and Facilities Damage - to Monroe and 29 other counties; (2) 5/19/04 through 7/3/04 severe storms and flooding impacted 37 Wisconsin Counties. Monroe County's local governments, individuals and businesses became eligible for grants and low interest loans. The damage assessment for publicly owned properties exceeded $1.37 million and; (3) June 2008 – an unprecedented amount of rain fell. A series of storms dating from June 5 – 12 caused widespread flooding that resulted in damage to thousands of homes, businesses and roads. Monroe County and 30 other counties received Presidential Disaster Declarations. Over $96 million in disaster assistance was approved. Monroe County received over $1.7 million in assistance from the Wisconsin Individual and Household programs.

2010's: 10 reported events by NCDC – (7/14/10 Four Corners flash flooding $10,000 PD); (9/23/10 Angelo flash flooding $10,000 PD & Four Corners, Warrens, Wilton flooding $28,000 PD); (6/18/14 Cataract flash flooding); (8/19/16 Kirby flooding); (9/21/16 Cashton flash flooding $170,000 PD); (9/22/16 Sparta flooding); (7/20/17 Sparta, Warrens flooding $3,050,000 PD, $1,900,000 CD & Warrens flash flooding $3,100,000 PD, $1,100,000 CD); (5/4/18 St. Mary's flooding); (8/28/18 Leon flash flooding $26,500,000 PD, $210,000 CD & Sparta flooding); and (9/3/18 Portland flash flooding $285,000 PD, $49,000 CD).

3 Presidential Disaster Declarations: (1) A series of storms dating from August 7 through September 14 caused widespread flooding that resulted in damages to homes, businesses and roads. Monroe county and 13 other counties received Presidential Disaster Declarations. Over $14 million in disaster assistance was approved; (2) Severe storms between July 19 through July 23rd caused flooding, mudslides and landslides. Monroe County and 11 other counties received Presidential Disaster Declarations. Almost $9 million in disaster assistance was approved; and (3) Storms on September 21 and 22 caused flooding and mudslides. Monroe County and 9 other counties received a Presidential Disaster Declaration. Almost $9 million in disaster assistance was approved.

PD = Property Damage and CD = Crop Damage

The Kickapoo River located in the south eastern part of the county has a long history of flood events dating back to 1907. The history above details flooding events in the county from 1951 to 2018.

Flood Warning and Evacuation Plans: Monroe County has developed Emergency Action Plans for all seven of the PL 566 dams in the County. The Emergency Action Plans outline the physical conditions (heavy rainfall, rising flood pools, damage to dam components) that can trigger a 3-tier response of County Emergency Management systems to protect the lives and property of downstream residents. Included in the response is an evacuation plan for downstream residents.

Floodplain Development and Regulation

- County (unincorporated area) Floodplain Management Program: Enforcement and day-to-day administration of the County Floodplain Zoning Ordinance is conducted by the County Zoning Administrator. The Zoning Administrator reviews, and issues floodway or flood fringe land use permits based on the permitted uses and prohibited uses outlined in the County Floodplain Zoning Ordinance. Standards for structures and buildings being built are also outlined in the Floodplain Ordinance. Reviewing plans of structures and buildings and then inspecting them is another floodplain management responsibility. Reporting to the DNR on decisions on variances, appeals, amendments, and violations pertaining to floodplain zoning and reporting violations to the County Zoning Agency and County Attorney for prosecution are also an integral part of the County Zoning Administrator's responsibilities. The County Zoning Administrator also frequently advises applicants of the provisions of the Floodplain Zoning Ordinance and assists them in properly preparing permit applications or proceeding with an appeals or amendment request. The existing floodplain ordinance being currently used is contemporary and understandable therefore no changes are proposed to it at this point in time. The floodplain maps were updated in 2010 and the entire ordinance was updated in 2018.

  Regulating Development. The development that occurs within the unincorporated areas of the County is subject to two ordinances. These are the County Shoreland-Wetland Ordinance and the County Floodplain Zoning Ordinance. The purpose and how the County addresses development with these ordinances is discussed below.

  County Floodplain Zoning Ordinance. The State of Wisconsin has delegated responsibility to counties to administer and enforce floodplain zoning in unincorporated areas. This regulatory activity is to be conducted in accordance with Chapter NR 116 of Wisconsin Administrative Code and the standards of the National Flood Insurance Program.

Floodplains are land areas which have been or may be covered by floodwater during the "regional flood". The regional flood is a flood determined to be representative of large floods known to have occurred in Wisconsin or which may be expected to occur on a particular lake, river or stream. The regional flood is based upon a statistical analysis of lake level or stream flow records available for the watershed or an analysis of rainfall and runoff characteristics in the watershed or both. In any given year, there is a 1% chance that the regional flood may occur or be exceeded. This regional flood is often referred to as the 100-year flood.

The floodplain is made up of the floodway and flood fringe areas. A floodway is the channel of a river or stream and those portions of the floodplain adjoining the channel required to carry the regional flood discharge. A flood fringe is that portion of the floodplain outside of the floodway, which is covered by floodwater during the regional flood. The term flood fringe is generally associated with standing water rather than flowing water.

Prohibiting new residential construction in the floodway, regulating improvements to existing residential structures in the floodway, requiring dry land access to new development in the flood fringe and requiring a floodplain zoning or shoreland-wetland permit application for all floodplain or shoreland-wetland development are common examples on how the County addresses development and redevelopment in its floodplains and shoreland-wetland areas.

County Shoreland-Wetland Ordinance. The State of Wisconsin has delegated responsibility to counties to protect shoreland-wetlands in unincorporated areas. Shoreland wetlands are defined as wetlands of five acres or larger in size, identified on Wisconsin Wetland Inventory Map, and in the Shoreland Zone. The Shoreland Zone is defined as the area located 1,000 feet of the ordinary high-water mark of a navigable lake, pond or flowage or within 300 feet of the ordinary high-water mark of a navigable stream or to the landward side of the floodplain whichever distance is greater. These regulations are unique in that they regulate additional uses detrimental to shoreland-wetland areas and preserve the shore cover and natural beauty by restricting the removal of natural shoreland cover and controlling shoreland-wetland excavation, filling and other earth moving activity.

City and Village Floodplain Management Programs: The State of Wisconsin has delegated responsibility to cities and villages to administer and enforce floodplain zoning in incorporated areas. This regulatory activity is to be conducted in accordance with Chapter NR 116 of Wisconsin Administrative Code and the standards of the National Flood Insurance Program.

National Flood Program Community Status

Community	In Good Standing	Initial FHBM Identified	Initial FIRM Identified	Current Effective Date
V. Cashton [1]				
V. Kendall	Yes	08/30/74	09/18/86	01/20/10
V. Melvina [2]				
V. Norwalk	Yes	08/03/74	01/20/10	01/20/10
V. Oakdale	Yes		01/20/10	01/20/10
V. Rockland	Yes	07/11/75	04/02/08	01/06/12
V. Warrens [3]				
V. Wilton	Yes	05/17/74	10/15/85	01/20/10
V. Wyeville	Yes	08/23/74	03/01/84	01/20/10
C. Sparta	Yes	01/09/74	08/03/81	01/20/10
C. Tomah	Yes	05/31/74	08/17/81	01/20/10
Monroe County	Yes	07/07/78	05/03/82	01/20/10

1: The Village of Cashton has chosen not to participate due to the topography of the village which creates a very low risk of riverine flooding.
2. The Village of Melvina has decided not to participate in NFIP due to lack of personell and cost of enforcement.
3. The Village of Warrens has chosen not to participate due to topography of the village.

Flood Mitigation Projects in Monroe County

At the time of this update Monroe County is applying for a FEMA grant to buyout 9 properties. Six of these are located in the Town of Leon, 1 is in the Town of Portland and 2 are in the Town of Sparta. The estimated cost of these nine buyouts is $1,865,544.

Flooding Vulnerability Assessment

- Floodplain Structures and Assessed Values. Monroe County has a total of 704 parcels on which structures are located within the FEMA 100-year flood boundary. These 704 parcels have a total assessed land value of $14,022,270; an assessed improvements value of $59,554,170; and a total assessed value of $73,576,440. The City of Tomah has the most parcels with 305 followed by the City of Sparta with 58 parcels and the Town of Byron with 37 parcels. These three municipalities account for 398 parcels or 56.5% of the total number of parcels and a total assessed value of $43,477,450 or 59% of the County's total. Table 3-3 has a listing by municipality of the parcels located within FEMA's 100-year flood boundary.

  - Repetitive Loss Structures. Repetitive Loss Structures are defined as those properties that have had two or more flood insurance claims of at least $1,000 each. As of July 2018, there have been 4 structures that have had repetitive losses within the county. All are residential structures. These structures located in the Towns of Portland and Sparta and the City of Tomah. It should be noted that the severe flooding which occurred in late 2018 are not included in these numbers.

  - Flood Risk Assessment. Flood events in the County have caused substantial property and infrastructure damage in the past and have the potential to cause future damage. Determining potential damage to residential and commercial structures is a difficult undertaking without intense survey work. Some of the factors which make it difficult are: not all of the first floor elevations of the structures are the same; even structures adjacent to each other often have different first floor elevations; some areas will receive damage due to wave action or flowing water; some may appear to be flooded and heavily damaged from the outside but in fact have received little damage due to flood proofing techniques; some cannot be observed due to floodwaters inhibiting access; damages are often not reported; and damages that are reported are based on each property owners individual opinion of damage. Using historical data from the 21 National Climatic Data Center reported events between 1990 and 2018, Monroe County can expect a flood every 1.3 years. The total property damage in these 21 events was $34,993,000 which averages out to $1,666,000 per event. The total crop damage was $4,598,000 with an average of $219,000. Projecting these averages forward within the next 5 years Monroe County can expect to experience 4 flood events with property damages of $6,664,000 and crop damages of $$876,000. A look at recent history with very significant flooding in 2017 (2 events, $6,150,00 PD & $3,000,000 CD) and 2018 (3 events, $26,785,00 PD & $259,000 CD) might indicate an increasing probability of floods occurring; hopefully this is an anomaly rather than a sign of increasing probability.

  - Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Flooding a risk factor of 25 indicating this natural hazard is a high risk to the county. While the overall risk of flooding to critical facilities in the county is negligible there are two critical facilities located within the 100-year floodplain and vulnerable to flooding. The Norwalk Fire Department and 4 schools. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
  - Business and Industry. In Monroe County there are 954 businesses and industries that employ 15,766 people with an annual payroll of approximately $651 million, see Table 3-5. In the county there are 41 businesses and industrial structures located in the floodplain. These businesses have an assessed value of $10,863,500. Many of these businesses sustain flooding damage and economic loses in lesser flood events. Businesses and industries in the county that do not suffer physical damage often sustain significant income losses as a result of a flood event due to reduction is sales or production problems caused by flood induced customer loss, employee problems and input / output interruptions. Tourism related businesses in particular, such as restaurants, motels, marinas and campgrounds, suffer a loss or revenue because of reduced customers desiring to visit the area. The media publicity generated during a flood event focus on flood related disasters and creates a negative mind-set in the public that can persist long after the floodwaters recede.
  - Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. The Natural Hazard Risk Assessment assigns flooding a high-risk factor in the county. The land adjacent to these rivers is mostly agricultural and pastures land that is subject to flooding.
  - Roads and Highways. Of all the hazards discussed so far, flooding is the hazard most likely to seriously impact the transportation infrastructure, rather than the vehicles used in transportation, or transportation operations and safety.

Periodic flooding of fixed waterways, such as streams and the La Crosse and Kickapoo Rivers is a known factor, and the extent of flooding, or potential flooding, has been delineated on maps. Several roadways in Monroe County are subject to flooding, either by the predictable, advance notice rising of rivers, or by the shorter advance warning flash flooding often besetting smaller streams. Other streams and low areas can result in water across the roadway, or at an intersection, even without the event being noted as a major flood event by FEMA.

- Railroads. Periodic flooding of fixed waterways, such the La Crosse River is a known factor, and the extent of the flooding, or potential flooding, has been delineated on maps. There are two railroad lines in Monroe County. The Union Pacific (UP) mainline between Chicago and the Twin Cities and the Canadian Pacific. Stretches of the railroads are reinforced with large boulder and rock riprap as necessary during high water.
- Airway. Neither the Sparta nor the Tomah airport are located in a floodplain.
- Waterways. There are no commercially navigable waterways in Monroe County. The only impact Riverine Flooding will have is on recreational boating.
- Municipal Water. In the county there are 19 municipal wells and water systems, see Table 3-10. These facilities are usually located outside the floodplain which lessens their vulnerability to flooding. With the volume of water associated with floods and the runoff from the lands and sites that are not usually covered by water, filterization could be accelerated and pollutants could migrate into the water source. Pumping stations in low areas may need to be protected.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities can be located in low-lying areas especially gravity type systems making them vulnerable to flooding. Homes and businesses with basement floor drains that empty directly into the wastewater treatment systems can overload wastewater treatment facilities if the buildings are flooded causing the discharge of untreated wastewater. Floodwaters can infiltrate into the piping of the system that could result in the system operating over its capacity. Lift stations may need to be protected.
- Hazardous Material Sites. Hazardous material in transit is subject to the same risk as other material on a given transportation mode. Hazardous material in a storage mode must be protected from floodwaters. Material stored in floodplains should be moved or flood proofed when a prediction of high water is received.

Riverine/Flooding Risk Assessment Designation

Riverine/Flooding Historical Occurrence Rating: High - 8
Riverine/Flooding Vulnerability Rating: Limited - 3
Riverine/Flooding Probability Rating: Likely - 6
Riverine/Flooding Local Official Survey Rating: Medium - 8
Riverine/Flooding Risk Assessment Designation: **High Threat– 25 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Flooding Hazard Mitigation Ideas: ● Acquire land in flood prone areas and remove structures and enforce permanent restrictions on development ● Relocate structures to less hazardous locations ● Elevate structures – mechanically lift so that the lowest floor, including the basement, is raised above the base flood elevation – utilities and other mechanical devices should also be raised above expected flood levels ● Dry-floodproofing – keep water out by strengthening walls, sealing openings, or by using waterproof compounds or plastic sheeting on walls ● Wet-floodproofing – Use water resistant paints or other materials that can allow for easy cleanup after floodwater exposure in accessory structures or in a garage area below an elevated residential structure. In basement, wet-floodproofing may be preferable to attempting to keep water out completely. ●Adopt zoning ordinances that limit development in the floodplain ● Limit density of developments in the floodplain ● Require that floodplains be kept as open space ● Subdivision design standards can require elevation data collection during the platting phase and lots may be required to have a buildable space above the base flood elevation ● Requirements for building design standards and enforcement include the following possibilities: 1) that a residential structure be elevated; and 2) that a non-residential structure be elevated or floodproofed ● Conservation easements may be used to protect environmentally significant portions of parcels from development – they do not restrict all use of the land, rather they direct development to areas of land that are not environmentally significant ● Purchasing flood insurance does not prevent a flood from occurring, but it does mitigate a property owner's financial exposure to loss from flood damage ● By taking initiative locally, to more accurately map problem areas with information not already on FEMA maps a community can warn residents about potential risks that may not have been anticipated ● To maintain dry access, roads should be elevated above the base flood elevation. However, if a road creates a barrier it can cause water to pond. Where ponding is problematic, drainage and flow may be addressed by making changes to culvert size and placement. ● Flood warning can alleviate health and

safety risk by providing citizens time to escape and possibly remove belongings that could be damaged. NOAA weather radio and EAS broadcasts can be incorporated into a community's flood warning system ● Local and state governments should have a plan/procedure in place for flood damage control by establishing volunteer teams available for sandbagging etc. and providing for temporary relocation and storage of equipment, furniture etc. ● Communities should develop a post-flood clean up- decontamination, and recovery plan/procedures ● Alternate routes can be determined and marked in advance of the actual flooding ● Movable message portable signs should be posted at locations where motorists can make detour decisions before entering into the flooded road segment ● Cleaning and clearing culverts, drains, and waterways must be kept uppermost as a maintenance practice ● After a flood it is especially important to check and maintain all drainage ways ● Highway agencies need to begin immediate patrols after floods have swept through an area to clean dangerous debris off the road and shoulder, and insure road signs and traffic signal are visible and functioning ● An emergency plan for retrieving and securing run away barges should be developed in cooperation with the barge towing industry and water-based terminals ● Have public relations strategy in place to counteract negative media reports after a flood to maintain community's tourism base ● Develop an electronic flood warning system for residences in flood prone areas ● Have a plan in place to warn/evacuate tourists

3.6 Monroe County, Dam Failure Flooding Risk Assessment

Dam Failure Flooding Definition: A dam failure involves the uncontrolled release of stored water due to the breaching of a water control structure, resulting in rapid downstream flooding. A dam can fail because of excessive rainfall or melted snow, poor construction or maintenance, flood damage, earthquake activity, weakening caused by burrowing animals or vegetation, surface erosion, vandalism or a combination of these factors. Dam failures can result in the loss of life and significant property damage in an extensive area downstream of the dam.

Dams serve many purposes, including agricultural uses, providing recreation areas, electrical power generation, erosion control, water level control and flood control. The federal government has jurisdiction over dams that produce hydro-electricity-approximately 5% of the dams in Wisconsin. Private individuals own approximately 50% of the dams in Wisconsin, the State owns 19%, municipalities such as townships or county governments own 16% and 15% are owned by various other groups. The Wisconsin Department of Natural Resources regulates all dams on waterways to some degree. However, the majority of dams overall in Wisconsin are small and are not stringently regulated for safety purposes. According to the Wisconsin DNR there are 2 dams in Monroe County which have a high hazard rating, these are the Tomah Lake and Tri Creek Number one dams.

Most of the dams that provide a flood control benefit are large hydroelectric dams on major rivers where flood control is a secondary benefit, or they are PL 566 dams built through the Watershed Protection and Flood Prevention Act of 1954. The PL 566 dams hold little or no water in their reservoirs under normal conditions. Since these dams only hold significant amounts of waters during floods, they present a special hazard as everyday water related problems such as seepage cannot be readily seen and corrected. When floodwater does arrive, the dam is used to its maximum capacity. There are seven PL566 dams in Monroe County.

For emergency planning purposes, dam failures are categorized as either *rainy day* or *sunny day failures*. *Rainy day failures* involve periods of excessive precipitation leading to an unusually high runoff. This high runoff increases the reservoir of the dam and if not controlled, the overtopping of the dam or excessive water present can lead to dam failure. Normal storm events can also lead to rainy day failures if water outlets are plugged with debris or otherwise made inoperable. *Sunny day failures* occur due to poor dam maintenance, damage/obstruction of outlet systems or vandalism. This type is the worst case of failure and can be catastrophic because the breach is unexpected and there may not be sufficient time to properly warn downstream residents.

Monroe County has 7 PL566 structures in the Coon Creek Watershed and 1 in the Kickapoo River Watershed. Coon Creek was the first watershed project in the US. The Coon Creek dams were built in the early 1960's. Engineering and financial assistance provided by NRCS. The county covered 30 percent of the cost to install the structures along with operation and maintenance for the past 50-60 years.

Dam Failure Flooding History and Frequency:

August 28, 2018 – 6 PL566 structures overtopped, 3 of the PL566 dams (Luckassen, Bilhovde, & Korn) breached during the storm event that put down 12-13" of rain in 6 hours or less. 3 other structures received damage to the auxiliary spillways and opposite groin. There was only one structure not effected by the storm event.
Plans moving forward: 3 of the structures damaged are being repaired. The three structures breached will be stabilized and debris removed until a decision is made on their future (abandon, rebuild, or relocate). Monroe, La Crosse and Vernon County are currently working with the state engineer in applying for watershed money to study the Coon Creek and W. Fork of the Kickapoo River watersheds. If funding is received, 18 months to two years will be needed to assess the watersheds prior to making decision on the breached dams in Monroe and Vernon County.

Dam Failure Flooding Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Dam Failure Flooding a risk factor of 9 indicating this natural hazard is a low risk to the county. The "Dam Hazard Assessment" completed for seven PL566 dams in Monroe County showed that no critical facilities are located in the hydraulic shadows of dams. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities. Hydraulic shadows of other dams in Monroe County are not known.
- Business and Industry. In Monroe County there are 954 businesses and industries. The Natural Hazard Risk Assessment assigns dam failure flooding a low risk factor in the county.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. The Natural Hazard Risk Assessment assigns dam failure flooding a low risk factor in the county. The land below the dams is mostly agricultural and pastureland that would be subject to flooding in the rare occurrence a dam fails. The "Dam Hazard Assessment" completed for seven PL566 dams in Monroe County showed that agricultural crops would be impacted in the rare occurrence that one of the dams fail. Hydraulic shadows of other dams in Monroe County are not known.
- Roads and Highways. Dam failure differs from traditional flooding in that flooding, even on a rapidly rising stream such as the Kickapoo River happens both with a certain regularity in terms of not being an "if", but a "when". A dam break on the other hand could leave little time, even in terms of minutes, to take any mitigation action. The "Dam Hazard Assessment" completed for the seven PL566 dams in Monroe County showed that several roads would be impacted in the rare occurrence that one of the dams fail.
- Railroads There are two railroad lines in Monroe County. The Canadian Pacific (CPRS) mainline between Chicago and the Twin Cities and the Union Pacific mainline between Milwaukee and the Twin Cities. The risk factor is low for dam failure. The "Dam Hazard Assessment" completed for the dams in Monroe County showed that no railroads are located in the hydraulic shadows of the PL566 dams. Hydraulic shadows of other dams in Monroe County are not known.
- Airway. Sparta and Tomah airports are the two public airports located Monroe County. The "Dam Hazard Assessment" completed for the dams in Monroe County showed that no airports are located in the hydraulic shadows of the PL566 dams. Hydraulic shadows of other dams in Monroe County are not known.
- Waterways. There is no commercial navigation on any waterway in Monroe County. Only pleasure crafts would be susceptible to a dam failure.
- Municipal Water. In the county there are 19 municipal wells and water systems, see Table 3-10. These facilities are usually located at higher elevation, which lessens their vulnerability to flooding or damage if a dam would fail. The "Dam Hazard Assessment" completed for the dams in Monroe County showed that no municipal water systems are located in the hydraulic shadows of the PL566 dams. Hydraulic shadows of other dams in Monroe County are not known.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities can be located in low-lying areas especially gravity type systems making them vulnerable to flooding in event that a dam fails. Floodwaters could infiltrate into the piping of the system that could result in the system operating over its capacity. The "Dam Hazard Assessment" completed for the dams in Monroe County showed that no wastewater treatment facilities are located in the hydraulic shadows of the PL566 dams. Hydraulic shadows of other dams in Monroe County are not known.
- Hazardous Material Sites. No major hazardous waste disposal or storage sites are located in the hydraulic shadows of PL566 dams. Most rural dwellings have fuel oil, bottled gas, gasoline, and other containers of various sizes mounted outdoors or in storage buildings. These containers need to be made secure from winds and flooding.

Dam Failure Flooding Risk Assessment Designation

Dam Failure Flooding Historical Occurrence Rating: Low - 1
Dam Failure Flooding Vulnerability Rating: Negligible - 2
Dam Failure Flooding Probability Rating: Unlikely - 3
Dam Failure Flooding Local Official Survey Rating: Low -3
Dam Failure Flooding Risk Assessment Designation: **Low Threat – 9 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Dam Failure Flooding Hazard Mitigation Ideas: ● Have an inspection, maintenance and enforcement program in place to ensure the continued structural integrity of dams ● Remove unnecessary or old and structurally unsound dams ● Planning for dam breaks can include constructing emergency access roads as well as automating pump and flood gate operation ● Regulate development in a dam's hydraulic shadow, where flooding would occur if there were a severe dam failure ● Develop and coordinate dam failure emergency action plans

3.7 Monroe County, Forest/Wildland Fire Risk Assessment

Forest/Wildland Fires Definition: A forest fire is an uncontrolled fire occurring in a forest or in woodlands outside the limits of incorporated villages or cities. A wildfire is any instance of uncontrolled burning in brush, marshes, grasslands or field lands. The causes of these fires include lightning, human carelessness and arson.

Forest and wildfires can occur at any time of the day and during any month of the year, but the peak fire season in Wisconsin is normally from March through November. The season length and peak months may vary appreciably from year to year. Land use, vegetation, amount of combustible materials and weather conditions such as wind, low humidity and lack of precipitation are the chief factors determining the number of fires and acreage burned. Generally, fires are more likely when vegetation is dry from a winter with little snow and/or a spring and summer with sparse rainfall.

Forest fires and wildfires are capable of causing significant injury, death and damage to property. A recent inventory showed that 46 percent of the state, 16 million acres is covered with forests. The potential for property damage from fire increases each year as more recreational properties are developed on wooded land and increased numbers of people use these areas. Fires can extensively impact the economy of an affected area, especially the logging, recreation and tourism industries. Major direct costs associated with forest fires or wildfires are the salvage and removal of downed timber and debris and the restoration of the burned area. If burned-out woodlands and grasslands are not replanted quickly to prevent widespread soil erosion, then landslides, mudflows and floods could result, compounding the damage.

Forest/Wildland Fires History and Frequency: No major forest fires have occurred in Monroe County in recent history; however, the National Climatic Data Center does report that 6 wildfires have occurred in Monroe County since 2000. These were on 4/5/00; 4/22/07; 4/14/09; 4/14/10; 5/18/10 and 9/27/12.

The 1976 drought created the most severe fire danger condition in Wisconsin forests and grasslands since the 1930's. During 1976 a total of 4,144 fires occurred, the greatest number in any one-year since 1971, when detailed record keeping began. The fire season of 1988 is also remembered as one of the driest on record. A total of 3,242 fires occurred that year, but just 9,740 acres burned, an extraordinarily low number considering the severity of the threat. Department of Natural Resource records show that no major forest fires *(fires burning over 500 acres)* have been reported for Monroe County from 1976 through 2017. Monroe County does have mutual aid agreements between fire departments.

Because there have no major forest fires in Monroe County in recent years there are no records of damage to property or crops. Due to this it is difficult to give a dollar amount of future fires.

Forest/Wildland Fires Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Forest/Wildland Fires a risk factor of 8 indicating this natural hazard is a low risk to the county. Critical facility's vulnerability to Forest/Wildland Fires is very negligible. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.

- Business and Industry. In Monroe County there are 954 businesses and industries. For the majority of urban businesses and industries forest/wildland fires pose a low risk. Businesses and industries located in rural areas or those located adjacent to forests and grasslands may be at a more significant risk. Examples of businesses that would be more vulnerable to these natural disasters include campgrounds and other recreation facilities.
- Agriculture. The overall hazard risk to agriculture is low. Agricultural buildings, especially out buildings that may be adjacent to forests or grasslands have an increased vulnerability to forest/wildland fires. Crops that have sustained long periods of drought or crops at harvest time could be more susceptible to damage from fires. This natural hazard could also endanger livestock.
- Roads and Highways. Smoke from forest fires can adversely affect visibility for motorists, but this is an isolated occurrence. The movement of heavy and specialized firefighting equipment on public roadways to fire scenes can cause temporary disruption or inconvenience to the motoring public. Following a major forest or wildland fire, sufficient vegetation may have been destroyed so as to warrant consideration of temporary emergence soil erosion control methods.
- Railroads. Smoke from forest fires can adversely affect visibility for train operation, but this is an isolated occurrence and can be mitigated by notification of the railroad dispatcher. A decision to close the railroad temporarily can be made by railroad management. Following a major forest or wildland fire, sufficient vegetation may have been destroyed so as to warrant consideration of temporary emergence soil erosion control methods.
- Airway. Although fires in the hardwood forests of Monroe County rarely reach the spectacular proportions of fires in the western state mountains, or even in the coniferous forests of northern Wisconsin, aircraft are sometimes used for observation, or water drops. During major fire events the Sparta or Tomah airports could become major hubs of air and ground activity. Highway traffic control by local officers in the vicinity of the airports might be needed.
- Waterways. As with land and air transportation, there could be isolated incidents of smoke drift creating a visibility hazard to pleasure boaters.
- Municipal Water. In the county there are 19 municipal wells and waters systems in operation, see Table 3-10. These facilities vulnerability to forest/wildland fires would be negligible except if these facilities are located adjacent to forests. The services provided by these facilities would not be interrupted except in extreme cases.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities vulnerability to forest/wildland fires would be negligible except if these facilities were located adjacent to forests. The services provided by these facilities would not be interrupted except in extreme cases.
- Hazardous Material Sites. Hazardous material storage areas in the path of forest or wildland fire would have to either receive concentrated protection, at the expense of resources that could otherwise be devoted to the main task of fire suppression, or the material would have to be moved and transported to a pre-designated relocation site if there were sufficient advance warning and accurate prediction of the fire's path. This latter option is not very likely to present itself.

Forest/Wildland Fires Risk Assessment Designation

Forest/Wildland Fires Historical Occurrence Rating: Low - 1
Forest/Wildland Fires Vulnerability Rating: Negligible - 1
Forest/Wildland Fires Probability Rating: Possible - 3
Forest/Wildland Fires Local Official Survey Rating: Medium - 3
Forest/Wildland Fires Risk Assessment Designation: **Low Threat – 8 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Forest/Wildland Fires Hazard Mitigation Ideas: ● Outreach efforts can promote such items as non-combustible roof covering, fire safe construction, and the important of cleaning brush away from buildings ● Promote public education on smoking hazards and the risks of recreational fires ● Zoning can be used to cluster development into defensible areas and keep development away from fire hazards such as steep slopes, where fires are difficult to contain ● Damage potential can be reduced by ensuring that structures are surrounded by defensible space or buffer zones ● Local power companies can help prevent or alleviate wildfires by property maintenance and separation of power lines, as well as efficient response to fallen power lines ● Maintenance of property in or near wildfire prone areas (fuel management techniques, pruning/clearing dead vegetation, selective logging, planting fire-resistant vegetation, creating fire breaks) ● Local governments can require burn permits and restrict campfires and outdoor burning ● Establish or continue to maintain cooperative fire agreements with the Wisconsin Department of Natural Resources ● Smoke from forest fires can adversely affect visibility for motorists, but can be mitigated by temporary signage or even road closures in a temporary basis ● Following a major forest or wildland

fire, sufficient vegetation may have been destroyed so as to warrant consideration of temporary emergence soil erosion control methods ● Develop a broadcast system to warn residents and tourists

3.8 Monroe County, Heavy Snow, Winter Storm Risk Assessment

Heavy Snowstorm Definition: Winter storms can vary in size and strength and include heavy snowstorms. A heavy snowfall is the accumulation of six or more inches of snow in a 12-hour period or eight or more inches in a 24-hour period.

Heavy Snowstorm History and Frequency:

1990's: 14 reported events by NCDC – 1/13/93, 1/16/94, 1/26/94, 2/22/94, 2/25/94, 3/6/95, 4/9/95, 11/26/95, 1/18/96, 12/23/96, 2/4/97, 3/13/97, 3/8/98, 1/1/99

2000's: 21 reported events by NCDC – 12/11/00, 12/18/00, 12/28/00, 3/1/02, 4/7/03,12/9/03, 2/5/04, 1/4/05, 1/21/05, 3/17/05, 2/15/06, 2/23/07, 3/1/07, 4/10/07, 12/22/07, 2/17/08. 12/8/08, 12/19/08, 12/20/08, 12/8/09, 12/23/09.

2010's: 10 reported events by NCDC – 1/6/10, 12/3/10, 12/20/10, 3/5/13, 3/22/15, 12/10/16, 1/24/17, 3/12/17, 4/3/18 and 4/18/18.

Much of the snowfall in Wisconsin occurs in small amounts between one and three inches per occurrence. Heavy snowfalls that produce at least eight to ten inches accumulation happen on the average only five times per season. Southwestern Wisconsin receives most of its snow during mid-winter. Snowfall in Wisconsin varies between the seasonal averages of approximately 30 inches in the south-central area of the state to over 100 inches a year in the extreme northwestern counties.

The National Climatic Data Center records show 14 heavy snowstorm events in Monroe County during the 1990's and 21 in the 2000's and 10 in the 2010's. Based on this data Monroe County can expect 1.6 winter storms, which produces at least 6" of snow per year. Estimating potential future losses for winter storms is difficult. Typically, damages are minor and widespread. Cost such as additional snow removal time and minor auto accidents are the typical costs associated with heavy snowstorms and are not usually tracked at the county level.

Heavy Snowstorm Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Heavy Snowstorm a risk factor of 29 indicating this natural hazard is a high risk to the county. In fact, this natural hazard received the highest risk assessment of hazards assessed for the county. Heavy snowstorms with large accumulations of snow could cause structural damage to the roofs of these buildings due to inadequate snow load capacity. In extreme cases, operations of these facilities could be limited because employees are unable to get to work. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In Monroe County there are 954 businesses and industries that employed 15,766 people and had an annual payroll of $651 million, see Table 3-5. Heavy snowstorms with large accumulations of snow could cause structural damages to roofs of these buildings due to inadequate snow load capacity. Businesses and industries vulnerability to heavy snowstorms could include economic loss and disruptions of inputs and outputs in extreme cases.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Snow from snowstorms is beneficial to many crops because it provides insulation from freezing and extreme cold. Livestock can be vulnerable to heavy snowstorms and can cause injuries and death. Crop land with significant frost depth can be negatively impacted by heavy snow cover. Spring rains are needed to draw the frost out of the ground; otherwise the water from snow melt will not be absorbed by the soil and can cause severe runoff and flooding.
- Roads and Highways. Direct hazard caused by poor visibility and slippery surface. Safety concerns with snowplows. Following a heavy snowfall, visibility problems can persist with blowing snow and icing following partial melting and refreezing of the runoff water. Blowing snow is more apt to occur on north-south oriented roads such as STH 27 and STH 131. Following a heavy snowfall, children may be outside playing in the snow near the roadway and be oblivious to traffic. Following the snow deposition, lesser used roads may remain blocked for hours, or even days after the storm is over. This blockage can cause motorist confusion and circuitous detours, as well as hampering access for emergency vehicles. Finding locations to store snow, especially snow removed from large expanses like urban parking lots, can be challenging.

- Railroads. Direct hazard caused by poor visibility. Following a heavy snowfall, visibility problems can persist with blowing snow.
- Airway. Light plane operation from the Sparta or Tomah airports would not be possible during a heavy snowstorm, because of the poor visibility and the physical blockage of the runway and taxiways. Following a heavy snowfall, visibility problems can persist with blowing snow and icing following partial melting and refreezing of the runoff water. Heavy snow squalls in the vicinity of Monroe County could cause some light aircraft, possibly flying over the county, to decide to land at Sparta or Tomah until the storms stop.
- Waterways. The recreational boating season is typically closed when most heavy snowfalls occur in the winter, and therefore present no challenge. Early heavy snows in early October, November or mid-March could catch some recreational boaters out. The same conditions of poor visibility that affect road and rail travel can impact boaters as well.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities vulnerability to heavy snowstorms is negligible and would not cause interruption of services provided by these facilities.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities vulnerability to heavy snowstorms is negligible and would not interrupt services provided by these facilities.
- Hazardous Material Sites. Heavy snow does not have as great an impact on hazardous materials in storage as does some of the other natural hazards, but heavy snow could cause collapse of storage building roofs, as well as restricting the response of emergency crews to the scene.

Heavy Snowstorm Risk Assessment Designation

Heavy Snowstorm Historical Occurrence Rating: High - 9
Heavy Snowstorm Vulnerability Rating: Catastrophic - 7
Heavy Snowstorm Probability Rating: Highly Likely - 8
Heavy Snowstorm Local Official Survey Rating: High - 5
Heavy Snowstorm Risk Assessment Designation: **High Threat – 29 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Heavy Snowstorm Hazard Mitigation Ideas: ● Local and state governments can produce and distribute family and traveler emergency preparedness information relating to severe winter weather hazards ● Safety strategies for severe weather events can be included in driver education classes ● Burying or otherwise protecting electric and other utility lines can prevent utility disruption ● Local governments can impact building/site design through building code enforcement of snow-related ordinances such as snow loads, roof slope, snow removal, and storage ● Establish heating centers or shelters for vulnerable populations ● Local governments need to always plan for and maintain adequate road and debris clearing capabilities ● Use snow fences to limit blowing and drifting of snow over critical roadway segments

3.9 Monroe County, Ice Storm Risk Assessment

Ice Storm Definition: Winter storms can vary in size and strength and include ice storms. An ice storm is an occurrence where rain falls from warmer upper layers of the atmosphere to the colder ground, freezing upon contact with the ground and exposed objects near the ground.

Freezing drizzle/freezing rain is the effect of drizzle or rain freezing upon impact on objects that have a temperature of 32 degrees Fahrenheit or below. Sleet is 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.

Both ice and sleet storms can occur at any time throughout the winter season from October into early April. Early and late season ice and sleet storms are generally restricted to northern Wisconsin; otherwise the majority of these storms occur in southern Wisconsin. In a typical winter there are 3-5 freezing rain events and a major ice storm occurs on a frequency of about once every other year. If a half inch of rain freezes on trees and utility wires, extensive damage can occur, especially if accompanied by high winds that compound the effects of the added weight of ice. There are also between three and five instances of glazing (less than ¼ inch of ice) throughout the state during a normal winter.

Ice Storm History and Frequency:

1970's: 1 event reported by Wisconsin Emergency Management – 3/76, devastating ice storm, $8.5 million-Public Gov't Property and Facilities Damage and $42 million Private-Individual Property, Crop and Facilities Damage to Monroe and 21 other counties, *Presidential Disaster Declaration*.

1990's: 2 events reported by NCDC – 2/26/96 and 1/4/98- $12,000 PD.

2000's: 3 events reported by NCDC – 2/24/01, 1/1/05 and, 3/8/09.

Wisconsin Emergency Management records show that in March of 1976 a devastating ice storm hit Monroe County along with 21 other counties, causing over $50 million in property damage warranting a Presidential Disaster Declaration. The National Climatic Data Center reported that Monroe County experienced five ice storm events between 1/1/90 and 12/31/18. Damages and costs typically associated with ice storms are downed power lines, auto accidents and additional personnel time for salting and plowing. Estimating future losses is difficult due to the fact that most costs associated with ice storms are not tracked at the county level.

Ice Storm Vulnerability Assessment

- Critical Facilities In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Ice Storm a risk factor of 23 indicating this natural hazard is a high risk to the county. Ice storms can damage the roofs of these facilities by forming "ice dams" and in severe conditions the weight of the ice from these storms can cause roofs to collapse. Ice storms can damage power and communication lines and cut off service to these buildings. Services provided by these facilities would not be interrupted except in extreme cases. See Table 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In Monroe County there were 954 businesses and industries that employed 15,766 people and had an annual payroll of $651 million, see Table 3-5. Ice storms can damage the roofs of these buildings by forming "ice dams" and in severe conditions the weight of the ice from these storms could cause roofs to collapse. Ice storms can damage power and communication lines and cut off service to buildings resulting in lost production and revenue from businesses and industries. Agricultural-related businesses and industries could suffer economic losses from crop damages, reduced milk production and loss of livestock due to ice storms.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. The hazard threat from ice storms is high in the county. The agricultural economy can sustain substantial economic losses from these storms. Ice storms can damage and collapse the roofs of buildings and can damage power and communication cutting off service to these buildings. The dairy industry in particular is vulnerable to ice storms because these operations are dependent on electric milking equipment that could result in reduced production and extreme cases milk may have to be dumped. This natural hazard can result in the loss of livestock due to exposure and increase crop damages. Christmas tree farms and fruit tree orchards can suffer damages due to ice sheared treetops, branches pulled down and destruction of trees. The gathering of sap for maple syrup production can be halted due to ice covering tree spigots and gathering systems during sap runs. Rural areas can be the last to get electrical power restored from downed lines to farms.
- Roads and Highways. Ice is one of the more treacherous hazards to roadway travel. It is not always as plainly obvious on the surface as is snow, and in spotty icing conditions, a vehicle can come upon it unexpectedly on a curve or the bottom of a hill, even though other parts of the highway are clear. Motorists tend to expect icing on bridges. Heavy ice can cause tree limbs or utility lines to fall across the roadway.
- Railroads. The main impact ice storms have on railroad movement is their potential to disrupt wire-based communications if the wires are weighted down and break. Icing can cause obvious productivity and safety hazards to rail crews working on the ground, as in necessary to switch cars at customer sidings or in rail sorting yards.
- Airway. Icing on wings and elsewhere on the exterior of an aircraft make it impossible to fly. Light planes in flight may have to make emergency landings at Sparta or Tomah if they encounter icing in flight. Aircraft parked in the open on the ground could have their control surfaces damaged by heavy ice storms.
- Waterways. Ice storms can occur earlier and later in the winter season than do severe snowstorms, and the most typical time for ice storms is in November and March. There is no Commercial navigation in Monroe County so only pleasure crafts would be affected.

- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities vulnerability to ice storms would be limited to such things as damage to the facility's roofs and loss of electrical service from downed power lines. Services provided by these facilities would not be interrupted except in extreme cases.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in the county, see Table 3-11. These facilities vulnerability to ice storms would be limited to such things as damage to building's roofs and loss of electrical service from downed power lines. Services provided by these facilities would not be interrupted except in extreme cases.
- Hazardous Material Sites. Ice, like snow, is more harmful for the potential peripheral impacts than direct impact. Icy road conditions can make emergency vehicle response difficult.

Ice Storm Risk Assessment Designation

Ice Storm Historical Occurrence Rating: Moderately Low - 4
Ice Storm Vulnerability Rating: Catastrophic - 7
Ice Storm Probability Rating: Likely - 5
Ice Storm Local Official Survey Rating: High - 7
Ice Storm Risk Assessment Designation: **High Threat – 23 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Ice Storm Hazard Mitigation Ideas: ● Local and state governments can produce and distribute family and traveler emergency preparedness information relating to severe winter weather hazards ● Burying or otherwise protecting electric and other utility lines can prevent utility disruption ● Local governments need to always plan for and maintain adequate road and debris clearing capabilities ● Home and building maintenance should be encouraged in order to prevent roof and wall damage from "ice dams"

3.10 Monroe County, Blizzard Risk Assessment

Blizzard Definition: Winter storms can vary in size and strength. A blizzard is the occurrence of sustained wind speeds in excess of 35 miles per hour accompanied by heavy snowfall or large amounts of blowing or drifting snow. True blizzards are rare in Wisconsin, however blizzard-like conditions often exist during heavy snowstorms when gusty winds cause severe blowing and drifting of snow.

Blizzard History and Frequency:

1990's: 1 event reported by NCDC – 1/26/96
2000's: 1 event reported by NCDC – 2/24/07
2010's: 1 event reported by NCDC – 12/11/10

Three blizzard events were recorded by the National Climatic Data Center for Monroe County. No property damage, injuries or deaths were reported for any of these blizzards.

Blizzard Vulnerability Assessment

- Critical Facilities In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Blizzard a risk factor of 17 indicating this natural hazard is a moderate threat to the county. Blizzards with heavy snowfalls and strong wind speeds could cause structural damage to roofs of these facilities because of inadequate snow load capacity. Roofing material could be blown off. Electrical service may be interrupted. Operations of these facilities could be limited because employees are unable to get to work. The services of these facilities provided would not be interrupted except in extreme cases. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In Monroe County there were 954 businesses and industries that employed 15,766 people and had an annual payroll of $651 million, see Table 3-5. Blizzards with heavy snowfalls and strong wind speeds could cause structural damage to buildings because of inadequate snow loan capacity. Roofing material could be blown off. Businesses and industries' vulnerability to blizzards could include economic loss and disruption of inputs and outputs.

- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Snow from blizzards is beneficial to many crops because it provides insulation from freezing and extreme cold. Livestock can be vulnerable to exposure from strong and persistent winds and the heavy snowfall with drifting which can cause injuries and death. The strong winds that accompany blizzards can cause soil erosion of soil especially on ridge tops.
- Roads and Highways. The same problem created by heavy snowfall applies to blizzards as well, except blizzards are characterized by heavy winds in addition to snow. Direct hazards caused by poor visibility and slippery surface are safety concerns with snowplows. Following a heavy snowfall, visibility problems can persist with blowing snow and icing following partial melting and refreezing of the runoff water. Blowing snow is more apt to occur on north-south oriented roads such as STH 27 and USH 12. Following a heavy snowfall, children may be outside playing in the snow near the roadway and be oblivious to traffic. Following the snow deposition, lesser used roads may remain blocked for hours, or even days after the storm is over. This blockage can cause motorist confusion and circuitous detours, as well as hampering access for emergency vehicles. Finding locations to store snow, especially snow removed from large expanses like urban parking lots, can be challenging.
- Railroads. Direct hazard caused by poor visibility. Following a heavy snowfall, visibility problems can persist with blowing snow.
- Airway. Plane operation from the Sparta or Tomah airports would not be possible during a heavy snowstorm, because of the poor visibility and the physical blockage of the runway and taxiways. Following a heavy snowfall, visibility problems can persist with blowing snow and icing following partial melting and refreezing of the runoff water. Heavy snow squalls in the vicinity of Monroe County could cause some light aircraft, possibly flying over the county, to decide to land at Sparta or Tomah until the storms stop.
- Waterways. Most heavy snowfalls occur in the winter when most waterways are iced covered, and therefore present no challenge. Early heavy snows in early December or mid-March could catch a pleasure craft on an open lake or river. The same conditions of poor visibility that affect road and rail travel can impact pleasure craft operators.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities vulnerability to blizzards is negligible and would not be interrupted except in extreme cases.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities vulnerability to blizzards is negligible and would not interrupt services provided by these facilities.
- Hazardous Material Sites. Heavy snow does not have as great an impact on hazardous materials in storage as does some of the other natural hazards, but heavy snow could cause collapse of storage building roofs, as well as restricting the response of emergency crews to the scene.

Blizzard Risk Assessment Designation

Blizzard Historical Occurrence Rating: Low - 2
Blizzard Vulnerability Rating: Catastrophic - 7
Blizzard Probability Rating: Possible - 3
Blizzard Local Official Survey Rating: High - 5
Blizzard Risk Assessment Designation: **Moderate Threat – 17 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Blizzard Hazard Mitigation Ideas: ● Local and state governments can produce and distribute family and traveler emergency preparedness information relating to severe winter weather hazards ● Burying or otherwise protecting electric and other utility lines can prevent utility disruption ● Local governments need to always plan for and maintain adequate road and debris clearing capabilities ● Use snow fences to limit blowing and drifting of snow over critical roadway segments

3.11 Monroe County, Extreme Cold Risk Assessment

Extreme Cold Definition: Winters are often accompanied with extremely cold temperatures. Extremely cold temperatures with strong winds can result in wind chills that cause bodily injury such as frostbite and death.

Extreme Cold History and Frequency:

1950's 1 event 1/30/51 (Coldest day on record in Sparta -48)
1970's 2 events 11/27/77 and 2/19/79.

1990's: 5 reported events by NCDC: 2/10/95, 12/9/95, 1/29/96, 2/1/96, (1/16/97 wind chills of 30-50 below zero)
2000's: 3 reported events by NCDC: 1/30/08, 2/10/08, and 1/14/09.
2010's: 2 reported events by NCDC: 1/6/14 and 1/27/14.

The National Climatic Data Center reported that Monroe County experienced 5 extreme cold events in Monroe County during the 1990's, 3 events in the 2000's and 2 events in 2010's. This averages out to about one every third year. Damages associated with extreme cold temperatures include frostbite and even death. No deaths have been recorded in Monroe County due to extreme cold temperatures.

Extreme Cold Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Extreme Cold a risk factor of 20 indicating this natural hazard is a moderate risk to the county. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In Monroe County there were 954 businesses and industries that employed 15,766 people and had an annual payroll of $651 million, see Table 3-5. Extreme cold can lead to physical problems for workers (frostbite) and lower productivity. The extreme cold can cause mechanical equipment failures which could lead to economic loss and disruption of inputs and outputs.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Extreme cold can cause dangerous physical conditions (frostbite) for agricultural workers. Livestock can be vulnerable to exposure from cold temperatures causing more stress on the animal and less production. In addition, extreme cold can cause injuries and death. Equipment failures such as frozen water pipes, fuel lines, etc. can disrupt agricultural production.
- Roads and Highways. Extreme cold impacts highway transportation by creating problems with vehicle starting and operation. Fuels lines and cooling systems can freeze, door latches not working properly, and other mechanical components can fail. The problem of extreme cold is compounded by the fact the roadways usually are already impacted by snow and ice from previous snowstorms. There is a safety hazards to individual motorists if they have any vehicle mechanical problems, or a driving situation that forces them into the ditch or situation where the vehicle is inoperative. Exposure injury, or death, either in or out of the vehicle, can occur quickly. Adverse impact to the road infrastructure can include contraction of bridge joints; contribute to rock face collapse, and pavement cracking.
- Railroads. Extreme cold causes contraction of welded continuous rails, and the imposition of a speed limit by the railroad companies. This speed reduction would impact operations on some railroads. The mechanical components of locomotives, rail cars, and railroad crossing gates can be adversely impacted by extreme cold. The extreme cold can impact railroad operating and maintenance crew's personal safety if they are exposed to the temperatures.
- Airway. Extreme cold can adversely impact all of the mechanical components of a light aircraft, including the engine and control surfaces. Planes in flight during extreme cold periods can experience engine icing.
- Waterways. Extreme cold events would most likely only occur during periods of the year when lakes and rivers are frozen over.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. The water systems are at slight risk to extreme cold temperatures as water mains are more susceptible to problems (frozen water lines) but service interruption would be minimal except in extreme cases.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities vulnerability to extreme cold is negligible and would not interrupt services provided by these facilities.
- Hazardous Material Sites. Depending upon the type of material involved, there could be problems from the material escape if the containers or piping rupture during extreme cold.

Extreme Cold Risk Assessment Designation

Extreme Cold Historical Occurrence Rating: Moderately Low - 4
Extreme Cold Vulnerability Rating: Catastrophic - 7
Extreme Cold Probability Rating: Likely - 5
Extreme Cold Local Official Survey Rating: Medium/High - 4
Extreme Cold Risk Assessment Designation: **Moderate Threat – 20 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Extreme Cold Hazard Mitigation Ideas: ● Local governments can organize outreach to vulnerable populations during periods of extreme temperature ● Communities can encourage utility companies to offer special arrangements for paying heating bills ● A community can establish heating and/or cooling centers for vulnerable populations

3.12 Monroe County, Earthquake

Earthquake Definition: 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 in an earthquake is seldom the direct cause of injury or death. Casualties mostly result from falling objects and debris, caused by the shocks, shaking, and damage or demolition of 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. This amount is expressed in Arabic numbers and each unit of increase represents a ten-fold increase in magnitude. An earthquake measuring 6.0 on the Richter scale is ten times more powerful than a 5.0 and one hundred times more powerful that 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. The *Modified Mercalli Intensity Scale* is an intensity scale expressed in Roman numerals, which reports the amount of shaking and effects at a specific location based on expert judgment. The scale has twelve classes and ranges from I (not felt) to XII (total destruction). No occurrence of earthquakes in Wisconsin has been severe. The most serious recorded earthquake registered 5.1 on the Richter scale and had a maximum intensity on the Mercalli Scale of VII.

Earthquake History and Frequency: No major earthquakes have occurred in Monroe County in recent history.

Earthquake Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Earthquake a risk factor of 12 indicating this natural hazard is a low threat to the county. Earthquakes can range from nothing felt to total destruction and loss of life. Since no major earthquakes have occurred in Wisconsin or Monroe County in recent history the risk to these facilities is insignificant. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In Monroe County there were 954 businesses and industries that employed 15,766 people and had an annual payroll of $651 million, see Table 3-5. Businesses vulnerability to earthquakes can range from nothing felt to total destruction and loss of life. Since no major earthquakes have occurred in Wisconsin or Monroe County the risk to businesses is insignificant.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Agriculture vulnerability to earthquakes is negligible.
- Roads and Highways. Earth movement can cause obvious incongruities with the roadway, as well as secondary damage due to related landslides, broken utility lines, and collapsed buildings on the roadway. This secondary damage of landslides would be most severe on roads in rock cuts, or cliffs, or any of the roads leading to ridge tops. Broken water or sewer lines could present the biggest problem in the eleven incorporated communities. Broken gas mains would present the greatest danger of fire and explosion, especially in the vicinity of downed power lines that are creating sparks.
- Railroads. Earth movement can cause obvious incongruities with railroad lines, as well as secondary damage due to landslides. Even a slight shift in the earth's surface can cause switches to not properly align, and a slight tremor could cause a parked rail car to move if the brakes were not properly set.
- Airway. Earth movement could cause parked planes to shift position, and in severe, but unlikely, movement, to smash into one another. Underground fuel tanks could rupture. Hangers and other structures could be damaged. Obviously, an earthquake would have no direct effect on an airborne aircraft, but runway damage could occur, with rutting or furrowing affecting the unsuspecting pilot upon landing.

- Waterways. An earth tremor could cause wave action, and possibly temporary current reversal.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities vulnerability is negligible and would not interrupt services provided by the facilities except in extreme cases.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities vulnerability to earthquakes is negligible and would not interrupt services provided except in extreme cases.
- Hazardous Material Sites. Industrial operations that require the piping of hazardous material to various locations in the storage or manufacturing process are most prone to earth tremor damage in that the pipes could break during the tremors. Material stored in tanks or other containers is always prone to the containers falling or being hit by debris, and breaking, resulting in the release of the material.

Earthquake Risk Assessment Designation

Earthquake Historical Occurrence Rating: Low - 1
Earthquake Vulnerability Rating: Catastrophic - 7
Earthquake Probability Rating: Possible - 3
Earthquake Local Official Survey Rating: Low - 1
Earthquake Risk Assessment Designation: **Low Threat – 12 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Earthquake Hazard Mitigation Ideas: ● Information gained from seismic hazard mapping can be used to assess risk ● State and local highway departments should review construction plans from all bridges to determine their susceptibility to collapse ● Local or state governments can use community outreach activities to foster an awareness of earthquake mitigation activities ● Earthquake hazards can be mitigated through land use planning ● Encourage local governments to adopt and enforce updated building code provisions is one effective way to reduce earthquake damage risk

3.13 Monroe County, Extreme Heat Risk Assessment

Extreme Heat Definition: A heat wave is primarily a public health concern. During extended periods of very high temperatures or high temperatures of humidity, individuals can suffer a variety of ailments including heat exhaustion and heat stroke. Heat stroke in particular is a life-threatening condition that requires immediate medical attention. 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. The majority of deaths during a heat wave are the result of heat stroke. The elderly, disabled and debilitated are especially susceptible to heat stroke.

Heat is the number one weather-related killer in the United States and Wisconsin far exceeding tornadoes, severe storms and floods combined. According to the National Weather Service during the period of 1988-2017, extreme heat and humidity associated with heat waves killed an average of 134 people a year in the United States. Within the State of Wisconsin, the National Weather Service Milwaukee/Sullivan Office reports that for the period of 1982-2010 at least 116 people have died in Wisconsin in which heat was the direct or primary cause.

In 1995, two major killer heat waves affected most of Wisconsin, resulting in 154 heat-related deaths and over 300 heat-related illnesses. In the summer of 2011, Wisconsin lost five people to heat-related illnesses during the July 18-22 heat wave. In 2012, Wisconsin had confirmed 27 heat related deaths, most occurred during five days of excessive heat warnings from July 2-6. The heat index rose to 105 F degrees for 48 hours with nighttime lows of 75 F. It was the second hottest and third longest heat wave in Wisconsin. In 2013, 11 Wisconsin residents suffered heat-related death. The 1995 heat wave caused more deaths than any other weather-related event in the history of Wisconsin. Other recent heat waves include the summer of 1999 which claimed 20 lives and the summer of 2001 in which 15 people died.

Extreme Heat History and Frequency:

1990's: 3 reported events by NCDC: 7/4/99, 7/23/99, 7/28/99

2000's: 1 reported event by NCDC: 7/31/01 through first week and a half of August

2010's 3 reported events by NCDC: 7/17/11 ($5,000 PD 1 Death and 6 Injuries) 7/2/12 and 6/29/18

The National Climatic Data Center reported that Monroe County experienced 3 heat events during the 1990's, one event in 2001 and 3 events in the 2010's. The National Weather Service records show that between 1982 and 2012 Monroe County experienced 52 heat wave days. Southwestern Wisconsin logged the most heat wave days during this time period. Damages associated with extreme heat are difficult to estimate, as amounts directly related to extreme heat are not tracked at the county level. Most damages which occur are additional costs associated with the additional power consumption by air conditioning and the costs associated with medical responses to heat strokes.

Extreme Heat Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns extreme heat a risk factor of 22 indicating this natural hazard is a high risk to the county. See Tables 3-6 through 3-9 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In Monroe County there were 954 businesses and industries that employed 15,766 people and had an annual payroll of $651 million, see Table 3-5. Extreme heat can lead to physical problems for workers (heat exhaustion) and lower productivity. The extreme heat can cause mechanical equipment failures which could lead to economic loss and disruption of inputs and outputs.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Extreme heat can cause dangerous physical conditions (heat exhaustion) for agricultural workers. Livestock can be vulnerable to extreme heat causing more stress on the animal and less production. In addition, severe heat can cause injuries and death. Equipment failures due to overheating could disrupt agricultural production.
- Roads and Highways. High heat does not present as direct a threat to transportation in general than do some other natural hazards such as blizzards or extreme cold, however heat can have many side impacts, such as the safety and comfort of people and livestock having to endure the condition without air conditioning. Motor vehicles may overheat and stall in unsafe locations at highway intersections, fuel stored, illegally, in vehicle trunks or truck beds is more apt to volatilize and cause safety problems. Extreme heat can cause asphalt road surface buckling and rough bumps and cracks. Extreme heat can cause dangerous working conditions for highway maintenance workers outdoors or in poorly ventilated or non airconditioned shop buildings.
- Railroads. Extreme heat can cause buckling and kinking of welded continuous steel rails. Extreme heat can cause dangerous working conditions for track and other rail maintenance workers outdoors or in poorly ventilated or non airconditioned shop buildings.
- Airway. Extreme heat can cause volatilization of fuel in aircraft parked outside. Extreme heat can cause changes in atmospheric pressure and in the lift characteristics of small aircraft that a pilot must be aware of and compensate for.
- Waterways. The biggest impact of extreme heat on pleasure craft operation is the danger of heat exhaustion to boaters and passengers.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities vulnerability is negligible and would not interrupt services provided by the facilities except in extreme cases. In extreme cases water usage may increase to the point where the water system supply may be stressed.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities vulnerability to extreme heat is negligible and would not interrupt services provided except in extreme cases.
- Hazardous Material Sites. Hazardous material of various types could volatilize in extreme heat, especially if safety relief valves were not operating properly.

Extreme Heat Risk Assessment Designation

Extreme Heat Historical Occurrence Rating: Moderately High - 6
Extreme Heat Vulnerability Rating: Catastrophic - 7
Extreme Heat Probability Rating: Possible - 5
Extreme Heat Local Official Survey Rating: Medium - 4
Extreme Heat Risk Assessment Designation: High **Threat - 22 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Extreme Heat Hazard Mitigation Ideas: ● Local governments can organize outreach to vulnerable populations during periods of extreme temperature ● Communities can encourage utility companies to offer special arrangements for paying utility bills ● A community can establish heating and/or cooling centers for vulnerable populations.

3.14 Monroe County, Agricultural Risk Assessment

Agricultural Definition: Agriculture is the science or art of cultivating the soil, producing crops, and raising livestock and in varying degrees the preparation of these products for man's use - *Webster's New Collegiate Dictionary*. For more than 150 years, agriculture has driven the State of Wisconsin's economy. It remains the number one industry in Wisconsin, employing one of every five people. The 2013-2017 American Community Survey 5-year Estimate showed that approximately 5.5% of Monroe County's employed civilian population was employed in the agriculture, forest, fishing and hunting and mining sector.

There are many natural hazards that can affect agricultural production in the State. Droughts reduce crop growth and yields and can decimate croplands. Extreme temperatures, high winds, hail and other extreme weather conditions can also decimate crop production. Insects can also decimate a crop resulting in a total loss. Animal diseases in farm animals carry the potential of harming not only the animals' health, but also human health in some cases. Agricultural losses from floods include crop loss, soil erosion or property damage to farm structures and equipment. These are just some of the hazards that may affect agriculture.

Agricultural History and Frequency: The history of agricultural losses due to droughts, floods, extreme temperatures, high winds, and hail are detailed under the appropriate natural hazard section.

There are many natural hazards that can affect agricultural production (droughts, floods, extreme temperatures, high winds, hail, insects etc.) to name a few. Agricultural hazards can occur annually in the county.

Agricultural Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Agricultural a risk factor of 12 indicating this natural hazard is a low risk to the county. Critical facility's vulnerability to agriculture is not applicable. See Table 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In Monroe County there are 954 businesses and industries that employ 15,766 people, see Table 3-5. For most businesses and industries, vulnerability to agriculture production and raising of livestock would be negligible. Businesses and industries that are involved in the growth, production, processing, manufacturing, distribution and wholesale and retail sales of agricultural products and food products can be vulnerable to crop and livestock losses. These businesses and industries can sustain economic losses from reduced production of agricultural commodities due to damages caused by natural hazards.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Agriculture production is vulnerable to numerous natural hazards including droughts, floods, extreme temperatures, high winds, hail etc. and are detailed under the appropriate hazard section.
- Roads and Highways, Railroads, and Waterways. Unlike the other risks outlined in this section, agricultural risk is not a natural hazard, but rather an economic condition created by the occurrence of natural hazards. If any result would occur from agricultural risk, or crop failure, to impact transportation modes, it would be a reduction in truck, train, and barge traffic due to less grain being produced to haul. Ultimately an import of hay or other livestock feed into the area could result.
- Airway. Agricultural risk is an economic condition, not a natural hazard. There would be no direct threat to the airports or air travel.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities vulnerability to agriculture is not applicable.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities vulnerability to agriculture is not applicable.

- Hazardous Material Sites. If the agricultural risk is brought about because of severe drought, then it is likely natural weather conditions and ground cover condition is also conducive to the danger of wildfire. The same threat caused by fire would be possible. If the agricultural risk is caused by a shift in market conditions, or severe insect or disease infestation, the wildfire threat would not be as high.

Agricultural Risk Assessment Designation

Agricultural Historical Occurrence Rating: Low - 2
Agricultural Vulnerability Rating: Limited - 3
Agricultural Probability Rating: Possible - 3
Agricultural Local Official Survey Rating: Medium - 4
Agricultural Risk Assessment Designation: **Low Threat – 12 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Agricultural Hazard Mitigation Ideas: Agricultural hazard mitigation ideas for droughts, floods, extreme temperatures, high winds, and hail are detailed under the appropriate natural hazard section.

3.15 Monroe County, Drought Risk Assessment

Drought Definition: A drought is an extended period of unusually dry weather, which may be accompanied by extreme heat (temperatures which are 10 or more degrees above the normal high temperature for the period). There are basically two types of drought in Wisconsin, 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.

Wisconsin is most vulnerable to agriculture drought. The state has about 15 million acres of farmland on 78,000 farms and was ranked 9th in the country in overall farm receipts (USDA, Economic Research Service). 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. Droughts also greatly increase the risk of forest fires and wildfires because of the extreme dryness. In addition, the loss of vegetation in the absence of sufficient water can result in flooding, even from average rainfall, following drought conditions.

Drought History and Frequency:

1970's:	1 event report by Wisconsin Emergency Management, 1976, $1 million-Public Gov't Property and Facilities Damage and $623 million Private-Individual Property, Crop and Facilities Damage to Monroe and 63 other counties, Presidential Emergency Declaration.
1980's	1 event report by Wisconsin Emergency Management, *Hazard Analysis, November 2002* - One of the most severe droughts on record for the state - 1987-1998 drought resulted in 52% of the state's 81,000 farms having a crop loss of 50% or more. All Wisconsin counties were designated eligible for drought assistance.
1990's	No events reported
2000's	No events reported
2010's	2 events reported by NCDC: 7/12 thru 10/12 and 9/13 thru 10/13

Wisconsin Emergency Management reported one major drought event (1976) which affected Monroe and 63 other counties in the State. A Presidential Emergency Declaration was made for those counties. According to *Wisconsin Emergency Management's Hazard Analysis, 2016*, Wisconsin's five most significant droughts in terms of severity and duration are:1987-1989, 1976-1977, 1955-1959, 1948-1950 and 1929-1934.

Drought Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Drought a risk factor of 14 indicating this hazard is a moderate threat to the county. In drought situations, water use may be restricted and affect the operation of these facilities. Hospitals may need water storage systems in emergency situations. Fire stations need adequate water capacity to fight fires. Critical facility's

vulnerability to droughts is negligible and won't interrupt services provided by these facilities except in extreme cases. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.

- Business and Industry. In Monroe County there were 954 businesses and industries that employed 15,766 people and had an annual payroll of $651 million, see Table 3-5. For most businesses and industries, vulnerability to drought would be negligible. Examples of businesses and industries that are negatively impacted by drought conditions include: agribusinesses, tourism related businesses, boat dealerships and marinas, golf courses, businesses that rely on barge traffic for shipment of raw materials or transporting finished goods and products, and fisheries.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Agriculture's vulnerability to drought can be catastrophic. One of the most severe droughts in the state occurred in 1987-1988 which resulted in 52% of the state's 81,000 farms had crop losses of 50% or more. All Wisconsin counties were designated eligible for drought assistance. The costs and losses to agriculture producers can include: reduced yields and crop loss, increased insect infestation and plant disease, increased irrigation, cost of new or supplemental water resource development, wind erosion of top soil, forced reduction of foundation stock, reduced milk production, increased feed costs, high livestock mortality rates, disruption of reproductive cycles, decreased stock weights, reduced productivity of pastureland and loss of farms and dairy herds.
- Roads and Highways, Railroads, and Waterways. The impact of drought on transportation modes is much the same as that caused by agricultural failure; a reduction in agriculturally related freight traffic.
- Airway. Extended drought could increase the possibility of wildfires. The possible impact of wildfires on the Sparta and Tomah airports, and on light plane travel has been discussed under that topic.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. Municipal water vulnerability to droughts can include decreased supply of water from low water tables and increased pollutant concentrations. Services from these facilities should not be interrupted except in extreme cases.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities vulnerability to droughts can include decreased water supply and diminished sewage flows. Services from facilities should not be interrupted except in extreme cases.
- Hazardous Material Sites. Extended drought could increase the possibility of wildfires. The possible impact of wildfires on hazardous material sites has been discussed under that topic.

Drought Risk Assessment Designation

Drought Historical Occurrence Rating: Low - 2
Drought Vulnerability Rating: Critical - 5
Drought Probability Rating: Possible - 3
Drought Local Official Survey Rating: Medium - 4
Drought Risk Assessment Designation: **Moderate Threat – 14 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Drought Hazard Mitigation Ideas: ● Citizens can be encouraged to take water-saving measures, especially when extra water is needed for irrigation and farming ● Maintain adequate water storage for human consumption ● Communities can pass ordinances to prioritize or control water use, particularly for emergency situations ● Contingency plans can be developed to help anticipate needs and actions to take during a drought ● Designs or plans for water delivery systems can include consideration of drought events ● Crop insurance can preserve economic stability for farmers during a drought

3.16 Monroe County, Fog Risk Assessment

Fog Definition: Simply, fog is a cloud near the ground. A cloud is an area of condensed water droplets (or ice crystals in the upper atmosphere). The same processes that produce clouds high above the ground can produce clouds near the surface. Therefore, understanding fog requires some basic meteorology. Fog forms when air can no longer hold all of the moisture it contains. This happens when 1) air is cooled to its dew point, which is the temperature at which air is holding as much moisture as it can (cool air can hold more moisture than warm air) or 2) the amount of moisture in the air increases. Once air has reached its dew point, it condenses onto very small particles forming tiny water droplets that comprise fog.

Fog is a hazard mostly for one very important reason: reduced visibility. Airport delays, automobile accidents, shipwrecks, plane crashes, and many other transportation problems are frequently caused by fog. However, like several other natural hazards, fog can also be beneficial. Several species of plants, including some crops, depend on fog for moisture and cool temperatures from decreased sunlight.

Fog History and Frequency:

2010's: 1 event reported by NCDC – 3/8/10

Fog is responsible for an average of over $1 million in property damage, dozens of injuries, and several deaths every year in the United States. The financial cost of transportation delays caused by fog has not been calculated but is substantial.

Fog Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Fog a risk factor of 18 indicating this natural hazard is a moderate threat to the county. Critical facility's vulnerability to fog is negligible and would not interrupt services provided by these facilities. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In Monroe County there are 954 businesses and industries, see Table 3-5. Businesses and industries vulnerability to fog would be negligible.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Several species of plants, including some crops, depend on fog for moisture. Agriculture's vulnerability to fog is negligible except in extreme cases during prolonged periods of heavy rains, fog may be a contributing factor in some plant diseases.
- Roads and Highways. Fogs are most apt to occur in lower elevations blocked by wind flow. Poor visibility is the major problem with fog, although in the early spring and late fall freezing of the roadway surface can accompany fog and present an additional hazard. Dense fog can be particularly challenging to drivers, pedestrians and bicyclists, even those not directly on the roadway. Dense fog in parking lots can present security and safety problems for people walking to their cars to and from buildings.
- Railroads. The location of railway lines usually following valley bottoms requires train engineers to operate more frequently in fog. The same visibility problems confronting the motorist confront the railroad engineer, except the rail operator is more assured other trains will be clear of the right-of-way than a motorist can be assured other vehicles will be clear of the highway. The train engineer still must contend with pedestrians and animals being on the track and not seen in a heavy fog, as well as the possibility of an unseen vehicle at a road grade crossing.
- Airway. The Sparta and Tomah airports are not equipped to handle aircraft in conditions other than Visual Flight Rules.
- Waterways. There is no commercial navigation on any waterway in Monroe County. Most waterways in the County are not big enough to handle larger boats, which typically have radar. This means that the same visibility problems confronting motorists apply to pleasure boaters.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities vulnerability to fog is negligible and would not interrupt services provided by these facilities.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities vulnerability to fog is negligible and would not interrupt services provided by these facilities.
- Hazardous Material Sites. Fog presents no specific hazard to stored hazardous material. Hazardous material being transported is subject to the same danger as the transportation mode being used.

Fog Risk Assessment Designation

Fog Historical Occurrence Rating: High - 7
Fog Vulnerability Rating: Negligible - 1
Fog Probability Rating: Highly Likely - 7
Fog Local Official Survey Rating: Medium - 3
Fog Risk Assessment Designation: **Moderate Threat – 18 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Fog Hazard Mitigation Ideas: ● Local and state governments can develop automated visibility warning systems that use weather sensors to detect reduced visibility conditions (heavy rains, fog white-out). These systems could trigger a permanent or portable

Dynamic Message Sign (DMS) with a message indicating the adverse driving conditions. These same systems could also distribute information on the road hazard to traffic management centers, public safety agencies, or other traffic information systems. ● Educate citizens on weather and road condition resources such as radio, cable TV, Internet etc.

3.17 Monroe County, Landslide Risk Assessment

Landslide Definition: A landslide is a relatively sudden movement of soil and bedrock downhill in response to gravity. The movement of the soil can cause damage to structures by removing the support for the foundation of a building or by falling dirt and debris colliding with or covering a structure. Landslides can be triggered by heavy rain, bank or bluff erosion, or other natural causes.

Landslide History and Frequency: In Monroe County landslides are infrequent and generally cause minor damage therefore there is no documented data pertaining to the history of landslides. However, mudslides occurred due to heavy rains in 2007, 2008, 2013 and 2018.

In Wisconsin landslides generally are not dramatic; however, there have been instances of rock fall along the bluffs of the Mississippi River and the collapsing of hillsides during heavy rainfall.

Landslide Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Landslide a risk factor of 15 indicating this natural hazard is a moderate risk to the county. Critical facility's vulnerability to landslides is negligible and would not interrupt services provided by these facilities except in extreme cased. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In Monroe County there are 954 business and industries that employ 15,766 people, see Table 3-5. For most businesses and industries vulnerability to landslides would be negligible except for buildings located next to steep slopes.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Agriculture's vulnerability to landslides is negligible because this natural hazard is usually an isolated incident and damages would be confined to a limited area.
- Roads and Highways. Landslides would be most severe on roads in rock cuts, or cliffs and could leave roads impassable.
- Railroads. Landslides can cause obvious damage with railroad lines.
- Airway. Landslides could cause parked planes to smash into one another and hangers or other structures could be damaged. Obviously, landslides would have no direct effect on an airborne aircraft, but runway damage could occur, with mud or debris covering it.
- Waterways. A landslide could cause wave action on rivers like the La Crosse River. If the event should occur during the recreation season it could have an effect on unsuspecting small crafts such as canoes, kayaks or small fishing boats.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities vulnerability to landslides is negligible and would not interrupt services provided by the facilities except in extreme cases.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the county, see Table 3-11. These facilities vulnerability to landslides is negligible and would not interrupt services provided except in extreme cases.
- Hazardous Material Sites. Industrial operations that require the piping or storage of hazardous material in the manufacturing process are most prone to landslide damage. Pipes could break if a landslide would hit the pipe or supporting structure. Material stored in tanks or other containers is also prone to being hit by a landslide and breaking, resulting in the release of the material.

Landslide Risk Assessment Designation

Landslide Historical Occurrence Rating: Low - 3
Landslide Vulnerability Rating: Negligible - 4
Landslide Probability Rating: Possible - 4
Landslide Local Official Survey Rating: Low - 4

Landslide Risk Assessment Designation: **Moderate Threat – 15 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Landslide Hazard Mitigation Ideas: ● Local governments, developers, and residents can make better decisions using maps ● Building codes can set construction standards, including minimum foundation requirements, in landslide-prone areas ● Zoning ordinances may be used to create buffers between structures and high-risk areas ● A special purpose ordinance for slide-prone areas may be used to limit fill or dumping ● Set drainage control regulations to reduce the risk of landslides resulting from saturated soils ● Grading ordinances require developers and landowners to obtain permits prior to filling or regrading ● Hillside development ordinances are special purpose ordinances that set specific standards for construction on hillsides ● Sanitary system codes can reduce the effect of drainage on landslides by limiting the type and location of sanitary systems ● Open space designations keep landslide prone areas undeveloped ● Structures may be moved to less hazardous locations ● Land and structures may be purchased by and titled in the name of a local government body than can remove structures and enforce permanent restrictions on development ● Restraining structures may be designed and used to hold soil in place ● Grading can be used to increase slope stability ● Various types of vegetation increase soil stability ● Placing utilities outside of landslide areas decreases risk of service disruption ● Restrictive covenants, a legal binding agreement, can be used in a private development to impose restrictions on land use

3.18 Monroe County, Subsidence Risk Assessment

Subsidence Definition: Sinkholes are geological phenomena that can pose a hazard to structures and people. A sinkhole is a depression in the ground caused by an evacuation of support from below the soil. Sinkholes can form naturally in areas with karst geology, areas that have limestone or other bedrock that can be dissolved by water. As the limestone rock under the soil dissolves over time from rainfall or flowing groundwater, a hollow area may form underground, into which surface soil can sink. Sinkholes can also be caused by human activity. Areas with karst conditions can be subject to groundwater contaminants from pollutants entering a sinkhole, fissure or other karst feature.

Sinkholes have not been a factor in any natural disaster. However, karst features should be identified and considered in a community especially for land use planning, stormwater management and hazardous materials planning to avoid possible damage to structures or contamination of groundwater. Even a well 100 feet deep can be contaminated for surface pollutants entering a sinkhole.

Subsidence History and Frequency: No information was found on major subsidence events in Monroe County.

Subsidence Vulnerability Assessment

- Critical Facilities In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. The Hazard Risk Assignment assigns Subsidence a risk factor of 7 indicating this natural hazard is a low risk to the county. Buildings are susceptible to sink holes and can cause a wide range of damage to structures including damage to foundations, partial collapse and/or total destruction of buildings. Sinkholes have not been a factor in any natural disasters in the county. Critical facility's vulnerability to sinkholes in this area is negligible and would not interrupt services provided by these facilities except in extreme cases. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In Monroe County there were 954 businesses and industries that employed 15,766 people and had an annual payroll of $651 million, see Table 3-5. Buildings are susceptible to sinkholes and can cause a wide range of damages to structures including damage to foundations, partial collapse, and/or total destruction of buildings. Businesses and industries' vulnerability to sinkholes is negligible in this area.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Agriculture vulnerability to sinkholes is negligible because this natural hazard is usually an isolated incident and damages would be confined to a limited area.
- Roads and Highways. Roads built on areas with karst topography could be subject to subsidence. Sinkholes, when they have occurred in other areas, often happen suddenly, and a vehicle on the highway could literally fall into a hole opening beneath it. The danger of the large subsidence area remains a threat to an unsuspecting motorist, especially at

night, until proper barricades can be put up. The threat of subsidence is greater on the ridge top and side hill areas than in the valleys.

- Railroads. Subsidence along the railroad tracks could come from direct undermining of the banks by river action.
- Airway. The Sparta and Tomah airports are not built in an area prone to subsidence.
- Waterways. Soil surface subsidence would have little impact on river navigation.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. Sinkholes can cause damage to structures and underground piping that carries the water supply. Wells can be contaminated from surface pollutants entering sinkholes. These facilities vulnerability to sinkholes in this area is negligible and would not interrupt services provide by the facilities except in extreme cases.
- Wastewater Treatment Facilities. There are 10wastewater treatment facilities in operation in the county, see Table 3-11. Sinkholes can cause damage to structures and underground piping that carry wastewater. These facilities vulnerability to sinkholes is negligible and would not interrupt services provides except in extreme cases.
- Hazardous Material Sites. Unless a hazardous materials storage or disposal site were built in karst topography or on unstable wetland soils, an unlikely possibility, subsidence would not pose a major problem.

Subsidence Risk Assessment Designation

Subsidence Historical Occurrence Rating: Low -1
Subsidence Vulnerability Rating: Negligible - 1
Subsidence Probability Rating: Possible - 3
Subsidence Local Official Survey Rating: Low - 2
Subsidence Risk Assessment Designation: **Low Threat – 7 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Subsidence Hazard Mitigation Ideas: ● Local governments and state governments can promote community awareness of subsidence risks and effects ● Old mining areas or geologically unstable terrain should be identified and mapped so that development can be prevented and limited ● Areas susceptible to collapse can be maintained as public open space ● Local governments can acquire and title land and enforce permanent restrictions on development ● Filling or buttressing subterranean open spaces, as with abandoned mines ● Move structures to less hazardous locations ● Monitor groundwater levels in subsidence-prone areas

3.19 Monroe County, Pandemic Flu Risk Assessment

Pandemic Flu Definition: A pandemic is a global disease outbreak. Flu pandemic occurs when a new influenza virus emerges for which people have little or no immunity, and for which there is no vaccine. The disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in very short time.

It is difficult to predict when the next influenza pandemic will occur or how severe it will be. Wherever and whenever a pandemic starts, everyone around the world is at risk. Countries might, through measures such as border closures and travel restrictions, delay arrival of the virus, but cannot stop it. Flu pandemics are low frequency events, but they have the capability of being extreme impact disasters.

Pandemic Flu History and Frequency:

Flu pandemics are naturally occurring events. Flu pandemics have occurred three times in the last century, in 1918, 1958, and 1967. The 1918 pandemic was the most severe disease outbreak in the history of the world. An estimated 20-40 million people died worldwide. It is not a matter of if another pandemic will occur but when will it occur and how lethal will it be.

Pandemic Flu Vulnerability Assessment

- Critical Facilities. In the county 129 service orientated critical facilities were identified. These include (37) government and military facilities; (35) hospitals, clinics, and residential facilities; (20) police and fire facilities; and (37) schools. These facilities will be severely affected during a pandemic flu. Hospitals and clinics will be inundated with the sick, residential care facilities will be closed to visitors and all the services will be severely affected by employees unable to

come to work. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.

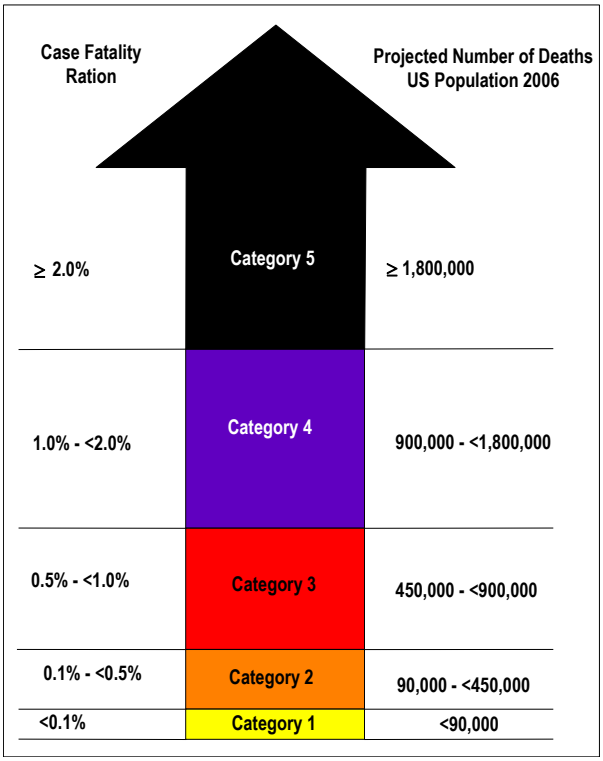
- Business and Industry. In Monroe County there were 954 businesses and industries that employed 15,766 people and had an annual payroll of $651 million, see Table 3-5. Businesses and industries will be severely affected by employees unable to come to work due to illness, at-home caring for ill family members, or perhaps a fear of going to work due to the contagious nature of the disease.
- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. Agriculture will be affected by workers unable to tend to crops and animals due to being unable to come to work.
- Roads and Highways. Automobiles and buses carrying affected people are a means of spreading a pandemic flu quickly throughout the U.S. and the world. A way of slowing this spread will be to ask people not to travel. In addition, highway crews and maintenance personnel will be affected.
- Railroads. Trains carrying affected people are a means of spreading a pandemic flu quickly throughout the U.S. and the world. A way of slowing this spread will be to stop passenger train services. In addition, other train services would be affected due to the lack of operators who would be unable to work due to the flu.
- Airway. Airplanes carrying affected people are a means of spreading a pandemic flu quickly throughout the U.S. and the world. A way of slowing this spread will be to close down airports. A pandemic flu will have a severe impact on airways.
- Waterways. Pandemic flu presents no specific hazard to waterways.
- Municipal Water. In the county there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities' vulnerability to pandemic flu is through the people who would be maintaining and running these facilities. If the operators are affected, then the facility will be affected due to lack of operators.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the County, see Table 3-11. These facilities' vulnerability to pandemic flu is through the people who would be maintaining and running these facilities. If the operators are affected, then the facility will be affected due to lack of operators.
- Hazardous Material Sites. Pandemic flu presents no specific hazard to stored hazardous material but could impact persons responsible for monitoring and maintaining these sites.

Pandemic Flu Risk Assessment Designation

Pandemic Flu Historical Occurrence Rating: Low -1
Pandemic Flu Vulnerability Rating: Negligible - 9
Pandemic Flu Probability Rating: Possible - 2
Pandemic Flu Local Official Survey Rating: Low - 2
Pandemic Flu Risk Assessment Designation: **Low Threat – 14 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Pandemic Flu Risk Assessment Designation

The following is a Pandemic Severity Index, this index uses case fatality ratio as the critical driver for categorizing the severity of a pandemic. The index is designed to enable estimation of the severity of a pandemic on a population level to allow better forecasting of the impact of a pandemic.



Source: Interim Pre-Pandemic Planning Guidance: Community Guidance for Pandemic Influenza Mitigation in the United States.

Pandemic Flu Hazard Mitigation Ideas: The pandemic mitigation framework that is proposed is based upon an early, targeted, layered application of multiple partially effective nonpharmaceutical measures. It is recommended that the measures be initiated early before explosive growth of the epidemic and, in the case of severe pandemics, that they be maintained consistently during an epidemic wave in a community. The pandemic mitigation interventions described in this document include:

1. Isolation and treatment (as appropriate) with influenza antiviral medications of all persons with confirmed or probable pandemic influenza. Isolation may occur in the home or healthcare setting, depending on the severity of an individual's illness and/or the current capacity of the healthcare infrastructure.

2. Voluntary home quarantine of members of households with confirmed or probable influenza case(s) and consideration of combining this intervention with the prophylactic use of antiviral medications, providing sufficient quantities of effective medications exist and that a feasible means of distributing them is in place.

3. Dismissal of students from school (including public and private schools as well as colleges and universities) and school-based activities and closure of childcare programs, coupled with protecting children and teenagers through social distancing in the community to achieve reductions of out-of-school social contacts and community mixing.

4. Use of social distancing measures to reduce contact between adults in the community and workplace, including, for example, cancellation of large public gatherings and alteration of workplace environments and schedules to decrease social density and preserve a healthy workplace to the greatest extent possible without disrupting essential services. Enable institution of workplace leave policies that align incentives and facilitate adherence with the nonpharmaceutical interventions outlined above.

All such community-based strategies should be used in combination with individual infection control measures, such as hand washing and cough etiquette.

Implementing these interventions in a timely and coordinated fashion will require advance planning. Communities must be prepared for the cascading second- and third-order consequences of the interventions, such as increased workplace absenteeism related to child-minding responsibilities if schools dismiss students and childcare programs close.

Decisions about what tools should be used during a pandemic should be based on the observed severity of the event, its impact on specific subpopulations, the expected benefit of the interventions, the feasibility of success in modern society, the direct and indirect costs, and the consequences on critical infrastructure, healthcare delivery, and society. The most controversial elements (e.g., prolonged dismissal of students from schools and closure of childcare programs) are not likely to be needed in less severe pandemics, but these steps may save lives during severe pandemics. Just as communities plan and prepare for mitigating the effect of severe natural disasters (e.g., hurricanes), they should plan and prepare for mitigating the effect of a severe pandemic.

3.20 Monroe, Railroad Risk Assessment

Railroad Definition: "Accident/Incident" include collisions, derailments, and other events involving the operation of on-track equipment causing damage including impacts between railroad on-track equipment and highway users at crossings.

In Monroe County there are two rail lines, the Canadian Pacific runs east-west through the middle of the county. It runs from Rockland in the west through Sparta, Fort McCoy, Tomah and Oakdale and exits the county along interstate 94. The Union Pacific is located in the northeast portion of the county. It has 2 sets of tracks, one beginning in the Town of Oakdale north of interstate 94 which runs northwest through Wyeville and Warrens and exiting the county in the town of Grant. The other set of tracks runs from Wyeville west to Tunnel City.

Train accidents are generally localized and most of the incidents result in limited impacts at the community level. However, if there are volatile or flammable substances on the train and the train is in a highly populated or densely forested area, death, injuries, and damage to homes, infrastructure, and the environment, including forest fires can occur.

It is difficult to predict when the next rail hazard will occur. Due to the large number of trains passing through Monroe County on a daily basis, it is not a matter of if a rail incident will occur but a matter of when. In addition, due to the rail lines passing through or near to the communities of Rockland, Sparta, Fort McCoy, Tomah, Tunnel City, Warrens, Wyeville and Oakdale the possibility of a derailment causing significant injury and damage is high. An added hazard is the growing number of hazardous cargo shipments these trains are carrying. Rail hazards are low frequency events, but they have the capability of being extreme impact disasters

Railroad History and Frequency:

1980's:	5 accidents reported by the Federal Railroad Administration: 1980 two accidents - $16,00 total damage; 1984 one accidents - $6,500 total damage; 1985 one accidents - $32,000 damages; 1986 one accidents - $27,649 damages.
1990's:	1 accident reported by the Federal Railroad Administration: 1993 one accidents - $21,603 in damages.
2000's:	2 accidents reported by the Federal Railroad Administration: 2003 one accidents - $58,000 in damages; 2007 one accident - $8,804 in damages, one person killed.
2010's:	1 accident reported by the Federal Railroad Administration: 2017 one accidents - $29,040 in damages.

Source: Federal Railroad Administration, Office of Safety Analysis

Railroad Vulnerability Assessment

- Critical Facilities. In the County, 129-service oriented critical facilities were identified. Of these include 47 are located within ½ mile of a rail line and could be directly or indirectly affected by a train derailment. These 47 facilities included: (10) government and military facilities; (13) hospitals, clinics, or residential facilities; (7) police and fire facilities; and (17) schools. These facilities could be severely affected from a train derailment. The structures could be destroyed or damaged from an explosion from a derailment, they could be forced to evacuate, or they could be cut off due to road closures. See Tables 3-6 through 3-9 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In Monroe County rail line runs through the Villages of Oakdale, Wyeville, Warrens the cities of Sparta and Tomah and Fort McCoy. Due to the location and layout of these incorporated communities most businesses and industries located within these communities would be severely affected by a train derailment. While most would not

be structurally impacted or damaged by a derailment, road closures or evacuations due to a derailment would shut down these businesses and industries.

- Agriculture. In 2018, county land use statistics indicated that 72.3% or 309,393 acres of county land were classified for agricultural use. (See Table 2-5). A lot of agricultural products are transported by rail, but a train derailment would have little impact unless the derailment would cause a significant shut down time for the rail line.
- Roads and Highways. All major roads and highways in Monroe County either run parallel to or cross over a section of one of the rail lines. An accident on the rail line at one of these areas which would cause an evacuation could shut down that section of the roadway.
- Railroads. Train derailments have a huge impact on railroads as any derailment cases a shutdown of that line until the derailment can be cleared.
- Airway. Train derailments impact on air travel is negligible and would only be affected in the event of an evacuation being necessary due to the release of toxins which would cover the airport area.
- Waterways. There are no commercially navigable waterways in Monroe County so a train accident would have no effect on commercial navigation. However, a train accident could potentially spill pollutants into a nearby river or creek resulting in habitat loss or even closure of recreation areas.
- Municipal Water. In the County there are 19 municipal wells and water systems in operation, see Table 3-10. These facilities' vulnerability to rail derailment is minimal. These facilities could be affected through a spillage from a derailment seeping into the groundwater and contaminating the well or if a facility would have to be shut down due to a prolonged evacuation caused by a derailment.
- Wastewater Treatment Facilities. There are 10 wastewater treatment facilities in operation in the County, see Table 3-11. Two of these facilities are located within a half mile to rail lines, these facilities are located in the Villages of Wyeville and the City of Sparta. A derailment adjacent to one of these facilities could damage or even destroy the facility. In addition, these facilities could also be affected in the event of a derailment causing a prolonged evacuation.
- Hazardous Material Sites. Hazardous materials located in close proximity to rail lines could be impacted by a train derailment. A derailment with explosive materials could damage or destroy buildings which house hazardous materials.

Railroad Risk Assessment Designation

Railroad Historical Occurrence Rating: Low -2
Railroad Vulnerability Rating: Negligible - 3
Railroad Probability Rating: Possible - 5
Railroad Local Official Survey Rating: Low - 2
Risk Assessment Designation: **Low Threat – 12 points**
See Table 3-2 for a detailed analysis to determine the above Risk Assessment Designation.

Rail Hazard Mitigation Ideas: ● Local governments and state governments can promote community awareness of train derailment risks ● First responders can obtain specific training provided by the railroad companies on how to respond to derailments ● Municipalities can develop evacuation plans ● Local governments can petition state and federal agencies for safer rail cars and equipment ● Local municipalities can purchase and stage along the rail line specific response equipment ● Move structures to less hazardous locations

MONROE COUNTY LOCAL OFFICIAL HAZARD RISK ASSESSMENT SURVEY

In April of 2017 the Monroe County Emergency Management Coordinator and the Mississippi River Regional Planning Commission coordinated efforts in developing a Hazard Risk Assessment Survey for local officials to complete and return. This survey was mailed to all Village Presidents, Town Chairman, Mayors, Chiefs of Police, the Sheriff, and Fire Department Chiefs in the County. Each local official was asked in the survey to rank the County's hazards as high, medium, or low regarding their opinion on each hazard's threat to their community's health and public safety. The following are results of this survey.

Table 3-1
Risk Assement Survey Results

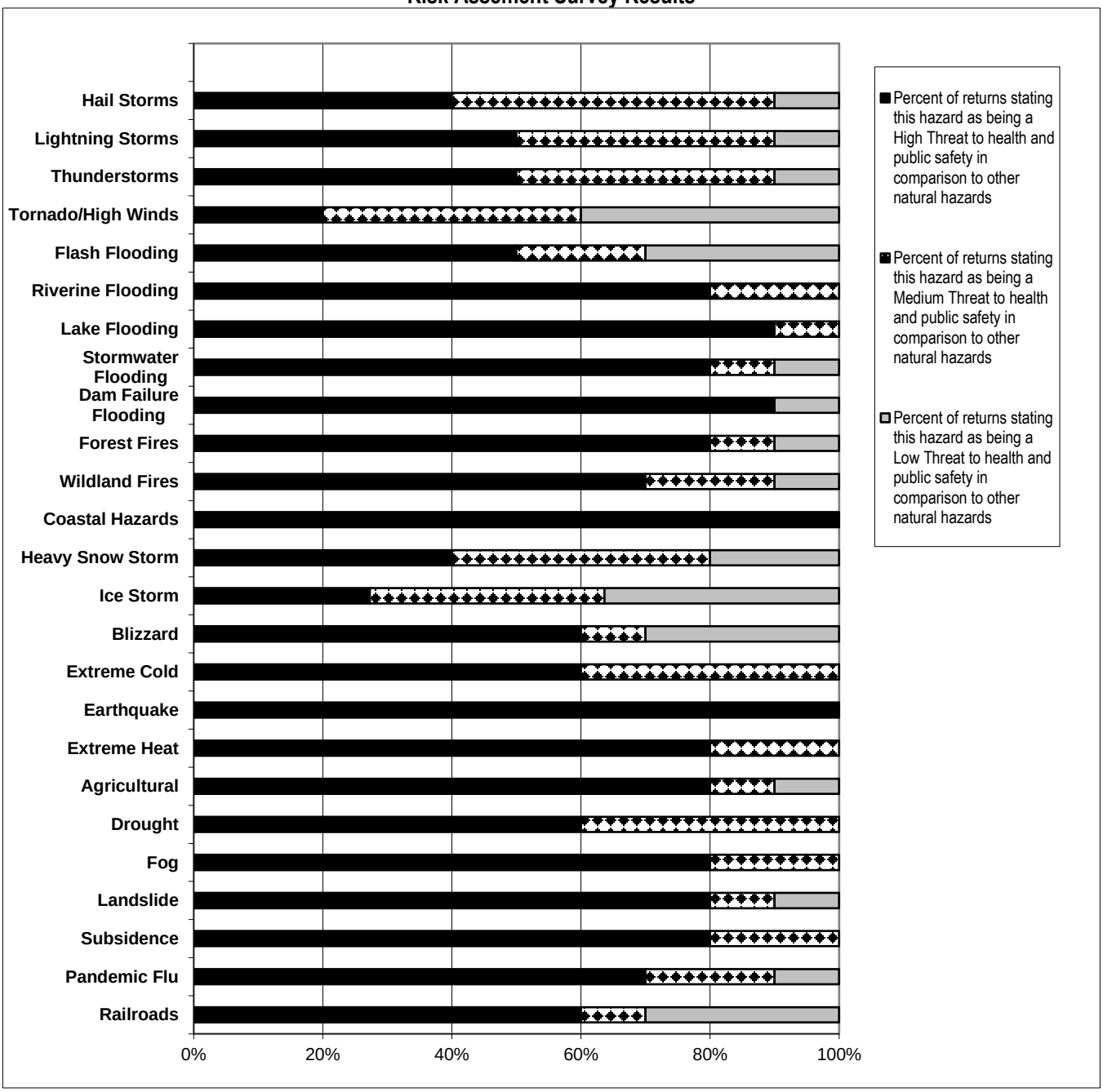


Table 3-2
Monroe County Hazard Risk Assessment

Natural Hazards:	**Historical Occurrence Rating Criteria:** • Less than 4 occurrences in the past 25 years =Low rating, 1-3 points • 4 to 7 occurrences in the past 25 years = Moderately Low rating, 3-5 points • 8 to 12 occurrences in the past 25 years = Moderately High rating, 5-7 points • More than 12 occurrences in the past 25 years = High rating, 7-9 points	**Vulnerability Rating Criteria:** • Less than 10% of population or property adversely affected = Negligible rating, 1-3 points • 10% to less than 25% of population or property adversely affected = Limited rating, 3-5 points • 25% to 50% of the population or property adversely affected = Critical rating, 5-7 points • More than 50% of the population or property adversely affected = Catastrophic rating, 7-9 points	**Probability Rating Criteria:** • Less than 1% probability in the next 100 years = Unlikely rating, 1-3 points • From 1% and 10% probability in the next year or at least one chance in next 100 years = Possible rating, 3-5 points • Over 10% to nearly 100% probability in the next year or at least one chance in the next 10 years = Likely rating, 5-7 points • Nearly 100% chance in the next year = Highly Likely rating, 7-9 points	**Local Official Hazard Survey Rating Criteria:** • A majority of local officials were of the opinion that this hazard posed a "low" threat to health and public safety = Low rating, 1-3 points • A majority of local officials were of the opinion that this hazard posed a "medium" threat to health and public safety = Medium rating, 3-6 points • A majority of local officials were of the opinion that this hazard posed a "high" threat to health and public safety = High rating, 6-9 points	**Risk Factor Rating Total:**	**Risk Assessment Designation:** • A combined risk factor rating of 14 points or less = Low Threat • A combined risk factor rating of 15 to 21 points = Moderate Threat • A combined risk factor rating of 22 points or greater = High Threat
Hailstorm	9	4	8	5	**25**	High Threat
Lightning Storm	9	2	7	6	**24**	High Threat
Thunderstorm	9	2	8	5	**24**	High Threat
Tornado/High Winds	7	5	6	8	**26**	High Threat
Riverine/Flash Flooding	8	3	6	8	**25**	High Threat
Dam Failure Flooding	1	2	3	3	**9**	Low Threat
Forest/Wildland Fires	1	1	3	3	**8**	Low Threat
Heavy Snowstorm	9	7	8	5	**29**	High Threat
Ice Storm	4	7	5	7	**23**	High Threat
Blizzard	2	7	3	5	**17**	Moderate Threat
Extreme Cold	4	7	5	4	**20**	Moderate Threat
Earthquake	1	7	3	1	**12**	Low Threat
Extreme Heat	6	7	5	4	**22**	High Threat
Agricultural	2	3	3	4	**12**	Low Threat
Drought	2	5	3	4	**14**	Low Threat
Fog	7	1	7	3	**18**	Moderate Threat
Landslide	3	4	4	4	**15**	Moderate Threat
Subsidence	1	1	3	2	**7**	Low Threat
Pandemic Flu	1	9	2	2	**14**	Moderate Threat
Railroads	2	3	5	2	**12**	Low Threat

Table 3-3
Monroe County
Structures in the FEMA 100-Year Floodplain

Municipality	Number of Parcels	2010 Land Value	2010 Assessed Improvements Value	Total Assessed Value
T. Adrian	12	200,800	1,255,400	1,456,200
T. Angelo	16	122,100	868,200	990,300
T. Byron	37	789,310	2,211,040	3,000,350
T. Clifton	1	15,300	95,400	110,700
T. Glendale	4	56,800	430,200	487,000
T. Greenfield	30	711,300	940,300	1,651,600
T. Jefferson	6	55,200	461,800	517,000
T. LaGrange	20	412,900	2,372,300	2,785,200
T. Leon	8	92,000	607,100	699,100
T. Lincoln	8	173,500	630,180	803,680
T. Little Falls	36	772,300	2,918,100	3,690,400
T. New Lyme	5	108,400	1,894,900	2,003,300
T. Oakdale	19	396,990	1,982,960	2,379,950
T. Portland	6	65,500	313,600	379,100
T. Ridgeville	5	74,400	1,076,500	1,150,900
T. Scott	4	171,400	1,079,600	1,251,000
T. Sheldon	9	119,000	603,100	722,100
T. Sparta	15	430,400	1,738,300	2,168,700
T. Tomah	12	155,200	881,500	1,036,700
T. Wellington	2	107,500	97,000	204,500
T. Wells	1	20,070	117,190	137,260
T. Wilton	6	65,200	521,800	587,000
V. Kendall	29	199,800	1,535,800	1,735,600
V. Norwalk	20	123,700	1,036,000	1,159,700
V. Wilton	1	28,400	172,100	200,500
V. Wyeville	29	150,000	1,641,500	1,791,500
C. Sparta	58	2,221,000	4,410,500	6,631,500
C. Tomah	305	6,183,800	27,661,800	33,845,600
Monroe County Total	**704**	**14,022,270**	**59,554,170**	**73,576,440**

Table 3-4
Monroe County Transportation Assessment

Municipality	Fed/State Numbered Highways Arterial Miles (1)	Fed/State Numbered Highways Collector Miles (1)	County Hwy Miles (1)	Town Roads (1)	Village/ City Streets (1)	Total Hwy Miles	Canadian Pacific / Union Pacific Rail Miles
Towns							
Adrian	6.22	5.99	9.89	36.27		58.37	
Angelo	8.76	6.33	10.33	23.40		48.82	4.72
Byron	7.42		11.98	46.41		65.81	12.34
Clifton	0.42		20.58	41.63		62.63	
Glendale	5.80		15.53	51.86		73.19	
Grant	3.53	1.15	6.85	21.82		33.35	1.75
Greenfield	5.93		10.69	24.14		40.78	3.68
Jefferson	6.96		14.76	40.33		62.05	
Lafayette	3.85		17.12	10.57		31.54	2.62
LaGrange	7.75	7.78	15.04	46.00		76.57	6.69
Leon	4.79		13.11	34.96		52.86	
Lincoln	3.64	5.92	17.72	35.37		62.65	6.76
Little Falls	16.12		18.09	74.37		108.58	
New Lyme	0.00		8.34	15.91		24.25	
Oakdale	7.91	6.72	15.67	37.28		67.58	8.46
Portland	12.96		12.56	45.28		70.80	
Ridgeville	5.68		19.59	39.04		64.31	
Scott	6.08		8.17	26.35		40.60	
Sheldon	7.71		10.50	46.73		64.94	
Sparta	7.75	6.58	13.14	69.71		97.18	4.51
Tomah	6.59	6.57	12.67	45.20		71.03	1.45
Wellington	2.56		21.58	44.72		68.86	
Wells	8.73		16.54	25.69		50.86	
Wilton	11.42		13.47	35.79		60.68	
Villages							
Cashton	1.45		0.13		11.98	13.56	
Kendall	1.13	1.47	1.47		3.65	7.72	
Melvina	0.76				1.57	2.33	
Norwalk	1.73		1.18		3.62	8.86	
Oakdale	0.97	1.08	1.15		2.38	5.58	
Rockland					0.12	0.12	
Warrens	0.00	0.50	1.80		7.08	9.38	0.98
Wilton	1.27				3.64	4.91	
Wyeville	0.87				2.87	3074	2.49
Cities							
Sparta	6.91		0.36		51.57	58.84	2.57
Tomah	7.70	2.74	3.57		54.86	68.87	3.70
Monroe County	**181.37**	**52.53**	**343.58**	**919.83**	**143.34**	**1,640.65**	**62.72**

(1) There are five jurisdictional classifications: Interstate Highways (Example I90), State System Highways (Example USH 12-STH 171), County Highways (Example CTH B), Town Roads (Example Mound Ridge Rd), and Village/City Streets (Example Main Street). Within incorporated areas (villages/cities), highways marked as state system or county roads will be classed by mileage by that system - even though they may also carry a local street name. The State system highways are either identified by functional classification-Principal/Minor Arterial (example USHs 12, STH 35, STH 27) or as Major/Minor collectors (example STH 171). Some local roads that are not identified as state systems roads may be a "federal aid" road.

Table 3-5

Monroe County Business Vulnerability Assessment

Number of Establishments/Employment/Payroll

NAICS Code and Description		No. of Employees (1)	Annual Payroll ($1,000) (2)	No. of Establishments
Monroe County Totals		**15,766**	**650,923**	**954**
11	Forestry, Fishing, Hunting & Agriculture Support	37	1,349	7
21	Mining	301	25,183	6
22	Utilities	72	6,040	4
23	Construction	458	31,062	98
31-33	Manufacturing	3,811	160,177	58
42	Wholesale Trade	716	42,514	39
44-45	Retail Trade	1,956	49,401	135
48-49	Transportation & Warehousing	2,050	96,672	61
51	Information	1,950	7,720	21
52	Finance and Insurance	423	20,186	62
53	Real Estate Rental & Leasing	84	2,727	30
54	Professional, Scientific & Technical Services	398	16,846	67
55	Management of companies and enterprises	a	D	2
56	Administrative and support and waste management	489	10,650	28
61	Educational Services	30	288	6
62	Health Care & Social Assistance	2,494	149,107	84
71	Arts, Entertainment & Recreation	69	1,591	11
72	Accommodation and Food Services	1,514	18,213	121
81	Other Services	704	14,164	114

Source: U.S. Department of Commerce-Economic and Statistics Administration-U.S. Census Bureau-County Business Patterns 2016

(1) Total includes number of employees in all industry classifications

(2) Total includes annual payroll in all industry classifications

Note: County Business Patterns (CBP) covers most NAICS industries excluding crop and animal production; rail transportation; National Postal Service; pension, health, welfare, and vacation funds; trusts, estates, and agency accounts; private households; and public administration. CBP also excludes most establishments reporting government employees.

A: 0-19 employees

B: 20-99 employees

C: 100-249 employees

E: 250-499 employees

F: 500-999 employees

G: 1,000-2,499 employees

H: 2,500 - 4,999 employees

I: 5,000 - 9,999 employees

J: 10,000 - 24,999 employees

K: 25,000 - 49,999 employees

L: 50,000 - 99,999 employees

M: 100,000 or more employees

S: Withheld because estimate did not meet publication standards

D: Withheld to avoid disclosing data for individual company's data are included in higher level totals

Table 3-6
Monroe County Critical Facilities: Government and Military Facilities

Facilities	Community	Address	Telephone
Adrian Town Hall	T. Adrian	15937 CTH T, Tomah	(608) 372-6694
Angelo Town Hall	T. Angelo	14123 CTH I, Sparta	None
Byron Town Hall	T. Byron	32386 STH 21, Warrens	(608) 372-9689
Clifton Town Hall	T. Clifton	31819 CTH A, Camp Douglas	(608) 427-6814
Glendale Town Hall	T. Glendale	27337 Mocha Rd, Kendall	(608) 463-7559
Grant Town Hall	T. Grant	19460 Bittersweet Ave., Warrens	(608) 378-4583
Greenfield Town Hall	T. Greenfield	11575 Fisher Rd., Tomah	(608) 374-5646
Jefferson Town Hall	T. Jefferson	12035 Olympic Ave., Cashton	(608) 654-7855
Lafayette Town Hall	T. Lafayette	11336 CTH Q, Sparta	(608) 269-2738
LaGrange Town Hall	T. LaGrange	22731 Flint Ave., Tomah	(608) 372-3792
Leon Town Hall	T. Leon	8108 Jackrabbit Ave., Sparta	(608) 269-5873
Lincoln Town Hall	T. Lincoln	506 Hartwell Dr., Warrens	None
Little Falls Town Hall	T. Little Falls	4124 CTH I, Sparta	(608) 272-3175
New Lyme Town Hall	T. New Lyme	2682 CTH S, Sparta	None
Oakdale Town Hall	T. Oakdale	228 Ballpark Dr., Oakdale	(608) 372-6475
Portland Town Hall	T. Portland	6736 STH 33, Cashton	(608) 657-5187
Ridgeville Town Hall	T. Ridgeville	309 Main St., Norwalk	(608) 823-7459
Scott Town Hall	T. Scott	28788 Buckley Ave., Warrens	(608) 378-4727
Sheldon Town Hall	T. Sheldon	29215 STH 131, Norwalk	None
Sparta Town Hall	T. Sparta	5724 Hamlet Ave., Sparta	(608) 269-4830
Tomah Town Hall	T. Tomah	24381 Heritage Ave., Tomah	(608) 372-4611
Wellington Town Hall	T. Wellington	27503 CTH P, Kendall	None
Wells Town Hall	T. Wells	11754 CTH XX, Norwalk	(608) 269-4391
Wilton Town Hall	T. Wilton	23988 STH 71, Wilton	(608) 435-6161
Cashton Village Hall	V. Cashton	811 Main St., Cashton	(608) 654-7828
Kendall Village Hall	V. Kendall	219 W. S. Railroad St., Kendall	(608) 463-7124
Melvina Village Hall	V. Melvina	604 Central Dr., Cashton	(608) 654-7433
Norwalk Village Hall	V. Norwalk	208 S. Church St., Norwalk	(608) 823-7760
Oakdale Village Hall	V. Oakdale	133 Well Dr., Oakdale	(608) 372-2927
Warrens Village Hall	V. Warrens	212 George St., Warrens	(608) 378-4177
Wilton Village Hall	V. Wilton	400 East St., Wilton	(608) 435-6666
Wyeville Village Hall	V. Wyeville	215 Wyeville Ave., Wyeville	(608) 272-7403
Sparta City Hall	C. Sparta	201 W. Oak St., Sparta	(608) 269-4340
Tomah City Hall	C. Tomah	819 Superior Ave., Tomah	(608) 372-7420
National Guard Armory – Sparta	C. Sparta	602 E. Division St., Sparta	(608) 269-4625
National Guard Armory – Tomah	C. Tomah	530 Mill St., Tomah	(608) 372-5434
Fort McCoy Headquarters	Fort McCoy	1941 S C Street, Sparta	(608) 388-7113

See Map 3.1 for the location of these government and military facilities.

Table 3-7
Monroe County Critical Facilities: Hospitals, Clinics, and Residential Care Facilities

Facilities	Address	Telephone
Hospitals		
Mayo Clinic Health System - Franciscan Healthcare	310 West Main Street, Sparta	(608) 269-1770
Tomah Health	501 Gopher Dr., Tomah	(608) 372-2181
Clinics		
Gundersen Lutheran – Sparta Clinic	1111 West Wisconsin St., Sparta	(608) 269-6731
Scenic Bluff Community Health Centers	238 Front St., Cashton	(608) 654-5100
Norwalk Clinic	200 North St., Norwalk	(608) 823-7853
Gundersen Lutheran – Tomah Clinic	505 Gopher Dr., Tomah	(608) 372-4111
Mayo – Lake Tomah Clinic	321 Butts Ave., Tomah	(608) 372-5951
VA Clinic Tomah WI	500 E Veterans St	(608) 372-3971
Warrens Walk-In Clinic	101 Unity Drive, Warrens	(608) 374-6671
Nursing Homes		
Morrow Memorial Home	331 S. Water St., Sparta	(608) 269-3168
Rolling Hills Rehabilitation Center	14345 CTH B, Sparta	(608) 269-8800
Tomah Nursing and Rehabilitation	1505 Butts Ave., Tomah	(608) 372-3241
Community Based Residential Care Facilities		
AGAPE Acres LLC	3737 Blueberry Rd., Warrens	(608) 378-4054
Bridge Path	503 S. Water St., Sparta	(608) 269-3168
Close To Home Inc.	1206 Mark Ave., Tomah	(608) 374-5300
Cranberry Court I LLC	1031 Heeler Ave., Tomah	(608) 372-5070
Cranberry Court LLC Bldg 2	1025 Heeler Ave., Tomah	(608) 372-5070
The Greenfield House	21444 Flatiron Ave., Tomah	(608) 372-7335
Holton House	315 E. Holton Ave., Tomah	(608)567-0183
Liberty Village LLC	200 Liberty Place, Tomah	(608) 374-5005
Little Falls CBRF	4039 CTH I, Sparta	(608) 272-3238
The Meadows (Rolling Hills Rehab Center)	14345 CTH B, Sparta	(608) 269-8839
Norwalk House	18067 CTH F, Wilton	(608) 451-5275
Oak St. House	220 Oak St., Sparta	(608) 343-1177
Rem Wall Street	904 Wall St., Cashton	(608) 654-5731
River Road Estates LLC	1848 River Rd., Sparta	(608) 269-8532
Sun Haven	20035 Junco Rd., Tomah	(608) 372-9670
Trowbridge Personal Care Residence	110 E. Council St., Tomah	(608) 372-4388
Warrens House	611 Colton Court, Warrens	(608) 378-3547
Windy Ridge Care Inc. Hollister House	326 Hollister Ave., Tomah	(608) 567-0203
Residential Care Apartment Complexes		
A Touch of Home	1211 Mark Ave., Tomah	(608) 372-5454
Close To Home Inc.	1206 Mark Ave., Tomah	(608) 372-2696
Homestead Apartments	331 S. Water St., Sparta	(608) 366-6298
Liberty Village RCAC	200 Liberty Pl., Tomah	(608) 374-5005
Marycrest Assisted Living	401 S. Water St., Sparta	(608) 269-3168

See Map 3.2 for the location of these hospitals, clinics and residential care facilities.

Table 3-8

Monroe County Critical Facilities: Police and Fire Facilities

Facilities	Community	Address	Telephone
Fire Departments			
Cashton	T. Portland, T. Jefferson, V. Cashton, V. Melvina	545 Front St, Cashton	(608) 654-5601
Elroy	Southeastern portion of T. Glendale	225 Main St., Elroy	(608) 462-5378
Kendall	T. Clifton, T. Wellington, T. Glendale	120 E. South Railroad St., Kendall	(608) 463-7192
Norwalk	T. Wells, T. Ridgeville, T. Sheldon	213 W. South St., Norwalk	(608) 823-7760
Oakdale	T. Greenfield, T. LaGrange, T. Byron, T. Adrian, T. Tomah, T. Clifton, T. Oakdale, V. Oakdale, V. Wyeville	230 Ballpark Dr., Oakdale	(608) 372-4915
Ontario	T. Sheldon, T. Wellington	205 State St., Ontario	(608) 337-4620
Sparta Area Fire District Station 2	T. Little Falls, T. Sparta, T. Leon, T. New Lyme, T. Lafayette, T. Angelo, T. Adrian, T. Wells, C. Sparta	118 E. Oak St., Sparta	(608) 487-9223
Sparta Area Fire District Station 1	T. Little Falls, T. Sparta, T. Leon, T. New Lyme, T. Lafayette, T. Angelo, T. Adrian, T. Wells, C. Sparta	202 E. Oak St., Sparta	(608) 269-6333
Sparta Area Fire District Station 3	T. Little Falls, T. Sparta, T. Leon, T. New Lyme, T. Lafayette, T. Angelo, T. Adrian, T. Wells, C. Sparta	4130 County Highway I, Sparta	
Tomah	C. Tomah	819 Superior Ave., Tomah	(608) 374-7465
Tomah Northside Station	C. Tomah	316 Arthur St., Tomah	(608) 374-7465
T. Lincoln	T. Lincoln, T. Grant, T. Scott, V. Warrens	506 Hartwell Dr., Warrens	(608) 378-4923
Wilton	T. Wilton, T. Wellington, V. Wilton	804 Railroad St., Wilton	(608) 435-6898
Fort McCoy	Fort McCoy	1941 S C Street, Fort McCoy	(608) 388-2508
Police Departments			
Cashton	Cashton	811 Main St., Cashton	(608) 654-7828
Fort McCoy	Fort McCoy	1941 S C St., Fort McCoy	(608) 388-2266
Kendall	Kendall	219 W South Railroad St., Kendall	(608) 463-7124
Monroe County Sheriff	Monroe County	112 S. Court, Sparta	(608) 269-2117
Wilton	Wilton	400 East St., Wilton	(608) 435-0046
Norwalk	Norwalk	208 South Church St., Norwalk	(608) 823-7760
Sparta	Sparta	121 E. Oak St., Sparta	(608) 269-3122
Tomah	Tomah	805 Superior Ave., Tomah	(608) 374-7400
Veterans Administration	Tomah	500 E. Veterans St., Tomah	(608) 372-1244

See Map 3.3 for the location of these police and fire departments.

Table 3-9
Monroe County Critical Facilities: School Facilities

Facilities	District	Address	Telephone
Public Schools			
Brookwood High School	Norwalk-Ontario-Wilton	28861 STH 131, Ontario	(608) 337-4401
Cashton Elementary	Cashton	436 Front St., Cashton	(608) 654-7377
Cashton Middle/High School	Cashton	540 Coe St., Cashton	(608) 654-5131
Cataract Elementary	Sparta	6070 STH 27, Sparta	(608) 366-3455
Innovations STEM Academy (Charter)	Sparta	1225 N. Water St., Sparta	
La Grange Elementary	Tomah	600 Straw St., Tomah	(608) 374-7057
Lakeview Montessori	Sparta	711 Pine St., Sparta	(608) 366-3473
Lawrence-Lawson Elementary	Sparta	429 N. Black River St., Sparta	(608) 366-3438
Lemonweir Elementary	Tomah	711 N. Glendale Ave., Tomah	(608) 374-7846
Maplewood Elementary	Sparta	900 E. Montgomery St	(608) 366-3467
Miller Elementary	Tomah	813 Oak Ave., Tomah	(608) 374-7027
Norwalk-Ontario-Wilton Elementary	Norwalk-Ontario-Wilton	28861 STH 131, Ontario	(608) 337-4403
Oakdale Elementary	Tomah	217 S. Oakwood St., Oakdale	(608) 374-7846
Robert Kupper Learning Center (Alternative)	Tomah	1310 Townline Rd., Tomah	(608) 374-7011
SAILS Sparta Area Independent Learning (Charter)	Sparta	201 E. Franklin St., Sparta	(608) 366-3400
Southside Elementary	Sparta	1023 Walrath St., Sparta	(608) 366-3400
Sparta Charter Prekindergarten	Sparta	201 E. Franklin St., Sparta	(608) 366-3529
Sparta High School	Sparta	506 N. Black River St., Sparta	(608) 366-3504
Sparta High Point	Sparta	201 E. Franklin St., Sparta	(608) 366-3529
Sparta Meadowview Intermediate	Sparta	1225 N. Water St., Sparta	(608) 366-3481
Sparta Meadowview Middle	Sparta	1225 N. Water St., Sparta	(608) 366-3497
Timber PUPS Learning Center	Tomah	129 W. Clifton St., Tomah	(608) 374-7846
Tomah Area Montessori (Charter)	Tomah	1720 Academy Ave., Tomah	(608) 374-7801
Tomah High School	Tomah	901 Lincoln Ave., Tomah	(608) 374-7351
Tomah Middle School	Tomah	612 Hollister Ave., Tomah	(608) 374-7883
Warrens Elementary	Tomah	409 Main St., Warrens	(608) 374-7801
Wyeville Elementary	Tomah	225 W. Tomah Rd., Wyeville	(608) 374-7801
Private Schools			
Clinton Amish	Cashton	Opted Out	Opted Out
East Ridgeville Amish	Norwalk-Ontario-Wilton	Opted Out	Opted Out
Oasis Christian	Tomah Area	22547 STH 21, Tomah	(608) 372-7101
Queen of the Apostles	Tomah Area	315 W Monroe St., Tomah	(608) 372-5765
Sacred Heart	Cashton	710 Kenyon St., Cashton	(608) 654-7733
Saint John's Evangelical Lutheran	Sparta Area	419 Jefferson Ave., Sparta	(608) 269-6001
Saint Patrick's Grade School	Sparta Area	100 S. L Street, Sparta	(608) 269-4748
Saint Paul Lutheran School	Tomah Area	505 Superior Ave., Tomah	(608) 372-4542
Sparta Mennonite School	Sparta Area	600 Walrath St., Sparta	(608) 487-1025
Tomah Baptist Academy	Tomah Area	1701 Hollister Ave., Tomah	(608) 372-5288

See Map 3.4 for the location of these schools.

Source: Wisconsin Department of Instructions

Table 3-10
Monroe County Critical Facilities: Wells

Community	Well ID #	Well Depth (ft.)	Design Yield (GPD)	Actual Capacity (GPM)	Currently in Service	Ground Storage (Gal)	Elevated Storage (Gal)
Cashton	4	852	432,000	280	Yes		
	5	660	432,000	300	Yes		
	Tower				Yes		250,000
	Tower				Yes		250,000
Kendall	2	370	346,000	330	Yes		
	4	300	404,000	360	Yes		
	Tower				Yes		100,000
Norwalk	1	360	360,000	300	Yes		
	2	350		285	Yes		
	Reservoir				Yes	150,000	
Oakdale	1	250	720,000	537	Yes		
	Tower				Yes		75,000
Warrens	1	180	288,000	175	Yes		
	2	380		1,000	Yes		
	Tower				Yes		100,000
Wilton	2	225	310,000	445	Yes		
	3	220	374,000	513	Yes		
	Reservoir				Yes		131,000
Sparta	2	165	720,000	480	Yes		
	4	185	540,000	750	Yes		
	6	222	504,000	402	Yes		
	7	264	720,000	510	Yes		
	9	286	1,152,000	800	Yes		
	10	300		1,000	Yes		
	Reservoir				Yes	425,000	
	Reservoir				Yes	600,000	
	Tower				Yes		600,000
	Tower				Yes		600,000
Tomah	6	325	864,000	450	Yes		
	9	175		425	Yes		
	10	300		1,000	Yes		
	11	240		1,050	Yes		
	12	240		1,050	Yes		
	Reservoir				Yes	1,000,000	
	Tower				Yes		500,000

Source: Wisconsin Department of Natural Resources

Table 3-11
Monroe County Critical Facilities: Wastewater Treatment Plants

Wastewater Treatment Plant	Community	Telephone
Cashton Wastewater Treatment Facility	Cashton	(608) 654-5160
Kendall Wastewater Treatment Facility	Kendall	(608) 463-7232
Norwalk Wastewater Treatment Facility	Norwalk	(608) 633-0708
Oakdale Wastewater Treatment Facility	Oakdale	(608) 372-5425
Sparta Wastewater Treatment Facility	Sparta	(608) 269-4340
Tomah Wastewater Treatment Facility	Tomah	(608) 374-7420
US Army Headquarters, Fort McCoy WWTP	Fort McCoy	(608) 388-6546
Warrens Monroe Wastewater Treatment Facility	Warrens	(608) 378-4177
Wilton Wastewater Treatment Facility	Wilton	(608) 387-5105
Wyeville Sewer System	Wyeville	(608) 372-5167

Source: Wisconsin Department of Natural Resources

Table 3-12
Monroe County Critical Facilities: Facilities Subject to Emergency Planning

EPCRA Off-Site Planning Facility	Municipality	Address	Telephone
Americold Logistics Inc.	T. Byron	28063 Essex Ave., Tomah	(608) 372-2500
American Bottling Co.	C. Tomah	110 Sime Ave., Tomah	(608) 372-0707
Arena Container	C. Tomah	1402 Rezin Rd, Tomah	(608) 372-9035
Century Foods International (Plant 1)	C. Sparta	915 Hoeschler Dr., Sparta	(608) 269-1900
Century Foods International (Plant 2&3)	C. Sparta	920 Industrial Blvd., Sparta	(608) 269-1900
Century Foods International (Plant 4)	C. Sparta	400 Century Court, Sparta	(608) 269-1900
Century Link Tomah	C. Tomah	120 E. Milwaukee St., Tomah	(715) 284-9607
CROPP Cooperative	V. Cashton	500 Organic Dr., Cashton	(608) 625-2666
Foremost Farms USA, Cooperative	C. Sparta	427 E. Wisconsin St., Sparta	(608) 269-3126
Northern Engraving	C. Sparta	803 S. Black River St., Sparta	(608) 269-6911
Ocean Spray Cranberries	T. Byron	28171 Essex Ave., Tomah	(608) 372-7824
Rosen's Inc. Sparta Warehouse	C. Sparta	1775 Herald Ave., Sparta	(608)269-0445
Sparta Cooperative Services-Fertilizer Plant	C. Sparta	1207 S. Water St., Sparta	(608) 269-5201
Sparta Water Department Service Building	C. Sparta	1227 N. Chester St., Sparta	(608) 269-6511
Sparta Water Well 7	C. Sparta	202 Tower St., Sparta	(608) 269-6511
Sparta Water Well 9	C. Sparta	920 Standard Dr., Sparta	(608) 269-6511
Sparta Water Well 10	C. Sparta	2050 Riley Rd., Sparta	(608) 269-6511
TC Transcontinental Packaging	C. Tomah	501 Williams St., Tomah	(608) 374-1430
The Toro Company	C. Tomah	200 Sime Ave., Tomah	(608) 372-1409
The Toro Company Distribution Center	C. Tomah	1914 E. Clifton St., Tomah	(608) 372-1572
U.S. Army - Fort McCoy	Fort McCoy	2171 S. 8th Ave., Fort McCoy	(608) 388-4776
Valley Pride Pack, Inc.	V. Norwalk	19081 STH 71 East, Norwalk	(608) 823-7445
Wal-Mart FDC #6085-4881	C. Tomah	525 Industrial Ave., Tomah	(608) 374-8507
Walt-Mart Super Center #979	C. Sparta	1600 Wisconsin St., Sparta	(608) 269-7501
Wal-Mart Super Center #965	C. Tomah	222 W. McCoy Blvd., Tomah	(608) 372-7900
Warrens Cold Storage	V. Warrens	23899 Aspen Ave., Warrens	(608) 892-7120
XPO Logistics	C. Tomah	1710 Winnebago St., Tomah	(608) 372-7388

See Map 3.3 for the location of these hazardous material sites.

Table 3-13

Monroe County Critical Facilities: Dams

Map Code	Dam Official Name	Dam Popular Name	Dam Size	Down City- Miles Amount	(1) ESTD Haz Rating Code	Stream Name
1	Tomah Lake		Large	Tomah - 0	0	Lemonweir
2	Paper Mill	Perch Lake, Sparta	Large	Sparta - 0	L	La Crosse River
3	Wetherby		Large		L	East Fork Lemonweir
4	Coon Creek 31		Large		L	Tr. Coon Creek
5	Coon Creek 29	Korn	Large		L	Coon Creek
6	Coon Creek 53		Large		L	Berge Coulee Creek
7	Coon Creek 25	Baltz/Amundson	Large		L	Tr. Rulland Coulee Creek
8	Coon Creek 23	Opsahl/Bilhovde	Large		L	Un. Trib. Rullands Coulee Creek
9	Coon Creek 24	Peterson	Large		L	Tr. Rulland Coulee Creek
10	Coon Creek 21	Tucker/Luckasson/Rulland	Large		L	Un Trib Rullands Coulee Creek
11	North Scott Township	Timber Dam No.4	Small		L	Dead Creek Drainage Ditch
12	Dandy Creek 6	Meadow Valley Work Unit #14	Large		L	Hart Lateral
13	Dandy Creek 9		Large		L	Hart Lateral
14	Dandy Creek 11		Large		L	Lemonweir
15	North Tomah Cranberry Company		Large		L	Mud Creek
16	Johnson		Large		L	Lowry Creek
17	Water Mill		Large		L	Mill Creek
18	Habelman	Lower Structure	Large		L	Clear Creek
19	Habelman	Upper Structure	Large		L	Clear Creek
20	Habelman	Main Structure	Large		L	Clear Creek
21	Potter (Upper Reservoir)	Upper West and East Structures	Large		L	East Fork Lemonweir
22	Potter (Lower Reservoir)	Main Structure	Large		L	East Fork Lemonweir
23	Valley Corporation	Lower	Large	Wyeville - 3	L	Tr. East Fork Lemonweir
24	Valley Corporation	Upper	Large	Wyeville - 3	L	East Fork Lemonweir
25	Tri Creek Number One		Large	Norwalk – 2	H	Tr. Morris Creek
26	Alder Lake	Alderwood Lake	Large	Fort Mc Coy - 6	L	La Crosse River
27	Borys		Small		L	Tr. Morris Creek
28	Angelo		Large	Angelo – 0	L	La Crosse River
29	Haldeman		Large		L	Tr. Morris Creek
30	Strozewski	Main & East Outlets	Large		L	East Fork Lemonweir
31	Jensen		Large		L	Whiskey Creek
32	Dandy Creek 236-C		Small		L	Tr. Silver Creek
33	Storkel	Od Usa	Small		L	Sparta Creek
34	Flora Dell	Lora Dell Assoc.	Small	Angelo – 10	S	Flora Creek
35	William Hall	Ninneman, Thomas	Small		L	Sparta Creek
36	Rock Garden	Raphael Eirschele	Small	Angelo – 9	L	Sparta Creek
37	Dandy Creek 2	Bushing, Don	Small	New Lisbon - 14	L	Dandy Creek
38	Dandy Creek 4	USFWS	Small	Wyeville - 4	L	Dead Creek
39	Dandy Creek 5	Pederson, Agnes	Small	New Lisbon - 16	L	Dandy Creek

Table 3-13

Monroe County Critical Facilities: Dams

Map Code	Dam Official Name	Dam Popular Name	Dam Size	Down City- Miles Amount	(1) ESTD Haz Rating Code	Stream Name
40	Dandy Creek 7	USFWS	Small	New Lisbon - 18	L	Dandy Creek
41	Dandy Creek 8	USFWS	Small	New Lisbon – 10	L	Dandy Creek
42	Dandy Creek 10	A Wenninger, T Burbulis	Small	New Lisbon – 16	L	Hart Lateral
43	Sherk Upper	Upper			L	Sand Creek
44	Sherk Lower	Lower	Small		L	Sand Creek
45	Evans Pond	Wi Dnr	Small	Cataract Dam - 3		Rathbone Creek
46	Kickapoo Springs		Small			Tr.-East Fork Kickapoo River
47	Pinnacle Rock		Small			Tr.-Little La Crosse R.
48	Dandy Creek 12	USFWS	Small			Dandy Creek
49	Dandy Creek 13	B.M. Pallash	Small			Dandy Creek
50	Dobbs, Larry		Small			Tr.-Bush Creek
51	Donskey, John		Small			No Waterway
52	McCoy		Small			Tr.-Jenkins Valley Creek
53	Stelter, Gorden		Small			Tr.-Kreyer Creek
54	Winans, Roger L.		Small			Tr.-Morris Creek
55	Olson, Arnold		Small			Tr.-Rocky Run
56	Lee, Howard	Ary Olsen	Small			No Waterway
57	Klitzke, Dale	Burnstad And Klitzke	Small			Tr.-Council Creek
58	Johnson, Monroe		Small			Tr.-Creek 12-15
59	Leis, Jerome		Small			Tr.-Morris Creek
60	Henderson, John A.		Small			Tr.-Bear Creek
61	Treu, James	Arvard B. Garves	Small			Tr.-Upper Big Creek
62	Sullivan, Dave		Small			Rathbone Creek
63	Anderson, Verdell	Hooded Inlet	Small			Tr.-Spencer Creek
64	Behrens, Garland		Small			Indian Creek
65	Brey, Earl		Small			No Waterway
66	Caulum, Lawrence					
67	Cook, Alvin		Small			No Waterway
68	Wolf, Tom		Small			Unnamed
69	Dobbs, Larry		Small			No Waterway
70	Donskey, Raymond		Small			Tr.-Morris Creek
71	Eckelberg, Loren		Small			Unnamed
72	Erpenbach, Hubert	Laverne Schmitz	Small			Tr.-Cook Creek
73	Gorn, Keith		Small			Tr.-Billings Creek
74	Jordan, Donald		Small			Farmers Valley Creek
75	Kelly, John J.	Elbros Inc.	Small			No Waterway
76	Koebernich, K.G.	Wilton Rod And Gun Club	Small			Tr.-Dorset Valley
77	Leis, Ernest B.		Small			Tr.-Big Creek
78	Linton, John	Orwood S. Ashley	Small			
79	Luethe, Lloyd L.		Small			Tr.-Morris Creek
80	Mitchell, Lester		Small			No Waterway
81	Molstad, George		Small			No Waterway
82	Muehlenkamp, Glen		Small			Unnamed
83	Nofsinger, Elmer		Small			No Waterway

Table 3-13

Monroe County Critical Facilities: Dams

Map Code	Dam Official Name	Dam Popular Name	Dam Size	Down City- Miles Amount	(1) ESTD Haz Rating Code	Stream Name
84	Preuss, George		Small			No Waterway
85	Rueckheim, Leonard		Small			Tr.-Kickapoo River
86	Teasdale, Howard No.1					Adjacent to Spencer Cr.
87	Teasdale, Howard No.2					Adjacent to Spencer Cr.
88	Vieth, Alvin		Small			No Waterway
89	Von Ruden, Anton		Small			Tr.-Morris Creek
90	Winston, Emanuel		Small			No Waterway
91	Young, Tom No.1		Small			No Waterway
92	Young, Tom No.2		Small			No Waterway
93	Clark	Joe Rice	Small			Brandy Creek
94	Hall, Fay R.		Small			Tr.-Tarr Creek
95	Sparta Rod And Gun Club	Warren Kastberg	Small			Tr.-Farmers Valley Creek
96	Kohlhof, Adolf		Small			None
97	Christensen, Leroy		Small			Tr.-Bear Creek
98	Steele, Robert E.		Small			Tr.-Mill Creek
99	Gebhardt, Vern		Small			Whiskey Creek
100	Miller, Eugene F.		Small			Tr.-Leon Creek
101	Wildes-Schenese-Wiseman	Ken Wilds	Small			Sodder Creek
102	Cardoza, Lester		Small			Tr.-Sank Creek
103	Henze, Dale		Small			Tr.-Kickapoo River
104	Laufenberg, Henry		Small			Tr.-Little La Crosse R.
105	Cataract	Cataract Mill	Small			Rathbone Creek
106	Dandy Creek 236-A	Wi Dnr	Small			Dandy Creek
107	Walker, George		Small			Tr.-Morris Creek
108	Peterson, Jon		Small			Tr.-Rullands
109	Warsaw, Neil		Small			Little Lemonweir
11	Dandy Creek 236-B	Wi Dnr	Small			Unnamed Ditch
111	Sletten, Duane		Small			Tr.-Morris Creek
112	Cook, Dale		Small			Tr.-Little Lemonweir R.
113	Kotten, Bernard		Small			Tr.-Morris Creek
114	Selz					Sand Creek
115	Hazel Dell Lake			Fort Mc Coy – 7		La Crosse River
116	Fort Mc Coy	Lower Squaw Creek	Large	Fort Mc Coy – 0		Squaw Creek
117	Fort Mc Coy			Fort Mc Coy - 0		Tarr Creek
118	Habelman, Ray, Etal					Stillwell Creek
119	Stillwell Cr					Stillwell Creek
120	Fort Mc Coy					Stillwell Creek
121	Waege		Small			Non-Nav. Tr.- Sleighton Creek
122	Upper Beaver Creek Dam	Upper Beaver Creek Dam				Beaver Creek
123	Yager	YAGER'S DAM				Kickapoo River
124	Leon	Leon				Little La Crosse River
125	Bunnells	Bunnells				Beaver Creek
126	City Mills	City Mills				Farmers Valley Creek

Table 3-13

Monroe County Critical Facilities: Dams

Map Code	Dam Official Name	Dam Popular Name	Dam Size	Down City- Miles Amount	(1) ESTD Haz Rating Code	Stream Name
127	Gilman	Gilman				La Crosse River
128	Old Vogel	Old Vogel				Kickapoo River
129	Sparta Creek	Sparta Creek				Sparta Creek
130	Dinsmore	Dinsmore				Little La Crosse River
131	Silver Creek	Silver Creek				Lemonweir
132	McDaniel		Small			Silver Creek
133	Durbrow		Small			Tr.-Kickapoo River
134	George		Small			Tr.-Poe Creek
135	Helming		Small			Tr.-Creek 8-1
136	Hurtz		Small			Brandy Creek
137	Burch		Small			Tr.-Brush Creek
138	Moskonas		Small			Tr.-Creek 27-15
139	Hansen		Small			Rathbone Creek
140	Parkhurst		Small			Tr.-Kickapoo River
141	Rumpe		Small			Tr.- Spencer Creek
142	Friedl, Harry		Small	Elroy - 5		Tr.-Creek 33-2

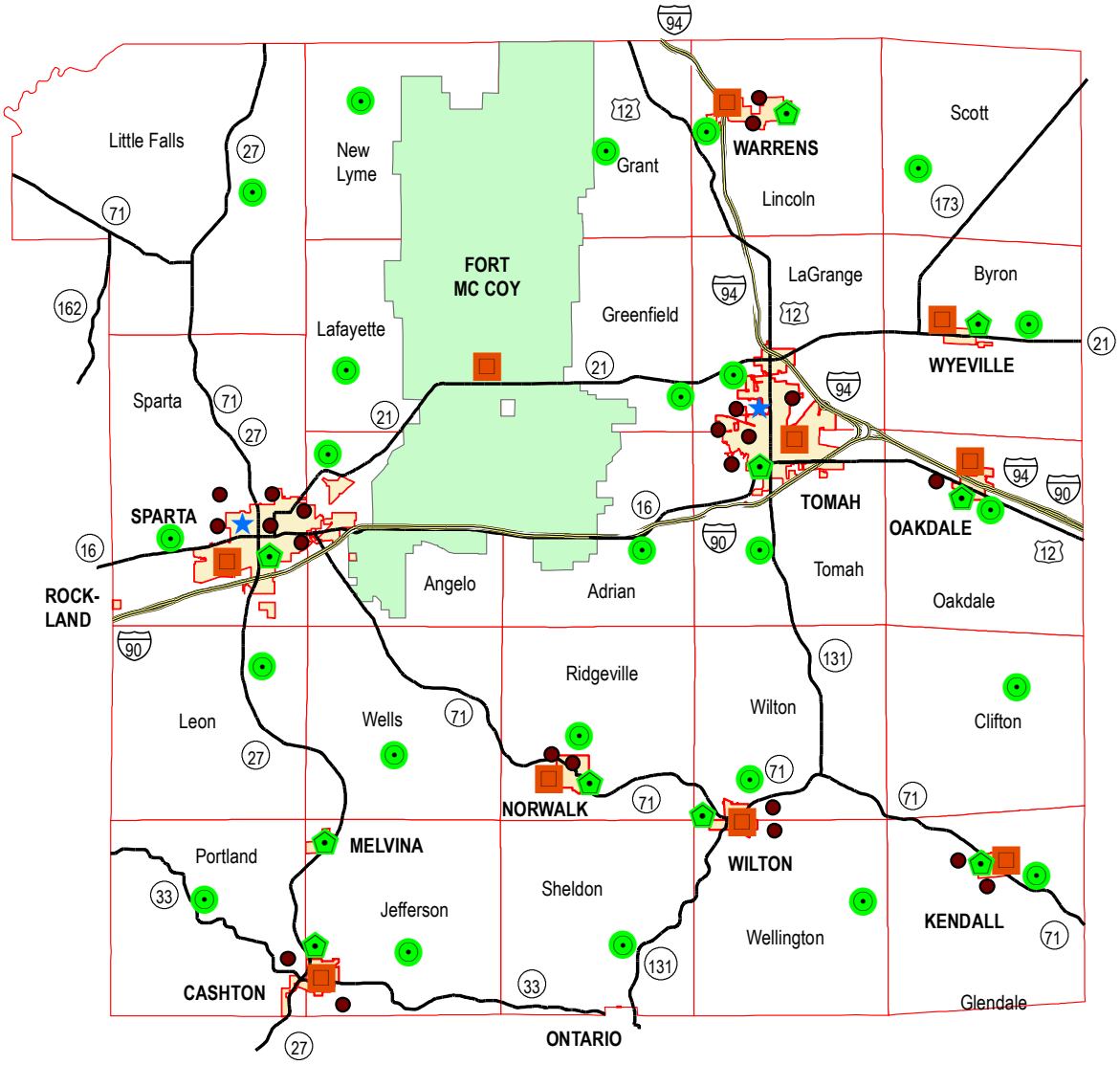
See Map 3.5 for the location of these dams.

A dam with a structural height of over 6 feet and impounding 50-acre feet or more or having a structural height of 25 feet or more and impounding more than 15-acre feet is classified as a large dam.

(1) Dams are classified as Low, Significant or High Hazard. A dam is assigned a rating of High Hazard when its failure would put lives at risk. The "hazard" rating is not based on the physical attributes, quality or strength of the dam itself, but rather the potential for loss of life or property damage should the dam fail.

Source: State of Wisconsin - Department of Natural Resources

Map 3-1
Monroe County Critical Facilities
Government, Military, Wastewater Treatment Facilities and Wells



There are 8 Village Halls, 2 City Halls, 24 Town Halls, 2 armories, 22 wells, and 10 Wastewater Treatment Facilities in the County. See Tables 3-6, 3-10 and 3-11 for additional information.

- Armory
- City/Village Hall
- Town Hall
- Well
- Wastewater Treatment Facility

- Interstate
- State/US Highway
- Town Boundary
- City/Village

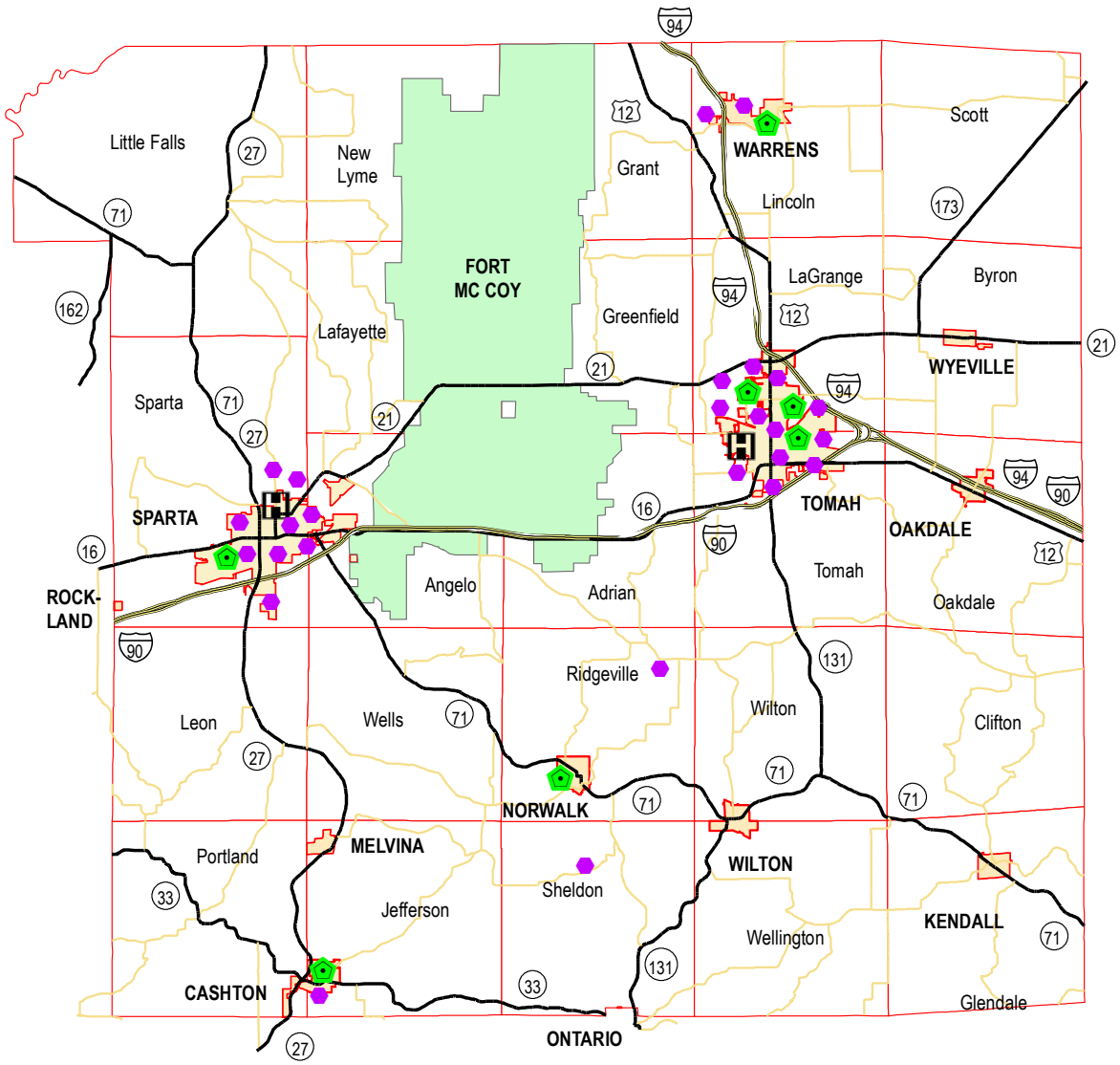
N

Miles

0 2.75 5.5 11

Prepared by: Mississippi River Regional Planning Commission /dab/7/19

Map 3-2
Monroe County Critical Facilities
Hospitals, Clinics and Residential Care



There are 2 Hospitals, 7 Clinincs and 26 Residential Care Facilities in the County. See Table 3-7 for additional information.

Hospital
Clinic
Residential Care

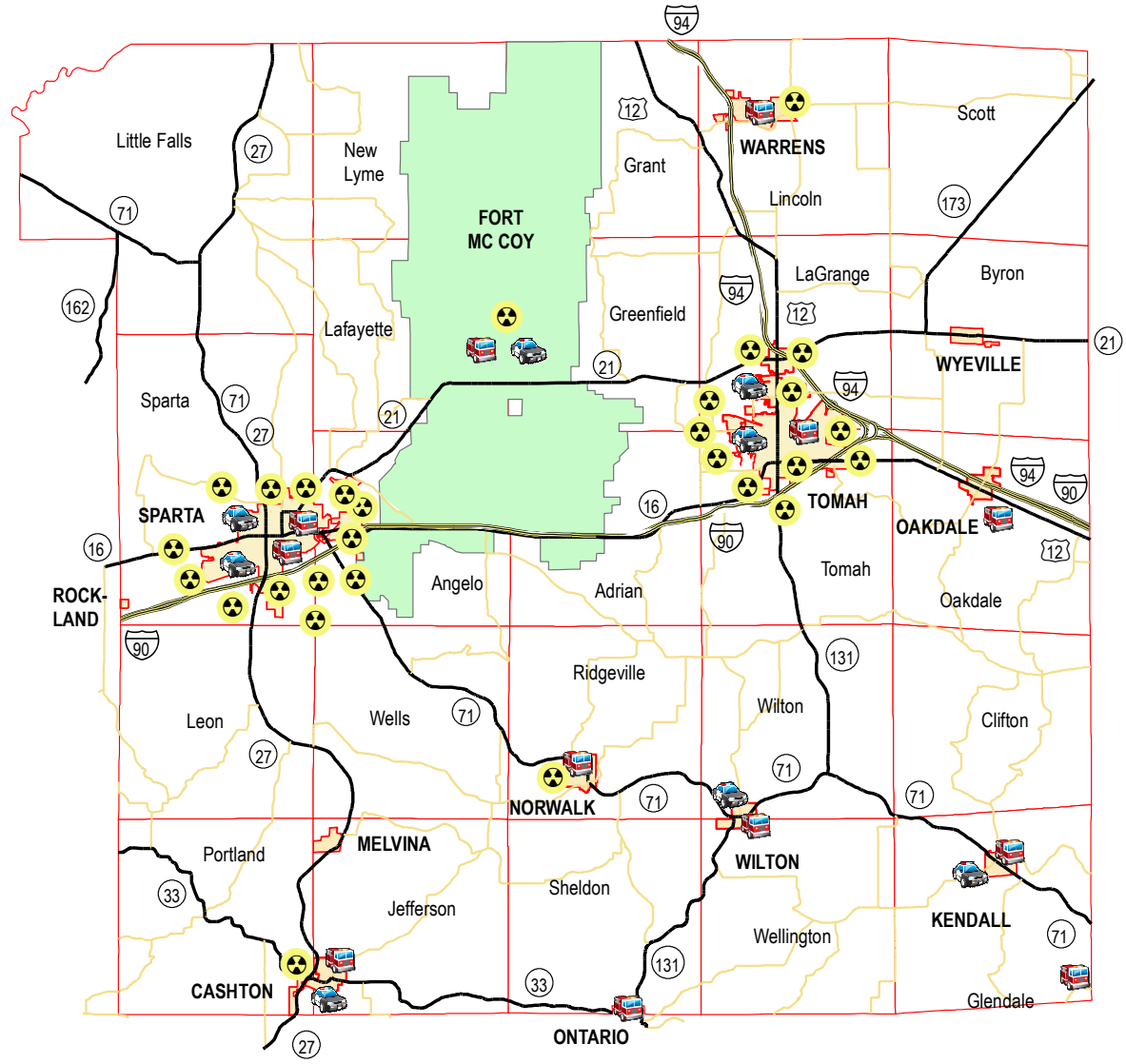
Interstate
State/US Highway
Town Boundary
City/Village

N

Miles
0 2.75 5.5 11

Prepared by: Mississippi River Regional Planning Commission /dab/7/19

Map 3-3
Monroe County Critical Facilities
Police, Fire Departments and Hazardous Material Sites



There are 12 Fire Departments, 8 Police Departments and 28 Hazardous Material sites. See Tables 3-8 and 3-12 for further information.

Fire Department
Police Department
Hazardous Material Site

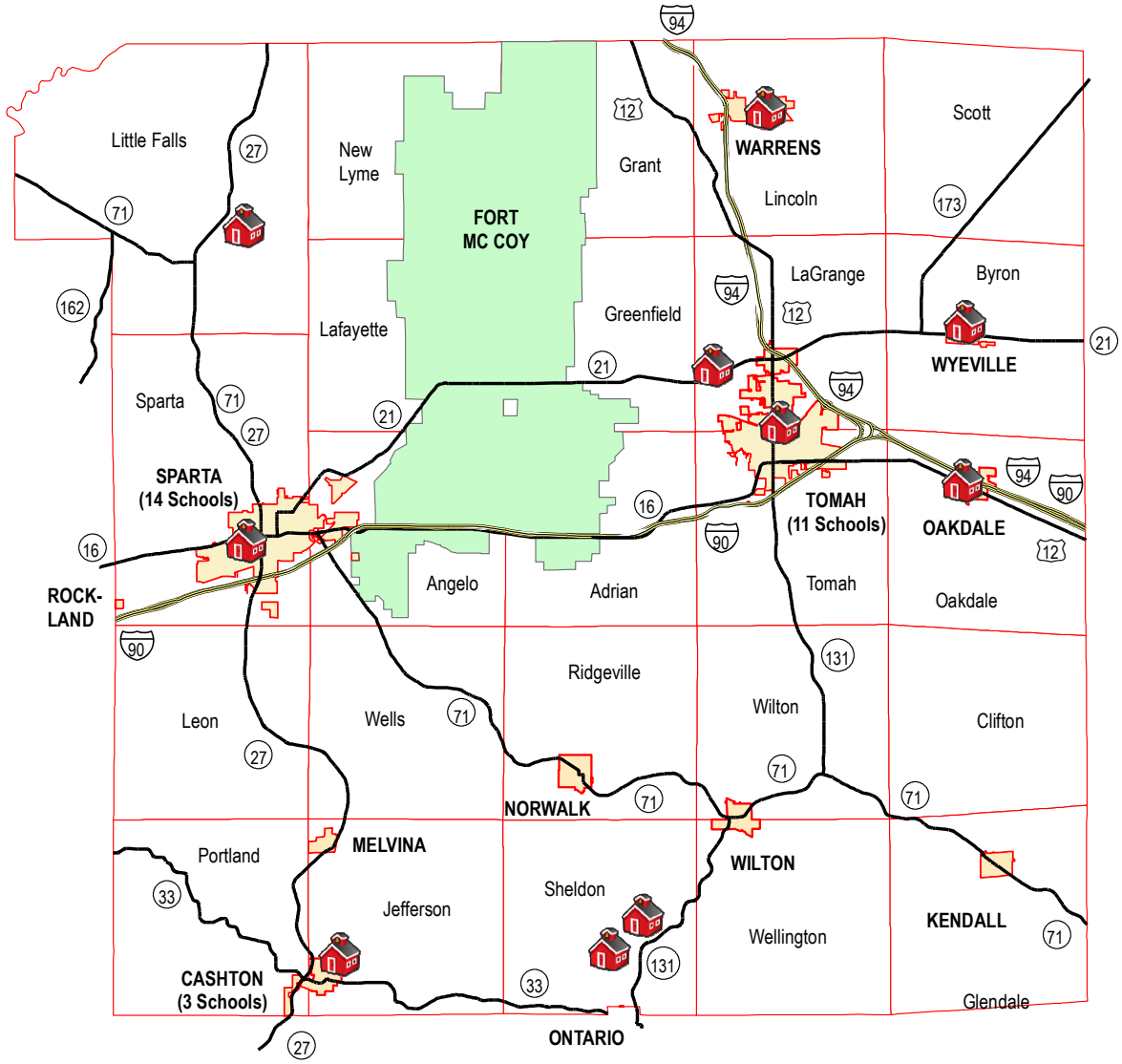
Interstate
State/US Highway
Town Boundary
City/Village

N

Miles
0 2.75 5.5 11

Prepared by: Mississippi River Regional Planning Commission /dab/7/19

Map 3-4
Monroe County Critical Facilities
Schools



There are 4 High Schools, 2 Middle Schools, 12 Elementary Schools and 19 Private or Other Schools (Montessori, Charter or Alternative Learning)

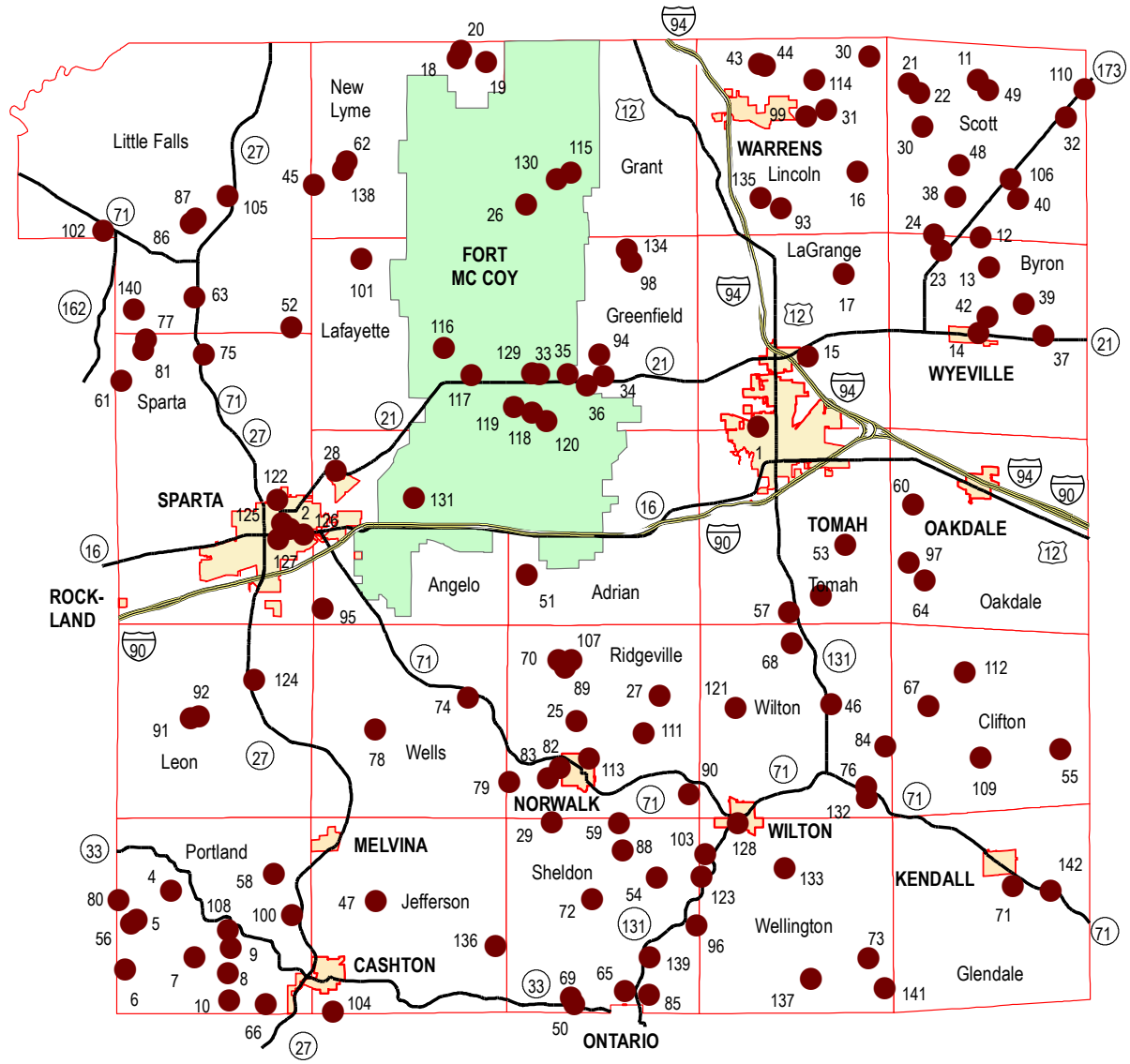
School
Interstate
State/US Highway
Town Boundary
City/Village

N

Miles
0 2.75 5.5 11

Prepared by: Mississippi River Regional Planning Commission /dab/7/19

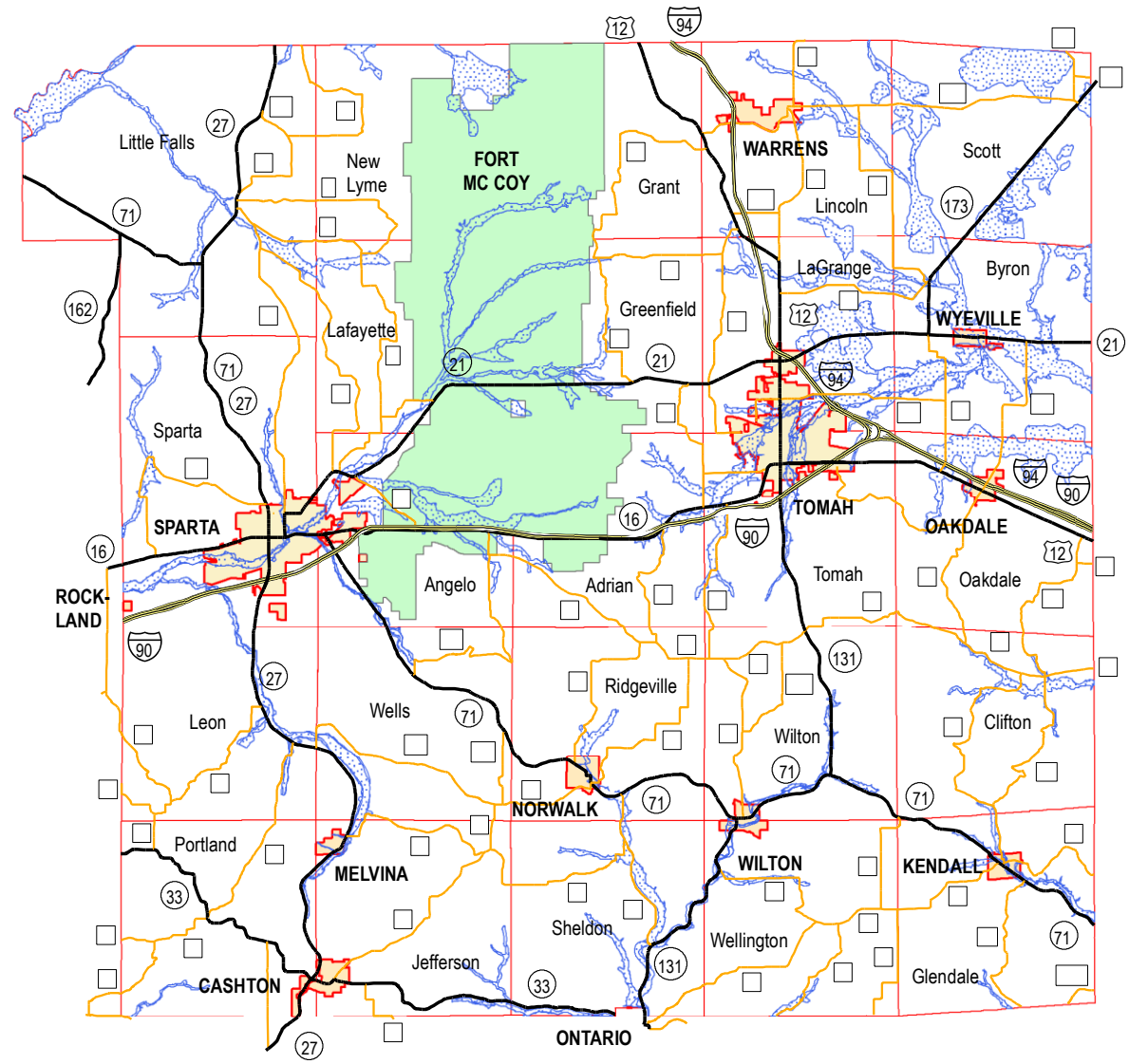
Map 3-5
Monroe County Critical Facilities
Dams



See Table 3-13 for additional information.

Prepared by: Mississippi River Regional Planning Commission /dab/7/19

Map 3-6
Monroe County Critical Facilities
FEMA 100-Year Flood Boundary



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4.0 MONROE COUNTY MULTI-HAZARDS MITIGATION PLAN STRATEGIES

Monroe County Hazard Mitigation Goals

Goals are general descriptions of desired long-term outcomes. State and federal guidance and regulation pertaining to mitigation planning require the development of mitigation goals to reduce or avoid long-term vulnerabilities to identified hazards. **The County's villages, city and towns overall multi-hazards mitigation goal is to identify economical and environmentally sound ways to protect life, health and property from future hazards.** In addition to this overall goal, the County also identified six specific goals:

1. Protect the residents of Monroe County from natural and man-made hazards.
2. Increase public understanding, support and demand for hazard mitigation.
3. Protect existing and new properties.
4. Build and support local capacity and commitment to become less vulnerable to hazards.
5. Maximize resources for investment in hazard mitigation.
6. Reduce the potential impact of natural and man-made disasters on the County's natural systems.

Objectives:

Objectives are well-defined intermediate points in the process of achieving goals. For the six goals listed above the Monroe County EM established a list of objectives within each goal. Monroe County mitigation planning objectives for each goal include:

Goal 1: Protect the residents of Monroe County from natural and man-made hazards.

- *Objective 1.1:* Advise the public and implement activities related to health and safety precautions that protect lives by making homes, businesses, critical infrastructure facilities, dams and other property more resistant to hazards.
- *Objective 1.2:* Target owners of properties within identified hazard areas for additional outreach regarding mitigation and disaster preparedness.
- *Objective 1.3:* Evaluate existing shelters to determine adequacy for current and future populations.
- *Objective 1.4* Maximize the use of the latest technology to provide adequate warning communication, and mitigation of hazard events. The County will continue to promote an increase use of National Oceanic and Atmospheric Administration (NOAA) weather radios. NOAA Weather Radio (NWR) is a nationwide network of radio stations broadcasting continuous weather information direct form a nearby National Weather Service office. NWR broadcast National Weather Service warnings, watches, forecasts and other hazard information 24 hours a day. NWR is not only for thunderstorms, but also for their hazards as well making is a single source for comprehensive weather and emergency information. NWR also broadcasts warning and post-event information for all types of hazards-both natural and environmental (such as chemical releases or oil spill).
- *Objective 1.5:* Continue to develop hazard data for Monroe County to meet new threats and refine knowledge of existing threats.

Goal 2: Increase public understanding, support, and demand for hazard mitigation.

- *Objective 2.1:* Develop education and outreach programs and materials to increase public awareness of the risks associated with natural hazards.
- *Objective 2.2:* Educate the public on actions they can take to prevent or reduce the loss of life or property from natural hazards.
- *Objective 2.3:* Cultivate a spirit of cooperation between County residents and County government that ensures an ongoing commitment to future mitigation activities.

Goal 3: Protect existing and new properties.

- *Objective 3.1:* Reduce losses and repetitive damages from chronic hazard events by encouraging adequate and well-understood insurance coverage, including separate personal property coverage, among property owners.
- *Objective 3.2:* Use cost-effective approaches to protect existing buildings and public infrastructure from hazards.
- *Objective 3.3:* Ensure that development will not put people in harm's way or increase threats to existing properties.

Goal 4: Build and support local capacity and commitment to continuously become less vulnerable to hazards.

- *Objective 4.1:* Build and support local partnerships to continuously become less vulnerable to hazards.
- *Objective 4.2:* Provide information on tools, partnership opportunities, and funding resources to assist in implementing mitigation activities.
- *Objective 4.3:* Ensure adequate training, exercise, and resources for emergency organizations and personnel.
- *Objective 4.4:* Continue to foster collaboration with county departments so that hazard mitigation concerns are consistently incorporated into normal county operations (i.e. budgeting, planning, and zoning).

Goal 5: Maximize resources for investment in hazard mitigation.

- *Objective 5.1:* Strengthen communication and participation between public agencies, citizens, non-profit organizations, businesses, and industry to facilitate the mitigation process.
- *Objective 5.2:* Maximize the use of outside sources of funding.
- *Objective 5.3:* Encourage maximum participation of property owners, community associations, and special tax districts in protecting their property.

Goal 6: Reduce the potential impact of natural disasters on the county's natural systems.

- *Objective 6.1:* Balance natural resource management, and land use planning with natural hazard mitigation techniques.
- *Objective 6.2:* Preserve, rehabilitate, and enhance natural ecosystems to serve natural hazard mitigation functions.

The objectives identified above will be periodically reviewed as part of the plan maintenance and any additional objectives or modification will be incorporated into the next scheduled plan update. This will be done with meetings on a yearly basis with emails after the different seasons; the meetings with the towns will be scheduled during their Towns Association Meetings.

MONROE COUNTY ACTIONS AND PROJECTS

The following tables identify projects and actions by local governments or organizations that are designed to achieve the above-mentioned goals that collectively serve as an overall strategy for hazard mitigation. These actions and projects are the result of the public participation process outlined in Chapter One and the hazard risk assessment conducted in Chapter 3. Cost effectiveness is not used to prioritize projects due to costs being unknown until the time that the project study is actually launched. A cost effectiveness study will be completed when costs for the project are known and sources of funds have been committed to undertake them. The project timetable on the following pages is how the county and municipalities will prioritize these goals, actions and projects. The project timetable listed for each of the municipalities was obtained from the respective municipality officials. Municipal officials did stress that due to financial considerations if funding for a specific project becomes available then that specific project would become its priority. Once funding becomes available a cost benefit review would be completed to prioritize which projects would be completed. Due to reductions in budgets and loss of State Aids most projects listed the Monroe County Multi-Hazards Mitigation Plan 2012 - 2016 have been carried over or deferred to this plan.

The following is a list of Multi-Hazard Mitigation Actions and Projects to be implemented by Monroe County.

Table 4-1
Monroe County
Hazard Mitigation Actions or Projects

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Flooding, Storm water Drainage, and Dam Hazards Actions and Projects				
Investigate the concept of a voluntary floodplain property buyout/relocation program through a survey of property owners in the floodplain. This survey could also inquire about interest in flood proofing and/or elevating their properties to protect health, public safety and welfare.	Existing County staff resources	County Zoning Administrator	Continual	Carried over, this project will be on-going until all floodplain structures are mitigated
Continue to monitor and enforce N.R. 116 Floodplain, Shore Land – Wetland Regulations and any changes to it.	County Zoning Administrator	County Zoning Administrator	Annually	Carried over from previous plan
To maintain the County's compliance with the National Flood Insurance Program the County will undertake the following actions: 1) The County Zoning Administrator shall annually attend floodplain zoning seminars and workshops to keep informed on floodplain issues and regulations. 2) The County Zoning Administrator shall report monthly on floodplain permit activity to the Emergency Management Committee. 3) The County Zoning Administrator shall administer, enforce and update the County's floodplain ordinance as prescribed by law.	Existing County staff resources	County Zoning Administrator	Annually	Carried over from previous plan, relates to NFIP compliance
Work to reduce or eliminate repetitive loss or substantially damaged structures by undertaking the following: 1) The Emergency Management Coordinator shall biannually write a letter to owners of repetitive loss structures or substantially damaged structures to inform them of techniques and potential state and federal resources available to reduce further flood losses. Specific emphasis will be placed on contacting them if the County, City or a Village proceeds with a voluntary buyout program as described above. 2) Inform property owners through the annual Survey to act as a resource for information and answer questions on how to reduce future flood losses.	Existing County staff resources	County Emergency Management Coordinator	Biannually	Carried over from previous plan
Promote the National Flood Insurance Program through community education	Existing County staff resources	County Emergency Management Coordinator	Continual	Deferred, relates to NFIP compliance
Review flood disaster impacts and revise and update this plan as needed after a flood disaster. New flood hazard mitigation projects and strategies are likely to arise after a flood disaster. To deal with this situation the County Emergency Management Coordinator and Zoning Administrator shall meet and report in a timely manner to the County Emergency Management Committee on potential changes to the County's Multi-Hazard Mitigation Plan. The Emergency Management Committee shall recommend reaffirming, amend or update (rewrite) this plan to the County Board.	Existing County staff resources	Public Safety and Justice Committee, County Zoning Administrator, County Emergency Management Coordinator	After each flood disaster	Carried over from previous plan
Develop mapping and model flood mitigation priorities	Grants	County Land Conservation Department	As funding becomes available	New Project
Utilize modeling, including EVAAL to identify priority areas for conservation and mitigation practices and projects	Grants	County Land Conservation Department	As funding becomes available	New Project
Develop a road/culvert inventory and documenting of "digital dams" that interfere with watershed modeling	Grants	County Land Conservation Department	As funding becomes available	New Project

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Develop a strategy for changed practices (sizing, lowering roads, etc.) for roads and culverts	Grants	County Land Conservation Department	As funding becomes available	New Project
Develop a landowner/farmer outreach program which will increase the number of practices that will retain water	Grants	County Land Conservation Department	As funding becomes available	New Project
Conduct breach route and hydraulic shadow analysis of all 7 PL-566 Dam structures	Grants	County Land Conservation Department	As funding becomes available	New Project
Update the County's floodplain maps using current County LIDAR	Grant	County GIS/Zoning Department	As funding becomes available	New Project
Update high water warning system	Grants	County Land Conservation Department	As funding becomes available	New Project
Develop a procedure for prioritizing voluntary buyouts	Grants	County Zoning Department	As funding becomes available	New Project
Develop a procedure to mail a notice to all owners of non-conforming structures as well as vacant land in the mapped floodplain making them aware of the floodplain regulations	Grants	County Zoning Department	As funding becomes available	New Project
Conduct a feasibility study on the development of cost-sharing program of rain gardens and other storm water retention practices	Grants	County Land Conservation Department	As funding becomes available	New Project
Develop a list of areas within the county which could be cut off from emergency vehicles during flooding and develop a plan to alleviate that problem	Grants	Emergency Management Coordinator	As funding becomes available	New Project
Hail, Lightning, Thunderstorm and Fog Hazard				
Encourage the burying of electrical lines	Existing County staff resources	Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Encourage the burying of telecommunication lines	Existing County staff resources	Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Utilize the Severe Awareness Week to alert residents of the need for concern about hail, lightning, thunderstorm and fog hazards and actions they can take to minimize losses from these hazards.	Existing County staff resources	County Emergency Management Coordinator	Annual Program	Carried over from previous plan
Tornadoes and High Winds				
Encourage the anchoring on new mobile home residences, carports and porches.	Existing County staff resources	Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Encourage burying of underground power, cable and telephone lines.	Existing County staff resources	Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Encourage the use of interlocked roofing shingles.	Existing County staff resources	Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Encourage the construction of safe rooms in mobile home parks and other residential structures subject to high winds.	Existing County staff resources	Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Identify buildings that would provide protection to the public in the event of a tornado or high winds.	Existing County staff resources	County Emergency Management Coordinator	2020-2021	Coordinate this activity with buildings being inventoried for use for extreme temperature events. Deferred

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Improve and update communication and advanced warning systems	Existing County staff resources	County Emergency Management Coordinator and Public Safety and Justice Committee	2021-2022	Deferred. Did not get funded
Extreme Cold and Heat Event				
Identify buildings that could be used as shelters with appropriate heating, ventilation and air conditioning for housing that segment of the population that are more vulnerable to extreme temperature events, such as the low income, elderly, and sick.	Existing County staff resources	Emergency Management Coordinator and Public Safety and Justice Committee in conjunction with the Cities, Villages and Towns.	2013-2015	Deferred
Investigate developing a program that provides fans to the elderly in times of extreme heat.	Existing County staff resources	Emergency Management Coordinator and Public Safety and Justice Committee	As funding becomes available	New Project
Participate in National Heat Awareness Day by distributing information regarding heat awareness	Existing County staff resources	Public Safety and Justice Committee	Continual Program	New project
Continue support of the Salvation Army	Existing County staff resources	Public Safety and Justice Committee	Continual Program	New Project
Forest and Wildland Fire				
Promote and maintain cooperative fire agreements among area fire departments and the Department of Natural Resources.	Existing County staff resources	County Emergency Management Coordinator	Continual Program	Carried over from previous plan
Encourage periodic cutting of Conservation Reserve Program (CRP) land per program requirements	Existing County staff resources	Public Safety and Justice Committee and National Resource Conservation Service	Continual Program	Carried over from previous plan
Enforce countywide ordinance regarding burning bans during dry seasons.	Existing County staff resources	Public Safety and Justice Committee and County Board	Continual Program	Carried over from previous plan
Heavy Snow and Ice Storms and Blizzard				
Prepare timely releases that inform the public on actions and precautions they can take to minimize disruptions and losses	Existing County staff resources	County Emergency Management Coordinator	Annually	Carried over from previous plan
Identify locations in the County where snow fences could be constructed or trees and bushes (living snow fence) could be planted to increase motor vehicle safety.	Existing County staff resources	County Emergency Management Coordinator in cooperation with the County Highway Commissioner	2020 - 2021	Deferred. Less of a priority
Utilize the Winter Weather Awareness Week to alert residents of the need for concern about heavy snow, ice storms and blizzards and the actions they can take to minimize losses from these hazards.	Existing County staff resources	County Emergency Management Coordinator in cooperation with the County Highway Commissioner	Annually	Carried over from previous plan

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Earthquake, Landslide and Subsidence				
Investigate developing an inventory/prioritization of roads/road segments that have shoulders with slopes conducive to erosion and land/mud slides. The roads/road segments identified can be stabilized as funding becomes available.	Existing County staff resources	County Emergency Management Coordinator in cooperation with the County Highway Commissioner and Public Safety Committee	2022-2023	Deferred. Less of a priority
Agricultural and Drought				
Consider developing an education/information program that informs agricultural producers and residents about water conserving measures and crop insurance.	Existing County staff resources	County Emergency Management Coordinator in cooperation with City, Village and Town Officials	2020-2021	Deferred, was not placed in any departments budget
Pandemic Flu				
Develop a pandemic flu plan listing specific actions and identifies emergency powers and who has the authority to use them.	Existing County staff resources	Public Health officer in cooperation with City Officials, Village Officials, Emergency response personnel and local hospitals and clinics	2020-2022	New Project
Train Derailment				
Develop evacuation plans for the incorporated communities which have rail lines running through them	Existing County staff resources	County Emergency Management Coordinator in cooperation with city and village officials	2019-2023	New Project
Additional training for emergency responders	Grants and Canadian Pacific and Union Pacific	County Emergency Management Coordinator in cooperation with first responders' organizations	Continual program	New Project
Develop a procedure for disseminating public information during events	Existing County staff resources	County Emergency Management Coordinator and the County Administrator	2021-2022	New Project
Develop a sheltering plan	Existing County staff resources	County Emergency Management Coordinator	2021-2022	New Project
Purchase electronic highway signs for detours and road closures	Grants	County Highway Dept.	2021-2022	New Project
Develop an Emergency Alert system for notification of County residents during emergencies	Existing County staff resources	County Administrator	2021-2022	New Project
Update Emergency Operations Center – update staff and equipment, obtaining additional training	HMP grants	County Emergency Management Coordinator	2021-2022	New Project

Mitigation Projects for Municipalities

The following list of Multi-Hazard Mitigation Actions and Projects have been compiled from a mitigation project survey each municipality completed, individual conversations and at public meetings. These projects will be implemented by the Cities of Sparta, Tomah, the Villages of Cashton, Kendall, Melvina, Norwalk, Oakdale, Warrens, Wilton, Wyeville and the Towns of Adrian, Angelo, Byron, Clifton, Glendale, Grant, Greenfield, Jefferson, Lafayette, LaGrange, Leon, Lincoln, Little Falls, New Lyme, Oakdale Portland, Ridgeville, Scott, Sheldon, Sparta, Tomah, Wellington, Wells and Wilton.

Table 4-2
Monroe County Municipal
Hazard Mitigation Actions or Projects

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Flooding, Storm water Drainage, and Dam Hazards Actions and Projects				
In conjunction with the County investigate the concept of a voluntary floodplain property buyout/relocation program through a survey of property owners in the floodplain. This survey could also inquire about interest in flood proofing and/or elevating their properties to protect health, public safety and welfare.	Existing Village and County staff resources to investigate	County Emergency Management Coordinator to serve as coordinator	Continual Program	Determine interest on an area by area basis
Continue to monitor and enforce N.R. 116 Floodplain, Shore Land - Wetland Regulations and any changes to it.	Existing Village and City resources	Village or City Board or designee	Annually	Continual Program
Work to reduce or eliminate repetitive loss or substantially damaged structures by undertaking the following: 1) The Village or City Clerk or designee biannually shall provide a list of owners of repetitive loss structures or substantially damaged structures within the Village or City to the County Emergency Management Coordinator. The County Emergency Management Coordinator will then biannually write a letter to owners of repetitive loss structures or substantially damaged structures to inform them of techniques and potential state and federal resources available to reduce further flood losses. Specific emphasis will be placed on contacting them if the County, City or a Village proceeds with a voluntary buyout program as described above. 2) Inform property owners through the annual survey to act as a resource for information and answer questions on how to reduce future flood losses.	Existing Village, City and County staff resources	Village or City Board or designee and the County Emergency Management Coordinator	Biannually	Carried over from previous plan
Promote the National Flood Insurance Program through community education	Existing County/Village/ City staff resources	Emergency Management Coordinator	Continual	Deferred, relates to NFIP compliance
To maintain compliance with the National Flood Insurance Program the Village/City will undertake the following actions: 1) The Village/City Clerk or designee shall annually attend floodplain zoning seminars and workshops to keep informed on floodplain issues and regulations. 2) The Village/City Clerk or designee shall report monthly on floodplain permit activity to the Village Board. 3) The Village/City Clerk or designee shall administer, enforce and update the municipality's floodplain ordinance as prescribed by law.	Existing Village/City staff and resources	Village/City Clerk or designee	Annually	Carried over from previous plan, relates to NFIP compliance

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Work in conjunction with the County to review flood disaster impacts and revise and update this plan as needed after a flood disaster. New flood hazard mitigation projects and strategies are likely to arise after a flood disaster. To deal with this situation Village/City Clerks or designees shall meet and report in a timely manner to the Village/City Boards on potential changes to the Village/City portions of the Monroe County Multi-Hazard Mitigation Plan. The Village/City Boards shall recommend reaffirming, amend or update (rewrite) this plan to the County Emergency Management Coordinator and the Public Safety and Justice Committee. This disaster assessment may be included in the annual review process discussed in the Plan Maintenance and Adoption section of this plan if the response to the recent flood disaster will not be impaired by doing so.	Existing Village/City/ County staff resources	Village/City Clerks or designees, Emergency Management Coordinator and Public Safety and Justice Committee	After each flood disaster	Carried over from previous plan
Hail, Lightning, Thunderstorm and Fog Hazard				
Encourage the burying of electrical lines	Existing City, Village, Town and County staff resources	Individual municipal Boards in conjunction with the County Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Encourage the burying of telecommunication lines	Existing City, Village, Town and County staff resources	Individual municipal Boards in conjunction with the County Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Assist the County in utilizing the Severe Awareness Week to alert residents of the need for concern about hail, lightning, thunderstorm and fog hazards and actions they can take to minimize losses from these hazards.	Existing City, Village, Town and County staff resources	County Emergency Management Coordinator coordinating with City, Town and Village Clerks	Annual Program	Carried over from previous plan
Tornadoes and High Winds				
Require anchoring on new mobile home residences, carports and porches.	Existing City, Village, Town and County staff resources	Individual municipal Boards in conjunction with the County Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Encourage the burying of underground power, cable and telephone lines.	Existing City, Village, Town and County staff resources	Individual municipal Boards in conjunction with the County Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Encourage the use of interlocked roofing shingles.	Existing City, Village, Town and County staff resources	Individual municipal Boards in conjunction with the County Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Encourage the construction of concrete safe rooms in mobile home parks and other residential structures subject to high winds.	Existing City, Village, Town and County staff resources	Individual municipal Boards in conjunction with the County Public Safety and Justice Committee	Continual Program	Carried over from previous plan
Identify buildings that will provide protection to the public in the event of a tornado or high winds.	Existing City, Village, Town and County staff resources	Individual municipal Boards in conjunction with the County Public Safety and Justice Committee	Continual Program	Carried over from previous plan

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Extreme Cold and Heat Event				
In conjunction with the County and adjacent municipalities identify buildings within or adjacent to their respective municipality that could be used as shelters with appropriate heating, ventilation and air conditioning for housing that segment of population that are more vulnerable to extreme temperature events, such as the low income, elderly, and sick.	Existing City, Town, Village and County staff resources	County Emergency Management Coordinator will coordinate with each municipal board or their designee	2020-2021	Deferred
Forest and Wildland Fire				
Develop/maintain cooperative fire agreements with area fire departments and the Department of Natural Resources as necessary.	Existing City, Town and Village staff resources	City, Town and Village Boards will be responsible for their municipality	Continual Program	Carried over from previous plan
Heavy Snow and Ice Storms and Blizzard				
Cooperate with the County in preparing timely releases that inform the public on actions and precautions they can take to minimize disruptions and losses.	Existing County staff resources along with City, Town and Village staff and resources	County Emergency Management Coordinator with City, Town and Village Clerks	Annually	Carried over from previous plan
Identify locations where snow fences could be constructed or trees/brushes (living snow fences) could be erected or planted to increase motor vehicle safety by reducing or eliminating blowing/drifting snow	Existing County staff resources along with City, Town and Village staff and resources	County Emergency Management Coordinator and County Highway Commissioner coordinating with City, Town and Village Clerks	2020 - 2021	Deferred from previous plan, project was not budgeted for in either department
Earthquake, Landslide and Subsidence				
Investigate developing an inventory/prioritization of roads/road segments that have shoulders with slopes conducive to erosion or land /mud slides. The roads/road segments identified can be stabilized as funding becomes available.	Existing City, Village/ and Town staff resources	City, Town or Village Board or designee	2019-2020	Deferred
Agricultural and Drought				
In conjunction with the County consider developing an education/information program that informs agricultural producers and residents about water conserving measures and crop insurance.	Existing County staff resources	County Emergency Management Coordinator in cooperation with City, Village and Town Officials	2021-2022	Deferred
Train Derailment				
Develop evacuation plans for the incorporated communities which have rail lines running through them	Existing County staff resources	County Emergency Management Coordinator in cooperation with city and village officials	2019-2023	New Project
Pandemic Flu				
Develop a pandemic flu plan listing specific actions and identifies emergency powers and who has the authority to use them.	Existing County staff resources	Public Health officer in cooperation with City Officials, Village Officials, Emergency response personnel and local hospitals and clinics	2020-2022	New Project

Individual Municipal Projects

The following is a list of Multi-Hazard Mitigation Actions and Projects which individual municipalities have identified in addition to the projects listed in Table 4-2.

Table 4-3
Municipal Specific Hazard Mitigation Actions or Projects

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Flooding, Storm water Drainage, and Dam Hazards Actions and Projects				
Town of Grant – Road repairs and upgrades to Blueberry, Cherrystone, Cheyenne, Charcoal, Chariot and Blazer Roads	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Grant – Culvert repairs – Charcoal and Clay, Cinder and Charcoal	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Jefferson – Repair and upgrade flood damaged Nevada and Omaha roads	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Jefferson – Repair/Upgrade bridges on Oneida and Nevada Roads	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Wellington – Repair/Upgrade culverts within the town which washout or fill with debris during high water	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Wells – Develop a flood warning plan for the Town	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Wells – Identify and raise roads within the town which become impassable during flooding	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Wells – Develop an evacuation plan for the Town	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Wells – Identify and flood proof building within the town which flood during high water events	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Village of Norwalk – Replace box culvert at intersection of STH 71 & Main St.	Grants and Village Budget	Village Board	As funding becomes available	Carried over from previous plan
Village of Oakdale – Purchase large submersible pumps	Grants and Village Budget	Village Board	As funding becomes available	Carried over from previous plan
Village of Oakdale – Upgrade the forced main going to the top of hill	Grants and Village Budget	Village Board	As funding becomes available	Carried over from previous plan
Village of Oakdale – Add a second well to Village	Grants and Village Budget	Village Board	As funding becomes available	Carried over from previous plan
City of Sparta – Conduct study of the Perch Lake Dam and implement recommendations	Grants and City Budget	City Board	As funding becomes available	New Project
City of Tomah – Improve storm water drainage	Grants and City Budget	City Board	As funding becomes available	Carried over from previous plan
Town of Lafayette – Construct a new bridge of Bailey Creek	Grants and Town Budget	Town Board	As funding becomes available	New Project

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Town of Tomah– Replace bridge – Highland Ave.	Grants and Town Budget	Town Board	As funding becomes available	New Project
Village of Melvina – Develop a flood warning plan for the village.	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Melvina – Develop an evacuation plan for the village.	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Melvina – Increase size of culverts on Central Dr. and in the lift station area.	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Norwalk – Review and update Emergency Action Plan for the dam located above the Village which will include response and notification.	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Norwalk – Conduct a study of the existing Norwalk dam alarm system.	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Norwalk – Updates and improvements/replacement to the existing Norwalk dam alarm system.	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Wilton– Conduct study of storm water issues resulting in flooding of STH 131/71 near Mill St.	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Wilton– Implement results of stormwater study	Grants and Village Budget	Village Board	As funding becomes available	New Project
Town of Portland– Rebuild dams which failed during flooding of 2018	Grants and Town Budget	Town Board	As funding becomes available	New Project
Town of Portland– Replace Oakland bridge	Grants and Town Budget	Town Board	As funding becomes available	New Project
Hail, Lightning, Thunderstorm and Fog Hazard				
Town of Wells – Improvements to roadways & waterways to provide aid to visibility	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Wells – Improvements to public warning systems	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Village of Melvina – Purchase generator for lift station	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Melvina – Develop a public warning plan for the village.	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Oakdale – Fuse kits for lift stations	Grants and Village Budget	Village Board	As funding becomes available	Carried over from previous plan
Village of Oakdale – Stand by generators for lift stations	Grants and Village Budget	Village Board	As funding becomes available	Carried over from previous plan
Village of Oakdale – Surge protection	Grants and Village Budget	Village Board	As funding becomes available	Carried over from previous plan

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Tornadoes and High Winds				
Town of Wells – Purchase weather radios	Grants and Town resources	Town Board	2020	Deferred
Town of Wells – Train additional weather spotters	Grants and Town resources	Town Board	2020	Deferred
Town of Wells – Purchase portable generators	Grants and Town resources	Town Board	2021	Deferred
Village of Cashton – Replace old 1940's warning siren with 3 new sirens	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Melvina – Purchase NOAA weather radios	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Melvina – Train weather spotters	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Melvina – Purchase and install severe weather warning sirens	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Warrens – Develop a Public warning plan for the village	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Warrens – Develop a plan on how to warn residents and visitors at Jellystone Park of severe weather	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Warrens – Purchase tornado siren for Jellystone Park	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Warrens – Purchase police radios for Village Hall and Public Works offices	Grants and Village Budget	Village Board	As funding becomes available	New Project
City of Tomah – Replace 2 severe weather warning sirens	Grants and City Budget	Police Chief	When funding can be obtained	Carried over from previous plan
City of Tomah – Develop evacuation plan for fairgrounds	Grants and City Budget	Fire Chief	When funding can be obtained	New Project
Town of Portland – Add fencing or construct a containment wall at waste disposal site.	Grants and Town Budget	Town Board	As funding becomes available	New Project
Heavy Snow, Ice or Blizzard Event				
Town of Adrian – Improve Index Ave. south of CTH A	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Extreme Cold and Heat Event				
Village of Warrens – Purchase 2 permanently mounted, natural gas generators for lift stations	Grants and Village Budget	Village Board	As funding becomes available	New Project
Village of Warrens – Purchase a permanently mounted, natural gas generator for Well House 1	Grants and Village Budget	Village Board	As funding becomes available	New Project

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Earthquake, Landslide and Subsidence				
Town of Wells – Identify areas of landslides/ falling rocks and develop a program to warn the public of these areas	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Lafayette – stabilize hillside alongside CTH Q	Grants and Town Budget	Town Board	As funding becomes available	New Project
Forest Fires, Drought				
Town of Wells – Develop and implement a plan for pruning and clearing of vegetation	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Wells – Identify and create buffer zones between structures and woodlands	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Wells – Encourage the purchase of crop insurance	Grants and Town Budget	Town Board	As funding becomes available	Carried over from previous plan
Town of Portland– Develop and implement a plan to clear brush and trees on town road rights-of-way	Grants and Town Budget	Town Board	As funding becomes available	New Project
Train Derailment				
City of Tomah – Develop evacuation plans	Grants and City Budget	Fire Chief	When funding can be obtained	New Project
City of Tomah – Additional training for emergency responders	Grants and City Budget	Fire Chief	When funding can be obtained	New Project

Monroe County Plan Maintenance and Adoption Action Plan

The following table is the Monroe County Multi-Hazards Mitigation Plan Maintenance and Adoption Action Plan. The plan maintenance and adoption projects are detailed in Chapter 5. Monroe County's Plan Maintenance and Adoption goal is: *To provide a continual opportunity for local officials to update, maintain and implement the Monroe County Multi-Hazard Mitigation Plan*.

Table 4-4
Monroe County Multi-Hazards Mitigation Plan Maintenance and Adoption Action Plan

Plan Maintenance and Adoption Projects	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Continual monitoring of progress made toward achieving plan goals, projects and action items by the Emergency Management Coordinator	Existing County resources	County Emergency Management Coordinator	Annually	See Chapter 5
Post disaster Multi-Hazard Mitigation Plan review and comment period for plan stakeholders	Existing County staff resources	County Emergency Management Coordinator in cooperation with County, City, Village and Town Officials	Post disaster	See Chapter 5
Annual Multi-Hazard Mitigation Plan review and comment period for plan stakeholders	Existing County staff resources	County Emergency Management Coordinator in cooperation with County, City, Village and Town Officials	Annually	See Chapter 5
County, City, Village, and Town plan approval by adopting resolutions	Existing County, City, Village, and Town resources	County Emergency Management Coordinator in cooperation with County, City, Village and Town Officials	After plan modification	See Chapter 5

5.0 MONROE COUNTY MULTI-HAZARDS MITIGATION PLAN MAINTENANCE AND ADOPTION

Plan Maintenance

Since changes across the County's landscape will always be occurring this Multi-Hazards Mitigation Plan should be monitored and amended as needed to meet these changing conditions. To accomplish this, it has been determined that the County Emergency Management Coordinator should review the contents of the plan for its applicability and prioritize projects each year during the 3rd quarter and report to the Public Safety and Justice Committee on the progress made pertaining to goals, projects and actions contained in the plan. Prior to the end of each calendar year, the Public Safety and Justice Committee shall recommend either reaffirmation, amendment or update (rewrite) of the plan to the County Board for their action based on recommendations provided by county staff, public input and other pertinent information provided to the committee. The Disaster Mitigation Act of 2000 requires that this plan be evaluated and updated at least every five years to remain eligible for assistance.

It has also been determined that the Public Safety and Justice Committee evaluate the plan after disasters to determine if the information, goals and actions are still appropriate in light of the given disaster. In addition, the committee shall evaluate the plan bi-annually to assess the following: are the goals and objectives addressing current or expected conditions; are the nature, magnitude, and/or type of risks changed; have priorities for mitigation projects changed, are current resources appropriate for implementing the plan; are there implementation problems, such as technical, political, legal, or coordination issues with other agencies; have agencies and other partners participated as proposed; and are mitigation projects being pursued. When this plan is being considered for evaluation due to the annual evaluation policy or because of the post disaster evaluation policy it will be the County Emergency Management Coordinator's responsibility to let stakeholders know through meeting notices and public announcements about the plan evaluation process and provide them with an adequate comment period if they cannot attend a plan evaluation meeting.

Plan Coordination

Upon adoption of the plan by the County and other participating local units of government the County Emergency Management Coordinator will distribute copies to key stakeholders including any additional copies needed by local governments that participated in and adopted the plan. The initial Hazard Mitigation Plan was not incorporated very well into other planning activities. The plan was used during land use planning by some but not all municipalities. To ensure that this updated plan will be incorporated into planning activities within the county, the County Emergency Management Coordinator will monitor other planning activities being undertaken and see to it that any related topics, goals or projects in this plan are presented to those involved in planning activities and especially those involved in preparing county, city, village or town comprehensive plans. In addition, the annual plan evaluation policy should serve as another method to ensure the information, findings, goals, actions and projects in this plan are incorporated into other planning projects and initiatives across the County. Lastly the County Emergency Management Coordinator will annually send out letters to all participating local units of government, county department directors and all new county board supervisors, their respective mitigation projects listing along with an explanation of the plan's mitigation projects and that these mitigation projects should be incorporated into any new or revised comprehensive plans, ordinances and codes.

Municipal Authority to implement the Plan

The incorporated communities of Cashton, Kendall, Melvina, Norwalk, Oakdale, Rockland, Sparta, Tomah, Warrens, Wilton and Wyeville all have the authority through taxing or annual budgets to commit funding to mitigation projects. All of the Towns also have the authority through taxing or annual budgets to commit funding. In addition, Monroe County also has the authority to commit funds to mitigation projects.

Plan Approval Process

The adoption of this plan by the county and any participating local government certifies to program and grant administrators from FEMA and Wisconsin Emergency Management that the plan's findings, goals and projects have been thoroughly considered and they have a desire to take planned actions to reduce losses from future hazard events. In exchange for this local commitment to plan to reduce future losses the Federal Emergency Management Agency and Wisconsin Emergency Management Agency will designate the county and other participating local governments that adopted the plan eligible for their Hazard Mitigation Grant Programs. The county and other participating local units of government are to adopt this plan by appropriate public meeting notice and by resolution.

Adoption Resolutions

The following is a list of the local units of government in the county. Those local units of government that adopted this plan are indicated with a check mark. The adoption resolutions from each local government follow this list.

Municipality	Adopted 2012 Plan	Adopted 2019-2023 Plan	Municipality	Adopted 2012 Plan	Adopted 2018-2022 Plan
Monroe County	☒	☐	Town of Sheldon	☐	☐
Town of Adrian	☐	☐	Town of Sparta	☐	☐
Town of Byron	☐	☐	Town of Tomah	☐	☐
Town of Clifton	☐	☐	Town of Wellington	☐	☐
Town of Glendale	☐	☐	Town of Wells	☐	☐
Town of Grant	☐	☐	Town of Wilton	☐	☐
Town of Greenfield	☐	☐	Village of Cashton	☐	☐
Town of Jefferson	☐	☐	Village of Kendall	☐	☐
Town of Lafayette	☐	☐	Village of Melvina	☐	☐
Town of LaGrange	☐	☐	Village of Norwalk	☐	☐
Town of Leon	☐	☐	Village of Oakdale	☐	☐
Town of Lincoln	☐	☐	Village of Ontario	☐	☐
Town of Little Falls	☐	☐	Village of Rockland	☐	☐
Town of New Lyme	☐	☐	Village of Warrens	☐	☐
Town of Oakdale	☐	☐	Village of Wyeville	☐	☐
Town of Portland	☐	☐	City of Sparta	☐	☐
Town of Ridgeville	☐	☐	City of Tomah	☐	☐
Town of Scott	☐	☐			

Town of Adrian Adopting Resolution

Town of Angelo Adopting Resolution

Town of Byron Adopting Resolution

Town of Clifton Adopting Resolution

Town of Glendale Adopting Resolution

Town of Grant Adopting Resolution

Town of Greenfield Adopting Resolution

Town of Jefferson Adopting Resolution

Town of Lafayette Adopting Resolution

Town of LaGrange Adopting Resolution

Town of Leon Adopting Resolution

Town of Lincoln Adopting Resolution

Town of Little Falls Adopting Resolution

Town of New Lyme Adopting Resolution

Town of Oakdale Adopting Resolution

Town of Portland Adopting Resolution

Town of Ridgeville Adopting Resolution

Town of Scott Adopting Resolution

Town of Sheldon Adopting Resolution

Town of Sparta Adopting Resolution

Town of Tomah Adopting Resolution

Town of Wellington Adopting Resolution

Town of Wells Adopting Resolution

Town of Wilton Adopting Resolution

Village of Cashton Adopting Resolution

Village of Kendall Adopting Resolution

Village of Melvina Adopting Resolution

Village of Norwalk Adopting Resolution

Village of Oakdale Adopting Resolution

Village of Ontario Adopting Resolution

Village of Rockland Adopting Resolution

Village of Warrens Adopting Resolution

Village of Wilton Adopting Resolution

Village of Wyeville Adopting Resolution

City of Sparta Adopting Resolution

City of Tomah Adopting Resolution

APPENDIX A

Risk Assessment Survey

and

Hazard Mitigation Projects Survey

MEMORANDUM

Date: March 15, 2017

To: All chief elected officials of local governments of Monroe County
All EMS, First Responders, Fire and Police Departments serving Monroe County

From: Darlene Pintarro, Monroe County Emergency Management Coordinator

Subject: Multi-Hazards Mitigation Information

Monroe County is in the process of updating the Monroe County All-Hazards Mitigation Plan. The County applied for and received a grant from Wisconsin Emergency Management to update this plan. The County has contracted with the Mississippi River Regional Planning Commission for the preparation of the update. The All-Hazards Mitigation Plan is a plan that describes the hazards that occur in Monroe County and lists strategies, goals and projects, which will eliminate or minimize the loss of life and damages. The plan covers all-natural hazards, i.e. tornadoes, hail, severe winds, flooding, extreme heat or cold, drought, snowstorms, etc.

In order to get better idea of your particular hazards and the areas affected we are asking for your assistance in this process. Enclosed you will find two surveys a Hazard Risk Assessment Survey and a Project Needs Survey, please complete these surveys and return them before April 30th, 2017.

The plan identifies mitigation projects by municipality so please list any needs within your jurisdiction regarding the mitigation a hazard. For example, if you know of a road that floods every spring and cuts off residents please make a note of it. Other potential needs would be severe weather shelters; update ordinances regarding building construction, additional flood warning, or flood insurance. These are only a few of the possible mitigation ideas; please do not limit your ideas to these. It is important to identify potential projects as projects identified in a plan that has been adopted by the county or municipality become eligible for certain FEMA grant programs. This is not to say they will get grant funding, but they will become eligible for grant funding.

If you have any questions regarding the surveys or potential projects, please contact Dave Bonifas with the Mississippi River Regional Planning Commission at 608-785-9396 or email dave@mrrpc.com.

Thank you for your time in this matter.

Darlene Pintarro, Coordinator Emergency Management
Monroe County

MONROECOUNTY MULTI-HAZARDS RISK ASSESSMENT SURVEY

From your experience living in your community and the current societal and environmental conditions please check one of the three columns titled Low, Medium or High Risk Rating to the right of each hazard listed in the far left column. Your check mark should be based on your opinion of that natural hazard's probable threat to your community's health and public safety over the coming five years. Each of the Hazards listed is to receive only one check mark. For example, if you check a medium risk rating for Lightning Storms this would be interpreted to mean that you think that Lighting Storms will probably have a medium harmful affect on your community in comparison to the other hazards listed. This survey is one of the methods Monroe County is using to receive public input into the plan. The survey information you and others provide is advisory and will not by itself set future public policy on how to deal with natural hazards.

NATURAL HAZARDS - Each natural hazard should receive either a low, medium, or high risk rating check mark.	**Low Risk Rating** √ A hazard risk rating of low means that in your opinion this hazard probably will have the least harmful affect on health and public safety in your community in comparison to the other hazards listed in column one.	**Medium Risk Rating** √ A hazard risk rating of medium means that in your opinion this hazard will probably have a medium or average harmful affect on health and public safety in your community in comparison to the other hazards listed in column one.	**High Risk Rating** √ A hazard risk rating of high means that in your opinion this hazard will probably have the highest or greatest harmful affect on health and public safety in your community in comparison to the other hazards listed in column one.
Hailstorms			
Lightning Storms			
Thunderstorms			
Tornado/High Winds			
Flash Flooding			
Riverine Flooding			
Lake Flooding			
Stormwater Flooding			
Dam Failure Flooding			
Forest Fires			
Wildland Fires			
Coastal Hazards			
Heavy Snowstorm			
Ice Storm			
Blizzard			
Extreme Cold			
Earthquake			
Extreme Heat			
Agricultural			
Drought			
Fog			
Landslide			
Subsidence			
Pandemic Flu			
Railroads			

Do you have any suggestions on projects or programs that may be undertaken by your local unit of government, the County or others that would reduce future losses and the threat to health and public safety from any of the above natural hazards? Please describe your suggestion(s) here or on a separate sheet of paper.

_____
_____
_____
_____

I am a resident of the (circle one) Town / Village / City of _____

Please return this survey to Darlene Pintarro, Monroe County Emergency Management Coordinator, Monroe County Emergency Management Office, 112 S. Court St. Room 500, Sparta WI 54656 **By April 30, 2017.**

MONROECOUNTY MULTI-HAZARDS MITIGATION PROJECT NEED SURVEY

The Monroe County Emergency Management Department along with the Mississippi River Regional Planning Commission are updating the existing Monroe County Multi-Hazards Mitigation Plan. A key part of this plan is the identification of policies, programs and projects from throughout the county that will reduce losses from future hazards. We are asking for your input in preparing this portion of the plan. Please be inclusive and generous in your ideas for policies, programs, or projects that you think are needed for your local government or organization. Listing a project in this survey will be interpreted as something needed to meet a local need and not as a commitment to undertake it. Projects you list may possibly become eligible for funding from Federal and State grant programs.

1. Does your local unit of government or organization you represent have any flooding, storm water drainage or dam hazard mitigation projects? If so, please describe below: (Examples of this these types of projects could include: road raising (dry land access) and/or repair, bridge improvements, culvert improvements, drainage channel improvements, elevation of buildings, flood proofing of buildings, floodplain mapping, dam hydraulic shadow mapping, new river gages, flood warning plans, evacuation plans, storm water, water line and sewer line improvements, and dam inspection or maintenance projects.)

Proposed flooding, storm water drainage, or dam hazard mitigation projects your local government or organization would like to seriously consider.	**Estimated Project Cost if Known?**	**Proposed Project Beginning & Ending Date if Known**	**Key Project Contact Person & Telephone Number**
a.			
b.			
c.			
d.			

2. Does your local unit of government or organization you represent have any hail, thunderstorm, lightning and fog hazard mitigation projects? If so, describe below. (Examples of these types of projects could include: Improving protection of warning and communication equipment, burying of power and communication lines, improvements to public early warning systems and plans, improvements to roadways and waterways that provide aid to visibility.)

Proposed hail, thunderstorm, lightning and fog hazard mitigation projects your local government or organization would like to seriously consider.	**Estimated Project Cost if Known?**	**Proposed Project Beginning & Ending Date if Known**	**Key Project Contact Person & Telephone Number**
a.			
b.			
c.			
d.			

3. Does your local unit of government or organization you represent have any tornado, and high wind mitigation projects you would like to undertake? If so, describe below. (Examples of these types of projects could include: public warning communication systems and networks i.e. sirens, telecommunications, radios, weather radios, weather spotters etc.; storm shelters-particularly for mobile home courts and campgrounds; projects that strengthen public and private structures i.e. structural bracing, straps, anchor bolts, using laminated or impact resistant glass; concrete safe rooms for mobile home parks, fairgrounds and shopping areas; protection of permanent and temporary debris disposal sites by fencing or relocation; burying power and telecommunication lines; purchase power supply backup power resources-generators.)

Proposed tornado and high wind hazard mitigation projects your local government or organization would like to seriously consider.	**Estimated Project Cost if Known?**	**Proposed Project Beginning & Ending Date if Known**	**Key Project Contact Person & Telephone Number**
a.			
b.			
c.			
d.			

4. Does your local unit of government or organization you represent have any extreme cold and heat mitigation projects you would like to undertake? If so, describe below. (Examples of these types of projects could include: local governments, civic and social service organizations can organize outreach activities to vulnerable residents during periods of extreme temperature; local governments, civic and social service organizations can work together to offer special arrangements for paying utility bills of vulnerable residents during times of extreme temperatures; local governments and civic and social service organizations can establish heating and cooling centers for vulnerable residents.)

Proposed extreme cold and heat event mitigation projects your local government or organization would like to seriously consider.	**Estimated Project Cost if Known?**	**Proposed Project Beginning & Ending Date if Known**	**Key Project Contact Person & Telephone Number**
a.			
b.			
c.			
d.			

5. Does your local unit of government or organization you represent have any forest and wildfire hazard mitigation projects you would like to undertake? If so, describe below. (Examples of these types of projects could include: promote use of non-combustible roof covering, fire safe construction materials and techniques; public education of smoking hazards and risks of recreational fires; use of zoning and subdivision regulations that create defensible space or buffer zones between structures and woodlands or grasslands; select logging, pruning and clearing of vegetation; create fire breaks; planting fire resistant vegetation; having adequate water supply locations, tanker trucks and pumping equipment.)

Proposed forest and wildfire mitigation projects your local government or organization would like to seriously consider.	**Estimated Project Cost if Known?**	**Proposed Project Beginning & Ending Date if Known**	**Key Project Contact Person & Telephone Number**
a.			
b.			

6. Does your local unit of government or organization you represent have any heavy snow, ice or blizzard hazard mitigation projects you would like to undertake? If so, describe below. (Examples of these types of projects could include: promote traveler emergency preparedness in education programs on severe weather hazards; burying electric and telecommunication lines underground; joint acquisition of vehicles and equipment among local governments to respond to severe winter storms; use of snow fences, including planting of trees to limit blowing and drifting of snow over roadways and to protect critical facilities.)

Proposed heavy snow, ice or blizzard mitigation projects your local government or organization would like to seriously consider.	**Estimated Project Cost if Known?**	**Proposed Project Beginning & Ending Date if Known**	**Key Project Contact Person & Telephone Number**
a.			
b.			
c.			
d.			

7. Does your local unit of government or organization you represent have any earthquake, landslide or subsidence hazard mitigation projects you would like to undertake? If so, describe below. (Examples of these types of projects could include: mapping and educating the public about areas in the county vulnerable to landslides and subsidence; identify and warn public about areas where falling rock from hillsides or cliffs can cause damage or harm; prepare zoning, subdivision, and site construction ordinances that set land use, development density, setback and slope construction standards.)

Proposed earthquake, landslide and subsidence mitigation projects your local government or organization would like to seriously consider.	**Estimated Project Cost if Known?**	**Proposed Project Beginning & Ending Date if Known**	**Key Project Contact Person & Telephone Number**
a.			
b.			

8. Does your local unit of government or organization you represent have any agricultural or drought hazard mitigation projects you would like to undertake? If so, describe below. (Examples of these types of projects could include: encouraging the purchase of crop insurance to preserve economic stability for farmers during drought; maintaining adequate municipal water storage supplies to provide water for human consumption over an extended period during times of drought; pass local government water emergency control ordinances to limit water use; construction of reservoirs for use during times of drought for agricultural use; purchasing tank trucks and pumping equipment for conveyance of water to special impact areas.)

Proposed agricultural or drought hazard mitigation projects your local government or organization would like to seriously consider.	**Estimated Project Cost if Known?**	**Proposed Project Beginning & Ending Date if Known**	**Key Project Contact Person & Telephone Number**
a.			
b.			

9. Does your local unit of government or organization you represent have any pandemic flu mitigation projects you would like to undertake? If so, describe below. (Identify nutrition program adaptations needed to respond to social distancing, voluntary quarantines, and possible disruption of the normal food supply, Develop clear and consistent guidance for planning for home care of ill individuals, such as when and where to seek medical care, how to safely care for an ill individual at home, and how to minimize disease transmission in the household. Develop guidance for appropriate use of community resources, such as home healthcare services, telephone care, the 9-1-1 emergency telephone system, emergency medical services, and triage services (nurse-advice lines, self-care guidance, and at-home monitoring systems) that could be deployed to provide resources for home care. Develop a plan to use media and trusted sources in communities to 1) explain the concepts of pandemic preparedness, 2) explain what individuals and families can do to be better prepared, and 3) disseminate clear information about what the public may be asked to do in the case of a pandemic.)

Proposed pandemic flu mitigation projects your local government or organization would like to seriously consider.	**Estimated Project Cost if Known?**	**Proposed Project Beginning & Ending Date if Known**	**Key Project Contact Person & Telephone Number**
a.			
b.			

10. Does your local unit of government or organization you represent have any railroad hazard mitigation projects you would like to undertake? If so, describe below. (Examples of these types of projects could include: (Examples are: additional emergency response training; purchase of new or additional emergency response equipment; relocate critical emergency response structures away from rail lines; develop evacuation plans; upgrade rail crossings.)

Proposed railroad hazard mitigation projects your local government or organization would like to seriously consider.	**Estimated Project Cost if Known?**	**Proposed Project Beginning & Ending Date if Known**	**Key Project Contact Person & Telephone Number**
a.			
b.			
c.			

Thank you for completing the survey. Please return it by May 15th to Darlene Pintarro, Coordinator Monroe County Emergency Management, 112 S. Court St. Room 500, Sparta WI 54656, Telephone: 608-269-8711. or fax to Dave Bonifas at 608-785-9394.

APPENDIX B

Public Notices and Meeting Agendas

PUBLIC HEARING NOTICE

Public Hearing

Monroe County Emergency Management will hold a public information meeting on the Monroe County All Hazards Mitigation Plan on Wednesday August 14th, 2019 at 6:00pm at the Monroe County Justice Center Assembly Room located at 112 S Court Street, Sparta. Please use human Services entrance on West Oak Street. The purpose of this public hearing is to receive public input on the County's All Hazard Mitigation Plan that is being updated in accordance with the Federal Disaster Mitigation Act of 2000. By updating this plan the County, Towns, Cities, and Villages can become eligible for FEMA's Hazard Mitigation Grant Programs. Prior to public comments a brief presentation will be made on the research that was conducted and on some projects that have been identified to reduce future damages and losses from hazards. For those individuals who cannot attend this meeting and want to provide written comments, please submit them by August 13th, 2019 to Darlene Pintarro, Emergency Management Coordinator, 112 S Court Street, Room 500, Sparta, WI, 54565.

PUBLIC SAFETY & JUSTICE COORDINATING COMMITTEE AGENDA

PUBLIC SAFETY & JUSTICE COORDINATING COMMITTEE

Date: July 8th 2019
Time: 5:00 pm
Place: Monroe County Justice Center, Assembly Room
112 S Court Street, Room 1100
Sparta WI 54656

AGENDA ITEMS

- Call to Order
- Roll Call
- Approval of Previous Meeting Minutes – June 10th, 2019 and June 24th, 2019
-
- Medical Examiner
  - Budget Review
  - Monthly Activities/Caseload Reports
- Justice Department
  - Budget Review
  - Justice Programs Report
- Dispatch
  - Budget Review
  - Zuercher and NG 911 Update
- Monroe County Sheriff
  - Budget Review
  - 2020 Budget (Discussion)
  - EM All Hazard Mitigation Plan (Discussion/Action)
  - Credit Card David Scheel (Discussion/Action)
  - Request of New Patrol Position (Discussion/Action)
  - Debt Collection (Discussion/Action)
  - Budget Adjustment x 2 (Discussion/Action)
  - Re-Purpose of Funds (Discussion/Action)
  - MUNIS/Pelco/Velocity Monthly Report
  - Monthly Activities/Caseload Reports
- Agenda Items for Next Meeting
- Next Meeting Date/Time : August 12th at 5:00 pm
- Adjourn

Wallace Habhegger, Chair

PLEASE NOTE: A quorum of the Monroe County Board or other committees may be present at this meeting. No Business of the County Board or other committees will be conducted at this meeting, only the business noted above.

LOCAL EMERGENCY PLANNING COMMITTEE AGENDA

LOCAL EMERGENCY PLANNING COMMITTEE (LEPC)

THURSDAY, JULY 25, 2019
10:00AM
FORT MCCOY, BUILDING 1681
1680 W EATON DR
SPARTA, WI 54656

MEETING CALLED BY: DAVE KUDERER, CHAIR

----- Agenda -----

1. Call Meeting to Order
2. Introductions
3. January 23, 2019 Minutes-Discussion/Action
4. Review/Revise LEPC Membership List-Discussion/Action
5. FirstNet-Discussion Only
6. All-Hazard Mitigation Plan-Discussion Only
7. 2019 Monroe/Jackson Joint DOT Functional Exercise-Discussion Only
8. Strategic Plan-Discussion Only
9. Review WHOPRS/EPCRA info on Reporting Facilities-Discussion Only
10. EPCRA Off-Site Plan Update-Discussion
    - VPP Group LLC
    - Century Foods Plant 1, 2 & 3, and 4
    - Rosen's Inc
11. HazMat Team Training Report-Discussion
12. HazMat Spill Report and Responses-Discussion
13. Old Business
14. New Business
15. Adjournment

Next meeting: Date and Time to be determined in January 2020; Location: **TBD**

EMERGENCY MANAGEMENT OFFICE
112 S. COURT STREET, ROOM 500 SPARTA WI 54656
OFFICE: 608-269-8711 **EMAIL:** Darlene.Pintarro@co.monroe.wi.us

COUNTY OF MONROE, WI
www.co.monroe.wi.us

MISSISSIPPI RIVER REGIONAL PLANNING COMMISSION AGENDA

MISSISSIPPI RIVER
REGIONAL PLANNING COMMISSION
1707 Main Street, Suite 435
La Crosse, WI 54601
Phone: (608) 785-9396
Fax: (608) 785-9394
Email: plan@mrrpc.com
Website: mrrpc.com

James Kuhn, Cashton, WI
Chairman
Margaret Baecker Independence, WI
Vice Chairman
Vicki Burke, Onalaska, WI
Secretary & Treasurer
Greg Flogstad, Onalaska, WI
Director

MISSISSIPPI RIVER REGIONAL PLANNING COMMISSION
BIMONTHLY MEETING NOTICE AND AGENDA
10:00 AM, Wednesday, April 11, 2018
AmericInn,1835 Rose Street, La Crosse, WI 54601

< MRRPC BIMONTHLY MEETING AGENDA >

1. Roll call and guest introductions
2. Decision on February 14, 2018 Bimonthly Meeting Minutes
3. Decision on Treasurer's Report: (a) February 2018 and March 2018 Account Balance, Revenue and Expense Reports. (b) Revolving Loan Fund Reports: (1) Business Capital Fund, (2) Crawford, Monroe Vernon - CMV Growth Development Fund (3) La Crosse County Loan Fund (4) Monroe County Loan Fund. (5) Pierce County Loan Fund. VB/GF
4. Presentation of 2017 MRRPC Audit by Mike Temp, CPA, Tostrud and Temp, S.C.
5. Decision to accept the 2017 MRRPC Audit.
6. Decision on Executive and Administration Committee recommendation on 2018 staff wage adjustments.
7. Decision on Executive and Administration Committee Recommendation on 2019 County Contributions.
8. Decision on return of excess revolving loan funds to the US Department of Commerce - Economic Development Administration. GF
9. Decision on contract to administer the Pierce County Community Development Block Grant business revolving loan fund. GF
10. Decision on contract to prepare a Comprehensive Plan for the City of Mondovi. GF
11. Decision on future lending policies and procedures for US Department of Commerce EDA revolving loan funds. GF
12. Report on Buffalo County zoning ordinance public hearing and county board meeting. PF
13. Report on the Association of Wisconsin Regional Planning Commissions First Annual Summit on Thursday June 14, 2018, in Wisconsin Rapids at the Meade Inn. GF
14. Commissioners' questions and comments on the following projects listed in the written staff report:
    a. Crawford County Hazard Mitigation Plan
    b. Trempealeau County Hazard Mitigation Plan
    c. Scenic Mississippi Regional Transit (SMRT) bus serving Crawford, Vernon and La Crosse counties
    d. Viroqua Recreation Plan
    e. The Upper Mississippi River Manufacturing Alliance – TUMMA
    f. Trempealeau County Towns - Comprehensive Plan update

<AGENDA CONTINUED>

    g. Development of Mississippi River Parkway Commission facilities and amenity plan
    h. Monroe County Hazard Mitigation Plan
    i. Vernon County Hazard Mitigation Plan
    j. Report on regional process to prepare regionally coordinated county human services transportation plans for 2018-2023 for state and federal transportation aids funding eligibility.
    k. Coulee Region Business Center and Western Wisconsin Workforce Development Board's Joint Application of $45,000 to the U.S. Department of Commerce - Economic Development Administration to fund a feasibility study on development of a fabrication lab, food processing, packaging and distribution center and a transitional jobs program to assist persons with barriers to employment.
15. Old Business
16. New Business
17. Adjourn

Commissioners

Buffalo County	La Crosse County	Pierce County
Mary Anne McMillan Urell	Vicki Burke	Richard Purdy
Del Twidt	James Ehrsam	William Schroeder
John Schlesselman	Shelly Miller	James Ross
Crawford County	**Monroe County**	**Trempealeau County**
Greg Russell	Sharon Folcey	Margaret Baecker
Gerald Krachey	James Kuhn	Ernest Vold
Ron Leys	Cedric Schnitzler	Phillip Borreson
Jackson County	**Pepin County**	**Vernon County**
Ron Carney	Bruce Peterson	Herb Cornell
Brad Chown	Gerald Bauer	Jo Ann Nickelatti
Todd Stittleburg	James Kraft	Nancy Jaekel

Staff
Dave Bonifas, Community Development Planner
Peter Fletcher, Transportation Planner
Greg Flogstad, Director
Sarah Ofte, Administrative Assistant

Providing Planning and Economic Development Services to Improve the Environment, Economy and Quality of Life
▪Land Use Planning and Zoning Assistance ▪Transportation Planning ▪Economic Development Planning ▪Recreation Planning ▪Business Lending
▪GIS Mapping ▪Grant Writing ▪Economic Data Dissemination ▪Assist Local Interests in Responding to State, Federal and Private Programs
▪Advise on Local and Regional Planning Issues ▪ Coordinating Programs and Activities ▪Advocate on Issues Affecting the Region