CRAWFORD 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 Crawford County Board of Supervisors, the Mississippi River Regional Planning Commission, the Wisconsin Emergency Management and the Federal Emergency Management Agency.

ABSTRACT

Title: CRAWFORD COUNTY MULTI-HAZARDS MITIGATION PLAN 2019-2023

Plan Purpose: This plan's purpose is 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 Land Conservation, Planning and Zoning Committee who coordinated their plan development efforts with the County Public Safety Committee through the County Emergency Management Director. 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.

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RESOLUTION # 1-2019

ADOPTING THE CRAWFORD COUNTY MULTI-HAZARDS MITIGATION PLAN 2019-2023

WHEREAS, Crawford County recognizes the threat that natural hazards pose to people and property; and

WHEREAS, undertaking hazard mitigation actions before disasters occur will reduce the potential for harm to people and property and save taxpayer dollars; and

WHEREAS, an adopted all hazards mitigation plan is required as a condition of future grant funding for mitigation projects; and

WHEREAS, Crawford County participated jointly in the planning process with the other local units of government within the County to prepare a Multi-Hazards Mitigation Plan; and

NOW, THEREFORE, BE IT RESOLVED, that Crawford County, hereby adopts the Crawford County Multi-Hazards Mitigation Plan 2019-2023 as an official plan; and

BE IT FURTHER RESOLVED, that the Crawford County Emergency Management Department will submit on behalf of the participating municipalities the adopted Crawford County Multi-Hazards Mitigation Plan 2019-2023 to Wisconsin Emergency Management and Federal Emergency Management Agency officials.

PASSED: 2/19/2019

Thomas D. Comford

Certifying Official

Respectfully Submitted
Land Conservation, Planning and Zoning Committee

Amy L Esa

David Cloar

Ann Behan

CRAWFORD COUNTY, WISCONSIN MULTI-HAZARDS MITIGATION PLAN 2019-2023
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1.0 CRAWFORD COUNTY MULTI-HAZARDS MITIGATION PLANNING PROCESS

Disaster Mitigation Act of 2000-DMA2K

The development of the Crawford County All Natural Hazards Mitigation Plan 2004-2009 and subsequent updates to that plan are 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 is 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 original Crawford County All Hazards Mitigation Plan 2004-2009 included all local units of government and organizations that desired to participate in it. All subsequent updates of the plan including this update also include all local units of government and organizations that desire to participate. This includes the County along with the Towns of Bridgeport, Clayton, Eastman, Freeman, Haney, Marietta, Prairie du Chien, Scott, Seneca, Utica, Wauzeka, the Villages of Bell Center, De Soto, Eastman, Ferryville, Gays Mills, Lynxville, Mt. Sterling, Soldiers Grove, Steuben, Wauzeka and the City of Prairie du Chien. The Plan was prepared under the guidance of the County Land Conservation Planning and Zoning Committee due to their familiarity with flooding issues and floodplain management. Members of this committee and who they represent are: Henry Esser, City of Prairie du Chien; Wade Dull, Town of Clayton and the Village of Soldiers Grove; David Olson, Town of Freeman and the Villages of De Soto and Ferryville, Harriet Behar and Don Dudenbostel citizen representatives. The County Emergency Management Director also participated in committee meetings and served as a liaison between the Land Conservation Planning and Zoning Committee and the County Public Safety Committee as well as with other local units of government in the County. The County, being a member of the Mississippi River Regional Planning Commission, contracted with them to facilitate the development and writing of the plan under the direction of the County Emergency Management Director.

County Departments

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

Public Involvement

The County used four surveys, committee meetings, individual community meetings, a Towns Association meetings and news releases as methods to garner public input into the plan. See Table 1-1 for a listing of representatives who received surveys.

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, 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 1-1 on page 1-4. This risk assessment survey asked the respondents to rank 24 natural hazards 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 results of this survey are shown on Tables 3-1 and 3-3. Copies of these surveys can be found in Appendices A and B.

Another attempt to ensure the opportunity for inclusion of all municipalities and organizations into the planning process was made with the use of a second survey designed to identify needed hazard mitigation projects in the various municipalities across the County. The hazard mitigation project identification survey was mailed in February 2016 to all village presidents, town chairmen, mayors, 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 1-4. These projects, identified through these surveys as well as others are listed in Chapter 4.

Both of these surveys were mailed out a second time to those recipients who did not respond to the first mailings.

Land Conservation, Planning and Zoning Committee Meetings. During the course of the period in which the plan was being developed the County Land Conservation, Planning and Zoning Committee included the Multi-Hazards Mitigation Plan on their monthly agenda at various times to monitor the status of the plan and to provide input into it.

Public Meetings and Hearings. The County also sponsored a public meeting on April 27, 2016, explaining the updating process and to receive input from the public. During this meeting the Crawford County Multi-Hazards Mitigation Plan 2012-2016 was discussed including the results of the previous local official Hazard Risk Assessment Survey. Individual hazard mitigation projects were highlighted from that plan to give the public ideas of the different types of mitigation projects for the County. Comments regarding individual mitigation projects were solicited from the audience. A second public hearing was held on January 17th to present the draft and get public input and comments. Comments from these public hearings were incorporated into the plan.

These meetings and hearings were advertised regionally by news releases to local radio and newspapers that covered areas beyond Crawford County. The public was notified of the April 27, 2016 and the January 17,2018 public hearings through a Class Two notice in the County's official newspaper, the Courier Press.

Municipal and Business Participation. All local municipalities were mailed the risk assessment surveys. The municipalities receiving the survey were the Towns of Bridgeport, Clayton, Eastman, Freeman, Haney, Marietta, Prairie du Chien, Scott, Seneca, Utica, Wauzeka, the Villages of Bell Center, De Soto, Eastman, Ferryville, Gays Mills, Lynxville, Mt. Sterling, Soldiers Grove, Steuben, Wauzeka and the City of Prairie du Chien. In addition of these municipalities were mailed their project listing from the first plan and were asked to update this list. A second survey way mailed out due to poor response to earlier surveys. See Table 1-3 on page 1-5 for a listing of who responded to these surveys. Individual meetings were set up for those communities which did not respond to either survey. 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 Prairie du Chien Economic Development Corporation and the Prairie du Chien Chamber of Commerce 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 Prairie du Chien Area, Seneca, North Crawford and Wauzeka-Steuben 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. Beginning with the April 2016 MRRPC Bimonthly meeting and continuing until the final approval from FEMA, the Crawford County Multi-Hazards Mitigation Plan was an agenda item at every 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.

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
Crawford County Flood Hazard Mitigation Plan 2002-2006	Provided base information to update.
Gays Mills Long-Term Community Recovery Plan, 2008	Provided data for the Village of Gays Mills
Emergency Action Plan – Flood Assessment, Warning and Response Procedures, City of Prairie du Chien, St. Feriole Island	Provided data on flooding within the City of Prairie du Chien along with action items.
Emergency Action Plan on Nederlo Creek	Provided data and action items for the Nederlo Creek area.
Hazard Analysis for the State of Wisconsin, November 2008	Provided data for historical natural hazard events.
2011 State of Wisconsin Hazard Mitigation Plan	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, Crawford County	Provided data for on the history and damage amounts for the various natural hazards and provided a source of mitigation projects
Natural Hazards Assessment, Crawford County WI, by NOAA/National Weather Service La Crosse, WI	Provided data for history and damage amounts for the various natural hazards
Wis. Dept. of Natural Resources Dam Database	Provided list of dams within Crawford County
Wis. Dept. of Administration, Hazard Material Site Database	Provided a list of hazardous material sites located within the County

Funding for the Crawford County Multi-Hazards Mitigation Plan

In February 2016, the County received word that they were awarded a $40,000 planning grant to update their Multi-Hazards Mitigation Plan. FEMA will provide 75% ($30,000) of the funds, and the remaining 25% ($10,000) will be provided by local match. In April 2016, the Mississippi River Regional Planning Commission (MRRPC) signed a contract with Crawford County that called for the MRRPC to prepare the plan and provide most of the local matching share.

Plan Contents

In order to meet FEMA's local mitigation plan requirements Crawford County's Multi-Hazard Mitigation Plan is organized into the following five parts which also follow the Resource Guide to Multi-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: Crawford County Land Conservation, Planning and Zoning 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 (to include data up to 2017), 100-year floodplain data, flood potential, updated critical facilities tables and maps and rail and lock & dam hazards;

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: Jim Hackett, Emergency Management Director
Crawford County Courthouse
220 North Beaumont
Prairie du Chien, WI 53821

Table 1-1
Risk Assessment Survey Mailing List

Name	Title
Geri Kozelka	Supervisor
Henry Esser	Supervisor
Kersten Rocksvold	Supervisor
Brad Steiner	Supervisor
Duane Rogers	Supervisor
Mary Jane Faas	Supervisor
David Olson	Supervisor
Mary C. Kuhn	Supervisor
Wade Dull	Supervisor
Donald Stirling	Supervisor
Wayne Jerrett Jr.	Supervisor
Larry W. Kelley	Supervisor
Greg Russell	Supervisor
Gari Lorenz	Supervisor
Gerals Krachey	Supervisor
Derek Flansburgh	Supervisor
Tom Cornford	Supervisor
John Karnopp	Bridgeport Town Chairman
Dennis Swiggum	Clayton Town Chairman
Sam Tesar Jr.	Eastman Town Chairman
David Olson	Freeman Town Chairman
Eling Jones	Haney Town Chairman
Dean Roth	Marietta Town Chairman
Larry Kapinus	Prairie du Chien Town Chairman
Wayne Jerrett Jr.	Scott Town Chairman
Ronald Hartley	Seneca Town Chairman
Leonard Olson	Utica Town Chairman

Name	Title
Thomas Jazdzewski	Wauzeka Town Chairman
Jeffrey Christie	Bell Center Village President
David Roberston	De Soto Village President
Faye Trautsch	Eastman Village President
Alan Kirchner	Ferryville Village President
Harry Heisz	Gays Mills Village President
Stanley Hagensick	Lynxville Village President
David Jones	Mt. Sterling Village President
Jerry Moran	Soldiers Grove Village President
Marcus McCullick	Steuben Village President
Gary Gundlach	Wauzeka Village President
Dave Hemmer	Mayor, City Prairie du Chien
Police Chief	City of Prairie du Chien
Police Chief	Village of Soldiers Grove
Police Chief	Village of Ferryville
Police Chief	Village of Gays Mills
Crawford Co. Sheriff	County Law Enforcement
Fire Chief	City of Prairie du Chien Fire Dept.
Fire Chief	Village of Ferryville Fire Dept.
Fire Chief	Village of Soldiers Grove Fire Dept.
Fire Chief	City of Boscobel Fire Dept.
Fire Chief	Village of De Soto Fire Dept.
Fire Chief	Village of Gays Mills Fire Dept.
Fire Chief	Village of Eastman Fire Dept.
Fire Chief	Mt. Sterling/Seneca Fire Dept.
Fire Chief	Village of Wauzeka Fire Dept.

Table 1-2
Projects Needs Survey Mailing List

Name	Title
John Karnopp	Bridgeport Town Chairman
Dennis Swiggum	Clayton Town Chairman
Sam Tesar Jr.	Eastman Town Chairman
David Olson	Freeman Town Chairman
Eling Jones	Haney Town Chairman
Dean Roth	Marietta Town Chairman
Larry Kapinus	Prairie du Chien Town Chairman
Wayne Jerrett Jr.	Scott Town Chairman
Ronald Hartley	Seneca Town Chairman
Leonard Olson	Utica Town Chairman
Thomas Jazdzewski	Wauzeka Town Chairman

Name	Title
Jeffrey Christie	Bell Center Village President
David Roberston	De Soto Village President
Faye Trautsch	Eastman Village President
Alan Kirchner	Ferryville Village President
Harry Heisz	Gays Mills Village President
Stanley Hagensick	Lynxville Village President
David Jones	Mt. Sterling Village President
Jerry Moran	Soldiers Grove Village President
Marcus McCullick	Steuben Village President
Gary Gundlach	Wauzeka Village President
Dave Hemmer	Mayor, City Prairie du Chien

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
T. Bridgeport	X	X	X		
T. Clayton	X		X		
T. Eastman	X		X		
T. Freeman	X	X	X		
T. Haney	X	X	X	X	
T. Marietta	X		X		
T. Prairie du Chien	X	X	X		
T. Scott	X		X		
T. Seneca	X	X	X		
T. Utica	X		X		
T. Wauzeka	X		X		
V. Bell Center	X	X	X	X	
V. De Soto	X	X	X		
V. Eastman	X	X	X	X	
V. Ferryville	X	X	X	X	
V. Gays Mills	X	X	X		X
V. Lynxville	X	X	X	X	
V. Mt. Sterling	X	X	X	X	
V. Soldiers Grove	X	X	X	X	
V. Steuben	X	X	X	X	
V. Wauzeka	X	X	X	X	
C. Prairie du Chien	X	X	X	X	X

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2.0 CRAWFORD COUNTY PLANNING AREA

General Geography

Crawford County, located in southwest Wisconsin, is approximately 600 square miles in size. The County contains 357,603 gross acres (22,260 acres are water and 335,343 acres are land). In 2010 the County had an estimated population of 16,644.

The County's boundary on the north is Vernon County, to the east is Richland County, the south is the Wisconsin River separating the County from Grant County, and west is the Mississippi River separating the County from the State of Iowa. The County is bisected from north to south by the scenic Kickapoo River.

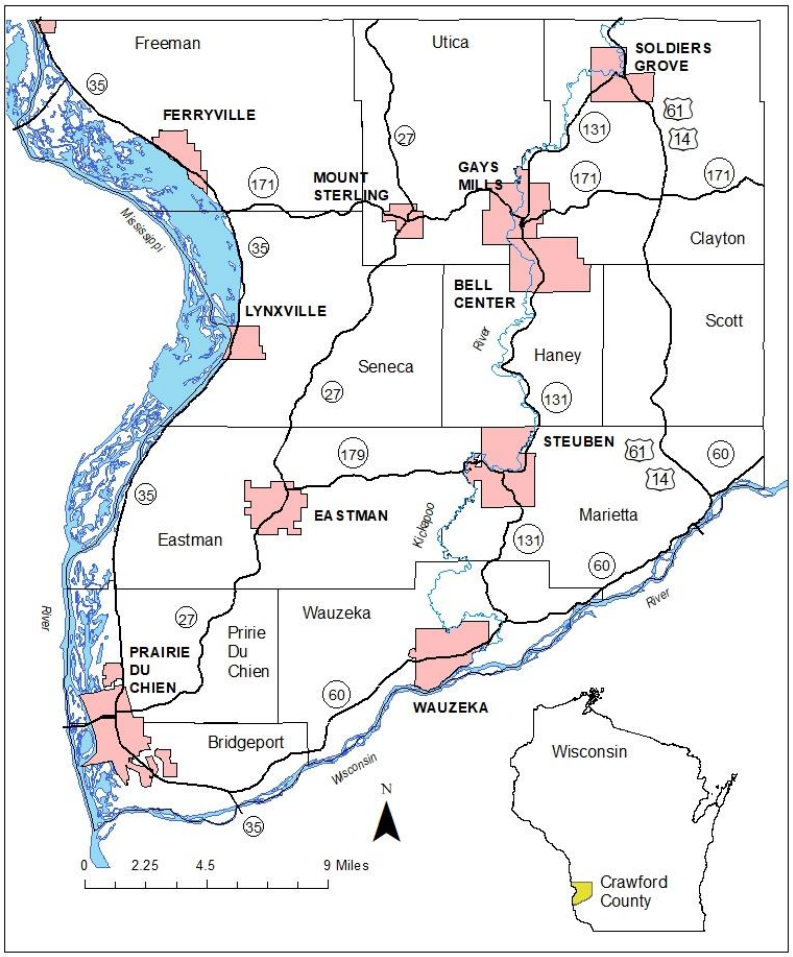
Driftless Area

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. Crawford County 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 karst topography with shallow limestone bedrock, caves and sinkholes.

County Landscape

Crawford County's landscape is inundated with steep sided valleys heavily forested with hardwoods. Elevation changes from valley floor to ridge top average 300-400 feet. Agricultural activities, primarily dairy and beef farming, are confined to the valley floors and ridge tops. Large and small meandering rivers and streams are also a characteristic.

The most striking topographic features in the County are along the Mississippi, Wisconsin and Kickapoo Rivers. The Mississippi River makes up the County's western border coast with its steep limestone cliffs interspersed with forested bluffs and goat prairies. The Kickapoo River traversing the County north to south is considered one of the best Class 1 canoe rivers. The Wisconsin River has high bluff escarpments and is filled with sand beach islands bordering the south edge of Crawford County.



Planning Area to be included in Plan

The planning area for this Multi-Hazards Mitigation Plan includes all of Crawford County. Crawford County is located on the Mississippi River in Southwest Wisconsin. Local government units include one city, ten villages, and eleven town governments (see above map). The cities and villages in the County range in geographic size from the City of Prairie du Chien's 6 square miles to the Village of Lynxville's 1.4 square miles. Town governments range in geographic size from the Town of Freeman's 78 square miles to the Town of Bridgeport's 23 square miles. Table 2-1 provides names, population and housing data for all the local units of government.

Demographic and Economic Profile

Population. The County's population declined from 17,243 in 2000 to 16,644 in 2010 a 4.9 percent decrease. This loss of population is in contrast to both the State which grew by 6.0% and the Nation which grew by 9.7%. However, according to the Wisconsin Demographic Services Center the County's population increased to 16,707 in 2017 a 0.37% increase. The Wisconsin Demographic Services Center's Official 2017 Final Population Estimates showed that the 11 cities and villages in the County range in population size from 5,831 in the City of Prairie du Chien to 116 residents in the Village of Bell Center. The 2017 population estimate of the towns in the County ranged from 1,067 in the Town of Prairie du Chien to 318 in the Town of Haney. Within the incorporated communities only the Villages of Ferryville and Gays Mills saw population increases between 2010 and 2017. This was different from the Town where only 3 towns (Clayton, Prairie du Chien and Wauzeka) saw population decreases while the rest saw population increases. See Table 2-1.

Table 2-1

Crawford County Population and Land & Water Area

	Population				Land Area (Sq. Miles)		
Jurisdiction	2010	2017	# Change 10-17	% Change 10-17	Land	Water	Total
T. Bridgeport	990	1,030	40	4.04	20.34	2.98	23.32
T. Clayton	958	937	-21	-2.19	69.22	0.00	69.22
T. Eastman	739	758	19	2.57	71.46	1.14	72.60
T. Freeman	686	713	27	3.94	68.19	9.50	77.70
T. Haney	309	318	9	2.91	32.68	0.01	32.69
T. Marietta	470	495	25	5.32	47.02	1.03	48.04
T. Prairie du Chien	1,073	1,067	-6	-0.56	33.56	2.77	36.33
T. Scott	462	476	14	3.03	35.67	0.00	35.67
T. Seneca	866	921	55	6.35	58.62	6.90	65.52
T. Utica	661	678	17	2.57	54.11	0.00	54.11
T. Wauzeka	422	417	-5	-1.18	42.25	1.36	43.61
Town Totals	**7,636**	**7,810**	**174**	**2.28**	**533.12**	**25.69**	**558.81**
V. Bell Center	117	116	-1	-0.85	5.53	0.04	5.57
V. DeSoto *	108	105	-3	-2.78	0.30	0.03	0.33
V. Eastman	428	428	0	0.00	3.58	0.00	3.58
V. Ferryville	176	182	6	3.41	2.47	0.00	2.47
V. Gays Mills	491	504	13	2.65	4.60	0.03	4.62
V. Lynxville	132	131	-1	-0.76	1.39	0.00	1.39
V. Mt. Sterling	211	209	-2	-0.95	1.42	0.00	1.42
V. Soldiers Grove	592	575	-17	-2.87	3.56	0.00	3.56
V. Steuben	131	123	-8	-6.11	6.19	0.00	6.19
V. Wauzeka	711	693	-18	-2.53	4.95	0.00	4.95
C. Prairie du Chien	5,911	5,831	-80	-1.35	5.59	0.75	6.34
City and Village Totals	**9,008**	**8,897**	**-111**	**-1.23**	**39.57**	**0.84**	**40.41**
Crawford County	**16,644**	**16,707**	**63**	**0.37**	**572.69**	**26.53**	**599.22**
Wisconsin	**5,686,986**	**5,783,278**	**96,292**	**1.69**	**54,310**	**11,888**	**65,498**
United States	**308,748,538**	**326,971,407**	**1,822,287**	**5.90**	**3,537,422**	**181,272**	**3,718,694**

***Part of the Village of De Soto is located in Crawford County**

Source: 1) 2010 Population: U.S. Department of Commerce-Bureau of the Census
2) 2017 Population Estimate: State of Wisconsin-Department of Administration, Demographic Services Center
3) Crawford County and Jurisdictions Land/Water Area: State of Wisconsin-Department of Administration, Demographic Services Center
4) Wis. and U.S. Land/Water Area: U.S. Census Bureau, 2000 Census of Population, Summary Population Characteristics

Housing. While the population of the County declined between 2000 -2010, housing units in the County grew from 8,480 in 2000 to 8,802 in 2010 an increase of 3.8 percent. This rate of growth was lower than both the State (13%) and the Nation (13.6%). The 2000 – 2010 decennial censuses showed that housing growth rates in 11 cities and villages ranged from 19.6% in the Village of De Soto to -11.1% in the Village of Steuben. Housing growth rates in the towns ranged from 19% in the Town of Wauzeka to –10% in the Town of Eastman, Table 2-2.

Table 2-2

Crawford Housing Units and Housing Units Per Square Mile of Land

Jurisdiction	Housing Units				Housing Units Per Sq. Mile of Land Area			
	2010	2016	# Change 10-16	% Change 10-16	2010	2016	# Change 10-16	% Change 10-16
T. Bridgeport	433	408	-25	-5.8	21.3	20.1	-0.2	-0.9
T. Clayton	574	578	4	0.7	8.3	8.4	0.1	1.2
T. Eastman	427	498	71	16.6	6.0	7.0	1.0	16.7
T. Freeman	573	561	-12	-2.1	8.4	8.2	-0.2	-2.4
T. Haney	174	168	-6	-3.5	5.3	5.1	-0.2	-3.8
T. Marietta	265	268	3	1.1	5.6	5.7	0.1	1.8
T. Prairie du Chien	868	826	-42	-4.8	25.9	24.6	-1.3	-5.0
T. Scott	254	245	-9	-3.5	7.1	6.9	-0.2	-2.8
T. Seneca	510	485	-25	-4.9	8.7	8.3	-0.4	-4.6
T. Utica	344	369	25	7.3	6.4	6.8	0.4	6.3
T. Wauzeka	207	206	-1	-.5	4.9	4.9	0.0	0.0
Town Totals	**4,629**	**4,612**	**-17**	**-.4**	**8.7**	**8.7**	**0.0**	**0.0**
V. Bell Center	64	75	11	17.2	11.6	13.6	2.0	17.2
V. DeSoto *	61	57	-4	-6.6	203.3	190	-13.3	-6.5
V. Eastman	179	188	9	5.0	50	52.5	2.5	5.0
V. Ferryville	165	161	-4	-2.4	66.8	65.2	-1.6	-2.4
V. Gays Mills	270	258	-12	-4.4	58.7	56.1	-2.6	-4.4
V. Lynxville	101	114	13	12.9	72.7	82.0	9.3	12.8
V. Mt. Sterling	98	110	12	12.3	69.1	77.5	8.4	12.2
V. Soldiers Grove	273	279	6	2.2	76.9	78.4	1.5	2.0
V. Steuben	64	55	-9	-14.1	10.3	8.9	-1.4	-13.6
V. Wauzeka	304	309	5	1.7	61.4	62.4	1.0	1.6
C. Prairie du Chien	2,594	2,643	49	1.9	464.0	472.8	8.8	1.9
City and Village Totals	**4,173**	**4,249**	**76**	**1.8**	**105.5**	**107.4**	**1.9**	**1.8**
Crawford County	**8,802**	**8,861**	**59**	**0.7**	**15.4**	**15.5**	**0.1**	**0.7**
Wisconsin	**2,624,358**	**2,649,597**	**25,239**	**1.0**	**48.3**	**48.8**	**0.5**	**1.0**
United States	**131,704,730**	**134,054,899**	**235,016**	**1.8**	**37.2**	**37.9**	**0.7**	**1.9**

***Part of the Village of De Soto is located in Crawford County**

Source: 1) 2010 Housing Units: U.S. Department of Commerce-Bureau of the Census

2) 2016 Housing Units: 2012-2016 American Community Survey

3) Crawford County and Jurisdictions Land/Water Area: State of Wisconsin-Department of Administration, Demographic Services Center

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

Employment and Industry

Employment for those aged 16 and older in the County grew from 7,104 employees in 2010 to 7,528 employees in 2016 an increase of 6.0 percent. This rate of growth was higher than both the State (1.4%) and the Nation (4.3%). The top three employment sectors in the County in 2016 were Educational, Health and Social Services (19.3%), Manufacturing (17.7%), and Retail trade (17.4%). The employment sectors of Public Administration (127.6%), Retail trade (106.8%), and Arts, Entertainment, Recreation, Accommodation and Food Services (82.1%) produced the greatest rates of employment growth during the 2010-2016 period. Wholesale Trade (43.4%) saw the largest decline during this period, See Table 2-3.

Table 2-3

Employment By Industry

	Crawford County					Wisconsin					United States				
	2010 [1]		2016 [2]		2010-16	2010 [1]		2016 [2]		2010-16	2010 [1]		2016 [2]		2010-16
	No. Emp.	%	No. Emp.	%	% Change	No. Emp.	%	No. Emp.	%	% Change	No. Emp.	%	No. Emp.	%	% Change
Agriculture, forestry, fishing and hunting, and mining	764	10.8	554	7.4	-27.5	71,684	2.5	71,071	2.4	-0.9	2,634,188	1.9	2,843,703	1.9	8.0
Construction	629	8.9	525	7.0	-16.5	171,616	6.0	155,081	5.3	-9.6	10,115,885	7.1	9,256,637	6.3	-8.5
Manufacturing	1,463	20.6	1,331	17.7	-9.0	536,934	18.7	536,806	18.4	0.0	15,581,149	11.0	15,316,355	10.3	-1.7
Wholesale trade	196	2.8	111	1.5	-43.4	86,908	3.0	77,724	2.7	-10.6	4,344,743	3.1	3,993,420	2.7	-8.1
Retail trade	633	8.9	1,309	17.4	106.8	329,863	11.5	330,945	11.4	0.3	16,293,522	11.5	17,027,853	11.5	4.5
Transportation and warehousing, and utilities	607	8.5	376	5.0	-38.1	130,387	4.5	124,870	4.3	-4.2	7,183,901	5.1	7,411,283	5.0	3.2
Information	134	1.9	85	1.1	-36.6	56,076	2.0	47,931	1.6	-14.5	3,368,676	2.4	3,131,838	2.1	-7.0
Finance, insurance, real estate, and rental and leasing	454	6.4	277	3.7	-39.0	182,526	6.4	177,499	6.1	-2.8	9,934,900	7.0	9,731,609	6.6	-2.0
Professional, scientific, management, administrative, and waste management services	286	4.0	291	3.9	1.7	218,788	7.6	236,958	8.1	8.3	14,772,322	10.4	16,516,075	11.2	11.8
Educational, health and social services	1,224	17.2	1,450	19.3	18.5	631,818	22.0	677,098	23.3	7.2	31,277,542	22.1	34,202,980	23.1	9.4
Arts, entertainment, recreation, accommodation and food services	308	4.3	561	7.5	82.1	238,223	8.3	252,787	8.7	6.1	12,566,228	8.9	14,316,298	9.7	13.9
Other services (except public administration)	219	3.1	254	3.4	16.0	115,426	4.0	120,714	4.1	4.6	6,899,223	4.9	7,275,839	4.9	5.5
Public Administration	187	2.6	404	5.4	127.6	99,061	3.5	100,855	3.5	1.8	6,864,046	4.8	6,977,436	4.7	1.7
Total Employees	7,104	100	7,528		6.0	2,869,310	100	2,910,339		1.4	141,836,325	100	148,001,326		4.3

[1] Census 2010, Profile of Selected Economic Characteristics

[2] 2012-2016 American Community Survey 5-Year Estimates, Industry by Occupation for the Civilian Employed Population 16 Years and over

Top Industries by Employment
According to Wisconsin Department of Workforce Development the top industries by employment for the 2nd quarter of 2017 were the following:

- Educational Services
- Food Services & Drinking Places
- Wood Product Manufacturing
- Nursing & Residential Care Facilities
- Justice Public Order & Safety Activities

General Development Pattern

Land Use Trends. The County contains 357,603 gross acres (22,260 acres are water and 335,343 acres are land). Real estate assessment records from 2012 to 2017 provide the most current land use information for the County. In 2017 Agricultural land totaled 196,333 acres or 54.9 percent of land use in the County. This was followed by Other (*federal, state, and local government owned lands*) 72,934 acres – 20.40 percent; Ag/Forest, 41,339 acres – 11.56%; Forest, 17,288 acres – 4.83 percent; Undeveloped, 15,243 acres – 4.26 percent; Residential, 9,829 acres – 2.75 percent; Other Real Estate, 2,749 – 0.77 percent; Commercial, 1,340 acres – 0.37 percent; and Manufacturing, 548 acres – 0.15 percent. The rural nature of the County is clearly indicated with 71.29 percent of the land being used for agriculture and forests, Table 2-4.

Agricultural assessed land (Agriculture and Agriculture Forest categories) declined between the years 2012 and 2017 from 238,850 acres to 237,672 acres in 2017 or 0.49 percent. While the more urban forms of land use, Residential, Commercial and Manufacturing all increased from 2012 – 2017. Residential land use increased by 268 acres or 2.8 percent, Commercial land use increased by 153 acres, and Manufacturing land uses increased by only 13 acres.

Table 2-4
Crawford County Land Use

	2012		2017	
	Acres	% of County	Acres	% of County
Residential (1)	9,561	2.67	9,829	2.75
Commercial (1)	1,187	0.33	1,340	0.37
Manufacturing (1)	535	0.15	548	0.15
Agriculture (1)	196,727	55.01	196,333	54.90
Undeveloped (1)	15,367	4.30	15,243	4.26
Agriculture Forest (1)	42,123	11.78	41,339	11.56
Forest (1)	20,714	5.79	17,288	4.83
Other Real Estate (2)	2,719	0.76	2,749	0.77
Other (3)	68,670	19.20	72,934	20.40
County Total (4)	**357,603**	**100.00**	**357,603**	**100.00**

(1) Wisconsin Department of Revenue - 2012 and 2017 Final Statement of Assessments

(2) Total of Residential, Commercial, Manufacturing, Agriculture, Swamp and Waste, and Forest. Figures as recorded by the Department of Revenue for Real Estate Equalization adjustment purposes.

(3) 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.

(4) Includes total area of county - both land area and water area but excludes the water area of the Mississippi River. Source: Wisconsin DNR

Development Trends. The County's population increased slightly between 2010 and 2017, where this population increase took place was not evenly distributed between urban (City and Villages) and rural (Towns) areas (See Table 2-2). During this period the rural areas saw an increase of 2.28 percent, while the urban areas saw a decline of 1.23 percent. Only the Villages of Eastman, Ferryville and Gays Mills did not see a decline of population during this time period. While all the Towns except Clayton, Prairie du Chien and Wauzeka saw population increases. Housing units per square mile for the time period 2010-2017 shows that the towns stayed the same while the City and Village increase 1.9%. In the rural areas the Towns of Bridgeport, Freeman, Haney, Prairie du Chien, Scott and Seneca all saw a decrease while the Town of Wauzeka stayed the same and the Towns of Clayton, Eastman, Marietta and Utica all saw increases. In the urban areas the Villages of De Soto, Ferryville, Gays Mills and Steuben all saw decrease while The Villages of Bell Center, Eastman, Lynxville, Mt. Sterling, Soldiers Grove, Wauzeka and the City of Prairie du Chien all saw increases, Table 2-2.

3.0 CRAWFORD COUNTY RISK ASSESSMENT

The following is Crawford 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. Only the Villages of Eastman and Mt. Sterling do not have a high risk of flooding. See Maps 3-6 and 3-7 for flood prone areas. Crawford 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. Voluntary buyouts has decreased the flooding hazard in some situations. See "Riverine Flooding" page 3-185.

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 17 to 21 points equates to a moderate risk assessment designation and a rating of 16 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 2016 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 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 more =	High Threat

3.1 Crawford 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: 1 reported event by NCDC, 5/4/64, 2.75" size hailstorm

1970's: 1 reported event by NCDC, 8/18/78, 2.5" size hailstorm

1980's: 4 reported events by NCDC – 9/24/84, 7/9/85, 5/29/89, 5/30/89, 1" to 2.75" size hailstorm

1990's: 8 reported events by NCDC – (7/6/94 Wauzeka), (4/18/96 Ferryville), (7/1/97 Gays Mills-$20,000 CD), (6/20/98 Gays Mills-$20,000 CD & Mt. Sterling), (6/25/98 Wauzeka-$25,000 CD & T. Bridgeport-$8,000 PD), (7/20/98 Mt. Sterling-$45,000 PD/$70,000 CD & Gays Mills-$45,000 PD/$60,000 CD), (8/14/98 Mt. Sterling-$10,000 PD /$30,000 CD & T. Seneca-$25,000 CD), (5/16/99 Prairie du Chien-$20,000 PD), .75" to 1.75" hailstorm

2000's: 22 reported events by NCDC – (5/11/00 Eastman), (5/30/00 Mt. Sterling & Soldiers Grove), (5/31/00 Rolling Ground), (6/12/01 Prairie du Chien), (9/07/01 Eastman-$1,000 PD), (4/18/02 Prairie du Chien, De Soto, and Soldiers Grove), (8/11/02 Eastman), (6/25/03 Gays Mills-$1,000 CD, Wauzeka- $1,000 CD), (7/31/03 Rising Sun, Gays Mills, Soldiers Grove), (8/25/03 Ferryville-$1,000 PD, Mt. Sterling, Gays Mills, Plugtown-$2,000 CD), (5/8/04 Ferryville, Seneca-$1,000 PD), (5/21/04 Prairie du Chien), (6/23/04 Soldiers Grove), (6/25/04 Gays Mills), (8/24/06 Ferryville), (10/4/06 Soldiers Grove-$12,000 PD & $20,000 CD, Wauzeka), (3/31/07 Eastman), (7/3/07 Fairview, Seneca-$3,000 PD & $10,000 CD), (7/2/08 Bell Center), (8/4/08 Plugtown), (2/26/09 Prairie du Chien), (7/24/09 Ferryville-$10,000 PD & $40,000 CD, Seneca-$70,000 PD & $675,000 CD, Steuben, Wauzeka, Eastman-$300,000 PD & $450,000 CD) .75" to 1.75" hailstorm

2010's *11 reported events by NCDC – (6/1/10 Bell Center-$2,000 CD) 0.75" hailstorm, (6/8/11 Bell Center, Rolling Ground) .75" to 1.75" hailstorm, (9/4/12 Prairie du Chien) .75" to 1.25" hailstorm, (4/30/13 Eastman) .75" to 2.00" hailstorm, (9/19/13 Wauzeka) .75" hailstorm, (5/19/14 Bridgeport) .75" hailstorm, (6/22/15 Prairie du Chien, Wauzeka) .75" to 1.50" hailstorm, (6/29/15 Prairie du Chien) 1.25" hailstorm, (5/25/16 Seneca) .88" hailstorm, (6/16/17 Steuben) 1.25" hailstorm, (9/20/17 Mt. Sterling) .75" hailstorm* *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.

According to National Climatic Data Center, Crawford County experienced 47 hailstorms from 1980 through 2017. The neighboring county of Grant, while slightly less than twice as large as Crawford County experienced 207 (nearly 4.5 times as many) hail storms during this same time period. In addition, the adjoining counties of Vernon and Richland experienced 111 and 68 hail storms respectively during this same time period.

During the 1990's, 2000's and 2010's the NCDC reported 41 Hailstorm events. Of these 41 events 10 events resulted in property damage and 11 had crop damage reported. The total property damage reported for the 10 events was $526,000 and crop damage reported totaled $1,451,000,000 during 11 events. Based upon this historical data when Crawford County experiences a hailstorm large enough to cause property damage or crop damage the average amount of property damage to occur is $52,600 and the average amount of crop damage is $131,900. Between 1990 and 2017 Crawford County averaged 1.5 hailstorm events per year. Based upon these averages the county's can expect to experience 8 hailstorms within the next 5-year period. If historical trends continue the county can expect that 24% of these storms will be strong enough to cause property damage and crop damage. This would result in 1 storm strong enough to cause property damage resulting is $52,600 damages. In addition, 1 storm would also cause crop damage resulting in $131,900 in damages during that same 5-year period.

Hailstorm Vulnerability Assessment

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns hailstorms a risk factor of 23 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 3-7 through 3-10 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In Crawford County there are 388 businesses and industries that employ 6,455 people, with an annual payroll of approximately $196 million, see Table 3-6. 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 2017, county land use statistics indicated that 54.90% or 196,333 acres of county land were classified for agricultural use. Agriculture is a significant part of the county's economy. While the overall threat of hailstorm is ranked as moderate, 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 11 municipal wells and water systems in operation, see Table 3-11. 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 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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.

Hail Storm Risk Assessment Designation

Hail Storm Historical Occurrence Rating: High - 9
Hailstorm Vulnerability Rating: Negligible - 2
Hailstorm Probability Rating: Highly Likely - 8
Hailstorm Local Official Survey Rating: Low - 4
Hail Storm Risk Assessment Designation: **High Threat - 23 points**
See Table 3-2 for a detailed analysis to determine the above Risk 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 Crawford 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:
According to the National Oceanic and Atmospheric Administration's Storm Event Database there were no reported Lightning events between the years 1980 and 2017 in Crawford County.

However, Wisconsin does have 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 2012 Census of Agriculture, Crawford County has 1,105 farms. Using the insurance statistics (2 out of every 100 farms being struck by lightning) would mean that Crawford County would experience 22 lightning strikes on farms each year. The total number of strikes hitting within Crawford County is higher if those strikes not on farms could be counted. In the State of Wisconsin between 2005 and 2014, 8 people were killed by lightning or about 1 per year on average. Wisconsin ranks 16th nationally in the number of lightning deaths. There were no reported deaths during that time period in Crawford County.

Lightning Vulnerability Assessment

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment, assigns lightning a risk factor of 23 indicating this natural hazard is a high risk to the county. Critical facilities vulnerability to lightning is generally perceived as a minor hazard. 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 of humans, fires in buildings and the sudden power surges resulting from lightning can cause significant damages to a facility's electrical services, and electronic equipment such as computers and motors and communications systems. See Table 3-7 through 3-10 and Maps 3-1 through 3-5 for further information and location of these facilities.
- 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 of 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 lighting 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 moderate. 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 11 municipal wells and waters systems in operation, see Table 3-13. These facilities' vulnerability 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 8 wastewater treatment facilities operating in the county, see Table 3-14. 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 - 5
Lightning Storm Risk Assessment Designation: **High Threat - 23 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 Crawford 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:

1970's: 7 reported events by NCDC – 6/24/71, 6/20/74, 7/18/74, 5/28/78, 6/1/78, 6/16/78, 8/18/78

1980's: 10 reported events by NCDC – 5/24/83, 7/3/83, 7/18/83 (52 kts), 7/19/83 (52 kts), 9/5/83 (52 kts), 4/27/84 (52 kts), 8/12/85, 7/11/87, 7/29/87, 6/26/89

1990's: 24 reported events by NCDC – (8/26/90), (3/22/91), (4/8/91), (4/27/91), (8/25/92), (4/18/94 Mt. Sterling-$50,000 PD and Gays Mills-$5,000 PD), (5/23/94 Prairie du Chien-$50,000 PD/$5,000 CD), (7/6/94 Wauzeka), (7/19/94 Ferryville-$1,000 PD/$5,000 CD, Prairie du Chien), (6/7/95 Eastman), (7/27/95 Lynxville), (6/29/96 Mt. Zion), (8/7/96 Lynxville-$11,000 PD and Prairie du Chien-$3,000 PD), (4/5/97 Prairie du Chien-$3,000 PD), (6/15/97 Mt. Sterling-$10,000 PD & Gays Mills-$15,000 PD), (7/1/97 Ferryville-$3,000 PD), (9/16/97 Ferryville-$15,000 PD), (5/31/98 Mt. Sterling-$25,000 PD/$30,000 CD and Prairie du Chien-$30,000 PD/1 injury), (6/18/98 Prairie du Chien-$18,000 PD/1 injury and Wauzeka-$40,000 PD), (6/27/98 Mt. Sterling-$200,000 PD/$90,000 CD and Eastman-$30,000 PD/$10,000 CD), (7/19/98 Seneca-$20,000 PD/$30,000 CD and Ferryville-$8,000 PD), (7/20/98 Mt. Sterling-$155,000 PD/$145,000 CD and Gays Mills-$90,000 PD/$30,000 CD), (5/16/99 Prairie du Chien-$35,000 PD), (7/8/99 Gays Mills). Magnitude of winds for these 24 events ranged from 52 knots to 69 knots)

2000's: 26 reported events by NCDC – (5/11/00 Prairie du Chien-$1,000 PD), (6/13/00 Ferryville-$4,000 PD), (6/15/00 Lynxville-$4,000 PD), (7/10/00 Prairie du Chien-$5,000 PD/$15,000 CD), (8/17/00 Prairie du Chien-$35,000 PD), (4/11/01 Steuben), (5/8/02 Eastman), (7/27/02 Mt. Sterling-$1,000 PD/$2,000 CD), (8/17/02 Rising Sun-$1,000 PD), (7/31/03 Gays Mills-$1,000 PD), (4/17/04 Steuben), (6/23/04 Soldiers Grove-$2,000 PD), (8/3/04 Plugtown-$2,000 CD), (8/26/04 Bridgeport-$1,000 PD), (6/29/05 Eastman-$1,000 PD), (7/25/05 Soldiers Grove-$1,000 PD & $6,000 CD), (7/1/06 Prairie du Chien-$1,000 PD), (5/23/07 Barnum-$1,000 PD), (7/3/07 Seneca-$1,000 PD), (8/14/07 Gays Mills-$3,000 PD, Steuben-$1,000 PD), (9/18/07 Ferryville), (9/21/07 Lynxville-$6,000 PD, Fairview-$10,000 PD, Prairie du Chien-$5,000 PD), (6/8/08Rolling Ground-$1,000 PD), (6/8/08 Lynxville-$1,000 PD), (7/31/08 Prairie du Chien-$2,000 PD), (7/27/09 Soldiers Grove-$20,000 PD & $20,000 CD). Magnitude of winds for these 26 events ranged from 52 knots to 58 knots)

2010's 12 reported event by NCDC – (6/23/10 Rolling Ground - $5,000 PD), (5/22/11 Eastman - $35,000 PD), (7/18/12 Ferryville - $3,000 PD, Seneca - $5,000 PD, Prairie du Chien - $5,000 PD, Mt. Zion - $5,000 PD), (5/29/13 Praire du Chien - $3,000 PD, Mt. Sterling), (5/30/13 Eastman), (7/7/14 Rolling Ground - $500 PD), (6/22/15 Crawford County - $5,000 PD, Wauzeka - $75,000 PD), (6/29/15 Pairie du Chien - $2,000 PD), (7/5/16 Soldiers Grove - $25,000 PD), (8/18/16 Ferryville - $6,000 PD), (5/17/17 Praire du Chien - $80,000 PD), (7/19/17 Pairie du Chien airport - $150,000 PD, Prairie du Chien - $3,000 PD & $10,000 CD, Bridgeport - $30,000 PD, De Soto). Magnitude winds of these 12 events ranged from 40 knots to 63 knots.

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 the end of 2017 the NCDC reported 62 Thunderstorm events in Crawford County. Of these 62 Thunderstorms 47 of them resulted in property damage and 12 had crop damage reported. The total property damage reported for these 47 thunderstorms was $1,414,000 and crop damage reported totaled $400,000 during those 12 storms. Based upon this historical data when Crawford County experiences a thunderstorm large enough to cause property damage or crop damage the average amount of property damage to occur is $30,000 and the average amount of crop damage is $33,300. Between 1990 and 2017 Crawford County averaged 2.3 thunderstorms per year. Based upon these averages the Crawford County can expect to experience 12 thunderstorms within the next 5-year period. If historical trends continue the county can expect that 76% of these storms will be strong enough to cause property damage. This would result in 9 storms strong enough to cause property damage resulting is $270,000 in property damage. In addition, 19% of these storms will cause crop damage. This would result in 2 storms causing $66,600 of crop damage during that same 5-year period.

Thunderstorm Vulnerability Assessment

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns thunderstorms a risk factor of 22 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 3-7 through 3-10 and Maps 3-1 through 3-5 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 local airports as “port of refuge”. Small aircraft parked on ground at airport may be damaged.
- Waterways. Poor visibility during the storm can cause safety problems to pilots. Dangerous conditions may exist for deck crews and lock crews working outside during the storm. Locking may be aborted. Improperly moored barges could break loose from fleets or terminals.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. 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 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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: High - 3
Thunderstorm Risk Assessment Designation: **High Threat – 22 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 Crawford 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 Tornado by NCDC – (4/18/55, $25,000 PD) F1 Magnitude

1960's: 4 reported Tornadoes by NCDC – (5/4/64, $250,000 PD/2 injuries), (4/11/65, $25,000 PD), (5/18/67, $3,000 PD), (8/6/68). Magnitude ranged from F0 to F2.

1970's: 2 reported Tornadoes by NCDC – (6/24/71, $250,000 PD/4 injuries), (7/3/79, 3 injuries). Magnitude ranged from F0-F1.

1980's: 1 reported Tornado by NCDC – 6/17/87 F0 Magnitude

1990's: 2 reported High Wind events by NCDC – (4/6/97 Winds of over 70 mph in Crawford & 4 other counties causing $45,000 in PD) and (11/10/98 Winds of up to 93 mph recorded, affected Crawford and 12 other counties, $1.7 million PD/1injury/2deaths).

2 reported High Wind events reported by Wisconsin Emergency Management – (1) 1998 (High winds and severe storms in Crawford and eight other counties, $5.8 million in Public-Government Property and Facilities and $47.9 million in Private-Individual Property, Crop and Facilities Damage), (2) 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 Crawford and 13 other counties, *Presidential Disaster Declaration*.

2000's: 1 reported Tornado by NCDC – 7/27/09 - $30,000 PD, $40,000 CD EF0 Magnitude

2 reported High Wind events by NCDC – (4/7/01 Winds of 60-70 mph in Crawford and 9 other counties, $12,000 PD), (10/25/01 Winds of 40-50 mph in Crawford and 12 other counties, no damages recorded)

2010's 3 reported Tornadoes by NCDC – (6/23/10 just east of Gays Mills – $5,000 PD), (6/22/15 Steuben - $10,000 PD), (6/22/15 Plugtown - $4,000 PD). All three were EF0 Magnitude

2 reported High Wind Events by NCDC – (10/26/10 Estimated gusts of wind at 61 knots - $5,000 PD), (3/16/16 Measured gusts of 53 knots

PD = Property Damage and CD = Crop Damage

According to the NCDC between 1955 and 2017 Crawford County experienced 12 tornadoes. These 12 tornadoes caused $602,000 in property damage, ranging from $0 to $250,000. Using this historical data Crawford County can expect to experience a tornado once every 4 years, which would cause $67,000 in property damage. None of these tornadoes have hit populated areas.

Should a tornado strike a populated area the property damage would significantly exceed the average of $67,000. However there is no way to predict when and where a tornado will strike.

Tornado/High Winds Vulnerability Assessment

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Tornado/High Winds a risk factor of 24 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, 12 occurred in the years 1955-2017. 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, two events were reported in the county. In one event, Crawford County and eight other county critical facilities sustained $5.8 million in damages to public and government property. The other event caused $11.1 million in damages to critical facilities in Crawford County and thirteen other counties and the area received a Presidential Disaster Declaration. The services provided by these facilities would not be interrupted except in extreme cases. See Tables 3-9 through 3-16 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In Crawford County there are 388 businesses and industries, See Table 3-6. 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 which are oriented in a north-south direction, such as STH 27, 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" box cars 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 of most likely to be based at, or using the Prairie du Chien airport, are the most prone to wind damage while parked on the ground.
- Waterways. High winds can have the same impact to craft on the Mississippi River as on lakes and oceans, with the wave action across long reaches of water creating potential for separating the barges and towboats. Waterway operations are controlled by the U.S. Coast Guard. Dangerous conditions may exist for deck crews and lock crews working outside during the storm. Locking may be aborted. Improperly moored barges could break loose from fleets or terminals.
- Municipal Water. In the county there are 11 municipal wells and water systems, 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.
- Wastewater Treatment Facilities. There are 8 wastewater treatment facilities operating in the county, see Table 3-12. 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: Medium – 6
Tornado/High Winds Risk Assessment Designation: **High Threat – 24 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 Crawford County, Riverine Flooding/Flash Flooding/Storm Water Flooding Risk Assessment

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.

Flooding History and Frequency:

1950's: 1 event: 1952 – Mississippi River Flood, River Level 20.89'; 626.19 MSL, Mc Gregor, IA gage

1960's: 2 events: (1) 1965 – Mississippi River Flood of Record, River Level 25.38', 630.68 MSL, Mc Gregor, IA gage, $4 million in federal funds awarded to acquire and relocate 128 residents and two businesses in PDC, one death also occurred, *Presidential Disaster Declaration;* (2) 1969 – Mississippi River Flood, River Level 21.55', 626.85 MSL, Mc Gregor, IA gage

1970's: 4 reported events by Wisconsin Emergency Management: (1) 1971 – Mississippi River Flood, River Level 17.7', 623 MSL; (2) 1973 – Mississippi River Flood, River Level 20.2', 625.5 MSL, McGregor, IA gage, $4 million-Public Gov't Property and Facilities Damage and $20 million Private-Individual Property, Crop and Facilities Damage to Crawford and 34 other counties, *Presidential Disaster Declaration;* (3) 1975 – Mississippi River Flood, River Level 21.12', 626.42 MSL, McGregor, IA gage, $633,500-Public Gov't Property and Facilities Damage and $1.8 million Private-Individual Property, Crop and Facilities Damage to Crawford and 7 other counties; (4) 1978 – Flooding and Tornadoes/Kickapoo River Flood, 703.95 MSL, Gays Mills gage, $11.7 million- Public Gov't Property and Facilities Damage and $40 million Private-Individual Property, Crop and Facilities Damage – to Crawford and fifteen other counties, *Presidential Disaster Declaration*.

1990's: 5 reported events by NCDC: (1) 1993 – Mississippi River Flood, $105,000 PD and $15,000 CD; (2) 4/3/97 – Mississippi River Flood, 3rd highest on record, $1 million PD – to Crawford and five other counties; (3) 6/15/97-Flash Flooding, Lynxville; (4) 6/27/98-Flash Flood, Mt. Sterling, $20,000 PD; (5) 6/28/98 – countywide flooding, torrential rains, $25,000 CD.

3 reported events by Wisconsin Emergency Management: (1) 1990-Flooding/Tornadoes, $4.6 million- Public Gov't Property and Facilities Damage and $16.5 million Private-Individual Property, Crop and Facilities Damage – to Crawford and 16 other counties, *Presidential Disaster Declaration;* (2) 1992 – Flooding/Kickapoo River Flood, $1.9 million- Public Gov't Property and Facilities Damage and $15 million Private-Individual Property, Crop and Facilities Damage – to Crawford and nine other counties, *Presidential Disaster Declaration;* (3) 1993 –Flooding, Storms, Tornadoes, Heavy Rain/Mississippi River Flood, River Level 21.92', 627.22 MSL, third highest level of record at McGregor, IA gage; $47 million- Public Gov't Property and Facilities Damage and $700 million Private-Individual Property, Crop and Facilities Damage – to Crawford and 46 other counties, *Presidential Disaster Declaration*.

2000's: 11 reported events by NCDC: (1) 5/31/00 through 6/1/00 – Flooding/Severe Storms, $1.1 million PD and $260,000 CD; (2) 4/10/01 – Mississippi River Flood, $6.5 million PD – to Crawford and five other counties; (3) 5/1/01-Mississippi River Flood, $7.5 million PD – to Crawford and five other counties; (4) 5/8/02 – [Flash Flooding Mt. Sterling- $3,000 PD, Gays Mills- $3,000 PD, Lynxville-$5,000 PD]; (5) 5/8/04 –Northwest part of county $15,000 PD; (6) 5/21/04 through 2/23/04 – Countywide flash flooding $400,000 PD and $427,000 CD; (7) 6/8/04- Northwest part of county $10,000 PD and $4,00 CD; (8) 7/18/0 – Prairie du Chien $80,000 PD and $35,000 CD; (9) 8/18/07 through 8/19/07 $23,660,000 PD & $970,000 CD [Steuben $150,000 PD & $50,000 CD, Gays Mills $1,250,000 PD & $300,000 CD, Soldiers Grove $2,260,000 PD & $160,000 CD, De Soto $20,000,000 PD & $460,000 CD]; (10) 6/7/08 through 6/8/08 $6,815,000 PD & $1,490,000 CD [Prairie du Chien $275,000 PD & $150,000 CD, Steuben $2,000,000 PD & $450,000 CD, De Soto $420,000 PD & $125,000 CD, Soldiers Grove $2,000,000 PD & $500,000 CD, Star Valley $2,100,000 PD & $400,000 CD, Ferryville $20,000 PD]; (11) 7/24/09-Lynxville, $15,000 PD and $20,000 CD.

5 reported events by Wisconsin Emergency Management: (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 Crawford and 29 other counties, *Presidential Disaster Declaration*; (2) 2001 –Flooding/Storms/Tornado, $47.7 million- Public Gov't Property and Facilities Damage and $56.1 million Private-Individual Property, Crop and Facilities Damage – to Crawford and 31 other counties, *Presidential Disaster Declaration*; (3) 2004-Severe storms and flooding, Between 5/19/04-7/3/04 severe storms and flooding impacted 44 Wisconsin Counties. A *Presidential Disaster Declaration* was declared, and Crawford County local governments, individuals and businesses became eligible for grants and low interest loans. Damages were $9.9 million- Public

Government Property and Facilities and $77.1 million Private-Individual Property, Crop and Facilities; (4) 8/26/07 Severe storms and flooding impacted 14 Wisconsin Counties. A *Presidential Disaster Declaration* was declared, and Crawford County local governments, individuals and businesses became eligible for grants and low interest loans. Damages exceeded $26.5 million; (5) June 2008 Flooding impacted 31 counties with damages exceeding $926 million. During the event a State of Emergency was declared by Governor Jim Doyle for 30 counties. A Presidential Disaster Declaration was declared on June 14th which included Crawford County and 30 other counties.

2010's 18 reported events NCDC: (1) 6/24/10 Soldiers Grove and Bell Center; (2) 7/5/10 through 7/8/10, [Soldiers Grove - $5,000 PD, Bell Center]; (3) 8/14/10 through 8/16/10 Soldiers Grove, Bell Center and Steuben; (4) 3/2211 through 3/23/11, Bell Center, Steuben and Soldiers Grove; (5) 4/23/11 Prairie du Chien - $75,000 PD; (6) 6/19/11 through 6/21/19, Bell Center, Steuben- $1,000 PD; (7) 7/18/12, Lynxville; (8) 6/21/13 through 6/24/13 Prairie du Chien, Mt Zion - $4.3 million PD, Steuben, Bell Center, Ferryville, Soldiers Grove; (9) 4/13/14 Plugtown - $1,000 PD; (10) 6/19/14 Prairie du Chien; (11) 6/29/14 Prairie du Chien, Charme - $50,000 PD; (12) 12/15/15 through 12/17/15 Bell Center, Steuben, Soldiers Grove; (13) 6/14/16 Prairie du Chien; (14) 8/24/16 Bell Center - $40,000 PD; Charme, Steuben; (15) 9/7/16 through 9/17/16 Bell Center, De Soto - $3,000 PD, Ferryville - $1,000 PD, Steuben, Soldiers Grove; (16) 9/21/16 through 9/22/16 Bell Center, De Soto - $5.31 million PD, $300,000 CD, Steuben, Soldiers Grove; (17) 5/30/17 De Soto - $50,000 PD; (18) 7/20/17 through 7/21/17 Bell Center, Steuben, Soldiers Grove, Towerville - $438,000 PD, $1.6 million CD.
PD = Property Damage, CD = Crop Damage

2 reported events by Wisconsin Emergency Management: (1) 2013-Historic 24-hour, 48-hour, 72-hour and 7-day rainfall amounts, $7.8 million- Public Assistance – to Crawford 7 other counties and one Native American nation, *Presidential Disaster Declaration*; (2) 2016 –Heavy Rains/Flash Flooding 10's of millions of dollar in Public Gov't Property and Facilities Damage to Crawford and 9 other counties, *Presidential Disaster Declaration.*

Heavy Rains on August 27th & 28th and September 3rd & 4th caused extensive flooding in Crawford County. A presidential disaster was declared in October. At the time of this update total damage amounts are still being collected.

Flooding Frequency: The Mississippi River, the largest river in the state, borders Crawford County making low-lying areas in the county prone to flooding. The Kickapoo River also has a long history of flood events in the County dating back to 1907. The history above details flooding events in the county from 1952 to the end of 2017. The County has received 12 Presidential Disaster Declarations since 1991 due to flooding. Including the June 2008 flooding disaster which is the largest disaster ever to occur in the State of Wisconsin having damages in excess of $926 million.

Flood Warning and Evacuation Plans – Mississippi River: Flood events on the Mississippi River are generally predictable and with rare exception even the crest height can be accurately forecast several days to a week or more before the event. There is no history of flash flooding on this part of the Mississippi River. There is usually ample time to prepare for a flood event, and to minimize flood damage by moving property out of lower elevations. This predictability makes the development of a flood warning and evacuation plan a practical concept. The area west of Beaumont Road in the City and Town of Prairie du Chien has been identified during public information meetings as a priority for this type of planning activity. The City of Prairie du Chien has an emergency action plan for St. Feriole Island. The following is a summary of the key elements of this plan.

Emergency Action Plan – Flood Assessment, Warning and Response Procedures, City of Prairie du Chien, St. Feriole Island.

Situation: The Mc Gregor, Iowa River gage reads 16 feet or 621.3 feet above mean sea level. This River level has been determined by the City to be flood stage where conditions exist which may cause damage.

Response: A "flood watch" is to be issued and the following emergency actions are to be undertaken as a result of this 16-foot river level reading.

(1) Maintain increased readiness.
(2) Activate local flood/weather monitoring systems, National Weather Service, U. S. Army Corps of Engineers, WPRE Radio and Courier Press.
(3) Ensure warning systems are operational (sirens).
(4) Alert key officials – [Mayor 608-326-6406] [County Emergency Management Coordinator 608- 326-0266] [City Engineer 608 326-6340] [Fire Chief 608-326-4111] [Police Chief 608-326 2421] [Sheriff 608-326-8414]
(5) Alert public via news media and advise them to be ready to take precautionary action.

Situation: The Mc Gregor Iowa River gage reads 18.5 feet or 623.8 feet above mean sea level. This river level has been determined by the City to pose an imminent threat of a flood disaster where property and/or life may be threatened.

Response: A flood warning or alert is to be issued and the following emergency actions are to be undertaken.

(1) Maintain local flood/weather monitoring systems, see (2) above
(2) Take precautionary action for protection of property and safety. Make calls to property owners at risk.
(3) Activate public warning
(4) Partially or fully activate Emergency Operations Center (City Hall), depending on extent of imminent threat of flooding.
(5) Alert key officials to standby or report for duty, see (4) above in "flood watch" section.
(6) Each agency is to identify essential personnel and assign duties.
(7) Request State and jurisdictional agency (*Coast Guard and Army Corps of Engineer assistance*).
(8) Establish access control points and reroute traffic around affected areas, depending on nature of flood forecast.

Situation: A minimum reading at the Mc Gregor Iowa gage of 18.5 feet or 623.8 feet above mean sea level and a river level forecast event that will be below 20 feet or 625.3 feet above mean sea level. This situation has been defined as a "Limited Emergency" which requires property protection and /or life safety responses in selected instances and areas.

Response: The following emergency actions are to be undertaken.

(1) Assess situation to determine appropriate response.
(2) Declare limited emergency, subject to update, and activate emergency operations as necessary.
(3) Partially activate Emergency Operations Center (City Hall).
(4) Authorize continual monitoring of situation and of areas that may need to evacuate or move to staging areas near Water Street and Blackhawk Avenue. Three small temporary storage areas above 630 feet mean sea level have been identified in the interior and western part of the island. The three selected options for evacuation routes are: (a) Railroad line; (b) Road – Water Street to Blackhawk Avenue to City Center and (c) Boat evacuation
(5) Maintain communications with flood monitoring network, news media, and rumor control centers.

Situation: A minimum reading at the Mc Gregor Iowa gage of 18.5 feet or 623.8 feet above mean sea level and a river level forecast event that will be above 20 feet or 625.3 feet above mean sea level. This situation has been defined as a "Community Emergency" that will severely impact the community with an imminent threat of widespread and severe damage, injury or loss of life or property.

Response: The following emergency actions are to be undertaken.

(1) Assess situation to determine appropriate responses.
(2) Assess need to request extraordinary state/federal assistance.
(3) Declare state of emergency and activate emergency operations as they become necessary.
(4) Maintain communications with flood monitoring network, news media and rumor control centers.
(5) Authorize continual monitoring of situation and of areas that may need to evacuate or move to staging areas near Water Street and Black Hawk Avenue, and authorize precautionary evacuation on an as needed basis. Three small temporary storage areas above 630 feet mean sea level have been identified in the interior and western part of the island. The three selected options for evacuation are: (1) Railroad line; (2) Road – Water Street to Blackhawk Avenue to City Center and (3) Boat Evacuation
(6) Determine evacuation boundary, routes and access control points based on specific forecasts and updates.

Situation: The river has crested and a high-water event has occurred. Immediate response measures have been taken and are no longer foreseen as needed. Long term actions to return the situation to normal are now warranted. This situation is categorized as "Recovery/Reentry"

Response: The following recovery actions are to be undertaken.

(1) Continually assess situation to update appropriate recovery actions.
(2) Perform on-site surveys to obtain estimates of costs and damages incurred and submit finalized disaster assessment to state officials.
(3) Determine need for assistance from higher levels of government.
(4) Inspect facilities for structural damage and determine if they are safe.

(5) Inspect roads and bridges for structural damage and determine if they are safe.
(6) Remove barricades from intersections as routes are re-opened and authorize and publicize reentry.
(7) Issue advice to property owners on methods of inspection for structural damage and on how to dispose of debris not normally part of trash removal service.

A transportation map and contour map were prepared as part of the emergency action plan for St. Feriole Island. Based on the maps three small temporary storage areas above 630 MSL in the interior and western portions of the island were identified, Water Street and Blackhawk Avenue areas were identified as staging areas, and evacuation routes were also identified.

It is recommended that plans be prepared for:
(1) All private property owners whose land contains improvements,
(2) All persons/entities leasing rights to public property on St. Feriole Island,
(3) A comprehensive plan should be prepared and submitted as a condition of approval for all persons/entities seeking permits or leases in the future.

Flood Warning and Evacuation Plans – Kickapoo River:
Emergency Action Plan on Nederlo Creek. This warning plan is in affect to safeguard lives and reduce property damage to citizens who live below a zoned earth embankment dam called Blackhawk-Kickapoo structure on Nederlo Creek. This dam was constructed in 1975 for the purpose of flood control. It is 500 feet long and 14 feet wide and has a structural height of 44 feet. The dam is located in the Town of Utica, Section 12, T10N, R5W, and is owned by the Crawford County Land Conservation Department. There is one residence in the floodplain shadow. An Emergency Action Plan for this dam has been prepared in the event that the dam breaches. This involves a chain of communication from first observance of a breach to the notification of downstream residents by way of the county conservation coordinator and sheriff's office.

Flood Warning and Evacuation Plans – Wisconsin River: Flood events on the Wisconsin River have had little impact due to the wetland environment and minimal development occurring in the floodplain. Because of this formal flood warning and evacuation plans have not been developed.

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. This ordinance was last updated in 2015.

  Regulating Development. The development that occurs within the unincorporated areas of the County is subject to three ordinances. These are the County Subdivision Ordinance, 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 Subdivision Ordinance. The County Subdivision Ordinance regulates land divisions in the County. When development is proposed in a floodplain or shoreland area the County Floodplain Zoning Ordinance and Shoreland-Wetland Ordinance are the controlling documents.

  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. Bell Center	Yes	01/09/74	03/05/90	10/15/16
V. De Soto	Yes	01/09/74	01/16/81	10/15/16
V. Eastman	Not Participating			
V. Ferryville	Yes		05/26/72	10/15/16
V. Gays Mills	Yes	10/05/73	06/15/78	10/15/16
V. Lynxville	Yes		03/16/73	10/15/16
V. Mt. Sterling	Not Participating			
V. Soldiers Grove	Yes	06/07/74	03/05/90	10/15/16
V. Steuben	Yes		04/20/73	10/15/16
V. Wauzeka	Suspended 10/19/15		04/20/73	10/15/16
C. Prairie du Chien	Yes	05/22/70	05/22/70	10/15/16
Crawford County	Yes		04/20/73	10/15/16

Note: The Villages of Eastman and Mt. Sterling have chosen not to participate due to the topography of the villages which creates a very low risk of riverine flooding.

Flood Recovery Plans

The Village of Gays Mills was struck by back-to-back floods in August 2007 and June 2008. Both flood events were greater than 500-year flood events, which resulted in substantial losses to residences and businesses within the Village. Due to these floods, the Village began to consider the possibility of relocating the portion of the Village located in the floodplain. After the flood of 2008, Crawford County and 30 other counties received a Presidential Disaster Declaration. Because of the scale of the disaster in Wisconsin, FEMA activated the Long-Term Community Recovery (LTCR) program, which integrates assistance from State and Federal partners to address recovery needs for communities experiencing particularly devastating losses. The Village Board requested a LTCR planning effort be initiated. This Long-Term Community Recovery Plan reflects a community vision for recovery in the aftermath of these two severe flooding events. The Plan is the result of an intensive 3-month planning process that involved many committee meetings, workshops and public presentations, along with numerous consultations with local, state, and federal officials. The document provides a framework for the recovery effort, identifying both short-term and long-term recommendations. Unlike a traditional comprehensive plan, the Long-Term Recovery Plan is an action oriented series of projects that Gays Mills can use to make critical funding and resource allocation decisions. Gays Mills mitigation projects listing in chapter 4 identifies projects citied in this recovery plan.

Flood Mitigation Projects completed in Crawford County

Several flood mitigation projects have been successfully completed or are in process within Crawford County. The most notable of these projects was in the Village of Soldiers Grove where the Village in 1978 moved the flood-prone areas of the Village to higher ground. This estimated $6 million dollars dollar project consisted of the village buying 100 acres of land away from the Kickapoo River floodplain and then buying out homes and businesses and relocating them to the newly acquired land. A second successful mitigation project was the relocation of the Crawford County Highway Shop. The original shop located in the Village of Gays Mills was at times inaccessible for up to a week due to flooding of the Kickapoo River. During these times of flooding County work crews which should have been out assisting with the flooding by closing roads, erecting safety barriers, building temporary dikes, etc. were unable to do those duties due not being able to get to their equipment. To alleviate this, Crawford County spent $2.7 million to relocate the county highway shop out of the floodplain. The current shop is centrally located in the County on high ground near the Village of Seneca. A third project is located in the Village of Gays Mills. The village has spent over $15 million of private and public funds to purchase land, relocate homes and businesses, elevate structures, build a mercantile center and build a community hall/commerce center. The Village purchased land out of the Kickapoo River floodplain and is relocating homes and businesses to this land as well as building a new mercantile center and community hall/commerce center there.

Flooding Vulnerability Assessment

- Floodplain Structures and Assessed Values. Crawford County has a total of 421 parcels on which structures are located within the FEMA 100-year flood boundary. These 421 parcels have a total assessed land value of $7,130,350; an assessed improvements value of $20,806,700; and a total assessed value of $27,937,481. The Town of Prairie du Chien has the most parcels with 144 followed by the City of Prairie du Chien with 112 parcels and the Village of Gays Mills with 86 parcels. These three municipalities account for 342 parcels or 81% of the total number of parcels and a total assessed value of $21,334,450 or 76% of the County's total. Table 3-5 has a complete listing by municipality of the parcels located within FEMA's 100-year flood boundary. Map 3-6 on page 3-82 shows the location of these properties throughout the floodplain.

- 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 January 31, 2018 there were 32 properties which have had 2 or more insurance claims. Of those 32 properties 10 have been mitigated. Of the remaining 22 properties which have not been mitigated. Three residential properties are located in the Town of Prairie du Chien, 3 residential properties are in the Village of Soldiers Grove, 2 commercial properties are in the Village of Steuben, 1 residential is in the City of Prairie du Chien and the other 13 (9 residential and 4 commercial) properties
- are in the Village of Gays Mills.

- Flood Risk Assessment. 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.

Despite these factors an attempt has been made to ascertain the approximate damages a 100-year flood would inflict on residences and businesses in the County. To assist in this damage assessment process the Federal Insurance Administration has prepared a table, which lists the percentage of damage to a structure based upon the amount of water in the first floor. This table can be found in the book titled "Design Manual for Retrofitting Flood-prone Residential Structures" published by FEMA. We used this table when determining the amount of damage to structures. To determine the amount of water in the first floor of structures and the number of structures, which would have water in the first floor, we used Flood Insurance Rate Maps, photos of the 2001 flood, and local knowledge of the areas. To make flood damage estimates more accurate we divided the County into 15 different areas; these are: 1) Mississippi River, from the north County line south to County Highway K except Frenchmen's Landing; 2) Mississippi River, Frenchmen's Landing; 3) Mississippi River, Ambro area; 4) Mississippi River, County Highway K from State Highway 35 south to Limery Road; 5) Mississippi River, County Highway K from Limery Road south to the City of Prairie du Chien; 6) Mississippi River, Town of Bridgeport (Indian Isle); 7) Kickapoo River, unincorporated areas; 8) Wisconsin River, unincorporated areas; 9) Village of Ferryville; 10) Village of Gays Mills; 11) Village of Lynxville; 12) Village of Soldiers Grove; 13) Village of Steuben; 14) Village of Wauzeka; and 15) City of Prairie du Chien.

Dividing the County into 15 different geographic areas enables the assignment of different real property values to different areas which is needed because each area is unique in regards to topography, hydrology and development characteristics. This process compensates for the change flood prone property can have across the County in property values from one area to another. By using an average value for each area more realistic flood damage estimates can be generated than if a county wide average value for each structure were used.

During a 100-year flood event the County would have a projected damage total to residential and commercial structures of approximately $9.85 million. The area totals are as follows: 1) Mississippi River, from the north County line south to County Highway K except Frenchmen's Landing - $70,238; 2) Mississippi River, Frenchmen's Landing - $703,395; 3) Mississippi River, Ambro area - $956,365; 4) Mississippi River, County Highway K from State Highway 35 south to Limery Road - $1,655,200; 5) Mississippi River, County Highway K from Limery Road south to the City of Prairie du Chien - $1,554,350; 6) Mississippi River, Town of Bridgeport (Indian Isle) - $236,250; 7) Kickapoo River, unincorporated areas - $70,200; 8) Wisconsin River, unincorporated areas - $96,206; 9) Village of Ferryville - $79,530; 10) Village of Gays Mills - $701,683; 11) Village of Lynxville - $32,494; 12) Village of Soldiers Grove - $75,379; 13) Village of Steuben - $48,026; 14) Village of Wauzeka - $5,434; and 15) City of Prairie du Chien - $1,347,567. A detailed breakdown of the areas showing total number of structures affected and depth of water in the structures can be seen in Table 3-4 on page 3-64.

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) 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 is one critical facility in the City of Gays Mills that is located within the 100-year floodplain and is vulnerable to flooding. See Tables 3-7 through 3-12 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In 2015 in Crawford County there were 388 businesses and industries that employed 6,455 people with an annual payroll of approximately $196 million, see Table 3-6. In the county there are 34 businesses and industrial structures located in the floodplain. These businesses have an assessed improvements value of $2,748,000. Many of these businesses sustain flooding damage and economic losses 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 2017, county land use statistics indicated that 54.90% or 196,333 acres of county land were classified for agricultural use. The Natural Hazard Risk Assessment assigns flooding a high risk factor in the county. Land adjacent to these rivers is mostly agricultural and pastureland that are subject to flooding. In an analysis of the 1993 flood in Crawford

County, agricultural damage estimates compiled by the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) indicated an $8.9 million loss in agricultural production based on 1992 prices as a result of the flooding and high rainfall. Based on figures from the Agriculture Census 2012, the most recent statistics available, the market value of agricultural products sold in Crawford County was $74,900,000. Crop sales accounted for 50.3 percent of the market value or $37,653,000 and Livestock and Poultry Products sales accounted for 49.7 percent of the market value or $37,247,000. These statistics illustrate the significant impact agriculture has on Crawford County's economy.

- 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 Mississippi, Kickapoo, and Wisconsin Rivers is a known factor, and the extent of flooding, or potential flooding, has been delineated on maps.

  Many roadways in Crawford County are subject to flooding, either by the predictable, advance notice rising of the Mississippi or Wisconsin Rivers, or by the shorter advance warning flash flooding often besetting the Kickapoo River. 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 as streams and the Mississippi, Kickapoo, and Wisconsin Rivers is a known factor, and the extent of the flooding, or potential flooding, has been delineated on maps. There are two railroad lines in Crawford County.

  The Burlington Northern & Santa Fe Railway's (BNSF) mainline between Chicago and the Twin Cities and the Pacific Northwest lies along the Mississippi River. It enters the County from the south across a long trestle over the Wisconsin River which is subject to high water both from Mississippi River back up and from the Wisconsin River flow. North of Pickatee Creek the BNSF right-of-way lies very close to the Mississippi and serves as a dike between the River and STH 35. This entire stretch of railroad is reinforced with large boulder and rock rip-rap as necessary during Mississippi River high water. Much of the River opposite the northern half of Crawford County is a natural lake 3 or 4 miles wide, and considerable wind induced wave action can cause erosion problems on the rail embankment. During the 2000 flood the eastbound track, closest to the Mississippi River was not used, with all traffic on the busy mainline sharing the single westbound track.

  The Wisconsin & Southern Railway operates the line along the Wisconsin River into Prairie du Chien. This right-of-way is owned by the Wisconsin Department of Transportation and the rail infrastructure is owned by a coalition of counties formed as the Wisconsin River Rail Transit Commission. The diamond, or crossing/interchange point with the BNSF at Crawford, south of Prairie du Chien, is subject to flooding. Most of the right-of – way eastward towards Richland County serves as a dike on the north shore of the Wisconsin River. There are places that are flooded, and other places where water erosion of the embankment needs to be monitored.

  The BNSF Railway has maintained its own right-of-way and managed the flood issues with its own resources. The Wisconsin & Southern, because of its use of government owned right-of-way and track, has used state and local financial assistance to help maintain the infrastructure.

- Airway. The Prairie du Chien airport is not located in a floodplain and therefore not subject to flooding.
- Waterways. The Mississippi River is the only commercially navigable waterway in Crawford County. Each Corps of Engineers Navigation Lock has a water elevation at which point the lock operations are stopped at that lock, and no further operations are conducted. All commercial tows whether up bound or down bound, seek secure mooring in existing fleeting areas if possible. Some tows may be permitted to pass through the lock to a different pool after closure, if it can be safely done, to allow a tow access to a more secure mooring location. Improperly moored barges could break loose from fleets or terminals. Three dams impact the Crawford County reach of the Mississippi River. The lock closure river elevation at the Genoa Lock 8 is 635.9 feet above mean sea level. Lock & Dam 9, located about two miles below Lynxville is 631.0, and L&D 10 at Guttenberg is 620.9 elevation at the Lynxville Dam # 9 is 631.0 feet. The 100-Year Flood elevation at Lynxville Dam # 9 is 632.0.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. 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 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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.

Flooding Risk Assessment Designation

Flooding Historical Occurrence Rating: High - 8
Flooding Vulnerability Rating: Critical - 3
Flooding Probability Rating: Highly Likely - 6
Flooding Local Official Survey Rating: High - 8
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

3.6 Crawford 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 in Wisconsin are small and are not stringently regulated for safety purposes.

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.

In 1996 the Mississippi River Regional Planning Commission published a "Dam Hazard Assessment", for 42 Soil Conservation Service Public Law (PL) 566 dams in five western Wisconsin counties. Only one dam in Crawford County was included in this study. The individual *Dam Hazard Assessments*, including the one for Blackhawk-Kickapoo Structure 6, include an engineering description of the hydraulic shadow, or the area that would be subjected to flooding if the dam should fail.

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.

Dam Failure Flooding History and Frequency: There are no reported incidences of dam failure.

Dam Failure Flooding Vulnerability Assessment

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Dam Failure Flooding a risk factor of 8 indicating this natural hazard is a low risk to the county. See Tables 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In Crawford County there are 388 businesses and industries. The Natural Hazard Risk Assessment assigns dam failure flooding a low risk factor in the county. The *Dam Hazard Assessment*" completed for the Blackhawk-Kickapoo 6 dam in Crawford County showed that no businesses are located in the hydraulic shadow of the dam. Hydraulic shadows of other dams in Crawford County are not known.
- Agriculture. In 2017, county land use statistics indicated that 54.90% or 196,333 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. Land below the dams is mostly agricultural and pasture land that would be subject to flooding in the rare occurrence a dam fails. The *Dam Hazard Assessment*" completed for the Blackhawk-Kickapoo 6 dam in Crawford County showed that agricultural crops would be impacted in the rare occurrence that the dam fails. The report estimated that approximately $16,000(in 1995 dollars) in crop damage would be sustained if the dam failed. Hydraulic shadows of other dams in Crawford County are not known.

- Roads and Highways. Dam failure differs from traditional flooding in that flooding, even on a rapidly rising river such as the Kickapoo, happens both with a certain regularity in terms of not being an "if", but a "when", and also with a certain advance warning, perhaps weeks for the Mississippi and hours for the Kickapoo; but none-the-less, there is a warning period to take action to close roads, move equipment, or other take other mitigation. 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 Blackhawk-Kickapoo 6 dam in Crawford County showed that Johnstown Road, in the Town of Utica, would be damaged by a complete failure of this dam. Hydraulic shadows of other dams are not known.
- Railroads. In 1996 the Mississippi River Regional Planning Commission published a "Dam Hazard Assessment", for 42 Soil Conservation Service Public Law 566 dams in five western Wisconsin counties. Only one dam in Crawford County was included in this study. The individual *Dam Hazard Assessments*, including the one for Blackhawk-Kickapoo Structure 6, include an engineering description of the hydraulic shadow, or the area that would be subjected to flooding if the dam should fail. No railroads in Crawford County are in the hydraulic shadow of any PL566 dams.
- Airway. The Prairie du Chien Municipal Airport is not located in the hydraulic flood shadow of any dam. Therefore, this potential hazard poses no threat to the airport.
- Waterways. The hazard to commercial navigation on the Mississippi River from dam failures on tributaries is minute. In most cases the initial flush of water from a partial or complete failure of a PL566 dam on a tributary would not even reach the Mississippi in a noticeable form.
- Municipal Water. In the county there are 11 municipal wells and water systems, see Table 3-11. These facilities are usually located at higher an elevation, which lessens their vulnerability to flooding or damage if a dam would fail. The *Dam Hazard Assessment* completed for dam in Crawford County showed that no municipal water systems are located in the hydraulic shadows of the PL566 dam. Hydraulic shadows of other dams in Crawford County are not known.
- Wastewater Treatment Facilities. There are 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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 dam in Crawford County showed that no wastewater treatment facilities are located in the hydraulic shadows of the PL566 dam. Hydraulic shadows of other dams in Crawford County are not known.
- Hazardous Material Sites. No major hazardous waste disposal or storage sites are located in the hydraulic shadow of the PL566 dam. 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 -2
Dam Failure Flooding Risk Assessment Designation: **Low Threat – 8 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 - Calculation of the hydraulic shadow by performing a dam failure analysis of all the PL566 dams in Crawford County would show all the roads, railroads, and other transportation modes that would be impacted by failure of these 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 Crawford 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 present and weather conditions such as wind, low humidity and lack of precipitation are the chief factors determining the number of fires and acreage burned. 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. According to the United States Department of Agriculture, Wisconsin is home to 17.1 million acres of forest, an increase of 0.4 percent since 2011. 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. The steep topography of Crawford County and the large amount of wooded areas add to the difficulty of containing a wild fire. Structures located at the top of bluffs which are located along local roads off of main roads are especially vulnerable.

Forest/Wildland Fires History and Frequency: No major forest fires have occurred in Crawford County in recent history.

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 Crawford County from 1976 through 2017. However, the DNR did report that between 1999-2018 there were 262 fires reported burning a total of 852 acres. The largest fire burned 189 acres on 10/19/15 in the Town of Wauzeka. The majority of fires (61%) burned less than one acre.

Because there have no major forest fires in Crawford 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. Even though Crawford County has not experienced a major fire due to the county's terrain and amount of wooded land this hazard should not be overlooked. The Wisconsin DNR has prepared a list of communities which are at risk to wild fires, Map 3-9 indicates which Crawford County communities are at risk.

Forest/Wildland Fires Vulnerability Assessment

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Forest/Wildland Fires a risk factor of 16 indicating this natural hazard is a moderate risk to the county. Critical facility's vulnerability to Forest/Wildland Fires is very negligible. See Tables 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In Crawford County there are 388 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. Forest and wildland fire control in Crawford County is handled by local fire departments as first responders and back up by the Department of Natural Resources (DNR) fire crew based in Boscobel. All DNR first-response fire apparatus entering Crawford County would do so via the USH 61

bridge over the Wisconsin River. 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. This would especially apply to steep slopes, such as along STH 35.

- 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. This would especially apply to steep slopes, such as along the Burlington Northern Santa Fe RR.
- Airway. Although fires in the hardwood forests of Crawford 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 in the counties or portions of counties participating in the DNR's "Extensive" fire protection program, the Prairie du Chien airport could become a major hub of air and ground activity. This Extensive designation includes all of Crawford and Richland Counties, and the northern 1/3 of Grant County, as well as other counties extending up the Wisconsin River valley. Highway traffic control by local officers in the vicinity of the Prairie du Chien airport might be needed.
- Waterways. Although there are some historical accounts of navigation by steamboat on the Mississippi River during wildfires on adjacent bluffs, these accounts relate little in the way of direct threat to boats on the river. As with land and air transportation, there could be isolated incidents of smoke drift creating a visibility hazard to river boat pilots, but modern tow boats equipped with radar, are less apt to be impacted by this than are motorists on a highway.
- Municipal Water. In the county there are 11 municipal wells and waters systems in operation, see Table 3-11. 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 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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 predesignated 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 - 5
Forest/Wildland Fires Vulnerability Rating: Negligible - 3
Forest/Wildland Fires Probability Rating: Possible - 3
Forest/Wildland Fires Local Official Survey Rating: Low - 5
Forest/Wildland Fires Risk Assessment Designation: **Moderate Threat – 16 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 ● Have a plan in place where the Prairie du Chien airport could become a major hub of air and ground activity during major fire events for counties or portions of counties participating in the DNR's "Extensive" fire protection program

3.8 Crawford County, Heavy Snowstorm 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: 12 reported events by NCDC – 1/26/94, 2/22/94, 2/25/94, 12/5/94, 3/6/95, 11/26/95, 1/18/96, 12/23/96, 2/4/97, 3/8/98, 1/1/99, and 3/8/99.

2000's: 22 reported events by NCDC – 12/11/00, 12/18/00, 12/28/00, 3/1/02, 3/4/03, 4/7/03, 2/5/04, 1/4/05, 1/21/05, 2/15/06, 3/5/06, 1/21/07, 2/23/07, 12/1/07, 12/22/07, 1/16/08, 1/21/08, 2/14/08, 2/17/08, 12/8/08, 12/18/08, 12/20/08.

2010's: 7 reported events by NCDC – 12/3/10, 3/5/13, 3/22/15, 11/20/15, 12/10/16, 1/24/17, 3/12/17

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.

National Climatic Data Center records show 41 heavy snowstorm events in Crawford County between 1990 and 2017. Heavy snow in Wisconsin in December 2000 contributed to spring flooding along the Mississippi in 2001. Floodwaters along the Mississippi River from Alma to Prairie du Chien rose to the highest levels since 1965.

Snowstorms are one of the most common natural hazards that impact transportation. As with most natural hazards, the problems caused by the meteorological event linger on after the event itself is over. Heavy snow can remain on the ground for weeks following a heavy snowstorm which can be blown across roadways, and the eventual melting of the snow can precipitate flooding months later. 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 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Heavy Snowstorm a risk factor of 30 indicating this natural hazard is a high risk to the county. In fact, this natural hazard received the highest risk assessment of all natural 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 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In 2015 in Crawford County there were 388 businesses and industries that employed 6,455 people and had an annual payroll of $196 million, see Table 3-6. 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 2017, county land use statistics indicated that 54.9% or 196,333 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 snow plows. 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 ridge roads such as STH 27.

Following a heavy snowfall, children may be outside playing in the snow near the roadway and be oblivious to traffic. Following a snow storm, 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. Finding locations to store snow, especially along the tight confines of an urban right-of-way, as in Prairie du Chien, is a challenge.
- Airway. Light plane operation from the Prairie du Chien airport 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 Crawford County could cause some light aircraft, possibly flying over the county, to decide to land at Prairie du Chien until the storms stop.
- Waterways. The River is typically closed from about the first week of December to the second week of March. Most heavy snowfalls occur in the winter when the Mississippi River is closed to navigation, and therefore present no challenge. Early heavy snows in early December or mid March could catch an active tow still on the Upper River. The same conditions of poor visibility that affect road and rail travel can impact river pilots as well. Although commercial riverboats are equipped with radar, eyesight visibility is still critical to navigate through locks, and while performing barge transfers. Heavy snow makes conditions dangerous for deck personnel where a slip and fall can be fatal. Lock workers experience the same problem. There is one Corps of Engineers navigation lock, Lock and Dam 9, about three miles south of Lynxville.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. These facilities' vulnerability to heavy snowstorms is negligible and would not cause interruption of services provided by these facilities.
- Wastewater Treatment Facilities. There are 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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 - 6
Heavy Snowstorm Risk Assessment Designation: **High Threat – 30 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 Crawford 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 Government Property and Facilities Damage and $42 million Private-Individual Property, Crop and Facilities Damage to Crawford and 21 other counties, *Presidential Disaster Declaration*.

1990's: 3 event s reported by NCDC – (12/13/95 glaze), 2/26/96, 1/4/98

2000's: 4 events reported by NCDC – 2/7/01, 2/24/01, 1/3/09, 3/8/09

2010's: No reported events

Wisconsin Emergency Management records show that in March of 1976 a devastating ice storm hit Crawford 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 Crawford County experienced three ice storm events in the 1990's and 4 events in 2000's. 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 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Ice Storm a risk factor of 22 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 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In Crawford County there were 388 businesses and industries that employed 6,455 people and had an annual payroll of $196 million in 2015, see Table 3-6. 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 2017, county land use statistics indicated that 50.9% or 196,333 acres of county land were classified for agricultural use. Due to Crawford County's large agricultural base the 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. In addition, rural areas tend to be the last to get electrical power restored.

- 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. In addition, 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. There are several rail customers in Prairie du Chien, and car interchange is done at Crawford between the Burlington Northern Santa Fe (BNSF) and Wisconsin and Southern (W & S).
- 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 Prairie du Chien 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 snow storms, and the most typical time for ice storms is in November and March. Commercial navigation can still be in full operation at the time of an ice storm. Deck surface conditions can be very treacherous for deck hands working on barge tows and for workers at navigation locks and cargo piers.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. 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 8 wastewater treatment facilities in the county, see Table 3-12. 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: Highly Likely - 5
Ice Storm Local Official Survey Rating: High - 6
Ice Storm Risk Assessment Designation: **High Threat – 22 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 Crawford 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: No events reported
2010's: 2 events reported by NCDC – 12/10/10, 12/20/12

No property or crop damage was reported by these three blizzards in Crawford County.

Blizzard Vulnerability Assessment

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Blizzard a risk factor of 18 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 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In 2015 in Crawford County there were 388 businesses and industries that employed 6,455 people and had a payroll of $196 million, see Table 3-6. 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 2017, county land use statistics indicated that 54.9% or 196,333 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 ridgetops.
- Roads and Highways. The same problems created by heavy snowfall apply to blizzards as well, except blizzards are characterized by heavy winds in addition to snow. 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 ridge roads such as STH 27. Following a heavy snowfall, children may be outside playing in the snow near the roadway and be oblivious to traffic. Following the blizzard, 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. Finding locations to store snow, especially along the tight confines of an urban right-of-way, as in Prairie du Chien, is a challenge.
- Airway. Light plane operation from the Prairie du Chien airport 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 Crawford County could cause some light aircraft, possibly flying over the county, to decide to land at Prairie du Chien until the storms stop.
- Waterways. The River is closed to commercial navigation from about the first week of December to the second week of March. Most heavy snowfalls occur in the winter when the Mississippi River is closed to navigation, and therefore present no challenge. Early heavy snows in early December or mid March could catch an active tow still on the Upper River. The same conditions of poor visibility that affect road and rail travel can impact river pilots as well. Although commercial riverboats are equipped with radar, eye-sight visibility is still critical to navigate through locks, and while performing barge transfers. Heavy snow makes conditions dangerous for deck personnel where a slip and fall can be fatal. Lock workers experience the same problem. There is one Corps of Engineers navigation lock, Lock and Dam 9, about three miles south of Lynxville.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. These facilities' vulnerability to blizzards is negligible and would not be interrupted except in extreme cases.
- Wastewater Treatment Facilities. There are 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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: Moderately High - 2
Blizzard Vulnerability Rating: Catastrophic - 7
Blizzard Probability Rating: Likely - 3
Blizzard Local Official Survey Rating: Medium - 6
Blizzard Risk Assessment Designation: **Moderate Threat – 18 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 Crawford 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:

1990's: 4 reported events by NCDC - (12/9/95), (1/29/96 Gays Mills -42˚ & Lynxville -40˚), (2/1/96 Gays Mills -44˚), (1/16/97 wind chills of 30-50 below zero)

2000's: 5 reported events by NCDC - (1/30/08 wind chills of 30-45 below zero), (2/10/08 wind chills of 35-45 below zero), (12/14/08 wind chills of 20-40 below zero), (12/21/08 wind chills of 20-40 below zero), (1/14/09 wind chills of 33-42 below zero)

2010's: 2 events by NCDC – (1/5/14 wind chills of 35-50 below zero), (1/27/14 wind chills of 30-36 below zero)

The National Climatic Data Center reported that Crawford County experienced 11 extreme cold events between the years 1990 – 2017. This averages out to one blizzard every three years. Damages associated with extreme cold temperatures include frostbite, loss of revenue for businesses that close early, water pipes breaking and flooding basements, heat and power failure in homes, vehicles that won't start and even death. No deaths have been recorded in Crawford County due to extreme cold temperatures. Estimating losses due to extreme cold temperatures are hard to predict due to the fact that most damages are not recorded at a County level.

Extreme Cold Vulnerability Assessment

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Extreme Cold a risk factor of 22 indicating this natural hazard is a high risk to the county. See Tables 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In 2015 in Crawford County there were 388 businesses and industries that employed 6,455 people and had a payroll of $196 million, see Table 3-6. 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. In addition, businesses may close early thus losing sales.
- Agriculture. In 2017, county land use statistics indicated that 50.9% or 196,333 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 work 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, rock face collapses, 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 the Burlington Northern Santa Fe as they normally operate trains at higher speeds. The normal operating speed of the Wisconsin & Southern railroad is below the limit set as the "slow order" of the BNSF. 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 commercial navigation on the Mississippi River would be seasonally closed. Recreational boaters in airboats, or recreationists crossing the Mississippi River in snowmobiles could be subject to extreme hazard if they became stranded in an inaccessible area due to mechanical failure or other cause.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. 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 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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 High - 4
Extreme Cold Vulnerability Rating: Catastrophic - 7
Extreme Cold Probability Rating: Likely - 5
Extreme Cold Local Official Survey Rating: Medium - 6
Extreme Cold Risk Assessment Designation: **High Threat – 22 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 ● Communities can establish heating and/or cooling centers for vulnerable populations

3.12 Crawford 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 may result from falling objects and debris, because of the shocks or shakes. They may also damage or demolish buildings and other structures. Disruption of communications, electrical power supplies and gas, sewer and water lines should be expected. Earthquakes may trigger fires, dam failures, landslides or releases of hazardous material, compounding their disastrous effects.

Earthquakes are measured by two principal methods: seismographs and human judgment. The seismograph measures the magnitude of an earthquake and interprets the amount of energy released on the *Richter scale*, a logarithmic scale with no upper limit. 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: Earthquakes were felt in 1981 in Madison and 1987 in Milwaukee. Some residents in Crawford County may have felt the strongest earthquake in central United States in 74 years on November 9, 1968. It was reported that this earthquake that originated in central Illinois was felt in Madison, Milwaukee, La Crosse and Prairie du Chien.

Earthquake Vulnerability Assessment

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Earthquake a risk factor of 12 indicating this natural hazard is a moderate 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 Crawford County in recent history the risk to these facilities is insignificant. See Tables 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In Crawford County there were 388 businesses and industries that employed 6,455 people and had an annual payroll of $196 million, see Table 3-6. 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 Crawford County the risk to businesses is insignificant.
- Agriculture In 2017, county land use statistics indicated that 50.9% or 196,333 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, such as STH 35, or any of the roads leading east-west off the STH 27 or USH 61 ridge tops. Broken water or sewer lines would present the biggest problem in the Prairie du Chien area, and other 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 on the Burlington Northern Santa Fe line along the Mississippi River. 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 on even a large river like the Mississippi. If the event should occur during the active commercial navigation season the problems caused could include, moored barges breaking free, tows running aground, and lock chamber doors becoming jammed and inoperative.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. These facilities vulnerability is negligible and would not interrupt services provided by the facilities except in extreme cases.
- Wastewater Treatment Facilities. There are 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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 Crawford 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 Centers of Disease Control and Prevention (CDC) during the period of 1998-2007, extreme heat and humidity associated with heat waves directly kill 172 people a year in the United States. Within the State of Wisconsin the National Weather Service Milwaukee/Sullivan Office reports that since 1982 the State has averaged 5 deaths per year in which heat was the direct or primary cause. Since 1982 heat waves have been responsible for more deaths in Wisconsin than all other natural disasters combined.

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 night time 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: 5 reported events by NCDC: (7/13/95 - 57 deaths in state), (10/12/95), (7/4/99–7/5/99), (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: 6 reported evens by NCDC: (7/27/10), (8/11/10), (8/12/10), (7/17/11), (7/2/12), (7/21/16)

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 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The

Hazard Risk Assignment assigns Extreme heat a risk factor of 21 indicating this natural hazard is a moderate risk to the county. See Tables 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.

- Business and Industry. In Crawford County there are 388 businesses and industries that employ 6,455 people and have an annual payroll of $196 million, see Table 3-6. 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 2017, county land use statistics indicated that 50.9% or 196,333 acres of county land were classified for agricultural use. Extreme 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 over-heating 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-air conditioned 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-air conditioned 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 commercial navigation is apt to be the danger of heat exhaustion to deck crews working outdoors. Hot weather could increase the number of pleasure craft operating on the Mississippi River and result in increased conflict with safe navigation.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. 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 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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: High - 5
Extreme Heat Vulnerability Rating: Catastrophic - 7
Extreme Heat Probability Rating: Likely - 5
Extreme Heat Local Official Survey Rating: High - 4
Extreme Heat Risk Assessment Designation: **Moderate Threat - 21 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 Crawford 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 2012-2016 American Community Survey 5-year estimate showed that 7.4% of Crawford County's employed civilian population was employed in the Agriculture, forest, fishing and hunting and mining.

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 so many natural hazards that can affect agricultural production (droughts, floods, extreme temperatures, high winds, hail, insects etc.) to name a few. Department of Revenue records show that in 2017 Crawford County had approximately 196,333 acres of agricultural land. Agricultural hazards can occur annually in the county.

Agricultural Vulnerability Assessment

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Agricultural a risk factor of 11 indicating this natural hazard is a low risk to the county. Critical facility's vulnerability to agriculture is not applicable. See Table 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In Crawford County there are 388 businesses and industries, see Table 3-6. 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 2017, county land use statistics indicated that 50.9% or 196,333 acres of county land were classified for agricultural use. Agriculture productions 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 not direct threat to the airport or air travel.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. These facilities' vulnerability to agriculture is not applicable.
- Wastewater Treatment Facilities. There are 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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 wild fire. 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: Low - 3

Agricultural Risk Assessment Designation: **Low Threat – 11 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 Crawford 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. In 2016 the state had about 14,427,000 acres of farmland on 68,700 farms with $10.7 billion in farm receipts (Wisconsin Agricultural Statistics 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 reported by Wisconsin Emergency Management, 1976, $1 million-Public Gov't Property & Facilities Damage, $623 million Private-Individual Property, Crop and Facilities Damage to Crawford 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 state - 1987-1988 drought which 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.

2010's: 1 event reported by NCDC – 7/17/12 thru 11/1/12

Wisconsin Emergency Management reported one major drought event (1976) which affected Crawford and 63 other counties in the State. A Presidential Emergency Declaration was made for those counties. According to *Wisconsin Emergency Management's Hazard Analysis, November 2002*, Wisconsin's five most significant droughts in terms of severity and duration are: 1987-1988, 1976-1977, 1955-1959, 1948-1950 and 1929-1934.

Drought Vulnerability Assessment

- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Drought a risk factor of 16 indicating this natural 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 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In Crawford County there were 388 businesses and industries that employed 6,455 people and had an annual payroll of approximately $196 million, see Table 3-6. 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 2017, county land use statistics indicated that 50.9% or 196,333 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 Prairie du Chien airport, and on light plane travel has been discussed under that topic.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. 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 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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: Limited - 5
Drought Probability Rating: Possible - 3
Drought Local Official Survey Rating: Medium - 6
Drought Risk Assessment Designation: **Moderate Threat – 16 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 Crawford 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: 2 events reported by NCDC – 3/8/10, 12/29/10

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. No property or crop damage was reported in Crawford County for either of the events reported by the NCDC.

Fog Vulnerability Assessment

- Critical Facilities. In the county 52 critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) 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 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In 2015 in Crawford County there were 388 businesses and industries, see Table 3-6. Businesses and industries vulnerability to fog would be negligible.
- Agriculture. In 2017, county land use statistics indicated that 50.9% or 196,333 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. STH 35 along the Mississippi River is a good example of fog occurrence and to a lesser extent the Wisconsin and Kickapoo River valleys can be pockets of fog occurrence. 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. Heavy fog can be particularly challenging to pedestrians and bicyclists, even those not directly on the roadway. Heavy fog in parking lots can present security and safety problems for people walking to their cars to and from buildings.
- Railroads. Because of the location of the Burlington Northern Santa Fe right-of-way along the Mississippi River, this railroad is going to be confronted more frequently with fog operation than is the Wisconsin & Southern. 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 Prairie du Chien Municipal Airport is not equipped to handle aircraft in conditions other than Visual Flight Rules.
- Waterways. Commercial vessels on the Mississippi River are equipped with radar and Coast Guard licensed pilots that know how to use the equipment. Navigation in fog is possible, but the reduced visibility increases the danger. Pleasure craft operated by recreationists pose the biggest threat to safety during foggy periods. Fog makes deck work more dangerous for deck hands on commercial craft.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. These facilities' vulnerability to fog is negligible and would not interrupt services provided by these facilities.
- Wastewater Treatment Facilities. There are 8 wastewater treatment facilities in operation in the county, see Table 3-12. 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: Low - 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 Crawford 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: During the flooding that occurred 05/31/00-6/2/00 a mudslide buried a home under the Mississippi River bluffs in De Soto, Wisconsin and another mudslide blocked the Burlington Northern railroad tracks north of Ferryville. Mudslides also occurred due to heavy rains in 2008 and 2013.

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 52 critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Landslide a risk factor of 9 indicating this natural hazard is a low 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 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In Crawford County there are 388 business and industries, see Table 3-6. For most businesses and industries vulnerability to landslides would be negligible except for buildings located next to steep slopes or blufflands.
- Agriculture. In 2017, county land use statistics indicated that 50.9% or 196,333 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, such as STH 35, or any of the roads leading east-west off the STH 27 or USH 61 ridge tops. Vehicles on STH 35 have been struck by falling rocks.
- Railroads. Landslides can cause obvious damage with railroad lines, especially on the Burlington Northern Santa Fe line along the Mississippi River. Recent experience in other parts of the country has illustrated the vulnerability.
- 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 large landslide into a waterway could cause wave action, and possibly temporary current reversal on even a large river like the Mississippi. If the event should occur during the active commercial navigation season the problems caused could include, moored barges breaking free, tows running aground, and lock chamber doors becoming jammed and inoperative.
- Municipal Water. In the county there are 11 municipal wells and water systems in operation, see Table 3-11. 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 wastewater treatment facilities in operation in the county, see Table 3-12. 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 - 1
Landslide Vulnerability Rating: Negligible - 1
Landslide Probability Rating: Possible - 3

Landslide Local Official Survey Rating: Low - 4
Landslide Risk Assessment Designation: **Low Threat – 8 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 Crawford 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 sinkholes, fissures or other karst features.

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 Crawford County.

Subsidence Vulnerability Assessment

- Critical Facilities. In the county 52 critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. The Hazard Risk Assignment assigns Subsidence a risk factor of 6 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 3-7 through 3-14 and Maps 3-1 through 3-5 for further information and location of these facilities.
- Business and Industry. In 2015 in Crawford County there were 388 businesses and industries that employed 6,455 people and had an annual payroll of $196 million, see Table 3-6. 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 2017, county land use statistics indicated that 50.9% or 196,333 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 Burlington Northern Santa Fe tracks could come from direct undermining of the banks by river action. The most likely large-scale subsidence events would be on the karst terrain of the limestone uplands.
- Airway. The Prairie du Chien Municipal Airport is 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 11 municipal wells and water systems in operation, see Table 3-11. 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 8 wastewater treatment facilities in operation in the county, see Table 3-12. Sinkholes can cause damage to structures and underground piping that carry wastewater. These facilities' vulnerability to sinkholes is negligible and would not interrupt services provided 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 - 1
Subsidence Risk Assessment Designation: **Low Threat – 6 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 Crawford 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, causing 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

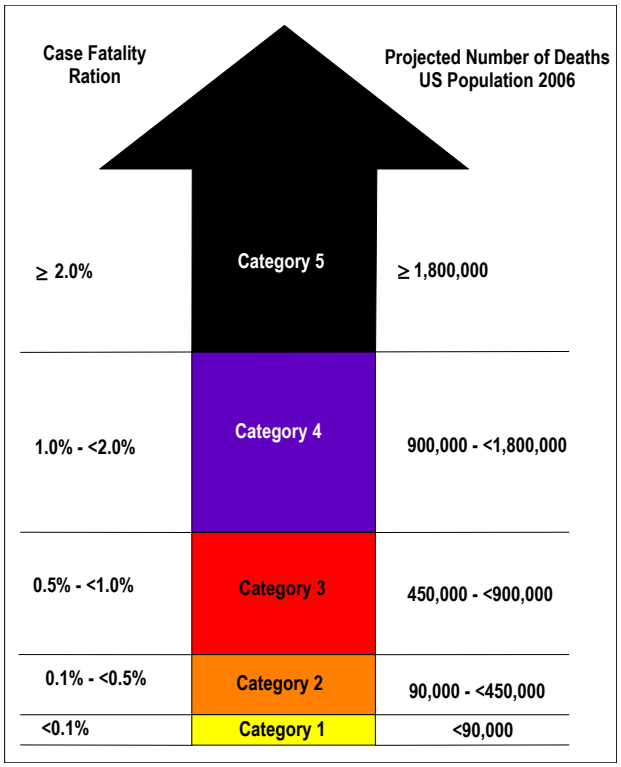
- Critical Facilities. In the county 52 service orientated critical facilities were identified. These include (15) government and military facilities; (8) hospitals, clinics, and residential facilities; (11) police and fire facilities; and (18) schools. These facilities will be severely affected during 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 3-7 through 3-14 and Maps 3-1 through 3-4 for further information and location of these facilities.
- Business and Industry. In 2015 there are 388 businesses and industries in Crawford County that employed 6,455 people and had an annual payroll of $196 million, see Table 3-6. 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 2017, county land use statistics indicated that 50.9% or 196,333 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 11 municipal wells and water systems in operation, 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.
- Wastewater Treatment Facilities. There are 8 wastewater treatment facilities in operation in the County, see Table 3-12. 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 - 8
Pandemic Flu Probability Rating: Possible - 1
Pandemic Flu Local Official Survey Rating: Low - 4
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 Crawford County, 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 Crawford County there are two rail lines. The Burlington Northern-Santa Fe runs along the Mississippi River from De Soto to the confluence of the Wisconsin and Mississippi Rivers. The Wisconsin and Southern runs along the Wisconsin river from Prairie du Chien to just east of the Village of Wauzeka where it crosses the Wisconsin river into Grant County.

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 Crawford 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 the incorporated communities of De Soto, Ferryville, Lynxville and Prairie du Chien 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:	10 accidents reported by the Federal Railroad Administration: 1980 two derailments - $151,700 total damage; 1981 two derailments - $380,200 total damage; 1982 two derailments - $172,500; 1985 one derailment - $16,600 damages; 1986 one derailment $110,000 damages; 1987 one derailment - $13,500 damages; 1989 one derailment - $16,200 damages.
1990's:	2 accidents reported by the Federal Railroad Administration: 1994 two derailments - $91,225 total damages; 1995 one derailment - $31,667.
2000's:	5 accidents reported by the Federal Railroad Administration: 2000 two derailments - $337,668 total damages; 2007one derailment - $35,478; 2008 one derailment and one obstruction impact – total damages $27,000.
2010's:	8 accidents reported by the Federal Railroad Administration: 2011 two derailments - $26,499; 2013 one derailment - $189,172 damages; 2015 one derailment - $145,200 damages; 2016 two derailments and one highway-rail impact - $2,239961 in total damages; 2017 one derailment - $381,929 damages.

Source: Federal Railroad Administration, Office of Safety Analysis

Railroad Vulnerability Assessment

- Critical Facilities. In the County, 52-service oriented critical facilities were identified. Of these include 35 are located within ½ mile of a rail line and could be directly or indirectly affected by a train derailment. These 35 facilities included: (9) government and military facilities; (6) hospitals, clinics, or residential facilities; (7) police and fire facilities; and (13) 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 3-7 through 3-10 and Maps 3-1 through 3-4 for further information and location of these facilities.

- Business and Industry. In Crawford County the Burlington Northern-Santa Fe rail line runs through the Villages of De Soto, Ferryville, Lynxville and the City of Prairie du Chien and the Wisconsin and Southern line runs through the Village of Wauzeka. 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 2017, county land use statistics indicated that 50.9% or 196,333 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. State Highway 35 runs parallel to the Burlington Northern-Santa Fe rail line and State Highway 60 runs parallel to the Wisconsin and Southern rail line, a derailment causing an evacuation could shut down these significant roadways in the county. In addition to potential evacuations train derailments could potentially close roads which cross over tracks if the derailment would occur at these points.
- 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. The Prairie du Chien Municipal Airport's vulnerability to train derailments 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. The Burlington Northern-Santa Fe rail line runs along the Mississippi River and the Wisconsin and Southern rail line runs along the Wisconsin River. A train derailment along either of these lines could potentially spill pollutants into the river. In addition, rail lines also run adjacent to Lock & Dam 9 south of Lynxville. A derailment on these tracks alongside the lock could potentially damage or shut down the lock which would close the Mississippi River to all boat traffic both recreational and commercial.
- Municipal Water. In the County there are 11 municipal wells and water systems in operation, see Table 3-11. These facilities' vulnerability to rail derailment is minimal. These facilities could be affect 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 8 wastewater treatment facilities in operation in the County, see Table 3-12. Five of these facilities are located in close proximity to rail lines, these facilities are located in the Villages of De Soto, Ferryville, Lynxville, Wauzeka and the City of Prairie du Chien. 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
Railroad 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

3.21 Crawford County, River Traffic Risk Assessment

River Traffic Definition: The passage of people or commercial goods along a river.

The main channel of the Mississippi River forms the western border of Crawford County. The border starts at the confluence of the Wisconsin River which is river mile 631 and ends at river mile 667 at De Soto, a total distance of 36 river miles. The Mississippi River has been controlled by a system of navigation locks and dams in order to maintain a 9-foot channel since 1930's. The dams were built to hold back water and form deeper navigation "pools." The pools are maintained at a constant minimum water depth of 9 feet for safe navigation. Dams allow river vessels to use a series of locks to "step" up or down the river from one water level to another. The U.S. Corps of Engineers operates the locks and dams on the Mississippi River for navigation, not flood control. The locks and dams create slack-water pools for navigation during periods of low- and moderate-level water. In the 36 miles of the Mississippi River which flows through Crawford County there is one Lock and Dam. Lock and Dam 9 is located at mile maker 648.

Lock and Dam 9 Commodities passing through in 2017

Commodity	Upbound Ktons	Downbound Ktons	Total Ktons
Coal, Lignite and Coke	1,614.20	1.60	**1,615.80**
Petroleum and Petroleum Products	26.93	209.60	**236.53**
Chemicals and Related Products	2,306.07	347.40	**2,653.47**
Crude Materials, Inedible, except Fuels	1,200.4	393.80	**1,594.20**
Primary Manufactured Goods	1,158.67	3.63	**1,162.30**
Food and Farm Products	89.90	9,138.60	**9,228.50**
All Manufactured Equipment and Machinery	17.58	13.16	**30.74**
Total Tons:	**6,413.75**	**10,107.79**	**16,521.54**

Source: US Army Corp of Engineers, Lock Performance Monitoring System

"Accident/Incident" includes any event involving the operation of equipment on waters of the Mississippi River which causes damage or injury to any person.

River Traffic 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 a barge and the barge is in traveling through a populated area, death, injuries, and damage to homes, businesses, infrastructure can occur. In addition, environmental contamination can result from River Traffic accidents. Anhydrous Ammonia is the hazardous material that is carried the most on this portion of the river.

Commercial traffic along the Mississippi River is not required to notify the county when hazardous materials are being transported or how much is being transported. Without the knowledge of what is actually being transported or how often it is being transported along the river it is very difficult to make any predictions of how often an accident will occur or how much damage an accident would cause.

River Traffic History and Frequency:
No historic data is available

River Traffic Vulnerability Assessment

- Critical Facilities. In the County, 52-service oriented critical facilities were identified. Of these include 35 are located within 1 mile of the main channel of the Mississippi River and could be directly or indirectly affected by a river traffic incident. These 35 facilities included: (9) government and military facilities; (6) hospitals, clinics, or residential facilities; (7) police and fire facilities; and (13) schools. These facilities could be affected from a river traffic incident by either being destroyed or damaged from an explosion from an incident, they could be forced to evacuate, or they could be cut off due to road closures. See Tables 3-7 through 3-10 and Maps 3-1 through 3-4 for further information and location of these facilities.

- Business and Industry. In Crawford County Lock and Dam 9 is not located adjacent to any business districts. Due to its location, businesses and industries located within Crawford County would not be severely affected by a river accident at the Lock and Dam.
- Agriculture. In 2017, county land use statistics indicated that 50.9% or 196,333 acres of county land were classified for agricultural use (See Table 2-5). Agriculture will be affected only by an accident or incident which would shut down the river for a long term which would affect the transportation of agricultural commodities.
- Roads and Highways. River Traffic would have an affect on Roads and Highways only if the accident would cause damage to a bridge which crosses the river.
- Railroads. The Burlington Northern Santa Fe rail line runs along the shore of the Mississippi River, river traffic, especially large barge traffic can undermine the banks along the river. This undermining of the tracks can and has in the past, cause derailments of trains.
- Airway. The only airport in Crawford County, the Prairie du Chien airport does lie in an area that would be affected by a River Traffic accident.
- Waterways. An accident on the Mississippi River would shut down the river to commercial traffic until the accident was cleaned up. This would not only affect the river traffic passing through Crawford County but could also potentially affect activities at the port of Prairie du Chien.
- Municipal Water. In the County there are 11 municipal wells and water systems in operation, see Table 3-11. These facilities' vulnerability to river traffic is minimal. These facilities could be affect through a spillage from a river traffic accident into the groundwater and contaminating the well.
- Wastewater Treatment Facilities. There are 8 wastewater treatment facilities in operation in the County, see Table 3-12. Four of these facilities are located along the Mississippi River, these facilities are located in the Villages of De Soto, Ferryville, Lynxville and the City of Prairie du Chien. A river traffic accident 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 river traffic accident occurring upstream of the facility which could contaminate the facility causing it to be shut down.
- Hazardous Material Sites. Hazardous materials located in close proximity to the Mississippi River could be impacted by a river traffic accident. An accident with explosive materials could damage or destroy buildings which house hazardous materials

River Traffic Risk Assessment Designation

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

River Traffic Mitigation Ideas: ● Local governments and state governments can promote community awareness of river traffic risks ● First responders can obtain specific training on how to respond to river traffic accidents ● Municipalities can develop evacuation plans ● Local governments can petition state and federal agencies for legislation requiring commercial haulers on the river to give notice when carrying hazardous materials ● Local municipalities can purchase specific response equipment ● Move structures to less hazardous locations

CRAWFORD COUNTY LOCAL OFFICIAL HAZARD RISK ASSESSMENT SURVEY

In May of 2016 the Crawford 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 natural 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

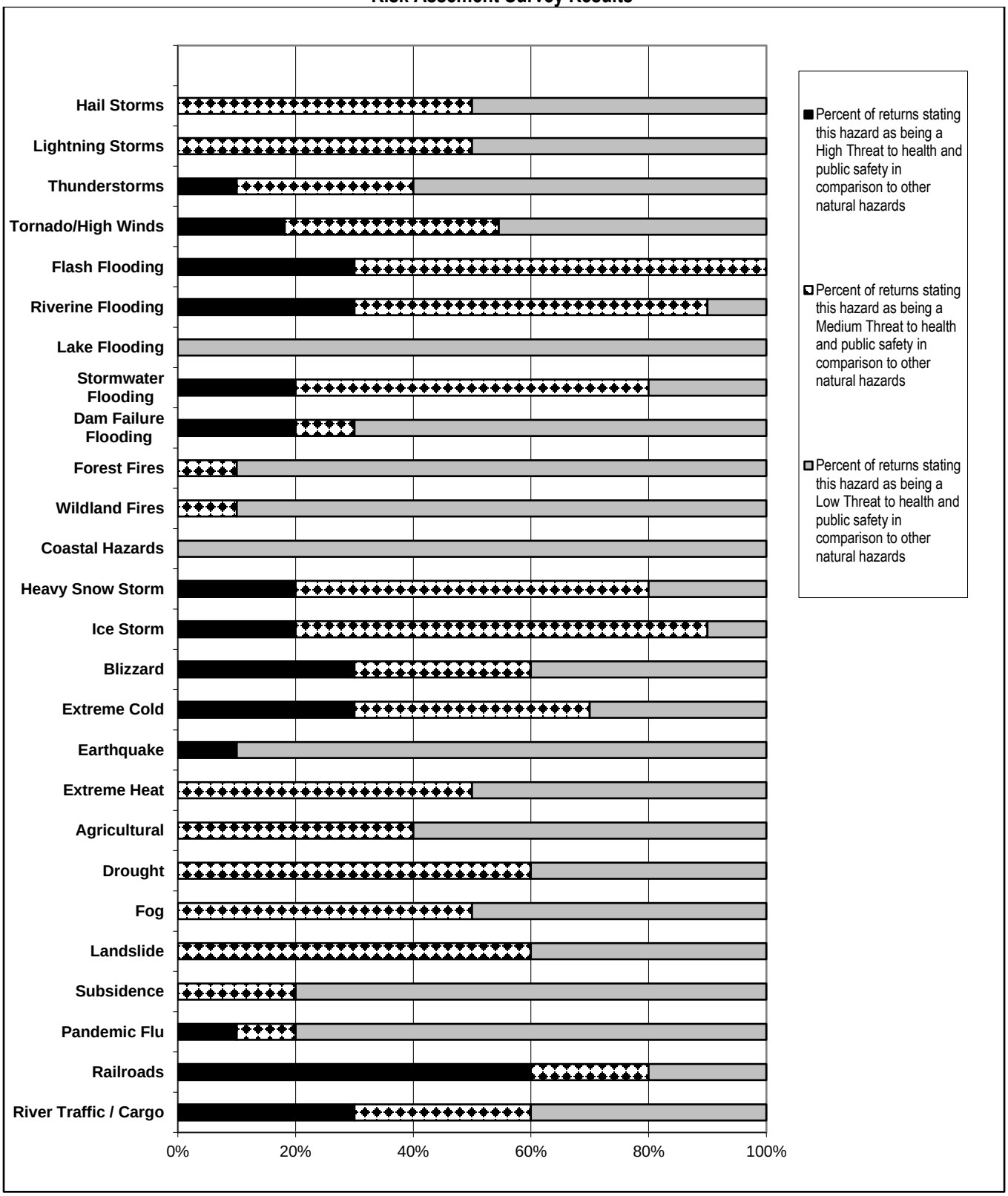


Table 3-2
Crawford County Hazard Risk Assessment

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	2	8	6	**25**	High Threat
Lightning Storm	3	2	7	5	**17**	Moderate Threat
Thunderstorm	9	2	8	6	**25**	High Threat
Tornado/High Winds	7	5	6	6	**24**	High Threat
Riverine/Flash Flooding	7	4	6	5	**22**	High Threat
Dam Failure Flooding	1	2	3	2	**8**	Low Threat
Forest/Wildland Fires	5	3	3	5	**16**	Moderate Threat
Heavy Snowstorm	9	7	8	6	**30**	High Threat
Ice Storm	5	7	5	6	**23**	High Threat
Blizzard	1	7	3	6	**17**	Moderate Threat
Extreme Cold	4	7	5	6	**22**	High Threat
Earthquake	1	7	3	1	**12**	Low Threat
Extreme Heat	5	7	5	5	**22**	High Threat
Agricultural	2	3	3	4	**12**	Low Threat
Drought	2	5	3	4	**14**	Low Threat
Fog	1	1	7	3	**12**	Low Threat
Landslide	2	1	3	2	**8**	Low Threat
Subsidence	1	1	3	1	**6**	Low Threat
Pandemic Flu	1	9	2	5	**15**	Moderate Threat
Railroads	2	3	5	2	**12**	Low Threat
River Traffic/Cargo	1	3	3	1	**8**	Low Threat

Table 3-3
Crawford County
Structures in the 100-Year Floodplain

Municipality	Number of Parcels	2016 Land Value	2016 Assessed Improvements Value	Total Assessed Value
T. Bridgeport	16	$200,000	$787,500	$987,500
T. Clayton	5	$49,300	$319,100	$368,400
T. Eastman	35	$963,400	$1,316,500	$2,279,900
T. Freeman	3	$29,400	$227,800	$257,200
T. Marietta	3	$46,900	$102,300	$149,200
T. Prairie du Chien	144	$4,091,400	$9,706,500	$13,797,900
T. Seneca	1	$37,400	$43,300	$80,700
T. Wauzeka	2	$20,500	$305,900	$326,400
V. Ferryville	11	$158,600	$382,200	$540,800
V. Gays Mills	86	$394,600	$2,554,700	$2,365,700
V. Lynxville	3	$34,000	$147,700	$181,700
V. Soldiers Grove	5	$44,400	$555,900	$600,300
V. Stueben	4	$6,200	$218,300	$224,500
V. Wauzeka	1	$12,700	$24,700	$37,400
C. Prairie du Chien	112	$1,056,650	$4,114,300	$5,170,850
Crawford County Total	**421**	**$7,130,350**	**$20,806,700**	**$27,937,481**

Table 3-4
Crawford County (100-Year) Flood Damage Potential
For Residences and Businesses

River Body and Location of Structures	Number of Structures at This Location	Structures Impacted During 100 Year Flood Event and First Floor Water Level Estimates[1]	Total Damage to Structures During a 100 Year Flood Level Event[1]
MISSISSIPPI RIVER			
North County Line South to Ambro area except Frenchmen's Landing	9 residences (*2 residences flood proofed*)	2 with minor damage 3 with 1' of water in first floor 2 with 2' of water in first floor	2 X $1,000 = $2,000 $101,400 x 0.22 = $22,308 $153,100 X 0.3 = $45,930 **TOTAL $70,238**
Frenchmen's Landing	29 mobile homes *(total improvements = $1,024,100)* 1 business (*3 of the mobile homes are elevated above 100-year flood*).	13 with 2' of water in first floor 13 with 3' of water in first floor 1 business minor damage	Avg. mobile home = $35,314 13 X $35,314 X 0.71 = $325,948 13 X $35,314 X 0.82 = $376,447 1 X 1,000 = $1,000 **TOTAL $703,395**
Ambro Area	57 seasonal structures (35 are elevated above 100-year flood level).	16 with 2' of water in first floor 8 would be a total loss	Avg. seasonal structure = $74,716 16 X $74,716 X 0.3 = $358,637 8 X $74,716 = $597,728 **TOTAL $956,365**
County Trunk Highway K Intersection with Ambro Road South on "K" to Limery Road	39 permanent residences 203 mobile homes on 12 parcels 4 commercial structures	13 residences with 2' of water in first floor 53 mobile homes with 2' of water in first floor 10 residences with 1' of water in first floor 2 commercial structures with 2' of water in first floor 1 commercial structure totaled	Avg. residence $54,841 Avg. mobile home $25,000 Avg. commercial $237,450 13 X $54,841 X 0.3 = $213,880 53 X 25,000 X 0.71 = $940,750 10 X $54,841 X 0.22 = $120,650 2 X 237,450 X 0.3 = $142,470 1 X 237,450 = $237,450 **TOTAL $1,655,200**
Limery Road and County Trunk Highway K Intersection South to Prairie du Chien City Boundary	24 residences 1 commercial structure 2 manufacturing structures	12 residences with 2' of water 3 manufactured homes with 3' of water 17 manufactured homes with 2' of water 1 commercial with 3' of water 2 manufacturing with 3' of water	Avg. residence $64,525 Avg. manufactured home $65,000 Manufacturing total $1,157,800 Commercial total $100,900 12 X $64,525 X 0.3 = $232,290 3 X $65,000 X 0.82 = $159,900 17 X $65,000 X 0.71 = $784,550 $100,900 X 0.3 = $30,270 $1,157,800 X 0.3 = $347,340 **TOTAL $1,554,350**
Town of Bridgeport and Indian Isle	16 parcels total 14 cabins 1 well house 1 commercial	All would have 2' of water in first floor. No damage to well house or commercial property.	Total residence = $787,500 $787,500 X 0.3 = $236,250 **TOTAL $236,250**
C. Prairie du Chien	112 parcels 27 are tax exempt 3 are commercial 82 are residential	40 with 2' of water 72 with 1' of water	Avg. non tax exempt parcel = $48,404 40 X $48,404 X 0.30 = $580,848 72 X $48,404 X 0.22 = $766,719 **TOTAL $1,347,567**
V. Ferryville	11 residences	2 elevated 9 would have 1' of water in first floor	Total residential not elevated $361,500 $361,500 X 0.22 = $79,530 **TOTAL $79,530**
V. Lynxville	3 residences	1' of water in each	Total residential $147,700 $147,700 X 0.22 = $32,494 **TOTAL $32,494**
		TOTAL MISSISSIPPI RIVER	**$6,635,389**
Kickapoo River			

Table 3-4
Crawford County (100-Year) Flood Damage Potential
For Residences and Businesses

River Body and Location of Structures	Number of Structures at This Location	Structures Impacted During 100 Year Flood Event and First Floor Water Level Estimates[1]	Total Damage to Structures During a 100 Year Flood Level Event[1]
Kickapoo River-Unincorporated Areas	5 residences, total assessed improvements - $319,100	All would have 1' of water in first floor	$319,100 X 0.22 = $70,202 **TOTAL $70,202**
V. Soldiers Grove	5 residential structures	2 minor damage 3 with 1' of water	Avg. residential = $111,180 2 X $1,000 = $2,000 3 X $111,180 X 0.22 = $73,379 **Total $75,379**
V. Gays Mills	86 parcels 15 structures elevated 42 residences 18 commercial structures 11 tax exempt	16 commercial with 2' of water 2 commercial with 1' of water 21 residential with 2' of water 21 residential with 1' of water 6 tax exempt with 2' of water 5 tax exempt with 1' of water	Avg. assessment = $34,771874 Avg. residential = $30,533 Avg. commercial = $45,241 16 X $45,241 X 0.30 = $217,157 2 X $45,241 X 0.22 = $19,906 21 X $30,533 X 0.30 = $192,358 21 x $30,533 X 0.22 = $141,063 6 X $45,241 X 0.30 = $81,434 5 X $45,241 X 0.22 = $49,765 **TOTAL $701,683**
V. Steuben	3 Commercial Structures 1 Residential Structure	1' of water in each	$218,300 X 0.22 = $48,026 **TOTAL $48,026**
		TOTAL KICKAPOO RIVER	**$895,290**
Wisconsin River			
Wisconsin River-Unincorporated Areas	4 residences, 1 business Total assessed improvements - $437,300	All would have 1' of water in first floor	$437,300 X 0.22 = $96,206 **TOTAL $96,206**
V. Wauzeka	1 resident	1' of water	1 X $24,700 X 0.22 = **$5,434** **TOTAL $5,434**
		TOTAL WISCONSIN RIVER	**$101,640**
Approximate Expense to repair structures to pre-flood condition on Mississippi, Kickapoo and Wisconsin Rivers			**$7,632,319**

1. *Damage estimates are based on determining an average value for a residence or business at for an area identified in the far left column and multiplying this average value by a percentage factor provided by the Federal Insurance Administration that is based on the level of water in the first floor of the structure. For further information see Design Manual For Retrofitting Flood-Prone Residential Properties published by FEMA.*

Table 3-5

Crawford County Population, Real Estate and Transportation Vulnerability Assessment

Municipality	Fed/State Numbered Highways Arterial Miles	Fed/State Numbered Highways Collector Miles	County Hwy Miles	Town Roads	Village/ City Streets	Total Highway Miles	Burlington Northern Sante Fe Rail Miles	Wisconsin Southern Rail Miles	Total Rail Miles
T BRIDGEPORT	8.79			18.17		26.96	1.8	5.0	6.8
T CLAYTON	7.84	13.70	19.91	90.58		132.03			0.0
T EASTMAN	11.22	6.85	15.6	76.64		110.31	6.2		6.2
T FREEMAN	9.41	2.50	16.39	82.42		110.72	10.8		10.8
T HANEY		6.49	10.92	41.05		58.46			0.0
T MARIETTA	13.36	3.79	6.8	60.37		84.32			0.0
T PRAIRIE DU CHIEN	11.20		3.24	34.54		48.98	3.6	1.0	4.6
T SCOTT	6.71		14.88	51.18		72.77			0.0
T SENECA	15.40	3.10	15.37	67.6		101.47	6.8		6.8
T UTICA	9.60	3.94	19.2	76.59		109.33			0.0
T WAUZEKA	9.54	2.82	3.4	47.97		63.73		8.0	8.0
V BELL CENTER		2.35	0.35		10.83	13.53			0.0
V DE SOTO	0.56				1.93	2.49	0.8		0.8
V EASTMAN	2.36	0.47	0.96		5.99	9.78			0.0
V FERRYVILLE	2.61		1.02		2.49	6.12			0.0
V GAYS MILLS		5.28			9.71	14.99			0.0
V LYNXVILLE	1.30		1.74		4.05	7.09	1.0		1.0
V MOUNT STERLING	0.96	1.67			1.57	4.2			0.0
V SOLDIERS GROVE	2.15	1.74	1.14		10.21	15.24			0.0
V STEUBEN		4.62	0.34		8.73	13.69			0.0
V WAUZEKA	2.95		1.6		6.6	11.15		2.0	2.0
C PRAIRIE DU CHIEN	5.06				47.49	52.55	2.6	2.0	4.6
COUNTY TOTAL	**121.02**	**59.32**	**132.86**	**647.11**	**109.60**	**1069.91**	**33.6**	**18.0**	**51.6**

There are five jurisdictional classifications: Interstate Highways (Example I94), State System Highways (Example USH 14-STH 171), County Highways (Example CTH B), Town Roads (Example Mound Rd), Village/City Streets (Example Main Street).
Within incorporated areas (villages/cities), highways marked as state system or county roads will be classed by mileage under that classification - 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 14/61, STH 35, STH 27) or as Major/Minor collectors (example STH 179).
Some local roads that are not identified as state systems roads may be a "federal aid" road.

Table 3-6
Crawford 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
Crawford County Totals		**6,455**	**196,002**	**388**
11	Agriculture, forestry, fishing & hunting	14	212	4
21	Mining, Quarrying, and Oil and Gas Extraction	A	D	2
22	Utilities	A	D	1
23	Construction	80	3,182	40
31-33	Manufacturing	1,481	67,938	21
42	Wholesale trade	58	2,202	9
44-45	Retail trade	995	23,155	68
48-49	Transportation & warehousing	990	24,872	19
51	Information	57	2,050	8
52	Finance & insurance	155	6,334	26
53	Real estate & rental & leasing	29	530	7
54	Professional, scientific, & technical services	595	9,528	24
55	Management of companies & enterprises	B	D	1
56	Administrative & support & waste management & remediation service	186	4,718	8
61	Educational services	27	418	4
62	Health care & social assistance	876	35,597	40
71	Arts, entertainment, & recreation	26	641	8
72	Accommodation & food services	657	8,843	55
81	Other services (except public administration)	178	4,052	43

Source: U.S. Department of Commerce-Economic and Statistics Administration-U.S. Census Bureau-County Business Patterns 2015

(1) Total includes No. 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 companies data are included in higher level totals

Table 3-7

Crawford County Critical Facilities: Government and Military Facilities

Facilities	Community	Address	Telephone
Bell Center Village Hall	Bell Center	4230 Bell Center Road	(608) 735-4324
De Soto Village Hall	De Soto	907 Steele Street	(608) 648-2643
Eastman Village Hall	Eastman	PO Box 42	(608) 874-4361
Ferryville Village Hall	Ferryville	14710 State Hwy 35	(608) 734-9406
Gays Mills Village Hall	Gays Mills	212 Main Street	(608) 735-4341
Lynxville Village Hall	Lynxville	362 Spring Street	(608) 874-4424
Mt Sterling Village Hall	Mt Sterling	PO Box 18	(607) 734-3108
Prairie du Chien City Hall	Prairie du Chien	207 W. Blackhawk	(608) 326-6406
Crawford County Courthouse	Prairie du Chien	220 N. Beaumont Road	(608) 326-0209
Crawford County Administration Building	Prairie du Chien	225 N. Beaumont Road	(608) 326-0200
OE Satter Building	Prairie du Chien	111 West Dunn Street	(608) 326-0270
National Guard Armory - PDC	Prairie du Chien	Rt 4, Box 690	(608) 326-2613
Soldiers Grove Village Hall	Soldiers Grove	PO Box 121	(608) 624-3264
Steuben Village Hall	Steuben	144 Bridge Street	(608) 476-2226
Wauzeka Village Hall	Wauzeka	401 E Main Street	(608) 875-5281

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

Table 3-8

Crawford County Critical Facilities: Hospitals, Clinics, and Residential Care Facilities

Facilities	Community	Address	Telephone
Hospitals			
Crossing Rivers Health	Prairie du Chien	37868 U.S. Hwy 18	(608) 357-2000
Clinics			
Mayo Clinic Health System-Franciscan Healthcare	Prairie du Chien	800 East Blackhawk Avenue	(608) 326-0808
Gundersen Health System Prairie du Chien Clinic	Prairie du Chien	610 East Taylor Street	(608) 326-6466
Kickapoo Valley Medical Clinic	Soldiers Grove	102 Sunset Ave.	(608) 624-5203
Residential Care			
Crossing Rivers Health Assisted Living	Prairie du Chien	424 N. Beaumont Rd.	(608) 357-2170
Bluff Haven Assisted Living	Prairie du Chien	720 S. Fremont St.	(608) 326-8472
Prairie Maison	Prairie du Chien	700 S. Fremont	(608) 326-8471
Sannes Skogdalen	Soldiers Grove	101 Sunshine Boulevard	(608) 624-5244

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

Table 3-9
Crawford County Critical Facilities: Police and Fire Facilities

Facilities	Community	Address	Telephone
Fire Departments			
De Soto Volunteer Fire Department	De Soto	57 Crawford St.	(608) 648-3331
Eastman Volunteer Fire Department	Eastman	112 Shanghi Ridge Road	(608) 874-4595
Ferryville Volunteer Fire Department	Ferryville	170 Pine St.	(608) 734-3624
Gays Mills Volunteer Fire Department	Gays Mills	103 Cedar St.	(608) 735-4424
T. Bridgeport & T. PDC Volunteer Fire Departments	Prairie du Chien	63176 Vineyard Rd	(608) 326-6623
Seneca Volunteer Fire Department	Seneca	323 W. Main St.	(608) 734-3256
Prairie du Chien Fire Department	Prairie du Chien	720 E Blackhawk	(608) 326-4365
Soldiers Grove Fire Department	Soldiers Grove	42387 North Clayton Road	(608) 624-5794
Wauzeka Volunteer Fire Department	Wauzeka	200 McCloskey St.	(608) 875-6931
Police Departments			
Crawford County Sheriff's Office	Prairie du Chien	224 North Beaumont Rd	(608) 326-0241
Prairie du Chien Police Department	Prairie du Chien	228 North Beaumont Road	(608) 326-2421

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

Table 3-10
Crawford County Critical Facilities: School Facilities

Facilities	Community	Address	Telephone
Public Schools*			
BA Kennedy School	Prairie du Chien	420 S Wacouta Ave	(608) 326-8451
Bluff View Elementary	Prairie du Chien	1901 E Wells Street	(608) 326-0503
Bluff View Middle School	Prairie du Chien	1901 E Wells Street	(608) 326-0503
Bluff View Jr High School	Prairie du Chien	1901 E Wells Street	(608) 326-0503
North Crawford High School	Soldiers Grove	47050 Co Rd X	(608) 735-4311
North Crawford Elementary	Soldiers Grove	47050 Co Rd X	(608) 624-5201
Prairie du Chien High School	Prairie du Chien	800 E Crawford Street	(608) 326-8437
Seneca Elementary	Seneca	Highway 27	(608) 734-3411
Seneca High School	Seneca	Highway 27	(608) 734-3411
Seneca Jr High School	Seneca	Highway 27	(608) 734-3411
Wauzeka Middle Elementary	Wauzeka	301 Main Street	(608) 875-5792
Wauzeka Middle School	Wauzeka	301 Main Street	(608) 875-5792
Wauzeka High School	Wauzeka	301 Main Street	(608) 875-5311
Private Schools*			
Mary Immaculate Academy	Seneca	167 Main St.	(734) 890-1687
New Frontier Day School	Prairie du Chien	625 Dousman St	(608) 326-6166
Prairie Catholic School	Prairie du Chien	515 N Beaumont Rd	(608) 326-8624
Prairie Christian Academy	Prairie du Chien	1110 N. Marquette Rd	(608) 326-8559
Secondary Education Schools			
Upper Iowa University- PDC Campus	Prairie du Chien	133 S Michigan	(608) 326-4292

* Source: Wisconsin Department of Public Instructions
See Map 3.4 for the location of these schools.

Table 3-11
Crawford County Critical Facilities: Municipal Wells

Municipality	Well Use	Construction Date	Well Bottom (ft.)	Static Water Level (ft.)	Well Status
Eastman	Community Municipality	1/1/1951	940	402	Active
Gays Mills	Community Municipality	1/2/1960	236		Permanently Filled
Mt Sterling	Community Municipality	6/15/1955	618	265	Active
Prairie Du Chien	Community Municipality	1/1/1980	138.5	31.5	Active
Prairie Du Chien	Community Municipality	7/10/1948	110	31	Active
Prairie Du Chien	Community Municipality	8/31/1979	138.6	31.1	Active
Seneca	Community Municipality	1/1/1949	583	340	Active
Soldiers Grove	Community Municipality	1/1/1980	358	0	Active
Clayton	Community Municipality	1/30/1979	490	72	Active
Wauzeka	Community Municipality		320		Permanently Filled
Wauzeka	Community Municipality		400		Permanently Filled
Wauzeka	Community Municipality	6/1/1984	205	68	Active
Wauzeka	Community Municipality	8/24/1984	240	8	Active
Gays Mills	Community Municipality	8/30/1986	286	10	Active
Prairie Du Chien	Community Municipality	2/14/1992	130	22	Active

Source: Wisconsin Department of Natural Resources

Table 3-12
Crawford County Critical Facilities: Wastewater Treatment Plants

Wastewater Treatment Plant	Community
De Soto Wastewater Treatment Facility	V. DeSoto
Eastman Wastewater Treatment Facility	V. Eastman
Ferryville Wastewater Treatment Facility	V. Ferryville
Gays Mills Wastewater Treatment Facility	V. Gays Mills
Prairie du Chien Waste Treatment Facility	C. Prairie du Chien
Soldiers Grove Wastewater Treatment Facility	V. Soldiers Grove
Valley Ridge Clean Water Commission Wastewater Treatment Facility	V. Lynxville
Wauzeka Wastewater Treatment Facility	V. Wauzeka

Source: Wisconsin Department of Natural Resources

Table 3-13

Crawford County Critical Facilities: Hazardous Material Sites

Facility/Site Name	Address	Community
3M Building 49	405 E. Frederick St	Prairie du Chien
3M Building 50	801 N. Marquette Rd	Prairie du Chien
3M Frenchtown Warehouse	34621 County Rd K	Prairie du Chien
Cabela's	Cliffhaven Dr.	Prairie du Chien
Centurylink Prairie du Chien	124 S. Beaumont	Prairie du Chien
Dillman Equipment	34600 County Rd K	Prairie du Chien
Gays Mills Highway Shop	118 N Railroad St	Gays Mills
Iverson Construction #60	Cliffwood Dr.	Prairie du Chien
James Richardson Trucking	23801 Byers Road	Boscobel
Lock & Dam #9	24545 State Highway 35	Eastman
Lynxville County Highway Shop	22425 State Highway 35	Lynxville
Miniature Precision Components, Inc.	63095 Vineyard Rd	Prairie du Chien
Mt. Sterling County Highway Shop	52990 School Street	Mt. Sterling
New Horizons – De Soto LP Plant	Spring Street	De Soto
New Horizons Supply Cooperative – Gays Mills Facility	728 State Highway 131	Gays Mills
New Horizons Supply Cooperative – Bridgeport Branch	38773 US Highway 18	Prairie du Chien
New Horizons Supply Cooperative – Gays Mills Agronom	Brockway Lane	Gays Mills
Prairie du Chien Terminal	34584 County Rd K	Prairie du Chien
Prairie du Chien Correction Inst.	500 E Parrish St	Prairie du Chien
Prairie du Chien County Highway Shop	420 North Ohio Street	Prairie du Chien
Prairie du Chien Municipal Airport	37735 USH 18	Prairie du Chien
Prairie du Chien Street Dept.	625 E. Washington St	Prairie du Chien
Prairie Sand and Gravel	34592 County Road K	Prairie du Chien
Premier Cooperative	26710 State Highway 27	Eastman
Riverside Coal	34592 County Road K	Prairie du Chien
Seneca County Highway Shop	21515 State Highway 27	Seneca
Soldiers Grove County Highway Shop	STH 131	Soldiers Grove
Solomon Corporation	1961 Vena Crt.	Prairie du Chien
Steuben County Highway Shop	CTH E	Steuben
Sunrise Orchards, Inc.	RR 2 Gays Mills	Gays Mills
Town of Clayton Shop	13069 US Highway 61	Soldiers Grove
Town of Marietta Shop	45550 Maple Ridge Rd	Marietta
Town of Seneca Shop	21041Town Hall Rd	Seneca
UFP Ventures II, Inc.	1801 E. Lessard	Prairie du Chien
Wal-Mart	38020 US Highway 18	Prairie du Chien
Waste Management - Prairie du Chien	62949 Vineyard Rd	Prairie du Chien
Wauzeka County Highway Shop	105 South Dousman	Wauzeka

Table 3-14

Crawford County Critical Facilities: Dams

Map Code	Dam Name	Municipal Location	Waterway	Est. Hazard Rating
1	Lynxville United States 9	T. Seneca	Mississippi	S
2	Windward Farms	T. Scott	Tr. Knapp Creek	H
3	Blackhawk-Kickapoo Project	T. Utica	Tr.-Nederlo Creek	S
4	Lourie	T. Clayton	Tr.-Kickapoo River	L
5	Gordon Olson	T. Clayton	Sheridan Creek – Offstream	L
6	Gays Mills	V. Gays Mills	Kickapoo	H
7	Achenbach, Jerry	T. Marietta	Tr.-Clear Creek	
8	Allan, Robert	T. Seneca	Tr.-S. Branch Copper Creek	
9	Aspensen, Orville	T. Utica	Tr.-Stream 12-9	
10	Baker, Orlie	T. Seneca	Tr.-Citron Creek	
11	Bane, Rita	T. Clayton	Tr.-Stream 25-16	
12	Boland, Mike	T. Utica	Tr.-Halls Branch Creek	
13	Brockway, Fred P.	T. Utica	Tr.-North Branch Copper Creek	
14	Brown, Jack	T. Clayton	Tr.-West Fork Of Knapp Creek	
15	Brown, Platt	T. Scott	Tr.-Richland Creek	
16	Chapman, Howard	T. Scott	Tr.-Crow Hollow Creek	
17	Childs, Raymond L.	T. Prairie du Chien	Tr.- Mississippi River	
18	Christ, Loren	T. Marietta	Tr.-Boydtown Creek	
19	Blackhawk-Kickapoo Project 5	T. Utica	Tr.-Nederlo Creek	
20	Doskocil, William	T. Seneca	Tr.-Halls Branch Creek	
21	Fjelstad, Willard	T. Freeman	Tr.-Rush Creek	
22	Holiday, William #1	T. Scott	Tr.- Stream 8-1	
23	Holiday, William #2	T. Scott	Tr.- Stream 8-1	
24	Kachelmeier, Roy	T. Bridgeport	Tr.-Wisconsin River	
25	Kreider, Robert	T. Prairie du Chien	Tr.- Mississippi River	
26	Lathrop, Lavon L.	T. Haney	Tr.-Kickapoo River	
27	Leirmo, David	T. Freeman	Tr.-Rush Creek	
28	Lightfoot, Oliver	T. Freeman	Tr.-Sugar Creek	
29	McDevitt, William	T. Freeman	Tr.-Rush Creek	
30	Meyer, Joel	T. Freeman	Tr.-Sugar Creek	
31	Mohr, Reuben	T. Wauzeka	Tr.-Bush Creek	
32	Orchards, Frank	T. Clayton	Tr.- Stream 22-10	
33	Salzseider, Jack #1	T. Scott	Tr.-West Fork Knapp Creek	
34	Salzseider, Jack #2	T. Scott	Tr.- West Fork Knapp Creek	
35	Steiner, Frank	T. Scott	Tr.- West Fork Knapp Creek	
36	Stevenson, Ivan	T. Freeman	Tr.-Copper Creek	
37	Zabel, Leonard	T. Eastman	Tr.-Otter Creek	
38	Zeman, Robert C.	T. Haney	Tr.- Kickapoo River	
39	Zinkle, A.P.	T. Wauzeka	Tr.- Wisconsin River	
40	McHugh, James P.	T. Scott	Gulley	
41	Bolln, George W.	T. Wauzeka	Tr.-Gran Grae Creek	
42	Ellefson, Millard	T. Freeman	Tr.-Creek 6-1	
43	Allan, Robert	T. Seneca	Tr.-Halls Branch	
44	Baker, Sam	T. Seneca	Tr.- Kickapoo River	

Table 3-14

Crawford County Critical Facilities: Dams

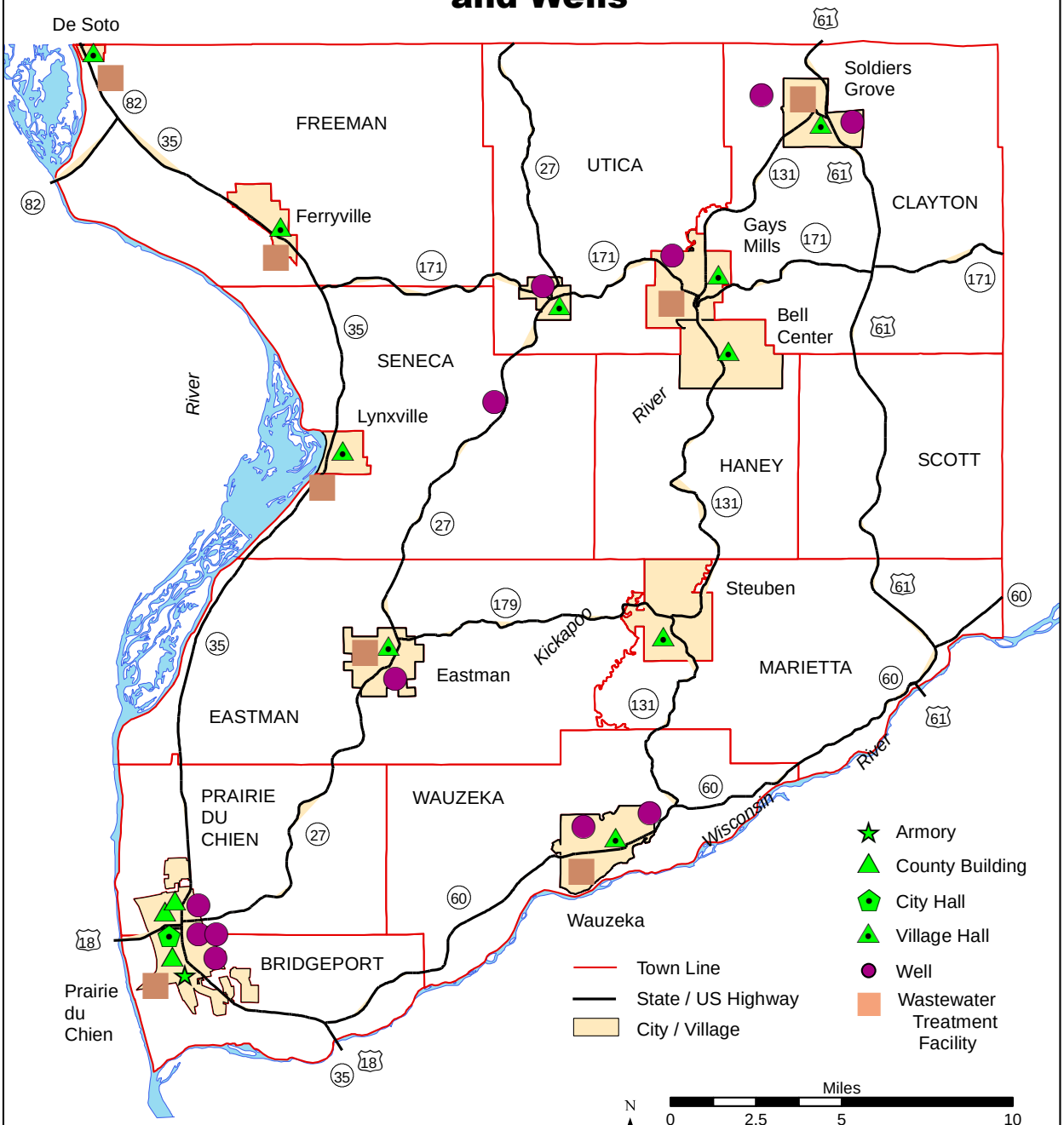
Map Code	Dam Name	Municipal Location	Waterway	Est. Hazard Rating
45	Bankes, Keith	T. Freeman	Tr.-Rush Creek	
46	Butler, Greg	T. Marietta	Spring Creek	
47	Caldwell, William H.	T. Marietta	Tr.- Wisconsin River	
48	Christ, Corinne	T. Marietta	Tr.- Wisconsin River	
49	Doll, Vernon	T. Utica	Tr.-Nederlo Creek	
50	George, Lyle	T. Haney	Tr.- Kickapoo River	
51	Gillitzer, John J.	T. Prairie du Chien	Tr.- Tucker Hollow Creek	
52	Hoekler, Donald	T. Seneca	Tr.- Citron Creek	
53	Johnson, Bernard	T. Clayton	Tr.-Sheridan Creek	
54	Leirmo, David	T. Freeman	Tr.- Sugar Creek	
55	Mikkelson, Elling	T. Freeman	Tr.-Buck Creek	
56	Olson, Lewis and Olson, Alvin	T. Utica	Tr.- Tainter Creek	
57	Rider, Augusta P.	T. Wauzeka	Tr.- Kickapoo River	
58	Roberts, Albert J.	T. Seneca	Tr.-Citron Creek	
59	Stevenson, Adolph	T. Freeman	Tr.-Buck Creek	
60	Trumm, John	T. Marietta	Tr.- Knapp Creek	
61	Swiggum, Norhahl	T. Utica	Tr.- Tainter Creek	
62	Tiller, Mark	T. Seneca	Tr.- Stream 23-7	
63	Piel, Richard A. & Nancy J.	T. Clayton	Tr.- Kickapoo	
64	Lock & Dam 9	T. Seneca	Mississippi River	
65	Soldiers Grove	V. Soldiers Grove		
66	Peterson Dam	V. Soldiers Gr.	Kickapoo River	
67	Christ	T. Marietta	Tr.- Boyd Creek	L
68	Allington	T. Clayton	Tr.- Kickapoo River	L
69	Saw	T. Scott	Unnamed Tr. to Knapp Creek	

See Map 3.5 for the location of these dams.

Table 3-15
Location of State System and County Trunk Highways That Are Subject to Flooding

Map Code	Flood Source	Highway or Road	From/To Location	Town or Village	Comments
1	Flash Flooding	STH 35	Rush Creek North1500 ft.	T. Freeman	
2	Floodwater over travel way	STH 131	South of CTH X intersection	T. Clayton	Raise road for dry wheel access
3	Floodwater over travel way	STH 131	North & South of CTH W intersection	T. Haney	Raise road for dry wheel access
4	Floodwater over travel way	STH 131	North of STH 60	T. Wauzeka	Raise road for dry wheel access
5	Floodwater over travel way	STH 60	East of STH 131	T. Wauzeka	Raise road for dry wheel access
6	Floodwater over travel way	STH 131	South of CTH S and Juddy Smith intersection	T. Haney	
7	Flash Flooding	STH 35	South of CTH C at Village Park and Sugar Creek Bridge	V. Ferryville	
8	Flash Flooding	CTH F	0.2 miles East of STH 35 intersection	T. Seneca	
9	Flash Flooding	CTH S	Between STH 27 and STH 131 – Petersburg	T. Haney	CTH S/STH 27 on ridge to CTH S/STH 131 in valley, subject to flash flooding on way down ridge
10	Flash Flooding	CTH B	Entire Starr & Tainter Creek Valleys	T. Utica	Between Towerville and Johnston Valley Road. Flood took out road in three places
11	Flash Flooding	CTH E	From STH 35 to 2 miles East of intersection	T. Freeman	This segment has been a problem with flash flooding
12	Flash Flooding	CTH E	Between STH 27 to STH 131 - Petersburg	T. Haney	CTH S/STH 27 on ridge to CTH S/STH 131 in valley, subject to flash flooding on way down ridge
13	Flash Flooding	CTH E	Entire Starr & Tainter Crek Valleys	T. Utica	Between Towerville and Johnstown Valley Road. Flood took out road in three places
14	Flash Flooding	CTH E	From STH 35 to 2 miles east of intersection	T. Freeman	This segment has been a problem with flash flooding
15	Flash Flooding	CTH X	Newby Hollow Rd to Citron Creek Crossing	T. Eastman	East of STH 27 approx. 4 miles North of STH 179, 1 mile
16	Flash Flooding	CTH H	Between USH 61 & STH 171	T. Clayton	Pigeon Run and English Run at South (STH 171) end of segment
17	Flash Flooding	CTH W	In area of Shaw Hollow	T. Haney	Flash Floods 1 mile East of Barnum
18	Flash Flooding	CTH W	USH 61 to Richland Co. Line	T. Scott	East end of CTH W
19	Flash Flooding	CTH U	1 to 1 1/2 mile of road	T. Clayton	East edge of Co line CTH U enters and leaves Co. at Richland Co.
20	Flash Flooding	CTH N	From Intersection with STH 35 East to Slama Lane	T. Prairie du Chien	Flash Flooding - Over Road
21	Flash Flooding	STH 171	Starting at the CTH X Intersection then East 500 Ft.	T. Clayton	Flash Flooding - Over Road

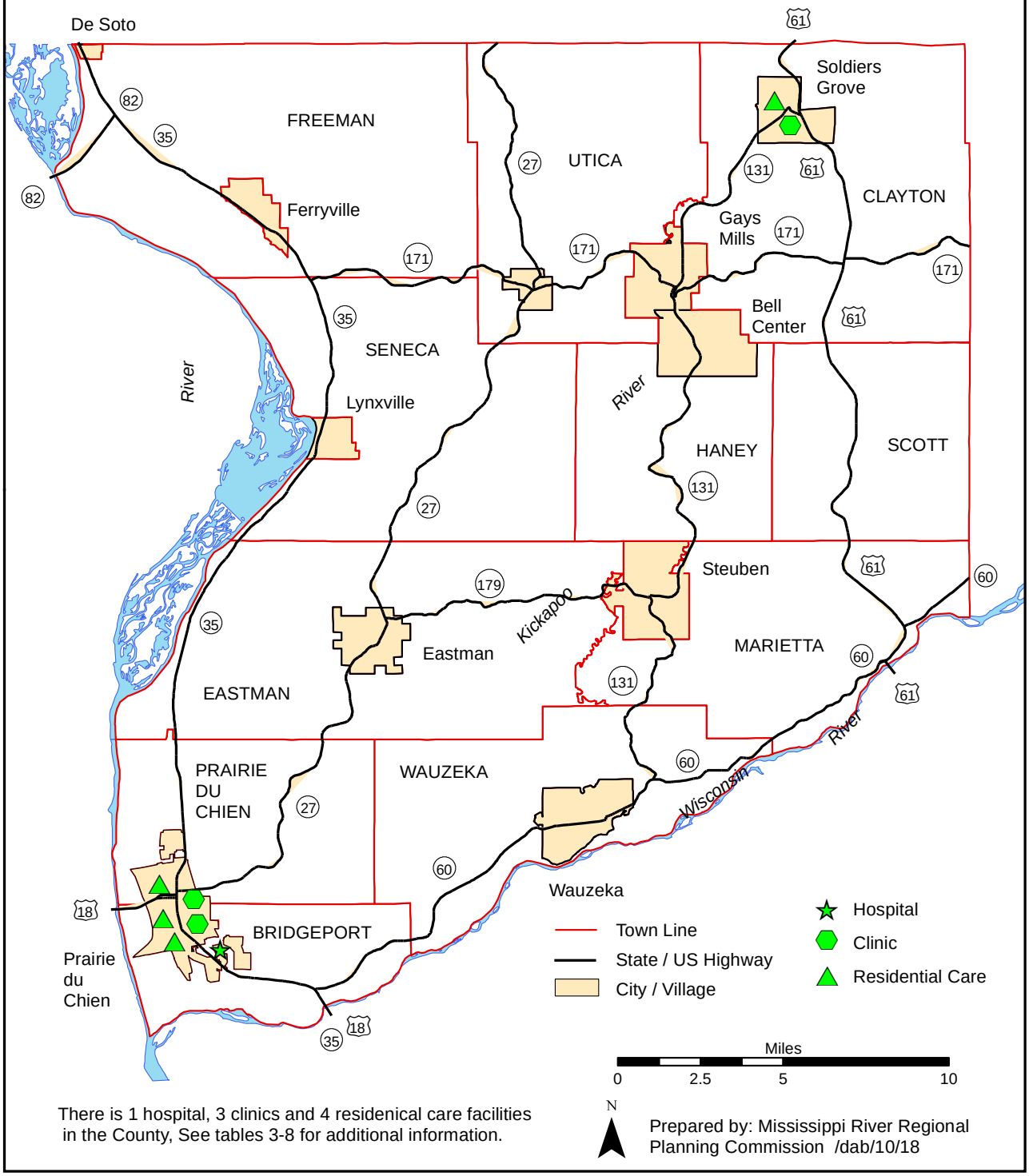
Map 3-1
Crawford County Critical Facilities
Government, Military, Wastewater Treatment Facilities and Wells



There are 10 Village Halls, 1 City Hall,3 County Buildings,1 armory, 12 wells and 8 Wastewater Treatment Facilities in the County, See tables 3-7, 3-11 and 3-12 for additional information.

Prepared by: Mississippi River Regional Planning Commission /dab/10/18

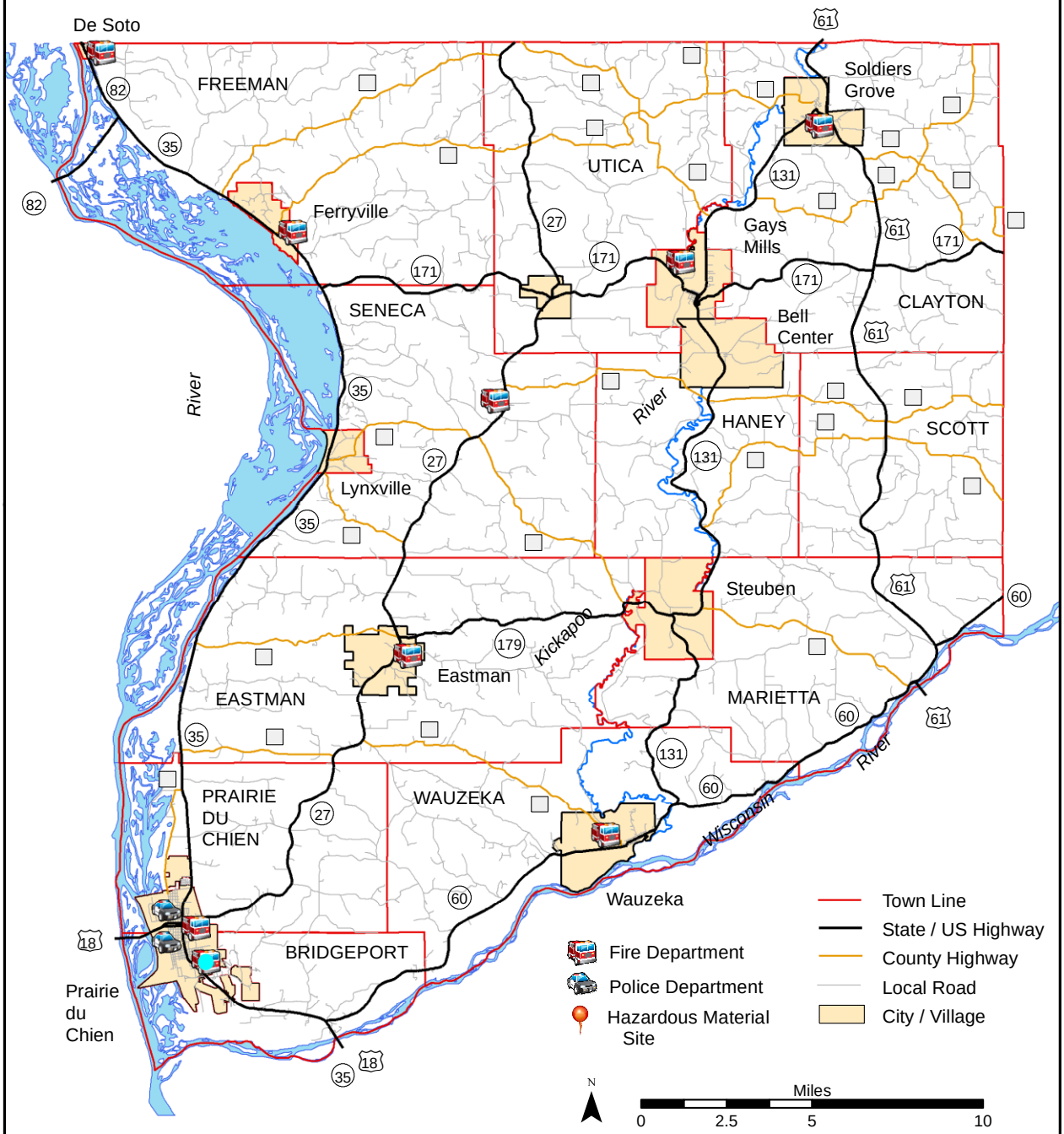
Map 3-2
Crawford County Critical Facilities
Hospitals, Clinics and Residential Care



There is 1 hospital, 3 clinics and 4 residenical care facilities in the County, See tables 3-8 for additional information.

Prepared by: Mississippi River Regional Planning Commission /dab/10/18

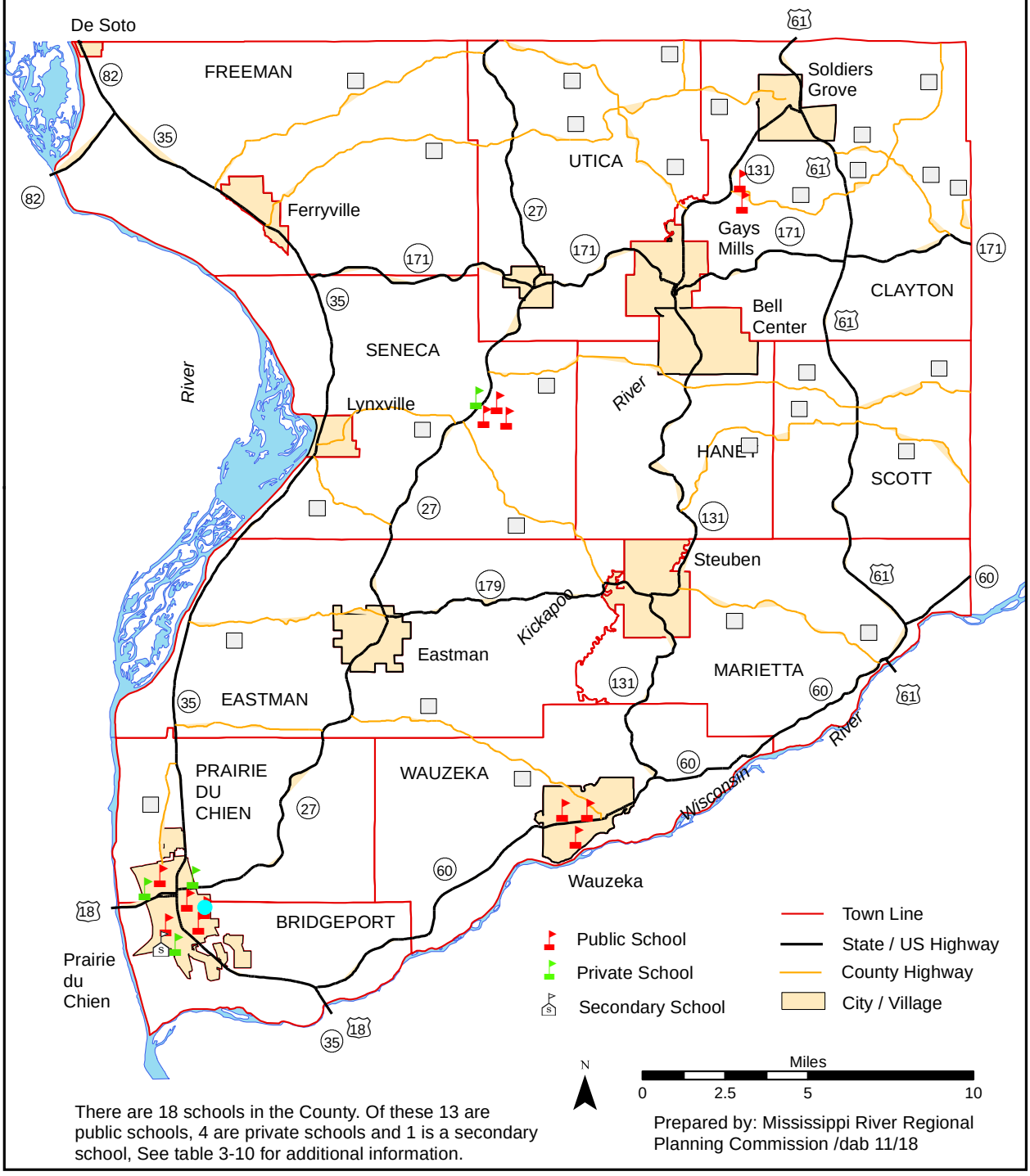
Map 3-3
Crawford County Critical Facilities
Police Dept, Fire Dept. and Hazardous Material Sites



There are 28 hazardous material sites, 9 fire departments and 2 police departments in the County, See tables 3-9 and 3-13 for additional information.

Prepared By: Mississippi River Regional Planning Commission /dab 10/18

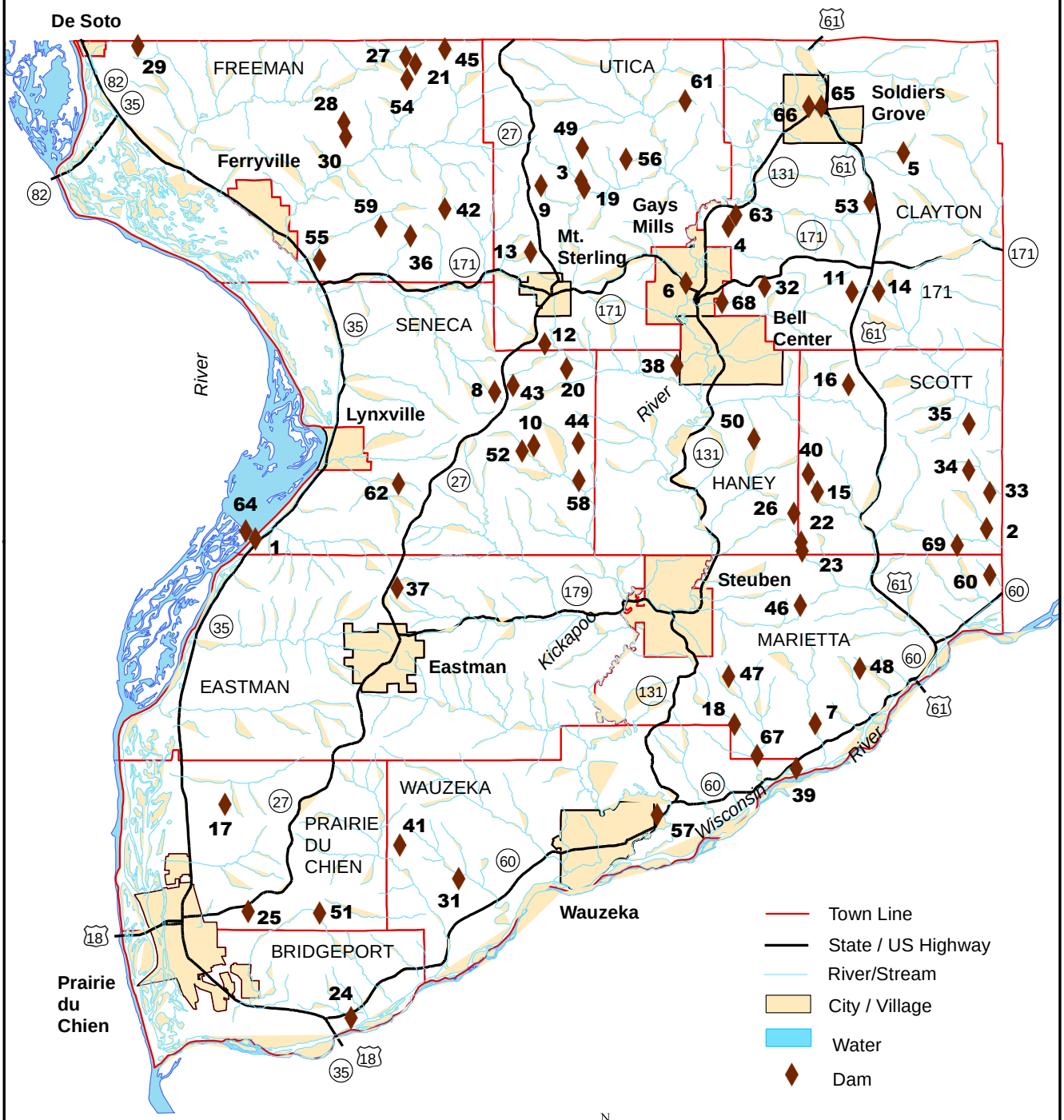
Map 3-4
Crawford County Critical Facilities
Schools



There are 18 schools in the County. Of these 13 are public schools, 4 are private schools and 1 is a secondary school, See table 3-10 for additional information.

Prepared by: Mississippi River Regional Planning Commission /dab 11/18

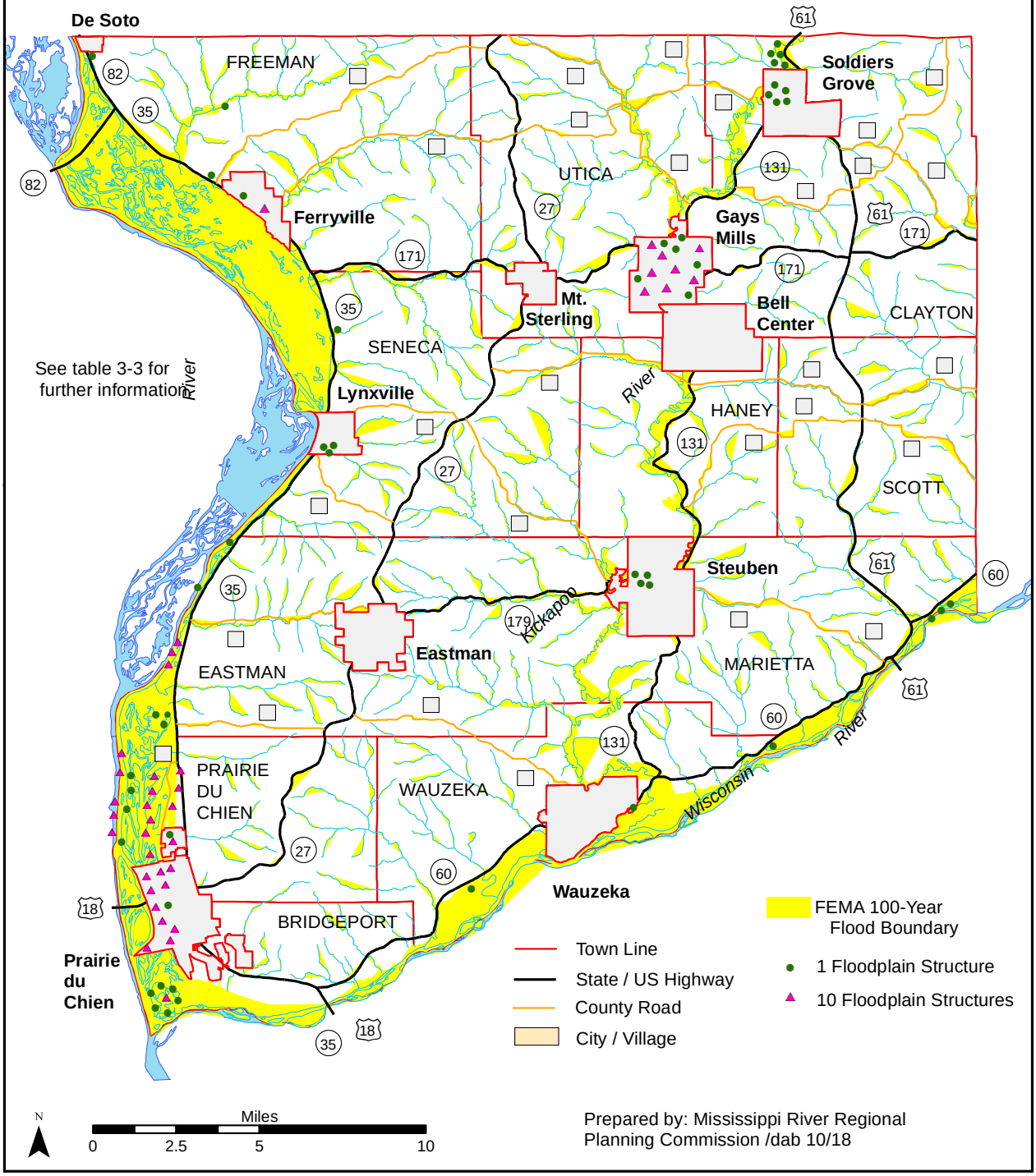
Map 3-5
Crawford County Critical Facilities
Dams



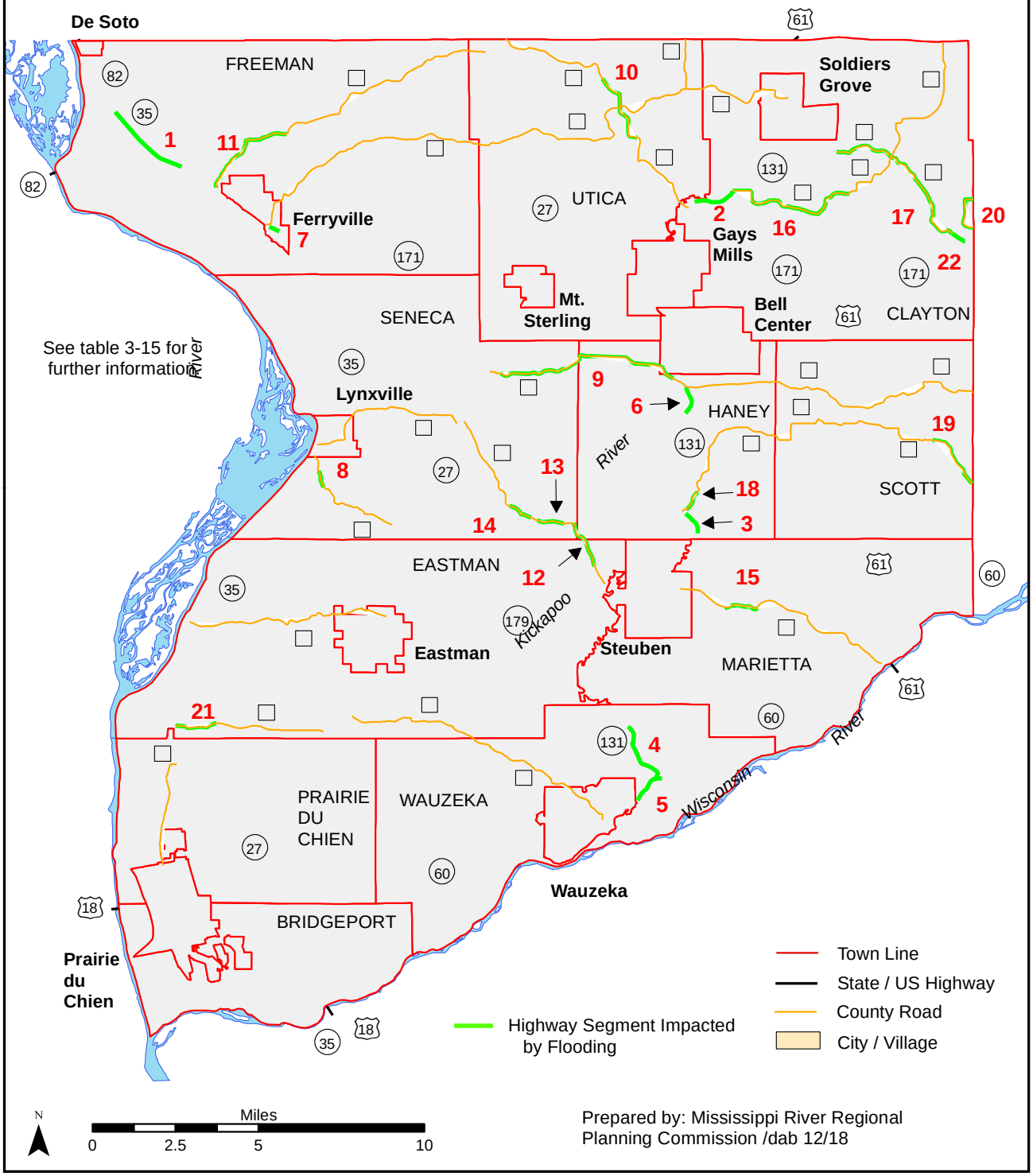
See Table 3-14 for further information on dams.

Produced by: Mississippi River Regional Planning Commission 4/17

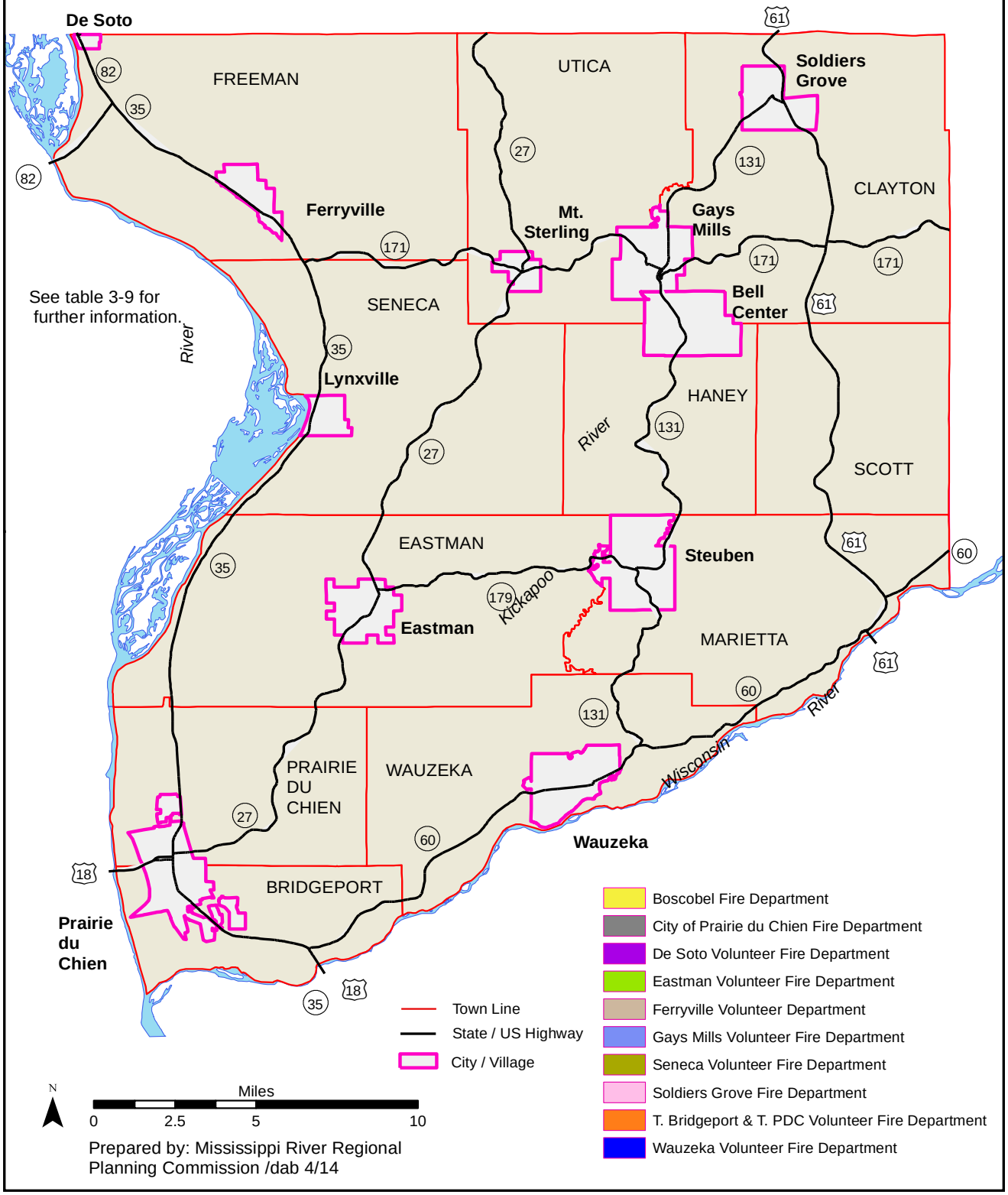
Map 3-6
Crawford County Structures with the FEMA 100-Year Flood Boundary



Map 3-7
Crawford County State and County Trunk Highways Impacted By Flooding



Map 3-8
Crawford County Fire Department Boundaries



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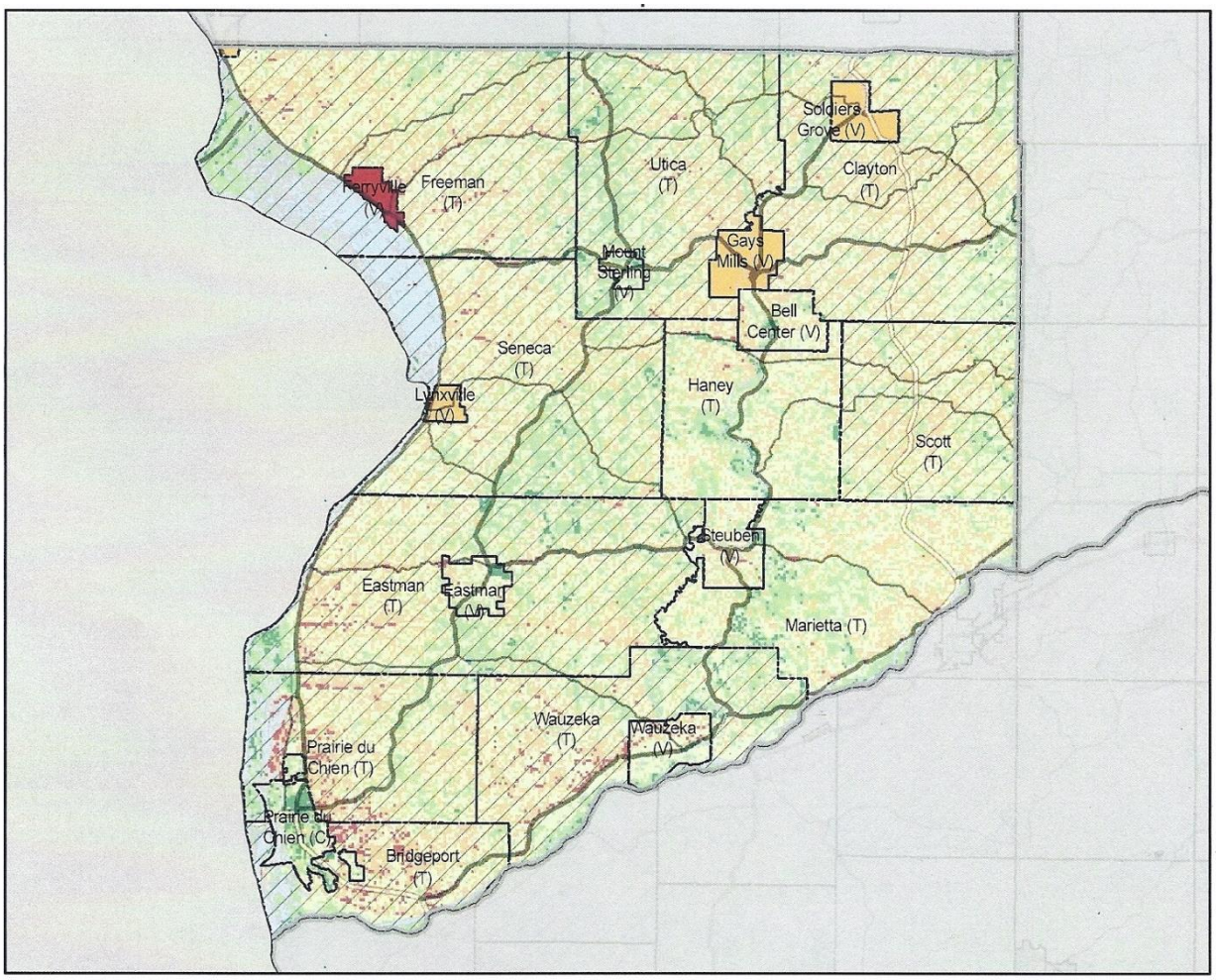
Map 3-9
Crawford County Communities At Risk For Wild Fires



Communities-at-Risk

MCD Name	Hazard (40%)	Risk (30%)	WUI (30%)
Ferryville (V)	M	VH	VH
Gays Mills (V)	M	VH	H
Lynxville (V)	M	H	VH
Soldiers Grove (V)	L	VH	H

1:340,494

Communities-of-Concern

Bridgeport (T)	Seneca (T)
Clayton (T)	Wauzeka (T)
Eastman (T)	Utica (T)
Freeman (T)	
Prairie du Chien (T)	
Scott (T)	

Community-of-Concern
Communities-at-Risk, Very High
Communities-at-Risk, High

Division of Forestry, September 2008

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4.0 CRAWFORD COUNTY MULTI-HAZARDS MITIGATION PLAN STRATEGIES

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.

The following is a list of projects and actions by local governments or organizations that are designed to achieve this goal that collectively serve as an overall strategy for hazard mitigation. These goals, 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 Crawford County Multi-Hazards Mitigation Plan 2012 - 2016 have been carried over or deferred to this plan.

The Crawford County Emergency Director will be the lead person for all jurisdictions regarding hazard mitigation projects as no other jurisdiction has a dedicated Emergency Management department. The County along with all Villages and Cities have the authority to enact and enforce zoning ordinances, are their own taxing authority, have their own comprehensive plan and maintain their own annual budget. The County along with all jurisdictions within the county are members in the Mississippi River Regional Planning Commission and are eligible for planning assistance from that organization.

CRAWFORD COUNTY SPECIFIC HAZARD GOALS, ACTIONS AND PROJECTS

The following is a list of goals Crawford County has developed for the various hazards

Table 4-1
Crawford County Hazard Mitigation Goals

Hazard	Goal
Flooding, Stormwater Drainage, and Dams	*Protect the health and safety of residents and property in high water events by improving infrastructure and warning and communication systems.*
Hail, Lightning, Thunderstorm and Fog	*Inform residents on the dangers of hail, lightning, thunderstorm and fog hazards and take actions to improve warning and communications and reduce loses from these hazards.*
Tornadoes and High Winds	*Protect the health safety and welfare of residents and property by improving emergency communication systems and shelters.*
Extreme Cold and Heat Event Hazards	*Provide educational information to the public on the dangers of extreme heat and cold to reduce future loss of life.*
Forest and Wildland Fire Hazards	*Protect residents and property from forest and wild land fires.*
Heavy Snow and Ice Storms and Blizzard Hazards	*Inform the public about the threat of heavy snow and Ice storms and blizzards and take actions to improve warning and communications and reduce future losses from these hazards.*
Earthquake, Landslide and Subsidence Hazards	*Lessen the impact of earthquakes, landslides, and subsidence on persons and property.*

Agricultural and Drought Hazards	*Inform the public on the hazards associated with drought and provide information on methods to reduce water usage and minimize agricultural losses.*
Pandemic Flu Hazards	*Inform the public on the hazards associated with pandemic flu and provide information on methods to reduce future losses.*
Railroads	*Inform the public on the hazards associated with railroads and provide information on methods to reduce future losses.*
River Traffic / Cargo	*Inform the public on the hazards associated with river traffic / cargo that passes through Crawford County and provide information on methods to reduce future losses.*

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

Table 4-2
Crawford 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 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	Emergency Management Committee	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, relates to NFIP compliance
Work to reduce or eliminate repetitive loss or substantially damaged structures by undertaking the following: • The Zoning Administrator 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. • 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 Zoning Administrator	Biannually	Carried over from previous plan
Investigate the idea of promoting the National Flood Insurance Program through a community seminar where federal and state officials would be able to present the program and answer questions. Especially with the V. Wauzeka which is suspended from the program.	Existing County staff resources	Local Emergency Planning Committee	2019-2020	Carried over from previous plan, relates to NFIP compliance
Identify and upgrade/improve or replace existing culverts and bridges within the County that are causing flooding issues or concerns as funding becomes available.	Grants, County resources	Emergency Management Director & County Highway Dept.	Continual Program	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 quarterly on floodplain permit activity to the Local Emergency Planning Committee 3) The County Zoning Administrator shall administer, enforce and update the County's floodplain ordinances as prescribed by law.	Existing County staff resources	County Zoning Administrator	Continual Program	Carried over from previous plan, relates to NFIP compliance

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Work with the City of Prairie du Chien and the Towns of Prairie du Chien, Bridgeport and Eastman to investigate the development of a join flood warning and evacuation plan for Mississippi River property owners.	Existing County, City and Town resources. Approximately $20,000 to prepare plan.	Emergency Management Director to serve as lead coordinator.	2020-2022	Deferred, lack of money to complete plan.
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 Director and Zoning Administrator shall meet and report in a timely manner to the County Local Emergency Planning Committee on potential changes to the County's Multi-Hazard Mitigation Plan. The Local Emergency Planning Committee shall recommend reaffirmation, amendment or update (rewrite) of this plan to the County Board for action. This disaster assessment may be included in the annual review process discussed in the Plan Maintenance and Adoption section of this plan if doing so will not impair the response to the recent flood disaster.	Existing County staff resources	County Zoning Administrator, County Local Emergency Planning Committee, County Emergency Management Director	After each flood disaster	Carried over from previous plan
Investigate the development of a joint flood warning and evacuation plan on the Kickapoo River.	Existing County staff resources	County Emergency Management Director	2020-2022	Deferred, not budgeted for in County budget
Construct a longer bridge or bridges over the Kickapoo River so that the County is not cut in half during flooding events thus reducing the response time of first responders.	Grants	County Highway Commissioner	2019	New Project
Install automated river gages on the Kickapoo River and its major tributaries.	Existing County resources and grants. Approximately $15,000 per gauge if implemented	County Emergency Management Director	2019-2021	Deferred, not budgeted for in County budget
Continue annual inspection and maintenance of Blackhawk-Kickapoo Dam	Existing County staff resources	County Land Conservation Dept.	Annually	Carried over from previous plan
Update Kickapoo Watershed hydraulic study	Grants	County Land Conservation Dept.	As funding becomes available	New Project
Investigate the concept of floodplain mapping of the following rivers and streams: - Sugar Creek in the Towns of Utica & Freeman, (10 mile length) - Copper Creek in Towns of Utica & Seneca, (6.5 mile length) - Mill Coulee Creek in the Town of Prairie du Chien, (4.2 mile length) - Vine Yard Coulee Creek in the Towns of Prairie du Chien & Bridgeport, (5.2 mile length) Richland Creek in the Towns of Scott & Marietta, (5.5 mile length)	Grants $45,000-50,000 $30,000-35,000 $20,000-25,000 $24,000-31,000 $38,000-43,000	Land Conservation, Planning and Zoning Committee	2021-2022	Costs to map to NR116 Standards using field cross sections. Carried over from previous plan
Encourage Wisconsin Dept. of Transportation to work with the US Corp of Engineers to conduct a study on the effect of the surges of raising and fast lowering of the water elevation of the Mississippi River on the Lansing Dike and STH 82	Existing County Staff resources	County Highway Commissioner	2020	New Project
Purchase six to 10 portable message boards for deployment for road closures	Grants	County Highway Commissioner	2020	New Project
Develop additional sites to place pre-approved debris from flooding	Existing County Staff resources	County Highway Commissioner	2021	New Project
Investigate the concept of developing a county ordinance requiring A-5 abutments on new bridge replacements	Existing County Staff resources	County Highway Commissioner	2020	New Project
Elevate sections of State and County Highways in the Kickapoo Valley that are affected by flooding	Grants	County Highway Commissioner	As funding becomes available	New Project

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Research and develop a list of sites along the Kickapoo River where the removal of sedimentation will result in the greatest amount of flood protection.	Grants	Land Conservation, Planning and Zoning Committee	2021-2022	New Project
Hail, Lightning, Thunderstorm and Fog Hazard				
Encourage the burying of electrical lines	Existing County staff resources	Local Emergency Planning Committee	Continual Program	Carried over from previous plan
Encourage the burying of telecommunication lines	Existing County staff resources	Local Emergency Planning 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 Director	Annual Program	Carried over from previous plan
Tornadoes and High Winds				
Require anchoring on new mobile home residences, carports and porches.	Existing County staff resources	County Local Emergency Planning Committee	Continual Program	Carried over from previous plan
Encourage the burying of underground power, cable and telephone lines.	Existing County staff resources	County Local Emergency Planning Committee	Continual Program	Carried over from previous plan
Encourage the use of interlocked roofing shingles.	Existing County staff resources	County Local Emergency Planning 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 County staff resources	County Local Emergency Planning 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 County staff resources	County Local Emergency Planning Committee	Continual Program	Carried over from previous plan
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 population that are more vulnerable to extreme temperature events, such as the low income, elderly, and sick and Biannually update this list.	Existing County staff resources	County Emergency Management Director and the County Local Emergency Planning Committee	Continual Program	Completed
Update the list of identified buildings to be used as shelters	Existing County staff resources	County Emergency Management Director and the County Local Emergency Planning Committee	Continual Program	Carried over from previous plan
Continue support of the Salvation Army and similar programs	Existing County staff resources	County Emergency Management Director and the County Local Emergency Planning Committee	Continual Program	New Project
Investigate developing a program that provides fans to the elderly in times of extreme heat	Existing County staff resources	County Emergency Management Director and the County Local Emergency Planning Committee	Continual Program	New Project

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Forest and Wildland Fire				
Promote and maintain cooperative fire agreements with area fire departments and the Department of Natural Resources as necessary.	Existing County staff resources	County Emergency Management Director	Continual Program	Carried over from previous plan
Develop Community Wildfire Protection Plans	Existing County staff resources and grants	County Emergency Management Director	2020-2023	New Projects
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 Director	Annually	Carried over from previous plan
Investigate the concept of identifying 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 Highway Commissioner, Public Safety Committee and DOT	2019	Deferred
Investigate the concept of identifying locations in the County where improvements could be made to eliminate drifting by cutting embankment areas.	Existing County staff resources	County Highway Commissioner, Public Safety Committee and DOT	2019	Deferred
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 Highway Commissioner and Village Officials	2020-2022	Deferred due to prioritization of projects within Highway department
Additional Mapping: • Map and field-verify sinkholes and other direct conduits to groundwater • Map potential groundwater hazard points (manure lagoons, septics, etc) • Map recharge areas and groundwater flow patterns	Existing County staff resources and grants	Land Conservation	2021-2023	New Project
Develop a plan to educate landowners on the Natural Resources Conservation Service Conservation Practice Standard for Karst Sinkhole Treatment (Code 527) for farms and other lands containing sinkholes	Existing County staff resources and grants	Land Conservation	2021	New Project
Study sinkhole-to-springs connections through dye tracing	Grants	Land Conservation	When funding can be obtained	New Project
Develop a plan to monitor drinking water quality in areas overlying carbonate bedrock, particularly in areas with high sinkhole concentrations, through coordinated and subsidized private well testing and data analysis.	Existing County staff resources and grants	Land Conservation	2022	New Project
Obtain depth to bedrock data beyond existing 168cm data	Grants	Land Conservation	When funding can be obtained	New Project
Agricultural and Drought				
Develop an education/information program that informs agricultural producers and residents about water conserving measures and crop insurance.	Existing County staff resources	NRCS and UW Extension in cooperation with City, Village and Village Officials	2019-2021	Deferred

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
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 Village of De Soto, Village of Ferryville, Village of Lynxville, Village of Wauzeka and City of Prairie du Chien	Existing County staff resources	County Emergency Management Director in cooperation with city and village officials		New Project
Additional training for emergency responders	Grants and BNSF	County Emergency Management Director 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 Director and the County Administrator		New Project
Develop a sheltering plan	Existing County staff resources	County Emergency Management Director		New Project
Purchase electronic highway signs for detours and road closures	Grants	County Highway Dept.		New Project
Develop an Emergency Alert system for notification of County residents during emergencies	Existing County staff resources	County Administrator		New Project
Update Emergency Operations Center – update staff and equipment, obtaining additional training	HMP grants	County Emergency Management Director		New Project
~~Purchase a drone – to be used to access derailment site without jeopardizing humans, also can be used to get aerial views of accident site~~	~~Grants~~	~~County Emergency Management Director~~		Completed
River Traffic				
Improve communications between County and US Army Corp of Engineers	Existing County staff resources	County Emergency Management Director and Lock Masters	2019-2020	New Project

Mitigation Projects for Municipalities

The following is a list of Multi-Hazard Mitigation Actions and Projects to be implemented by each City, Village and Town within Crawford County.

Table 4-3
Crawford 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 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 Director to serve as coordinator	Continual	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 Director. The County Emergency Management Director 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 Director	Biannually	Carried over from previous plan
In conjunction with the County investigate the idea of promoting the National Flood Insurance Program through a community seminar where federal and state officials would be able to present the program and answer questions.	Existing Village, City and County staff resources	Village or City Board or designee and the County Emergency Management Director	2019-2021	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
Identify and upgrade/improve or replace existing culverts and bridges that are causing flooding issues or concerns as funding becomes available		Individual municipal boards in conjunction with the Emergency Management Director and County Highway Department	Continual Program	Carried over from previous plan

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 the Village/City Clerk or designee shall meet and report in a timely manner to the Village/City Board on potential changes to the Village's portion of the Crawford County Multi-Hazard Mitigation Plan. The Village Board shall recommend to reaffirm, amend or update (rewrite) this plan to the County Emergency Management Coordinator and the Emergency Management 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 and County staff resources	Village Clerk or designee, Village Board, Emergency Management Coordinator, Emergency Management 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 Emergency Management 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 Emergency Management 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 Director 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 Emergency Management 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 Emergency Management 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 Emergency Management 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 Emergency Management 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 Emergency Management Committee	Continual Program	Carried over from previous plan

Mitigation Action or Project	Funding Source(s)	Responsible Official or Organization	Project Timetable	Comments
Purchase NOAA All Hazards radios		Individual municipal Boards in conjunction with the County Local Emergency Planning Committee	Continual Program	New Project
Extreme Cold and Heat Event				
Update existing list 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 Director will coordinate with each municipal board or their designee	Continual Program	Carried over from previous plan
Forest and Wildland Fire				
Promote and 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 Director coordinating 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 Highway Commissioner, Public Safety Committee along with City, Town and Village Clerks	2019	Deferred from previous plan, project was not budgeted for in either Highway or Emergency Management department
Identify areas where improvements could be made to eliminate drifting by cutting embankment areas.	Existing County staff resources along with City, Town and Village staff and resources	County Highway Commissioner, Public Safety Committee along with City, Town and Village Clerks	2019	New Project
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	2020-2022	Deferred due to prioritization of projects within Highway department
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	2019-2021	Deferred

Individual Municipal Projects

The following is a list of Multi-Hazard Mitigation Actions and Projects which individual municipalities have identified.

Table 4-4
Municipal Specific Hazard Mitigation Actions or Projects

Mitigation Action or Project	Responsible Official or Organization	Project Timetable	Comments
Flooding, Storm water Drainage, and Dam Hazards Actions and Projects			
Towns of Bridgeport, Eastman, Prairie du Chien – Work with the County to investigate the development of a join flood warning and evacuation plan for Mississippi River property owners.	Town Boards	2020-2022	Deferred, lack of money to complete plan.
Towns of Clayton, Haney, Marietta, Eastman, Wauzeka and the Villages of Soldiers Grove, Gays Mills, Bell Center, Steuben and Wauzeka – In conjunction with the County investigate the development of a joint flood warning and evacuation plan for residents along the Kickapoo River.	Town and Village Boards	2020-2022	Deferred, lack of money to complete plan.
Towns of Bridgeport – Vineyard Road project.	Town Board	As funding becomes available	New project.
Town of Eastman – Drainage channel improvement along Walker Road adjacent to Kickapoo River	Town Board	As funding becomes available	Deferred, lack of money to complete plan.
Town of Eastman – DuCharme Ridge Hill from Cty D to top of hill – culvert replacement/drainage channel improvement	Town Chairman	As funding becomes available	Deferred, lack of money to complete plan.
Town of Eastman – Shanghai Ridge (Haddock Hill) – drainage channel improvement	Town Chairman	As funding becomes available	Deferred, lack of money to complete plan.
Town of Eastman – Morovitz Hollow Road from Valentine Lane to State Hwy 179 – drainage channel improvement	Town Chairman	As funding becomes available	Deferred, lack of money to complete plan.
Town of Eastman – Replace undersized, deficient bridge on Plum Creek Road	Town Chairman	As funding becomes available	Deferred, lack of money to complete plan.
Town of Eastman – Plum Creek Rd – drainage channel improvement	Town Chairman	As funding becomes available	Deferred, lack of money to complete plan.
Town of Freeman – Install two large culverts on White Road and County Highway C, and widen ditch on White Road for ½ mile	Town Chairman	As funding becomes available	Deferred, estimated cost $50,000
Town of Haney – Install large drain tube on Newby Hollow Road	Town Chairman	As funding becomes available	New project
Town of Marietta – Replace undersized bridge and pave approaches on Clear Creek Road. This bridge crosses Clear Creek 1.6 miles northeast of Hwy 60 on Clear Creek Rd.	Town Board and County Highway Commissioner	As funding becomes available	Deferred, estimated cost $140,000
Town of Prairie du Chien – Survey floodplain property owners to investigate the possibility of providing public sewer service along County Highway K and the Ambro area	Village Board	Once every 5 years	Deferred
Village of De Soto – Culvert and asphalt replacement on Treadwell St.	Maintenance Dept.	As funding becomes available	Deferred Estimated Cost $10,000
Village of Ferryville – Purchase John Doe property in the flood fringe next to the Tower Buy Out site.	Village Board	As funding becomes available	Deferred Estimated cost $50,000

Village of Gays Mills – Develop list of equipment required to evacuate residents and purchase that equipment	Village Board	As funding becomes available	Deferred from previous plan
Village of Gays Mills – Repair di in the road (STH 171) near dam	Village Board	As funding becomes available	Deferred from previous plan
Village of Gays Mills – Identify, aquire and remove abandoned buildings located in the floodplain	Village Board	As funding becomes available	Deferred from previous plan
Village of Gays Mills – Install a web camera on the Village website which would show the Kickapoo river level upstream of the Village	Village Board	As funding becomes available	Deferred from previous plan
Village of Gays Mills – Install a severe weather/flooding notification system	Village Board	As funding becomes available	Deferred from previous plan
Village of Gays Mills – Develop and distribute an information packet/flyer which will inform residents what to do before, during and after a flooding event	Village Board	As funding becomes available	Deferred from previous plan
Village of Gays Mills – Backup generator for the Kickapoo Valley Medical Clinic	Clinic Board	As funding becomes available	New Project
Village of Wauzeka – Install stormwater detention pond by CTH N northeast of Rosemary St.	Village Board	As funding becomes available	Deferred from previous plan
City of Prairie du Chien – Acquisition of the WQPC radio station property located on St. Feriole Island. Demolish the existing building and assist in the relocation of the radio station	City Council	As funding becomes available	Deferred from previous plan
~~**City of Prairie du Chien –** Install storm sewer on E. Fowler St cul du sac~~	~~Street Superintendent~~	~~2004~~	Completed
~~**City of Prairie du Chien** – Install storm sewer on E. Fowler St.~~	~~Street Superintendent~~	~~2004~~	Completed
~~**City of Prairie du Chien** – Improve alley west of Marquette Rd.~~	~~Street Superintendent~~	~~2004~~	Completed
~~**City of Prairie du Chien –** Upgrade storm water system~~	~~Street Superintendent~~	~~2004~~	Completed
~~**City of Prairie du Chien** – Create storm water utility to better maintain and fund the storm water system~~	~~Street Superintendent~~	~~2004~~	Completed
~~**City of Prairie du Chien –** Upgrade floodplain maps and create detailed aerials of the city~~	~~Street Superintendent~~	~~2004~~	Completed
~~**City of Prairie du Chien** – Map city storm sewers and investigate flood water impacts in the area~~	~~Street Superintendent~~	~~2004~~	Completed
Hail, Lightning, Thunderstorm and Fog Hazard			
Village of Ferryville – Establish early warning siren for boaters on Lake Winneshiek/Mississippi River	Village Board	As funding becomes available	Deferred from previous plan, estimated cost $20,000
Village of Ferryville – Purchase communication equipment for fire department/first responders	Village Board	As funding becomes available	Deferred from previous plan
City of Prairie du Chien – Traffic paint improvement to improve visibility	Street Superintendent	2019	Deferred from previous plan
City of Prairie du Chien – Sign replacement to improve sign visibility	Street Superintendent	Continual	Deferred from previous plan
Tornadoes and High Winds			
City of Prairie du Chien – Construct safe rooms in various locations within the city	City Council	As funding becomes available	Deferred from previous plan
Village of Soldiers Grove – purchase a storm siren	Village Board	As funding becomes available	New project

Extreme Cold and Heat Event			
Forest and Wildland Fire			
Village of Ferryville – Create fire breaks – Eagle Mountain development	Village Board	As funding becomes available	Deferred from previous plan
Village of Ferryville – Continue to promote removal of vegetation from around homes	Village Board	Continual	New project
Heavy Snow and Ice Storms and Blizzard			
Town of Eastman – Shangai Ridge, Wall Ridge, DuCharme Ridge, Swatek Ridge – cut back slopes to allow the snow to blow across the roadway instead of piling up.k,	Town Chairman	As funding becomes available	Deferred from previous plan
Village of Ferryville – Purchase heavy duty truck and plow and ice removal equipment	Town Board	As funding becomes available	Deferred from previous plan
~~**City of Prairie du Chien –** Purchase 4X4 pickup/sander to ensure timely snow/ice removal~~	~~Street superintendent~~		Completed
~~**City of Prairie du Chien –** Purchase trackless vehicles~~	~~Street superintendent~~		Completed
~~**City of Prairie du Chien** – Purchase 2 international dump trucks/plows/sanders to ensure timely snow/ice removal~~	~~Street superintendent~~		Completed
Earthquake, Landslide and Subsidence			
~~**City of Prairie du Chien** – Erosion control and road improvements at reservoir~~	Water Superintendent		Completed
Agricultural and Drought			
Train Derailment			
Village of Ferryville – Increase contact with State and Federal agencies regarding what is moving on rails and possible training	Town Board	Continual	New project
River Traffic			

Crawford County Plan Maintenance and Adoption Action Plan

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

TABLE 4-5
Crawford 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 Director	Annually	See Chapter 5
Post disaster Multi-Hazard Mitigation Plan review and comment period for plan stakeholders	Existing County staff resources	County Emergency Management Director 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 Director 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 Director in cooperation with County, City, Village and Town Officials	After plan modification	See Chapter 5

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5.0 CRAWFORD 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 Director should review the contents of the plan for its applicability each year during the 3rd quarter and report to the County Public Safety Committee and the County Land Conservation, Planning and Zoning Committee on the progress made pertaining to goals, projects and actions contained in the plan. Prior to the end of each calendar year, the Land Conservation, Planning and Zoning Committee and Public Safety 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 County Public Safety Committee and the County Land Conservation, Planning and Zoning 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; 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 have outcomes happened as expected. 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 Director'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. The Disaster Mitigation Act of 2000 requires that this plan be evaluated and updated at least every five years to remain eligible for hazard mitigation grant assistance. The Emergency Management Director will be responsible for updating the plan.

Plan Coordination

Upon adoption of the plan by the County and other participating local units of government the County Emergency Management Director 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 incorporated very well into other planning activities. The plan was used during land use planning by a few but not all municipalities. To ensure that this updated plan will be incorporated into planning activities with the county, the County Emergency Management Director 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 Director 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 an explanation of the plans mitigation projects and 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 Bell Center, De Soto, Eastman, Ferryville, Gays Mills, Lynxville, Mt. Sterling, Prairie du Chien, Soldiers Grove, Steuben and Wauzeka 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 budges to commit funding. In addition, Crawford 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 2012-2016 Plan	Adopted 2019-2023 Plan
Crawford County	☒	☐
Town of Bridgeport	☒	☐
Town of Clayton	☒	☐
Town of Eastman	☒	☐
Town of Freeman	☒	☐
Town of Haney	☒	☐
Town of Marietta	☒	☐
Town of Prairie du Chien	☒	☐
Town of Scott	☒	☐
Town of Seneca	☒	☐
Town of Utica	☒	☐
Town of Wauzeka	☒	☐
Village of Bell Center	☒	☐
Village of De Soto	☒	☐
Village of Eastman	☒	☐
Village of Ferryville	☒	☐
Village of Gays Mills	☒	☐
Village of Lynxville	☒	☐
Village of Mt. Sterling	☒	☐
Village of Soldiers Grove	☒	☐
Village of Steuben	☒	☐
Village of Wauzeka	☒	☐
City of Prairie du Chien	☒	☐

APPENDIX A

RISK ASSESSMENT SURVEY

CRAWFORD COUNTY 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 natural 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 over the next five years Lighting Storms will probably have a medium harmful affect on your community in comparison to the other hazards listed. The five year period was chosen because that is how often Crawford County must update their All Hazards Mitigation Plan. This survey is one of the methods Crawford 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 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 over the next five years 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 over the next five years 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 over the next five years in comparison to the other hazards listed in column one.
Hail Storms			
Lightning Storms			
Thunderstorms			
Tornado/High Winds			
Flash Flooding			
Riverine Flooding			
Lake Flooding			
Stormwater Flooding			
Dam Failure Flooding			
Forest Fires			
Wildland Fires			
Coastal Hazards			
Heavy Snow Storm			
Ice Storm			
Blizzard			
Extreme Cold			
Earthquake			
Extreme Heat			
Agricultural			
Drought			
Fog			
Landslide			
Subsidence			
Pandemic Flu			
Railroads			
River Traffic / Cargo			

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 Jim Hackett 220 North Beaumont Rd Prairie Du Chien, WI 53821 by May 15, 2016.

APPENDIX B

HAZARD MITIGATION PROJECTS SURVEY

CRAWFORD COUNTY MULTI-HAZARDS MITIGATION PROJECT NEED SURVEY

Crawford County is updating the Crawford County Multi-Hazards Mitigation Plan 2012-2016. A key part of this plan is the identification of policies, programs and projects from throughout the county that will reduce losses from future natural hazards. 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 hazard mitigation projects you would like to undertake? If so, describe below. (Identify nutrition program adaptions 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 into the household. Develop guidance for appropriate use of community resource, such as home healthcare services, telephone care, the 9-1-1 emergency telephone system emergency medical services, and triage services (nurse-advise line, 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 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.			

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.			

Thank you for completing the survey. Please return it by May 31, 2016 Jim Hackett, Director Crawford County Emergency Management, 224 North Beaumont St, Prairie du Chien, WI 53821, Telephone: 608-326-0266 or fax to Dave Bonifas at 608-785-9394.